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Religious and Socioeconomic Diversity of Ancient Jerusalem and its Hinterland during the 8th-2nd centuries BCE: A View from the Faunal Remains

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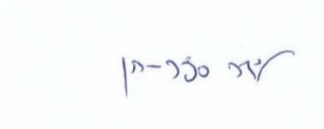

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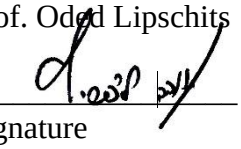

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Dedication

In memory of my grandfather

Stanley 'Papa' Rosenbaum

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Abstract

The site of Jerusalem is one of the most excavated, yet contentious, sites in the Ancient Near East. The rise and fall of Jerusalem's political, cultic, and economic status in the Iron Age II through Hellenistic periods (9th–2nd centuries BCE) allows for a unique perspective into the urban development of a Levantine site in the first millennium BCE. Through the zooarchaeological analysis of faunal remains, this dissertation aims at understanding the socioeconomic and religious status of Jerusalem, the economic relationship between Jerusalem and its hinterland, and the development of the food and sacrificial laws in the Hebrew Bible.

Faunal remains, or animal bones, found in archaeological contexts are studied to decern patterns in a site's animal economy and subsistence strategies. Animal remains are regularly interpreted as leftovers from meals and refuse from other animal activities. The role animals played in society is vast. Further, what and how people consume food reflects the ideological aspects of societies. Therefore, the theoretical framework of this research is based on the paradigms of Social Zooarchaeology. This research will explore how human decisions in the exploitation of animals were affected by geopolitical events, environmental and climatic fluctuations, and sociocultural developments.

Jerusalem serves as a prime location for study, as it is the location for the national cult described in the biblical texts. Further is represents a hypothetical location for the biblical authors, editors, and priestly class. Faunal remains collected for this research derive from sites in the core of ancient Jerusalem and its periphery. Sites selected for study from Jerusalem include Area D3, along the eastern cliffs of the Southeastern Ridge, and Area's M2, M4, and M5 located in the Givati Parking Excavations in the Tyropeon Valley. Sites from Jerusalem's hinterland

include Nebi Samuel, Khirbet er-Ras, and Beit HaKerem. These sites, paired with previously published remains, allow for a complete diachronic view of Jerusalem animal economy from the 8th through the 2nd centuries BCE.

The *longue durée* of Jerusalem's economic development indicate a continuity of an urban settlement with a stratified society that goes beyond rich and poor, elite and non-elite. The intricate urban economy present in the Iron Age IIB of Jerusalem continues well into the Iron Age IIC. Consumption patterns throughout the enigmatic Babylonian, Persian, and Early Hellenistic periods suggest continuity in subsistence strategies and import of non-endemic species, such as sea bream and catfish. The homogenous nature of Jerusalem's animal economy throughout its history is the social reality of priests, elites, craftspeople, and other specialists sharing neighborhoods and consuming in similar manners, with those residing in the city directly benefiting from the national cult.

Classification of Jerusalem as consumers and its hinterland as producers is reassessed in this study. Archaeological faunal assemblages from Jerusalem's hinterland are representative of smaller and larger sites that each had different functions, with some sites as agropastoral producers and others as administrative sites. The presence of cultic activities in the hinterland and their respective subsistence strategies reinforce the narrative of the hinterland, providing for the national cult in Jerusalem. Through the understanding of subsistence patterns of livestock producers, craft producers, and consumers present within the zooarchaeological material aids in the reassessment of the sociocultural and socioeconomic reality of Jerusalem and its rural hinterland. Any reassessment of Jerusalem in the Iron Age II through Hellenistic periods requires placing the site within the global worldview, and the application of historical and textual evidence. A holistic approach to the study of faunal remains from Jerusalem and its hinterland

provides a new understanding of the exploitation of fish and birds in ancient animal economies. Conclusions of this research, in light of historical and textual data paired with the faunal remains, indicate Jerusalem's animal economy was a sacrificial economy that relied on local craft producers and its hinterland for goods and services.

Chapter One: Introduction and Research Objectives

Jerusalem is one of the most excavated sites in the world. Jerusalem's alternating political, economic, and cultic position, in the Iron Age II through Hellenistic periods (9th–2nd centuries BCE), is well known from biblical texts but still largely enigmatic from the archaeological remains. Recent excavations of the ancient city, as well as its neighboring countryside, have allowed for more detailed and complex questions to be approached.

Jerusalem serves as a prime location for study, through its description as a major cultic and capital city in the biblical texts, and as it was the probable hub for (some or even most of) the biblical authors and editors. The following research focuses on three major themes, by studying animal remains from sites dated to the 8th through 2nd centuries BCE: the socioeconomic and religious status of Jerusalem, the economic relationship between Jerusalem and its hinterland, and the development of the sumptuary and sacrificial laws in the Hebrew Bible.

Animal economy, in general, develops and changes over time in response to social changes and environmental conditions. Animal bones, or faunal remains, found in archaeological contexts are typically studied to understand the animal economy and subsistence strategies of ancient settlements. Within the parameters of the growing sub-field of social zooarchaeology, faunal remains can also help to shed light on the socio-cultural aspects of an area (deFrance 2009; Russell 2011). In the last few years, faunal remains have been collected from almost every major excavation in Jerusalem, and several assemblages were published (see Section 2.1.5). These publications, paired with material analyzed as part of this research, allow for a comprehensive study of Jerusalem's socioeconomic status and the city's relationship with its

neighboring environs.

Application of taphonomic and zooarchaeological analysis of faunal remains from Jerusalem also allows for the food laws dictated in the Hebrew Bible (e.g., Deuteronomy. 14 and Leviticus 11) to be examined. Faunal remains from the subsequent Early Roman period (63 BCE – 70 CE) suggest that the population of Jerusalem was observing some of the biblical food laws (Bar-Oz et al. 2007; Bouchnick 2011; Spiciarich et al. 2017); leading this research to reassess the development and introduction of the biblical food laws into Jerusalem's society during the periods before and after their composition. The diachronic approach of studying Jerusalem and its hinterland, during the mid-late Iron Age II through Hellenistic periods (8th–2nd centuries BCE), warrants further exploration into the development and incorporation of these food laws into Judahite and later Judean culture.

1.1 Research Objectives

This dissertation is concerned with human-animal relations in the context of urban and rural spheres of Jerusalem in the 8th through the 2nd centuries BCE. Scholars have devoted much effort to publishing individual case studies or faunal site reports (see Section 2.1.5). A general investigation into the larger realm of how human-animal relations developed and changed within Jerusalem and between Jerusalem and its periphery, therefore the core of this research, pushes scholarship to have a broader, more complete view of Jerusalem's human-animal relationship. The faunal remains from sites located within Jerusalem and, in its periphery, are assessed from the lens of economic, religious/cultic, and social factors that possibly affected the use of animals. In pursuit of this objective, three main questions will guide the zooarchaeological analysis of mammalian, avian, and, in some cases, ichthyological remains:

1. How did the animal economy of Jerusalem develop in the 8th through the 2nd centuries

BCE? Further, how did the animal economy vary between neighborhoods?

2. What was the animal economy of Jerusalem's hinterland, and how did this rural sphere interact with its neighboring urban sphere?

3. How were animals used concerning the Jerusalem cult, and further is there evidence for the food laws described in the biblical texts?

1.2 Zooarchaeological Research

Davis (1983) defined zooarchaeology (or archaeozoology) as the study of garbage of ancient meals, and thus more formally as the analysis and interpretation of animal remains from archaeological contexts. From this perspective, he argues that garbage is as much a culturally constructed context as any other. This argument is logical as the majority of zooarchaeological studies focus on the leftovers and, as such, the garbage of ancient meals. Studying the faunal remains collected from excavations throughout Jerusalem, and its hinterland follows the theory that they represent culturally constructed refuse of consumption and animal use activities. There is no single theoretical framework for zooarchaeology, or more broadly the archaeology of food, instead includes several theoretical perspectives commonly conglomerated under the broad umbrella of post-processualism: practice theory (Franklin 2001; McKee 1999; Smith 2003), engendered theory, Marxist/Neo-Marxist theory (Genz 2003, Thomas 2007), and phenomenology (Twiss 2012).

Going beyond the post-processual origins of zooarchaeology, the crux of zooarchaeological research is the human need for constant nutritional and caloric intake that renders food cognitively prominent and physically necessary. As a result, the exploitation of animals for food is useful in interpreting culturally specific social structures (Dietler 2007; Twiss 2008; 2012). Zooarchaeological research can also explain more than just past consumption

habits. Animal remains are also useful in the production of textiles, leathers, and bone tools, as well as the cultic practices of divination, modes of transportation, and generally as a form of wealth. Identification of these practices, along with evidence of site-formation processes, is conducted through zooarchaeological and taphonomic methods (see, Section 4).

This research aims at broadening our understanding of the use and exploitation of animals. Previous studies of Jerusalem's animal economy have focused mainly on their role in agricultural production and as food (see Section 2.1.4). Animal use is present in all aspects of society, in many ways, shapes, and forms, and this research intends to explore the expansive role of animals in Jerusalem's society.

1.2.1 Social Zooarchaeology

In the introduction of Nerissa Russell's (2012: 7) seminal work *Social Zooarchaeology,* she defines the subfield of social zooarchaeology as "beyond protein and calories and even attrition." Social zooarchaeology combines tenants of archaeology, zoology, and anthropology to answer questions focused on animals in all aspects of society, ideally extrapolating further than just subsistence-based questions (*ibid*). Paradigms of social zooarchaeology follow the well-established anthropological principle that the value of things is based on several elements, such as capital input, labor input, utility, abundance versus scarcity, exchange rate, and social value, as well as political and cultic significance (Wiessner 2001: 117; Hastorf 2016: 153).

An example of this principle is that food is a particular, yet sensitive way, by which we as individuals, humans, and as a society are controlled and can be controlled by others or outside forces (Fitchen 1988; Weismante 1988; Hastorf 2016: 153). The modes and methods of this control can be as grand as environmental change and hegemonic taxation, or as minuscule as banditry or tithing. As such, food represents one of the best reflections of social, economic

status, and the tension between the two (*ibid*). This research will explore how human decisions in the exploitation of animals were affected by geopolitical events, environmental and climatic fluctuations, and socio-cultural developments.

Chapter Two: History of Research

2.1 Historical Jerusalem and its Hinterland

The expansion, prosperity, destruction, abandonment, resettlement, and renewed prosperity of Jerusalem, throughout the 8th through 2nd centuries BCE, most likely affected the usage and exploitation of animals. Exploitation patterns employed by the inhabitants of Jerusalem and the settlements in its neighboring hinterland should hypothetically reflect the demography and status of the city as a response to geopolitical and climatological events. Jerusalem's history is extensive and nuanced. Noted here a few key events that affected Jerusalem's population and the status during the periods between the 8th through 2nd centuries BCE that may have affected its animal economy. A list of key historical events that took place in the ancient Near East during the 8th through the 2nd centuries BCE can be found in Table 2.1.

2.1.1 Jerusalem and Judah in the Iron Age II (9th–6th centuries BCE)

The Iron Age II is typically divided into three sub-periods: Iron Age IIA, Iron Age IIB, and the Iron Age IIC, the latter of which is sometimes referred to as the Iron Age III– depending on the scholar. These periods each encapsulate eras of geopolitical unrest as well as represent a period of time referred to as 'the First Temple period.' Major trends of the Iron Age II are the conquests of the Neo-Assyrians and Neo-Babylonians and their subsequent ramifications. The historical reconstruction of Jerusalem in the Iron Age II is based primarily on the archaeological evidence as well as literary evidence from the Hebrew Bible.

2.1.1.1 Iron Age IIA (*940-800 BCE*)

Jerusalem, prior to the 9th century BCE, is one of the most longstanding debates in the history of the Levantine region. The reconstruction of Jerusalem in the 10th century BCE, Iron Age I – Iron

Age IIA transition, as a state or smaller political entity, has led scholars to reconstruct the 10th – 9th centuries BCE along or against biblical lines.[1] The archaeological reconstruction of Jerusalem in the Iron Age IIA is similar to other periods that have minimal or limited archaeological evidence, in which scholars attempt to draw concrete conclusions from limited evidence (Na'aman 1996; DeGroot 2012). These assumptions are based on what has not been found does not exists; thus, occupation of the site was likewise sparse (Knauf 2000; Finkelstein 2003a; Ussishkin 2003).

Beyond ceramic remains from fills, archaeological remains in Jerusalem dated to the 10th – 9th centuries BCE are a casemate wall, excavated by Kenyon (1974: 92, 114-115), and the Stepped Stone Structure in Area G, initially excavated by Shiloh (1984). The Stepped Stone Structure in Jerusalem is a monumental piece of architecture built possibly in the Iron Age IIA or earlier and was reconstructed throughout history to reinforce the eastern side of the Southeastern Ridge (Finkelstein 2011; Gadot and Uziel 2017). The exact dating of the Stepped Stone Structure, the Large Stone Structure, and additional buildings excavated by Mazar in Area G are debates beyond the scope of this research.[2] The monumentality of these structures has led to the proposal that Jerusalem in the 10th –9th centuries BCE was a political state, synonymous with the biblical descriptions of David and Solomon's Jerusalem (Mazar 2006; Mazar 2007; 2009; 2015a; 2015b).

[1] Jamieson-Drake 1991; Knauf 1991; Thompson 1992: 409-411; Davies 1992: 67-70; Lemche 1994: 183-184; Lemche and Thompson 1994; Cahill 1998; 2003; Faust 2004; 2007; Finkelstein 2003; 2010; 2015a; Finkelstein et al. 2007; Finkelstein and Piasetzky 2010; Geva 2014; Mazar 2006; Mazar 2007; 2009; Mazar and Ramsey 2008:178; Naʾaman 1996; 2012; 2013; Sergei 2013; 2015; 2017; Ussishkin 2003.

[2] *for debate see*, DeGroot 2012; Gadot and Uziel 2017; Faust 2010; Finkelstein 2011, Mazar 2006; Mazar 2008; 2015b; Sergi 2017; Steiner 1994

However, there is another theory that Jerusalem was partially abandoned after the decline of the Iron Age I (Knauf 2000: 80). Moreover, it is generally accepted that Jerusalem is a small settlement limited the Southeastern Ridge (i.e., City of David) before the 9th century BCE.[3] The site's economy at this time has been described as 'noncentralized, kinship-based' (Maeir and Shai 2016). Complicating matters further for the study of Jerusalem is the circular argument that the sparseness of material culture for periods like the Iron Age IIA is obscure due to the Herodian platform on Mount Moriah (i.e., Temple Mount).

If one is to follow the biblical retelling, the rise of Jerusalem is due to a peace treaty with the Northern Kingdom of Israel (1 Kings 22:45). The stability generated by the Omride–Davidic alliance, which was sealed by marriage (2 Kings 8:18; 26-27), allowed Jerusalem to expand into a statehood administrative center (Finkelstein 2001; Na'aman 2013). Finkelstein has proposed that Jerusalem made its first steps in its development from a small Amarna-like governmental stronghold to an elaborate capital in the 9th century BCE (Finkelstein 2003: 98). His proposal, like the proposals of many others, is based on the Books of Samuel and Kings (see, Na'aman 1996).

Finkelstein suggests that Jerusalem's development is a reaction to the influence of the Omrides, in the first half of the 9th century BCE, or possibly later in the second half of the 9th century BCE under the Damascene hegemony (*Ibid*; 2018a). Sergi (2013) suggests that the appearance of an administrative system with territorial and military aspirations in Judah, with Jerusalem as its core, is a result of Omride presence in Jerusalem and the exposure of the Judahite elite to the court of Samaria, following Keel (2012: 317–323) and Finkelstein (2003: 81-

[3] Na'aman 1996; Finkelstein 2001: 7; Geva 2014; Uziel and Szanton 2015

101). Jerusalem's relationship with territories to its north, such as Benjamin and Israel, are argued along the lines of settlement activity paired with deciphering the biblical authors' intention in their reflection of these polities.[4]

Going beyond the biblical texts, the development of Jerusalem has two perspectives: The first, and more commonly accepted view, is that Jerusalem's initial occupation settled on Mount Moriah (i.e., Temple Mount) and expanded south toward the Gihon spring (Finkelstein, Koch, and Lipschits 2011). The second view suggests that Jerusalem's settlement began near the Gihon spring and expanded northwards to the mount and then later to the west (Gadot and Uziel 2017; Shalev et al. 2020). The ambiguity of the 9th century BCE of Jerusalem is frustrating for scholars because of the want or need to prove the reality of a palatial cultic capital in the Iron Age I – Iron Age IIA, but also to help understand the socioeconomic draw of Jerusalem in the subsequent Iron Age IIB.

2.1.1.2 Iron Age IIB (8th-7th centuries BCE)

The Neo-Assyrian Empire's conquest of the Southern Levant, in the second half of the 8th century BCE, had a profound impact on the entire region. Sennacherib reported the destruction of forty-six cities during his campaign in Judah in 701 BCE (Prichard 1969: 287-288). Jerusalem, the capital of Judah, was not among the cities destroyed. Notwithstanding, Assyria's campaigns throughout the 8th century BCE had direct and indirect effects on the economy, status, and demography of Jerusalem.

Jerusalem was spared from Assyria's wrath earlier in the 8th century BCE. Following the biblical texts, King Ahaz rejected joining the Kingdom of Israel and Kingdom of Aram coalition

[4] Finkelstein 2001; 2003; 2006; Na'aman 1992; 2007a; 2009a; 2012; 2013; Sergi 2013; 2015; 2017; Ussishkin 2003

against Tiglath-Pileser III, even as these kingdoms laid siege to Jerusalem (2 Kings 15:29; 16:1-9; Isa 7:1-9). By aligning with Tiglath-Pileser III, Jerusalem and Judah effectively became a Neo-Assyrian vassal (2 Kings 16:5, 7-18). Anti-Neo-Assyrian sentiments are littered throughout the biblical text, and its clear the authors viewed the Neo-Assyrian hegemony with distaste. His son, Hezekiah, succeeded Ahaz. By the time Hezekiah came to the throne, the Neo-Assyrian empire was at its apogee, and its king, Sargon II, was fighting off rebellions in the west (Na'aman 1994; 2007b). Hezekiah eventually also rebelled against the Neo-Assyrian yoke (~705 BCE; 2 Kings 18:7, 13-16; *ibid*), after the northern and coastal entities had already been destroyed.

Ahaz's acceptance of the Neo-Assyrian rule changed Judah's status from an independent state to a vassal kingdom (Simo 2003; Lipschits 2018; 2019). This transition is crucial because it marks the beginning of six centuries in which Jerusalem, and Judah as a whole, were under the rule of foreign empires (*ibid*). After the conquest and subordination of Jerusalem and Judah, Assyria imposed an imperial ideology of aggressive commercial exploitation, also considered heavy taxation (Na'aman 1991: 33–55; Gitin 1998: 276-78).

Beyond exporting agricultural products, being a Neo-Assyrian vassal required sending regular intelligence reports, paying taxes, and participating in military operations (Lipschits 2018; 2019). The effects of the Assyrian's administrative and economic agreements allowed local Judean leadership to remain in place, gave rise to well-known aspects of Judean economy and material culture (i.e., stamp handles), and allowed the local elites to protect the national cult in Jerusalem (*ibid*). Meanwhile, the Assyrians maintain a close eye on Jerusalem, never easing on demands and pressures (Lipschits 2019b: 129).

Archaeologically we have evidence of Assyria's campaigns through destruction layers in Judah's Shephelah (i.e., lowlands). The Shephelah bore the brunt of Hezekiah's revolt and was utterly devastated, with centers such as Lachish decimated in 701 BCE (Stern 2001:161; Thareani-Sussely 2007). However, there is some indication that some sites were resettled shortly thereafter (Finkelstein and Na'aman 2004). The regions east of Jerusalem into the Judean Desert and to the shores of the Dead Sea were sparsely settled for the most of the Iron Ages (Stern 1994), but in the late 8th century through 7th century BCE, there is a rise in settlements (Faust 2008; Gadot 2015).

Settlement expansion has primarily been attributed to the need to produce grain and other goods to pay tribute to Assyria (Faust 2008; Finkelstein 1994: 175-181). Archaeological evidence of Assyria's economic strategy is evidence by the advancement of oil production, with the identification of oil press installations throughout the region (Finkelstein and Na'aman 2004; Faust 2015). The use of hieratic writing in this industry suggests the oil industry was not a Neo-Assyrian development but a Judean one, as the Assyrians may have demanded the product, but the production was organized using what the Judeans already knew (Lipschits 2018; 2019).

Jerusalem's demographic expansion in the Iron Age IIB can be seen in the population extension to the Western Hill and the fortification of Jerusalem in the late 8th century BCE to protect the new extramural neighborhoods (Geva 2003a: 516-517; Uziel and Szanton 2015: 248). According to Ussishkin (2006a; 2006b), Jerusalem in the 8th century BCE was surrounded by massive city walls that encompass the eastern side of the Southeastern Ridge, exposed by Kenyon (1974: 144–47; Steiner 2001: 89–92), Shiloh (1984: 8–10, 28; figs. 30, 33), Reich and Shukron (2000; Shanks 1999), and Mazar (E. Mazar and B. Mazar 1989: 1–48); the Western Hill, exposed by Avigad (1983: 46–60; Avigad and Geva 2000; Geva and Avigad 2000); also by

modern-day Hagay Street, exposed by Kloner (1984), and in the Ottoman citadel near the Jaffa Gate (Geva 1979; 1983: 56–58).

Reconstruction of Jerusalem's fortifications suggests that the Iron Age fortification of the Western Hill was not what allowed people to settle on that side of the Southeastern Ridge, but rather a requirement in order to protect the growing settlement (Uziel and Szanton 2015: 248). Settlement expansion onto the Western Hill is debated amongst scholars within the context of demographic density. Faust has proposed that the extramural neighborhood, the necropolis, and the surrounding countryside support the traditional view of Jerusalem as a sizeable dense city (2005: 101). This is counter to Geva's reconstruction that proposes that the Western Hill was never densely settled, and this newly settled area included mostly isolated structures, such as farmsteads and installations– much of which was open agricultural fields (2002, 2003a).

Jerusalem's increase in population went beyond naturally occurring births and, therefore, must represent an influx of new settlers. Jerusalem's demographic expansion relates to a variety of factors, from the destruction of the Shephelah region in 701 BCE to the migration of refugees from the Northern Kingdom after its destruction in 720 BCE, as well as King Ahaz's agreement to cooperate with the Assyrians (Finkelstein 2001; Finkelstein and Silberman 2006; Finkelstein 2015). Counter the refugee migration theory, Na'aman has suggested that the population extension to the Western Hill was independent of the fall of the Northern Kingdom in 720 BCE (2007b, 2009b, 2014; Faust 2008). Another explanation, following Neo-Assyrian ideology, is the deportation and resettlement of foreign populations in the newly acquired territory, in order to maximize agricultural exploitation (Lipschits 2019). Regardless of how, Jerusalem reached a population density that required the expansion of the city limits and represents a zenith in the site's cultic and social status.

2.1.1.3 Iron Age IIC (7th–6th centuries BCE)

Following the Sennacherib's campaign and the destruction left in its wake, the subsequent Iron Age IIC in Judah is characterized by the fall of the Neo-Assyrians, the geopolitical takeover of the Neo-Babylonians, and the eventual destruction of Jerusalem in 586 BCE. The transition between the Iron Age IIB and Iron Age IIC is debated along the lines of destruction levels, occupation and abandonment of sites, and ceramic typology.

Archaeologically, the start of the Iron Age IIC is marked by Lachish Phase III, respectively, the 701 BCE destruction (Aharoni and Aharoni 1976: 74; Zimhoni 1997). It cannot be assumed that the ceramic repertoire of Judah at this time dramatically or immediately changed with the transition into the 7th century BCE or with Sennacherib's campaign (Finkelstein 1994; Finkelstein and Na'aman 2004; Thareani-Sussely 2007). Thus, some have argued that the start of the Iron Age IIC is later into 7th century BCE or possibly 6th century BCE (Fantalkin and Tal 2015: 188-195), while others contend that the Iron Age IIC should be dated earlier, starting at 732 BCE (Lipschits 2019). The faunal remains from Jerusalem included in this research are precisely dated to the 8th century and 587/6 BCE destruction layer; thus, the demarcation between the Iron Age IIB and Iron Age IIC is inconsequential.

One of the central questions in this period is, if and when Judah, specifically the regions of the Shephelah, the southern Judean hills, and the Negev, recovered from the Neo-Assyrian destruction of 701 BCE. Stamp impressions on storage jars have long been used to indicate the reach of cultural administrations, specifically those used by the Judahite/Judean administration. The volume of stamp handles identified in the Benjamin Plateau and Refaʿim valley in the early and middle 7th century BCE suggests Judah refocused its economic exploitation in areas under

their control rather than trying to reassert their control over the lost Shephelah (Lipschits and Gadot 2008; Gadot 2015).

Some scholars suggest the recovery in Judah began in the first half of the 7th century BCE, under the glorious days of King Manasseh (Beit-Arieh 1987; Biran 1987; Finkelstein 1994; Stern 2001; Thareani-Sussely 2007; Knauf 2005; Faust 2008). Manasseh was coregent starting in 696/5 BCE and king from 686/5–642/1 BCE, most of which was under the *pax Assyriaca* (Lipschits 2019b). During the first two-thirds of the 7th century BCE, Jerusalem retained the economic prosperity of Judah under the Neo-Assyrian Hegemony (Lipschits 2018; 2019). The eastern and southern borders of Judah (i.e., the Negev and Jordan Valley) were integrated into the commercial system created by the *pax Assyriaca* and flourished (*ibid*). Arguments for recovery in the first half of the 7th century BCE are supported by the economic security of the *pax Assyriaca* and the region's integration into the Neo-Assyrian empire's economy and administration.

A counter-argument is a delayed recovery not until after the withdrawal of the Assyrians from the Levant, during the reign of Josiah (Koch and Lipschits 2013; Lipschits 2019b). Koch and Lipschits suggest that Judah did not recover from the 701 BCE campaign due to the geopolitical and administrative arrangements that were in place between 701 BCE and the Neo-Assyrian withdrawal (*Ibid*). Only after the Neo-Assyrian withdrawal, the change in policies of Egypt's 26th Dynasty, and Judah's success in reconsolidating control over the highlands (Na'aman 1991: 34-41; Lipschits 2018; 2019), was Judah able to repopulate outside of the hill country into the Shephelah and Negev. The withdrawal of the Assyrians marks the distinction between the early Iron Age IIC and the late Iron Age IIC, according to Lipschits (2019).

The rise of the Neo-Babylonians took place after the collapse of Neo-Assyrian hegemony over the Southern Levant in 624/3 BCE (Lipschits 2005: 20). The collapse of the Neo-Assyrian empire is not entirely understood but most likely connected to Babylonian pressure (*ibid:* 15). In the void left by Assyria's withdrawal, both Egyptian and Babylonian forces battled for control over the region (*ibid:* 20). Babylonia's Nebuchadnezzar solidified command over the region by defeating the Egyptian army at the Battle of Carchemish in 604 BCE. Babylonia's regional policy, unlike the Assyrians approach to Judah, was focused on direct rule over provinces that were subject to them (*ibid*: 34-39). Judah's anti-Babylonian sentiments and King Jehoiakim's revolt, iterated in the biblical texts, eventually led to the destruction of Jerusalem and its Temple in 587/6 BCE and the deportation of a significant portion of the city's population (*ibid*).

2.1.1.3.1 The Babylonian Period (604-539 BCE)

The attack on the Kingdom of Judah, at the beginning of the 6th century BCE, brought the total disintegration of Jerusalem and its immediate environment (Lipschits 2011: 57). This can be seen on the western border of Judah, whereas part of the Babylonian military campaign, urban, administrative, military forts, and settlements were all deserted (*ibid*). Destruction of the periphery (i.e., Negev, Jordan Valley, and Shephelah) was, by and large, a result of Judah's collapse, as there was no army to protect these regions from semi-nomadic groups (Lipschits 2005: 69). In the years following the Babylonian destruction (604 -539 BCE), also considered the 'exilic period,' a rural settlement continued to exist in Jerusalem's periphery (Lipschits 2011: 68; Gadot 2015). Abandonment of settlements and movement of nomadic tribes in the Negev and Shephelah during the late 6th through the first half of the 5th century BCE (~520-450 BCE) was likely a result of the drier climate that lead to periods of drought, economic instability, and shortages of agricultural supplies (Langgut and Lipschits 2017: 154-155).

Following the biblical description, and the archaeological evidence there are no signs that all of Judah, in its entirety, was destroyed or that the population was wholly deported (2 Kings 25:22; Lipschits 2005: 69). Archaeological evidence for the Babylonian period specifically is difficult to identify as there is a continuity of ceramic forms, with only minor adaptations to bowls, kraters, and decanters (Freud 2018: plate 18-20). Precise archaeological contexts for the Babylonian period in Jerusalem is limited to fills in Area G (Str. 10/9; Mazar 2015), and even these are debated (Na'aman 2011; Steiner 2011: 313; Geva 2012; Finkelstein 2018: 25).

The surveys of Jerusalem's hinterland indicates a decrease in settlements during this time (Gadot 2015), and some use this data to suggest an extreme lack of continuity in the hinterland (Faust 2003). According to the biblical accounts, the poor are said to have remained in the region (2 Kings 24:14, 25: 12, 22; Jeremiah 39:10). Habitation, especially in the hinterland, suggests some portion of the population remained after the destruction in 586 BCE and continued to exist adjusting to the new military, political, and economic structures (Lipschits 1998: 21; Faust 2012; Gadot 2015). Those that remained to the north and south of Jerusalem maintained their rural economy, including paying annual taxes and producing pottery in the style and stamp system prior to 587/6 BCE (Lipschits 2019b).

The province's name changed from Judah to Yehud, and the capital transferred from Jerusalem to Mizpah, which served as the *Bîrāh* for 141 years (Lipschits 2011b). Jerusalem likely did not have permission to undertake building projects in the city nor its hinterland, following the shabby quality of material culture (i.e., ceramics and seals) as well as the poor-quality building techniques (Lipschits 2018). The material culture of the Babylonian period

suggests a continuity that lasted well in the early Persian period.[5] Similarity to the ceramic horizons of the rest of the Iron Age II obscures our understanding of this transitional period of Jerusalem's history.

2.1.2 Jerusalem and Yehud in the Persian Period (6th-5th centuries BCE)

The Persian period is commonly described as an enigmatic period because we have scarce archaeological evidence for occupation in Jerusalem, and the population was considerably smaller than the prior Iron Age IIA-B, leaving fewer physical traces behind. The historical and archaeological reality of Persian Jerusalem as been extensively studied.[6] Biblical sources such as the texts of Ezra and Nehemiah should be used as provisional for the historical reconstruction of Jerusalem in this period, as they are literary works. However, the lack of physical material has led to a reconstruction based heavily upon these texts. The major themes reflected in Ezra and Nehemiah also reflect the overarching social dynamics of the period, that of a returning population versus a population that remained in the region. As a counter-argument to the application of Ezra and Nehemiah in the 6th and 5th centuries BCE is that many of the themes of rebuilding and geopolitics may reflect ideologies of the Late Hellenistic, specifically the Hasmonean period (Edelman 2005; Finkelstein 2018b, *references therein*); further supporting the notion that these texts should be used as provisional.

The transition into the Persian period began with Cyrus of the Achaemenid's seizing control over the entire Babylonian empire in 539 BCE (Levine 2002: 8). In the first year of his reign, Cyrus proclaimed that the exiles, taken by the Babylonians, could return to their native

[5] Barkai 1992; Lipschits 2011, Barstad 1996; 2001; Freud 2018
[6] See Carter 1999; Eshel 2000; Stern 2001: 434-36; Edelmen 2005; Lipschits 2003, 2005, 2006, 2011; Usshiskin 2006; Finkelstein 2008– *references therein*

lands (Levine 2002: 10; Ezra 1:1-4). The biblical accounts of the exiles returning to Jerusalem, in the books of Ezra and Nehemiah, frame the Persian period as one of expansion and rebuilding (Ezra 2:64; Nehemiah 3, 7).[7] King Darius, according to Ezra, arranged for the rebuilding of the temple to be financed by his treasury and supplied the temple with animals to sacrifice (Ezra 6:6-14). The temple was completed on the 3rd of Adar in the 6th year of Darius (March 12, 515 BCE; Ezra 6:15).

The Achaemenids, similar to the previous Babylonians, had no intention of redeveloping the urban centers and instead concentrated their attention on maintaining the rural settlements, as they produced the agricultural supplies that were collected as taxes (Grabbe 2011: 169). Settlements in the form of villages and farmsteads in Jerusalem's hinterland have shown to be occupied at this time, reinforcing the need for agricultural production (Edelman 2005: 332; Gadot 2015). His successors did not maintain Darius' altruism, as Xerxes I (486-465BCE) cut off the flow of funds to local temples in order to preserve the Achaemenid's treasury (Levine 2002: 19). Social inequality created by the economic hardships of the periods that were exacerbated by the burden of rebuilding led to polarization within Jerusalem and the greater Yehud society (Levine 2002: 27; Edelman 2005). On one side, there was the elite composed of the priesthood, affluent families, and local officials, and on the other, there were the commoners that included farmers, small landowners, and craft-tradesmen (*ibid*).

Lipschits has argued that despite the periods' harshness, archaeologically, the Persian period has shown itself to be a period of political, cultural, and economic continuity, especially in the region north and south of Jerusalem (2011: 58). Those that remained in the region

[7] Expansion and rebuilding of Jerusalem mirrors the Hasmonean reality, according to Finkelstein (2018b).

continued to maintain rural settlements that included paying taxes in the form of wine, oil, and other agricultural products in the same way as previous periods, specifically about the continuity of stamped storage jars (*ibid*: 73). Occupation of Jerusalem's hinterland suggests that a majority of sites settled during the Persian period had already been active in the period prior (Iron Age IIC) – a figure that indicates continuation in land-division and ownership (Gadot 2015). Climate conditions in the Persian period also varied and affected settlement and agricultural activity (Langgut and Lipschits 2017). The early Persian period was characterized by dry conditions that were one factor in the abandonment of villages in the southern regions of Judah (*Ibid*). Later in the 5th and 4th centuries BCE, there is a gradual increase that encouraged and stabilized settlement and agricultural activity (*ibid*).

Jerusalem retained its status as the capital of the province of Yehud, albeit a brief period when the capital was moved to Mizpah. The reestablished settlement of Jerusalem at the end of the 6th and beginning of the 5th century BCE saw the development of a completely different, smaller settlement pattern than previous periods (Lipschits 2003: 331). Following the biblical accounts, the Temple, or Mount Moriah, continued to be the location for cultic rituals, and the settlement area was concentrated on the Southeastern Ridge (*ibid*: 329-330; Geva 2014: 142). Archaeologically, we have no evidence that the Western Hill was settled during this period (Finkelstein 2008, *references therein*), although this opinion is debated (Shalev et al. 2020). Regardless of the archaeological and textual sources, Jerusalem and its hinterland would remain economically poor and not regain its urban status until the reign of the Hasmoneans in the Late Hellenistic period (141- 63 BCE) (Lipschits 2003: 330; Geva 2014: 142).

2.1.3 Jerusalem and Judaea in the Hellenistic Period

The Hellenistic period is divided into two sub-periods: Early Hellenistic (332–141 BCE) and Late Hellenistic (140–63 BCE). Distinctions between the two sub-periods are based on geopolitical aspects, with the Early Hellenistic period being characterized by political instability between the Ptolemies and the Seleucids and the Late Hellenistic characterized by political independence and the establishment of the Hasmonean dynasty.

Excavations in Jerusalem attested to the scarcity of archaeological remains dated to the Early Hellenistic period, whereas Late Hellenistic remains are increasingly attested, in a somewhat similar volume to those of the Iron Age IIB-C (Smith 1990: 123; Ben-Ami 2013; Geva 2014).8 The transition from the regional name of Yehud to Judea/Judaea comes at the end of the Early Hellenistic period, around 141 BCE, and coincides with the formation of the nearly independent region by High Priest Simon (Babota 2014: 35).

Our primary literary source for this period is 1 and 2 Maccabees. 1 Maccabees is written in a historical narrative style that covers more or less the period of 175–134 BCE (*ibid*). Meanwhile, the final redaction of 2 Maccabees has been linked to 63 BCE (*ibid*), the year of Pompey's siege. It should be noted that these texts were presumptively written with a biased pro-Hasmonean intention and, in essence, can be read as Hasmonean propaganda (*ibid*: 10; Grabbe 2000; Collins 2005).

Outside of 1 and 2 Maccabees, there are very few literary references for the historical reality of Jerusalem and the regions of Judea in the Hellenistic period. One of the few literary extrabiblical sources is Josephus. The writings of Josephus are typically considered tendentious

[8] Archaeological evidence of the Early Hellenistic in Jerusalem is akin to the archaeological evidence of the Persian period, making the Early Hellenistic just as enigmatic.

and convoluted when it comes to the Hellenistic period. However, he does paraphrase 1 Maccabees; therefore, his credibility is arguable (Grabbe 2000). The authenticity of 1 and 2 Maccabees are best summarized as 1 Maccabees is preferred for the depiction of the revolts, whereas 2 Maccabees is preferred for its representation of events leading up to revolt (Grabbe 2000).

Adoption or rejection of Hellenistic trends along with the cultural policy by the ruling hegemony varies (Regev 2017: 176). Following the texts, the Seleucid troops and Antiochus IV had enforced Hellenization, in a practice of enculturation and prohibited basic religious practices (2 Maccabees 4:10, 6:9, 11:24). Hellenistic culture infused itself in all areas of urban civic life. Reconstruction of the period assumes that the middle and lower classes of Jerusalem were also Hellenized, as those residing in urban centers were generally more exposed to foreign trends than those living in the hinterland (Levine 2002: 45). Aspects that differed in the Hellenistic world of Jerusalem were the establishment of new institutions, namely the gymnasium and the *Gerousia* (*Ant.* 12.3,3; 138; 142; 2 Maccabees 11:22). These institutions created a socioeconomic and political differentiation amongst priests and between priests and laity, such as exempted taxes, access to higher education, as well as a greater role within the priesthood (Babota 2014: 52).

2.3.3.1 The Early Hellenistic Period (332-167 BCE)

The Early Hellenistic period is characterized by Ptolemaic suzerainty and Seleucid contention (Smith 1990: 123; Levine 2002: 46; Hannestad 2012). Jerusalem in the Early Hellenistic period did not deviate in settlement size from that of the previous Persian period (Geva 2014: 142). The Ptolemies gained control over Jerusalem in 320, 310, 302, and 301 BCE. The extent of the five Syrian wars between the Ptolemies and Seleucids in the late 3rd century BCE on Jerusalem is not fully understood, as most of the conflict was concentrated along the coast (Levine 2002: 50;

Berlin 2018). Judea came under Seleucid suzerainty after Antiochus III won the 5th Syrian War (202-198 BCE), over the Ptolemaic Scopas. The Seleucids were subservient to Rome, and as such, Judea found itself subject to a Seleucid King, who, in turn, had to pay tribute to Rome and adjust to Roman policies (Babota 2014: 37).

In the Early Hellenistic, there is a continuity of settlement in the rural regions (Tal 2006: 5-163; Lipschits and Tal 2007). Occupation of the hinterland reflected the continual need for agricultural production for taxes, as well as a fear of drought that occurred in the 4th century BCE (Smith 1990: 124; Langgut and Lipschits 2017). The decrees of Antiochus III dramatically altered Jerusalem; according to Josephus, the decrees included the banning of the flesh of horses, mules, wild and tame donkeys, or of leopards, foxes, hares, or any prohibited animals (*Ant.* 12.3-4). Antiochus III's decrees intensified the practices described in the biblical texts, possibly as a means to pacify the ruling priesthood. In 175 BCE, Jason acting as interim high priest for his brother Onias III, convinced the now ruling Antiochus IV Epiphanes to re-designate Jerusalem as a *polis* (Levine 2002; Magness 2012). The political and religious situation within Jerusalem changes in 167 BCE; when Apollonius, under the instructions of Antiochus IV, entered Jerusalem with troops to profane the temple and despoil the court, augmenting the practice of daily sacrifices and purity of the cultic rituals (Babota 2014: 77). These religious and political changes created deep divides within Jerusalem and the broader Jewish population of Judea.

This violation of religious purity leads to the Maccabean/Hasmonean revolts in 168-162 BCE, with the most destructive events occurring in 168-167 BCE (Levine 2002: 76). The death of Antiochus IV was considered a success to the Jewish rebels (Babota 2014: 77). Antiochus V reinstated Jewish control over the Temple. Disputed control over the Temple between the Seleucids at the Acra and the Hasmoneans would dictate the processes of the high priesthood

(*ibid*). This dispute would continue for over two decades until the Hasmoneans gained control in 141 BCE (*ibid*).

One of the major buildings constructed in this period was the Acra– the Seleucid Citadel. The building of the Acra is referenced in 1 Maccabees 1.33-35 and *Ant.* 12.252. The Acra was a political, military, and administrative center. It was meant to exercise a more efficient royal control over the temple's economy and the taxation of Jerusalem and greater Judea. Its location was described as looking over the temple mount. Its exact location is a mystery. Ben-Ami and Tchekhanovets (2015; 2016) have proposed one of the many theories of its location in their excavation of the Givati Parking Lot (Zilberstein 2019). Excavation in the Giv'ati parking lot has identified massive tower walls with a supporting glacis (Phase VIII), and the excavators have identified this building as the elusive Acra (Ben-Ami and Tchekhanovets 2015; 2016). The foundation of the Acra was accompanied by the building of foreign altars and sacred precincts around the market square (1 Maccabees 1:47; 2 Maccabees 10:2).

2.3.3.1 The Late Hellenistic (168-63 BCE)

The Late Hellenistic period (168-63 BCE) is marked by the rise of the Hasmonean monarchy and the achievement of political independence (Smith 1990: 123; Levine 2002: 46). The attainment of political independence and the Hellenization of Judea marks the final historical event concerning this dissertation's focus that shaped Jerusalem's population and status.

Judean independence was achieved through an alliance with Rome, who wanted to undermine Seleucid power in the region (Magness 2012: 94-95). At this time, Jonathan assumed the office of the high priest, which was a controversial move that aligned the royal and priestly powers into the hands of a single-family, the Hasmoneans (*ibid*). The achievement of independence by the Hasmoneans was not unique. Other regional groups, such as the Idumaeans,

Ituraeans, and Nabataeans, were also carving out their own independent tracts of land around this time (Levine 2002: 90). The Hasmonean leaders in the second half of the 2nd century BCE embarked on an extensive campaign of expansion and conversion, possibly with the hopes of unifying the region under the same religious-cultural banner. The major results of this policy saw the conversion of Idumaea to Judaism and the destruction of the temple at Mount Gerizim (Magness 2012: 95).

Political and religious tension arose at the beginning of the 1st century BCE between the religious Pharisees and ruler Alexander Jannaeus. Jannaeus's disregard or liberal view of religious law instigated a few rebels to approach the Seleucid king Demetrius III (*ibid*: 96). The following invasion and death of Jannaeus resulted in a civil war between his sons– John Hyrcanus II and Aristobulus II (*ibid*). The instability generated by the chaos provided the perfect opportunity for the Roman general Pompey to annex the Hasmonean Kingdom in 63 BCE (*ibid*).

In the end, the Hasmonean monarchy was instrumental in providing the economic means for Jerusalem's substantial growth in this period; and constituted the driving factor that reshaped the city's social, religious, and cultural agendas, along with its political and geographical ones (Levine 2002: 92). The majority of Hellenistic sites without Persian occupation are the result of Hasmonean settlement activity rather than Ptolemaic or Seleucid settlement (Lipschits and Tal 2007: 39). Physically, Jerusalem expanded rapidly during this period in a westerly direction and more than quadrupled its area to 150-160 acres (Geva 2014). By the end of the Late Hellenistic, Jerusalem's population would again extend to the Western Hill, which geographically was higher than the temple mount and was protected by the Hinnom Valley (Geva 2003b: 502). As well as the northern upper part of the Tyropoeon valley was settled, an area that would eventually be surrounded by the second wall (Geva 2011, 2014).

TABLE 2.1: MAJOR NEAR EASTERN HISTORICAL EVENTS RELATED TO THIS RESEARCH THAT OCCURRED IN THE 8TH THROUGH 2ND BCE

Date	Event
727 BCE	Death of Tiglath-Pileser III
722 BCE	Sargon II captures Samaria
701 BCE	Sennacherib invades Judah, destroy Shephelah and besiege Jerusalem
664-663 BCE	Assurbanipal invades Egypt
647 BCE	Assurbanipal sacks Susa
631 BCE	Death of Assurbanipal
626 BCE	Independent dynasty in Babylonia under Nabopolassar
~624/3 BCE	Withdrawal of Neo-Neo-Assyrian empire from the Southern Levant
605/4 BCE	Nebuchadnezzar II defeats the Egyptian at the Battle of Carchemish
587/6 BCE	Nebuchadnezzar II sacks Jerusalem. Destruction of the First Temple
559 BCE	Cyrus rises to power in Persia
539 BCE	Cyrus captures Babylon
521 BCE	Darius seizes the throne of Persia
March 12, 515 BCE	Completion of the Second Temple
490-480 BCE	Persian invasions of Greece
484 BCE	Xerxes crushes rebellion in Babylonia
404 BCE	Egypt secedes from the Persian Empire
401 BCE	Artaxerxes II and Cyrus the younger battle at Cunaxa
343 BCE	Artaxerxes III recaptures Egypt
336 BCE	Alexander the Great becomes king of Macedon
334 BCE	Alexander the Great marches into Anatolia
331 BCE	Alexander the Great enters Babylonia
323 BCE	Death of Alexander the Great in Babylon
301 BCE	The final division of Alexander's empire between the Seleucids (Asia Minor and Syria) and the Ptolemies (Egypt and Southern Levant)
202-198 BCE	5th Syrian War between Seleucid Antiochus III and Ptolemaic Scopas.
198 BCE	Levant under Seleucid rule
167 BCE	Antiochus IV Epiphanes bans Jewish practices and dedicates Jerusalem's temple to Zeus– causing the Maccabean Revolt
167-162 BCE	Maccabean Revolt
164 BCE	Antiochus IV Epiphanes rescinds edit, rededicates the Jerusalem temple.
150-140 BCE	The Maccabees establishes the independent Jewish Kingdom ruled by the Hasmoneans
63 BCE	Pompey's siege and capture of Jerusalem

2.1.4 Archaeology of Jerusalem and its Hinterland

The following subsections discuss areas of Jerusalem and its surrounding hinterland that have been previously excavated. The examination of previous excavations is instrumental in understanding the development and archaeological reality of Jerusalem and its environs. Excavations within Jerusalem are focused on three key areas: Temple Mount, Southeastern Ridge (i.e., the City of David), and the Western Hill, the latter of which includes excavations in the Tyropoeon Valley.

2.1.4.1 Archaeology of Jerusalem

The archaeological exploration of Jerusalem began in 1838 when Edward Robinson traversed portions of the subterranean water supply system, now known as Hezekiah's Tunnel. After over a century of explorations, archaeologists have exposed much of Jerusalem's occupational layers.[9] Archaeology of Jerusalem is typically divided into three sectors: Temple Mount, Southeastern Ridge (i.e., City of David), and Western Hill (Figure 2.1). These sectors incorporate the main occupational areas in Jerusalem's history.

The Temple Mount, or Mount Moriah, is believed by many to be the traditional Tel of Jerusalem and the probable location of the temples mentioned in biblical texts (Finkelstein, Koch, and Lipschits 2011). The Southeastern Ridge, also known as the City of David, is the most excavated area of Jerusalem with the location of Gihon spring on its eastern edge, massive fortifications, water systems, as well as one of the few areas that have occupational evidence from the Chalcolithic to modern times.[10] The Western Hill, or Southwestern Hill, was occupied in periods when Jerusalem was densely populated as there was a need to expand westwards.

[9] For stratigraphy of Jerusalem, see Appendix I
[10] See, Shiloh's Area E in Appendix I.

Excavation of these areas has been conducted since the beginning of archaeology in the Levant and continues into today based on modern development and constructional needs.

Excavations atop the Temple Mount are limited due to the current political situation. Excavations in this area are conducted on an as-needed basis due to renovations and focus on sections within the Haram el-Sharif complex (Avni and Seligman 2006, *references therein*). Excavations in the south of the Temple Mount have been conducted for many years by Benjamin and Eilat Mazar (Mazar and Mazar 1989; Mazar 2015a).

The Southeastern Ridge has been the main focus of excavations since the late 19th century CE.[11] Major archaeological elements in this area include massive fortification features, such as massive walls, the Stepped Stone Structure, the Large Stone Structure, as well as parts of the water system, such as Channel II, the Rock-Cut Pool, the Siloam Pool, as well as the Early Roman garbage dump, amongst others.[12] The Israel Antiquities Authority has continued to conduct excavations of the Southeastern Hill in a variety of areas from the eastern to western ridge. Permits and field reports of these excavations are available on Hadashot Arkeologiyot.[13]

Additional excavations have been conducted on the Western Hill. In later periods this area is known as the Upper City. One of the major excavations of this area was the Jewish Quarter Excavations.[14] Major archaeological elements on the Western Hill include the Roman Cardo, made famous by its depiction in the Madaba map, as well as the Broad Wall, a portion of

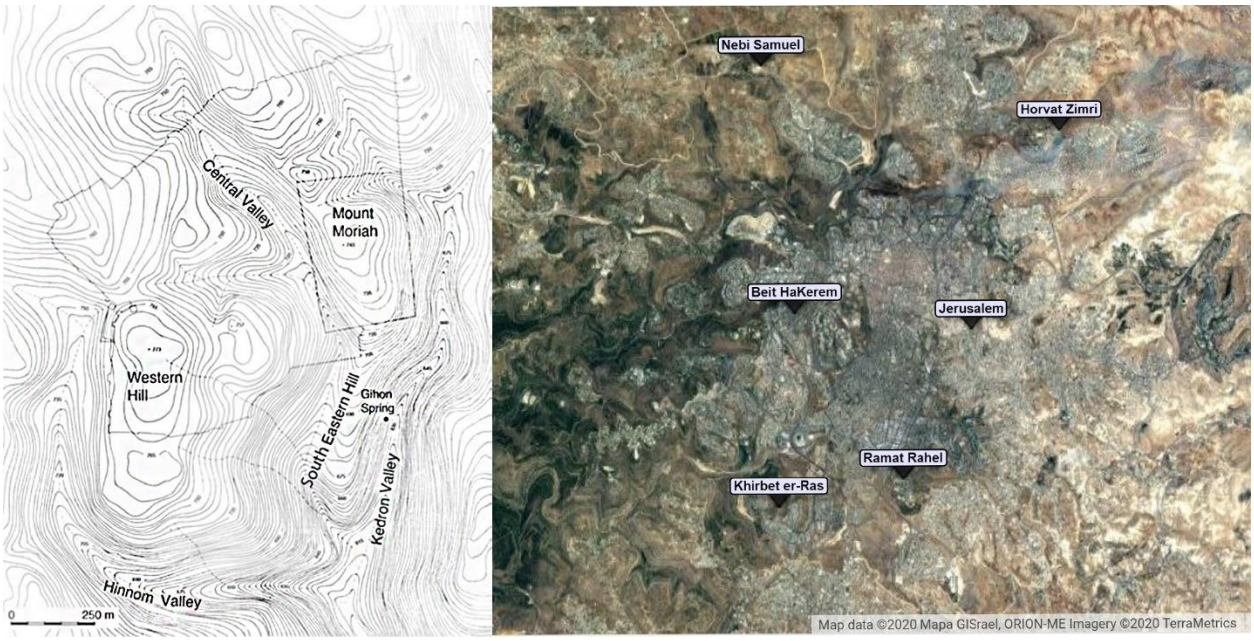
[11] Warren and Conder 1884; Vincent 1912; Weill 1920; Macalister and Duncan 1926; Kenyon 1965; 1966; 1974; Shiloh 1984; Franken and Steiner 1990; Eshel and Prag 1995; Ariel and De Groot 1996; Reich and Shukron 2000; 2004; 2007; 2008a; 2008b; 2009; 2010; Reich et al. 2007; De Groot and Bernick-Greenberg 2012; Gadot 2014; Mazar 2015b.
[12] This is list is by no means exhausted but represent some of the most well-known features.
[13] The Israel Antiquities Authority conducts the majority, if not all, the excavation within the modern boundaries of Jerusalem. Access to published reports is available through Hadashot Arkheologiyot. See, https://www.hadashot-esi.org.il/reports_list_eng.aspx.
[14] Amiran and Eitan 1970; Avigad 1975; 1983; Broshi 1976: 82-83; Gibson 1987; Geva 2000; 2003a; 2003b; 2012

the Iron Age II fortification (Avigad 1975; 1983). The Tyropoeon Valley is associated with the Western Hill area with a large-scale excavation at the Givati Parking Lot (Ben-Ami 2013; Ben-Ami and Tchekhanovets 2015; 2016; Shalev et al. 2020). D. Ben-Ami, and Y. Tchekhanovets excavated the Givati Parking Lot from 2007 until 2016. They exposed occupational layers from the Iron Age IIB through the Early Islamic period (see Appendix I). Since 2016, excavation of the Givati Parking Lot has been conducted by Y. Shalev and Y. Gadot. Faunal material for this research derives from the excavations of D. Ben-Ami and Y. Tchekhanovets, as well as Y. Shalev, and Y. Gadot.

The results of over a century of excavations suggest that the status and demography of Jerusalem fluctuated, with settlement peaks during the Iron Age IIB/C and the Early Roman period (Geva 2014: Fig. 1). Crucial aspects that are debated within the archaeology of Jerusalem are the lack of finds dated to smaller demographic phases and their absence correlated to the need to construct on bedrock or on previous structures, such as the Middle Bronze and Iron Age fortifications.[15]

[15] For debate see Finkelstein, Koch, and Lipschits 2011; Ussishkin 2016; Gadot and Uziel 2017.

FIGURE 2.1 MAP OF JERUSALEM AND ITS HINTERLAND



2.1.4.2 Archaeology of Jerusalem's Hinterland

Jerusalem's economy is intrinsically linked to its hinterland. In order to understand Jerusalem's geopolitical and economic position, many sites in the neighboring wadis of Nahal Soreq and Nahal Refaʿim have been surveyed and excavated in the last few decades (Gadot 2015; Gadot et al. 2019). Hundreds of sites have been excavated and surveyed in the region, of all sizes and types, and they attest to the region's importance and complexity (Edelstein, Milevski, and Aurnat 1998; Kloner 2003; Gadot et al. 2019). Copious surveys and excavations in the hinterland are on-going and conducted by the Israel Antiquities Authority. Permits and field reports of these excavations are available on Hadashot Arkeologiyot.[16]

The size and function of these sites vary. Extensive administrative and cultic sites are present north, west, and south of Jerusalem, such as at Ramat Raḥel Tel Moẓa Khirbet el-Burj,

[16] Modern Jerusalem extends to the vicinity of Jerusalem's ancient hinterland, many of the excavations are conducted by The Israel Antiquities Authority. Access to published reports is available through Hadashot Arkheologiyot. See, https://www.hadashot-esi.org.il/reports_list_eng.aspx.

Tel el-Fûl, and Nebi Samuel.[17] Smaller settlements like individual houses, villages, and farmsteads, are dispersed throughout the landscape, such as Khirbet er-Ras, Horvat Zimri, and Beit HaKerem (Figure 2.1).[18] Beyond these settlements, other ancillary sites are also present in the landscape, such as field towers, stone-heap clearings, and winepresses hewn from bedrock in the Ramot forest.[19]

The importance of these excavations indicates that Jerusalem's hinterland continued to be occupied throughout the 8th through 2nd BCE. Fluctuations in the hinterland's demographics do not undermine the continuity of occupation of this region. Moreover, it is evident that Jerusalem was not a singular economic unit but rather relied heavily on its neighboring environs (Faust 2007; Gadot 2015; Gadot et al. 2019).

2.1.5 Zooarchaeology of Jerusalem and its Hinterland

The framework of this dissertation was built off of a previous comparison between Jerusalem and its hinterland. In their 2016 article Sapir-Hen et al. compared two assemblages dated to the Iron Age IIB-C: the first from the Western Wall Plaza in Jerusalem and the second from the hinterland site of Tel Moẓa. The study indicated that the Western Wall Plaza's animal economy focused on male caprines (sheep and goats) of prime-age and meat consumption, whereas Tel Moẓa's animal economy focused on producing caprines for secondary products (Sapir-Hen et al. 2016). Suggesting that Jerusalem did not herd the caprines its population consumed, but rather

[17] Ramat Raḥel (Lipschits, Oeming et al. 2011), Tel Moẓa (Greenhut and De Groot 2009; Kisilevitz 2013), Khirbet el-Burj (DeGroot and Weinberger-Stern 2013), Tel el-Fûl (Baruch and Uziel 2015), and Nebi Samuel (Magen and Dadon 1995; Magen and Har-Even 2007).
[18] Khirbet er-Ras (Feig 1995; 1996; 2000; Feig and Abu Rabu 1996; Edelstein 2000; Gadot 2011), Horvat Zimri (Nadelman 1993), Beit HaKerem (Billig 2007).
[19] Rapuano and Onn 2004; Davidovich et al. 2006; Beeri 2012; Elgart-Sharon 2017; Storchon 2017; Gadot et al. 2018; 2019.

Tel Moẓa, and possibly other sites in the hinterland, acted at the primary herders and producers (*ibid*).

Differential access to meat at ritual centers has also been noted by several other cultic sites.[20] Past studies have primarily focused on the intra-site analysis of differential accesses to meat, noting differences between the cultic contexts and the residential contexts. Jerusalem, as a case study, allows us to examine the influence of an economy impacted by cultic and urban factors. Unlike many other sites, Jerusalem and its hinterland provide for a rare situation in that there are several faunal studies, from a variety of periods, published and available for comparison. The following sections will briefly describe the previously published faunal assemblages, which are critical in building a larger model of Jerusalem's animal economy.

2.1.5.1 Faunal Assemblages from Jerusalem

The following section will discuss the available comparative material of faunal assemblages from Jerusalem proper. The bulk of the comparative material dates to the Iron Age II, and fewer assemblages are dated to the Persian and Hellenistic periods. It is not a surprise that the majority of the comparative material originates from Iron Age II contexts, rather than the later historical periods, as there is more archaeological evidence for the Iron Age II.

2.1.5.1.1 Faunal Assemblages from Jerusalem's Iron Age II Periods

Published faunal assemblages from the Iron Age II periods of Jerusalem are extensive but also constrained, as they cannot be isolated into sub-periods: Iron Age IIA, IIB, or IIC. Iron Age II comparable assemblages are from south of the Temple Mount excavations, the Western Wall Plaza excavations, the Giv'ati Parking Lot excavations (Area M1), multiple reports from the City

[20] Davis 2008; Greer 2013; Kozuh 2010; Lev-Tov and McGeough 2007.

of David: Area D1, Phases 12 and 14, Area G, Area's C and H, and a small report from a hewn cave on the southeastern slope of the Southeastern Hill. [21]

TABLE 2.2: NUMBER OF IDENTIFIED SPECIMENS (NISP) OF IRON AGE II COMPARABLE FAUNAL ASSEMBLAGES

SITE	Temple Mount	Western Wall Plaza	Giv'ati Parking Lot; Area M1	City of David: Area D1	City of David: Area G	City of David: Area C and H	Cave I on Southeastern Hill
CITATION	(Horwitz and Tchernov 1989)	(Sapir-Hen et al. 2016)	(Bar-Oz and Raban Gerstel 2013)	(Horwitz 1996; Horwitz and Tchernov 1996)	(Tamar and Bar- Oz 2015)	(Marom and Agha in Press)	(Lernau 1995)
TOTAL NISP	79	2451	90	884	2615	2227	43

2.1.5.1.2 Faunal Assemblages from Jerusalem's Babylonian and Persian Period

Published faunal remains from the Babylonian and Persian periods are paltry in comparison to the previous period. Only a single report is representative of the Babylonian period, and there are only two assemblages dated to the Persian period. The only Babylonian faunal assemblage derives from fills in Area G (Tamar and Bar-Oz 2015). Persian remains are from Shiloh's Phase 9 of Area D2 in the City of David (Horwitz 1996: 310). Area D2 is related to an inner supporting wall and white material from a quarry; the dating of the material is based on its stratigraphic relationship and pottery (Shiloh 1984: 8-9). The second assemblage is from the Persian fills under the Stepped Stone structure in Area G of the City of David (Tamar and Bar-Oz 2015). These assemblages both derive from fills; as such, they cannot be considered as coming from a clean Persian context, limiting them as comparable support.

TABLE 2.3: NUMBER OF IDENTIFIED SPECIMENS (NISP) OF PERSIAN COMPARABLE FAUNAL ASSEMBLAGES.

SITE	City of David: Area D2	City of David: Area G, Phase 9	City of David: Area G, Phase 9/10
CITATION	(Horwitz 1996; Horwitz and Tchernov 1996)	(Tamar and Bar-Oz 2015)	
NISP	38	583	663

[21] South of the Temple Mount excavations (Horwitz and Tchernov 1989; Lernau and Lernau 1989), the Western Wall Plaza excavations (Sapir-Hen in press; Sapir-Hen et al. 2016), the Giv'ati Parking Lot excavations (Area M1; Bar-Oz and Raban-Gerstel 2013), City of David: Area D1, Phases 12 and 14 (Horwitz 1996; Horwitz and Tchernov 1996), Area G (Tamar and Bar-Oz 2015), Area's C and H (Marom and Agha in press), and Cave I (Lernau 1995).

2.1.5.1.2 Faunal Assemblages from Jerusalem's Hellenistic Period

Similar to the Persian period, there are only very few published Hellenistic assemblages. Faunal assemblages dated to the Hellenistic period of Jerusalem did not differentiate between Early and Late Hellenistic, except for one, but they do relate to different phases/strata. The first assemblages derive from Stratum VII of Area D2, in the City of David (Horwitz 1996; Horwitz and Tchernov 1996). The second derives from Stratum VIII of Area M1, more commonly known as the Giv'ati Parking Lot excavation (Bar-Oz and Raban-Gerstel 2013). The third assemblage dates to the Late Hellenistic and if from salvage excavations of 7 Shone Halakhot Street in the Jewish Quarter (Raphael 2015; Bouchnick 2018).

TABLE 2.4: NUMBER OF IDENTIFIED SPECIMENS (NISP) OF HELLENISTIC COMPARABLE FAUNAL ASSEMBLAGES

SITE	City of David: Area D2, Phase VII (Horwitz 1996; Horwitz and Tchernov 1996)	Giv'ati Parking Lot: Area M1, Phase VIII (Bar-Oz and Raban-Gerstel 2013)	7 Shone Halakhot Street (Bouchnick 2018)
TOTAL NISP	46	691	106

2.1.5.2 Faunal Assemblages from Jerusalem Hinterland

There are three comparable assemblages from sites in Jerusalem's hinterland. The first is Tel Moẓa, a provincial administrative and agricultural center that supported Jerusalem, starting in the 9th century BCE (Greenhut and DeGroot 2009). The faunal assemblage from Tel Moẓa is dated to the Iron Age II, with the assemblage split between the 7th century BCE (Stratum IV) and 8th century BCE (Stratum V), respectively. Tel Moẓa' faunal assemblage was initially analyzed by Sade (2009). The assemblage from Tel Moẓa was re-examined by Sapir-Hen et al. (2016).

The second assemblage is from the site of Ramat Raḥel, which is situated between Jerusalem and Bethlehem. Ramat Raḥel is an important administrative center in the late Iron Age

II and Persian periods. The faunal remains from Ramat Raḥel were collected from the palatial complex and have been dated to the late 7th century BCE based on pottery (Fulton et al. 2015). The material from Ramat Raḥel was separated into two assemblages, based upon their context. The first assemblage derives from a *favissa*, a ritual feasting pit (Locus 14109), and the second assemblage is from two phases of the building complex (Fulton et al. 2015). The final assemblage is from Horvat Zimri, a small fortress with evidence of Persian remains (Horwitz 1993).

TABLE 2.5: NUMBER OF IDENTIFIED SPECIMENS (NISP) FROM COMPARABLE FAUNAL ASSEMBLAGES OF JERUSALEM'S HINTERLAND

SITE	Tel Moẓa	Ramat Raḥel: Building Complex	Ramat Raḥel: *Favissa* L14109	Horvat Zimri
CITATION	(Sapir-Hen et al. 2016)	(Fulton et al. 2015)	(Fulton et al. 2015)	(Horwitz 1993)
NISP	2262	1200	144	68

2.2 Urbanism and Economy

Jerusalem, depending on the historical period, was the political and cultic capital of a territorial polity, vassal state, province, or independent kingdom. It cannot be argued that the main attraction to Jerusalem was the Temple. The economic draw of the Temple, in the form of tithing, sacrificing, and redistribution of these offerings, shaped not only those who came to inhabit the city or those who visited but generated a unique economic situation that allowed an urban settlement to develop. This chapter aims to discuss the aspects of society that dictated the use of animals. That requires comprehension of Jerusalem as an urban center, its dependence on a hinterland, its cult, and how all these aspects are interwoven.

2.2.1 Urbanism in the 8th through 2nd Centuries BCE

One of the issues when studying urbanism of the Levant in the 8th through 2nd BCE is that the majority of scholarship focuses on the rise of urbanism in the third millennium BCE and ignores the complexity that occurred in later stages of urbanism or re-urbanization. One of the factors that affected the urban nature of sites, and specifically of Jerusalem, was the ebb and flow, or rise and fall, of its population. In a period of low demography, namely that of the Persian and possibly Early Hellenistic, was the city no longer urban? Or was the urban center just smaller than the periods with high demography? Any attempt to answer these questions leads to a more significant debate within urban studies, did urbanism develop abruptly or as a progression (Cowgill 2004: 535)?

The transition from a small village to a state occurred within the context of climatic deterioration and fundamental changes in the Mesopotamian landscape in the 4th/3rd millennium BCE. In this way, urbanism can be seen as a response to extraordinary environs (Hole 1994: 121). There is an assumption that sites with urban qualities simply arose as a natural response to political and economic situations, like the process of centralization, by which people, according to Childe (1950), were "persuaded and compelled" to gather in substantial numbers in particular places, along with monumental architecture that enabled the authority of those in leadership to be further legitimized (Cowgill 2004, *references therein*).

Childe's (1950) influential work created the basis of our understanding about the urbanism of past societies, in which he proposed ten defining characteristics: (1) a density of population; (2) diversity of occupations; (3) concentration of agricultural surplus, either by tithing or taxation; (4) monumental architecture; (5) social hierarchy; (6) invention of recording; (7) developing more complex recording, specifically written script; (8) skilled artisans and

craftspeople; (9) trade and importation of foreign materials; (10) shared cultural identity. Other scholars have noted that some of these characteristics have more weight than others.

Sweet (1997: 48) links the rise of urbanism to the advent of writing as the use of cuneiform and proto-cuneiform tablets parallels the rise of urbanism. Others have suggested that the minimal requirements that are necessary for the development of urban society are the production of basic subsistence resources, specifically an adequate surplus of resources to feed a growing population not involved in agropastoralism (Zeder and Arter 1994: 105; Hastorf 2016: 169). Going beyond the requirement of monumental architecture, critical aspects in the composition of urban centers are other physical structures such as markets, public open spaces, leisure venues, and social segregation (Glennie 1998). Social segregation within urban society is traditionally stratified as an elite class of administrators and priests, a 'middle class' that were engaged in craft production and manufacturing, the lowest class that contained the rest of society (Trigger 2003). All of these aspects, urbanism, population growth, commodity production, technical and social innovation, function as a positive feedback loop, in which developments in any of them cause supporting reactions that amplify the other ones (Algaze 2018: 31).

A critique of Childe's work is that he underestimated the use and function of hinterlands in his defining characteristic of urbanism. Any definition of urbanism, in modern scholarship, must include the hinterland. As such, for this dissertation, the functional definition of urbanism is urban settlements act as centers whose economic, administrative, and religious activities and institutions affect a larger hinterland (Fox 1977; Marcus 1983; Smith 2007). Jerusalem, along with many other urban centers, depended on settlements in their hinterlands for subsistence in the form of agricultural products, pastoralism, trade, and taxation. Going back to the concept of the feedback loop, hinterlands, and urban centers are also connected, with advancement or

regression in either directly affecting the other. Any paradigm of Jerusalem's urbanism in the 8th through 2nd centuries BCE needs not only to address the role of the hinterland but also the role of the cult.

2.2.1.1 Religion, Cult, and Urbanism

It is commonly proposed that the biblical scribes were priests or Levites (1 Chronicle 2:55, 24; 6; 2 Chronicles 34:3), that were mostly employed by the cult, resided in Jerusalem (Grabbe 2000: 151). This would explain why the biblical texts convey an overwhelming urban perspective of religion (Davies 2010: 109). Cultic activities in cities took place in private homes, major streets, gates, and marketplaces, as well as at the national cult of the temple (*ibid*). Urban centers typically contain a greater diversity of cultic customs than rural villages, in addition to being directly affected by the royal or national cult, especially in comparison to the hinterland (*ibid*). It has been proposed that the biblical food laws developed as a reaction to the political situation in the 6th century BCE and that they represent an intensified desire for community boundaries emphasized through shared rules of practice (Hastorf 2016: 230). While the date can be debated, the laws and propaganda by the royal cult promoted a degree of unity or solidarity in the city (Davies 2010: 109) and is evident in 1 and 2 Maccabees and further may be reflected in other biblical texts.

Grant suggested that the religious, symbolic, and economic are all inextricably related (1991: 110). An example of the interrelatedness between religion and urbanism in Jerusalem can be seen in the urbanization of cultic festivals. The biblical texts specify that the laity should visit the temple three times a year for the pilgrimage festivals of Sukkot, Shavuot, and Pesach, respectably the festival of tabernacles, the festival of weeks, and festival of first fruits (Exodus 23:17 and Deuteronomy 16:16). From Jerusalem's perspective, these harvest festivals represent

revenue in the form of taxes to the king and tithes of agricultural and livestock offerings to the temple (Davis 2010: 112). The economic transfer of wealth from the village to the urban center, in essence, represents a financial harvest for Jerusalem (*ibid*).

2.2.1.2 The Role of Hinterlands

Ancient urban cities are not solely defined by a concentration of population or even by having fortifications and gates. Instead, the essential feature of an urban sector is that it is not economically autonomous but dependent, sometimes referred to as parasitic, on a rural hinterland.[22] Hinterland landscapes are intertwined in past human activities and experiences, as such they are deeply imbued with social significance and lived realities (Janusek and Kolata 2004). Previous scholarship has advocated that preindustrial urban cities were consumer cities, sustaining off the agropastoral produce of its hinterland, while at the same time were producing crafts and supplying services to the population within its territorial control (Small 2006: 317).

The prevailing paradigm regarding urban and rural relationships have revolved around the assumed sovereignty of urban pressure over the rural hinterland (*ibid*; Falconer and Savage 1995). Historical and archaeological evidence from areas outside of the Ancient Near East, in particular Mesoamerica, highlight to social and hierarchical distinctions between those that resided within the urban sphere versus the vast majority of the population who lived in the rural periphery (D'Altroy 2009: 483). Cultural and political power in the hinterland was not always the product of rulers and centralized governments, but also local kin-based groups, that could levy it own status to maintain large-scale economic production (Falconer and Savage 1995; Pauketat, 2000; Janusek and Kolata 2004).

[22] Johnson 1980; Schwartz 1994: 21; Pollack 1999; Cowgill 2004; Davies 2010: 105

Our understanding of Jerusalem's relationship with its hinterland is primarily based on the settlement and demographic analysis by Faust (1997; 2006; 2007) and Gadot (2015), as well as the zooarchaeological perspective from Sapir-Hen et al. (2016). It should be noted that these studies are the result of the numerous salvage and survey excavations that have revealed a variety of sites: rock-cut installation, isolated houses, villages, and farmsteads (Gadot 2015, *references therein*). The foundation of these studies argues that for Jerusalem to sustain a rise in population growth and complex political formations, its economy has to be based on more than the goods it could produce in its immediate arable land (*ibid*). Thus, Jerusalem was dependent on its neighboring hinterland whose population residing in the Refaʿim and Soreq valleys had greater access to wadi-beds rich in alluvium soil, which was favorable for dry-farming, due to their location near tributaries (*ibid*).

These assumptions have led some scholars to posit that during periods when there are few settlements, specifically the Late Bronze and Persian periods, represent the demographic breakdown of Jerusalem based on geopolitical events that caused the city's decline (Faust 2007: 169; 2012: 139–43). Others have disagreed, suggesting that the settlement dispersal during the 8th through 2nd centuries BCE represent the 'normal' carrying capacity for the region and that the settlement peaks of the Middle Bronze IIB and Iron Age IIB-C, along with possibly the Late Hellenistic and Roman periods, represent outliers (Gadot 2015: 6).

It has mostly been agreed that the surge in settlement activity in the hinterland during the Iron Age IIC (7th and early 6th century BCE) is attributed to the after-effects of Sennacherib's campaign, in the 8th century BCE, that devastated the Shephelah and necessitated Judah to

exploit new areas.[23] It is assumed that the Babylonian destruction and deportation at the end of the 6th century BCE also dramatically affected the hinterland. However, as Gadot revealed, the number of sites between the Iron Age IIC and Persian period went from 61 to 24, and 21 of the 24 sites settled in the Persian period were already occupied in the Iron Age IIC (2015: 18). This number is still higher than the number of sites in the periods preceding the Iron Age IIC and further that the stability of Jerusalem's hinterland in the Persian period was due to the economic hub of Ramat Raḥel (*ibid:* 21).

Overall, the stability of the hinterland was not solely dependent on the status of Jerusalem. Instead, the settlements in the rural hinterland can be considered more or less autonomous units, producing and consuming most of their resources. Those residing in the hinterland were more closely connected to animal productions and would regularly receive meat and other animal products through direct channels, versus the urban center that received meat though more regulated channels (Zeder and Arter 1994: 177; Sapir-Hen et al. 2016).

This statement for Jerusalem is exemplified through the zooarchaeology of Jerusalem and its hinterland in the Iron Age II, through a comparison of faunal remains from Tel Moẓa and the Western Wall Plaza excavation in Jerusalem (Sapir-Hen et al. 2016). The assemblage from Tel Moẓa depicted a subsistence pattern that is in-line with intensive agricultural production, such as a large frequency of cattle, as a result of draft work, along with older female caprines, for secondary product production (*ibid*). This pattern was counter to the picture at the Western Wall Plaza, where the frequency of cattle was lower than Tel Moẓa, and the caprines were younger

[23] Faust 1997; Feig 2000; Greenberg and Cinamon 2006; De Groot 2012: 159; Gadot 2015

and mostly males, suggesting an assemblage that was representative of a consumer class, as mentioned previously (*ibid*).

Rural agrarian life was not so much of a choice but a way to survive, maintain familial relations, and to provide for one's household (Adams 2014: 83). One of the reoccurring tasks facing agricultural production was the efficient harnessing of animal power and its impact on fruitful cultivation (*ibid*: 85), which was vital, as Jerusalem's hinterland acted as the central location for the region to grow cash crops that varied between olive oil, wine, and grains that were required as taxes and tithes by the ruling hegemony and neighboring cult center (Gadot 2015). The hinterland also benefited from its relationship to the urban center. Jerusalem provided facilities for the rural population, such as protection from outside forces, the central marketplace, and a more reliable, cheaper, and possibly more varied services of manufactured products (Davies 2010: 105). Regardless of residing in either urban Jerusalem or its rural hinterland, those that resided in either would visit and interact with the other, which relates to a shared collective cultural identity (Emberling 2003).

2.2.2 Jerusalem's Economy

Understanding Jerusalem's economy and the modes and mechanisms behind it are not straightforward. There are neither prevailing paradigms nor a singular approach to how ancient economies functioned. The role of animals is crucial to understanding Jerusalem's economy, as food in the ancient world was equivalent to power (Garnsey 1999: 33). To an extent, the control of food is the basis of all ancient economies (Hastorf 2016: 142). Previous scholars have studied numerous societies in different regions of the world and have devised no social laws, or economic laws, that apply regionally, much less globally (Carrier 2012: 3).

The most significant debate within economic anthropology is between two schools of

thought: substantivist and formalist. The central arguments between the two schools are by-and-large philosophical and can be summarized into five categories following Campbell (1981): materialist–idealist, normative–descriptive, holistic–individualistic, consensus–conflict, and interpretive–positive. The relevance of this debate is in understanding the substantivist perspective, as its founder Karl Polanyi was the first to put forth an economic-political model for ancient Near Eastern societies (Polanyi 1957; Polanyi et al. 1957).

The definition of the substantive, from Polanyi's perspective, is the relationship between humans and their natural and social environments, with the goal of this relationship to supply the individual with material satisfaction (*ibid*: 243). The reality of this perspective within ancient Near Eastern cultures is debatable, and the importance of Polanyi's contribution to the study of ancient Near Eastern economies is his framework of economic development, which has three stages: the first is non-monetary or bartering, followed by state-run redistribution, and the last stage is market economy (Polanyi 1944). This progression implies that by the market economy stage, bartering and redistribution are no longer practiced. However, this is most likely not the case, as ancient economies, including Jerusalem and its hinterland, practiced all three stages simultaneously.

Economic analysis traces the impacts of food production, distribution, and consumption within given societies (Goody 1982: 14). Tracking the food provisioning and subsistence strategies offer perspectives into long-term economic movements, which in turn reflect power structures, and highlights how food choice and value demonstrate societies economic position.[24] There are many economic models for food production, from the functional orientation of

[24] Marx 1939 [1867]; Engels 1942; Earle 1977

Radcliffe-Brown (1922) to energetic derived models.[25] These approaches, while a good introduction, do not discuss the unequal, or socioeconomic, the power that motivated these decisions.

Potentially useful food production models are Staple Finance and Wealth Finance, proposed by D'Alroy and Earle (1985). Staple Finance is defined as the direct mobilization of food and utilitarian products and can be seen as local agropastoralists feeding the larger population (*ibid*). On the other hand, Wealth Finance is achieved by converting staple production into other products and allows for the production, acquisition, and conversion of materials (*ibid*). The focus of Wealth Finance is on the role of local or regional production in surplus economies (*ibid*). The significance of Staple and Wealth Finance is that these models address the role of animals within societies and how their uses differ between economic spheres, including the differences between urban and rural settlements (Hastorf 2016: 160).

Economic activities leave behind tangible material remains, which can be used in archaeology to retrace economic mechanics (Zeder 1994). In the case of this study, the lens of economic movements will be explored through animal remains. The following subsections will further explore aspects of Jerusalem's economy, specifically the role of animals, in terms of markets, butchers, imports, and trade connections, how sacrificial practices at the temple affected the broader economy of Jerusalem and Judah, and the overall socioeconomics of Jerusalem's population.

2.2.2.1 The Role of Animals

[25] Hawkes, Hill, and O'Connell 1982; Harris 1985; Stephens and Krebs 1986; Harris and Ross 1987; Hawkes and O'Connell 1992

The role of animals in all societies is vast, and this fact is exceptionally so in ancient societies. Most notably, animals are used for food. Animal consumption products go beyond protein and calories (Russell 2011). Animal hair and skin can be crafted into wool, textiles, and leathers, while their bones were crafted into tools and jewelry, such as awls and inlays. Different parts of the body were used in medicine and divination. Animals were used in agricultural fields as draft power, and their manure was used as fertilizer. Animals themselves were a form of property and, in essence, constituted wealth.

What and how people consume food reflects the ideological aspects of society. Food choice is a complex action of sensory, meaning taste and texture, as well as non-sensory aspects such as health, price, availability, convenience, perceived risk, ethical concern, and individual values (Honkanen et al. 2005: 162). These food traditions are manifested through repetitive, habitual, bodily routines, and retained sensory clues that immerse individuals into their social identities, as such food harbors political and religious discourse (Hastorf 2016: 226). Explicit regulations that define a community are founded on long-established social mares, defining status, morals, values, and proper behavior (*ibid*: 228). A clear example of this phenomenon is the food or dietary laws dictated in the biblical texts (see Section 2.3). Even during times of distress, regardless of environmental or socio-political changes, individuals retain some agency over the food they consume, if not receive (Powers and Powers 1984; Wilk 2006). Evidence of this in the southern Levant is reflected in the continued exploitation of livestock throughout the dry and wet climate phases that characterized the Late Bronze Age to Iron Age I transition (Sapir-Hen et al. 2014, *references therein*).

It is generally accepted that meat was an expensive commodity that was rarely consumed, and primarily consumed only at special events (Hastorf 2016). Everyday special events in

ancient societies, and even today, are feasts. Feasts are the communal consumption of food and drinks in an out of the ordinary event that includes specialized food, either in terms of portion, preparation, and uniqueness.[26] Feasting has generally been regarded as the material manifestation of political action. Feasts become the location of political gossip and discussions because of the ramifications public food sharing, along with social and entertainment performances, has on interpersonal and interfamilial relations (Dietler 2007:71).

Identifying feasting activities within archaeological contexts is rare. Unless the symbolically charged refuse is specially deposited in unique circumstances, the remains are usually deposited with everyday consumption refuse, limiting their identification. An example from Jerusalem's hinterland that has evidence of feasting is the palatial Neo-Assyrian complex at Ramat Raḥel. Faunal remains from a ritual-feasting pit (*favissa*; L.14109), dated to the 7th century BCE, were uncovered under a sealed floor of the central courtyard (Fulton et al. 2015: 31). Results of the pits faunal assemblage determined that the feast included multiple fish and at least two sheep, a cow, seven partridges, a goose, and a songbird based on the Minimum Number of Individuals (MNI) (*ibid*: 35-36).

Interestingly, the species are common in historical faunal assemblages. There is a potential that feasting activities may be identified within this study's assemblages. Although it is more likely aspects of urban markets, butchery practices, trade, imports, and cultic sacrificial practices affected the use of animals within Jerusalem and its hinterland. The following subsections will delve into these topics and discuss the role animals played.

2.2.2.1.1 Market Economy and the Butcher

[26] Hayden 2001: 28; 2014: 8; 2016: 18; Dietler and Hayden 2001: 3; Smith 2015; Rowley-Conwy 2018

Markets vary in time, space, and items available (Harris and Lewis 2016: 9). Direct archaeological evidence of a marketplace in Jerusalem has not been identified before the Roman period. However, that does not imply that permanent or periodic markets did not occur within the city. In any discussion of markets, there needs to be a clear distinction between physical and abstract markets. A physical market is a location where people buy and sell goods, which is different from abstract markets, which are a conceptual construct where prices are created by the forces of supply and demand (Bonhannon and Dalton 1962). Abstract markets are determined by location and profitability, based on a combination of prices of products, rent, and transportation costs of products (Van Thunen 1826; Chrishelm 1979; Faust and Weiss 2005: 77). Transportation costs and the loss of product due to long-distance trade, of and by animals, affects profitability and drives up the cost by merchants (Harris and Lewis 2016: 16). For example, the price of fish in Jerusalem, and other inland sites, was probably higher than in coastal communities because of their location and transportation costs.

Evidence for an abstract market in antiquity is predominately based on literary sources describing the Greek *agora*, or market. Greek literary parallels are iterated in *Polybius* 34.8.4-10, *Strabo* 3.2.7, and *Ant.* 8.I.330C-33Ib. Plutarch makes references to farmers traveling from the countryside to the market in Sicyan (*Aratus* 8.3). In most models, the *agora* is depicted as a location into which goods and services flowed in and out of, connecting farms and individuals to markets abroad (Davies 1998). Grecian goods were imported far and wide and even made their way to markets of Jerusalem in the form of Rhodian wine (Ben-Ami 2013: 22). According to Herodotus (1.153.1-2), the *agora* was a standard feature of any *polis*.

Animals, meat, and their by-products were produced on a local scale but also on a market scale. They were sold or bartered for between neighbors and also in the marketplace. In rural

societies, most markets were periodic rather than permanent, but in centers, as the economy grew and specialized labor increased, permanent markets were established (Harris and Lewis 2016: 11). Those who did not slaughter and butcher their animals most likely acquired their meat through a specialist– a butcher.

Our primary source for butchers in ancient societies comes in the form of cuneiform texts from the Ezida temple of Borsippa, a cultic city linked to Babylon's New Year Festival. The texts dated to the period when the sanctuary was dedicated to the god of Nabû (c. 740–484 BCE) and detailed the day-to-day management of the cult (Waerzeggers 2010). The temple scribes of Uruk and Sippar were known to produce extensive archives on livestock management and the allocation of sacrificial animals, but only a few texts make references to butchers (*ibid*: 251). Butchers, similar to other specialists, performed services for the temple and participated in the communal preparation of sacrificial meals (*ibid*: 256; BM 29202 no. 113:8-9).

The main task of the butcher was to slaughter sheep, lamb, bulls, and fowl– all notably domesticated animals; after the slaughtered animal was presented to the deities, it served as food for the priesthood (*ibid*). The texts continue to describe the butcher's dissection of the sacrificial animal's carcass, in specific, prescribed ways (*ibid*; OECT 1 20). This process was charged with social meaning, as the distribution of specific cuts among the priesthood reflected an individuals rank within the temple's hierarchy (*ibid*: 258). The prime cut intended for the king and the higher echelons of the priesthood was the *imittu* (zag.lu, zag) or shoulder cut.[27] This sacrificial act is reminiscent of the sacrificial system detailed in the biblical texts, most notably the redistribution of the right shoulder to the priests in Leviticus 7: 28–37 (see Section 2.3.2.1).

[27] Uruk– SWV 117:23'3', AUWE 11 179; Babylon– Baker 2004 no. 58; Sippur– BM 43095; Borsippa– BM 102276 no. 166, BM 82617, BM 85443, BM 26511 no. 35

The butchers of Ezida were rewarded with substantial amounts of meat from the temple (~13kg/day), according to BM 29226 no. 112. Seemingly some existence of a meat market, where one could dispose of excess quantities of meats, is advantageous. It is therefore not unexpected to find evidence that the butchers, who were not a part of the priesthood, sold their compensation to third parties who marketed it outside of the temple (BM 26511 no. 35). These third parties acted as intermediaries, or mediators, between the cult, the butcher, and the market (Waerzeggers 2010: 268).

The price of sacrificial meat was two to five times higher than the meat of non-sacrificial animals (*ibid*: 270). Following the so-called market principle: that products for sale will fluctuate in price depending on the level of supply and demand, with prices that vary in times of distress, famine, and cultic influence. Although meat consumption was generally associated with the sacrifice of large animals, we should not underestimate the varieties of meat products available in the market, including that of birds and small game animals (Frost 1999; Harris and Lewis 2016: 22). Meat for the market entered Jerusalem through a few methods, such as by intermediaries, directly from herders who conducted slaughter and sale decisions, as well as by the religious elite (Hastorf 2016: 167).

We cannot accurately characterize an urban society in terms of an elite perspective, which utilizes markets for 'luxury' purchases, sitting atop an unassuming horde of subsistence farmers for whom the market was of minor importance (Harris and Lewis 2016: 22). Markets were used by all levels of society and functioned as a place for locals to trade goods and services. Major urban cities, like Jerusalem, also function as the location for the trade of sacrificial meats, trades, and imports.

2.2.2.1.2 Imports and Trade Connections

Evidence of imported goods inherently reflects trade connections, either through direct channels or through intermediaries. A society's perspective concerning imported food contends with their social memory of long-held cuisines or food traditions (Hastorf 2016: 165). Over time and depending on the global zeitgeist, this may be reflected in the gradual adoption or utter objection of foreign foods (*ibid*). An example of the gradual adoption of foreign products in Jerusalem can be seen in the prevalence of Rhodian amphorae found in the 4th-1st centuries BCE (Levine 2002: 56). The abundance of Rhodian amphorae, primarily dating to the mid-3rd and 2nd centuries BCE, suggests that the consumption of Rhodian wine went beyond just foreigners (*ibid*). Consumption of foreign wine by Jerusalemites during the Hellenistic periods is compelling, as it goes against later *halakha* texts that prohibit consuming foreign wine (*ibid*), echoing the contention between trying to maintain long-held social traditions and adoption of foreign trends.

Another notable example of food imports into Jerusalem is the presence of ichthyological remains or fish bones. Jerusalem's nearest water source, the Gihon, does not support fish habitation, implying that the fish must have been sourced from somewhere else. Fish remains from Jerusalem have been identified at the Ophel in Building's C and D (Lernau and Lernau 1989), at the City of David in Area's D1, D2, E1, E3, and G (Lernau and Lernau 1992) and an enormous collection was unearthed in the 'Rock-Cut' pool near the Siloam Tunnel (Reich et al. 2007).

Fish remains suggest that many different species originating from freshwater and marine sources (Lernau and Lernau 1989; Lernau and Lernau 1992; Reich et al. 2007). The most common fish was Gilt-head seabream (*Sparus sparus aurata*), a coastal marine fish that spawns in the Bardawil Lagoon but could be fished from along the entire coast (*ibid*). A recent investigation into the phosphate oxygen isotope composition of Gilt-head seabream teeth enamel

suggests that these fish were sourced from the hypersaline Bardawil Lagoon and traded throughout the Southern Levant (Guy et al. 2018).

Beyond the Bardawil fisheries, Egypt also exported Nile Perch (*Lates niloticus*), Tilapia (*Tilapiini sp.*), and African Catfish (*Clarias gariepinus*) (Lernau and Lernau 1989; Boulenger 1907). Catfish could have also been sourced from rivers in Syria (Teugel 1982) and Israel (Goren 1974; 1983). Similarly, Tilapia could have been sourced from the Yarkon and Jordan River, as well as the Galilee Sea (Lernau and Lernau 1989). Mediterranean fish including White Grouper (*Epinephelus aeneus*), Meagre (*Argyrosomus regius*), variety of Seabream (*Pagrus pagrus*) including Blue-Spotted (*Pagrus coeruleostictus*) and Striped Seabream (*Lithognatus mormyrus*), as well as Mullets (*Mugilidae sp.*), these constitute the majority of the fish population present in Jerusalem (Lernau and Lernau 1989; Lernau and Lernau 1992; Reich et al. 2007).

The enormous collection from the 'Rock-Cut' pool also had evidence of other Mediterranean species such as European Seabass (*Dicentrarchus labrax*), Tuna (*Scombrida sp.*), Red Soldierfish (*Sarocentron rubrum*), Jacks and Pompons (*Carangidae sp.*), Eels (*Anguilla Anguilla*), sharks or rays (*Elasmobranchiae sp.*) (Reich et al. 2007). The only clear evidence of trade with the Red Sea is one bone from Parrotfish (*Scaridae sp.*). Consumption of parrotfish is traditionally linked to the Byzantine period (Figueras 1991; Lernau 2005; Tepper et al. 2018a; 2018b), and its presence in earlier periods is unique.

Typically, military campaigns and wars cause a decline in interregional trade (Eden and Molot 1992). However, fish commerce continued throughout the geopolitical chaos of the late Iron Age II and subsequent periods (Borowski 1998: 175). Fish in Jerusalem are also attested to in the biblical texts. Nehemiah 3:3 and 12:39, as well as 2 Chronicles 33:14, references a 'Fish Gate,' ostensibly where they sold fish. Further, Egypt's association with fish is reiterate in

Numbers 11:5. Jerusalem's fondness for fish predates these texts and supports the notion that fish, as well as other imports, were an integral aspect of Jerusalem's diet and economy. Imports, as a whole, are instrumental in economic expansion, when not constrained by political scrutiny, can lead to a blossoming rather than cessation of foreign trade (Jacobs 1969; Algaze 2018: 31).

2.2.2.2 Cultic Animal Economy – Sacrificial Economy

Taxation played a critical role in the economics of the 8th through the 2nd centuries BCE. Regular individuals typically had to participate in the taxation system, in one form or another, either in the form of paying tithes to the temple or taxes to foreign rulers (Adams 2014: 128). Tithes to the temple, according to biblical sources, included grains and fruits, wine and oil, honey, coin, and domesticated livestock.[28] The conversion of surplus agropastoralist products into sacrifices, along with the redistributive practices of tithing, is better understood as an example of cultic economy (Lapin 2017).

The religious act of tithing and sacrificing was a key component of cultic activity in the ancient Near East. It has been argued that the purpose of food and animal offering is to share a meal with the deity, thus creating unity between humans and gods (Smith 1889). Following the anthropology of ritual theory, consumption of the sacrifice not only connected the worshipper to the deity but also strengthened community bonds and identity (Smith 1889; Lev Tov and McGeough 2007; Cheung et al. 2017). The bond of ritual meals is also iterated in the biblical texts, in specific reference to the connection between festive meals among kin and social provisions (Deuteronomy 12:18, 14:27-29, 16:11, 16:14).

[28] grains and fruits (Leviticus 27:30-31; Deuteronomy 12:17; 14:22; 14:28; 2 Chronicles 31:5; Nehemiah 10:37; 13:5; 13:12), wine and oil (Deuteronomy 12:17; 2 Chronicles 31:5; Nehemiah 10:37; 13:5; 13:12), honey, (2 Chronicles 31:5), coin (Deuteronomy 14:25), and domesticated livestock (Lev 27:32; Deuteronomy 12:6; 12:11; 12:17; 2 Chronicles 31:6; Nehemiah 10:37).

The explicit motivation for sacrificing animals was to please or honor various deities or past ancestors, but the violence of the act itself would instill fear into the spectators, which helped to dissuade internal unrest (Gibbons 2012: 83). Sacrifice stood as an import piece of political and religious theater that has two motivations, to consolidate power and to create group identity (Cheung et al. 2017). The biblical texts make references to two types of sacrifice. The most common was holocaust offerings in which the entire sacrifice was consumed by fire, but in some cases, the sacrificial remains were redistributed and consumed (Leviticus 7; 9). Parallels for the evidence of cultic sacrifices can be found in some archaeological evidence, but explanatory evidence is more coherent in the textual evidence.

2.2.2.2.1 Zooarchaeological Evidence of Sacrifice

Zooarchaeological material relating to cult use is primarily identified in pits near altars or courtyards of cultic structures. These pits, depending on the literature, are defined as *favissa*, midden, pit, or installation. In order to standardize this discussion, the term 'ritual pit' will be used. Beyond their location, ritual pits are characterized by containing primarily bones, ash, and in some cases, ceramics, in the form of consumption wares or figurines. Ritual pits have been identified in the Late Bronze at Hazor, at Iron Age I at Mount Ebla, and Iron Age II at Tel Dan and Tel Moẓa.[29] The only potential ritual pit in Jerusalem is Cave I, dated broadly to the Iron Age II (Franken and Steiner 1990; Eshel and Prag 1995). Cave I is not a pit but an artificial rock-hewn cave that was filled with debris that has been described as a *favissa*, according to its original excavator Kathleen Kenyon (Prag 1995: 211-212; Lernau and Lernau 1995). Chronologically a majority of these pits are not synchronic within the scope of this dissertation,

[29] Hazor (Lev Tov and McGeough 2007; Marom et al. 2017; Kehati 2017), Mount Ebla (Horwitz 1987), Tel Dan (Greer 2013), and Tel Moẓa (Kisilevitz 2013).

but they do attest to a continuity of sacrificial practices in the Southern Levant.

A general synthesis of the faunal remains found within these pits can be found in Table 2.6. In some cases, the faunal material has not been published and was not included. In general, the only analogous aspect between the ritual pits is the age of caprines, representing both young and older livestock, as well as the inclusion of cranial and limb elements (Table 2.6). The frequency of burned and butchered remains is heterogenous between the ritual pits and may represent the lack of uniformity in anthropogenic processes.

TABLE 2.6: DEMOGRAPHIC AND TAPHONOMIC PROFILE OF RITUAL PIT FAUNAL ASSEMBLAGES IN THE SOUTHERN LEVANT

Site Stratigraphy	References	Animal Frequencies (NISP%)				Body Part Preferences	Age of Livestock	Butchered %	Burned %
		Caprines	Cattle	Pig	Wild				
Hazor– LB Phase XV, L.9504	Kehati 2017: 664-672, Marom et al. 2017	78%	21%		1.4%	Cranial, Limb, Trunk	Generally described as both young and older livestock	0.1252	0.0584
Hazor– LB Phase XIV-XIII, Building 7050	Lev Tov and McGeough 2007, Marom et al. 2017	67%	30%	1%	1.4%	Cranial, , Some Truncal Limbs	1-3 years "market-aged"	NA	NA
Mount Ebla– Iron I Northern & Southern Installations	Horwitz 1987	45%	36%		>1%	Cranial, Trunk*	NA	0.1% (Northern Installation) ; 3%*	10.6% (Northern Installation) ; 4%*
Tel Dan – Iron Age II Phase IVA-III Area T- SD1, SD2, SED, SED2, NED	Greer 2013	82%	17%			Limbs	Evidence of young and older	3%	0
Jerusalem, Iron Age II Cave I, A. XXVI	Lernau 1995	49%	5%			Cranial Hind-Limbs	Evidence of young and older	NA	NA

* From the entire site, independent context percentage not specified

2.2.2.2.2 Textual Evidence of Sacrifice

Descriptions of the sacrificial practices and procedure within the biblical texts do not exist in a vacuum, nor was Jerusalem the only major urban center with an economy that centered around a cultic institution. Cuneiform texts from a myriad of cultic sites in the ancient Near East either mirror the practices detailed or maybe a resource in understanding aspects of the sacrificial procedure that are absent in the biblical texts.

A parallel to the sacrificial offerings in the Hebrew Bible can be seen in the Ugaritic Rites for the Vintage texts describing the autumn grape harvest and wine production at the Temple of Baal in Ugarit (KTU 1.41//1.87, 1.95). Animals mentioned in the Rites for the Vintage included the standard male and female caprines (i.e., sheep and goats) but also mentioned domestic pigeons twice and general birds twice (Levine, de Tarragon, and Robertson 1997: 299-301). The text also references offerings designated to the staff of the gods, meaning priests, as well as the consumption of a sacred meal (KTU 1.41//1.87: 33b-38a).

Cuneiform texts from the Eanna Temple of Uruk describe the extensive operations involved in the sacrificial economy of ancient Near Eastern cults (Kozuh 2010; 2014). The Eanna Temple represents a contemporary institution to Jerusalem's Temple, as it was active during the Neo-Babylonian and Achaemenid periods (625-520 BCE; Kozuh 2014). Beyond the ritually prescribed minimum of nine lambs sacrificed a day, the temple had an internal infrastructure for the care, maintenance, breeding, ritual expenditure, payment of services, and distribution of offerings that made their way to the sacrificial altar versus those that were deemed non-sacred (*ibid*).

The relevance of these cuneiform texts is the intricacies in the division of labor between the temple's immediate personal and its outside contractors, which cuts across many aspects of cultic economy as a whole (Kozuh 2014: 2). Those primarily involved in the livestock management of the cult's herds were contractors (*ibid*; YOS 7 143). A majority of these animals remained at pasture in the countryside, though the herdsmen were not equated to shepherds (*ibid*). They were considered business-people with a financial interest in both the temple's livestock and agricultural products (*ibid*: 68). It has been argued that these individuals, as well as other artisans associated with the temple, had substantial wealth that could not be placed within

the dichotomy of a higher or lower class (*ibid*; Kozuh 2010: 535).

In lieu of a payment in the form of silver or rations, the temple distributed animals that were designated as non-sacrificial.[30] Non-sacrificial animals were considered female caprines brought by private individuals, goats, or older barren sheep that were considered less prestigious because they were not young male sheep (Kozuh 2010). Payment or distribution, either in the form of portions from the sacrificial offerings or livestock that were designated as non-sacrificial, represents the economic transfer of wealth from the cult to general society. In principle, the Eanna Temple, as well as Near Eastern temples writ large, could be understood as a corporate entity with accompaniment associates and a wide range of assets (‘van Driel 1993; Kozuh 2014).

2.2.2.3 Socioeconomics of Ancient Societies including Jerusalem’s Population

As a general principle, the food people consume tends to reflect their identity, or rather the identity they wish to be associated with (Fitchen 1988; Fiddes 1991). Identity goes beyond cultural ties but also includes economic status. It has been argued that the term ‘socioeconomic status’ is only appropriate from the 15th century CE onward, as the terms relate to the development of capitalism, which led social and economic status to be intertwined (McBride and McBride 1987; Ashby 2002).

However, at least within urban societies, one’s economic, social, and political status can be traced back to specific intertwined status-related activities, such as evidence of those of higher economic status, or *elites*, is generally associated with game hunting (Dalix and Vila 2007; Firmage 1992; Marom and Zuckerman 2013) and conspicuous consumption (Zeder and Arter

[30] BIN 174: 24, 31; BM 114558; BM 113264; UCP 9/2 24: 28; YOS 17 360: iv 6-41

1994: 105). Counter to urban society, the socioeconomic status of the rural hinterland is of equal economic and social standing, and less hierarchical, with the majority of rural populations involved in agropastoralism (Redfield 1953; Faust 2000).

The communal cooperation in the division of land balanced the economic and social division of rural communities (Wolf 1955; Faust 2000). According to Faust, the archaeological evidence for Jerusalem's hinterland in the Iron Age II suggests the size of houses and material culture does not indicate any distinction between lower and higher economic status, rather that both intra- and inter-site contexts are similar (2000: 28). Peripheral or rural areas had less oversight from governing forces (Gadot 2015), which allowed them to maintain social equality. If this is the case, then distinguishing the upper and lower stratum of society is limited to the urban core of Jerusalem.

The distinction between higher and lower socioeconomic status is based on differential access to food, stemming from the mechanics of prestige economy, such as control over staple food production and possible surplus (D'Altroy and Earle 1985; Hastorf 2016: 161). Farming or agricultural families would shift their staple production and consumption of crops, and possibly herds, under the influence of the ruling empire and the demands they requested from their subjects (Hastorf 1990; 2016). Beyond agricultural products, the local production of wool and woven cloth was the single most important economic activity contributing to the urbanism and economic status of an area (McCorriston 1997). Even meat-based economies still produced wool products (Kozuh 2014). Thus, control over production and surplus of agriculture and wool is the basis of economic power, which propagates inequalities (D'Altroy and Earle 1985; Zeder and Arter 1994; Hastorf 2016: 161). Further inequalities can be seen in excessive taxation, which leads to the subsequent impoverishment of broad sectors of society (Garcia 2016: 2). In historical

literary sources, Antiochus III exempted taxes from Jerusalem's *Gerousia*, priests, scribes, and temple singers (*Ant.* 12.142), further differentiating economic status between the elites from the non-elites in the Hellenistic periods.

Increased specialization of higher status goods and restricted access to goods is a prerequisite to socioeconomic control; thus, in other words, elite specialized products confer status (Rosen 1997). Models of meat consumption suggest that urban centers were provisioned with meat-rich body parts.[31] Control or access to resources by the urban elite was a powerful tool in an attempt to maintain economic and sociopolitical superiority, to the extent that the elites controlled butchering markets as well as probably access to meat (Zeder and Arter 1994; Hastorf 2016: 167).

Zeder has proposed three styles of meat provisioning that may reflect social inequalities: high-quality cuts, lesser quality meat, and no restrictions (1991). High-quality cuts were restricted to public buildings or temples, where butchers worked on sacrificial offerings (*ibid*: 250). Lesser quality meats would signify craftspeople and specialists associated with the administration, following the idea that cost efficiency was more evident in the control of the governmental meat provisioning (*ibid*). Meat supply with no restrictions is representative of unattached city residents who had the accessibility to select meat independently and obtained meat from all sources, including markets or directly from herders (*ibid*).

Conspicuous consumption, in this discussion, meaning the consumption of distinctive foodstuffs in a specific manner, is an indicator of social and ethnic distinctions between members of an increasingly hierarchical society (Zeder and Arter 1994: 105). Status-related practices and

[31] Zeder 1984, 1988; Wapnish and Hesse 1988; Crabtree 1990: 164; Stokes 2000: 151; Marom and Bar-Oz 2009: 57

conspicuous consumption is reflected in the diversity of species exploited, the relative abundance of domestic versus wild taxa in an assemblage, body part frequencies, and butchery marks (Ashby 2002: 39). As such, symbolic capital generates elite prestige, acted out in social politics (Bourdieu 1977: 177-183).

Examples of symbolic capital can be seen in the choice cut of meat that is designated to the priests or priestly class in the biblical texts (Leviticus 7:26; 1 Samuel 2:12-17) as well as the biblical political leader's ability to finance a feast, and dictate not only who comes, but who is invited, and where they can sit (1 Samuel 20:18; 24-30). All meals have been argued as political. Even grandiose feasts overtly display political and social control over others (Dietler 1998). Consumption of specific body parts also conferred status, with high status represented by hindlimbs versus forelimbs, which were considered of medium utility (Rowley-Conwy 2018). The distribution of these limbs at feasts, so the participants can take them away is attested to in ethnographic scholarship (*ibid*). Meaning prestige and status drive the mechanism that provides meaning to society and its internal ranking, which was further instilled within the economic system (Hastorf 2016: 161).

Some level of dependency between elites and non-elites is evident in the organization of cultural society, suggests that out of social, political, and economic necessity or mutual dependency, members of the elite, artisans, and specialists lived within proximity to one another (Parkins 2005). Emulation of elite and sociopolitical practices is assumed to occur in all levels of society (Hastorf 2016: 153), which exposes why neighborhoods are often found to be heterogeneous, at least in socioeconomic status (Cowgill 2004: 538).

Overall, Jerusalem's population was made up of a diverse conglomeration of people from all aspects of society. The rural population would have visited the urban core to sell products and

offer sacrifices to the temple. The core consisted of elites, composed of priests and political leaders, the middle class represented by craftspeople and specialists who had some connection to the cult, and the lowest class would have been the remainder. Distinguishing these populations is primarily based on aspects of conspicuous consumption, but it is not improbable that elite emulation by the lower classes would have also occurred.

2.3 Animals and the Biblical Laws

Scholarship regarding the biblical food laws originates in an ambition to date and comprehend the lists of animals in Leviticus 11 and Deuteronomy 14. Archaeological theory has attempted to connect the physical remains to the textual sources. At the same time, the application of zooarchaeological principles and theories may be able to shed light on the extent that these laws were incorporated into ancient daily life. A matter of contention in this discussion is: when were the laws written, when were they redacted, and to what degree did Mishnaic and Talmudic writings influence our understanding of the biblical food laws. It should be noted, as a further complication, that many of the laws are comprised of multiple verses, in different books, and parts of these foodways may date to different historical periods.

This research will focus on four central food laws mentioned in the biblical texts that zooarchaeological methodologies may be applied. The first is what, in modern terms, comes to be known as *kashrut*. *Kashrut* dictates which animals are acceptable or prohibited to be eaten following the lists of animals in Leviticus 11 and Deuteronomy 14. In archaeological terms, it may be evident in the presence or absence of certain species in a given context. The second food way is the butchery practices of *Shechita* and *Nikur*, which regulate food preparation (i.e., slaughtering and butchering) of sacrificial offerings, as dictated in Genesis 32:33, Leviticus 7:26,

and Deuteronomy 12:16.[32] The Priestly tithe in Leviticus 7:28–37 is the third food way as it is closely related to the butchery practices and involves the redistribution of choice meat cuts. The tithe dictates the redistribution of the right limb of sacrificial offerings to the priests or priestly class. The final food way relates to the sourcing and herd location of sacrificial offerings. Understanding these prohibitions and laws through zooarchaeological methodologies is varied and intricate; however, if conciliated, we may be able to explore the introduction and development of these biblical customs.

2.3.1 Kashrut– Beyond the Pig Taboo

Similar lists of consumable species in Leviticus and Deuteronomy gains the most attention by scholars.[33] The context of the list in Leviticus primarily focuses on the priests, specifically the priestly laws (Milgrom 1991: 1). However, what makes Leviticus 11:3–16 unique is that it is one of the few series of laws in Leviticus that is not just for the priest but also for the entire nation. The verses are a part of instructions to Aaron, his sons, and their decedents to teach them how to distinguish between the sacred and profane (Carmichael 2006: 14).

The verses contain a summary of food laws that are concerned with which animals are pure or impure to consume. Milgrom asserts that the criteria for all animals mentioned in this chapter are so worded as to emphasize means of locomotion (1991: 619): The determination of pureness is based on the assumption that those animals which are permitted to consume, move in a way that is natural to their environment, such as land animals walk, water animals swim, and

[32] Terminology for the biblical butchery practices (i.e., *Shechita, Gid HaNashe, Nikur*, etc.) derives primarily from the Talmud and modern Jewish scholarship. These terms are commonly used within the scholarship of biblical butchery practices and for continuity will continue to be used in this discussion albeit possibility dating the practices to after the destruction of the Second Temple in 70 CE

[33] Wood 1869; Aharoni 1943–1946: 103, 239–55; Bilik 1961; Houston 1993; Borowski 1998; Kislev 2000; Amar et al. 2010; Nihan 2011

air animals fly (Milgrom 1991: 655). This determination or explanation of pure and impure, however, is not universally agreed upon (see, Douglas 1966, 1993; Houston 1993).

The context for the lists in Deuteronomy is less about conveying the difference between the sacred and the profane but instead focused on distinguishing the Israelites from their neighbors vis-à-vis the Deuteronomic Code (Deuteronomy12-26) (Lundbom 2013: 477). Interestingly, it is in Deuteronomy that the list of consumable, or pure, species is dictated for the large land animals in 14:4–5. The importance of these verses is not the social law or taboo that are created, but rather these verses are the complete list of mammals known by the people of the Southern Levant during the period of biblical transcription and ostensibly redaction.

The first three species listed are domestic livestock: the ox (*Bos taurus)*, the sheep (*Ovis aries)*, and the goat (*Capra hircus*), their identification is unquestionable (Amar et al. 2010: 3). The identification of these remaining seven, as well as the birds mentioned, is ambiguous. Scholars have battled over the identification of these species, and no consensus has been made.[34]

Prohibition of the pig gains the most attention by scholars because it is one of the few animals expressly declared impure by the biblical texts (Leviticus 11:7; Deuteronomy 14:8). Leviticus states that a pure ungulate is determined as one that has cloven hoofs and chews its cud (Leviticus 11: 4). The pig is the only one of the four quadrupeds listed that have cloven hoofs and does not chew its cud. The chapter could have stipulated only one criterion, cloven hoofs, and it would have eliminated the other three quadrupeds (i.e., camel, rock badger, and hare). Milgrom assumes, therefore, that the scribes must have added cud-chewing as a second criterion for the sole purpose of eliminating the pig (1991: 649).

[34] Wood 1869; Aharoni 1943–1946: 103, 239–255; Bilik 1961; Houston 1993; Kislev 2000; Amar et al. 2010

Biblical and anthropological scholarship on the pig prohibition influenced archaeology to propose and debate the hypothesis that the presence or absence of pig remains in archaeological contexts could determine cultural identity.[35] Brian Hesse was the first to look at pig frequencies at sites in the Southern Levant (Hesse 1990). He demonstrates that pig frequencies were low in the Iron Age (1130–586 BCE) except in Philistine sites (*ibid*). The use of the pig as an ethnic border was established. Its application was suggested with an air of caution, as other factors influence rearing pigs, such as economic and political factors, ecological aspects, and site function (Horwitz and Studer 2005). Further inquiry into Philistine pig consumption showed an increased consumption during the early Iron Age and a recession of consumption later into the Iron Age, which probably related to the Philistines' arrival and subsistence practices of newcomer societies (Sapir-Hen et al. 2013). This conclusion was further supported by the ancient DNA of pig haplotypes, indicating that Philistines brought with them local pigs from their countries of origin (Meiri et al. 2013).

The capstone to the pig taboo debate is Sapir-Hen et al.'s (2013) results from their research into the dichotomies of pig frequencies in the Southern Levant. They find that there was a dichotomy of pig consumption between Philistine urban and rural settlements, where pig remains were more prevalent in Philistine urban centers. This suggests that pig consumption was a convention of urban populations rather than an ethnic trait.

Further, Sapir-Hen et al. conclude there was also a dichotomy of pig remains in the Iron Age IIB (780-680 BCE) between the Northern Kingdom of Israel, where pigs are present in significant numbers, and the Southern Kingdom of Judah, where pigs are mostly absent (*ibid*).

[35] Douglas 1966; Hübner 1989; Hesse 1990; Milgrom 1991: 649; Finkelstein 1996; Harris 1997; Hesse and Wapnish 1997; 1998; Horwitz and Studer 2005; Grigson 2007; Bunimovitz and Lederman 2011

Israelite pork consumption is likely then related to the need for a quickly maturating meat source in order to feed a growing population during a period of peak prosperity. After Sennacherib's campaign of the Northern Kingdom in 720 BCE, Judah continued to avoid pork consumption, suggesting that the pig taboo may have originated as a reaction to Israelite refugees, as pig consumption was already on the decline in Philistia (*ibid*).

2.3.2 Cultic and Sacrificial Butchery

According to ethnological and anthropological literature, the social identity of a group can be expressed in the manner they produce their food.[36] The taboos, customs, and rituals specific to individual groups or societies influence the butchery practices performed, which translates into specific food-processing activities (Soulier and Costamagno 2017). By reconstructing the processes of the butcher, it is possible to retrace the intentions and technical skills of the butcher (Vigne et al. 1987). Thus, there is a possibility that we can trace cultic or sacrificial butchery markings dictated in the Hebrew Bible (Genesis 32:33, Leviticus 7:26, and Deuteronomy 12:16).

Across all cultures, the practice of animal sacrifice is one of the most gendered practices, nearly always being practiced by men (Sered 2002). Sacrificing an animal may not have required any special knowledge or skill; however, the elaborate regulation and prescriptions of dissection certainly did (Waerzeggers 2010: 271). The majority of our information regarding the ritual procedure of sacrificial dissection comes from Mishnah, which was written in the 2nd century CE, and the Gemara, which was written centuries later in the 4th to 5th centuries CE (Levine 2002: 157; Halivini 2009; Greenfield and Bouchnick 2010: 7).

These texts were written as a reaction to the loss of the temple in 70 CE when the ritual

[36] e.g., Fischler 1988; Simoons 1994; Lalhou 1998; Politis and Saunders, 2002; D'Iatchenko et al. 2007; Serra Mallol 2010

acts could not be carried out without a functioning temple or priesthood. The central focus of Jewish religion during this time transferred from animal sacrifice to the study of Torah (Cope 2016: 331). The religious theory developed by the Tannaim, a group of rabbinic sages active during the 1st and 2nd centuries CE, understood the Torah as requiring that an animal could only be consumed if it were killed and butchered in a sacrificial manner (*ibid*). The elaborate procedure associated with *shechita* (i.e., religious butchery) and *nikur* (i.e., porging, removal of the sciatic nerve) may have its origin in avoidance of the *gid hanasheh* (i.e., sciatic nerve; Genesis 32:33) and prohibition of blood consumption (Leviticus 7:26 and Deuteronomy 12:16). Retrojection of Mishnaic and Talmudic laws onto activities dated to before the destruction of the Second Temple should be done with an err of caution. Notwithstanding, these traditions may have derived from sacrificial activities occurring at the Temple, and particular focus will be given to practices mentioned in the Pentateuch (e.g., blood taboo, avoidance of hindlimb).

The procedure for the initial slaughtering of sacrificial offerings is not mentioned in the biblical texts. All that is known is that one must spill blood on to the altar.[37] According to the Talmud, the initial cut along the jugular veins by the ceremonial knife (*Chalaf*) may not mark [the bone] or cause pain to the animal (*Tosafot,* Hullin 27b). This procedure was done with the animal's head bent back, and the knife *chalaf* passed downward on a slant from the carotid artery under the ear and across the ventral surface of the cervical vertebrae, deep enough to sever the windpipe– allowing for a wider surface area and allow for heavier bleeding from the artery, thus rendering the animal unconscious quicker. The slant would prevent the windpipe from closing, allowing more blood to be drained and allowing the animal not to strangle on its blood (Cope

[37] Exodus 29:16, 20; Leviticus 1: 5, 11; 3:2, 8, 13; 7:2; 8:15, 19; 9:12, 18; 16:15; 2 Chronicles 29:22, 24; 35:11

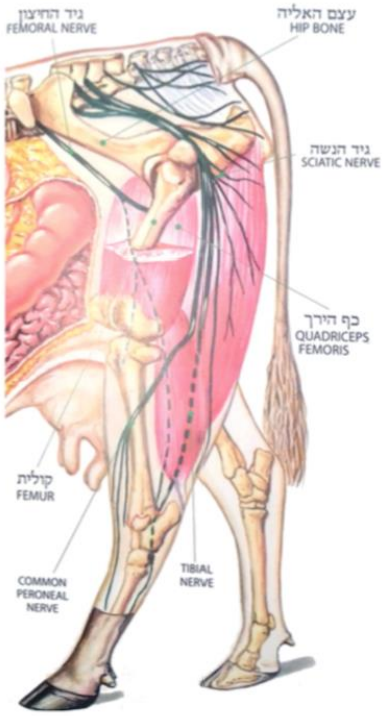
2016: 332). The specifics of this process would suggest no markings on the cervical vertebrae. However, if this is the development of the Talmud or earlier is unclear. In previous scholarship, Cope has argued that markings on the ventral side of the axis and atlas should indicate religious slaughter (Cope 2004; 2016), while others have suggested there should be no markings following the Talmudic order that the *chalaf* cannot touch the bone (Greenfield and Bouchnick 2010).

The prohibition against consuming blood is reiterated numerous times in the biblical texts.[38] The avoidance of the hindlimb relates to the blood taboo as this part of the body contains the sciatic nerve, a large blood vessel that, if pierced, would contaminate the muscle, or meat, surrounding it with blood. Porging, or *nikur*, is a butchery process involving the removal of specific parts of the carcass, notably the sciatic nerve. Porging removes two prohibited nerves: the 'inner nerve' or *gid hanasheh*, which is forbidden in Genesis 32:33; and the 'outer nerve' or *gid hachitzon,* which is prohibited following the Talmud (Lisowski 2019).

The sciatic nerve is a continuation of the sciatic plexus, emerging inbound on the fifth and sixth lumbar vertebrae, and passes through the greater sacral foramen, and blends with the gluteal nerve. It then passes downward on the lower section of the sacro-sciatic ligament on the origins of the deep gluteal muscles, and then it passes over the ischiatic spine of the innominate front of the acetabular notch (Figure 2.2; König et al. 2013; Cope 2016: 334). It exits the pelvis and passes the proximal epiphysis of the femur, on its caudal side and divides into the tibial nerve and common fibular/peroneal nerve (*ibid*).[39]

[38] Genesis 9:4; Leviticus 3:17; 7:26; 17:10-14; 19:26; Deuteronomy 12:12-25; 15:23; 16
[39] Identification of religious butchery markings in zooarchaeological assemblages is discussed below in Methodology, Section 3.5.5.1.

FIGURE 2.2: LOCATION OF CATTLE NERVES RELEVANT IN *NIKUR*/PORGING. ILLUSTRATION FROM LACH (2011: 95)



2.3.2.1 The Priestly Tithe

Butchering animals in a sacrificial manner ostensibly also included the separation of the priestly tithe. The priestly tithe is dictated in Leviticus 7:28–37 when the procedure for ritual sacrifices is described. Depending on the translation of the word *shôk* [שוק], as thigh, hip, leg, or shoulder thigh, the priestly tithe has been specified as either the right hind limb (i.e., femur, tibia, metatarsal) or the right forelimb (i.e., humerus, radius, ulna, and metacarpal). Opposing translations complicates zooarchaeologists' ability to identify the priestly tithe and may suggest there that either the fore or hindlimb could have been given to the priests. However, the semantics of the butchering system of *shechita*, discussed above, would justify that the forelimb was the priestly offering, as this portion of the animal does not contain the sciatic nerve, which, as noted above, was prohibited.

The zooarchaeological method used to identify the priestly tithe is based on statistically testing Sided NISP. NISP, or the number of identified specimens, is calculated by counting the number of identified fragments per taxa (Lyman 1994: 100–1). Sided NISP separates the right and left side of the forelimb skeletal elements (humerus, radius, ulna, and metacarpal) and the hindlimb (femur, tibia, and metatarsal), and then tests the difference statistically to see if the count of right versus left is significant.[40]

NISP frequencies have been employed at the site of Tel Qiri, where Ben-Tor (1980) reports a high frequency of right forelimbs of goats (*Capra hircus*) associated with cultic vessels in a dwelling dated to the 12th-11th centuries BCE. He uses the biblical edict to explain the frequency of right forelimbs in the dwelling (*ibid*). Mount Ebal is another site for which scholars have used NISP frequencies as a method for explaining the dominance of forelimbs elements in an Iron Age I cultic context (Horowitz 1987). The remains from Tel Qiri and Mount Ebal are both dated earlier than the transcription of Leviticus, suggesting the priestly tithe was a cultic habit practiced in the southern Levant before the composition of Leviticus.

Sacrifice, throughout the ancient Near East, commonly entailed the dismemberment and appointment of animal cuts to various ritual, social, and political actors (Marom and Zuckerman 2013: 574; Burket 1996: 150). A text from the Temple of Uruk, dated to the 9th century BCE, described in detail how sacrificial animals at the temple had to be dissected and distributed (OECT 1 20). The prized cut of meat, according to these texts, was the shoulder-cut [*imittu*

[40] Specifics of this methodology will be discussed further in Methodology, Section 3.5.5.1.1.

(zag.lu, zag)], this designation is also paralleled in several other cultic praxes of Babylonian Temples (Waerzeggers 2010).[41]

Additionally, there are epigraphic parallels from Greece on red and black Attic Vessels dating to the 6th–5th centuries BCE that depict the sacrificial honorary offering of the right thigh or leg portion to the priests or honored guests (Tsoukala 2009). Depictions of honorary offerings on Greek Attic Vessels, as well as other Near Eastern texts, suggest that the practice of allocating choice cuts of meat to religious officials and dignitaries was a known practice throughout the ancient world.

2.3.3 Sourcing of Sacrificial Offerings

Deuteronomy 14:24–26 states that if the distance to the temple is too great, one may convert their offering into silver and spend it at the cultic location. Typically interpreted as within the walls of the cultic city. This mandate is relevant in studying the role of animals, trade, and pilgrims in cult-based economies. The economic foundation of the Jerusalem Temple, as well as the other local cultic centers, were the pilgrimage feasts exemplified in the biblical commandments in Exodus 23:17 and Deuteronomy 16:16. These verses command laypersons to visit and give tithes during the three major festivals: Sukkot, Pesach, and Shavuot (Goodman 1999: 60; Hartman et al. 2013: 4369).

Elites presumably controlled the traffic of luxury goods into and within Jerusalem, and possibly other cultic centers, because sumptuary laws restricted the use of food as a status symbol, even within the context of feasting (Blanton and Feinman 1984: 676; Kipp and Schortman 1989: 374). Control by the elites over the goods brought into a city by pilgrims or

[41] Uruk: SWV 117:23’3’; AUWE 11 179; Babylon: Baker 2004: no. 58; Sippur: BM 43095; Borsippa: BM 102272 no. 166; BM 82617; BM 85443; BM 26511 no. 35

traders is an aspect of a "redistributive economy," in that goods channeled through redistributive hierarchies were used primarily to finance activities directed by the elites (Earle 1977: 227). In the case of Jerusalem and Jerusalem's cult, the social elite, for this discussion, the priestly class, financed the city and the cultic activities through the biblical commandments to bring tithes in the form of silver and foodstuffs.

The trade and commerce developed by pilgrims are typically studied under the umbrella of religious tourism, which estimates the general expenditures of pilgrims, including transportation, accommodation, meals, tours, souvenirs, and provisions for ritual activities (Saayman et al. 2013: 407). Religious tourism of pilgrims can be seen as early as the third millennium BCE in the land of Sumer (Elsner and Rutherford 2010: 11), and has continued into present-day throughout the world and is significant in many world religions, with the most notable being the pilgrimage to Mecca in Saudi Arabia. The specifics of transportation, provisions for ritual activities vary between religions and timeframe. These facets all played a role in the decision makings of southern Levantine pilgrims; in that, they had to travel to the cultic center, either on foot or donkey, they had to pack or find shelter, they had to pack or purchase food, and they had to bring their tithes to the cult. These decisions are all economic, and the decision to transport tithes, such as livestock, can reveal the herding distances of pilgrims and the economic reach of the cult.

Commonly used zooarchaeological method for understanding regional variance, meaning the range of herding, and transporting of livestock (i.e., sheep, goat, cattle), is based on metrical analysis (i.e., the measurement of bone elements) Simply, the measurement of specific elements, such as the humerus and phalanges can indicate if a population is of similar or diverse size ranges. Animals raised in the same regional environment, or herd, are likely to be similar in size,

due to genetics and grazing nutrition. By comparing the measurements of bone elements from a site in question to a site with known local herding, one can examine the range of herding and transport of animals. This method allows zooarchaeologists to test if the animals in an assemblage were locally raised or imported into the site. Typical elements used for testing regional variance are the fore and hindlimbs, specifically the humerus, although one has to be cautious as sizes of these elements are also impacted by sexual dimorphism (Zeder 2001).

Horwitz and Tchernov employed metrical analysis to study the size variance of caprines (sheep and goat) from the Iron Age II levels of the Ophel in Jerusalem (Horwitz and Tchernov 1989: 152, Table 4). Comparing the measurements of the elements humeri, astragalii, and phalanges between the caprines of the Ophel (Buildings C and D) to Beer-Sheba (Phases IX-VI), they conclude that caprine sizes are similar for the entire region (*ibid*). However, another view, if one takes a closer examination of the Ophel and Beer-Sheba caprine measurements, may suggest that the caprines were raised or herded in Beer-Sheba and then imported into Jerusalem, as was common in later periods (see, Hartman et al. 2013).

Another method to identify the source of animals found in archaeological contexts is based on the application of stable isotope biogeochemistry. Stable isotope analysis involves the study of environmental physiological and dietary changes through the measurement of carbon, nitrogen, oxygen, and strontium isotope ratios obtained from sediments, water, plants, and animal tissues (Makarewicz 2016: 190). The aim of zooarchaeological and anthropologically orientated isotopic studies is geared towards understanding human subsistence, social organization, ritual activity, and political complexity. The isotopic case studies discussed below use carbon, nitrogen, and strontium isotopes to locate the grazing areas of caprines in order to examine the origin of cultic sacrifices and the site's livestock.

Two sites have put forth isotopic studies with Deuteronomy 14:24–26 as their basis: Tel Dan and Jerusalem. Tel Dan's analysis was based on sheep and goat remains from the Iron Age II levels of domestic Area M and cultic Area T (Arnold et al. 2015). The isotopic results suggest that there was minimal diversity amongst the sheep and goat brought into the city, and they all originated within ca. twenty kilometers of Dan. The results suggested that the cultic institution was most likely raising its sacrifices; perhaps Dan was a multi-ethnic city, and the cult personnel wanted to ensure ritually pure sacrifices (*ibid*).

Another isotopic case study is from Early Roman Jerusalem, and it reinforces Martian Goodman's (1999) theory that Jerusalem's economy was entirely based on the city's cultic nature and dependence on pilgrims. Mass international pilgrimage to Jerusalem did not start until the Hellenistic period and peaked in the Early Roman period. Goodman (*ibid*: 73) states that it was probably Herod's entrepreneurship that helped develop Jerusalem's pilgrimage economy. Philo claims that Jews came from everywhere to give tithes to the Temple (*Special Laws* 1.69), including himself when he once visited (*De Prov* 2.64, 2.216). The financial influence of diaspora Jews can be seen in the requirement of the second tithes and other donations (Levine 2002, 389; Deuteronomy 14:28-29; 26:12). Literary sources indicate that pilgrims in the Early Roman period brought tents with them (*Ant* 17.213-217) or used accommodations within the city (Mark 11:11) for housing. Archaeological evidence shows that the northern area of Jerusalem was quickly built-up during the Early Roman period to help accommodate the surge in population and possibly semi-permanent pilgrimage dwellings (Amit 2009: 28; Geva 2014).

The isotopic analysis was based on material from Jerusalem's Early Roman landfill located on the western slope of the Kidron Valley (Bar-Oz et al. 2007). The remains tested were collected from Area's C and L, which are located just southeast of the Temple Mount. The

results suggest that sheep and goats were imported from the Galilee in the North, the Judean Desert in the south, and from the hinterlands of Jerusalem (Hartman et al. 2013). Isotopic analysis of the material also suggests that there was an animal trade from the Galilee to the Jerusalem hinterland and then brought to the Jerusalem markets. As Jerusalem was the largest urban center in the region, it is understandable that the city functioned as a major location for the dispersal of imported and regional goods.

The case studies of Tel Dan and Jerusalem are examples of the complexity of applying biblical foodways to archaeological remains. An argument can be made that these two case studies depict the development and incorporation of Deuteronomy 14 during two different periods of biblical history. However, they also reflect two different economic strategies of two different calibers of cults with vastly different demographics. The conclusions of these studies have methodological and historiographical issues, as well as changing the perspective away from the biblical texts may clarify their significance.

2.3.4 Dietary Laws, Priests, and Laity

The archaeological reality of the biblical food laws requires an understanding of the relationship between those who lived in Jerusalem to those who were a part of the cult. Should it be expected that the laity also followed all the biblical laws, or were they only intended for the priests, or, further, are they only the ideals of the scribes who wrote the biblical texts. Also, we have to contend with the date of composition, redaction, and transmission into society.

The debate over Leviticus' composition is intricate, as the historical referents are confined to the patriarchal and wilderness periods for which we have no extra-biblical sources (Milgrom 1991: 3). The lack of physical evidence leads scholarship to date the composition based on who composed the text and who was their audience, agreeing that the main aim was

priestly authority over cultic practices between the 6th and 4th centuries BCE (Watts 2007: 1-19; Leuchter 2010: 353).

The dating of Deuteronomy is similarly nuanced. De Wette (1830; 1843) surmises that Deuteronomy was written right before it was found, putting Deuteronomy's composition around the 7th century BCE. A 7th-century date for Deuteronomy is now widely accepted (Na'aman 2008), while some scholars argue for a later dating to the 6th century BCE (Knauf 2009: 2-4). If the bulk of scholars posit that the biblical texts were written sometime between the Iron Age IIC and the Early Hellenistic (7th–4th centuries BCE), should we retroject the customs detailed onto earlier phases of the Iron Age? Further, should we assume the religious activities and foodways redacted after the destruction of the First Temple in 586/7 BCE were practiced while the temple was still active?

No society lacks some kind of religion, and people from all aspects of society had some form of religious life that hardly consisted solely of what they or their professional representatives (i.e., priests) carried out at community shrines, temples, or altars (Meyers 2010: 118). From the biblical texts as well as archaeology, we can distinguish the difference between religion at a national/macro-level and from a household/micro-level (*ibid*: 119). For example, the physical perfection of animals was only required for sacrifices and priests, but not for the consumable animals of the laity, even when the laity entered the cultic compound (Milgrom 1993: 107).

Our understanding of Jerusalem's priests, scribes, and the priestly class is well-known. Josephus, following Hecataeus, notes the priests were economically well-off because they tended to own larger plots of land and received tithes (*Apion* 1.22; 188). Those associated with the temple, or temple personnel, were educated and had leisure time for intellectual pursuits. Thus,

they constituted the bulk of the educated and audience of religious literature (Grabbe 2002: 136). As well as the leading employers of scribes were likely to have been the temple, as well as these scribes were probably priests or Levites, themselves (Grabbe 2002: 151; 1 Chronicle 2:55, 24; 6; 2 Chronicle 34:3).

On the other hand, our knowledge of the religious practices of the laity (i.e., those who were not directly associated with the cult) is absent in literary sources. Archaeological evidence of cult suggests that personal religion was very much a part of people's daily lives, in the form of cultic corners, figurines, and local sacrifice in near-by altars (Stravrakopoulou and Barton 2010). In the discussion over the reality of the biblical foodways, there needs to be a distinction between public versus personal religion, priestly consumption versus laity consumption, and at what point were the dietary laws known by general society and not solely limited to the priestly class. It is not enough, moving forward, to posit that such-and-such phenomenon was part of the original audience's daily life and thus their social knowledge (Burnside 2016).

Chapter Three: Materials

The assemblages selected for this research derive from a variety of contexts, public and domestic, farmstead and village, from both the urban core of Jerusalem and its surrounding hinterland.

3.1 The Assemblages from Jerusalem

Assemblages collected from the urban core of Jerusalem derive from a variety of contexts and chronological periods. In an attempt to get the full economic view of Jerusalem, the material was collected from areas on the east and west sides of the Southeastern Ridge. Descriptions of each assemblage and its archaeological context are detailed below.

3.1.1 City of David, Area D3

The first assemblage derives from Area D3 on the eastern cliffs of the Southeastern Ridge. Excavation of Area D3 was conducted by Y. Gadot in 2013. Faunal remains retrieved through hand collection and sieving from the City of David's Area D3 excavations originate from three contexts, dated to the Iron Age IIB, Hellenistic, and Late Hellenistic periods. The Iron Age assemblage was derived mainly from fills and floor accumulations of a dwelling that correlates to dwellings in Area D1 of Shiloh's excavation (Fig. 3.1 and Fig. 3.2; Y. Gadot per comm.). The dwellings in Area D relate to a housing system found in other areas of Jerusalem during the 8th century BCE, specifically in the City of David's Area's C and H, and in Area M1 of the Givati parking lot. The Iron Age IIB, a lower-economic housing system, is typified by dwellings constructed clinging to the rock scarp, deep in the ravine (DeGroot 2012). The Hellenistic and Late Hellenistic assemblages, both dated to around the mid-2nd centuries to the 1st centuries,

derive from refuse thrown down the Kidron Valley's slope and may reflect daily consumption patterns from a variety of Jerusalem's neighborhoods.

FIGURE 3.1: TOP PLAN OF AREA D3 (IN BLACK) AND SHILO H'S AREA D1 (IN RED).

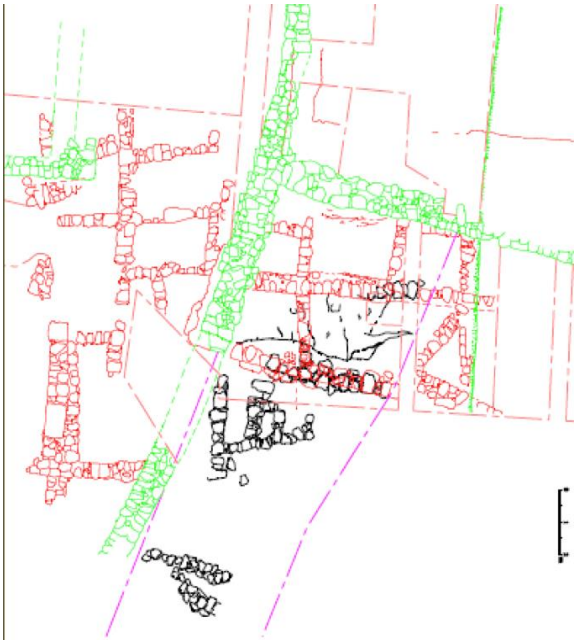


FIGURE 3.2: THE IRON AGE IIB DWELLING IN AREA D3

3.1.2 Giv'ati Parking Lot, Area M4 – The 'Glacis' Sequence

Excavation of the Givati Parking Lot (Area M4) in the Tyropoeon Valley of Jerusalem, directed by Doron Ben-Ami and Yana Tchekhanovets of the Israel Antiquities Authority, in the 2014 season (License #A6691), exposed substantial remains from the Late Hellenistic (2nd century BCE; Phase VIII; Figure 1.3). Faunal remains were collected from a Late Hellenistic glacis. The glacis relates to a fortification wall and an abutting watchtower (Ben-Ami and Tchekhanovets 2015; Zilberstein 2019).

The tower was built of fieldstones and large ashlars, ca. one-meter-long, with some portion of the upper ashlars reused in antiquity. Whether the differences in construction technology between the tower, wall, and glacis are related to chronological reconstructions or differences in technique have not been determined, as of yet (Ben-Ami and Tchekhanovets 2015, 2016; Zilberstein 2019). Preliminary dating of the glacis, based on coins, suggests a short time frame of construction or use between ~175-129 BCE (Ben-Ami and Tchekhanovets 2016: 20). The material finds in the glacis such as bronze arrowheads, lead sling stones, and ballista stones, some even stamped with a trident, speak to the military nature of the site and hints towards the debate if the Seleucids constructed the fortification as the possible location of the Acra, or by the Hasmoneans as part of solidifying their political independence (Ben-Ami and Tchekhanovets 2015, 2016; Langgut 2017). Preliminary stratigraphic dating suggests that the glacis, precisely, dates to the second half of the 2nd century BCE; thus, this part of the glacis relates to the take-over of Jerusalem by the Hasmoneans (Zilberstein 2019).

The loci sequence of the glacis was separated into three subphases: Phase VIIIc–I (Early Stage): representing the early phase of the glacis (may include intrusions from the later phase of the glacis); Phase VIIIc–II (Late Stage): representing the later phase of the glacis construction;

Phase VIIId (Hasmonean Stage): representing the latest phase of the glacis that may include Late Roman intrusions (Zilberstein 2019; Zilberstein and Ben-Ami per comm.). The aim of studying the faunal remains from the glacis' subphases are fourfold. The first is to reconstruct formations processes of the glacis though taphonomic analysis in order to assess construction technologies. The second is to recontextualize the origin of the refuse that comprises the glacis' layers. The third is to explore the intra-site urban provisioning of Jerusalem in the Late Hellenistic period, through a comparison to the faunal assemblage from Area M1– Stratum 8, and other Late Hellenistic assemblages included in this research. The final aim of this study is to consider the influence of Hellenism through the relative frequency of chicken, as well as the characterization of Hellenistic Jerusalem from literary sources, such as First and Second Maccabees.

FIGURE 3.3. THE SLANTED LAYERS OF THE GLACIS ABUTTING THE FRONT OF THE TOWER, VIEW TO THE EAST (PICTURE FROM BEN-AMI AND TCHEKHANOVETS 2015: 22)

3.1.3 Givati Parking Lot, Area M2

This assemblage was recovered from Area M2 of the Givati Parking Lot excavations relates to multiple phases ranging from the Iron Age IIC through Late Hellenistic (Fig. 3.4), including material from the enigmatic Persian and Early Hellenistic periods.[42] Area M2 is currently being excavated by Y. Gadot, and Y. Shalev as a collaboration between Tel Aviv University and the Israel Antiquities Authority. The current understanding of Area M2 is that it relates to the continuity of public buildings, with some possible 'crisis architecture' from the Persian period (Shalom et al. 2019; Shalev et al. 2020). Beyond synthesizing each period, additional questions that will be examined are possible differences between the Iron Age IIC (Phase IX) Building's rooms A, B, and C (Fig. 3.4); as well as to assess differences between the multiple phases related to the Late Hellenistic (Phases IV, V, and VI). The main stratigraphic sequence for Area M2 is as follows:

- Phase IX: Iron Age IIC.
- Phase VIII: Persian.
- Phase VII a/b: Early Hellenistic.
- Phase VI: Late Hellenistic–Glacis.
- Phase Va-c: Late Hellenistic.
- Phase IV: Late Hellenistic.

[42] Excavation of Givati Parking Lot by Y. Gadot and Y. Shalev also term Area M2 as Area 1000 or Area 10.

FIGURE 3.4: STRATIGRAPHIC TOP PLAN OF GIVATI PARKING LOT, AREA M2.

3.1.4 Givati Parking Lot, Area M5

The faunal assemblage recovered from Area M5 of the Givati Parking Lot excavations, excavated by Y. Gadot, and Y. Shalev relates to a narrow section that has multiple phases, but the focus of this research will be on the Hellenistic layers (3rd –2nd century BCE).[43] The living surface below the Hellenistic layers could either date to the Iron Age II or Persian period.[44] Excavation in this area focused on a domestic context that is represented by a series of tightly packed floors, a pit, and a tabun (Phase IIIb-c), dated to the Hellenistic period (3rd–2nd centuries

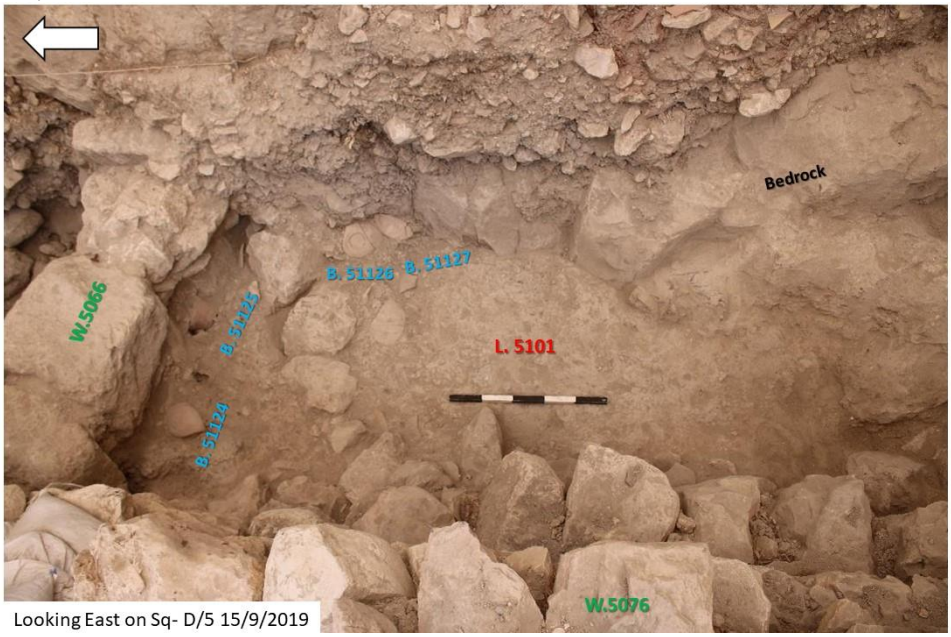
[43] Excavation of Givati Parking Lot by Y. Gadot and Y. Shalev also term Area M5 as Area 5000 or Area 50.
[44] At time of writing this research no pottery reading was conducted for Phase IV of Area M5. It was stratified as an Iron Age II living surface but with material continuity, it could also be Persian, according to the excavators Y. Gadot and Y. Shalev.

BCE). The domestic context was covered by a Late Hellenistic glacis (2nd century BCE). Excavation below the Hellenistic floors uncovered an Iron Age II/Persian living surface (Phase IV; Figure 3.5). The main foci of the zooarchaeological analysis from Area M5 are on the faunal remains in the pit (L.5092, Phase IIIc) and floor accumulations from the Hellenistic domestic context (Figure 3.6). Faunal remains from the living surface were minimal, and analysis was limited to a list of species present and taphonomic modifications.

The main stratigraphic sequence for Area M5 is as follows[45]:

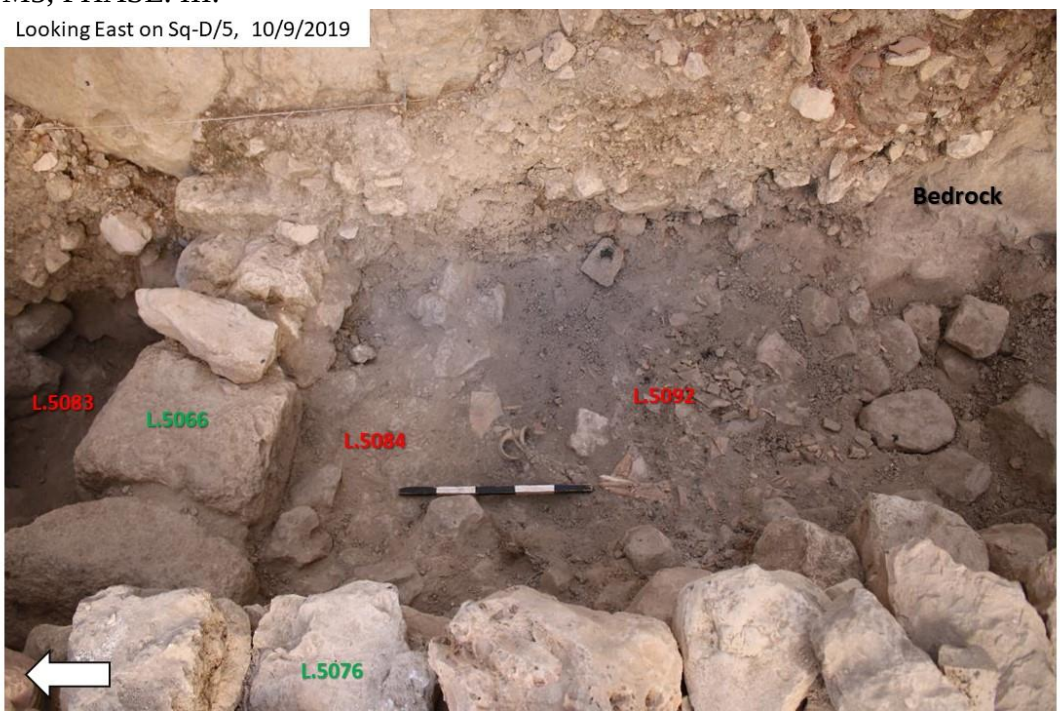
- Phase IIIb: Hellenistic
- Phase IIIc: Hellenistic
- Phase IV: Persian/Iron Age II

FIGURE 3.5: WORKING PHOTO OF THE IRON AGE II/PERSIAN LIVING SURFACE IN AREA M5, PHASE IV



[45] Stratigraphy for this section of the Givati Parking Lot is individual to Area M5/Area 5000, and has not, as of yet, been correlated to the main stratigraphic sequence of the site.

FIGURE 3.6: WORKING PHOTO OF HELLENISTIC CONTEXT AND PIT (L.5092) IN AREA M5, PHASE. III.



3.2 Jerusalem's Hinterland

Three assemblages from Jerusalem's hinterland will be examined as part of this research. They include a farmstead at Beit HaKerem and the village sites of Nebi Samuel and Khirbet er-Ras. Excavations of Beit HaKerem and Nebi Samuel were conducted by the Israel Antiquity Authority (IAA) as salvage excavations. The recovery of faunal remains in some of the hinterland assemblages are limited but aid in any reconstruction of Jerusalem's economic hinterland.

3.2.1 Beit HaKerem

Beit HaKerem is located a ca. five kilometers from Jerusalem and was excavated by Y. Biling on behalf of the IAA. Faunal remains retrieved from Beit HaKerem excavations originate from two

contexts, dated to the Iron Age II and the Byzantine periods. For this study, only the Iron Age II material will be included in this study. The main architectural unit of Beit HaKerem is a farmhouse dated to the 7th century BCE, thus the Iron Age IIC (Freud 2018). The Iron Age II assemblage was derived mainly from fills outside the main structure's wall.

3.2.2 Nebi Samuel

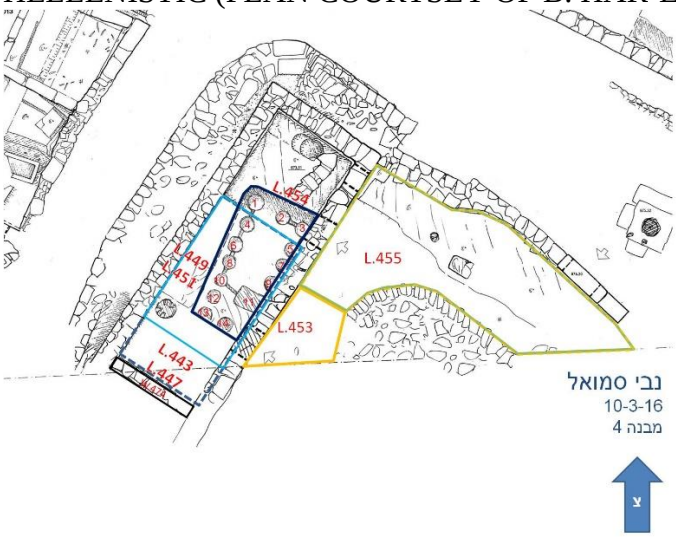
Nebi Samuel is located seven kilometers north-west of Jerusalem and covers an area of five acres. It overlooks the main roads from the Coastal Plain and West Samaria to Jerusalem (see Magen and Har-Evan 2007). Nebi Samuel, excavated in 2015-2017 by B. Har-Even on behalf of the IAA Department of the Civil Administration in Judea and Samaria, is a village site with a long occupational history. Faunal remains included in this study derive from Persian, Hellenistic, and Hasmonean (Late Hellenistic) phases in Building 1 and Hasmonean (Late Hellenistic) in Buildings 4 and 6 (Figure 3.7).[46] These buildings relate to a well preserved Hellenistic and Hasmonean neighborhood that include installations, streets, alleys, and rooms (Figure 3.8; B. Har-Even and D. Taubman per comm 2020). Stratigraphy based on archaeological and ceramic remains from Nebi Samuel relevant to this study is as follows:

- Phase VII: Hasmonean/Late Hellenistic
- Phase VIII: Hellenistic
- Phase IX: Persian

[46] Faunal remains from Area 11 and Building 2 of Nebi Samuel were also collected. Archaeological remains from Area 11 date to Early Roman period (Str. VI) and remains from Building 2 date to Byzantine (Str. III) to Modern, as such they are outside of the scope of this research and not included in this study.

FIGURE 3.7 ARIEL PHOTO OF EXCAVATION AREA OF NEBI SAMUEL (PHOTO COURTSEY OF B. HAR-EVEN AND D. TAUBMAN)

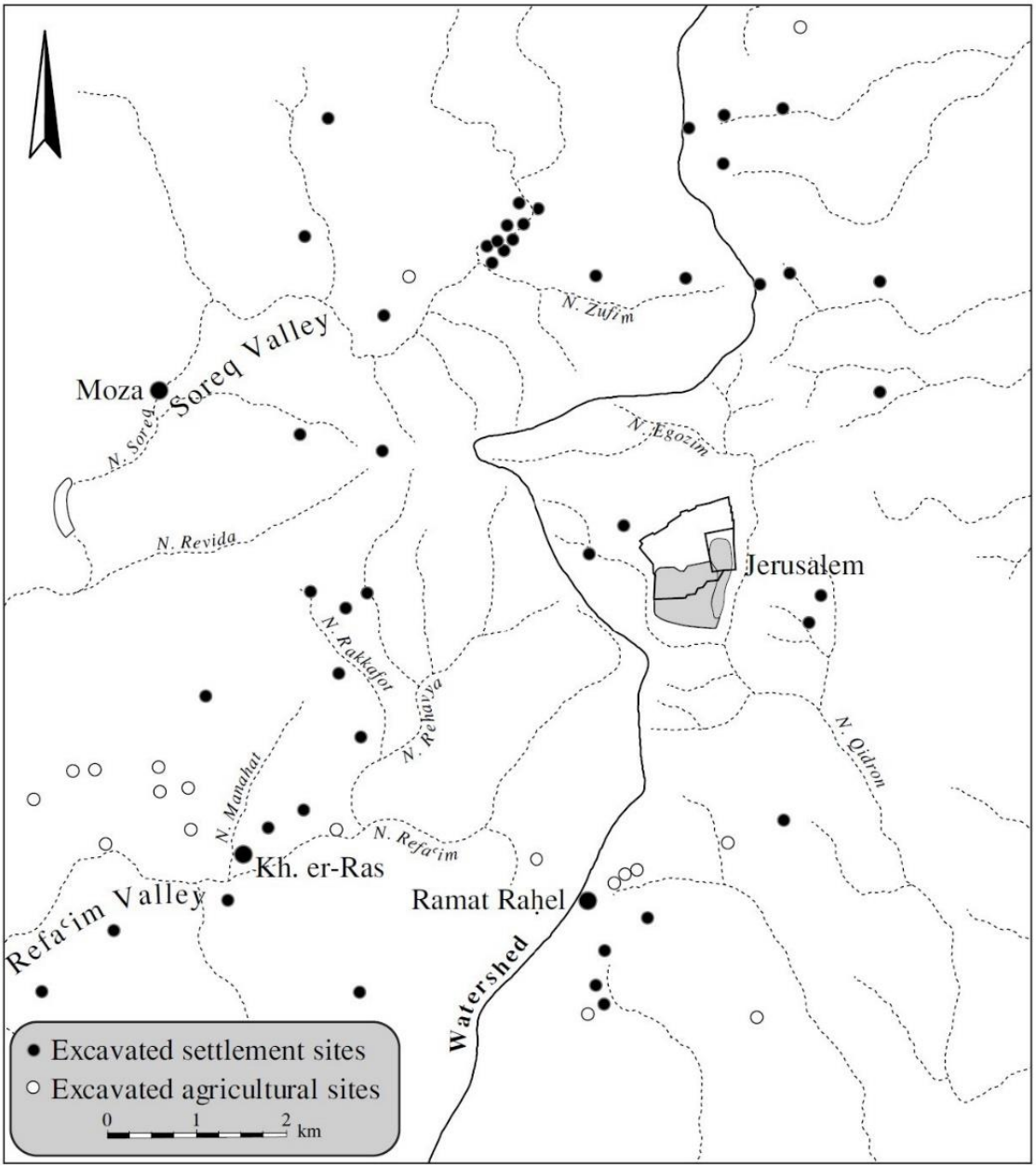
FIGURE 3.8. TOP PLAN OF BUILDING 4, PHASE VII HASMONEAN/LATE HELLENISTIC (PLAN COURTSEY OF B. HAR-EVEN AND D. TAUBMAN)



3.2.3 Khirbet er-Ras

The site of Khirbet er-Ras, located on the northern slope of Nahal Refaʿim, was first identified by Gibson and Barkay in 1977 (Gibson and Barkay 1977). Khirbet er-Ras is a village site located approximately seven kilometers from Jerusalem (Figure 3.9; Gadot 2011). Previous excavation of the site was conducted by Edelstein and Gat (Edelstein 2000) and Feig (Feig 1996; Feig and Abul Rabu 1996). Faunal remains for this study derive from Y. Gadot's excavation of the site on behalf of Tel Aviv University, between 2011 and 2013 (Gadot 2015). Gadot excavated five areas with a stratigraphic sequence that spans from the Middle Bronze until the Early Roman (Gadot 2011; 2015). For this study, the focus will be on three chronological/stratigraphic contexts: Iron Age II, Persian with intrusions, and Hellenistic. Very few bones were collected from this site, but a general idea of what was present will aid in our understanding of Jerusalem's hinterland in the Iron Age through Hellenistic periods.

FIGURE 3.9 MAP OF JERUSALEM AND ITS RURAL HINTERLAND, INDICATING THE LOCATION OF KHIRBET ER-RAS. MAP FROM GADOT 2015: FIGURE 1.



Chapter Four: Methodology

Zooarchaeological research intends to understand the relationship between humans and animals (Reitz and Wing 2008: 4). Humans today, as well as in the past, use animals for a variety of needs, from leather to food, to tools, and dairy products. In terms of animals, humans pass through a series of stages when they interact with food: they produce or gather it by hunting, herding, or trade for it; process it through slaughtering, butchering, and cooking it, consume it, and they discard the remains (Twiss 2012). It is the remains of this process that we find in archaeological contexts (i.e., animal bones, teeth, and horns). Through these remains, we can reconstruct culturally specific social structures and ideologies of past cultures (Dietler 2007; Twiss 2008). In order to draw conclusions from archaeological faunal remains, the material must be identified and recorded. The modes and methods for this dissertation, described below, are based on/or developed from the scholarship.

4.1 Recording of Elements

Faunal remains were recorded on an Excel spreadsheet (Excel: mac 2011) with each assemblage cataloged individually by the site. Each fragment was given an ordinal number as they were processed. The fragment's area, license number, loci, and basket number were documented for continuity of context and accountability. Each fragment analyzed was recorded based on taxonomic identification, completeness of element, aging, cut marks, burning, weathering, pathologies, and sexing when possible. Unidentified fragments were counted, and evidence of burning on unidentified fragments was additionally recorded. Identification of bone elements was documented by describing the specific element, its side (left or right), and the portion of the

bone (proximal epiphysis, proximal shaft, medial shaft, distal shaft, and distal epiphysis). Also, each of the identified bone elements were coded according to its fraction of completeness (i.e., percentage of complete aspect). Carpals, tarsals, and vertebrae were also documented according to their percentage of completeness (Bar-Oz 2004: 21).

4.2 Taxonomic Identification

The main focus of this research is on macro-fauna, such as mammals and birds. Fish and rodents, depending on assemblage, were identified with the help of other specialists, or were sorted out before analysis. Identification of faunal remains was based on the comparative collections stored at the Steinhardt Museum of Natural History and National Research Center and the Laboratory of Zooarchaeology of the Institute of Archaeology, Tel Aviv University. The identification of fish remains was based on the private reference collection of O. Lernau. The taxonomic nomenclature of fish follows Wheeler and Jones 1989 and Nelson 1994.

Skeletal elements, including cranial elements (e.g., occipital, parietal, frontal, petrosum), vertebrae, ribs, tarsals, carpals, long bones, and long bone shaft fragments, were identified to the lowest possible taxonomic level. Skeletal elements that could not be identified to taxon were assigned by size class: A size (*Bos, Equus*, and *Camelus*), B size (*Capra*, *Ovis,* and *Sus*), C size (*Canis* and *Gazella*), D size (1 small *aves*, 2 medium *aves*, 3 large *aves*), E size (*Pisces*), F size (*Lepus* and *Felis*). When necessary, morphological markers were utilized to differentiate between closely related species, such as sheep and goats (Zeder and Lapham 2010).

4.3 Quantifications

Four methods of quantification are typically employed when studying faunal remains. All quantification methods are subject to some biases. For instance, some elements or portions of

elements survive better than others. The frequency of elements differs between species, as well as biases of the person quantifying the material (Reitz and Wing 2008: 202-203). The uses of these quantifications are widespread and enable us to compare to other datasets. All quantifications are based on Lyman (2008: 27-261).

4.3.1 Abundance of Taxa: NISP and MNI

The Number of Identified Specimens (NISP) and Minimum Number of Individuals (MNI) is used in this study to quantify relative frequencies of taxa. These frequencies permit a synchronic and diachronic examination of the assemblages (Reitz and Wing 2008: 202). NISP is used as an observational unit and is calculated by counting the number of fragments per taxa. NISP, as a frequency, exaggerates the importance of species whose elements are more readily identified (Lyman 1994: 100-101), leading us to employ other methods of quantification.

MNI is the minimum number of individuals per taxon. This unit of measurement is determined by the most commonly occurring skeletal element of a taxon in an assemblage based on the Minimum Number of Elements (MNE; Lyman 2008: 38). MNI, as an observational method, can only show the minimum number of animals present and may not account for the number of animals that are in an assemblage.

4.3.2 Skeletal Elements Frequencies: MNE and MAU

Minimum Number of Elements (MNE) is the frequency of a singular anatomical element of a specified taxon. MNE is calculated by summing the percentages of each measured portion of a skeletal element (Marean and Spencer 1991: 649-650). It is used to understand if specific elements are more prevalent or frequent than others (Lyman 2008: 214-218).

Minimum Animal Units (MAU) is the minimum number of animal units necessary to account for the specimens in an assemblage. This value is calculated in order to compare the

frequency of skeletal elements within an assemblage. MAU is calculated by dividing the observed bone count, MNE, for each anatomical unit by the number of times that unit occurs within a singular skeleton (Lyman 1994: 104). The percentage of MAU or MAU% is derived by dividing the element's MAU by the highest MAU and multiplied by 100 ((MAU/MAU*i*) x 100).

4.3.2.1 Body Parts Frequencies

The calculation for body part frequencies is determined by MAU%. MAU% creates a frequency that can be used to understand which elements are more present than others. Which, in turn, is used to determine animal usage within an assemblage. There are a few biases that must be considered when calculating body part frequencies. The first bias is retrieval methods. Hand collection of faunal material leads to a dominance of larger fragments and overlooks smaller elements and taxa (O'Connor 2000: 31). Retrieval strategies differ between assemblages depending on the excavation method of the site. The majority of sites included in this research were hand-collected. Sites included in this research that implemented sieving strategies are Area D3 and Area M2.

The second bias is the effects of natural factors, such as density-mediated attrition. Destructive taphonomic processes, such as gnawing, burning, weathering, and trampling, are responsible for altering assemblages by preferentially destroying the least dense parts of elements (Lyman 1994: 283-285). Also, immature ungulates are more susceptible to taphonomic destruction than older ungulates, as their elements are porous (Symmons 2005: 1692). The above factors create a bias towards senescent assemblages with a higher representation of structurally dense elements, such as the femur, tibia, humerus, radius, metapodials, vertebrae, phalanges, carpals, and tarsals. In order to estimate if the structural density of the elements is related to their survivorship in the current assemblages, MNE totals for each element in an assemblage are

tested for correlation (Pearson test for goodness of fit to structural-density values of elements; mean DP, Symmons 2005: 1695; Table 3).

Unlike previous biases that relate to uncontrollable factors, the final bias relates to anthropogenic factors. These factors include the selection of what taxa or portion of the body was consumed, burned, and disposed-of. Anthropogenic factors are vital in understanding the cultural and economical disposition of a given assemblage or area.

4.4 Measurements

Body dimensions relate to age, sex, geographical range, nutrition, and individual variation (Reitz and Wing 2008: 183). Measurements were taken for a few distinct reasons. The first was to assess if sexing is possible based on Zeder's regional variation of male and female sizes (2001: 66, Fig. 5). The second was to define if caprines originated from various or neighboring regions. In order to assess regional variation based on metrical analysis, measurements were compared to Tel Dor – a site that is known for locally herding caprines (Sapir-Hen per comm.). Metrical data was calculated by applying calipers to a particular region on elements, based on von den Driesch (1976). All measurements can be found in Appendix II.

4.5 Recording Taphonomic Changes

Taphonomy is the study of deposition and burial processes (Lyman 1994: 1). Recording taphonomic changes can shed light on the environmental and human processes on archaeological faunal remains. In studying these changes, we can attempt to recreate the complete picture of how the animal was used by humans and what happened to them after they were disposed-of.

4.5.1 Burning

Burned bones are an indicator of anthropogenic activities, such as cooking, disposal of food waste to reduce attractiveness by scavengers, or as fuel for fires (Gifford-Gonzalez 1989: 187). The role of fire in prehistoric and premodern communities' figures prominently in food preparation and leads to the association of burned remains with cooking and consumption. The frequency and degree of burning can be utilized to understand if an assemblage is burned as a result of garbage disposal, indicated by a high frequency of burned remains, or consumption remains, indicated by a smaller frequency or indication of boiling (O'Connor 2000: 45; Greenfield and Beattie 2017). Contextualizing burned remains is also in relation to their archaeological deposition, such as near hearths or tabuns.

Burnt bones can be divided into three stages based on color change and melting distortion (O'Conner 2000: 45). Burned remains were recorded based upon these three categories: B- representing slightly charred remains with no distortion, B representing remains completely black and carbon with cracking, and B+ representing bones which are white and blue due to calcification of the bone that occurs in very high temperatures (Shipman et al. 1984: 307-325; Stiner et al. 1995: 223-237). Merely tallying the number of identified burned bones would create bias because the process of charring causes them to melt and become distorted, and thus identifiable (O'Connor 2000: 45). In order to hedge this bias, all unidentifiable burned bones were also recorded to create a percentage of total burned material per assemblage.

4.5.2 Weathering

Weathering is the process of decomposition and destruction of skeletal elements by physical and chemical agents in both surface and subsurface contexts (Behrensmeyer 1978). Behrensmeyer organized weathering patterns into six stages for macro-fauna based on the number and depth of

cracks observed on the surface of the bone (*ibid*). Weathering stages of the bones indicates the period of time the bones were exposed to the environment. Behrensmeyer's categorization was used in order to examine the natural attrition of the remains and environmental biases (*ibid*).

4.5.3 Animal Activity

Scavenging predators, such as dogs, rats, and mice, leaves distinctive markings on bones (Lyman 1994: 195-216). It is critical to document tooth markings and other damage caused by gnawing, as it is an indicator of reworking and alteration before bone deposition (O'Conner 2000: 22). Recording carnivore and rodent gnaw markings were used to assess to what degree the assemblages were ravaged by scavengers or deposited out of reach.

4.5.4 Pathologies

Identifying pathologies, as a result of trauma or disease, is essential in determining the overall health of animals in antiquity. Irregularities in the appearance of bones aid in the identification of pathologies. These irregularities are the result of stress during growth and development, exposure to pathogens, inherited anomalies, and diseases, intentional or unintentional injury, and activity patterns (Baker and Brothwell 1980: 189-192). Analysis of pathologies was based upon Baker and Brothwell's (1980) compendium of animal pathologies. Simple definitions of pathologies were used for example healed fractures or boney-outgrowth, meaning exostoses.

4.5.5 Butchering Marks

Butchering typically involves a set of activities that take place between the procurement of an animal and the disposal of its carcass. The order and frequencies of these activities depend on the carcass and the intention of the butcher (Lyman 1994: 299). Identifying cut marks requires knowledge of the anatomical placement and orientation of the markings, and the function behind the specific marking (*ibid*). The identification of cut markings is commonly based on Lewis

Binford's ethnological study of Inuit animal processing (Binford 1981; 1984). Recording of cut markings with be based on Binford's coding and categorization into three categories: dismemberment/disarticulation, filleting, and skinning (*ibid*).

4.5.5.1 Identifying Sacrificial and Cultic Butchery Markings

Cope (2004; 2016) was the first to put forth a method for analyzing religious butchering marks (i.e., *shechita, gid hanashe, nikur*, etc.), based on her research from Gamla and Yodefat, known Jewish settlements, during the classical periods. Her work was followed by a historical and zooarchaeological approach by Greenfield and Bouchnick (2010). Bone elements that would typically show signs of biblical butchery patterns are the neck vertebrae's atlas and axis, the pelvis, and the femur. It is debated whether the presence or absence of cut marks on the ventral side of the neck vertebrae should be considered an indicator of *nikur* (Deuteronomy 12:16; Cope 2004: 26–27; Greenfield and Bouchnick 2010: 7). This debate is following the Talmudic order that the initial slaughter of the animal should not mark the bone.[47]

Marks on the pelvis relate to the removal of the sciatic nerve. Indication of sciatic nerve removal is identified by cut marks on specific parts of elements. Precisely, on the ischium and ilium arms of the acetabulum as well as the pubis symphysis are cut. Marks on the femur relate to the stripping of the gluteus medius in order to expose the sciatic nerve. Femoral indicators can be found on the trochanter major, trochanter minor, beneath the femoral head and the on the posterior distal just above the condyle (Cope 2004: 30–31); as many of these markings also correlate to disarticulation; their identification as solely *shechita* butchery is arguable. The

[47] For debate see Section 2.3.2

humerus, radius, scapula, and tibia have also been found to have marks relating to biblical butchery practices (Cope 2016).

Application of Cope's methodology is limited, as she describes the markings in-depth but does not create a functional atlas in order to identify similar cutmarks. In order to apply Cope's methodology to this research, I paired her cutmark descriptions to the typology of cutmarks suggested by Binford (1981; 1984) (see Table 4.1). There are four markings that Cope describes that did not correlate to any of Binford typology codes. These markings are given ordinal codes following those of Binford (1984; Table 4.1). Following Cope's descriptions, new ordinal codes are given to the markings on the tibia's posterior proximal shaft (Tp-6) and the posterior distal end (Td-5), the scapula's medial surface marks along the neck (S-5), and transverse marks along the distal base of the lateral surface (S-6). The methodology created by correlating the cutmark identification methodologies of Cope (2016) and Binford (1981; 1984) allowed me to standardize identifying biblical religious butchery markings in archaeofaunal collections.

TABLE 4.1: CORRELATED BUTCHERY DESCRIPTIONS FOR *SHECHITA* FOLLOWING COPE (2004; 2016) AND BINFORD (1981; 1984).

Code Number /Element	Cope 2004; 2016	Binford 1981; 1984	Activity Producing Mark
Femur			
Fp-1	Cuts on the trochanter major	Marks on the neck of the femur	Dismembering
Fp-3	Cuts beneath the femoral head	Marks circling the margin of the femur head	Dismembering
Fp-4	Major arteries may be stripped along with the muscle that inserts on the trochanter minor of the femur, with marks on the posterior distal just above the condyle	Transverse mark on the lesser trochanter	Filleting
Pelvis			
PS-5	The pubic symphysis is cut through	Cut or Chop through the pubic symphysis	Dismembering
PS-7	Curs along the ilium in front of the rectus depression	Marks above the acetabulum on the arm of the ilium	Dismembering
PS-8	Cuts over the ischiatic spine of the innominate in front of the acetabular notch	Marks below the acetabulum on the arm of ischium	Dismembering
PS-10	Marks along the pubic tubercle	Marks below acetabulum on the arm of the pelvis	Dismembering
Scapula			
S-1	On the tuber of the scapula for the origin of the coracobrachialis and the deep pectoral	Marks along the inferior border of the condyle or at the origin of triceps brachia	Dismembering

S-2	The coastal neck of the scapula. These cuts are associated with the junction of the brachial artery, subscapular artery, and the brachial vein	Marks along the neck of the scapula	Dismembering
S-5	Beneath the scapular spine	X	Filleting
S-6	The posterior border of the scapula, cuts here would sever the origin of the long head of the triceps	X	Dismembering
Humerus			
Hp-3	Cuts on the neck of the humerus correspond to the origin of the medial head of the triceps	Marks on the lateral face of the neck just below the lateral tuberosity	Dismembering
Hp-4	Cuts on the upper deltoid tuberosity	Short "chevron" marks obliquely orientated along crest below the external tuberosity at the insertion of teres minor	Dismembering
Hd-1	Single cut just above the coronoid fossa on the anterior distal humerus (but only for caprines)	Transverse mark across the anterior articular face	Dismembering
Radius			
RCp-5	A short cut severing the flexor carpi radialis, with marks on the proximal medial radius	Transverse marks on anterior margin of radial tuberosities	Dismembering
Tibia			
Tp-6	Cuts on the proximal posterior, maybe related to the muscle Tibialis posterior	X	Dismembering
Td-5	Cut on the Medial malleolus of the Distal Tibia, which corresponds to the insertion of the gastrocnemius	X	Dismembering

4.5.5.1.1 Identifying the Priestly Tithe

The zooarchaeological method used to identify the priestly tithe is based on statistically testing Sided NISP. NISP, or the number of identified specimens, is calculated by counting the number of fragments per taxa (Lyman 1994: 100-101). Sided NISP separates the right and left side of the forelimb's humerus, radius, ulna, and metacarpal. Statistics include using a Chi-squared comparison of frequencies to compare assemblages in terms of taxonomic composition (test for independence), to find deviations from the expected 1:1 ratios of right versus left limb elements (test for goodness of fit) following Marom and Zuckerman (2013: 577). This calculation will be used to help understand this of the priestly portion as a socioeconomic marker (Leviticus 7:28-37).

4.6 Demographic Analysis

The demographic profile of the animal population can illustrate how anthropogenic processes affected the animal population. Subsistence strategies employed by a population can relate to the importance of secondary products (e.g., wool and milk) or meat consumption, which in turn can

be used to understand socioeconomic patterns within a given assemblage (Lev-Tov 2003: 20; deFrance 2009: 122; Russell 2011: 297-331).

4.6.1 Age Profiles

The age-at-death or estimate age-at-death of animals is used to discern patterns of animal-human behavior, specifically husbandry strategies, sedentism, and mobility. Mammals and birds have determinate growth, which means that their bones stop growing when they reach adult or mature size. Determining the age of faunal remains is based on what stage of skeletal growth, the elements were at the time of death or slaughter (Reitz and Wing 2008: 70). Skeletal features that reflect age include form and porosity of the element (*ibid*), epiphyseal fusion and closure of cranial sutures, tooth growth and replacement stages (Tomé and Vigne 2003), tooth wear (Kline and Cruz-Uribe 1983: 70-78), and antler and horn development (Brown 1983). Aging by stage of epiphyseal fusion of sheep and goats was based on Zeder (2006). For cattle, epiphyseal fusion was based on Silver (1969: 284-301). Age estimation based on teeth growth for cattle will be based on Grant (1982: 91-108), and teeth growth for sheep and goat will be based on Payne (1973).

4.6.2 Sex Profiles

The ability to differentiate between males and females in faunal assemblages can provide information on sex-based strategies of animal husbandry and exploitation. Anatomical elements used to determine sex are antlers, horns, forelimbs, pelvis, spurs, medullary bone, and the presence or absence of canines in suids and equids (Reitz and Wing 2008: 178). Morphological markers on the iliac and ischial regions of the acetabulum based on Greenfield was studied in order to sex ungulates (2002: 69). In case the acetabulum markers prove impractical, then alternative methods will be applied.

In such cases, mixture analysis was employed. Mixture analysis applies the method of maximum likelihood and is designed to detect the presence of two or more groupings within a population or dataset (Dong 1997; Monchot 1999). The bimodality of mixture analysis allows it to be a satisfactory assessment of sexual dimorphism within caprine populations. Skeletal elements of caprine sampled for mixture analysis are those that depict sexual dimorphism in particular the humerus, as the weight of horns cause the humerus to be more robust in male caprine (Zeder 2001). Mixture analysis was limited to smalls greater than four, assemblages with less than four samples were not sexed. Sexing cattle are based on metacarpals following Davis et al. (2012) and Telldahl et al. (2012).

Birds are typically sexed by their plumage, which cannot be identified based on their bones. Skeletally, birds have a few secondary sexual characteristics. Sexing of *Galliformes*, instead, was based on the presence or absence of a spur on the tarsometatarsus of cocks (i.e., male birds; Serjeantson 2013: 35, 47) and through mixture analysis of the femur's proximal breadth (BP).

Chapter Five: Results

In the following chapter, the detailed taphonomic analysis of each assemblage modifying factors is presented, followed by a summary analysis of major animal economy trends in the respective assemblage. The results are organized by site. Starting with the core of Jerusalem, and then moving to the sites in the hinterland.

5.1 City of David, Area D3

A total of 9900 bone fragments were processed, and 974 NISP bones were identified from Area D3, located on the cliffs of the Southeastern Ridge. Of the identified bones, 846 NISP were derived from the Iron Age IIB context, 114 (NISP) from the Hellenistic context, and the remaining 14 NISP from the Late Hellenistic context.

5.1.1 Species Represented in Area D3

Domestic livestock is the most dominant species, and they represent 91% of the Iron Age II assemblage, 93% of the Hellenistic assemblage, and 100% of the Late Hellenistic assemblage (Table 5.1). Wild ungulates represent 1.5% of the Iron Age II and less than 1% in the Hellenistic assemblage.

The most common livestock animals in the Iron Age II assemblage are caprine (i.e., sheep and goat) with 80% of the assemblage. The ratio between the distinguishable sheep (*Ovis aries*, N: 28) and goat (*Capra hircus*, N: 27) bones is relatively equal, with 1:0.9. The second most common mammal in the Iron Age II is cattle (*Bos taurus*, combined with large mammal body size group) with 10% of the assemblage. The third most common species is identified fish (*Pisces*) with 6% of the assemblage. This assemblage also included a variety of other species such as donkey (*Equus asinus*, N: 6), domestic dog (*Canis familiaris*, N: 7), mountain gazelle

(*Gazella gazella*, N: 5), cape hare (*Lepus capensis*, N: 2), small rodents (N: 3), chicken (*Gallus gallus*, N: 4) and partridge (*Alectoris chukar*, N: 2) (Table 5.1).

In the Hellenistic assemblage, caprine represent 84.2% of the assemblage with a 1:1.25 ratio between sheep (N: 4) and goat (N: 5) bones. Caprine is followed by cattle– 8.7%. The assemblage also includes a domestic dog (N: 1), rodents (N: 2), fish (N: 2), and two bird bones – solely chicken (N: 2). In the smaller Late Hellenistic assemblage, the most common animals are caprine with 57% with a sheep and goat ratio of 3:2. Caprine are followed by cattle (42.8%). This frequency of cattle is high and relates to the small assemblage size. The Late Hellenistic assemblage did not include any other species.

TABLE 5.1. THE NUMBER OF IDENTIFIED SPECIMENS (NISP), MINIMUM NUMBER OF INDIVIDUALS (MNI), AND FREQUENCY OF NUMBER OF IDENTIFIED SPECIMENS (NISP) FROM CITY OF DAVID, AREA D3.

Area D3	Species	Common Name	Iron Age II			Hellenistic			Late Hellenistic		
			NISP	MNI	NISP%	NISP	MNI	NISP%	NISP	MNI	NISP%
Domesticated Ungulates	*Capra hircus*	Goat	27	3	3.15%	5	1	4.39%	2	1	14.29%
	Ovis aries	Sheep	28	4	3.27%	4	1	3.51%	3	1	21.43%
	Caprine size	Sheep or Goat	624	6	72.90%	87	2	76.32%	3	1	21.43%
	Bos taurus	Cow	50	3	5.84%	5	1	4.39%	4	1	28.57%
	A Size	Large Mammal	33	1	3.86%	5	1	4.39%	2	1	14.29%
	Equus asinus	Donkey	6	2	0.70%						
	Canis familiaris	Domestic Dog	7	1	0.82%	1	1	0.88%			
Wild Mammals	*Gazella gazella*	Mountain gazelle	5	1	0.58%						
	C size	Small Mammal	7	1	0.82%	1	1	0.88%			
	Lepus capensis	Hare	2	1	0.23%						
Aves	*Medium aves*	Medium Bird	1	1	0.12%						
	Gallus gallus	Chicken	4	1	0.47%	2	1	1.75%			
	Alectoris chukar	Chukar Partridge	2	1	0.23%						
	Columba livia	Rock Dove	2	1	0.23%						
Rodents	*G-size*	Rodent	3	1	0.35%	2	1	1.75%			
Pisces	*Clariidae Clarias gariepinus*	African sharp tooth catfish	2		0.23%						
	Centropomidae Lates niloticus	Nile Perch	4		0.47%						
	Sparidae sp.	Porgies	20		2.34%	1		0.88%			
	Sparidae Sparusu aurata	Gilt-head seabream	13		1.52%						
	Sparidae Sparusu mormyrus	Striped seabream	2		0.23%						
	Cichlidae	Tilapia	1		0.12%						
	Mugilidae	Mullets	11		1.29%						
	Elasmobranchii	Sharks	2		0.23%						
	Cyprinidae Barbus barbus	Common Barbel			0.00%	1		0.88%			
TOTAL			856	27	100%	114	10	100%	14	5	100%

5.1.1.1 Fish (Pisces) in Area D3

There was a total of 157 fish fragments found in the assemblage. Of those, 35% were identified (Table 5.1, Iron Age II, N: 53; Hellenistic, N: 2). In the Iron Age II, there are seven different species of fish identified. The most common family of fish is porgies (*Sparidae;* N: 35), with the Bardawil's Gilt-head Seabream (*Sparusu aurata*) being the most common porgies (N: 13). Other fish present in the Iron Age II assemblage is the African Sharp-tooth Catfish (*Clarias gariepinus*, N: 2), Nile Perch (*Lates niloticus*, N: 4), Striped Seabream (*Sparusu mormyrus*, N: 2), Mullets (*Mugilidae*, N: 11), Tilapia (*Cichlidae*, N: 1), and two teeth of Shark (*Elasmobranchii*). In the Hellenistic assemblage, only two species of fish were identified, porgies and Common Barbel (*Cyprinidae Barbus barbus*).

5.1.2 Taphonomic Analysis of Area D3

5.1.2.1 Weathering of Area D3

Weathering pattern of the bones from all periods fall primarily between stages 0-2 of Brehensmeyer's guide (1978: 157) (77%; Table 4.2), suggesting that the bones were covered quickly after their disposal (three years or less). However, approximately 20% of bones were exposed for longer than three years (Scale 3-6; Brehensmeyer 1978) in the Iron Age II and Hellenistic periods (Table 5.2).

TABLE 5.2. TOTAL OF FRAGMENTS RECORDED IN EACH WEATHERING STAGE (STAGES ACCORDING TO BEHRENMEYER 1978) OF AREA D3.

D3 Weathering	0	1	2	3	4	5	6
Iron Age II	249	215	172	103	39	18	5
Hellenistic	23	16	33	26	11	4	
Late Hellenistic	3	2	2	7			
TOTAL	275	233	207	136	50	22	5

5.1.2.2 Burned Remains Collected from Area D3

Ca. 3.2% of the Iron Age II assemblage and ca. 7.5% of the Hellenistic assemblage showed some evidence of burning (Table 5.3). This analysis includes all fragments from the assemblage, including those that could not be identified to the skeletal element. Burned remains in the Iron Age II (N: 11) and Hellenistic (N: 5) assemblages were scarce and absent in the Late Hellenistic. Of the identified fragments, burned remains in the Iron Age II included only caprine (N: 10) and small mammal (C-size) rib (Table 5.4). Caprine elements with evidence of burning in the Iron Age II assemblage include a singular rib, metatarsal, mandibular tooth, femur, and a carpal. In the Hellenistic assemblage, burned remains only included the main domestic animals: caprine (N: 2) and cattle (N: 1) (Table 5.4). Specific elements burned in the Hellenistic assemblage include the mandibular tooth of a cattle, and the radius, vertebrae, and rib of caprine. The exact rational for the burn pattern present in the Iron Age II and Hellenistic assemblages is unclear and may relate to consumption practices versus destruction processes that would result in a higher frequency of burned remains.

TABLE 5.3. COUNT OF IDENTIFIED AND UNIDENTIFIED FRAGMENTS WITH AND WITHOUT EVIDENCE OF BURNING SEPARATED BY PERIOD FROM AREA D3.

Area D3	Iron Age II		Hellenistic		Late Hellenistic	
	Burned	Non-burned	Burned	Non-burned	Burned	Non-burned
Identified Fragments	11	920	5	109	0	14
Unidentified Fragments	304	8430	17	161	4	15
Total	315	9350	22	270	4	29

TABLE 5.4. COUNT OF BURNED BONES BY PERIOD, BURN SCALE, AND SPECIES FROM AREA D3. SCALE: B-: SLIGHTLY BURNED, B: BURNED, AND B+: FULLY CALCIFIED.

Area D3 Burned	Iron Age II			Hellenistic			Total
Species	*B*	*B-*	*B+*	*B*	*B-*	*B+*	
Caprine	5	1	3	2	1		12
Goat		1					1
Cattle				2			2
C size			1				1
Total	5	2	4	4	1	0	16

5.1.2.3 Animal Activity and Root Etching in Area D3

Animal scavenging by carnivores and rodents is present with 2.8% of the Iron Age II assemblage and 4.3% of the Hellenistic assemblage (Table 5.5). Evidence of destructive root etching was only present on less than 1% of the entire assemblage (Iron Age II, N: 5; Hellenistic, N: 2) (Table 5.5). Evidence of gnawing or root etching was absent in the Late Hellenistic assemblage.

TABLE 5.5: TOTAL COUNT OF GNAWING AND ROOT ETCHING BY PERIOD FROM AREA D3.

Area D3 Gnawing/Root	Rodent Gnawing	Carnivore Gnawing	Root Etching
Iron Age II	22	4	5
Hellenistic	5		2
Late Hellenistic			
Total	27	4	7

5.1.2.4 Pathologies in Area D3

Evidence of pathologies is present only on caprine in the Iron Age II and Hellenistic periods. The most common pathology was boney outgrowth in Iron Age II caprine (N: 3), but there was also evidence of bone degradation in both periods (Table 5.6).

TABLE 5.6: TABLE COUNT OF PATHOLOGIES BY PERIOD FROM AREA D3

Area D3		Iron Age II		Late Hellenistic
Species	Element	Boney Outgrowth	Bone Degradation	Bone Degradation
Caprine	Humerus	1		
	Pelvis	1		
	Calcaneus	1	1	
	Phalanx 1			1
Total		3	1	1

5.1.2.5 Butchery and Cut Marks in Area D3

A small number of bones showed evidence of butchering from Area D3. A total of 54 cut marks (~1% of the assemblage) were recorded with 49 from the Iron Age II and five from the Hellenistic period (Table 5.7). 83% of the cut marks were recorded on caprines bones (Table

5.7), the dominant species in both assemblages. Dismembering cut marks on caprines and cattle represent approximately 60% of both Iron Age II and Hellenistic assemblages, indicating primary butchery (Table 4.7).

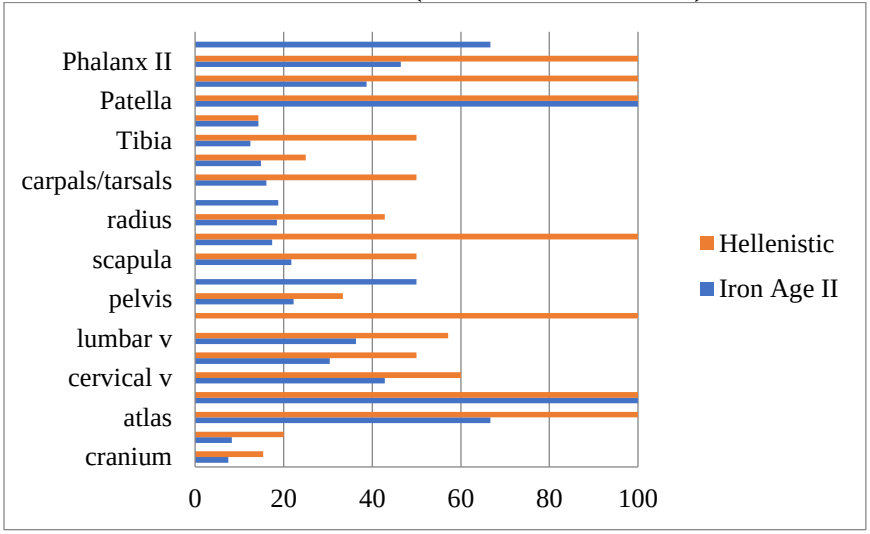
TABLE 5.7. CUT MARKS (NISP) FOR DOMESTIC AND WILD MAMMALS FOR AREA D3 BASED ON THE TYPOLOGY OF BINFORD (1984).

Area D3 Cut	Iron Age II							Hellenistic			Total
Style	*Dismembering*	*Dismembering (Stiff Body)*	*Dismembering (Ribs from Brisket)*	*Filleting*	*Filleting (tenderloin)*	*Skinning*	*Worked*	*Dismembering*	*Filleting (tenderloin)*	*Worked*	
Cattle	2			4		2					8
Caprine	20	1	4	6	3		1	3			18
Goat	2					1			1	1	5
Sheep	2										2
Chicken	1										1
Total	27	1	4	10	3	3	1	3	1	1	54

5.1.2.6. Fragmentation of Area D3

Comparing the completeness percentage of caprine elements (MNE/ NISP) between the Iron Age II and Hellenistic assemblages suggests that the Iron Age II assemblage was more fragmented than the later Hellenistic (Figure 5.1).

FIGURE 5.1. COMPLETENESS (MNE/NISP) OF IRON AGE II AND HELLENISTIC ELEMENTS FOR CAPRINES (SHEEP AND GOAT) FROM AREA D3.



5.1.3 Animal Demographics of Area D3

5.1.3.1 Caprine Age Profiles of Area D3

The caprine assemblages from all layers of Area D3 were aged based on epiphyseal fusion. The Iron Age II caprine survivorship percentage (%fused bones) suggests that most caprine survived to 18-30 months, with 64% surviving to this point, which relates to the exploitation of caprine for meat (Table 5.8A; Payne 1973). Aging of distinguishable sheep and goat suggests goats were maintained longer than sheep, with all goat remains fused whereas some portion of sheep were culled around one to one-and-a-half years (Table 5.8B) The sample size of the Hellenistic and Late Hellenistic assemblages are too small to allow estimation of age profiles. The few caprine bones, which allow estimation of age-at-death, show a representation of primarily adult animals (Table 5.8A).

TABLE 5.8. A. UNFUSED AND FUSED ELEMENTS OF CAPRINES (NISP BASED) FOR AREA D3. B. UNFUSED AND FUSED ELEMENTS OF IDENTFIED SHEEP AND GOAT (NISP BASED) FOR IRON AGE AREA D3 - AGING BASED ON ZEDER (2006).
A.

Area D3 Caprine			Iron Age II			Hellenistic			Late Hellenistic		
Element	Portion	Age (months)	Total	Unfused	%Unfused	Total	Unfused	%Unfused	Total	Unfused	%Unfused
Radius	Proximal	0-6	23	3	13.04%	2	0	0%	1	0	0%
Humerus	Distal	6-12	15	1	6.66%	2	0	0%	0	0	0%
Pelvis		6-12	10	2	20%	1	1	5%	0	0	0%
Scapula		6-12	4	1	25%	1	0	0%	0	0	0%
2nd Phalanx		6-12	15	3	20%	1	0	0%	0	0	0%
1st Phalanx		6-12	16	8	50%	1	0	0%	1	0	0%
Tibia	Distal	18-30	11	2	18.18%	0	0	0%	1	0	0%
Metacarpal	Distal	18-30	15	8	53.33%	2	0	0%	1	0	0%
Metatarsal	Distal	18-30	0	0	0%	0	0	0%	0	0	0%
Calcaneus		30-48	5	2	40%	0	0	0%	0	0	0%
Femur	Proximal	30-48	15	13	86.66%	2	0	0%	1	1	100%
Femur	Distal	30-48	7	3	42.85%	2	1	2.33%	0	0	0%
Ulna	Proximal	30-48	4	2	50%	0	0	0%	0	0	0%
Radius	Distal	30-48	5	5	100%	1	0	0%	0	0	0%
Tibia	Proximal	30-48	7	4	57.14%	0	0	0%	0	0	0%
Humerus	Proximal	48++	12	10	83.33%	0	0	0%	0	0	0%

B.

Area D3 Caprine			Iron Age II Capra			Iron Age II Ovis		
Element	Portion	Age (months)	Total	Unfused	%Unfused	Total	Unfused	%Unfused
Radius	Proximal	0-6	1	0	0.00%	4	0	0.00%
Humerus	Distal	6-12	4	0	0.00%			
2nd Phalanx		6-12	7	0	0.00%	6	0	0.00%
1st Phalanx		6-12	4	0	0.00%	3	1	33%
Tibia	Distal	18-30				1	0	0.00%
Metapodials	Distal	18-30	4	0	0.00%	1	1	100%
Calcaneus		30-48	1	0	0.00%	1	1	100%
Radius	Distal	30-48						

5.1.3.2 Cattle Age Profiles of Area D3

The sample size of cattle bones is minimal in both the Iron Age II, Hellenistic, and Late Hellenistic assemblages. The Iron Age II assemblage shows a representation of both juveniles and adults (Table 5.9).

TABLE 5.9. UNFUSED AND FUSED ELEMENTS OF CATTLE (NISP BASED) FOR AREA D3. AGING BASED ON SILVER (1969).

Area D3 Cattle			Iron Age II			Hellenistic			Late Hellenistic		
Element	Portion	Age	Total	Unfused	%Unfused	Total	Unfused	%Unfused	Total	Unfused	%Unfused
Pelvis		7-10 m	0	0	0%	0	0	0%	0	0	0%
Scapula		7-10 m	0	0	0%	0	0	0%	0	0	0%
Radius	Proximal	12-18 m	0	0	0%	0	0	0%	0	0	0%
Humerus	Distal	12-18 m	0	0	0%	0	0	0%	0	0	0%
2nd Phalanx		1.5 y	0	0	0%	1	0	0%	1	0	0%
1st Phalanx		1.5 y	2	0	0%	0	0	0%	1	0	0%
Tibia	Distal	2-2.5 y	2	0	0%	0	0	0%	0	0	0%
Metacarpal	Distal	2-2.5 y	2	1	50%	0	0	0%	0	0	0%
Metatarsal	Distal	2.25- 3 y	1	0	0%	0	0	0%	1	1	50%
Femur	Proximal	3.5 y	1	0	0%	0	0	0%	0	0	0%
Calcaneus		3.5-4 y	0	0	0%	0	0	0%	0	0	0%
Femur	Distal	3.5-4 y	0	0	0	0	0	0	0	0	0
Ulna	Proximal	3.5-4 y	0	0	0	0	0	0	0	0	0
Radius	Distal	3.5-4 y	0	0	0	0	0	0	0	0	0
Tibia	Proximal	3.5-4 y	6	6	100	0	0	0	0	0	0
Humerus	Proximal	3.5-4 y	0	0	0	0	0	0	0	0	0

5.1.3.3. Caprine Body Part Frequencies in Area D3

In the Iron Age II assemblage from Area D3, the most common elements for caprine are the humerus and scapula (based on MAU values, Table 5.10). The second most common caprine elements in the Iron Age II assemblage are the hindlimb's femur and tibia followed closely by

cranial elements, metapodials, phalanges, and vertebra. The caprine consumption pattern in the Iron Age II of Area D3 suggests the entire carcass was consumed with a focus on the forelimbs. The most common caprine element in the Hellenistic assemblage is the radius, followed vertebra (Table 5.10).

There were no significant relationships between bone structural density and caprine MNE found for either the Iron Age II or Hellenistic assemblages (Iron Age II Pearson's r= 0.205, p= 0.371; Hellenistic Pearson's r= 0.414, p= 0.061), suggesting there was no level of influence of the bone structural density on the survivorship of bones. In addition, there was no meaningful relationship between caprine bone survivorship (%MAU) and food utility index (FUI; Metcalfe and Jones (1988)) in the Iron Age II (Pearson's r= 0.158, p=0.531) or in the Hellenistic period (Pearson's r= 0.360, p=0.229). The sample size of the Late Hellenistic assemblage did not allow for statistical testing of bone density or food utility index.

TABLE 5.10. SKELETAL ELEMENTS FREQUENCIES OF CAPRINES BY PERIOD FOR AREA D3

Body Part Frequencies	Iron Age II				Hellenistic			
Element	NISP	MNE	MAU	MAU%	NISP	MNE	MAU	MAU%
Cranium	40	3	3	60%	13	2	2	100%
Mandible	48	4	2	40%	5	1	0.50	25%
Atlas	3	2	2	40%	1	1	1	50%
Axis	1	1	1	20%	1	1	1	50%
Cervical v	14	6	1.2	24%	5	3	0.60	30%
Thoracic v	23	7	0.54	10.77%	2	1	0.08	4%
Lumbar v	33	12	1.71	34.29%	7	4	0.57	29%
Sacrum			0	0%	1	1	1	50%
Pelvis	27	6	1	20%	3	1	0.5	25%
Sternum	2	1	2.5	50%	0	0	0	0%
Scapula	23	5	4	80%	2	1	0.5	25%
Humerus	46	8	5	100%	1	1	0.5	25%
Radius	54	10	1.5	30%	7	3	1.5	75%
Ulna	16	3	0.41	8.18%	0	0	0	0%
Carpals/Tarsals	56	9	1.75	35%	8	4	0.18	9%
Metapodials	47	7	2.5	50%	8	2	0.5	25%
Tibia	40	5	2.5	50%	2	1	0.5	25%
Femur	35	5	0.5	10%	7	1	0.5	25%
Patella	1	1	1.5	30%	1	1	0.5	25%
1st Phalanx	31	12	1.63	32.5%	2	2	0.25	13%
2nd Phalanx	28	13	0.75	15%	2	2	0.25	13%
3rd Phalanx	9	6	3	60%	0	0	0	0%

5.1.3.4. Cattle Body Part Frequencies in Area D3

The most prevalent cattle element in the Iron Age II is the hindlimb's tibia and cranial elements (Table 5.11). The second most common cattle elements are the radius, ulna, and femur, and metapodials (Table 5.11). Prevalent cattle body parts in the Hellenistic assemblage are the mandible and phalanges, suggesting majority waste stock in the Hellenistic period. Skeletal elements were too few to allow statistical analysis as carried above for caprine.

TABLE 5.11. SKELETAL ELEMENTS FREQUENCIES OF CATTLE BY PERIOD FROM AREA D3.

Cattle	Iron Age II				Hellenistic			
Element	NISP	MNE	MAU	MAU%	NISP	MNE	MAU	MAU%
Cranium	2	1	1	100%	1	1	1	100%
Mandible	3	1	0.5	50%	3	2	1	100%
Atlas	0	0	0	0%	0	0	0	0.0%
Axis	0	0	0	0%	0	0	0	0.0%
Cervical v	0	0	0	0%	0	0	0	0.0%
Thoracic v	0	0	0	0%	1	1	0.077	7.7%
Lumbar v	0	0	0	0%	0	0	0	0.0%
Ribs	0	0	0	0%	0	0	0	0.0%
Sacrum	16	3	0.17	17%	0	0	0	0.0%
Pelvis	1	1	0	0%	0	0	0	0.0%
Sternum	0	0	0	0%	0	0	0	0.0%
Scapula	0	0	0	0%	0	0	0	0.0%
Humerus	0	0	0.5	50%	0	0	0	0.0%
Radius	1	1	0.5	50%	0	0	0	0.0%
Ulna	1	1	0.14	14%	0	0	0	0.0%
Carpals/Tarsals	13	3	0.5	50%	0	0	0	0.0%
Metapodials	12	2	1	100%	0	0	0	0.0%
Tibia	10	2	0.5	50%	0	0	0	0.0%
Femur	4	1	0	0%	0	0	0	0.0%
Patella	0	0	0.38	38%	0	0	0	0.0%
1st Phalanx	8	3	0.38	38%	0	0	0.13	12.5%
2nd Phalanx	4	3	0.25	25%	1	1	0.13	12.5%
3rd Phalanx	5	2	1	100%	1	1	1	100%

5.1.4 Summary of Area D3

The Iron Age II, Hellenistic, and Late Hellenistic periods in Area D3 are dominated by domestic livestock, as is typical of southern Levant faunal assemblages of these periods (Horwitz and Dahan 1996). The Iron Age II and Hellenistic periods' assemblages from Area D3 differ from each other in the diversity of exploited species and the manner of their exploitation.

While caprine dominate both assemblages, their frequency is relatively higher in the Hellenistic period than in the Iron Age II. The Iron Age II animal economy was more diverse with the small inclusion of game and fish. Fish represented 6% of the Iron Age II assemblage and indicate some trade and imports from the freshwater sources of the Yarkon, Jordan, and Nile Rivers, and the saltwater sources of the Bardawil Lagoon in the Sinai Peninsula and the Mediterranean Sea.

Caprine exploitation in both periods is generally similar with the presence of older and younger caprine. In the Iron Age II assemblage there is evidence for the exploitation of juvenile individuals. In particular sheep were culled younger than their goat counterparts, indicating a subsistence strategy focus meat consumption (Payne 1973). The exploitation of the entire caprine body parts is observed in both periods, with a focus towards consuming the fore and hindquarters. In comparison the Hellenistic assemblage suggests a preference neck and rib cuts, as there is a higher frequency of these elements. Overall, caprine exploitation in Area D3 suggests those residing in the Iron Age II dwelling were in control of processing and possibly obtaining their own meat. This aspect may suggest a direct connection between herder and consumer as there is no evidence for spatial distribution of specific portions that would indicate a specialized economy, following Zeder's understanding of hierarchical urban economies (1988).

The frequency of cattle in both periods is low (less than 10% of livestock), per the immediate local environment of the site, which is less suitable for agriculture (Rubin 2000; Gadot 2015). The lower frequency of cattle in Area D3 is similar to the frequency of cattle found at the Western Wall Plaza (Sapir-Hen et al. 2016) and Area D (Horwitz and Tchernov 1989),

while the other comparable assemblages have a cattle frequency of ~20%.[48] The main difference between the Iron Age II and Hellenistic assemblages is the diversity of species. The Iron Age II included a more diverse animal economy with evidence of donkey, gazelle, hare, partridge, and, surprisingly, fish.

5.2 Givati Parking Lot, Area M4 "Glacis/Acra Sequence."

A total of 7025 bone fragments were processed, and 4800 (NISP) bones were identified from the Hellenistic glacis in Area M4 of the Givati Parking Lot. Of the identified bones, 1754 (NISP) was derived from the Early Stage, 1466 derived from the Late Stage, and the remaining 1580 (NISP) from the Hasmonean Stage (Table 5.12).

TABLE 5.12. GIVATI AREA M4' GLACIS" LOCI SEQUENCE WITH ASSOCIATED PHASE AND NUMBER OF IDENTIFIED SPECIMENS (NISP) PER LOCI.

Loci	Phase	NISP
4080	VIIIc-I	1204
4089	VIIIc-I	550
3991	VIIIc-II	215
3996	VIIIc-II	53
3997	VIIIc-II	173
4002	VIIIc-II	202
4008	VIIIc-II	419
4024	VIIIc-II	44
4032	VIIIc-II	133
4034	VIIIc-II	75
4035	VIIIc-II	15
4058	VIIIc-II	46
4059	VIIIc-II	42
W2024	VIIIc-II	50
3796	VIIId	465
3928	VIIId	1066
3991/3919	VIIId	39
3891	VIIId	3

[48] Area D1, Horwitz 1996; Giv'ati Area M1, Bar-Oz and Raban-Gerstel 2013; Area G, Tamar and Bar-Oz 2015

5.2.1 Species Represented in Area M4

Domestic livestock (i.e., sheep, goat, cattle, donkey) are the most dominant species in all assemblages, and they represent ~92% of the Early Stage and Late Stage assemblages, and 90% of the Hasmonean Stage. The most dominant livestock animal in the Early Stage assemblage is caprine (sheep and goat) with ~60% of the assemblage. The ratio between the distinguishable goat (N: 66) and sheep (N: 65) is relatively equal at 1:0.9. The second most common species in the Early Stage is cattle (*Bos taurus,* combined with large mammal body size group) with 31.9% of the assemblage. The wild species represented by fallow deer (*Dama mesopotamica*, N: 52), red deer (*Cervus elaphus,* N: 1), and gazelles (N: 17) contributed to 4% of the Early Stage assemblage. Avian species represented 2.5% of the Early Stage assemblage comprised mostly of chicken (N: 35) but also included partridge (N: 5), mallard (*Anas platyrhynchos,* N: 1), and pigeon/rock dove (*Columba livia,* N: 1). Other species present in low quantities are dogs (N: 23), pig (*Sus scrofa domesticus*, N: 4), donkey (N: 2), and fish (N: 1) (Table 5.13).

The majority of the Late Stage assemblage consists of caprine (71%) with a 1:0.9 ratio between sheep and goat bones. Cattle follow caprine representing 20% of the assemblage of the Late Stage assemblage. Wild species contributed to 5% of the Late Stage assemblage, represented by fallow deer (N: 40), red fox (*Vulpes vulpes,* N: 2), and gazelles (N: 30). Avian species represented ~3% of the Early Stage assemblage comprised mostly of chicken (N: 34) but also some partridge (N: 2). Other species present but in low quantities are dog (N: 1), pig (N: 4), and fish (N: 2) (Table 5.13).

Although domesticated livestock dominates the Hasmonean Stage assemblage, it also has the greatest richness of species (Table 5.13). The most prominent livestock animal in the Hasmonean Stage is caprine with 72% of the assemblage, with a 1:0.8 ratio between sheep and

goat bones. Cattle again are the second most common species with 18% of the Hasmonean Stage assemblage. This assemblage also included other species such as a domestic dog (N: 4), pig (N: 1), camel (*Camelus dromedarius*, N: 1), gazelle (N: 13), hare (N: 1), red deer (N: 1), roe deer (*Capreolus capreolus*, N: 1), fallow deer (N: 33), chicken (N: 62), partridge (N: 8), and domestic goose (*Anser anser*, N: 1) (Table 5.13).

TABLE 5.13. NUMBER OF IDENTIFIED SPECIMENS (NISP), MINIMUM NUMBER OF INDIVIDUALS (MNI), AND PERCENTAGE OF TOTAL ASSEMBLAGE PER SPECIES IDENTIFIED BY SUB-PHASE OF GIVATI AREA M4 "GLACIS"

Givati M4	Species	Common Name	Phase VIIIc_I Early Stage			Phase VIIIc_II Late Stage			Phase VIIId_I Hasmonean with Intrusions		
			NISP	MNI	NISP%	NISP	MNI	NISP%	NISP	MNI	NISP%
Domesticated Ungulates	*Capra hircus*	Goat	66	6	3.76%	78	9	5.32%	69	9	4.37%
	Ovis aries	Sheep	65	7	3.71%	77	7	5.25%	79	8	5.00%
	Caprine size	Sheep or Goat	915	17	52.17%	892	21	60.85%	996	16	63.04%
	Bos taurus	Cow	401	9	22.86%	222	5	15.14%	197	4	12.47%
	A Size	Large Mammal	160	2	9.12%	74	2	5.05%	91	1	5.76%
	Canis familiaris	Domestic Dog	23	3	1.31%	1	1	0.07%	4	1	0.25%
	Sus scrofa domesticus	Domestic Pig	4	1	0.23%	4	1	0.27%	1	1	0.06%
	Camelus dromedarius	Arabian Camel							1	1	0.06%
	Equus asinus	Donkey	2	1	0.11%						0.00%
Wild Mammals	*Canis/Gazella size*	Small mammal	4	1	0.23%	3	1	0.20%	13	1	0.82%
	Gazella Gazella	Gazelle	17	1	0.97%	30	2	2.05%	13	2	0.82%
	Lepus capensis	Hare							1	1	0.06%
	Cervus elaphus	Red Deer	1	1	0.06%				1	1	0.06%
	Capreolus capreolus	Roe Deer							1	1	0.06%
	Dama mesopotamica	Fallow Deer	52	4	2.96%	40	3	2.73%	33	2	2.09%
	Vulpes vulpes	Red Fox				2	1	0.14%			
Aves	*Alectoris chukar*	Partridge	5	2	0.29%	6	2	0.41%	8	3	0.51%
	Anas platyrhynchos	Mallard Duck	1	1	0.06%						
	Anser anser	Domestic Goose							1	1	0.06%
	Columba livia	Rock Pigeon/Dove	1	1	0.06%						
	Gallus gallus	Domestic Chicken	35	6	2.00%	34	5	2.32%	62	7	3.92%
	Medium aves	Medium Bird	1	1	0.06%	1	1	0.07%	8	2	0.51%
	Large Aves	Large Bird							1	1	0.06%
Pisces	*Pisces Size*	Fish	1	1	0.06%	2	1	0.14%			
TOTAL			1754	65	100%	1466	62	100%	1580	63	100%

5.2.2 Taphonomic Analysis of Area M4

5.2.2.1 Weathering of Area M4

Weathering pattern of the bones from all periods fall primarily between stages 0-2 of Brehensmeyer's guide (1978: 157) (Table 5.14), suggesting they were covered quickly after disposal (three years or less). However, the Early Stage has a greater number of bones that were exposed for longer than three years (38% between Scales 3-6; Brehensmeyer 1978) than the Late and Hasmonean Stages (Table 5.14). The difference in weathering degrees of the subphases suggests two hypothetical options. First, there was a period of exposure between the Early and Late subphases; or second, the material used for the construction of the Early Stage was exposed before use.

TABLE 5.14. TOTAL OF FRAGMENTS RECORDED IN EACH WEATHERING STAGE (STAGES ACCORDING TO BEHRENMEYER 1978) BY SUBPHASE OF GIVATI AREA M4.

Weathering	0	1	2	3	4	5	6
Phase VIIIc_I Early	193	530	375	400	172	71	13
Phase VIIIc_II Late	231	558	277	196	116	79	10
Phase VIIId_I Hasmonean	238	804	310	139	51	24	6
TOTAL	662	1892	962	735	339	174	29

5.2.2.2 Burned Remains Collected from Area M4

Ca. 0.17% of the Early Stage, ca. 1.4% of the Late Stage, and ca. 1.7% of the Hasmonean Stage assemblage showed some evidence of burning (Table 5.15). This analysis includes all fragments from the assemblage, including those that could not be identified to the skeletal element. Of the identified fragments, burned remains represented less than one percent of the Early Stage included caprine (N: 3) and a single red deer metatarsal (Table 5.15 and 5.16). Identified burned fragments in the Late Stage assemblage represented 2%, included mostly caprine (N: 19) but also

gazelle (N: 2) and a cow (Table 5.15 and 5.16). The Hasmonean Stage also had 2% of identified burned remain that included the main domestic animals: caprine (N: 21) and cattle (N: 3) (Table 5.15 and 5.16). The frequency of burned remains implies that burning did not heavily affect the constructional fill of Area M4. Contextualizing if the burned remains are a result of cooking, destruction, or garbage disposal is ambiguous, but overall the minimal frequency of burned remains suggest anthropogenic processes related to fire did not affected the Early Stage, and minimally affected the Late and Hasmonean Stage.

TABLE 5.15. COUNT OF IDENTIFIED AND UNIDENTIFIED FRAGMENTS WITH AND WITHOUT EVIDENCE OF BURNING AND CHARRING BY SUBPHASE OF GIVATI AREA M4

Percentage of Subphases Burned	Phase VIIIc_I Early	Phase VIIIc_II Late	Phase VIIId_I Hasmonean with Intrusions
Burned	4	33	38
NISP Identified	1754	1466	1580
NISP Unidentified	647	922	644
Percentage	0.17%	1.4%	1.7%

TABLE 5.16. COUNT OF BURNED BONES BY SUBPHASE, BURN SCALE, AND SPECIES OF GIVATI AREA M4. SCALE: B-: SLIGHTLY BURNED, B: BURNED, AND B+: FULLY CALCIFIED

Burning	VIIIc_I Early				VIIIc_II Late			VIIId_I Hasmonean				Total
Species	*B*	*B-*	*B+*	*Green*	*B*	*B-*	*B+*	*B*	*B-*	*B+*	*Green*	
Caprine			1	1	5	3	8	4	5	9	2	38
Goat								1	1	1		3
Sheep		1				3						4
Cattle					1		3			3		7
Gazelle					1	1						2
Red Deer		1										1
Fallow Deer							1					1
Total	0	2	1	1	7	7	12	5	6	13	2	56

5.2.2.3 Animal Activity and Root Etching of Area M4

Animal scavenging by carnivores and rodents is present with 1.6% of the Early Stage, 1.2% of the Late Stage, and 1.7% of the Hasmonean Stage (Table 5.17). Evidence of destructive root etching was only present on less than 1% of the entire assemblage (Early Stage, N: 4; Late Stage

N: 1; Hasmonean Stage, N: 3) (Table 5.17). They indicate that the destructive effects of scavenging only minimally affected the subphase assemblages.

TABLE 5.17: TOTAL COUNT AND PERCENTAGE OF GNAWING AND ROOT ETCHING BY SUBPHASE OF GIVATI AREA M4.

Period	Rodent Gnawing	Rodent Gnaw %	Carnivore Gnawing	Carnivore Gnaw %	Root Etching	Root Etching %
VIIIc_I Early Stage	9	0.51%	17	1.16%	4	0.25%
VIIIC_II Late Stage	6	0.34%	13	0.89%	1	0.06%
VIIId_I Hasmonean Stage	16	0.91%	12	0.82%	3	0.19%
TOTAL	31	1.77%	42	2.86%	8	0.51%

5.2.2.5. Pathologies in Area M4

Evidence of pathologies was present on less than one percent of each subphase assemblage (Table 5.18; Figure 5.2). The most common pathology was boney outgrowth in both the Early Stage (N: 8) and Late Stage (N: 9) (Table 5.18; Figure 5.2). There was also evidence of degradation, healed fractures, and arthritis in the subphases (Table 5.18).

TABLE 5.18: TABLE COUNT OF PATHOLOGIES BY SUBPHASE OF GIVATI AREA M4.

Givati M4		VIIIc_I Early Stage		VIIIc_II Late Stage			VIIId_I Hasmonean Stage	
Species	Element	Boney Outgrowth	Bone Degradation	Boney Outgrowth	Bone Degradation (arthritis)	Healed Fracture	Boney Outgrowth	Healed Fracture
Caprine	Humerus	1						
	Femur							1
	Metatarsal		1	1				
	Thoracic V.			1				
	Phalanx I	1						
Goat	Phalanx II			2				
	Phalanx II	2						
Sheep	Phalanx I	1						
	Metacarpal	1						
	Metatarsal			1				
Cattle	Tibia						1	
	Metacarpal						1	
	Astragals				1			
Chicken	Phalanx II	2					1	
	Phalanx III			2			1	
	Rib					2		
	Sternum			1				
	Tibia			1				
Total		8	1	9	1	2	4	1

FIGURE 5.2. PATHOLOGIES FROM GIVATI AREA M4

A. UPPER: COW TIBIA WITH BONEY OUTGROWTH (+3509, L. 3707); LOWER: CAPRINE METATARSAL (#1735, L.4008) WITH BONEY OUTGROWTH.

B. SECOND PHALANXS OF CATTLE AND CAPRINE WITH BONEY OUTGRWOTH

5.2.2.6 Butchery and Cut Marks in Area M4

Approximately 14% of each subphase showed evidence of butchery and cut marks (Early Stage, N: 231; Late Stage, N: 212; Hasmonean Stage, N: 225) (Table 5.19). The Early and Late Stage butchery patterns are similar with ~54% representing dismembering, ~33% representing filleting, and ~10% representing skinning activities, whereas the Hasmonean Stage is characterized by ~50% dismembering, ~28% filleting, and ~20% skinning (Table 5.19). Domestic livestock represents the majority of butchered animals, but there is also the presence of butchered deer, gazelle, and chicken in all subphases. Butchery in the Early Stage has evidence of fillet markings on a tibia of a dog and a femur of a pig. The wide distribution of the butchery markings and the percentage of the assemblages butchered suggest some form of systematic processing by artisans or craftspeople that included primary and secondary butchery of animals.

TABLE 5.19. CUT MARKS (NISP) FOR DOMESTIC AND WILD MAMMALS BASED ON THE TYPOLOGY OF BINFORD (1984) FROM GIVATI AREA M4

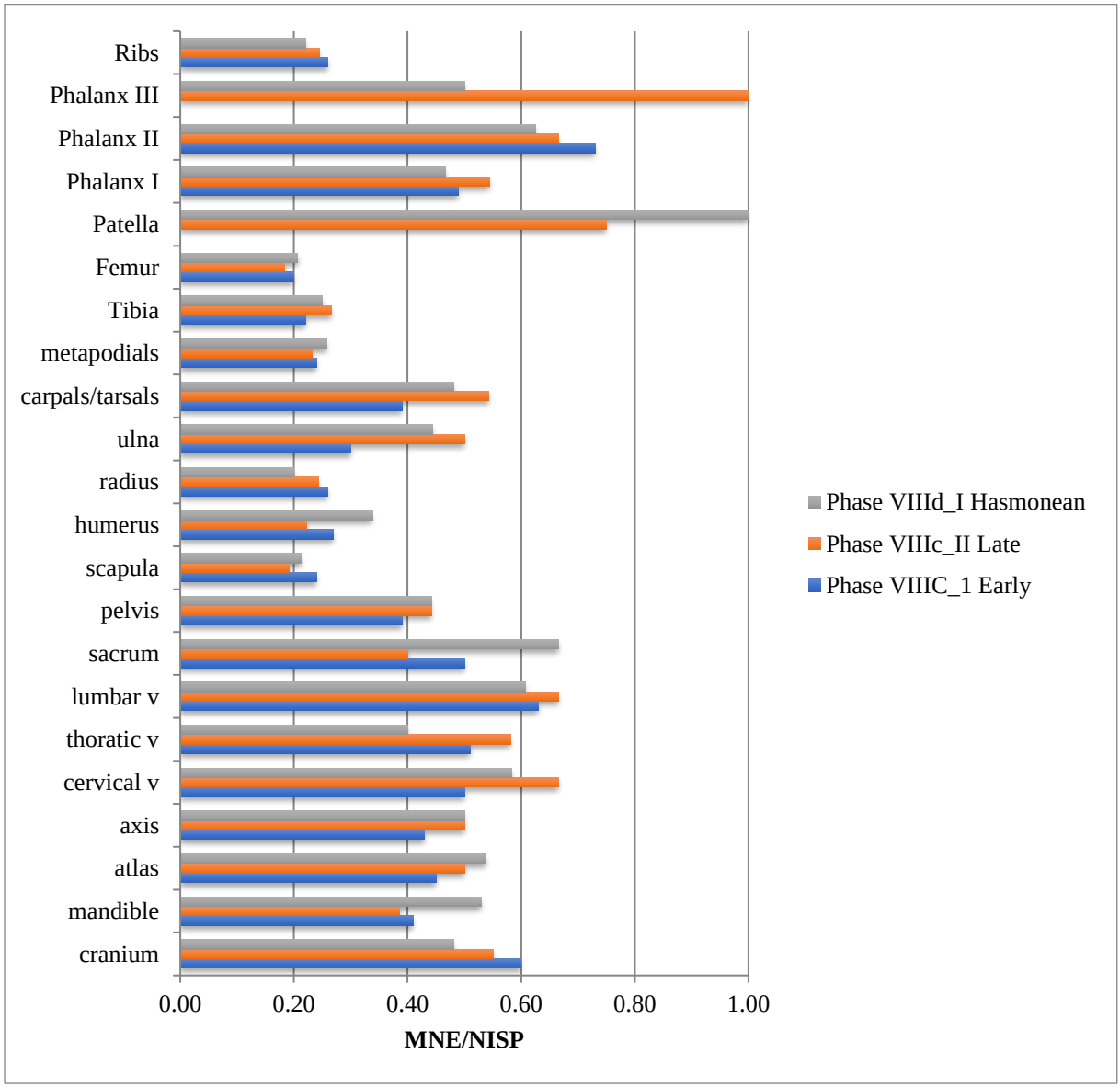
M4 Cut	VIIIc_1 Early					VIIIc_II Late						VIIId_I Hasmonean				
	Dismembering	Filleting	Skinning	Sawed	Worked	Dismembering	Filleting	Skinning	Sawed	Food Prep	Worked	Dismembering	Filleting	Skinning	Food Prep	Worked
Cattle	43	28	7			24	15	7				25	12	14		
Caprine	62	39	9	2	3	66	45	6		1	1	72	40	22		1
Goat	6		1			3	3	3				4	2	5		
Sheep	7	5	4			8	2	3				7	3	5		
Pig		1														
Fallow Deer	4	1	4			3	4	1	1			2	4		1	
Roe Deer													1			
Red Deer													1			
Gazelle	1					8	4	1				2	1			
Dog	1	1														
Chicken	1	1				3						1				
Total	125	76	25	2	3	115	73	21	1	1	1	113	64	46	1	1
%Subphase	13.2%					14.5%						14.2%				

5.2.2.7. Fragmentation of Area M4

Comparing the completeness percentage of caprine elements (MNE/ NISP) between the Subphases suggests that the assemblages were all fragmented similarly (Figure 5.3), and there

was no significant difference between the subphases (ANOVA: df: 2, Mean Sq: 0.007, f: 0.1886, p: 0.8186). Regardless of subphase, most elements were 20-50% complete.

FIGURE 5.3. COMPLETENESS (MNE/NISP) OF EARLY STAGE, LATE STAGE, AND HASMONEAN STAGE ELEMENTS FOR CAPRINES (SHEEP AND GOAT) FROM GIVATI M4.



5.2.3 Animal Demographics of Area M4

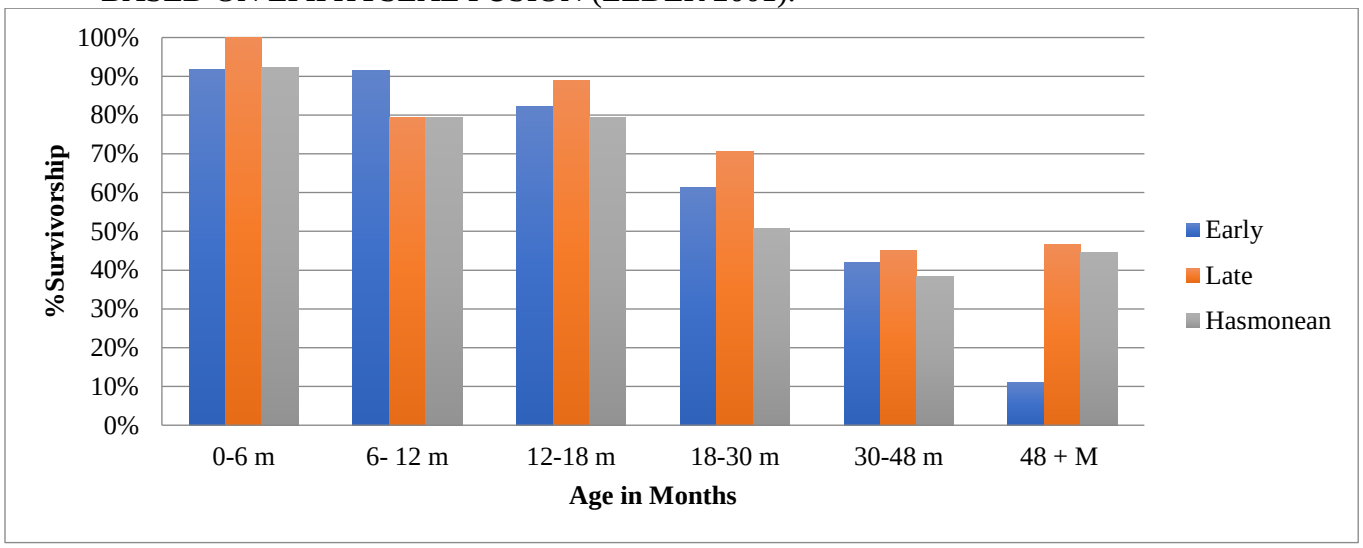
5.2.3.1 Caprine Age Profiles of Area M4

The caprine assemblages from all subphases were aged based on epiphyseal fusion and tooth-wear. The mortality profiles for the subphases suggest a variety of culling strategies were employed (Figure 5.4A; Table 5.20). The Early Stage mortality profile suggests that the main aim of caprine exploitation was for milk, with 61% of the herd surviving to two and half years, with a secondary aim for meat (*following* Payne 1973). The Late Stage caprine exploitation focused on wool, with 47% of the herd surviving past four years; and the Hasmonean Stage was geared towards meat, with 54% surviving past two and half years, with a small percentage being used for milk and wool production, as 44% survived past four years (*following* Payne 1973). Epiphyseal fusion of taxonomically distinct sheep and goats suggest throughout the subphases that sheep were culled slightly younger than goats, around one to two years for meat (Figure 5.4B). In the Late Stage, sheep were preserved specifically for wool as 75% of the herd survives past four years (Figure 5.4B). In comparison to the other subphases this frequency is higher, reinforcing the use of sheep for wool.

Aging profile based on caprine teeth (i.e., mandibular dP4 and M3) for the Early and Late Stage concur with the results from epiphyseal fusion, with the presence of both young and older caprine (Table 5.21). The number of caprine with a tooth structure of older than four years reinforces the role of secondary products in these Early and Late Stages; whereas, the Hasmonean Stage tooth wear suggests caprine only under the age of four, denoting a strategy focused more on meat production rather than secondary products (Table 5.21; Payne 1973).

FIGURE 5.4.

A. MORTALITY PROFILE OF CAPRINES BY SUBPHASE OF GIVATI AREA M4, BASED ON EPIPHYSEAL FUSION (ZEDER 2001).



B. MORTALITY PROFILE OF SHEEP (OVIS) AND GOAT (CAPRA) BY SUBPHASE AND COMBINED SUBPHASES, BASED ON EPIPHYSEAL FUSION.

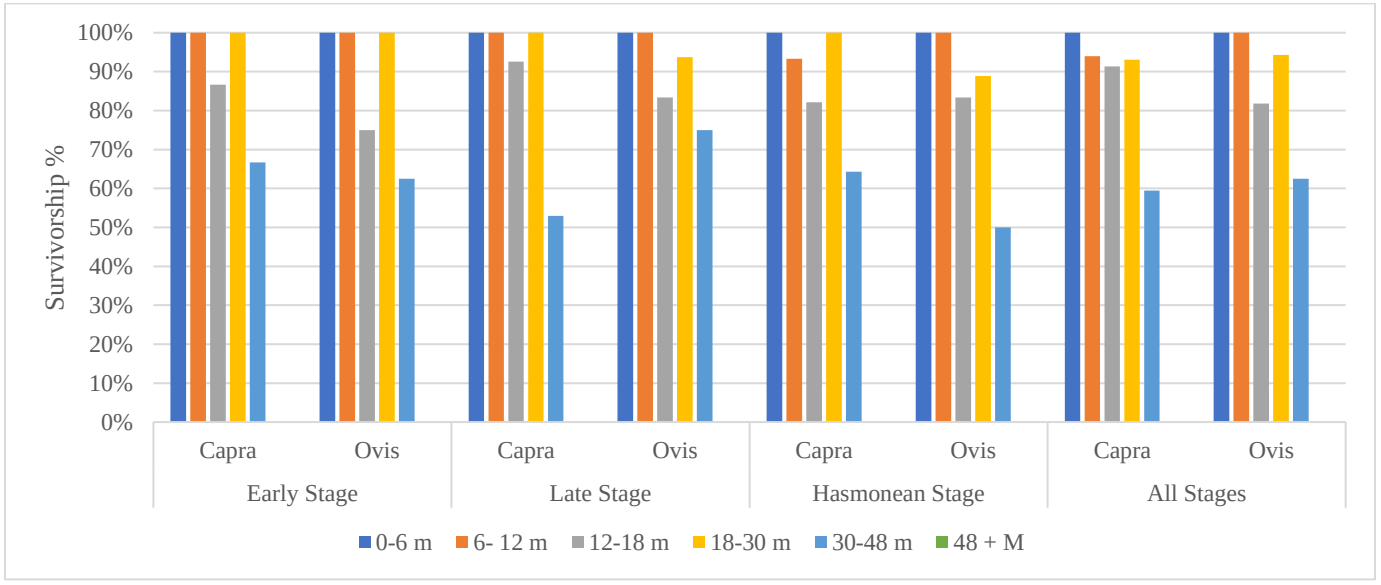


TABLE 5.20. UNFUSED AND FUSED ELEMENTS OF CAPRINES (NISP BASED) BY SUBPHASE OF GIVATI AREA M4. AGING BASED ON ZEDER (2006).

Caprine M4			Phase VIIIc_I Early Stage			Phase VIIIc_II Late Stage			Phase VIIId_I Hasmonean Stage		
Element	Portion	Fused Age Range	Total	Unfused	%UF	Total	Unfused	%UF	Total	Unfused	%UF
Radius	Proximal	0-6 months	24	2	8%	29	0	0%	26	2	8%
Humerus	Distal	6-12 months	35	3	9%	36	5	14%	39	5	13%
Pelvis		6-12 months	0	0		18	6	33%	11	5	45%
Scapula		6-12 months	0	0		14	3	21%	18	4	22%
Phalanx II		12-18 months	12	1	8%	5	0	0%	7	2	29%
Phalanx I		12-18 months	34	7	21%	49	6	12%	56	11	20%
Tibia	Distal	18-30 months	20	9	45%	27	5	19%	21	9	43%
Metacarpal	Distal	18-30 months	17	6	35%	21	6	29%	18	8	44%
Metatarsal	Distal	18-30 months	7	2	29%	30	12	40%	9	7	78%
Calcaneus		30-48 Months	0	0		24	13	54%	13	6	46%
Femur	Proximal	30-48 Months	25	11	44%	16	8	50%	12	6	50%
Femur	Distal	30-48 Months	11	8	73%	17	13	76%	20	15	75%
Ulna	Proximal	30-48 Months	4	2	50%	2	2	100%	12	5	42%
Radius	Distal	30-48 Months	19	14	74%	18	8	44%	5	2	40%
Tibia	Proximal	30-48 Months	15	8	53%	16	7	44%	22	13	59%
Humerus	Proximal	48+ months	9	8	89%	15	7	47%	10	9	90%

TABLE 5.21. AGING OF CAPRINES, BY SUBPHASE OF GIVATI AREA M4, BASED ON TOOTH WEAR OF THE MANDIBULAR DP4 AND M3, BASED ON PAYNE 1973.

Payne Range	Age (based on mandibular M3)	Phase VIIIc_I Early Stage	Phase VIIIc_II Late Stage	Phase VIIId_I Hasmonean Stage
C	6-12 months	3	3	1
D	1-2 years	4	4	4
E	2-3 years	1	1	1
F	3-4 years	4	3	5
G/H	4-8 years	8	9	0

5.2.3.2 Cattle Age Profiles of Area M4

The cattle assemblages from all subphases were aged based on epiphyseal fusion (Table 5.22). Mortality profiles for the Early and Late stages suggest a similar strategy of cattle exploitation geared towards meat, with a few surviving past four years for draught-work. The Hasmonean Stage mortality profile shows that 80% of the herd survived past two and a half to three years, but only 56% of Hasmonean stage cattle survived past four years. This suggests that some portion was exploited as draught animals or for secondary products, and some for beef (Figure 5.5; 5.22). Cattle could not be aged based on tooth-wear due to the scarcity of age-able teeth in the subphases (Table 5.23).

FIGURE 5.5. MORTALITY PROFILE OF CATTLE BY SUBPHASE OF GIVATI AREA M4, BASED ON EPIPHYSEAL FUSION (SILVER 1969).

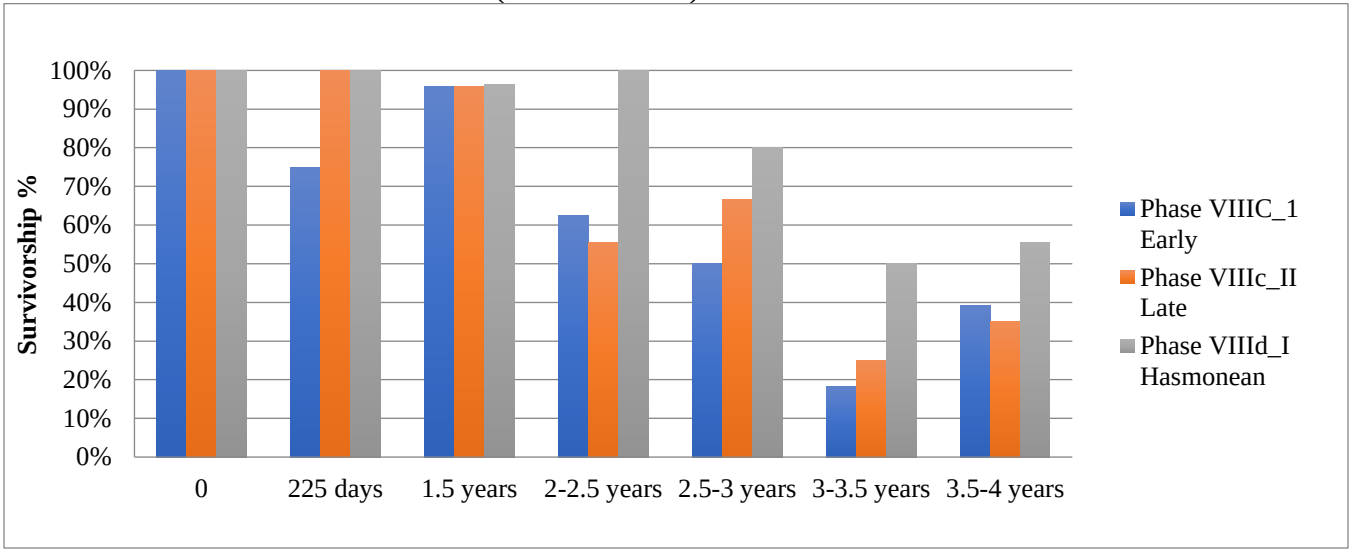


TABLE 5.22. UNFUSED AND FUSED ELEMENTS OF CATTLE (NISP BASED) BY SUBPHASE BY SUBPHASE OF GIVATI AREA M4. AGING BASED ON SILVER (1969).

Cattle			Phase VIIIc_I Early Stage			Phase VIIIc_II Late Stage			Phase VIIId_I Hasmonean Stage		
Element	Portion	Fused Age Range	Total	Unfused	%UF	Total	Unfused	%UF	Total	Unfused	%UF
Pelvis		7-10 months	5	1	100%	3	0	0%	3	0	0%
Scapula		7-10 months	1	0	0%	0	0		1	0	0%
Radius	Proximal	12-18 months	7	0	0%	4	0	0%	5	0	0%
Humerus	Distal	12-18 months	11	2	18%	9	0	0%	3	0	0%
Phalanx II		1.5 years	19	1	5%	13	0	0%	14	0	0%
Phalanx I		1.5 years	26	1	4%	11	1	9%	13	1	8%
Tibia	Distal	2-2.5 years	5	0	0%	6	2	33%	2	0	0%
Metacarpal	Distal	2-2.5 years	5	2	40%	1	0	0%	1	0	0%
Metatarsal	Distal	2.25- 3 years	6	3	50%	2	2	100%	2	0	0%
Metapodial	Distal	2-2.5 years	6	6	100%	6	2	33%	5	1	20%
Femur	Proximal	3.5 years	11	9	82%	4	3	75%	2	1	50%
Calcaneus		3.5-4 years	7	3	43%	7	4	57%	1	0	0%
Femur	Distal	3.5-4 years	3	2	67%	3	3	100%	0	0	
Ulna	Proximal	3.5-4 years	1	1	100%	3	2	67%	1	0	0%
Radius	Distal	3.5-4 years	3	2	67%	3	2	67%	2	1	50%
Tibia	Proximal	3.5-4 years	5	4	80%	3	1	33%	3	2	67%
Humerus	Proximal	3.5-4 years	4	2	50%	1	1	100%	2	1	50%

TABLE 5.23. AGING OF CATTLE, BY SUBPHASE OF GIVATI AREA M4, BASED ON TOOTH WEAR OF THE MANDIBULAR DP4 AND M3, BASED ON GRANT 1982.

Grant (1982)	Phase VIIIc_I Early Stage	Phase VIIIc_II Late Stage	Phase VIIId_I Hasmonean Stage
A	2		
B	1	1	
C			1
F	2		
G			1
J	2		
L	1		

5.2.3.3. Caprine and Cattle Body Part Frequencies in Area M4

In all subphases, all body parts of caprine (sheep/goat group combined with medium mammal group for the sake of analysis) were present, with a prevalence of both upper and lower limb elements (i.e., humerus, radius, tibia, and femur), followed by metapodials and to a lesser degree cervical vertebra (based on MAU values, Table 5.24). Similarly, the entire body parts of cattle were present in all subphases (based on MAU values, Table 5.25).

Examining factors that could influence bone survivorship, bone structural density was not a significant factor (compared to MNE values; Early Stage Pearson's r= 0.0041, p= 0.55; Late Stage Pearson's r=0.11, p= 0.54; Hasmonean Stage Pearson's r= 0.0057, p= 0.58). In addition, no significant relationship was found between caprines bone survivorship (MAU%) and food utility index (FUI; Metcalfe and Jones (1988)) in the Early Stage (Pearson's r= 0.3875, p=0.21) or the Late Stage (Pearson's r= 0.3701, p=0.22). However, there was a significant relationship between bone survivorship and food utility index of the Hasmonean Stage (Pearson's r= 0.9969, $p<0.001$), suggesting that at this stage, meat value had a greater impact on the choice of body parts than in other periods.

TABLE 5.24. SKELETAL ELEMENTS FREQUENCIES OF CAPRINE BY SUBPHASE OF GIVATI AREA M4.

Caprine	Phase VIIIc_I Early Stage				Phase VIIIc_II Late Stage				Phase VIIId_I Hasmonean Stage			
Element	NISP	MNE	MAU	MAU%	NISP	MNE	MAU	MAU%	NISP	MNE	MAU	MAU%
Cranium	87	52	1.58	14%	49	27	0.82	8%	83	40	1.21	11%
Mandible	68	28	2.33	20%	70	27	2.25	21%	66	35	2.92	25%
Atlas	20	9	9.00	78%	8	4	4.00	38%	13	7	7.00	61%
Axis	14	6	6.00	52%	6	3	3.00	29%	8	4	4.00	35%
Cervical v	40	20	4.00	35%	36	24	4.80	46%	24	14	2.80	24%
Thoracic v	68	35	2.69	23%	43	25	1.92	18%	55	22	1.69	15%
Lumbar v	62	39	5.57	48%	39	26	3.71	35%	51	31	4.43	39%
Sacrum	6	3	3.00	26%	5	2	2.00	19%	3	2	2.00	17%
Pelvis	44	17	2.83	25%	52	23	3.83	37%	43	19	3.17	28%
Sternum	1	1	1.00	9%								
Scapula	38	9	4.50	39%	52	10	5.00	48%	61	13	6.50	57%
Humerus	85	23	11.50	100%	81	18	9.00	86%	68	23	11.50	100%
Radius	65	17	8.50	74%	74	18	9.00	86%	75	15	7.50	65%
Ulna	10	3	1.50	13%	12	6	3.00	29%	9	4	2.00	17%
Carpals/tarsals	38	15	0.68	6%	35	19	0.86	8%	27	13	0.59	5%
Metapodials	84	20	5.00	43%	99	23	5.75	55%	97	25	6.25	54%
Tibia	82	18	9.00	78%	79	21	10.50	100%	64	16	8.00	70%
Femur	82	16	8.00	70%	60	11	5.50	52%	58	12	6.00	52%
Patella			0.00	0%	4	3	0.21	2%	3	3	0.21	2%
Phalanx I	35	17	2.13	18%	57	31	3.88	37%	60	28	3.50	30%
Phalanx II	11	8	1.00	9%	6	4	0.50	5%	8	5	0.63	5%
Phalanx III	0	0	0.00	0%	2	2	0.25	2%	2	1	0.13	1%
Rib	98	25	1.92	17%	176	43	3.31	32%	254	56	4.31	37%

TABLE 5.25. SKELETAL ELEMENTS FREQUENCIES OF CATTLE BY SUBPHASE OF GIVATI AREA M4.

Cattle	Phase VIIIc_I Early Stage				Phase VIIIc_II Late Stage				Phase VIIId_I Hasmonean Stage			
Element	NISP	MNE	MAU	MAU%	NISP	MNE	MAU	MAU%	NISP	MNE	MAU	MAU%
Cranium	63	35	1.06	27%	24	13	0.39	16%	10	6	0.18	12%
Mandible	42	19	1.58	40%	23	10	0.83	33%	23	11	0.92	61%
Atlas	9	4	4.00	100%	1	1	1.00	40%	3	1	1.00	67%
Axis	4	1	1.00	25%	2	1	1.00	40%	1	1	1.00	67%
Cervical v	27	10	2.00	50%	9	4	0.80	32%	10	4	0.80	53%
Thoracic v	30	10	0.77	19%	15	5	0.38	15%	16	7	0.54	36%
Lumbar v	13	7	1.00	25%	2	1	0.14	6%	9	3	0.43	29%
Sacrum	2	1	1.00	25%	0	0	0.00	0%	3	1	1.00	67%
Pelvis	18	3	0.50	13%	11	5	0.83	33%	9	4	0.67	44%
Sternum	2	1	1.00	25%	0	0	0.00	0%			0.00	0%
Scapula	12	3	1.50	38%	4	1	0.50	20%	5	2	1.00	67%
Humerus	33	5	2.50	63%	18	3	1.50	60%	15	2	1.00	67%
Radius	24	3	1.50	38%	14	2	1.00	40%	16	3	1.50	100%
Ulna	12	5	2.50	63%	7	4	2.00	80%	8	3	1.50	100%
Carpals/tarsals	37	15	0.68	17%	24	10	0.45	18%	15	11	0.50	33%
Metapodials	45	11	2.75	69%	26	5	1.25	50%	21	4	1.00	67%
Tibia	18	3	1.50	38%	16	5	2.50	100%	12	3	1.50	100%
Femur	31	4	2.00	50%	13	2	1.00	40%	7	2	1.00	67%
Patella	4	3	0.21	5%	1	1	0.07	3%			0.00	0%
Phalanx I	31	13	1.63	41%	12	6	0.75	30%	13	7	0.88	58%
Phalanx II	19	11	1.38	34%	15	7	0.88	35%	14	10	1.25	83%
Phalanx III	15	7	0.88	22%	8	4	0.50	20%	12	9	1.13	75%
Rib	64	10	0.77	19%	48	12	0.92	37%	60	13	1.00	67%

5.2.3.4. Body Part Frequencies of Game Animals in Area M4

Game animals, specifically gazelles and fallow deer, make up between four to five percent of the subphase assemblages, and in the Hasmonean Stage also includes red and roe deer. Their relative abundance allows for an exploration of their body parts frequencies in order to understand what portions of hunted animals were brought back or traded into Jerusalem. The most prevalent game elements in the subphases represent selective portions of the body, with a focus on limb and foot elements (based on MAU values, Table 4.26). There is also a presence pelvic element, suggesting that the entire portion from the pelvis to the hooves were brought back. Cranial and mandibular remains represented principally by mandibular and maxillary teeth, as well as the occipital process were also present but in low frequencies in all subphases and may allude to the keeping of animal trophies from the hunt.

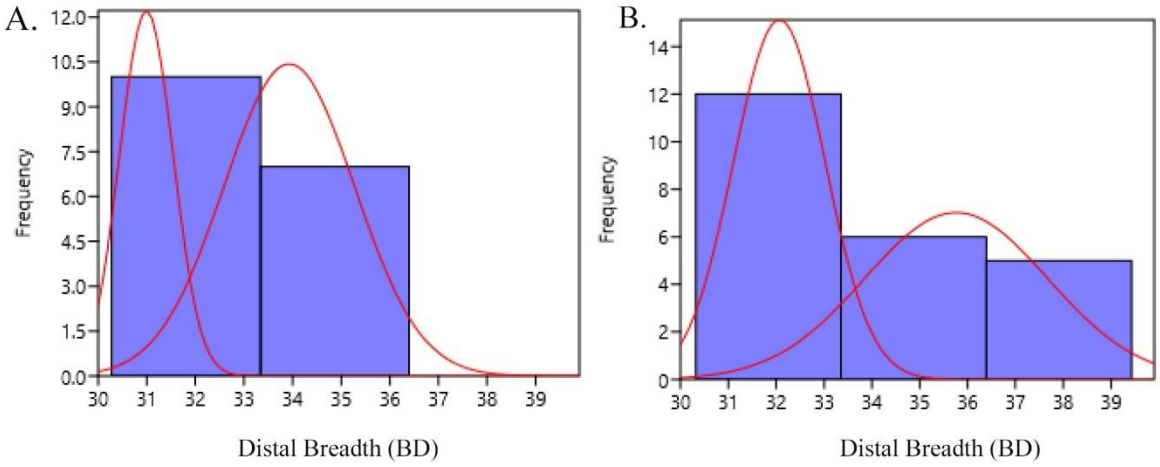
TABLE 5.26. SKELETAL ELEMENTS FREQUENCIES OF WILD SPECIES (GAZELLE, FALLOW DEER, RED DEER, AND ROE DEER) BY SUBPHASE OF GIVATI AREA M4

Element	Phase VIIIc_I Early Stage				Phase VIIIc_II Late Stage				Phase VIIId_I Hasmonean Stage			
	NISP	MNE	MAU	MAU%	NISP	MNE	MAU	MAU%	NISP	MNE	MAU	MAU%
Cranium	1	1	0.03	2%	1	1	0.03	2%	2	2	0.06	3%
Mandible	3	1	0.08	4%	3	3	0.25	13%	2	1	0.08	4%
Atlas	0	0	0	0%	0	0	0	0%	1	1	1	50%
Axis	0	0	0	0%	0	0	0	0%	0	0	0	0%
Cervical v	1	1	0.2	10%	0	0	0	0%	0	0	0	0%
Thoracic v	0	0	0	0%	1	1	0.07	4%	0	0	0	0%
Lumbar v	0	0	0	0%	0	0	0	0%	1	1	0.14	7%
Sacrum	1	1	1	50%	0	0	0	0%	0	0	0	0%
Pelvis	3	1	0.16	8%	7	4	0.66	33%	9	5	0.83	42%
Sternum	0	0	0	0%	0	0	0	0%	0	0	0	0%
Scapula	0	0	0	0%	4	2	1	50%	0	0	0	0%
Humerus	5	2	1	50%	13	4	2	100%	12	4	2	100%
Radius	7	2	1	50%	7	3	1.5	75%	4	2	1	50%
Ulna	3	2	1	50%	0	0	0	0%	1	1	0.5	25%
Carpals/tarsals	2	2	0.09	5%	4	2	0.09	5%	2	2	0.09	5%
Metapodials	15	5	1.25	63%	10	4	1	50%	2	1	0.25	13%
Tibia	5	1	0.5	25%	8	4	2	100%	7	2	1	50%
Femur	3	1	0.5	25%	8	4	2	100%	3	2	1	50%
Patella	0	0	0	0%	0	0	0	0%	0	0	0	0%
Phalanx I	20	16	2	100%	3	2	0.25	13%	2	2	0.25	13%
Phalanx II	0	0	0	0%	1	1	0.12	6%	0	0	0	0%
Phalanx III	1	1	0.12	6%	0	0	0	0%	0	0	0	0%
Rib	0	0	0	0%	0	0	0	0%	1	1	0.07	4%

5.2.3.5 Sexing of Caprine and Cattle in Area M4

The sexing of caprine in Area M4 is based on the mixture analysis of the distal breath of the humerus. Mixture analysis was conducted individually for sheep and goats, as the exploitation of males and females differ by sex. All subphases were assessed together in order to have a large sample size. The ratio of females to males is different in the exploitation of goats and sheep (Figure 4.6). Mixture analysis of goats suggests a ratio of 68% males to 32% females (Figure 4.6A), with a higher probability of males. Sheep depict a ratio of 52% females to 48% males, with a slightly higher probability of females (Figure 4.6B). The sexing of cattle based on the distal breadth of metacarpals (following Davis et al. 2012) suggests the cattle in the subphase assemblages are primarily females (Bd<63mm; measurements in Appendix II). This result should be treated with caution as it is based on four samples.

FIGURE 5.6. MIXTURE ANALYSIS OF SHEEP AND GOAT BASED ON THE DISTAL BREATH MEASUREMENT (MM) OF HUMERI FROM GIVATI AREA M4.



Area M4 - Goats	P1	P2
Proportions	0.32332	0.67668
Mean	30.992	33.929
Standard Deviation	0.54882	1.3459

N: 17

Area M4 - Sheep	P1	P2
Proportions	0.51917	0.48083
Mean	32.065	35.76
Standard Deviation	0.95544	1.9091

N: 23

5.2.4. Summary of Givati Area M4

The animal remains from the glacis subphases follow the same pattern as prior periods, in which sheep and goat, in relatively equal proportions, make up the majority of the assemblage, followed by cattle and, to a lesser extent, game and birds.

5.2.4.1 Site Formation Processes of Area M4

The fragmentary and depositional nature of the glacis's assemblage compared to the fragmentation of Area M1, where the majority of long bones are nearly complete (<80%), suggests that the remains are from secondary deposition (Figure 5.3). As the material accumulated, post-depositional processes caused the bones to break and fracture further. Ostensibly the process of construction (i.e., collecting, moving, and depositing the material downslope) caused most of the fragmentation.

The weathering pattern of the remains suggests some extent of time between the Early Stage (Phase VIIIc-1) and subsequent Late and Hasmonean Stages (Phase VIIIc-2, Phase VIIId). The pattern can suggest two hypothetical modes of formation, either the Early Stage was constructed and then after some time it was covered by the Late and Hasmonean Stages, or the Early Stage remains were collected from material that was exposed for a few years before construction. The lack of gnaw marks in the subphases suggests the remains were either not exposed for an extended period or were isolated and beyond the reach of scavengers.

5.2.4.2. Anthropogenic Processes in Area M4

Processes that would result in charred or burned remains are minimal throughout the subphases. The lack of charred remains suggests that material used for construction did not originate from roasting or destruction refuse. This pattern is counter to the Stratum VIII material from Area M1 in Givati, where 36.4% of the assemblage was charred or burned (Bar-Oz and Raban-Gerstel

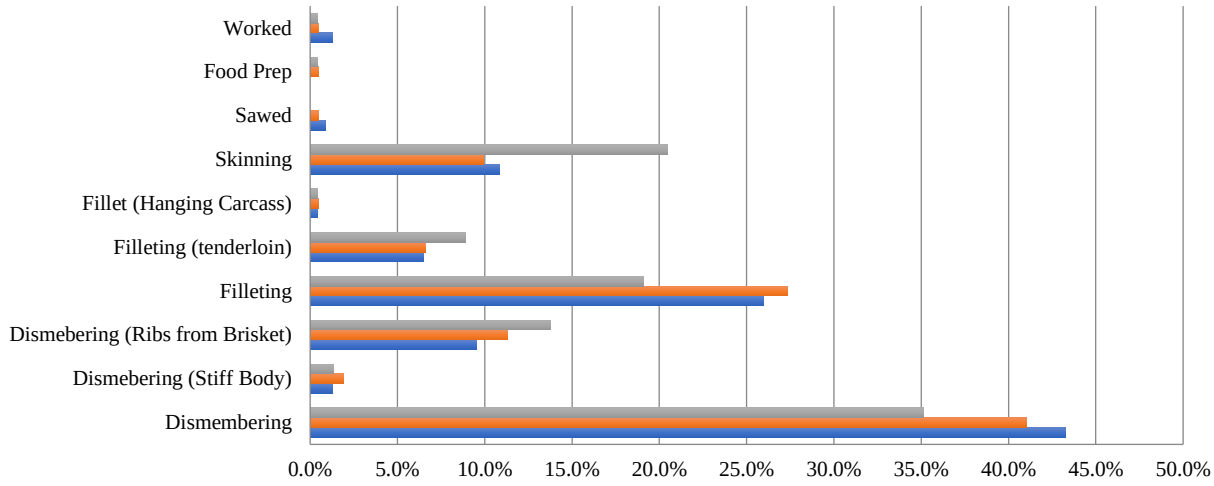
2013: 352). The burned material from Area M1 primarily derives from L808 (92.4%) and L795 (9%) (Bar-Oz and Raban-Gerstel 2013: Table 23.5). These loci relate to plaster floors (L795+818; L808+814) that abut the outer west face of a wall (W969) and included a ceramic assemblage that included bowl, plates, and notably imported Rhodian amphorae (Ben-Ami 2013: 22). There was no evidence for a destruction event in Stratum VIII of Area M1, suggesting that the burned remains may indicate localized cooking or offerings practices that occurred, alongside the sale of Rhodian goods, in the public spaces of Tyropoeon Valley. The contrasting pattern of burned remains between Stratum VIII of Area M1 to the glacis (Stratum VIII) in Area M4 demonstrates that the material used for the construction of the glacis did not originate from activities occurring in Area M1.

Evidence of human activities can also be seen in the high frequency of butchered bones in all of the subphases– 14%. The butchering evidence depicts a wide variety of activities, primarily focusing on initial skinning and dismemberment, followed by filleting. The main difference between the subphases can be seen in the relatively higher frequency of skinning in the Hasmonean Stage, which may be related to the higher frequency of cut phalanges and horncores in that sub-phase (Figure 5.7). The butchered horncores are premonitory sawed in half (Figure 5.8) The processing of horncores in this manner is specific and time consuming as such it implies, based on the frequency and style of butchery that this material derives from butchery or artisanal craft production such as tannery refuse.

One of the hypotheses suggested by the excavation team was that the cut horns related to the production of *shofars*, a musical instrument made from ram horns (A. Shatil and A. Zilberstein pers. comm.). While a few of the horns do indicate that the tip was cut-off (Figure 5.8), which is required in order to create an embouchure (Montagu 2015: 61), some of the other

cut marks on the bases of the horns indicate other processes, namely skinning. It is not inconceivable that some of the cut horns relate to the production of *shofars* or the remains of production mistakes. However, cut horns are also linked to the skinning of caprine and game for their skin, which in turn could be used for leather goods. Horns provide little subsistence, and the presence of horns is also an indicator of butchery scrap. The variety of species, along with the variety of butchery marks, reveal animal processes that included an assortment of goods produced, such as choice meat cuts, leathers, *shofars*, and worked bone objects.

FIGURE 5.7. FREQUENCY OF CUT MARKS BUTCHERY BY SUBPHASE OF GIVATI AREA M4



	Dismembering	Dismebering (Stiff Body)	Dismebering (Ribs from Brisket)	Filleting	Filleting (tenderloin)	Fillet (Hanging Carcass)	Skinning	Sawed	Food Prep	Worked
VIIID_I Hasmonean	35.1%	1.3%	13.8%	19.1%	8.9%	0.4%	20.4%	0.0%	0.4%	0.4%
VIIIC_II Late	41.0%	1.9%	11.3%	27.4%	6.6%	0.5%	9.9%	0.5%	0.5%	0.5%
VIIIC_1 Early	43.3%	1.3%	9.5%	26.0%	6.5%	0.4%	10.8%	0.9%	0.0%	1.3%

FIGURE 5.8. CUT HORNS FROM HASMONEAN STAGE (PHASE VIIID)

5.2.4.3. Animal Economy of Area M4

The subphases of the glacis in Area M4 are dominated by domestic livestock, as is typical of southern Levant faunal assemblages during historical periods (Horwitz and Dahan 1996). The dependence on domestic livestock is also characteristic of Jerusalem during the Hellenistic period (Horwitz 1996; Bar-Oz and Raban-Gerstel 2013; Tamar and Bar-Oz 2015). This study of the glacis subphase assemblages from Area M4 reveals slight differences in the animal economy overtime in the glacis, in the frequency of exploited species, and the manner of their exploitation.

The role of sheep and goat vary by species and by subphase. In terms of general exploitation both sheep and goats being equally present throughout the subphases, with presence

of all body parts with a focus on the use of limb elements. The main difference in caprine exploitation between the subphases was in their culling and sex exploitation strategy, with the Early Stage focusing on meat and milk, the Late Stage on wool, and the Hasmonean Stage on meat and wool. Throughout the subphases there is a preference for male goats (billys) over female goats (does), leading to the assessment that billy goats were exploited for meat; whereas, rams and ewes were both exploited for their wool. The diverse modes and aims of the caprine culling practices suggest complex and varied subsistence strategies were employed either at different points during the Hellenistic period or in different areas of the city where the refuse was collected for construction material.

Cattle exploitation is similar in all subphases with a culling strategy that was geared towards some older cattle, most likely used in draught work, and some younger cattle for meat. This pattern is also similar to Area M1, where some portion of the cattle herds was killed off before three years of age for meat (Bar-Oz and Raban-Gerstel 2013: 357). The entire cow was exploited with a focus on the lower limb and meat-poor elements, such as cranium, mandible, metapodials, and phalanges– which also lend support for the argument of butchery refuse. The frequency of cattle between the subphases is slightly different; nonetheless, cattle still represent a considerable portion of the assemblage.

Chickens and other birds are uncommon in the sub-phase assemblages. The frequency of chicken at the majority of other Levantine sites is greater than five percent (Perry-Gal et al. 2015: Dataset S1), which is different from the glacis average of around three percent. The difference in chicken frequency does not suggest a lesser degree of Hellenization in the subphases of the glacis but rather that the construction material primarily derived from activities that were geared towards red meat, such as a butcher shop or slaughterhouse. Previous

archaeological exploration into animal frequencies in ancient markets supports the assumption that poultry and red meat were processed and sold in different stalls, as is still common today (Hesse et al. 2011).

Wild species also contributed to the animal economy of Hellenistic Jerusalem. Game, including gazelles and fallow deer, were hunted and quartered before being transported to the city. In rare cases, their heads were also carried back, presumably as trophies or for other activities. Other low-frequency species present, such as domestic dogs and pigs, suggests that the strict purity laws that are observed in assemblages of the subsequent Early Roman period (Bar-Oz et al. 2007; Spiciarich et al. 2017) had not yet been enforced.

5.3. Giv'ati Parking Lot Area M2

A total of 9442 (NISP) bones were identified to species. Of the identified fragments, 1029 (NISP) derived from Phase IX–Iron Age IIC, 2784 (NISP) from Phase VIII–Persian context, 1327 (NISP) from the Phase VII–Early Hellenistic, 128 (NISP) from Phase VI–Late Hellenistic, and 4025 (NISP) from Phase V–Late Hellenistic (Table 4.27). The terminal phase for this study of Area M2 is Phase IV, with 149 (NISP).

5.3.1 Species Represented in Area M2

Domestic livestock (i.e., sheep, goat, cattle, donkey, and pig) are the most dominant species in all assemblages, and they represent 74% of the Iron Age IIC assemblage, 82% of the Persian assemblage, 90% of the Early Hellenistic assemblage, and ~85% of the Late Hellenistic assemblages (Table 5.27). Domestic livestock within the Late Hellenistic (Phase VI, V, and IV) vary by phase, with livestock representing 83% of Phase VI, 89% of Phase V, and 84% of Phase IV. Wild species represents approximately three percent of the Iron Age IIC, Early Hellenistic,

and Late Hellenistic−Phase V assemblages, and less than two percent in the Persian and Late Hellenistic−Phase VI and IV (Table 5.27).

Caprine are the most common livestock animal in the Iron Age IIC, representing 66% of the assemblage. The ratio between the distinguishable sheep (N: 33) and goat (, N: 45) bones is 11:15. The second most common animals in this assemblage are domestic chicken (*Gallus gallus*, calculation combined with medium aves body size group) and cattle, each representing approximately five percent of the Iron Age IIC assemblage. The Iron Age IIC assemblage contains a wide variety of big game, small game, and avian species (Table 5.27). Ten different species of fish are present in the Iron Age IIC assemblage, representing a combined total of 11% of the assemblage (see below; Table 5.27).

The Iron Age IIC assemblage included a series of rooms, the frequency of species between the rooms varies. Room A has the highest species richness, comprising primarily of caprine (58%), a variety of fish species (19%), and a high frequency of snakes (*Reptilia sp.*) (Table 4.28). Room B is also dominated by caprine (69%) and fish (18%) but includes a higher frequency of avian remains (7%), in the form of chukar partridge and domestic chicken (Table 5.28). Room C has the lowest richness of species, and 95% of the assemblage is represented by caprine (Table 5.28). Cattle are minimal in every room and represent less than one percent of Room A. Wild species (i.e., gazelle, red deer, and spring hare) are equally represented in each room, representing approximately three percent of every room (Table 5.28). Comparing the diversity of species between the rooms suggest there is significant difference in the richness of species between these Room A and C and Room B and C.[49]

[49] Room A v. C: Shannon index: t=5.097, df=215.49, p<0.001; Simpson index: t=-3.533, df=158.18, p<0.001; Room B v. C: Shannon index: t=2.853, df=110.37, p<0.005; Simpson index: t=-1.703, df=133.65, p<0.090; Room A v B: Shannon index: t=1.009, df=110.39, p<0.315; Simpson index: t=-1.150, df=96.634, p<0.252.

The Persian period assemblage is composed of a wide variety of species—caprine comprising the majority of the assemblage, representing 73% (Table 5.27). The ratio between the distinguishable sheep (N: 79) and goat (N: 91) bones is 1:1.15. The second most common species in this assemblage are cattle (combined with large mammal body size group) and chicken (combined with medium bird body size group) with ~9% of the assemblage, respectfully. Additional avian species present in the Persian assemblage included chukar partridge (N: 12) and goose (N: 3). The Persian assemblage also included a variety of other domestic species such as donkey (N: 3), pig (N: 3) domestic dog (N: 6), all representing less than one percent of the assemblage. Wild species comprises approximately one percent of the Persian assemblage and is represented by gazelle (N: 13), red deer (N: 1), roe deer (N: 4), and red fox (N: 1). A variety of micro-fauna, including some rodents (N: 33), snake (N: 8), and fish (N: 133, 5%) remains were identified (Table 5.27).

The Early Hellenistic assemblage follows a similar trend to the previous assemblages, with caprine representing 76% of the assemblage with a 1:1.02 ratio between sheep (N: 35) and goat bones (N: 36). Cattle follow caprine representing ~14% of the assemblage of the Early Hellenistic assemblage. The Early Hellenistic assemblage also included other domesticates such as pig (N: 3), domestic dog (N: 13), and donkey (N: 3). Wild species comprises 3% of the assemblage, represented by gazelle (N: 6), red deer (N: 3), roe deer (N: 1), and fallow deer (N: 1) (Table 5.27). In terms of avian species, the most common bird was chicken (4.5%; N: 51), but there was also chukar partridge (N: 2) and goose (N: 2). Rodents (N: 7), snakes (N: 8), as well as some fish (1%, N: 16), were also identified (Table 5.27).

The Late Hellenistic assemblage is comprised of multiple and subphases. Phase VI relates to the glacis previously studied (see Section 5.2) and will not be presented here. The

subphases of Phase V have varying frequencies of species (Table 5.29). Caprine are the most dominate livestock throughout Phase V, representing 70% of Phase Va, and 75% of Phase Vb and Phase Vc. The ratio between sheep to goat in Phase Va and Phase Vb is relatively equal (Va: 1:1; Vb: 1:0.9), but there are more goats than sheep in Phase Vc with a ratio of 1:0.75. Cattle are the second most common species in the subphases representing, 16% in Phase Va and Vb, and 11% in Phase Vc. Avian species are common in the subphases, with chicken being the most prevalent, comprising 8% of Phase Va and Vc, and 6% of Phase Vb. Other avian species in the subphases included chukar partridge, ducks, geese, pigeon, and crows (Table 5.29). Wild species and fish species are also present in the subphases, with the Phase Va having the most considerable frequency of wild species and Phase Vc having the largest frequency of fish.

The terminal Late Hellenistic Phase, Phase IV, is dominated by caprine (70%: Table 5.27). The second most common species in Phase IV is cattle with 20%. Phase IV also include the interment of a complete puppy (MNI:1); following epiphyseal fusion suggests the dog was under a year and a half. Phase IV–Late Hellenistic assemblage also included other species, namely, fallow deer (N: 1), chicken (N: 7; 6%), as well as a Short-Toed Snake Eagle (*Circaetus gallicus,* N: 1).

5.3.1.1 Fish (Pisces) in Area M2

There was a total of 560 fish fragments found in the assemblage; 53% of them were identified to element or species (Table 4.27 and Table 4.30, N: 300). The most common species of fish throughout the phases are African Sharp-tooth Catfish, mullets, and porgies (Table 5.30). Fish derive from several marines and freshwater sources, such as the Yarkon and Jordan Rivers, and the Mediterranean Sea. Fish species derived from Egyptian water sources (i.e., Nile River and Baradwil Lagoon), such as Nile Perch (*Lates niloticus*) in the Iron Age IIC (2.6%) and Persian

(3%) assemblages, and Gilt-Head seabream, which is present in nearly every Phase (IX: 14%; VIII: 9%; VII: 6%; VI: 11%; V: 3.6%; Table 4.30). Over time, the import of Gilt-head seabream into Area M2 decreases.

TABLE 5.27. NUMBER OF IDENTIFIED SPECIMENS (NISP), MINIMUM NUMBER OF INDIVIDUALS (MNI), AND FREQUENCY OF SPECIES (NISP%) BY PHASE OF AREA M2

Givati M2	Species	Common Name	Phase IX_ Iron Age IIC			Phase VIII_Persian			Phase VII_Early Hellenistic			Phase VI_Late Hellenistic (Glacis)			Phase V_Late Hellenistic			Phase IV_Late Hellenistic		
			NISP	MNI	NISP%	NISP	MNI	NISP%	NISP	MNI	NISP%	NISP	MNI	NISP%	NISP	MNI	NISP%	NISP	MNI	NISP%
Domesticated Ungulates	*Capra hircus*	Goat	45	3	4.4%	91	9	3.3%	36	3	2.7%	3	1	2.3%	157	9	3.9%	4	1	3.2%
	Ovis aries	Sheep	33	4	3.2%	79	6	2.8%	35	4	2.6%	3	1	2.3%	159	18	4.0%	2	1	1.6%
	Caprine size	Sheep or Goat	630	9	61.2%	1874	11	67.3%	936	9	70.5%	80	3	62.5%	2665	37	66.2%	82	3	65.1%
	Bos taurus	Cow	27	4	2.6%	142	3	5.1%	98	2	7.4%	8	1	6.3%	330	5	8.2%	9	1	7.1%
	A Size	Large Mammal	26	1	2.5%	97	2	3.5%	82	2	6.2%	13	1	10.2%	288	3	7.2%	17	1	13.5%
	Canis familiaris	Domestic Dog	1	1	0.1%	6	1	0.2%	13	2	1.0%				14	1	0.3%	1 (24)	1	0.8%
	Sus scrofa domesticus	Domestic Pig				3	1	0.1%	3	1	0.2%				9	1	0.2%			
	Camelus dromedarius	Arabian Camel																		
	Equus asinus	Donkey	1	1	0.1%	3	1	0.1%	3	1	0.2%				4	1	0.1%			
Wild Mammals	*Canis/Gazella size*	Small mammal	11	1	1.1%	15	1	0.5%	11	1	0.8%				16	1	0.4%			
	Gazella fazella	Gazelle	15	2	1.5%	13	1	0.5%	6	1	0.5%				33	3	0.8%			
	Cervus elaphus	Red Deer	1	1	0.1%	1	1	0.04%	3	2	0.2%				6	1	0.1%			
	Capreolus capreolus	Roe Deer	1	1	0.1%	4	2	0.1%	1	1	0.1%	1	1	0.8%						
	Dama mesopotamica	Fallow Deer	2	1	0.2%				1	1	0.1%				13	2	0.3%	1	1	0.8%
	Lepus capensis	Cape Hare				1	1	0.04%							1	1	0.02%			
	Pedetes capensis	Spring Hare	1	1	0.1%															
	Vulpes vulpes	Red Fox	1	1	0.1%	1	1	0.04%			0.0%				2	1	0.05%			
Aves	*Alectoris chukar*	Partridge	11	1	1.1%	12	2	0.4%	2	1	0.2%	1	1	0.8%	12	2	0.3%			
	Anas platyrhynchos	Mallard Duck													2	2	0.05%			
	Anser anser	Domestic Goose	3	1	0.3%	3	2	0.1%	2	1	0.2%	1	1	0.8%	1	1	0.02%			
	Columba livia	Rock Pigeon/Dove	1	1	0.1%										1	1	0.02%			
	Gallus gallus	Chicken	40	5	3.9%	200	7	7.2%	51	5	3.8%	9	2	7.0%	246	15	6.1%	7	2	5.6%
	Corvus corvus	Crow													2	1	0.05%			
	Circaetus gallicus	Short-toed Snake Eagle																1	1	0.8%
	Small Aves	Small Bird	2	1	0.2%	11	2	0.4%	2	1	0.2%				1	1	0.02%			
	Medium Aves	Medium Bird	17	3	1.7%	51	5	1.8%	9	1	0.7%				30	2	0.7%	2	1	1.59%
	Large Aves	Large Bird				1	1	0.04%	2	1	0.2%									
Rodentia	*G-Size*	Rodents	12	2	1.2%	30	7	1.1%	5	1	0.4%				2	1	0.05%			
	Mus musculus	Mouse				3	1	0.1%	1	1	0.1%									
	Rattus rattus	Rat	1	1	0.1%															
	Martes Fiona	Beech Marten							1	1	0.1%				1	1	0.02%			
	Spalax ehrenbergi	Mole-Rat													1	1	0.02%			
	Soricidae	Shrew				1	1	0.04%												
Reptilia	*Reptilia*	Snake	33	1	3.2%	8	1	0.3%	8	1	0.6%				1	1	0.02%			
Anura	*Anura*	Frog or Toad	1	1	0.1%	2	1	0.1%												
Pisces	*Pisces Size*	Fish	24	1	2.3%	27	1	1.0%	3	1	0.2%	6	1	4.7%	6	1	0.1%			
	Clariidae Clarias gariepinus	African sharp tooth catfish	17	1	1.7%	16	1	0.6%	3	1	0.2%	1	1	0.8%	1	1	0.02%			
	Sparidae sp.	Porgies	22	1	2.1%	25	1	0.9%	2	1	0.2%				4	1	0.1%			
	Sparidae Sparusu aurata	Gilt-head seabream	16	3	1.6%	12	1	0.4%	1	1	0.1%	1	1	0.8%	1	1	0.02%			
	Sparidae Lithognathus mormyrus	Striped seabream	3	1	0.3%															
	Cyprinidae Barbus barbus	Common Barbel	3	1	0.3%	5	1	0.2%	1	1	0.1%	1	1	0.8%	1	1	0.02%			
	Mugilidae	Mullets	17	1	1.7%	27	1	1.0%	4	1	0.3%				3	1	0.1%			
	Muglilidae mugil cephalus	Flathead gray Mullet			0.0%	1	1	0.04%												
	Muglilidae liza ramada	Thinlip Grey Mullet				1	1	0.04%												
	Lates Nilotic	Nile Perch	3	1	0.3%	4	1	0.1%												
	Cichlidae	Mouth Breeders				7	1	0.3%	2	1	0.2%				9	1	0.2%			
	Serranidae	Groupers	4	1	0.4%	4	1	0.1%							2	1	0.05%			
	Serrenidae epinephelus aeneus	White Grouper	1		0.1%	1	1	0.036%												
	Scianidae Argyrosomus regius	Meagre	1		0.1%	1	1	0.036%							1	1	0.02%			
	Carangidae	Jacks and Pompons				1	1	0.036%												
	Elasmobranch	Shark or Ray	3	1	0.3%	1	1	0.036%												
Total			1030	60	100%	2785	86	100%	1327	51	100%	128	16	100%	4025	122	100%	126	13	100%

TABLE 5.28. THE NUMBER OF IDENTIFIED SPECIMENS (NISP), MINIMUM NUMBER OF INDIVIDUALS (MNI), AND FREQUENCY OF SPECIES (NISP%) BY ROOMS IN IRON AGE IIC, PHASE IX OF AREA M2.

Phase IX_Rooms	**Species**	**Common Name**	**Phase IX_ Room A**			**Phase IX_ Room B**			**Phase IX_ Room C**		
			NISP	MNI	NISP%	NISP	MNI	NISP%	NISP	MNI	NISP%
Domesticated Ungulates	*Capra hircus*	Goat	4	1	2.9%	1	1	1.6%	8	2	8.9%
	Ovis aries	Sheep	2	1	1.4%	2	1	3.3%	9	2	10.0%
	Caprine size	Sheep or Goat	72	2	51.4%	37	2	60.7%	65	2	72.2%
	Bos taurus	Cow	1	1	0.7%	2	1	3.3%	3	1	3.3%
	A Size	Large Mammal	1	1	0.7%				1	1	1.1%
	Equus asinus	Donkey	1	1	0.7%						
Wild Mammals	*Canis/Gazella size*	Small mammal	2	1	1.4%	2	1	3.3%	1	1	1.1%
	Gazella gazella	Gazelle	2	1	1.4%				1	1	1.1%
	Cervus elaphus	Red Deer							1	1	1.1%
	Pedetes capensis	Spring Hare	1	1	0.7%						
Aves	*Alectoris chukar*	Partridge			0.0%	2	1	3.3%			
	Columba livia	Rock Pigeon/Dove	1	1	0.7%						
	Gallus gallus	Chicken	4	1	2.9%	1	1	1.6%			
	Small Aves	Small Bird	1	1	0.7%						
	Medium Aves	Medium Bird	1	1	0.7%	1	1	1.6%			
Rodentia	*G-Size*	Rodents	3	1	2.1%	1	1	1.6%			
	Mus musculus	Mouse	1	1	0.7%						
Reptilian	*Reptilia*	Snake	18	1	12.9%						
Pisces	*Pisces Size*	Fish	7	1	5.0%	2	1	3.3%			
	Clariidae Clarias gariepinus	African sharp tooth catfish	4	1	2.9%	1	1	1.6%			
	Sparidae sp.	Porgies	1	1	0.7%	2	1	3.3%			
	Sparidae Sparusu aurata	Gilt-head seabream	5	1	3.6%	2	1	3.3%			
	Sparidae Lithognathus mormyrus	Striped seabream				2	1	3.3%			
	Mugilidae	Mullets	8	1	5.7%	1	1	1.6%			
	Lates Nilotic	Nile Perch	1	1	0.7%	1	1	1.6%			
	Serrenidae epinephelus aeneus	White Grouper							1	1	1.1%
	Scianidae Argyrosomus regius	Meagre				1		1.6%			
	Elasmobranch	Shark or Ray	1	1	0.7%						
Total			142	24	100%	61	17	100%	90	12	100%

TABLE 5.29. THE NUMBER OF IDENTIFIED SPECIMENS (NISP), MINIMUM NUMBER OF INDIVIDUALS (MNI), AND FREQUENCY OF SPECIES (NISP%) BY SUB-PHASE OF LATE HELLENISTIC PHASE V, AREA M2.

Givati M2 Phase V	Species	Common Name	Phase Va			Phase Vb			Phase Vc		
			NISP	MNI	NISP%	NISP	MNI	NISP%	NISP	MNI	NISP%
Domesticated Ungulates	*Capra hircus*	Goat	38	4	3.76%	96	6	3.92%	20	1	4.19%
	Ovis aries	Sheep	38	3	3.76%	102	8	4.17%	15	3	3.14%
	Caprine size	Sheep or Goat	635	9	62.81%	1648	26	67.32%	321	6	67.30%
	Bos taurus	Cow	89	4	8.80%	210	4	8.58%	28	2	5.87%
	A Size	Large Mammal	74	1	7.32%	180	2	7.35%	26	2	5.45%
	Canis familiaris	Domestic Dog	3	1	0.30%	6	1	0.25%	5	1	1.05%
	Sus scrofa domesticus	Domestic Pig	4	1	0.40%	4	1	0.16%			
	Equus asinus	Donkey				4	1	0.16%			
Wild Mammals	*Canis/Gazella size*	Small mammal	4	1	0.40%	8	1	0.33%	4	1	0.84%
	Gazella fazella	Gazelle	10	2	0.99%	19	3	0.78%	2	1	0.42%
	Cervus elaphus	Red Deer	2	1	0.20%						
	Capreolus capreolus	Roe Deer				4	1	0.16%			
	Dama mesopotamica	Fallow Deer	7	1	0.69%	4	1	0.16%	2	1	0.42%
	Lepus capensis	Cape Hare				1	1	0.04%			
	Vulpes vulpes	Red Fox				2	1	0.08%			
Aves	*Alectoris chukar*	Partridge	4	1	0.40%	7	2	0.29%	1	1	0.21%
	Anas platyrhynchos	Mallard Duck	1	1	0.10%				1	1	0.21%
	Anser anser	Domestic Goose							1	1	0.21%
	Columba livia	Rock Pigeon/Dove							1	1	0.21%
	Gallus gallus	Chicken	80	8	7.91%	127	8	5.19%	33	6	6.92%
	Corvus corvus	Crow	2	1	0.20%						
	Small Aves	Small Bird				1	1	0.04%			
	Medium Aves	Medium Bird	5	2	0.49%	19	2	0.78%	6	1	1.26%
Rodentia	*G-Size*	Rodents				1	1	0.04%	1	1	0.21%
	Martes Fiona	Beech Marten							1	1	0.21%
	Spalax ehrenbergi	Mole-Rat	1	1	0.10%						
Reptilia	*Reptilia*	Snake							1	1	0.21%
Pisces	*Pisces Size*	Fish	5	1	0.49%				1	1	0.21%
	Clariidae Clarias gariepinus	African sharp tooth catfish				1	1	0.04%			
	Sparidae sp.	Porgies	1			1	1	0.04%	2	1	0.42%
	Sparidae Sparusu aurata	Gilt-head seabream							1	1	0.21%
	Cyprinidae Barbus barbus	Common Barbel							1	1	0.21%
	Mugilidae	Mullets	3	1	0.30%						
	Cichlidae	Mouth Breeders	4	1	0.40%	3	1	0.12%	2	1	0.42%
	Serranidae	Groupers	1	1	0.10%				1	1	0.21%
	Scianidae Argyrosomus regius	Meagre				1	1	0.04%			
Total			1011	46	100%	2448	74	100%	477	38	100%

TABLE 5.30. NUMBER OF IDENTIFIED SPECIMENS (NISP) AND FREQUENCY (NISP%) OF FISH SPECIES BY PHASE OF AREA M2

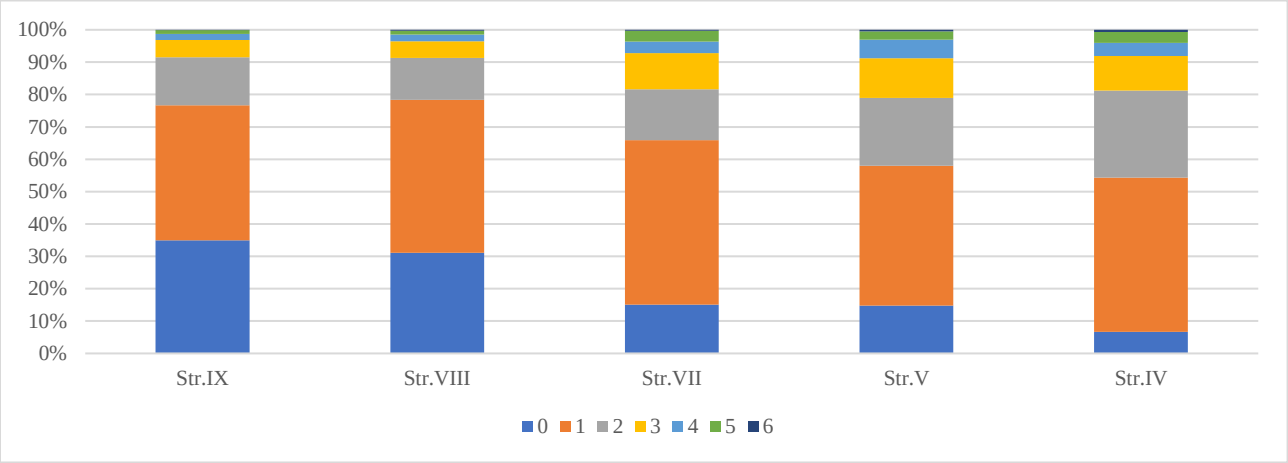
Area M2 Fish	Phase IX	NISP%	Phase VIII	NISP%	Phase VII	NISP%	Phase VI	NISP%	Phase V	NISP%
Identified Fish Elements	24	21.1%	27	20.3%	3	18.8%	6	66.7%	6	21.4%
African sharp-tooth catfish	17	14.9%	16	12.0%	3	18.8%	1	11.1%	1	3.6%
Porgies	22	19.3%	25	18.8%	2	12.5%		0.0%	4	14.3%
Gilt-head seabream	16	14.0%	12	9.0%	1	6.3%	1	11.1%	1	3.6%
Striped seabream	3	2.6%								
Common Barbel	3	2.6%	5	3.8%	1	6.3%	1	11.1%	1	3.6%
Mullets	17	14.9%	27	20.3%	4	25.0%			3	10.7%
Flathead Gray Mullet			1	0.8%						
Thinlip Grey Mullet			1	0.8%						
Nile Perch	3	2.6%	4	3.0%						
Mouth Breeders (tilapia)			7	5.3%	2	12.5%			9	32.1%
Groupers	4	3.5%	4	3.0%					2	7.1%
White Grouper	1	0.9%	1	0.8%						
Meagre	1	0.9%	1	0.8%					1	3.6%
Jacks and Pompons			1	0.8%						
Shark or Ray	3	2.6%	1	0.8%						
Total	114	100%	133	100%	16	100%	9	100%	28	100%

5.3.2 Taphonomic Analysis of Area M2

5.3.2.1 Weathering of Area M2

Weathering pattern of the bones from all phases fall primarily between stages 0−2 of Brehensmeyer's guide (1978: 157) (~80-90%; Figure 5.9), suggesting that the majority of bones were covered soon after disposal (three years or less). The Late Hellenistic phases, Phase V and IV, have a higher frequency of bones with weathering between stages 3−6 (~20%; Figure 5.9), suggesting the later phases of this area were exposed for a more extended period than earlier phases.

FIGURE 5.9. WEATHERING FREQUENCY OF FRAGMENTS RECORDED IN EACH WEATHERING STAGE FROM AREA M2 (STAGES ACCORDING TO BEHRENMEYER 1978).



5.3.2.2 Burned Remains Collected from Area M2

Ca. 12% of the entire assemblage showed some evidence of burning. This analysis includes all fragments from the entire assemblage, including those that could not be identified to the skeletal elements. Of the identified fragments, burned remains in all phases included mainly caprine but also included a variety of other species, such as game animals, birds, and fish (Table 5.31). Burned remains in the Iron Age IIC accounted for 14% of the assemblage. Examining the

frequency of burned remains between the rooms of the Iron Age IIC−Phase IX building demonstrates that Room A (20%) and Room C (17%) had a higher degree of burnt remains then Room B (7%; Table 5.32). The building in the Iron Age IIC also has burnt reptiles (i.e., snakes) and rodents, suggesting that burnt remains in this Phase went beyond commonly consumed domestic livestock (Table 5.31).

Burnt remains from the Early Hellenistic were moderately burned, with 7% of the assemblage having charred remains (Table 5.31). Burnt remains in Persian, Late Hellenistic−Phase V, and Late Hellenistic−Phase IV all averaged around 3−4% burned, indicating activities that can result in burned bones (i.e,. cooking or refuse disposal) did not heavily contribute to these assemblages.

TABLE 5.31. COUNT AND FREQUENCY OF BURNT BONES BY PHASE, BURN SCALE, AND SPECIES FROM AREA M2. SCALE: B-: SLIGHTLY BURNED, B: BURNED, AND B+: FULLY CALCIFIED.

Burned	**Phase IX Iron Age IIC**					**Phase VII Iron Persian**					**Phase VII Early Hellenistic**					**Phase V Late Hellenistic**					**Phase IV Late Hell.**				
Species	***B***	***B-***	***B+***	***Green***	***Total***	***B***	***B-***	***B+***	***Green***	***Total***	***B***	***B-***	***B+***	***Green***	***Total***	***B***	***B-***	***B+***	***Green***	***Total***	***B***	***B-***	***B+***	***Green***	***Total***
Caprine	49	21	12	2	84	59	16	20	2	97	50	13	19		82	49	18	34	3	104	1	1			2
Goat	3	4	2		9	4	2	1		7	2				2	4	1	1		6					
Sheep	6	3			9	1	1			2	3		1		4	3	1	2		6			1		1
Cattle	2				2	6	2			8	2	3	1		6	5	3	13		21	1		1		2
Gazelle	4	1	3		8	1				1						1		2		3					
Pig						1				1															
Fish	9	2	1		12	1	2			3							1			1					
Chicken	3	2	2		7	1				1	1			1	2	9		1		10					
Chukar Partridge	1	1			2	1	1			2															
Goose	1				1																				
Rodent	2				2																				
Reptile		2			2																				
Total	80	36	20	2	138	75	24	21	2	122	58	16	21	1	96	71	24	53	3	151	2	1	2		5
%	58%	26%	14%	1%	100%	61%	20%	17%	2%	100%	60%	17%	22%	1%	100%	47%	16%	35%	2%	100%	40%	20%	40%	0%	100%
Phase%	14%					4%					7%					4%					3%				

TABLE 5.32. COUNT AND FREQUENCY OF IRON AGE IIC−PHASE IX BURNT BONES BY ROOM, BURN SCALE, AND SPECIES. SCALE: B-: SLIGHTLY BURNED, B: BURNED, AND B+: FULLY CALCIFIED.

Burned Phase IX Rooms	**Phase IX: Room A**				**Phase IX: Room B**				**Phase IX: Room C**			
Species	*B*	*B-*	*B+*	*Total*	*B*	*B-*	*B+*	*Total*	*B*	*B-*	*B+*	*Total*
Caprine	12	4		16	2		1	3	4	4	2	10
Goat		1	1	2							1	1
Sheep		2		2					2	1		3
Cattle	1			1								
Gazelle	1	1		2							1	1
Fish	3			3			1	1				
Chicken	1			1								
Rodent	1			1								
Total	19	8	1	28	2		2	4	6	5	4	15
Room%	20%				7%				17%			

5.3.2.3 Animal Activity and Root Etching of Area M2

Evidence for bones' scavenging by carnivores and rodents is found on less than 2% of the entire assemblage (Table 5.33). Gnawing, digestion, and root etching affected 0.5-2% of the Iron Age IIC, Persians, Early Hellenistic, and Late Hellenistic phases, suggesting the faunal remains were out of reach of scavengers and tree roots.

TABLE. 5.33. COUNT OF ANIMAL ACTIVITY AND ROOT ETCHING BY PHASE AND FREQUENCY OF EFFECTS BY PHASE OF AREA M2.

Phase	Rodent Gnawing	Carnivore Gnawing	Root Etching	Digested	Total	Phase %
Phase IX	3	5			8	0.79%
Phase VIII	8	10	1		19	0.69%
Phase VII	9	7	1		17	1.28%
Phase V	12	28	18	1	59	1.47%
Phase IV		1			1	0.67%

5.3.2.5. Pathologies of Area M2

Evidence of pathologies was present on less than one percent of the Iron Age IIC (N: 2), Persian (N: 7), Early Hellenistic (N: 3), and Late Hellenistic−Phase V (N: 19) (Table 5.34). The majority of pathologies present represent boney outgrowths as a result of the labor of cattle and caprines. Other pathologies included healed fractures and possibly tumors in the Early Hellenistic and Late Hellenistic −Phase V (Table 5.34). There was no evidence for pathologies in Phase IV–Late Hellenistic assemblages. Overall, the animals present in the assemblages were minimally affected by traction or other injuries that could result in pathologies.

TABLE 5.34. TABLE COUNT OF PATHOLOGIES BY PHASE AND FREQUENCY OF PHASE FROM AREA M2

Pathologies		Phase IX		Phase VIII	Phase VII			Phase V		
Species	Element	Boney Outgrowth	Suspensory ligament	Boney Outgrowth	Healed Fracture	Boney Outgrowth	Tumor	Healed Fracture	Boney Outgrowth	Stress
Caprine	Cranium								1	
	Rib				1					
	Ulna								1	
	Humerus								1	
	Metacarpal								1	
	Phalanx III	1		1						
	Phalanx I								1	
	Pelvis			1						
Goat	Phalanx III			1						
	Phalanx I					1	1		1	
	Metacarpal								2	
Sheep	Phalanx I		1						2	
	Humerus								1	
Cattle	Mandible			1						
	Phalanx I								1	
	Phalanx III								3	
	Metacarpal									1
	Metatarsal								1	
	Metapodial								1	
Donkey	Mandibular Tooth									
Chicken	Tibia			1						
	Sternum			1				1		
Total		1	1	6	1	1	1	1	17	1
Phase %		0.20%		0.25%	0.23%			0.47%		

5.3.2.6. Butchery and Cut Marks from Area M2

Every phase depicted evidence of human modification from butchery and slaughtering. A total of 595 (6% of the total assemblages) modified bones were recorded (Table 5.35). The Late Hellenistic phases, Phase V and IV, have a higher frequency of butchery between 7−8%. The Iron Age IIC and Persian have a lower frequency of butchery between 3−4%. The majority of cut marks were recorded on either caprine or cattle bones, ~90% of cut marks. The frequency of both primary butchery (i.e., skinning and dismemberment) and secondary butchery (i.e., filleting)

present in all phases suggests full processing of carcasses took place on-site. The Early Hellenistic has the highest frequency of filleting (31% of Phase VII), suggesting a larger focus on secondary butchery occurred in Phase VII (Table 5.35). Evidence of worked bone, specifically evidence of worked spatulas, was present in every phase and comprised 14% of the cut marks in the Iron Age IIC and 10% of the cut marks in the Persian assemblages (Table 5.35), suggesting some craft or artisanal use of worked bone occurred in the area.

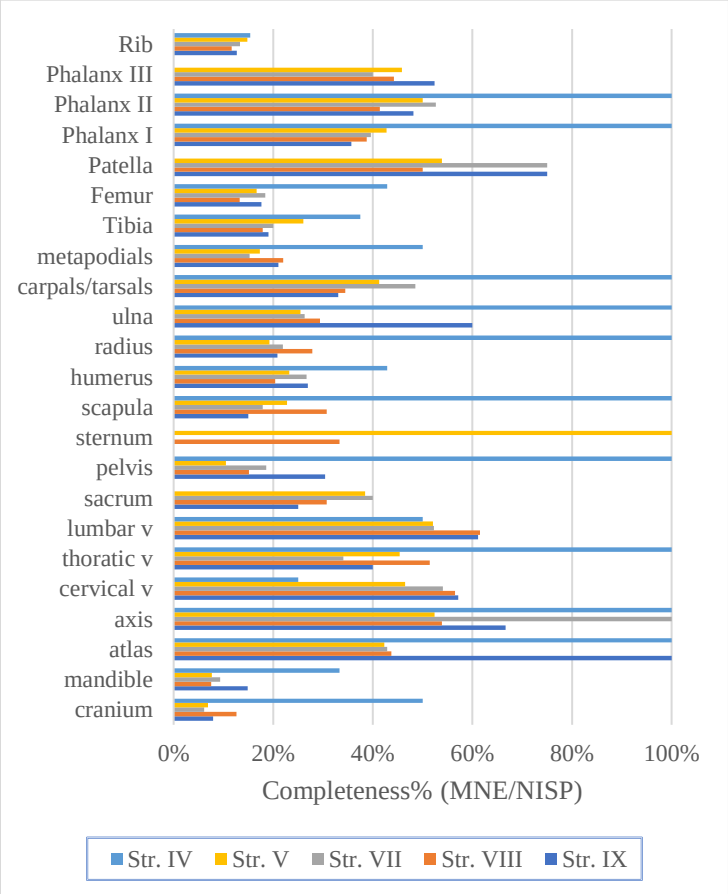
TABLE 5.35. BUTCHERY CUT-MARKS (NISP) BY AREA M2 PHASE, FOLLOWING THE TYPOLOGY OF BINFORD (1984).

Butchery		*Dismembering*	*Dismembering (Stiff Body)*	*Dismembering (Ribs from Brisket)*	*Filleting*	*Filleting (tenderloin)*	*Skinning*	*Sawed*	*Worked*	*Secondary Butchery*	*Food Prep*	*Epiphysis Shaved*	*Total*	Phase %
Phase IX	Cattle	1											1	3.60%
	Caprine	15		4	7				4				30	
	Goat	2					4		1				1	
	Sheep						3						3	
	Gazelle	2											2	
	Total	20		4	7		7		5				37	
Phase VIII	Cattle	13		1	2		3		2				21	3.99%
	Caprine	41	1		9	2	8	1	9	1			72	
	Goat	4					3						7	
	Sheep	6					1						7	
	Roe Deer				1								1	
	Fallow Deer				1								1	
	Chicken	1			1								2	
	Total	65	1	1	14	2	15	1	11	1			111	
Phase VII	Cattle	8			5		4		1	2			20	6.10%
	Caprine	24	2	4	15	4	1	1	1				52	
	Goat	2											2	
	Sheep	3			1		1						5	
	Chicken	2											2	
	Total	39	2	4	21	4	6	1	2	2			81	
Phase V	Cattle	30		7	14	5	14		2			2	74	8.32%
	Caprine	125	4	5	32	9	21	2	9	2	1	3	213	
	Goat	12	1		1		3		2				19	
	Sheep	6			2	1	3					1	13	
	Donkey	1											1	
	Gazelle	1			1		1						3	
	Fallow Deer	2			2								4	
	Chicken	3			5								8	
	Total	180	5	12	57	15	42	2	13	2	1	6	335	
Phase VI	Cattle	2		1	1								4	7.38%
	Caprine	2			1		1						4	
	Goat		1										1	
	Sheep				1								1	
	Fallow Deer											1	1	
	Total	4	1	1	3		1					1	11	

5.3.2.7. Fragmentation of Area M2 Caprine

Examining the fragmentation of caprine elements (calculated as MNE/ NISP*100) suggests that the Iron Age IIC through Late Hellenistic−Phase V skeletal elements were highly fragmented. The average of the Iron Age IIC through Late Hellenistic−Phase V phases is between 20-50% fragmentation, leading to the assumption that these assemblages are either in secondary deposition or were immensely affected by activities occurring in the area (i.e., destruction, collapse, or trampling; Figure 5.10). Elements from Phase IV are less fragmented and often complete, suggesting the remains from this phase are in a primary deposition.

FIGURE 5.10. COMPLETENESS% (MNE/NISP) OF CAPRINE ELEMENTS BY AREA M2 PHASE.



5.3.3 Animal Demographics of Area M2

5.3.3.1 Caprine Age Profiles of Area M2

The caprine assemblages from Area M2 were aged based on epiphyseal fusion, following Zeder (2006) and tooth-wear, following Payne (1973) (Figure 5.10; Table 5.36). Age estimation based on tooth-wear of caprine can only be assessed in the Persian, Early Hellenistic, and Late Hellenistic−Phase V (Figure 5.11), as there were scarce age-able teeth in the Iron Age IIC or Late Hellenistic−Phase IV.

The caprine survivorship percentage (%fused bones) in the Iron Age IIC suggests a regular culling of caprine with a massive culling around 1.5−2.5 years (37%), with a portion of the herd maintained for secondary products, with 50% survivorship past four years of life (Figure 5.11A; Table 5.36). In the Iron Age IIC assemblage it appears that sheep were culled particularly at around 1.5−2.5 years for meat, with 14% survival percentage compared to goats with 60% survival (Figure 5.11B).

Caprine survivorship in the Persian assemblage has a steady culling until 2.5−4 years (36%) and a continual culling of caprine past four years (29%; Figure 5.11A; Table 5.36), suggesting a meat-focused exploitation strategy. In the Persian assemblage goats were culled younger with 35% surviving past 1.5−2.5 years, compared to 58% of sheep that surviving past this point (Figure 5.11B). This subsistence pattern in the Persian period points to an exploitation strategy focus on goats for meat and sheep for wool (Payne 1973). Tooth-wear analysis of the Persian assemblage suggests caprine were not used solely for their meat as the mortality profile based on fusion suggests. Secondary products were also a part of the subsistence strategy in the Persian assemblage, with the highest count of wear in categories D and G/H (Figure 5.12).

The Early Hellenistic also depicts a regular culling of caprine with 42% of the herd surviving up to four years and 50% surviving past four years of age, indicating milk focused exploitation strategy (Figure 5.11B; Table 5.36). Distinguishing between the epiphyseal fusion of sheep and goats, suggests that sheep were exploited for wool with 60% of sheep surviving past four years (Figure 5.11B). Tooth-wear for the Early Hellenistic supports the notion that secondary products were the main subsistence strategy, with the presence of old caprine in categories E, F, and G/H (Figure 5.12).

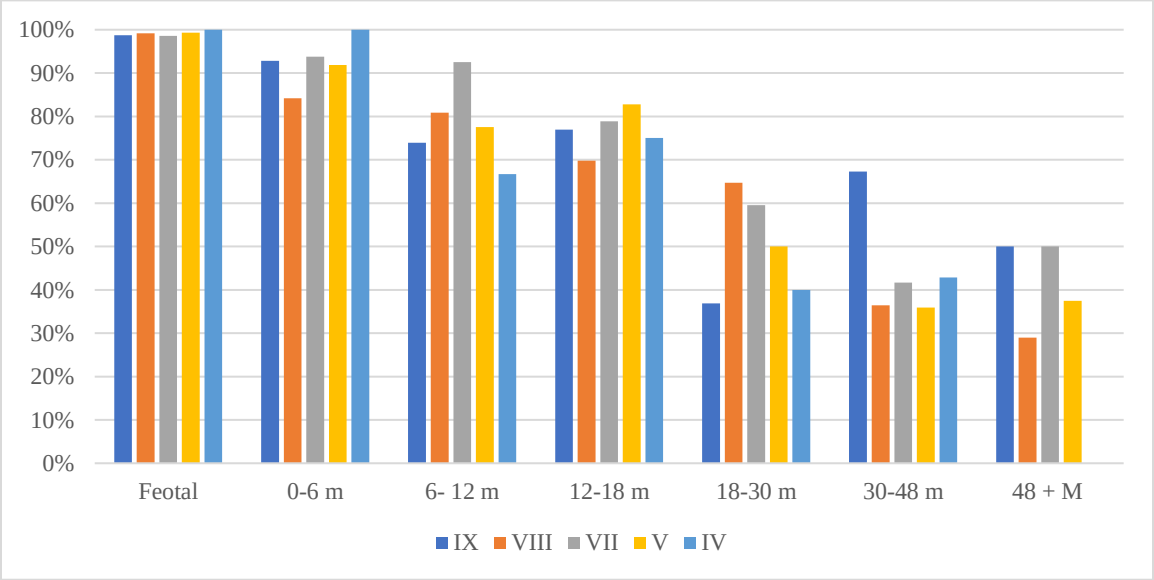
Caprine survivorship in the Late Hellenistic phases, Phase V and IV, suggest a similar pattern of exploitations, with large-scale culling for meat around 1.5−2.5 year of age with a 40-50% survivorship, with some portion of the herd was maintained for secondary products, with 50% survivorship past four years (Figure 5.11A; Table 5.36). Meat exploitation in the Late Hellenistic is clearly evident in the epiphyseal fusion of sheep. Sheep in Phase V are culled drastically around 1.5−2.5 years with 18% surviving to this point, compared to 86% of goats (Figure 5.11B); indicating the subsistence strategy of Late Hellenistic Area M2 focus on exploiting sheep for meat and goats for dairy. The Late Hellenistic tooth-wear analysis depicts a similar pattern to the Persian assemblage, with dual use of caprine for meat and secondary products (Figure 5.12).

TABLE 5.36. UNFUSED AND FUSED ELEMENTS OF CAPRINES (NISP BASED) IN AREA M2. AGING BASED ON ZEDER (2006).

Caprine Fusion Age			Phase IX			Phase VIII			Phase VII			Phase V			Phase IV		
Element	Portion	Fused Age Range (zeder)	Total	UF	%UF	Total	UF	%UF	Total	UF	%UF	Total	UF	%UF	Total	UF	%UF
Radius	Proximal	0-6 months	14	1	7%	19	3	16%	16	1	6%	37	3	8%	1		0%
Humerus	Distal	6-12 months	13	2	15%	28	7	25%	23	2	9%	57	5	9%	4	1	25%
Pelvis		6-12 months	7	2	29%	27	3	11%	17	1	6%	50	19	38%	1		0%
Scapula		6-12 months	3	2	0%	13	3	0%	5	1	0%	22	3	14%	1	1	100 %
Phalanx II		12-18 months	24	3	13%	51	13	25%	17	3	18%	56	4	7%	1		0%
Phalanx I		12-18 months	28	9	32%	78	26	33%	35	8	23%	130	28	22%	3	1	33%
Tibia	Distal	18-30 months	12	6	50%	26	14	54%	13	2	15%	60	28	47%	2	1	50%
Metapodial	Distal	18-30 months	22	14	64%	25	4	16%	29	15	52%	72	38	53%	3	2	67%
Calcaneus		30-48 Months	10	4	40%	18	11	61%	12	5	42%	48	29	60%	0		0%
Femur	Proximal	30-48 Months	10	5	50%	24	13	54%	16	12	75%	38	27	71%	3	2	67%
Femur	Distal	30-48 Months	4	3	75%	19	15	79%	14	10	71%	31	20	65%	1	1	100 %
Ulna	Proximal	30-48 Months	4	0	0%	10	7	0%	3	2	0%	15	8	53%	1		0%
Radius	Distal	30-48 Months	6	3	50%	31	18	58%	10	5	50%	29	20	69%	0		0%
Tibia	Proximal	30-48 Months	3	3	100 %	16	11	69%	5	1	20%	20	12	60%	2	1	50%
Humerus	Proximal	48+ months	6	3	0%	14	10	0%	4	2	50%	24	15	63%	2	2	100 %

FIGURE 5.11.

A. HISTOGRAM OF THE PERCENTAGE OF FUSED ELEMENTS OF CAPRINES FOR AREA M2, FOLLOWING AGE GROUP OF ZEDER (2006).



B. HISTOGRAM OF THE PERCENTAGE OF FUSED ELEMENTS OF IDENTIFIABLE SHEEP AND GOAT FOR AREA M2, FOLLOWING AGE GROUP OF ZEDER (2006).

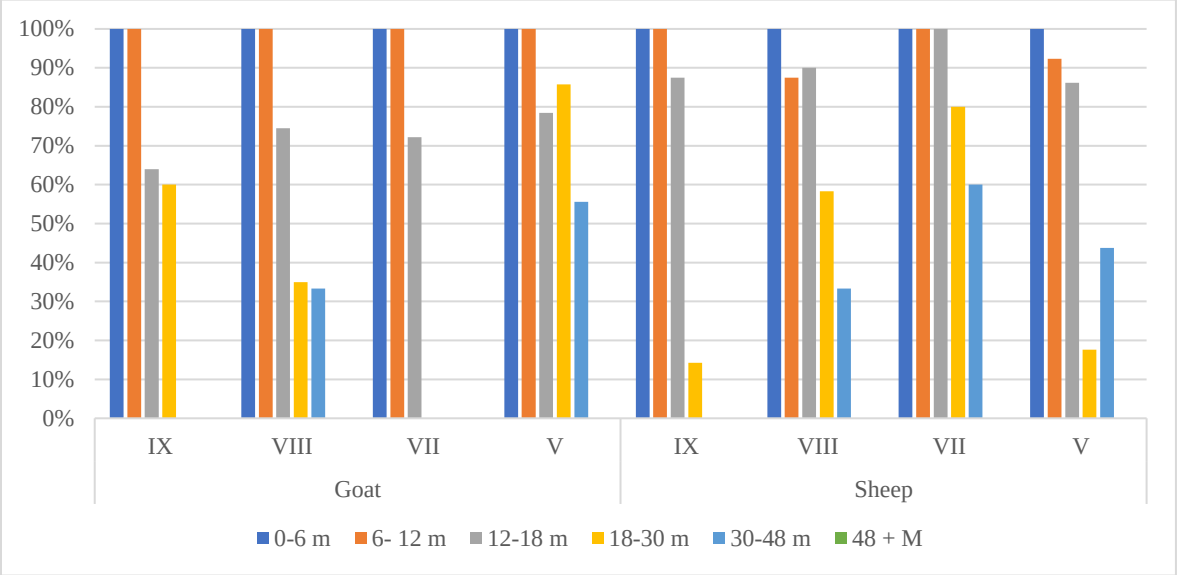
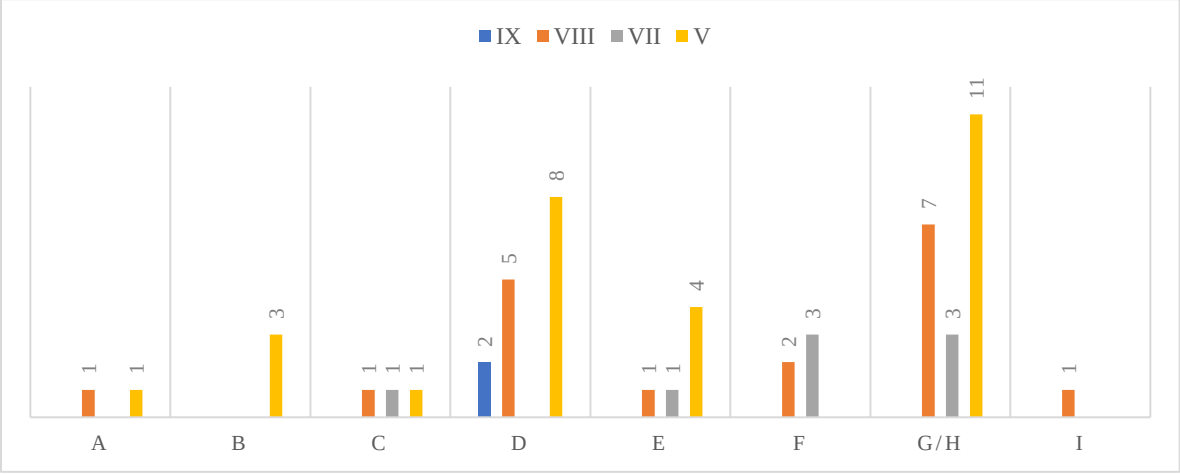


FIGURE 5.12. COUNT OF MANDIBULAR M3 TOOTH-WEAR FOR CAPRINE IN AREA M2, FOLLOWING PAYNE (1973).



5.3.3.2 Cattle Age Profiles of Area M2

The sample size of cattle bones is minimal in many of Area M2's assemblages, limiting analysis of aging profiles for the site. Aging by epiphyseal fusion for the Iron Age IIC and Persian assemblages suggests cattle were culled around one-and-a-half years, but a part of the herd was maintained for secondary products, such as dairy or traction (Table 5.37). Aging of cattle in the Early Hellenistic and Late Hellenistic−Phase V suggests cattle were culled around 2−3.5 years

for meat with a portion of the herd maintained for secondary products or traction (Table 5.37). The epiphyseal fusion of cattle suggests a dual-use of cattle for meat and traction in Area M2 throughout the Iron Age IIC, Persian, and Hellenistic phases.

TABLE 5.37. UNFUSED AND FUSED ELEMENTS OF CATTLE (NISP BASED) FROM AREA M2. AGING BASED ON SILVER (1969).

Cattle Fusion Age			IX			VIII			VII			V			V		
Element	Portion	Fused Age Range (silver)	Total	UF	%UF	Total	UF	%UF	Total	UF	%UF	Total	UF	%UF	Total	UF	%UF
Pelvis		7-10 months	1	1	100%	2	0	0%	4	0	0%	9	3	33%	0	0	0%
Scapula		7-10 months	0	0	0%	0	0	0%	0	0	0%	0	0	0%	0	0	0%
Radius	Proximal	12-18 months	0	0	0%	9	1	11%	5	0	0%	5	0	0%	0	0	0%
Humerus	Distal	12-18 months	1	0	100%	2	1	50%	4	2	50%	4	0	0%	0	0	0%
Phalanx II		1.5 years	0	0	0%	6	2	33%	4	0	0%	23	0	0%	3	0	0%
Phalanx I		1.5 years	2	0	50%	11	4	36%	6	1	17%	26	4	15%	0	0	0%
Tibia	Distal	2-2.5 years	3	2	33%	3	1	33%	3	0	0%	5	2	40%	0	0	0%
Metapodial	Distal	2-2.5 years	0	0	0%	4	2	50%	11	9	82%	17	9	53%	1	1	100%
Femur	Proximal	3.5 years	1	1	100%	4	4	100%	4	2	50%	7	5	71%	1	0	0%
Calcaneus		3.5-4 years	2	1	50%	2	1	50%	3	2	67%	5	3	60%	1	1	100%
Femur	Distal	3.5-4 years	1	0	100%	0	0	0%	0	0	0%	2	1	50%	1	1	100%
Ulna	Proximal	3.5-4 years	0	0	0%	2	1	50%	0	0	0%	2	1	50%	0	0	0%
Radius	Distal	3.5-4 years	1	1	100%	2	1	50%	1	0	0%	4	2	50%	0	0	0%
Tibia	Proximal	3.5-4 years	0	0	0%	2	1	50%	2	1	50%	4	2	50%	0	0	0%
Humerus	Proximal	3.5-4 years	0	0	0%	1	1	100%	0	0	0%	3	1	33%	0	0	0%

5.3.3.3. Caprine Body Part Frequencies of Area M2

The frequencies of caprine body parts depict some similarities between phases, but overall, the assemblages are not homogenous. In nearly every Phase (Phase VIII, VII, Va-c, IV), the most common elements are cranial remains and forelimbs (Figure 5.13, Table 5.38). Phalanges and metapodials are present but relatively uncommon throughout the assemblages (7−46%; Figure 5.13, Table 5.38).

In the Iron Age IIC assemblage, the most common elements are the forelimb's humerus, radius, and ulna (56−100% MAU) followed by cranial remains (Figure 5.13, Table 5.38). There

were slightly more right forelimbs than left in Building 100's rooms (Table 5.39), but the only room with a greater number of rights than lefts is Room C with a ratio of 7:1 (Table 5.39). Cranial and forelimbs were also common in the Persian assemblage, but there was also a focus on lower limbs, such as the radius, ulna, and metapodials (46−71% MAU; Figure 5.13, Table 5.38). In the Early Hellenistic, the humerus is the most common element (100 %MAU), but there is also a focus on hindlimb elements, such as the tibia and femur (58−74 %MAU; Figure 5.13, Table 5.38). Body part frequencies in the Late Hellenistic−Phase V suggest various portions were prevalent, such as the cranium, upper cervical vertebrae (i.e., atlas and axis), the tibia, humerus, and pelvis were also common (Figure 5.13, Table 5.38). Late Hellenistic– Phase IV maintained a preference for limb elements (i.e., humerus, tibia, femur) after cranial remains (Figure 5.13, Table 5.38).

There were no significant relationships between bone structural density and caprines MNE found for any of the assemblages (IX Pearson's r= 0.437, p=0.179; VIII Pearson's r= 0.445, p=0.176; VII Pearson's r= 0.072, p=0.399; V Pearson's r= 0.222, p=0.278), suggesting there was no level of influence of the bone structural density on the survivorship of bones. Comparing caprine MNE to the food utility index (FUI; Metcalfe and Jones (1988)) suggests that meat value played a role in the food decision made in the Iron Age IIC and Persian assemblage (IX Pearson's r= 0.855, p=0.047; VIII Pearson's r= 0.902, p=0.032), but did not role in the Early or Late Hellenistic assemblages (VII Pearson's r= 0.681, p=0.107; V Pearson's r= 0.641, p=0.121).

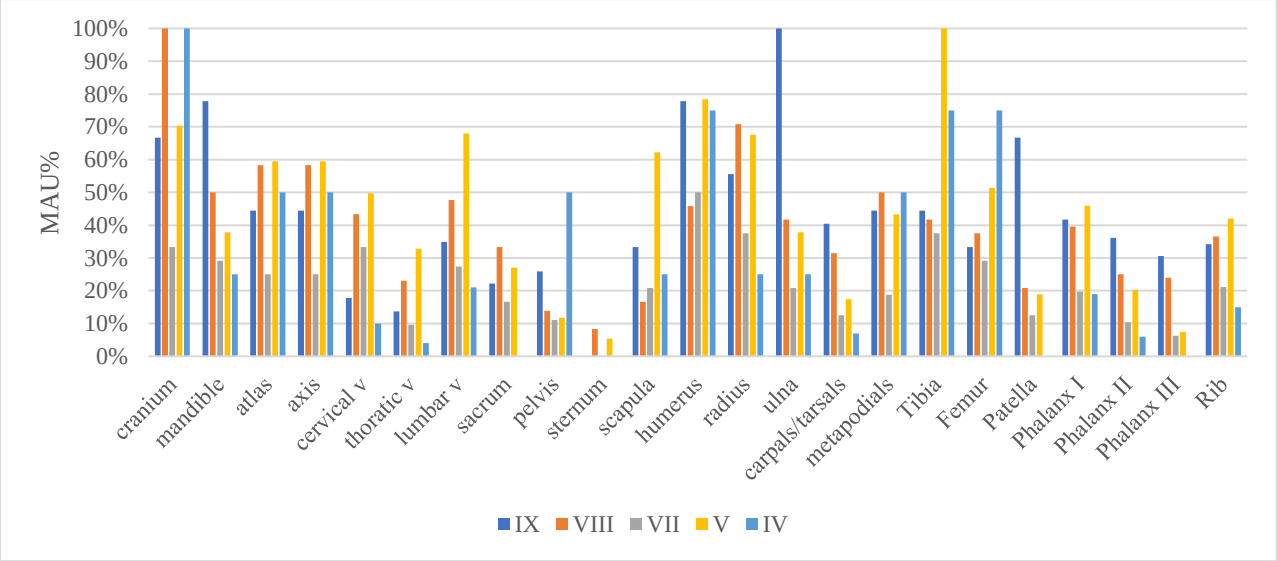
TABLE 5.28. CAPRINE BODY PART INDICES BY PHASE OF AREA M2.

Caprine Body Part Indices	IX				VIII				VII				V				IV			
Element	NISP	MNE	MAUi	MAU%	NISP	MNE	MAUi	MAU%	NISP	MNE	MAUi	MAU%	NISP	MNE	MAUi	MAU%	NISP	MNE	MAU	MAU%
Cranium	38	3	3.00	67%	95	12	12.00	100%	65	4	4.00	67%	189	13	13.00	70%	4	2	2	100%
Mandible	47	7	3.50	78%	159	12	6.00	50%	75	7	3.50	58%	183	14	7.00	38%	3	1	0.5	25%
Atlas	2	2	2.00	44%	16	7	7.00	58%	7	3	3.00	50%	26	11	11.00	59%	1	1	1	50%
Axis	3	2	2.00	44%	13	7	7.00	58%	3	3	3.00	50%	21	11	11.00	59%	1	1	1	50%
Cervical V	7	4	0.80	18%	46	26	5.20	43%	37	20	4.00	67%	99	46	9.20	50%	4	1	0.2	10%
Thoracic V	20	8	0.62	14%	70	36	2.77	23%	44	15	1.15	19%	174	79	6.08	33%	1	1	0.08	4%
Lumbar V	18	11	1.57	35%	65	40	5.71	48%	44	23	3.29	55%	169	88	12.57	68%	6	3	0.43	21%
Sacrum	4	1	1.00	22%	13	4	4.00	33%	5	2	2.00	33%	13	5	5.00	27%	0	0	0	0%
Pelvis	23	7	1.17	26%	66	10	1.67	14%	43	8	1.33	22%	124	13	2.17	12%	1	1	1	50%
Sternum	0	0	0.00	0%	3	1	1.00	8%	0	0	0.00	0%	1	1	1.00	5%	0	0	0	0%
Scapula	20	3	1.50	33%	13	4	2.00	17%	28	5	2.50	42%	101	23	11.50	62%	1	1	0.5	25%
Humerus	26	7	3.50	78%	54	11	5.50	46%	45	12	6.00	100%	125	29	14.50	78%	7	3	1.5	75%
Radius	24	5	2.50	56%	61	17	8.50	71%	41	9	4.50	75%	130	25	12.50	68%	1	1	0.5	25%
Ulna	15	9	4.50	100%	34	10	5.00	42%	19	5	2.50	42%	55	14	7.00	38%	1	1	0.5	25%
Carpals/Tarsals	121	40	1.82	40%	241	83	3.77	31%	68	33	1.50	25%	172	71	3.23	17%	3	3	0.14	7%
Metapodials	38	8	2.00	44%	109	24	6.00	50%	59	9	2.25	38%	185	32	8.00	43%	8	4	1	50%
Tibia	21	4	2.00	44%	56	10	5.00	42%	45	9	4.50	75%	142	37	18.50	100%	8	3	1.5	75%
Femur	17	3	1.50	33%	68	9	4.50	38%	38	7	3.50	58%	114	19	9.50	51%	7	3	1.5	75%
Patella	8	6	3.00	67%	10	5	2.50	21%	4	3	1.50	25%	13	7	3.50	19%	0	0	0	0%
Phalanx I	42	15	1.88	42%	98	38	4.75	40%	48	19	2.38	40%	159	68	8.50	46%	3	3	0.38	19%
Phalanx II	27	13	1.63	36%	58	24	3.00	25%	19	10	1.25	21%	60	30	3.75	20%	1	1	0.13	6%
Phalanx III	21	11	1.38	31%	52	23	2.88	24%	15	6	0.75	13%	24	11	1.38	7%	0	0	0	0%
Ribs	158	20	1.54	34%	489	57	4.38	37%	248	33	2.54	42%	682	101	7.77	42%	26	4	0.31	15%

TABLE 5.38. COUNT AND RATIO OF RIGHT AND LEFT SIDE FORELIMBS IN IRON AGE IIC– PHASE IX ROOMS

Side	Element	Room A	Room B	Room C
Left	Scapula		1	
	Humerus	2	3	
	Radius	1	1	
	Ulna	1		1
	Metacarpal			
Right	Scapula			1
	Humerus	2	3	1
	Radius	2	1	2
	Ulna	1	1	1
	Metacarpal		1	2
Ratio Left: Right		4:5	2:3	1:7

FIGURE 5.13. BODY PART FREQUENCY (MAU%) OF CAPRINES FROM AREA M2



5.3.3.4. Cattle Body Part Frequencies of Area M2

The small number of cattle remains in the Iron Age IIC and Late Hellenistic IV–Late Hellenistic limited a full understanding of body part frequencies for these phases (Table 5.40). From the data available, the most common element was cranial elements (100MAU%; Table 5.40). In the Persian, Early Hellenistic, and Late Hellenistic−Phase V, the most common or second most common elements are forelimb elements (i.e., radius, ulna, humerus). Hindlimb elements in the Iron Age IIC and Late Hellenistic−Phase V are also common (Table 5.40). Cattle extremities (i.e., phalanges, carpals, and tarsals), vertebra, and ribs were present but in lower frequencies in all the assemblages.

5.3.3.5 Body Part Frequencies of Chicken in Area M2

A considerable amount of chicken remains in the Persian and Late Hellenistic–Phase V allowed for an exploration into the frequency of elements for these phases (Table 5.41). Body part frequencies in the Persian and Late Hellenistic–Phase V suggests a dominance of furcula (i.e., wishbone) and sternum, areas of the body that relate to the meat-bearing core of the chicken, followed by limb elements (Table 5.41). Cranial and feet elements were present in the Persian assemblage but absent in the Late Hellenistic–Phase V (Table 5.41), suggesting local preparation and consumption of chicken in the Persian assemblage versus chicken that was decollated elsewhere and represent only consumed remains in the Late Hellenistic–Phase V (Serjeantson 2013: 164).

TABLE 5.40. CATTLE BODY PART INDICES BY PHASE OF AREA M2.

Bos	IX				VIII				VII				V				IV			
Element	NISP	MNE	MAUi	MAU%	NISP	MNE	MAUi	MAU%	NISP	MNE	MAUi	MAU%	NISP	MNE	MAUi	MAU%	NISP	MNE	MAUi	MAU%
Cranium	4	1	1.00	100%	18	2	2.00	100%	13	2	2.00	100%	50	2	2.00	100%	4	1	1.00	100%
Mandible	7	1	0.50	50%	20	2	1.00	50%	7	1	0.50	25%	28	3	1.50	75%	1	1	0.50	50%
Atlas	0	0	0.00	0%	2	1	1.00	50%	0	0	0.00	0%	4	2	2.00	100%	1	1	1.00	100%
Axis	0	0	0.00	0%	4	1	1.00	50%	1	1	1.00	50%	1	1	1.00	50%	0	0	0.00	0%
Cervical V	1	1	0.20	20%	5	2	0.40	20%	3	1	0.20	10%	18	4	0.80	40%	1	1	0.20	20%
Thoracic V	4	2	0.15	15%	6	2	0.15	8%	11	6	0.46	23%	41	15	1.15	58%	1	1	0.08	8%
Lumbar V	4	2	0.29	29%	4	2	0.29	14%	5	1	0.14	7%	20	6	0.86	43%	1	1	0.14	14%
Sacrum	0	0	0.00	0%	0	0	0.00	0%	2	1	1.00	50%	2	1	1.00	50%	0	0	0.00	0%
Pelvis	1	1	0.17	17%	9	2	0.33	17%	7	1	0.17	8%	27	5	0.83	42%	0	0	0.00	0%
Sternum	0	0	0.00	0%	1	1	1.00	50%	0	0	0.00	0%	0	0	0.00	0%	0	0	0.00	0%
Scapula	1	1	0.50	50%	6	3	1.50	75%	1	1	0.50	25%	14	3	1.50	75%	0	0	0.00	0%
Humerus	1	1	0.50	50%	3	1	0.50	25%	11	2	1.00	50%	16	3	1.50	75%	1	1	0.50	50%
Radius	1	1	0.50	50%	13	3	1.50	75%	13	2	1.00	50%	21	4	2.00	100%	0	0	0.00	0%
Ulna	0	0	0.00	0%	11	2	1.00	50%	6	2	1.00	50%	16	3	1.50	75%	0	0	0.00	0%
Carpals/Tarsals	11	6	0.27	27%	39	18	0.82	41%	13	7	0.32	16%	51	19	0.86	43%	2	2	0.09	9%
Metapodials	4	1	0.25	25%	10	2	0.50	25%	16	3	0.75	38%	49	7	1.75	88%	2	1	0.25	25%
Tibia	4	2	1.00	100%	7	2	1.00	50%	5	1	0.50	25%	27	4	2.00	100%	0	0	0.00	0%
Femur	2	1	0.50	50%	5	2	1.00	50%	6	2	1.00	50%	24	4	2.00	100%	3	1	0.50	50%
Patella	0	0	0.00	0%	2	1	0.50	25%	1	1	0.50	25%	2	1	0.50	25%	0	0	0.00	0%
Phalanx I	2	1	0.13	13%	12	7	0.88	44%	9	5	0.63	31%	34	13	1.63	81%	0	0	0.00	0%
Phalanx II	0	0	0.00	0%	7	3	0.38	19%	5	3	0.38	19%	24	15	1.88	94%	3	3	0.38	38%
Phalanx III	2	1	0.13	13%	8	5	0.63	31%	1	1	0.13	6%	21	10	1.25	63%	0	0	0.00	0%
Rib	6	2	0.15	15%	42	8	0.62	31%	42	6	0.46	23%	116	17	1.31	65%	6	1	0.08	8%

TABLE 5.41. CHICKEN BODY PART INDICES BY PHASE OF AREA M2

Gallus Body Part Indices	IX				VIII				VII				V			
Element	NISP	MNE	MAUi	MAU%	NISP	MNE	MAUi	MAU%	NISP	MNE	MAUi	MAU%	NISP	MNE	MAUi	MAU%
Coracoid	8	4	2.00	80%	17	7	3.50	44%	5	3	1.50	50%	21	9	4.50	56%
Cranium	1	1	0.50	20%	5	3	1.50	19%	1	1	0.50	17%	0	0	0.00	0%
Carpometacarpus	0	0	0.00	0%	5	2	1.00	13%	0	0	0.00	0%	4	2	1.00	13%
Radius	3	3	1.50	60%	16	9	4.50	56%	6	6	3.00	100%	21	0	0.00	0%
Femur	2	1	0.50	20%	11	4	2.00	25%	4	3	1.50	50%	27	11	5.50	69%
Fibula	0	0	0.00	0%	6	4	2.00	25%	0	0	0.00	0%	2	2	1.00	13%
Furcula	4	2	2.00	80%	17	8	8.00	100%	5	3	3.00	100%	10	6	6.00	75%
Humerus	2	1	0.50	20%	16	6	3.00	38%	4	6	3.00	100%	24	11	5.50	69%
Lumbosacral	0	0	0.00	0%	4	4	4.00	50%	0	0	0.00	0%	1	1	1.00	13%
Metatarsus	12	5	2.50	100%	23	8	4.00	50%	4	2	1.00	33%	36	16	8.00	100%
Pelvis	2	2	0.33	13%	10	4	0.67	8%	4	2	0.33	11%	22	9	1.50	19%
Scapula	1	1	0.50	20%	15	8	4.00	50%	3	2	1.00	33%	12	8	4.00	50%
Phalanx I	3	3	0.38	15%	11	10	1.25	16%	1	1	0.13	4%	4	4	0.50	6%
Phalanx II	4	3	0.50	20%	4	4	0.67	8%	0	0	0.00	0%	1	1	0.17	2%
Phalanx III	0	0	0.00	0%	1	1	0.25	3%	0	0	0.00	0%	0	0	0.00	0%
Phalanx IV	0	0	0.00	0%	2	1	0.13	2%	0	0	0.00	0%	0	0	0.00	0%
Phalanx Wing	0	0	0.00	0%	0	0	0.00	0%	0	0	0.00	0%	0	0	0.00	0%
Sternum	0	0	0.00	0%	12	5	5.00	63%	1	1	1.00	33%	9	6	6.00	75%
Tibiotarsus	5	3	1.50	60%	24	9	4.50	56%	13	5	2.50	83%	36	11	5.50	69%
Ulna	1	1	0.50	20%	11	5	2.50	31%	4	2	1.00	33%	20	9	4.50	56%
Vertebrae	1	1	0.08	3%	16	14	1.08	13%	0	0	0.00	0%	1	1	0.08	1%

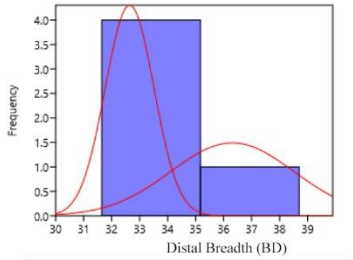
5.3.3.6 Sexing of Caprine and Chicken from Area M2

The sexing of caprine in Area M2 is based on the mixture analysis of the distal breath of the humerus. Mixture analysis was conducted individually for sheep and goats, following the parameters of mixture analysis only assemblages with < 4 samples; therefore, limiting sexing to sheep in the Persian–Phase VIII (N: 5) and the Late Hellenistic – Phase V-IV (N: 10; Figure 5.14). Mixture analysis of goat was limited to the Late Hellenistic – Phase V-IV (N: 15; Figure 5.14). The ratio of females to males is different in the exploitation of goats and sheep in the Persian and Late Hellenistic (Figure 5.14). Mixture analysis of Persian–Phase VIII sheep suggests a ratio of 53% males to 47% females (Figure 5.14), with a higher probability of males. Sheep in the Late Hellenistic – Phase V-IV depict a ratio of 63% females to 35% males, however the bimodal distribution of P1 (females) and P2 (males) overlaps indicating this ratio is questionable. Mixture of goats in the Late Hellenistic – Phase V-IV depict a clear bimodal distribution with a ratio of 55% females to 45% males (Figure 5.15).

The sexing of chicken, based on mixture analysis of the proximal breadth of the femur, was limited to the Persian −Phase VIII and Late Hellenistic−Phase V, due to the lack of measurable chicken elements in the assemblages. The proximal breadth of the chicken femur in the Persian −Phase VIII suggest a ratio of 59% females to 40% males and in the Late Hellenistic−Phase V a ratio of 51% females to 49% males (95% confidence interval; Figure 5.15). There is a clear preference for hen in the Persian period assemblage, whereas in the Late Hellenistic there is no clear preference for hens or cocks, limiting our understanding for the later assemblage.

FIGURE 5.14. MIXTURE ANALYSIS OF SHEEP AND GOAT FROM AREA M2, BASED ON THE DISTAL BREATH (BD) OF HUMERI.

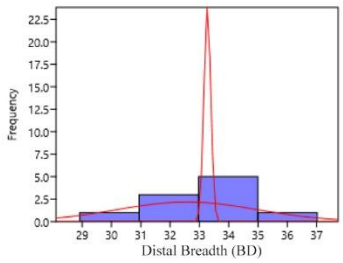
A.



Persian Sheep	P1	P2
Proportions	0.46677	0.53323
Mean	36.312	32.643
Standard Deviation	2.2015	0.87021

N: 5

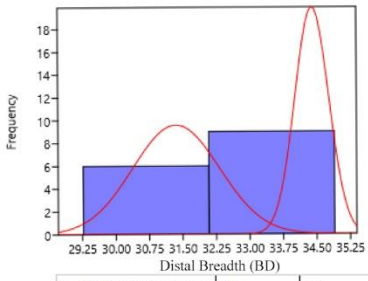
B.



L. Hellenistic Sheep	P1	P2
Proportions	0.65254	0.34746
Mean	32.583	33.271
Standard Deviation	2.4188	0.11734

N: 10

C.

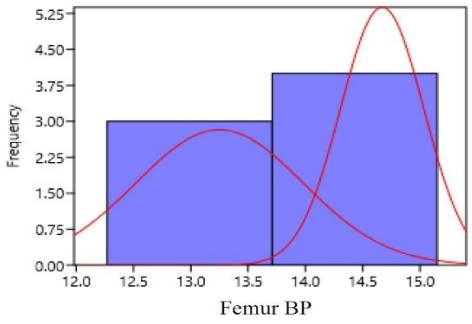


L. Hellenistic Goat	P1	P2
Proportions	0.55234	0.44766
Mean	31.35	34.398
Standard Deviation	0.97112	0.37858

N: 15

FIGURE 5.15. SEXING OF CHICKEN FROM AREA M2, BASED ON THE MIXURE ANALYSIS OF THE FEMUR'S PROXIMAL BREADTH (BP).

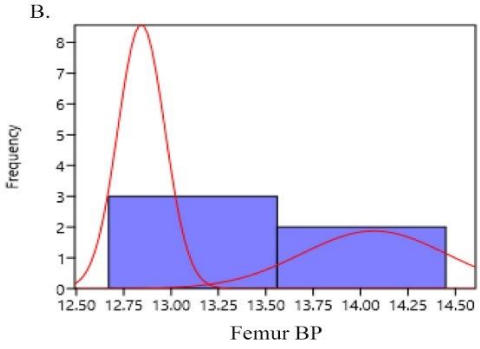
A.



Late Hellenistic	P1	P2
Proportions	0.51311	0.48689
Mean	13.251	14.669
Standard Deviation	0.7303	0.36373

N: 7

B.



Persian	P1	P2
Proportions	0.59856	0.40144
Mean	12.843	14.071
Standard Deviation	0.12369	0.38079

N: 5

5.3.4 Summary of Givati Area M2

The *longue durée* perspective of this assemblage allows us to not only conduct an intra-site comparison between other Givati Parking Lot assemblages but also an inter-site comparison

between multiple assemblages from the City of David, the Stepped-Stone Structure (Area G), and the Western Wall Plaza excavations. The animal remains from Area M2 of the Givati Parking Lot follow the same pattern as prior periods, in which caprine (i.e., sheep and goat), in relatively equal proportions, make up the majority of the assemblage, followed by cattle and chicken and to a lesser extent game, birds, and fish.

5.3.4.1. Area M2 and the Remains of Destruction − Phase IX (7th century-586 BCE)

The remains from Iron Age IIC−Phase IX relate to fills and accumulation in Building 100. A portion of these remains derive from Building 100's three rooms: Room A, Room B, and Room C. Fourteen percent of the faunal assemblage was burnt as a result of consumption or destruction events in the area. The faunal remains from the Iron Age IIC comprise of sheep, goat, cattle, and chicken but also include game, birds, and fish. The most common fish in the Iron Age IIC were catfish, seabream, and mullets. Fish are predominately present only in Room A and Room B. Fish species from the Rooms as well as the larger Iron Age IIC assemblage, were imported from freshwater sources, such as the Yarkon and Nile Rivers, and saltwater sources of the Bardawil Lagoon in the Sinai Peninsula and the Mediterranean Sea.

The species richness in Iron Age IIC Area M2 is similar to Area G (Stepped Stone Structure; Tamar and Bar-Oz 2015) and the collapse/fill from the Western Wall Plaza excavations (Sapir-Hen et al. 2016; Sapir-Hen in press). Sheep and goats were exploited for their meat and as well as for their secondary goods. All portions of the carcass were present, but there was a preference for crania and forelimbs, portions of the body that have religious significance (Russell 2011). There were slightly more right forelimbs than left in Building 100's rooms, but the only room with a greater number of rights than lefts is Room C.

The diversity of species between Building 100's rooms is significant (Table 5.28).

Looking at the fragment count of species (NISP) between Room A, Room B, and Room C, there are apparent differences in the species present. For example, Room A and B have a variety of birds, rodents, reptiles, and fish, whereas Room C has a near absence of these species. Room A is the only room with burnt remains of reptile, most likely snake, and rodent bones suggesting two hypothetical modes of deposition. The first option is that reptiles and rodents acted as commensals, residing in Building 100 alongside its inhabitants during its destruction; or the other option is that reptile, in particular, were hibernating during a period of abandonment as the building was destroyed. The answer to this question is currently being investigated in the renewed excavation of this building and its occupational history.

5.3.4.2. Area M2 in the Persian Period − Phase VIII (6-4th centuries BCE)

The animal remains from the Persian−Phase VIII assemblage relates to fills and accumulations in the reuse or reoccupation of Building 100, understood through the lens of crisis-architecture (Y. Shalev per comm.). The Persian assemblage from Area M2 is the largest to date and follows the same pattern as prior assemblages in which sheep and goat, in relatively equal proportions, make up the majority of the assemblage, followed by cattle and chicken, and to a lesser extent, wild species and fish.

Fish in the Persian period was previously recorded in Area G (Stepped Stone Structure; Lernau 2015). However, the Persian assemblage of fish from Area M2 is more extensive and varied (Table 5.30). The most common fish in the Persian assemblage are mullets and seabream (porgies), but there is also the presence of catfish, tilapia, barbel, meagre, and Nile Perch (Table 5.30). The fish present suggests there were trade imports from the Yarkon and Nile Rivers, the Bardawil Lagoon, and the Mediterranean Sea.

Caprine in the Persian assemblage were primarily utilized for their secondary products, but some were killed off younger for their meat. This dual usage of caprine for meat and secondary products was typical of urban Jerusalem in the Iron Age IIB.[50] All skeletal elements of the sheep, goat, and cattle are present, but cranial and limb elements, with slightly more fore than hind limbs, are more prevalent. All skeletal elements of chicken were also present, suggesting localized butchery of domesticates occurred in the area. The animal economy of Area M2, along with the presence of geese, game animals, and imported fish in the Persian period, suggests a higher socioeconomic subsistence pattern.

5.3.4.3. Area M2 in the Early Hellenistic −Phase VII (4th-mid-2nd centuries BCE)

Our understanding of the animal economy of the Early Hellenistic period of Jerusalem is currently unknown. Previous faunal reports from Jerusalem generally study the entire Hellenistic period as a complete unit. However, we argue that historical, social, and economic changes between the Early Hellenistic (4- mid-2nd centuries BCE), that was encapsulated by Seleucid and Ptolemaic contention, and the Late Hellenistic (2nd century BCE) that witness the rise of the Hasmonean monarchy, could be evident in the animal economy of Jerusalem.

Similar to the earlier periods, the animal economy of Area M2 focuses on sheep, goat, and cattle. Sheep and goats are equally represented and were primarily used for secondary products, namely milk. Cattle were used for both meat and secondary uses, such as milk and traction. All body parts of livestock were present, but there was a focus on the upper fore and hindlimbs, the meatier section of the legs. The Early Hellenistic assemblage also had evidence of a wide array of game, birds, and fish, similar to the periods before. The Early Hellenistic

[50] See epiphyseal fusion of caprine in Bar-Oz and Raban-Gerstel 2013; Tamar and Bar-Oz 2015; Sapir-Hen et al. 2016.

subsistence pattern focused on meat, secondary products, hunted and import species, suggests a continuity of a higher socioeconomic subsistence strategy.

5.3.4.4. Area M2 in the Late Hellenistic−Phase VI, Phase V, and Phase IV (2nd century- 63 BCE)

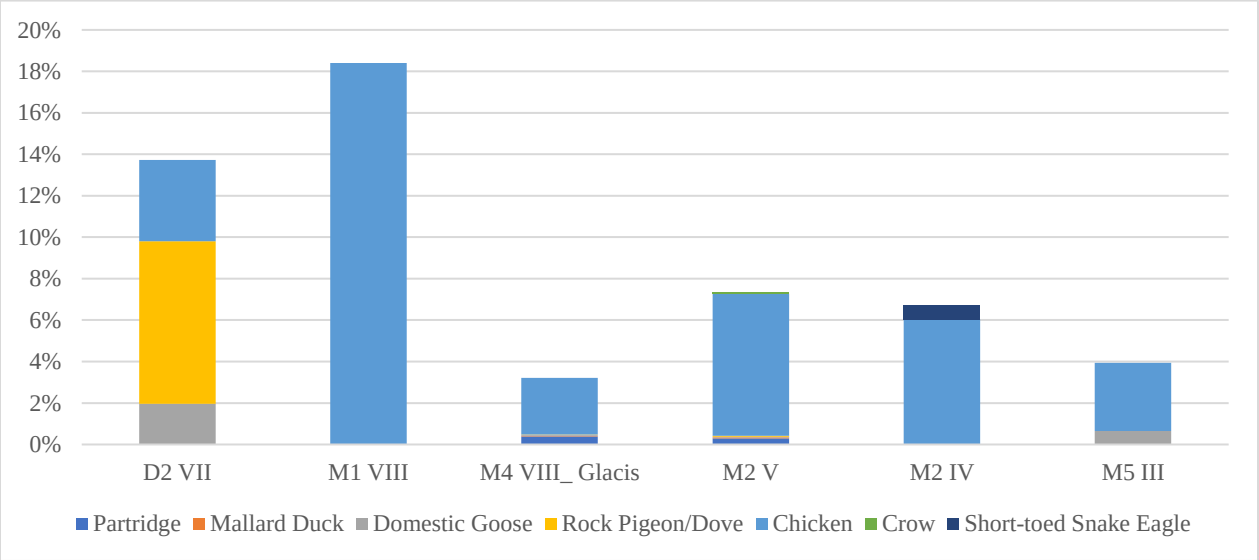
The Late Hellenistic of Area M2 includes multiple phases of a public building, the focus of this report in on Phase V and Phase IV, which relate to fill and floor accumulations. Weathering patterns for these phases suggest they were exposed longer than the previous periods and that they were less fragmented, probably as a result of their stratigraphic location. The focus of the animal economy was on sheep, goat, cattle, and chicken, which is in line with the other reports from this period, such as City of David−Area D2 (Horwitz 1996; Horwitz and Tchernov 1996), and Givati−Area M1 (Bar-Oz and Raban-Gerstel 2013), the glacis in Area M4 (see above) and Area M5 (see below).

Sheep, goats, and cattle were used for meat and secondary products, based on epiphyseal fusion and tooth-wear analysis. Livestock was locally butchered as all parts of the carcass are present, but there was greater exploitation on cranial and the hind limbs, including the pelvis, suggesting larger meat portions from the rump. Results suggest that most of the sheep and goats from Phase V were males, which is following expectations from a consumer city. Beyond the subsistence aspects of the Late Hellenistic, Phase IV included the remains of a nearly complete puppy, under one and a half years old.

Chicken remains are relatively common in the Late Hellenistic; this is in line with the majority of other Levantine sites that have a frequency of greater than five percent (Perry-Gal et al. 2015: Dataset S1). The inflation of chicken consumption as a faunal indicator for Hellenistic influence may be evident in Area M1, where chicken represent 18% (Bar-Oz and Raban-Gerstel 2013), and City of David Area D2, where birds represent 14% of the total assemblage (Horwitz

and Tchernov 1996). The difference in chicken frequency between the areas does not suggest a lesser degree of Hellenization in Area M2 but instead points to the specific activities occurring in different sectors of the city. Exploring the frequency of chicken and other birds throughout the Givati Parking Lot in the Late Hellenistic (Figure 4.16) suggests the 18% from Area M1 is an anomaly that does fit with the pattern of less than eight percent.

FIGURE 5.16. FREQUENCY OF AVIAN SPECIES IN JERUSALEM (BASED ON THE ASSEMBLAGE PERCENT NISP).



5.3.4.5. Summary of Area M2

The results from Area M2 suggests continuity from the Iron Age IIC through Late Hellenistic of exploiting sheep, goats, and cattle for meat and secondary products, hunted game, and fish imports. The results point towards the continuity of a subsistence strategy that is of high socioeconomic status in nature.

5.4 Givati Parking Lot Area M5

Presented below is a detailed taphonomic analysis of the pit assemblage (L.5092) and Hellenistic assemblage (Phase IIIb-c) modifying factors, followed by an analysis of major animal trends.

The small assemblage of faunal remains from the Iron Age II/Persian living surface (Phase IV) limited the analysis to a species list and taphonomic modifications, if present.

5.4.1 Species Represented in Area M5

Domestic livestock (i.e., sheep, goat, and cattle) are the most dominant species in all assemblages, and they represent 86% of the Iron Age II/Persian assemblage, 96% of the pit assemblage, and 89% of the combined Hellenistic assemblage (Table 5.42). Domestic livestock within the Hellenistic assemblage varies by subphase, with livestock representing 93.5% of Phase IIIb, 97% of Phase IIIb-c, 89% of Phase IIIc, and 95% of Phase IIIc? (Table 5.43). Other species, such as domestic dogs, mountain gazelle, and fallow deer, represent approximately two percent or less in all assemblages, except in the Iron Age II, where they represent 3.4% of the assemblage (Table 5.42; Table 5.43).

The Iron Age II/Persian living surface has 59 NISP (Table 5.42). The most dominant livestock animals in the living surface assemblage are the caprines (sheep and goat), with 80% of the assemblage. Only goats (N: 4) were distinguishable in the living surface assemblage (Table 5.42). The second most common species representing 8.5% of this assemblage, are cattle. The living surface assemblage also included mountain gazelle (N: 1), fallow deer (N; 1), medium and large birds (N: 4), and two species of fish: white grouper (*Serranidae Epinephelus aeneus*, N: 1) and mullet (N: 1) (Table 5.42).

Overall, the Hellenistic assemblages have a NISP of 739 (Table 5.42). The Hellenistic assemblage is comprised of subphase and a pit that was analyzed individually. The subphase of Hellenistic assemblage has varying frequencies of species. Caprines are the most dominant throughout Hellenistic, representing 94% of Phase IIIb, and 81% of Phase IIIc, 78% of Phase IIIc, and 87.5% of Phase IIIc? (Table 5.43). Goats are more prevalent than sheep (*Ovis aeries*) in

Phase IIIb-c, with a ratio of 2.75:1 and Phase IIIc with a ratio of 2:1. Sheep are more common than goats in Phase IIIc? with a ratio of 1:1.6. Only sheep were distinguishable in Phase IIIb.

Cattle are the second most common species in the Hellenistic sub-phase representing 15.7% of Phase IIIc, 10.4% of Phase IIIc, and 7.1% of Phase IIIc? (Table 5.43). Cattle are absent in Phase IIIb. Chicken are common throughout the subphase, comprising 3.2% of Phase IIIb, 2.5% of Phase IIIb-c, 5.2% of Phase IIIc, and 1.8% of IIIc? (Table 5.43). Wild species and fish species are also present in the subphase (Table 5.43).

Phase IIIc's pit assemblage (N: 434) was comprised mostly of caprine with 85.5% of the assemblage (Table 5.42). The ratio between the distinguishable sheep (N: 4) and goat (N: 43) bones is approximately 1:10. The dominance of goats in the pit assemblage relates to the possible deposition of a complete right and left hooves (metapodials, carpals, tarsals, first, second, and third phalanges; Figure 5.17A) and a right forearm (humerus and radius). The second most common species in the pit are cattle, representing 11% of the assemblage (Table 5.42). The deposition of a non-articulated hoof of a cow (Figure 5.17B). The pit assemblage also included a few other species, such as gazelle (N: 5; 1.2%), fallow deer (N: 2), and domestic chicken (N: 3) (Table 5.42).

TABLE 5.42. THE NUMBER OF IDENTIFIED SPECIMENS (NISP), MINIMUM NUMBER OF INDIVIDUALS (MNI), AND PERCENTAGE OF TOTAL ASSEMBLAGE PER SPECIES IDENTIFIED IN AREA M5

Givati M5	Species	Common Name	Iron Age II/ Persian Phase IV			Hellenistic Phase III Pit L.5092			Hellenistic Combined Phase IIIb-c		
			NISP	MNI	NISP%	NISP	MNI	NISP%	NISP	MNI	NISP%
Domesticated Ungulates	*Capra hircus*	Goat	3	1	5.1%	43	3	9.9%	18	3	5.9%
	Ovis aries	Sheep				4	1	0.9%	13	4	4.3%
	Caprine size	Sheep or Goat	43	1	72.9%	324	4	74.7%	221	8	72.5%
	Bos taurus	Cow	1	1	1.7%	29	1	6.7%	13	2	4.3%
	A Size	Large Mammal	4	1	6.8%	19	1	4.4%	20	3	6.6%
Wild Mammals	*Canis/Gazella size*	Small mammal				5	1	1.2%	2	2	0.7%
	Canis familiaris	Domestic Dog							1	1	0.3%
	Gazella gazella	Gazelle	1	1	1.7%	5	1	1.2%	1	1	0.3%
	Dama mesopotamica	Fallow Deer	1	1	1.7%	2	1	0.5%			
	Lepus capensis	Cape Hare							2	1	0.7%
Aves	*Gallus gallus*	Chicken				3	1	0.7%	5	4	1.6%
	Medium Aves	Medium Bird	2	1	3.4%				5	3	1.6%
	Large Aves	Large Bird	2	1	3.4%				2	1	0.7%
Pisces	*Cichlidae*	Mouth Breeders							1	1	0.3%
	Serranidae epinephelus aeneus	White Grouper	1	1	1.7%				1	1	0.3%
	Mugilidae	Mullets	1	1	1.7%						
Total			59	10	100%	434	14	100%	305	35	100%

TABLE 5.43. THE NUMBER OF IDENTIFIED SPECIMENS (NISP), MINIMUM NUMBER OF INDIVIDUALS (MNI), AND PERCENTAGE OF TOTAL ASSEMBLAGE PER SPECIES IDENTIFIED FOR AREA M5 PHASE III SUBPHASES.

Givati M5	Species	Common Name	Phase IIIb			Phase IIIb-c			Phase IIIc			Phase IIIc?			Combined Phase IIIb-c		
			NISP	MNI	NISP%	NISP	MNI	NISP%	NISP	MNI	NISP%	NISP	MNI	NISP%	NISP	MNI	NISP%
Domesticated Ungulates	*Capra hircus*	Goat				11	1	9.1%	4	1	4.1%	3	1	5.4%	18	3	5.9%
	Ovis aries	Sheep	2	1	6.5%	4	1	3.3%	2	1	2.1%	5	1	8.9%	13	4	4.3%
	Caprine size	Sheep or Goat	27	1	87.1%	83	3	68.6%	70	2	72.2%	41	2	73.2%	221	8	72.5%
	Bos taurus	Cow				8	1	6.6%	5	1	5.2%			0.0%	13	2	4.3%
	A Size	Large Mammal				11	1	9.1%	5	1	5.2%	4	1	7.1%	20	3	6.6%
Wild Mammals	*Canis/Gazella size*	Small mammal	1	1	3.2%			0.0%	1	1	1.0%			0.0%	2	2	0.7%
	Canis familiaris	Domestic Dog				1	1	0.8%			0.0%			0.0%	1	1	0.3%
	Gazella Gazella	Gazelle										1	1	1.8%	1	1	0.3%
	Dama mesopotamica	Fallow Deer															
	Lepus capensis	Cape Hare							2	1	2.1%				2	1	0.7%
Aves	*Gallus gallus*	Chicken	1	1	3.2%	1	1	0.8%	2	1	2.1%	1	1	1.8%	5	4	1.6%
	Aves-2	Medium Bird				2	2	1.7%	3	1	3.1%				5	3	1.6%
Pisces	*Cichlidae*	Mouth Breeders							2	1	2.1%				2	1	0.7%
	Sciaenidae Argyrosomus regius	Meagre							1	1	1.0%				1	1	0.3%
	Clariidae Clarias gariepinus	African sharp tooth catfish										1	1	1.8%	1	1	0.3%
Total			31	4	100%	121	11	100%	97	12	100%	56	8	100%	305	35	100%

FIGURE 5.17. HYPOTHETICAL RECONSTRUCTION OF ARTICULATED HOOVES FROM AREA M5 PIT (L.5092).

A. GOAT (*CAPRA HIRCUS*)

B. CATTLE (*BOS TAURUS*)

5.4.2 Taphonomy of Area M5

5.4.2.1 Weathering of Area M5

Weathering stages of the bones from Hellenistic assemblage fall primarily between stages zero to two of Brehensmeyer's guide (1978: 157) (Table 4.44), suggesting bones were covered quickly after disposal (three years or less). Two subphases of Phase III have a greater number of bones that were exposed for longer than three years, Phase IIIb with 48%, and the pit with 41.5% between stages three to six (Table 4.44; Brehensmeyer 1978). Weathering stages of bones from Iron Age II/Persian were quickly covered with 97% of the bones in this assemblage falling primarily between stages zero to two (Table 4.44; Brehensmeyer 1978).

TABLE 5.44. TOTAL OF FRAGMENTS RECORDED AND PERCENTAGE IN EACH WEATHERING STAGE (STAGES ACCORDING TO BEHRENMEYER 1978) OF AREA M5 PHASE III (HELLENISTIC) AND IV (IRON AGE II).

Weathering	Phase IIIb		Phase IIIb-c		Phase IIIc		Phase IIIc?		Combined Phase III		Phase IIIc: L.5092		Phase IV	
Stages	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%
0			5	4%	18	19%	17	30%	40	13%	1	0.2%	26	44%
1	15	48%	69	57%	41	42%	31	55%	156	51%	106	24.4%	26	44%
2	1	3%	28	23%	19	20%	4	7%	52	17%	147	33.9%	5	8%
3	11	35%	10	8%	12	12%	2	4%	35	11%	146	33.6%	2	3%
4	2	6%	5	4%	2	2%	1	2%	10	3%	22	5.1%		
5	2	6%	4	3%	4	4%	1	2%	11	4%	11	2.5%		
6					1	1%			1	0%	1	0.2%		
Total	31	100%	121	100%	97	100%	56	100%	305	100%	434	100%	59	100%

5.4.2.2 Burned and Charred Remains Collected from Area M5

Ca. 3% of Hellenistic assemblage and ca. 7% of the pit assemblage showed some evidence of burning (Table 5.45). This analysis includes only identifiable fragments from the assemblages. Burned remains are absent in Iron Age II assemblage. Burned remains from the Hellenistic assemblage include both axial and appendicular elements of only domestic and game animals. The Hellenistic assemblage relates to a pit near a tabun suggesting the burned remains were likely the result of the preparation of animals for food consumption.

TABLE 5.45. COUNT OF BURNED BONES IN AREA M5 BY PHASE, BURN SCALE, AND SPECIES. SCALE: B-: SLIGHTLY BURNED, B: BURNED, AND B+: FULLY CALCIFIED.

Burning	Phase IIIb	Phase IIIb-c		Phase IIIc	Phase IIIc?	Combined Phase III			Phase IIIc: 5092		
Species	*B-*	*B-*	*B+*	*B*	*B*	*B*	*B-*	*B+*	*B*	*B-*	*B+*
Caprine	1	4		1	2	3	4		4	8	7
Cattle			1					1	1	1	
Sheep									1		2
Cattle									3	2	1
Gazelle										1	
Fallow Deer									1		
Total	1	4	1	1	2	3	4	1	10	12	10

5.4.2.3 Animal Activity and Root Etching in Area M5

Animal scavenging by carnivores is present only on remains from in the pit and the Iron Age II/Persian assemblages, representing 0.5% of the pit and 1.7% of the Iron Age II/Persian (Table 5.46). The lack of gnawing evidence indicates that the destructive effects of scavenging did not affect the Hellenistic subphase. Evidence of root etching was present in the Hellenistic subphase, representing 3.2% of Phase IIIb, 0.8% of Phase IIIb-c, 1% of Phase IIIc, and 7.1% of IIIc? (Table 5.46). Overall, when combined, root etching is present on only 1.6% of the Hellenistic assemblage, suggesting the assemblage was minimally affected by roots. Root etching was present on 3.3% (N: 2) of the Iron Age II/Persian assemblage, suggesting some taphonomic destruction by roots (Table 5.46).

TABLE 5.46: TOTAL COUNT OF GNAWING AND ROOT ETCHING IN AREA M5 BY SUBPHASE AND PERCENTAGE OF ASSEMBLAGE.

Phase	Carnivore Gnawing	Root Etching	Total	Assemblage%
Phase IIIb		1	1	3.23%
Phase IIIb-c		1	1	0.83%
Phase IIIc		1	1	1.03%
Phase IIIc?		4	4	7.14%
Phase IIIc: 5092	2		2	0.46%
Phase IV	1	2	3	5.08%

5.4.2.4 Pathologies in Area M5

Evidence of pathologies was present only on caprine and cattle in the Hellenistic subphase (Table 5.47). Phase IIIc has the most pathologies, representing 4.12% of the phase and less than one percent of the pit. Pathologies present in Hellenistic include healed fractures, boney-outgrowth, bone degradation related to arthritis, as well as possible evidence of cancer in the form of a tumor on a caprine sacrum (Table 5.47; Figure 5.18).

TABLE 5.47: TABLE COUNT AND PERCENTAGE OF PATHOLOGIES IN AREA M5 BY SUBPHASE.

Pathologies		Phase IIIb-c	Phase IIIc			Phase IIIc: L.5092
Species	Element	Healed Fracture	Outgrowth	Tumor	Degradation	Boney Outgrowth
Caprine	Carpal	1				1
	Rib					
	Sacrum			1		
	Caudal Vertebra		2			
Cattle	Phalanx III					2
	Femur				1	
Total		1	2	1	1	3
Assemblage %		0.83%	2.06%	1.03%	1.03%	0.69%

FIGURE 5.18. EVIDENCE OF A PATHOLOGICAL OUTGROWTH ON A SACRUM (N.9246) FROM AREA M5 PHASE IIIC, LOCUS 5088.

5.4.2.5 Butchery and Cut Marks in Area M5

Approximately 7-9% of the Hellenistic subphase showed evidence of human processing (Table54.48). Domestic livestock represents the majority of butchered animals in the Hellenistic and Iron Age II assemblages. Evidence of deer and chicken processing is only in the pit assemblage (Table 5.48). All aspects from dismembering, filleting, to skinning are present in Hellenistic, suggesting local preparation of livestock. The Iron Age II/Persian assemblage has evidence of dismemberment and filleting, but not skinning, suggesting only secondary butchery aspects occurred in this context. Worked bones in the form of spatulas and inlays were present in the Hellenistic, while a polished astragalus of a goat was present in the Iron Age II/Persian (Table 5.48).

TABLE 5.48. CUT MARKS (NISP) FOR DOMESTIC AND WILD MAMMALS BASED ON THE TYPOLOGY OF BINFORD (1984), BY AREA M5 SUBPHASE.

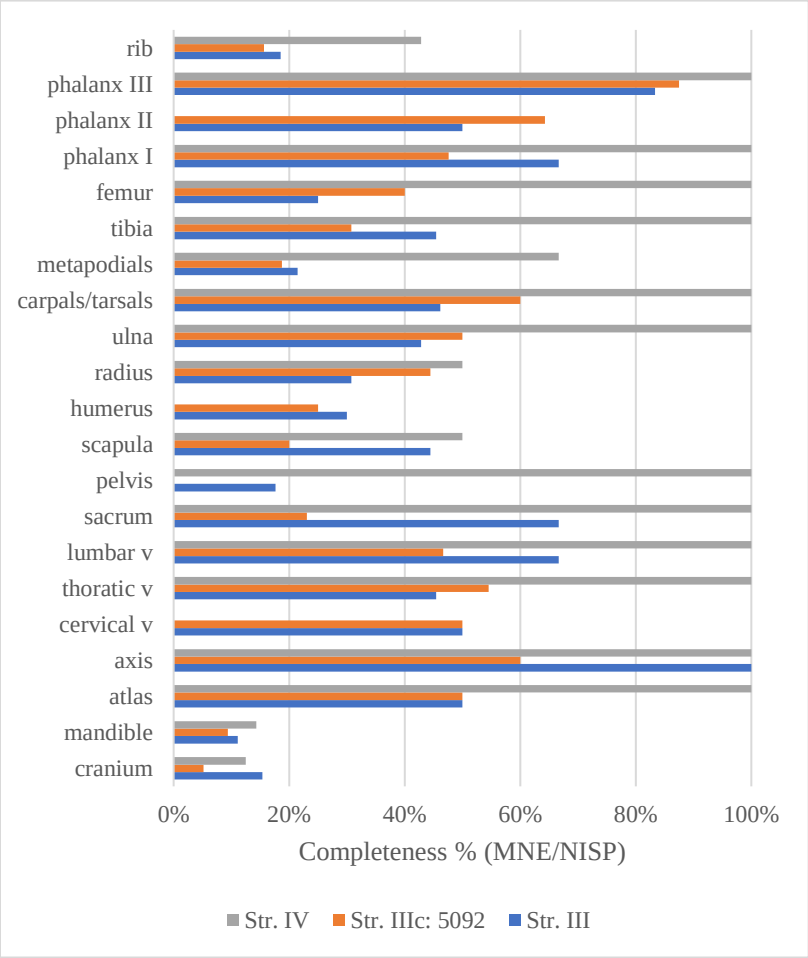
Area M5 Butchery	Phase IIIb-c			Phase IIIc			Phase IIIc?			Phase IIIc: L.5092			Phase IV			*Total*
	Dismembering	*Filleting*	*Skinning*	*Dismembering*	*Filleting*	*Worked*	*Dismembering*	*Skinning*	*Worked*	*Dismembering*	*Filleting*	*Skinning*	*Dismembering*	*Filleting*	*Polished*	
Cattle	1					1				2	3	1				8
Caprine	4	3	1	4	1		1		1	16	5	4	2	1		43
Goat			1				1	1		2		1			1	7
Sheep	1			1				1								3
Chicken										1						1
Fallow Deer												1				1
Total	6	3	2	5	1	1	2	2	1	21	8	7	2	1	1	63
Assemblage %	9.09%			7.22%			8.93%			8.29%			6.78%			

5.4.2.6 Fragmentation of Area M5

Comparing the fragmentation of caprine elements between the subphase (completeness percentage calculated as MNE/ NISP; Figure 5.19) suggests that most elements in the Hellenistic and pit assemblage are 20-50% complete. Further, there is no significant difference in their fragmentation between the assemblages (Pearson's: p=0.7244, r=0.0002). Fragmentation of

caprine elements in the Iron Age II/Persian suggests most elements are complete; however, the small size of the assemblage may negate this conclusion (Figure 5.19).

FIGURE 5.19. COMPLETENESS (MNE/NISP) OF CAPRINE ELEMENTS FROM AREA M5'S IRON AGE II/PERSIAN (PHASE IV), HELLENISTIC (PHASE III), PIT (L.5092) ASSEMBLAGES.



5.4.3 Animal Demographics of Area M5

The demographic analysis was limited to caprine (sheep and goats) due to the small sample size of cattle. The Hellenistic sub-phase, except for the pit (L.5092), were analyzed as an entire unit, in order to have a statistically viable sample size.

5.4.3.1 Aging of Caprine from Area M5

The mortality profiles of the assemblages suggest similar culling strategies were employed in this area (Figure 5.20A; Table 5.49). The mortality profile of the Hellenistic assemblage suggests the main aim of caprine exploitation was for milk, with 61% of the herd surviving to two and half years, with a secondary aim for meat (*following* Payne 1973). The pit assemblage had a similar focus of caprine exploitation on milk and meat, with 56% of the herd surviving to two and half years and then 22% surviving to three and half years of age (Figure 5.20A). The mortality profile of the pit also depicts a sharp kill-off of caprine at six months to one year of life (Figure 5.20A); this pattern most likely relates to the use of meat in this deposit. The subsistence strategies present in the Hellenistic assemblages are supported through taxonomically distinct epiphyseal fusion of sheep and goats, whereby goats were culled at 18-30 months with 20% surviving to this point (Figure 5.20B).

The Iron Age II mortality profile suggests some use of caprine for secondary products, but also some culled for meat, with 50% surviving to four years of age (Figure 5.20A). Aging profile based on tooth-wear of caprine mandibular dP4 and M3 for the pit concur with the results from epiphyseal fusion, with the presence of both younger and older caprine (Table 5.50). The number of caprine with a tooth structure of older than four years reinforces the role of secondary products in the Hellenistic assemblage as a whole, including the pit (Table 5.50).

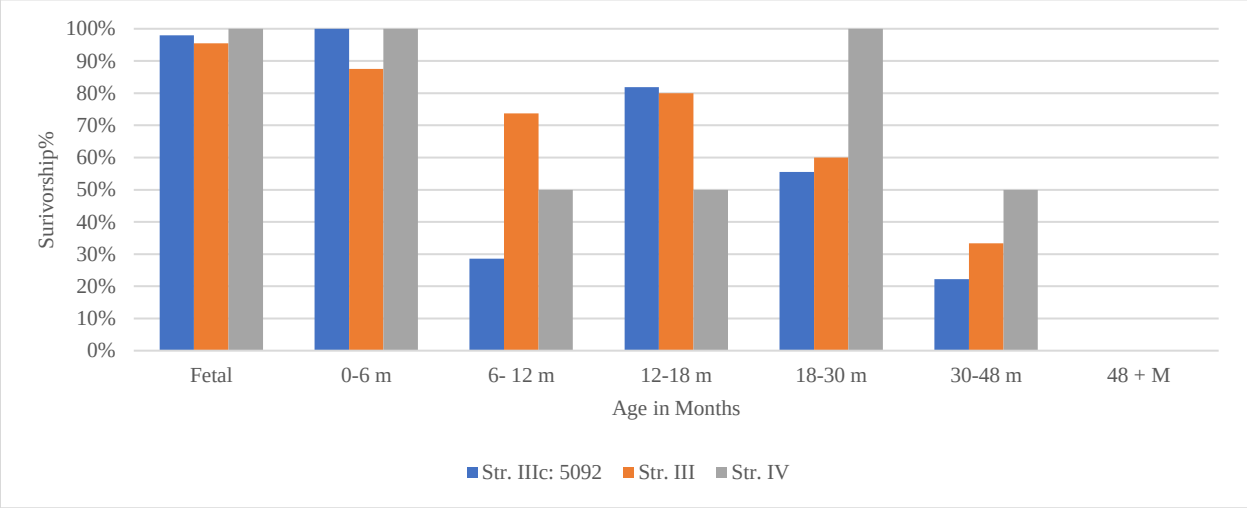
TABLE 5.49. UNFUSED AND FUSED ELEMENTS OF AREA M5 CAPRINE (NISP BASED). AGING BASED ON ZEDER (2006).

Caprine Fusion			Phase III Combined			Phase IIIc: L.5092			Phase IV		
Element	Portion	Fused Age Range (zeder)	Total	Unfused	%F	Total	Unfused	%F	Total	Unfused	%F
Radius	Proximal	0-6 months	8	1	88%	2	0	100%	2	0	100%
Humerus	Distal	6-12 months	5	2	60%	3	3	0%	0	0	0%
Pelvis		6-12 months	8	1	88%	3	2	33%	1	1	0%
Scapula		6-12 months	6	2	67%	1	0	100%	1	0	100%
Phalanx II		12-18 months	6	1	83%	14	2	86%	0	0	0%
Phalanx I		12-18 months	9	2	78%	19	4	79%	2	1	50%
Tibia	Distal	18-30 months	7	4	43%	6	2	67%	0	0	0%
Metapodial	Distal	18-30 months	8	2	75%	3	2	33%	2	0	100%
Calcaneus		30-48 Months	1	0	100%	2	1	50%	0	0	0%
Femur	Proximal	30-48 Months	3	1	67%	1	1	0%	0	0	0%
Femur	Distal	30-48 Months	2	2	0%	1	1	0%	0	0	0%
Ulna	Proximal	30-48 Months	0	0	0%	1	1	0%	1	0	100%
Radius	Distal	30-48 Months	3	3	0%	2	2	0%	0	0	0%
Tibia	Proximal	30-48 Months	0	0	0%	2	1	50%	1	1	0%
Humerus	Proximal	48+ months	0	0	0%	4	1	75%	0	0	0%

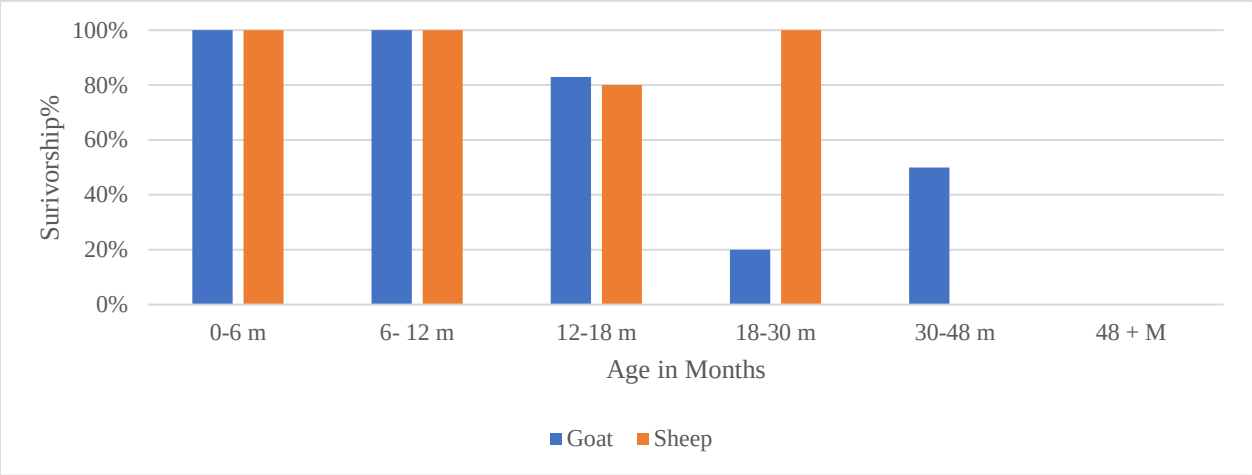
TABLE 5.50. AGING OF CAPRINE IN AREA M5 BASED ON TOOTH WEAR COUNT OF THE MANDIBULAR DP4 AND M3, FOLLOWING PAYNE 1973.

Tooth wear	Phase III combined	Phase IIIc: L.5092	Phase IV
A	1	1	
B		2	
C		1	
D	1	1	1
F		1	
G/H		2	
I	1	1	

FIGURE 5.20.
A. CAPRINE SURVIVORSHIP FROM AREA M5



B. SURVIVORSHIP OF SHEEP AND GOATS FROM AREA M5 PHASE III.



5.4.3.2 Body Part Frequencies of Caprine in Area M5

In every assemblage, all body parts of caprine were present, with the prevalence of cranial remains, as well as upper and lower limb elements (i.e., humerus, radius, tibia, and femur) based on MAU values (Table 5.51). Body parts that were frequent only in specific contexts are the Hellenistic's preference for scapulae, suggesting truncal parts were also favored in this assemblage (Table 5.51). The pit assemblage has a higher frequency of extremities (i.e., phalanges and tarsal), which relates to the potential complete hooves in the pit (Table 5.51). The ratio of left to right limb elements, as well as the left to right ratio goat extremities in the pit, is approximately 1:1.2.

Examining factors that could influence bone survivorship, the latter was not significantly correlated to bone structural density, implying it was not a significant modifying factor in the pit assemblage (bone density values compared to MNE values; p=0.301, r= 0.184). Also, no significant relationship was found between caprine bone survivorship (MAU%) and food utility index (FUI; Metcalfe and Jones (1988)) in the pit assemblage (p=-0.1616, Pearson's r= 0.521). Therefore, meat value did not have an impact on the choice of body parts represented in the pit deposit.

TABLE 5.51. SKELETAL ELEMENTS FREQUENCIES OF CAPRINE BY PHASE.

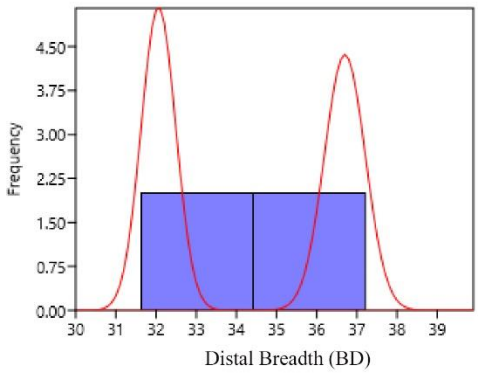
Caprine Body Part Frequencies	Phase III Combined				Phase IIIc: L.5092				Phase IV			
Element	NISP	MNE	MAUi	MAU%	NISP	MNE	MAUi	MAU%	NISP	MNE	MAUi	MAU%
Cranium	13	2	2	40%	58	3	3.00	75%	8	1	1	100%
Mandible	18	2	2	40%	32	3	3.00	75%	7	1	1	100%
Atlas	2	1	1	20%	2	1	1.00	25%	1	1	1	100%
Axis	3	3	3	60%	5	3	3.00	75%	1	1	1	100%
Cervical V	2	1	0.2	4%	8	4	0.80	20%	0	0	0	0%
Thoracic V	22	10	0.76	15%	11	6	0.46	12%	3	3	0.23	23%
Lumbar V	9	6	0.85	17%	15	7	1.00	25%	1	1	0.14	14%
Sacrum	3	2	2	40%	5	2	2.00	50%	1	1	1	100%
Pelvis	17	3	0.5	10%	13	3	0.50	13%	1	1	0.16	17%
Sternum	0	0	0	0%	0	0	0.00	0%	0	0	0	0%
Scapula	9	4	4	80%	10	2	2.00	50%	2	1	1	100%
Humerus	10	3	3	60%	12	3	3.00	75%	0	0	0	0%
Radius	13	4	4	80%	9	4	4.00	100%	2	1	1	100%
Ulna	7	3	3	60%	6	3	3.00	75%	1	1	1	100%
Carpals/Tarsals	13	6	0.54	11%	20	12	1.09	27%	2	2	0.18	18%
Metapodials	14	3	1.5	30%	16	3	1.50	38%	3	2	1	100%
Tibia	11	5	5	100%	13	4	4.00	100%	1	1	1	100%
Femur	8	2	2	40%	5	2	2.00	50%	1	1	1	100%
Patella	0	0	0	0%	0	0	0.00	0%	1	1	1	100%
Phalanx I	9	6	1.5	30%	21	10	2.50	63%	1	1	0.25	25%
Phalanx II	6	3	0.75	15%	14	9	2.25	56%	0	0	0	0%
Phalanx III	6	5	1.25	25%	8	7	1.75	44%	1	1	0.25	25%
Ribs	54	10	0.76	15%	83	13	1.00	25%	7	3	0.23	23%

5.4.3.3 Sexing of Caprine and Chicken from Area M5

The sexing of caprine, based on the distal breadth of humeri, was limited due to few measurable sample between taxonomically distinct sheep and goats for mixture analysis. A hypothetical model was constructed based on two humeri measurements of goats and two humeri measurements of caprine (either sheep or goat) (Figure 5.21).

Identifying the sex of chicken is limited, typically due to the small sample size of assemblages and rarity of indicative features (i.e., a spur for cocks and medullary bone for hens). The fragmented nature of the chicken remains (N: 3) in the pit assemblage (L.5092) allowed for the medullary bones in all fragments to be observed, see Figure 5.22 for comparison. Therefore, the few remains of chicken in the pit assemblage derived from egg-laying hens. Mixture analysis of chicken was unavailable in Area M5 because there were few measurable samples.

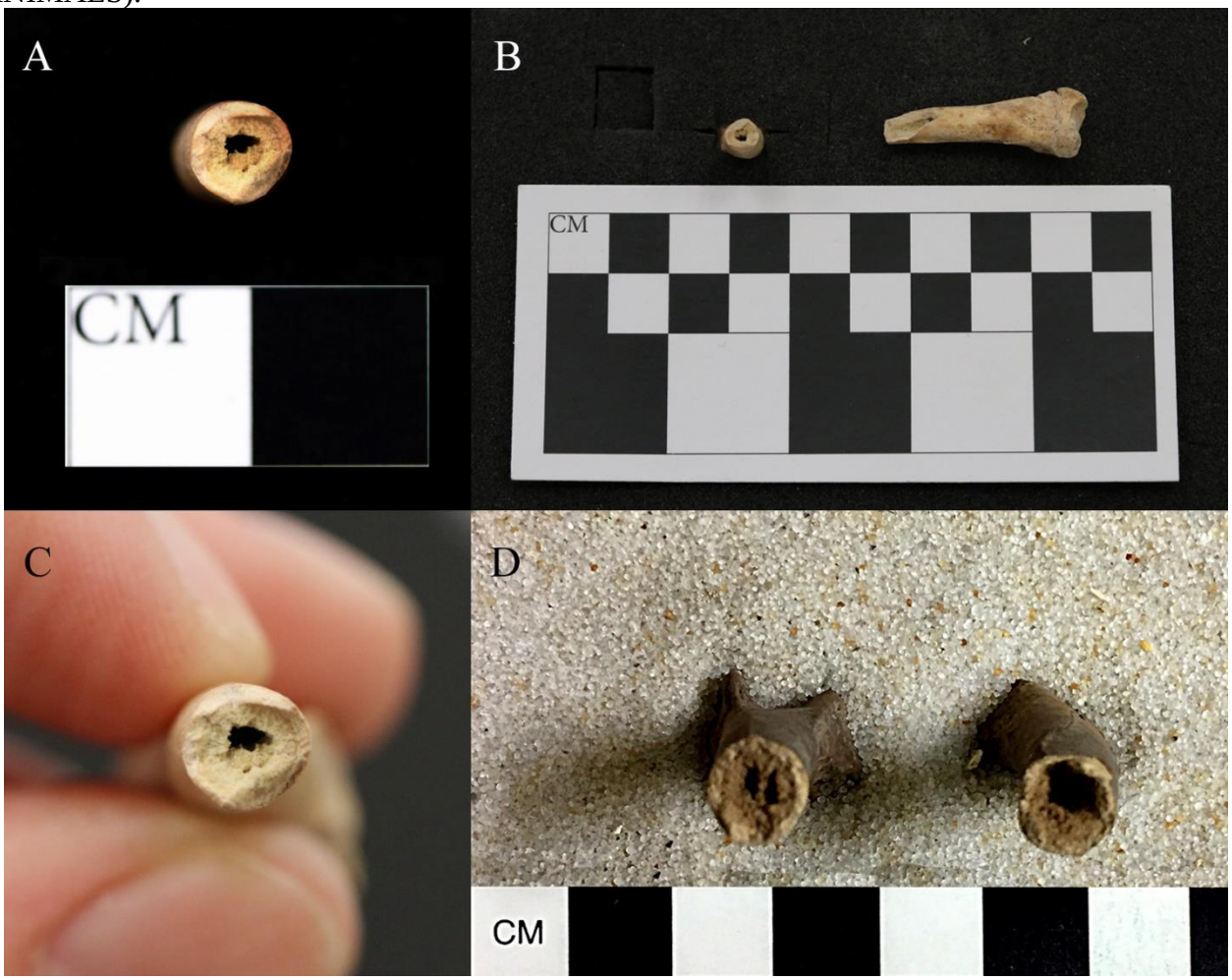
FIGURE 5.21. MIXTURE ANALYSIS OF CAPRINES FROM HELLENISTIC AREA M5



Area M5 Caprines	P1	P2
Proportions	0.5	0.5
Mean	36.7	32.06
Standard Deviation	0.51	0.43

N: 4

FIGURE 5.22.
A. FEMORAL SHAFT WITH PRESENCE OF MEDULLARY BONE (#8650; L.5092);
B. FEMUR WITH PRESENCE OF MEDULLARY BONE (#8650, #8651; L. 5092);
C. CLOSE UP OF #8650 WITH FOCUS OF MEDULLARY ASPECT;
D. MEDULLARY BONE EXAMPLE FROM ILLINOIS STATE MUSEUM COLLECTION (HTTP://ZOOARCH.ILLINOISSTATEMUSEUM.ORG/CONTENT/CHARACTERISTICS-ANIMALS).



5.4.4 Summary of Givati Area M5

The Iron Age II/Persian and Hellenistic periods in Area M5 are dominated by domestic livestock, as is typical of southern Levantine faunal assemblages in these periods (Horwitz and Dahan 1996). Preference for domestic livestock is also characteristic of Jerusalem in these periods (Horwitz and Tchernov 1989; Lernau 1995; Horwitz 1996; Horwitz and Tchernov 1996;

Bar-Oz and Raban-Gerstel 2013; Tamar and Bar-Oz 2015; Sapir-Hen et al. 2016). The context of faunal remains from Area M5 allows for an exploration into the domestic nature of Jerusalem in the Iron Age II and Hellenistic period.

5.4.4.1. The Iron Age II/Persian Living Surface of Area M5

Remains from the Iron Age II/Persian living surface comprise primarily of sheep, goat, and cattle but also include various game, birds, and fish. The species richness in Iron Age II Area M5 is similar to Area D3 (see above in Section 4.1) and Area D1 (Horwitz 1996; Horwitz and Tchernov 1996) on the cliffs of the Southeastern Ridge. From the few remains, it appears that caprine present were under three years of age, and the entire body was present. The preservation of the bones on the living surface suggests they were not exposed for an extended period and did not have any evidence of burning or charring. Faunal remains on the living surface were likely the remains of food and consumption debris. Fish remains from the Iron Age II/Persian living surface included grouper and mullets, both coastal marine fish that was imported from the Mediterranean coast.

5.4.4.2. The Hellenistic Domestic Context of Area M5

The Hellenistic domestic context from Area M5 is vital because contemporaneous assemblages from Jerusalem primarily derive from fills and accumulations, such as the glacis that covered Area M5 (see Section 5.2). Thus, this assemblage allows for the domestic nature of Hellenistic Jerusalem to be explored.

The animal remains from the floor accumulations of Phase III follow the same paradigm as prior assemblages in which sheep and goat, in relatively equal proportions, make up the majority of the assemblage, followed by cattle and, to a lesser extent, game, birds, and fish. Caprine in the Hellenistic assemblage were primarily utilized for their secondary products, but

some were killed off younger for their meat. This dual usage of caprine for meat and secondary products is typical of urban Jerusalem.[51] All aspects of the carcass are present, but limb elements, with slightly more fore than hind limbs, are more prevalent. This pattern suggests the floor accumulations included localized butchery with a focus on consuming meat and marrow from the legs of sheep and goats.

Comparing the diversity of species between the pit and the floors, the species present in the pit of Phase IIIc reflects a narrow pattern, indicating less diversity (Figure 5.23). The remains in the pit are from consumable animals, such as primarily caprine and cattle, some game animals and a little chicken. Of identifiable caprine, goat comprises ten percent of the total assemblage. The ratio of sheep to goats suggests goats outnumber sheep ten to one. Goat in the ancient Near East is regarded as less favorable than sheep, as sheep were the preferred sacrificial meat (Kozuh 2010).

Aspects of the pit that would indicate if the remains are sacrificial, such as higher frequencies of right-sided limbs or more sheep than goats, are not present. The only indicator of sacrificial use in the pit is in the age of caprine, where there is an apparent culling of caprine at six months to one year of age and then again later around four years (Figure 5.20). This sharp kill-off pattern is typical of subsistence pattern that is geared toward meat (Payne 1973) but is also the same age of caprine in sacrificial pits in the southern Levant.[52]

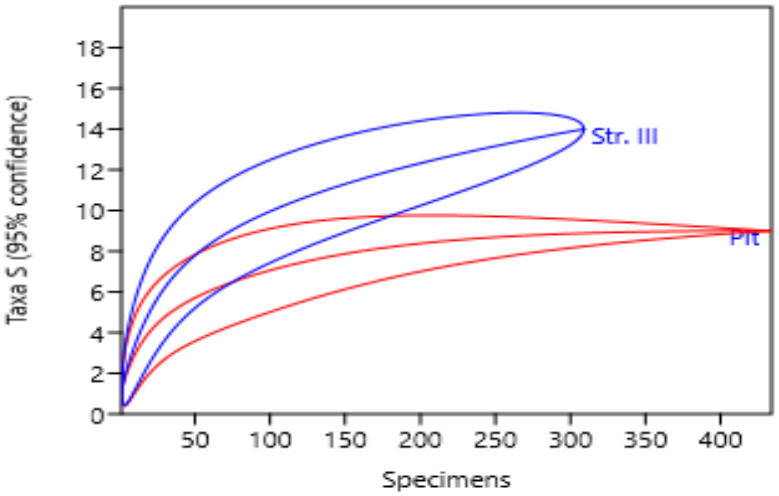
Anatomical parts of caprine present in the pit assemblage suggest portions with less meat were favored, particularly cranial, lower limb, and extremities (Table 5.51). The use of these

[51] See the epiphyseal fusion of caprine in Bar-Oz and Raban-Gerstel 2013; Tamar and Bar-Oz 2015; Sapir-Hen et al. 2016.
[52] see Hazor− Lev-Tov and McGeough 2007, Kehati 2017; Mount Ebal− Horwitz 1987; Dan− Greer 2013; Jerusalem− Lernau 1995.

parts is generally associated with lower socioeconomic usage of animals, based on the concept that these portions do not have high meat yields and the lower limbs would be exploited for marrow. Taphonomic evidence of burning, butchery, weathering, and marks from scavengers in the pit assemblage further supports the notion that the remains in the pit are remains of consumption refuse that were quickly covered after disposal. Overall, the faunal remains in the Hellenistic pit and relating floors represent an economically lower usage of animals in this context.

The presence of egg-laying hens is a unique aspect of the pit assemblage that should be mentioned. Chicken and other birds are relatively uncommon in Area M5's assemblages. In the Hellenistic period, the frequency of chicken at the majority of other Levantine sites is greater than five percent (Perry-Gal et al. 2015: Dataset S1), which is different from the floor and pits average of less than five percent (Table 5.43). Contemporaneous assemblages from Jerusalem also have a higher frequency of chicken, with 18% in Area M1 (Bar-Oz and Raban-Gerstel 2013), and 14% of Area D2 (Horwitz 1996). It is assumed that chicken was used mainly as entertainment in cockfights (Perry-Gal et al. 2015); however, the presence of egg-laying hens in the pit assemblage is an indicator that chicken eggs were likely consumed. Further, the removal of an egg-laying hen from the subsistence cycle, meaning the cessation of a secondary protein source, supports the need for meat in the Hellenistic domestic context.

FIGURE 5.23. DIVERSITY RAREFACTION IN AREA M5 BETWEEN PHASE III AND THE PIT (L.5092).



5.5 Beit HaKerem

A total of 327 (NISP) derived from the Iron Age II context. Domestic livestock is the most dominant species, and they represent 98.4% of the assemblage (Table 5.52). Wild species were rare and represented less than one percent of the assemblage.

5.5.1 Species Represented at Beit HaKerem

The most dominant livestock animal at Beit HaKerem is caprine (sheep and goat), with 89% of the assemblage. The ratio between the distinguishable sheep (N: 15) and goat (N: 18) bones is relatively equal, with 1:1.2. The second most common species in this assemblage is cattle, with 10% of the assemblage. This assemblage also included singular fragments of pig, mountain gazelle, and red deer (N=1). Avian species could not be identified down to species, but three medium-sized bird fragments were recorded.

TABLE 5.52. NUMBER OF IDENTIFIED SPECIMENS (NISP), MINIMUM NUMBER OF INDIVIDUALS (MNI), AND PERCENTAGE OF SPECIES FROM BEIT HAKEREM

Beit HaKerem	Species	Common Name	NISP	MNI	NISP%
Domesticated Ungulates	*Capra hircus*	Goat	18	4	5.50%
	Ovis aries	Sheep	15	3	4.59%
	Caprine size	Sheep or Goat	255	5	77.98%
	Bos taurus	Cow	28	2	8.56%
	Bos Size	Large Mammal	5	1	1.53%
	Sus scrofa domesticus	Pig	1	1	0.31%
Wild Mammals	*Gazella gazella*	Mountain gazelle	1	1	0.31%
	Cervus elaphus	Red Deer	1	1	0.31%
Aves	*Medium aves*	Medium Bird	3	1	0.92%
TOTAL			327	19	100%

5.5.2 Taphonomic Analysis of Beit HaKerem

5.5.2.1 Weathering of Beit HaKerem

Weathering pattern of the bones from Beit HaKerem fall primarily between stages 0-2 of Brehensmeyer's guide (1978: 157) (Table 5.53). Suggesting the bones were covered quickly after disposal (three years or less).

TABLE 5.53 TOTAL OF FRAGMENTS RECORDED IN EACH WEATHERING STAGE (STAGES ACCORDING TO BEHRENMEYER 1978) FROM IRON AGE II BEIT HAKEREM.

Weathering	0	1	2	3	4	5	6
Iron Age II	163	97	47	14	3	3	0
TOTAL	261	131	74	27	10	7	0

5.5.2.2 Burned Remains Collected from Beit HaKerem

Ca. 9.4% of the assemblage from Beit HaKerem showed evidence of burning or charring. This analysis includes all fragments from the assemblage, including those that could not be identified to the skeletal element. Of the identified fragments, only caprines were burned in the Iron Age II assemblage (Table 5.54).

TABLE 5.54. COUNT OF BURNED BONES BY BURN SCALE, AND SPECIES FROM BEIT HAKEREM: SCALE: B-: SLIGHTLY BURNED, B: BURNED, AND B+: FULLY CALCIFIED

Beit HaKerem	Iron Age II		
Species	**B**	**B-**	**B+**
Caprine	14	2	6
Goat (*Capra hircus*)	1		
Total	15	2	6

5.5.2.3 Animal Activity and Root Etching in Beit HaKerem

Animal scavenging by carnivores and rodents is present on 7.03% of the assemblage from Beit HaKerem (N: 21). Gnawing marks were only present on caprines (N: 20) and identifiable sheep (N: 3). Evidence of destructive root etching was present on less than 1% of the assemblage (0.84%; N: 2).

5.5.2.5 Butchery and Cut Marks in Beit HaKerem

A small number of bones showed evidence of butchering at Beit HaKerem. A total of 4.2% of the assemblage was butchered, with the majority represented on caprines (Table 5.55). The main butchering activity recorded on the bones was filleting, representing 64.3% of the cut marks, with the rest of the assemblage represented by dismemberment marking. Suggesting the local preparation of meat occurred at the site.

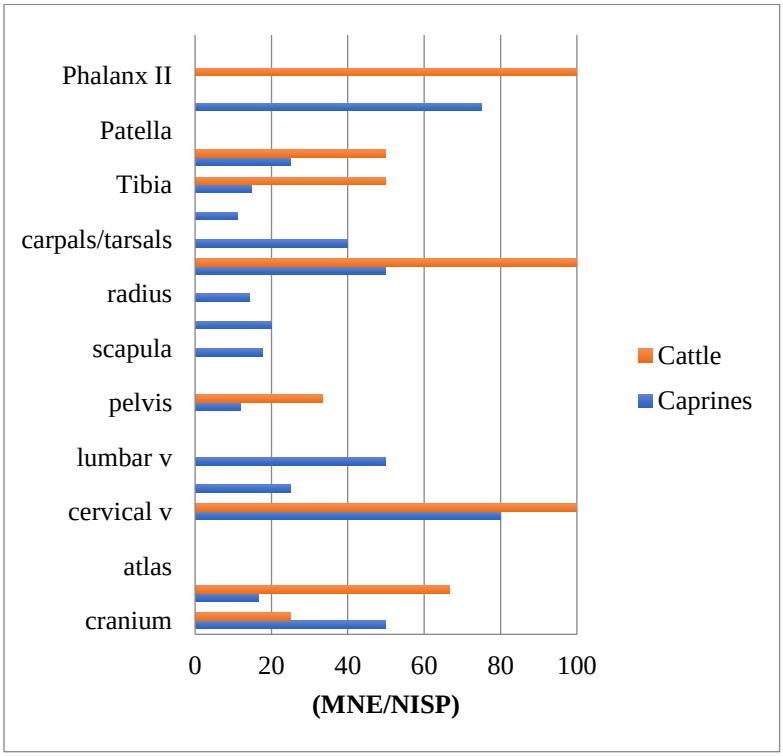
TABLE 5.55. CUT MARKS (NISP) FOR DOMESTIC AND WILD MAMMALS BASED ON THE TYPOLOGY OF BINFORD (1984) FOR BEIT HAKEREM.

Beit HaKerem	Dismembering	Filleting	Filleting (tenderloin)
Caprine	3	5	2
Cattle		1	
Goat	2		
Red Deer		1	
Total	5	7	2

5.5.2.6. Fragmentation of Beit HaKerem

Comparing the completeness percentage (MNE/NISP) between caprines and cattle at Beit HaKerem suggests that caprine are heavily fractured, with the majority being under 20% complete (Figure 5.24). Cattle was mostly complete, with the majority being over 50% complete.

FIGURE 5.24. COMPLETENESS (MNE/NISP) OF CAPRINE AND CATTLE ELEMENTS FROM BEIT HAKEREM'S IRON AGE II ASSEMBLAGE



5.5.3 Animal Demographics of Beit HaKerem

5.5.3.1. Aging of Caprine and Cattle from Beit HaKerem

Based on the sample size from Beit HaKerem, the caprine and cattle were aged following the epiphyseal fusion of elements. The Iron Age II caprine survivorship percentage (%fused bones) suggests that most caprine survived to an older age (Table 5.56A), which relates to the exploitation of caprine for secondary products (*following* Payne 1973). Exploring the aging of taxonomically distinct sheep and goats, suggest sheep were preserved for wool exploitation compared to goats that were partially culled around one year and at three years of age (Table

5.56B). The sample size of cattle bones is minimal, but the assemblage suggests a representation of mostly adults (Table 5.56A).

TABLE 5.56.
A. UNFUSED AND FUSED ELEMENTS OF CAPRINES (BASED ON ZEDER 2006) AND CATTLE (BASED ON SILVER 1969)

Caprine						**Cattle**					
Element	Portion	Age (months)	Total	Unfused	%Unfused	Element	Portion	Age (months)	Total	Unfused	%Unfused
Radius	Proximal	0-6	5	1	20%	Pelvis		7-10	1	0	0
Humerus	Distal	6-12	2	0	0	Scapula		7-10	0	0	0
Pelvis		6-12	1	0	0	Radius	Proximal	12-18	1	0	0
Scapula		6-12	1	0	0	Humerus	Distal	12-18	0	0	0
2nd Phalanx		12-18	0	0	0	2nd Phalanx		18	1	1	100%
1st Phalanx		12-18	2	1	50%	1st Phalanx		18	0	0	0
Tibia	Distal	18-30	4	1	25%	Tibia	Distal	24-30	0	0	0
Metacarpal	Distal	18-30	3	1	33.3%	Metacarpal	Distal	27-30	0	0	0
Metatarsal	Distal	18-30	4	1	25%	Metatarsal	Distal	27-30	0	0	0
Calcaneus		30-48	0	0	0	Femur	Proximal	42	0	0	0
Femur	Proximal	30-48	1	1	100%	Calcaneus		42-48	0	0	0
Femur	Distal	30-48	0	0	0	Femur	Distal	42-48	0	0	0
Ulna	Proximal	30-48	0	0	0	Ulna	Proximal	42-48	0	0	0
Radius	Distal	30-48	1	0	0	Radius	Distal	42-48	0	0	0
Tibia	Proximal	30-48	0	0	0	Tibia	Proximal	42-48	1	0	0
Humerus	Proximal	48++	0	0	0	Humerus	Proximal	42-48	0	0	0

B. UNFUSED AND FUSED ELEMENTS OF SHEEP AND GOATS FROM BEIT HAKEREM

Aging of BHK Sheep and Goats			Goat			Sheep		
Element	Portion	Age (months)	Total	Unfused	%Unfused	Total	Unfused	%Unfused
Radius	Proximal	0-6	3	0	0%	4	0	0%
Humerus	Distal	06-12	2	0	0%			
1st Phalanx		12-18	4	1	25%			
Tibia	Distal	18-30	4	0	0%	5	0	0%
Metapodial	Distal	18-30	3	0	0%	2	0	0%
Calcaneus		30-48	1	1	100%	1	0	0%
Radius	Distal	30-48	1	0	0	1	0	0%

5.5.3.2. Body Part Frequencies of Caprine and Cattle from Beit HaKerem

Body part frequencies of cattle from Beit HaKerem suggests the most prevalent elements in the Iron Age II are the hindlimb femur and tibia as well as the forelimb's radius (Table 5.57). The frequency of caprine body parts suggests the most common element is the lower hindlimb tibia and the lower forelimb radius (based on MAU values, Table 5.57). The second most common caprine elements are the upper forelimb's humerus, scapula, and upper hindlimb femur, suggesting a focus on hind and forelimb consumption (Table 5.57). Feet and trunk parts are scarcely represented in the Iron Age II of Beit HaKerem.

Significant relationships between bone structural density and the minimum number of elements (MNE) of caprine was identified in the Iron Age II (Pearson's r= 0.44, p= 0.04; Byzantine Pearson's r= 0.49, p= 0.02), suggesting some level of influence (less than 50%) of the bone structural density on the survivorship of bones. However, there was no meaningful relationship between caprine bone survivorship (%MAU) and food utility index (FUI; Metcalfe and Jones (1988)) in the Iron Age II (Pearson's r= 0.43, p=0.13). These results suggest a bias based on the structural density of the caprine bones, but not in their nutritional value.

TABLE 5.57 SKELETAL ELEMENTS FREQUENCIES OF CAPRINE AND CATTLE FROM IRON AGE II BEIT HAKEREM.

Beit HaKerem	**Caprine**				**Cattle**			
Element	NISP	MNE	MAU	MAU%	NISP	MNE	MAU	MAU%
Cranium	2	1	0.03	1.21%	4	1	0.03	6.06%
Mandible	12	2	0.16	6.66%	3	1	0.16	33.33%
Atlas								
Axis								
Cervical v	5	4	0.8	32%	1	1	0.2	40%
Thoracic v	4	1	0.07	3.07%				
Lumbar v	2	1	0.14	5.71%				
Sacrum								
Pelvis	17	2	0.33	13.33%	3	1	0.16	33.33%
Sternum								
Scapula	17	3	1.5	60%				
Humerus	15	3	1.5	60%				
Radius	35	5	2.5	100%				
Ulna	2	1	0.5	20%	1	1	0.5	100%
Carpals/Tarsals	5	2	0.09	3.63%				
Metapodials	18	2	0.5	20%				
Tibia	34	5	2.5	100%	2	1	0.5	100%
Femur	12	3	1.5	60%	2	1	0.5	100%
Patella								
1st Phalanx	4	3	0.37	15%				
2nd Phalanx					1	1	0.125	25%
3rd Phalanx								

5.5.4 Summary of Beit HaKerem

Domestic livestock dominates the Iron Age II farmstead at Beit HaKerem. Caprine and cattle exploitation suggests a kill-off pattern geared towards secondary products of caprine and draught work for cattle (Payne 1973; Sasson 2005). Caprine were most likely locally raised and

consumed based on the presence of primary and secondary butchery alongside meat-rich parts, and their use for secondary products– that also reinforces their consumption of older animals.

The frequency of cattle in both periods is low (less than 10% of livestock), per the immediate local environment of the site, which is less suitable for agriculture (Rubin 2000; Gadot 2015). The lower frequency of cattle at Beit HaKerem compared to Iron Age IIB Tel Moza (~30%; Sapir-Hen et al. 2016), another rural site but which is engaged in highly intensive agriculture, suggests that Beit HaKerem's population focused on caprine herding rather than agriculture.

5.6 Nebi Samuel

A total of 665 (NISP) bones were identified to species. Of the identified fragments, 143 (NISP) were derived from Phase IX–Persian context, 107 (NISP) from Phase VIII–Hellenistic context, and 415 (NISP) from the Phase VII–Late Hellenistic (Hasmonean) context. The number of faunal remains from the Persian and Hellenistic contexts at Nebi Samuel limited analysis for these assemblages.

5.6.1 Species Represented at Nebi Samuel

Domestic livestock (i.e., sheep, goat, cattle, donkey, and pig) are the most dominant species in all assemblages, and they represent 83% of the Persian assemblage, 90% of the Hellenistic assemblage, and 80% of the Late Hellenistic assemblages (Table 5.58). Wild species represent approximately 3.5% percent of the Persian, 5.6% of the Hellenistic, and 7% of the Late Hellenistic assemblages (Table 5.58).

Caprine are the most common livestock animal in the Persian assemblage, representing 64% of the assemblage. The ratio between the distinguishable sheep (N: 3) and goat (N: 4) bones

is 3:4. The second most common animals in this assemblage are cattle with 18% of the assemblage, followed by domestic chicken representing approximately 8% of the Persian assemblage. The Persian assemblage also contains a wide variety of wild species, avian species, rodents, and fish (Table 5.58).

In the Hellenistic assemblage, caprine represent 42% of the assemblage with a 1:3 ratio between sheep (N: 1) and goat (N: 3) bones (Table 5.58). Caprine are not the most common domestic livestock in the Hellenistic assemblage. The most common livestock species in this assemblage are cattle, with approximately 48% of the assemblage. The Hellenistic assemblage also included gazelle (N: 4), red deer (N: 1), and chicken (4.7%, N: 5).

In the Late Hellenistic assemblage, caprines represent 57.6% of the assemblage with a relatively equal 11:10 ratio between sheep (N: 11) and goat (N: 10) bones. Cattle follow caprine with 20%. The assemblage also included domestic dog (N: 1), donkey (N: 8), game animals, birds, rodents, and fish. The wild species comprises approximately 7% of the assemblage and is represented by a wide array of species, including gazelle (N: 12), red deer (N: 6), fallow deer (N: 8), hare (N: 1), and red fox (N: 3). Avian species present are primarily chicken, representing 7% of the assemblage but also include chukar partridge (N: 2).

Microfauna such as rodents, reptiles, Anura, and fish were also present but in low frequencies. Rodents present in the Late Hellenistic include mouse (*Mus musculus*, N: 5), rat (*Rattus rattus*, N: 1), and mole-rat (*Spalax Ehrenberg*, N: 1). Fish species identified in the assemblage include gilt-head seabream (N: 1) and common barbel (*Cyprinidae barbus barbus*, N: 1), both originating from the Mediterranean Sea. Tortoise (*Testudo graeca*, N: 1) and frogs (N: 3) were also present in the Late Hellenistic assemblage.

TABLE 5.58 NUMBER OF IDENTIFIED SPECIMENS (NISP), MINIMUM NUMBER OF INDIVIDUALS (MNI), AND PERCENTAGE OF SPECIES FROM NEBI SAMUEL.

Nebi Samuel	**Species**	**Common Name**	**Phase IX Persian**			**Phase VIII Hellenistic**			**Phase VII Late Hellenistic**		
			NISP	MNI	NISP%	NISP	MNI	NISP%	NISP	MNI	NISP%
Domesticated Ungulates	*Capra hircus*	Goat	4	1	2.8%	3	1	2.8%	10	1	2.4%
	Ovis aries	Sheep	3	1	2.1%	1	1	0.9%	11	3	2.7%
	Caprine size	Sheep or Goat	85	2	59.4%	41	2	38.3%	218	5	52.5%
	Bos taurus	Cow	15	1	10.5%	29	1	27.1%	54	2	13.0%
	A Size	Large Mammal	11	1	7.7%	22	2	20.6%	29	1	7.0%
	Canis familiaris	Domestic Dog							1	1	0.2%
	Equus asinus	Donkey	1	1	0.7%				8	1	1.9%
Wild Mammals	*Canis/Gazella size*	Small mammal				1	1	0.9%	2	1	0.5%
	Gazella gazella	Gazelle	3	1	2.1%	4	1	3.7%	9	1	2.2%
	Cervus elaphus	Red Deer				1	1	0.9%	6	1	1.4%
	Dama mesopotamica	Fallow Deer	2	1	1.4%				8	1	1.9%
	Lepus capensis	Cape Hare							1	1	0.2%
	Vulpes vulpes	Red Fox							3	2	0.7%
Aves	*Alectoris chukar*	Partridge							2	1	0.5%
	Anas platyrhynchos	Mallard Duck	1	1	0.7%						0.0%
	Gallus gallus	Chicken	10	1	7.0%	5	1	4.7%	20	3	4.8%
	Small Aves	Small Bird	2	1	1.4%				1	1	0.2%
	Medium Aves	Medium Bird	3	1	2.1%				9	2	2.2%
Rodentia	*G-Size*	Rodents	1	1	0.7%				2	1	0.5%
	Mus musculus	Mouse	1	1	0.7%				5	1	1.2%
	Rattus rattus	Rat							3	1	0.7%
	Spalax ehrenbergi	Mole-Rat							1	1	0.2%
Reptilia	*Testudo greaca*	Tortoise							1	1	0.2%
Anura	*Anura*	Frog or Toad							3	1	0.7%
Pisces	*Pisces Size*	Fish	1	1	0.7%				6	1	1.4%
	Sparidae Sparusu aurata	Gilt-head seabream							1	1	0.2%
	Cyprinidae Barbus barbus	Common Barbel							1	1	0.2%
Total			143	16	100%	107	11	100%	415	37	100%

5.6.2 Taphonomic Analysis of Nebi Samuel

The taphonomic analysis of Nebi Samuel was limited in the Persian and Hellenistic assemblages due to their small sample size. The full taphonomic analysis was conducted on the Late Hellenistic assemblage.

5.6.2.1 Weathering of Nebi Samuel

Weathering stage of the bones from the Persian and Late Hellenistic fall primarily between stages 0-2 of Brehensmeyer's guide (1978: 157) (75-85%; Table 5.59), suggesting they were covered quickly after disposal (three years or less). Whereas the Hellenistic assemblage had 58% of bones falling between stages 3-5, suggesting this assemblage was exposed to the elements more prolonged than the other assemblages (Table 5.59)

TABLE 5.59 TOTAL OF FRAGMENTS RECORDED IN EACH WEATHERING STAGE (STAGES ACCORDING TO BEHRENMEYER 1978) FROM PERSIAN, HELLENISTIC, AND LATE HELLENISTIC NEBI SAMUEL.

Weathering Scale	0	1	2	3	4	5
XI Persian	65	24	19	21	9	6
VIII Hellenistic	12	12	22	32	21	11
VIII Late Hellenistic	159	123	72	37	13	7

5.6.2.2. Burned Remains Collected from Nebi Samuel

Ca. 1.4% of the Persian assemblage, ca. 0.9% of the Hellenistic assemblage, 3.1% of the Hasmonean assemblage showed some evidence of burning (Table 5.60). This analysis only identifiable fragments from the assemblage. Burned remains in the Persian (N: 2) and Hellenistic (N: 1) assemblages were scarce and included only caprine (Table 5.60). In the Late Hellenistic assemblage, burn marks were present on a variety of species, including sheep, goat, cattle, donkey, chicken, and red deer. From the burn marks, it is unclear if the charring is a result of consumption processes, garbage disposal, or destruction process.

TABLE 5.60. COUNT AND FREQUENCY OF BURNED BONES BY BURN SCALE, SPECIES, AND PHASE FROM NEBI SAMUEL: SCALE: B-: SLIGHTLY BURNED, B: BURNED, AND B+: FULLY CALCIFIED

Burn Marks	Phase IX Persian	Phase VIII Hellenistic	Phase VII Late Hellenistic		
Species	*B+*	*B-*	*B*	*B-*	*B+*
Caprine	2	1	1	3	
Goat				1	
Sheep				1	
Cattle			1	1	1
Donkey			1		
Red Deer				1	1
Chicken			1		
Total	2	1	4	7	2
NISP%	1.4%	0.9%	3.1%		

5.6.2.3 Animal Activity and Root Etching at Nebi Samuel

Destructive processes in the form of gnawing by rodent and carnivores were present on approximately 11% of the Persian assemblage, 10% of the Hellenistic, and 4% of the Late

Hellenistic (Table 5.61). Evidence of destructive root etching was also present in each assemblage and affecting approximately 4% of the Persian assemblage, 6% of the Hellenistic, and 7% of the Late Hellenistic (Table 5.61). The destructive process from gnawing impacted the assemblages from Nebi Samuel, suggesting some portion of the assemblage was available to scavengers.

TABLE 5.61: TOTAL COUNT AND FREQUENCY OF GNAWING AND ROOT ETCHING AT NEBI SAMUEL BY PHASE.

Nebi Samuel	Rodent Gnawing	%	Carnivore Gnawing	%	Root Etching	%	Total	Assemblage%
Phase IX Persian	4	3%	11	8%	6	4%	21	14.69%
Phase VIII Hellenistic	3	3%	8	7%	6	6%	17	15.89%
Phase VII Late Hellenistic	8	2%	10	2%	27	7%	45	10.84%

5.6.2.4. Pathologies at Nebi Samuel

Evidence of pathologies is present only in the Hellenistic and Late Hellenistic assemblages. Pathologies present are boney outgrowth on a caprine metacarpal in the Hellenistic and a cow's third phalanx in the Late Hellenistic (Table 5.62). Pathologies on these elements, specially outgrowth, is typically a result of labor (Baker and Brothwell 1980).

TABLE 5.61: TABLE COUNT OF PATHOLOGIES BY PHASE FROM NEBI SAMUEL

Pathologies at Nebi Samuel		**Phase VIII Hellenistic**	**Phase VII Late Hellenistic**
Species	Element	Boney Outgrowth	Boney Outgrowth
Caprine	Metacarpal	1	
Cattle	Phalanx 3		2

5.6.2.5. Butchery and Cut Marks at Nebi Samuel

Evidence of cut marks and butchery are present in each assemblage. Humans modified approximately 7% of the Persian assemblage. Modifications in the Persian assemblage are primarily skinning cut marks (N: 4) and worked bones (N: 3) but also include dismembering (N: 2) and filleting marks (N: 1; Table 5.62). Cut marks in the Hellenistic assemblage are present on

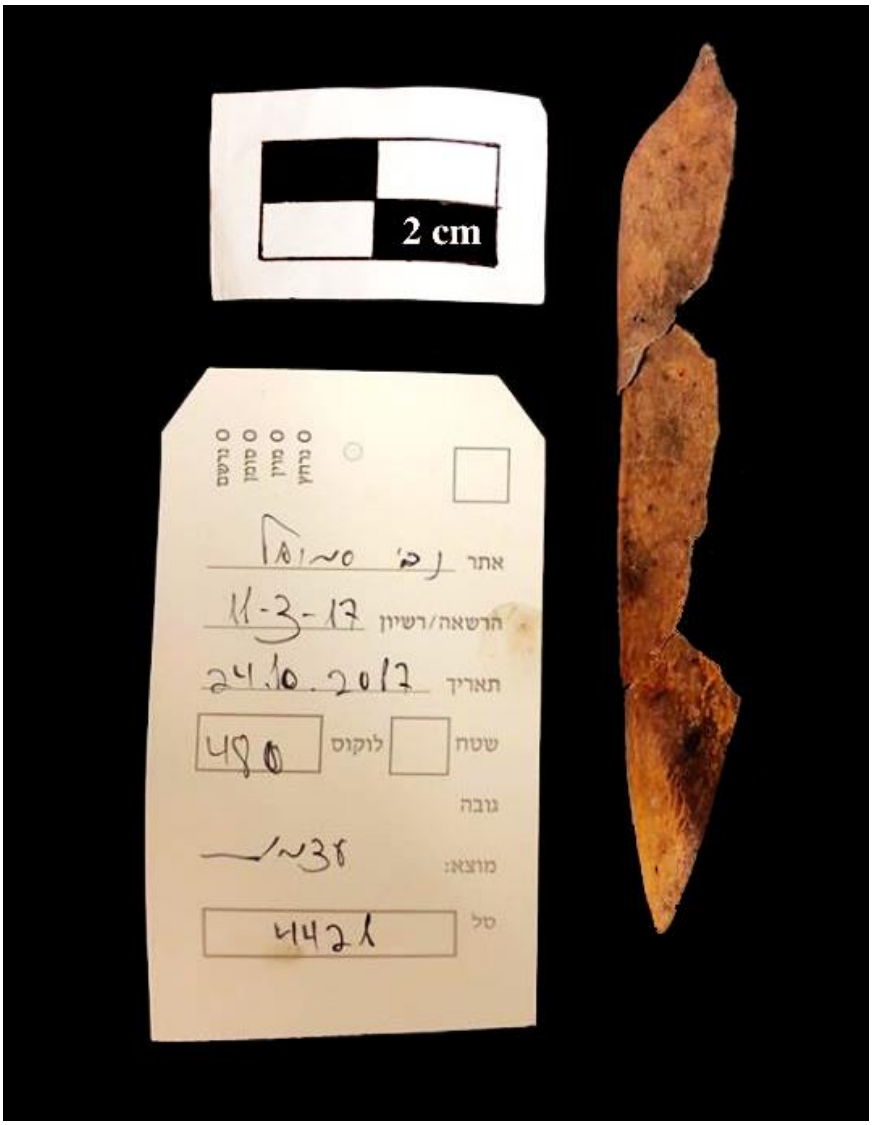
6.5% of the assemblage. Modifications in the Hellenistic are primarily dismembering (N: 4), but also include skinning (N: 1) and worked bones (N: 1; Table 5.62). The Late Hellenistic assemblage has the highest frequency of cut bones, with approximately 8% of the assemblage modified. All aspects of butchery are present in the Late Hellenistic, with half of the marks related to dismembering (N: 15) but also including filleting (N: 6) and skinning (N: 7; Table 5.62).

A total of nine bones from Nebi Samuel were worked. The majority of worked bones were fragments of spatulas (Figure 5.25) but also included a smoothed/polished right-sided astragalus of a sheep. Spatulas from Nebi Samuel are exclusively made from the ribs. The width of the spatula indicate if the tool was made from cattle, sheep, or goats.

TABLE 5.62. TOTAL COUNT AND FREQUENCY OF CUT MARKS (NISP) BASED ON THE TYPOLOGY OF BINFORD (1984) FOR NEBI SAMUEL.

Nebi Samuel	Phase IX Persian				Phase VIII Hellenistic			Phase VII Late Hellenistic				*Total*
	Dismembering	*Filleting*	*Skinning*	*Worked*	*Dismembering*	*Skinning*	*Worked*	*Dismembering*	*Filleting*	*Skinning*	*Worked*	
Cattle	1		1	1	1		1	6	1	1	3	16
Caprine	1	1	1	1	1			6	3	3	1	18
Goat					1			1				2
Sheep			1	1				1				3
Red Deer					1	1		1		2		5
Fallow Deer			1						1	1		3
Gazelle						1						1
Red Fox									1			1
Total	2	1	4	3	4	2	1	15	6	7	5	50
Assemblage %	6.99%				6.54%			7.95%				7.5%

FIGURE 5.25. WORKED BONE SPATULA FROM NEBI SAMUEL, PHASE VII LATE HELLENISTIC

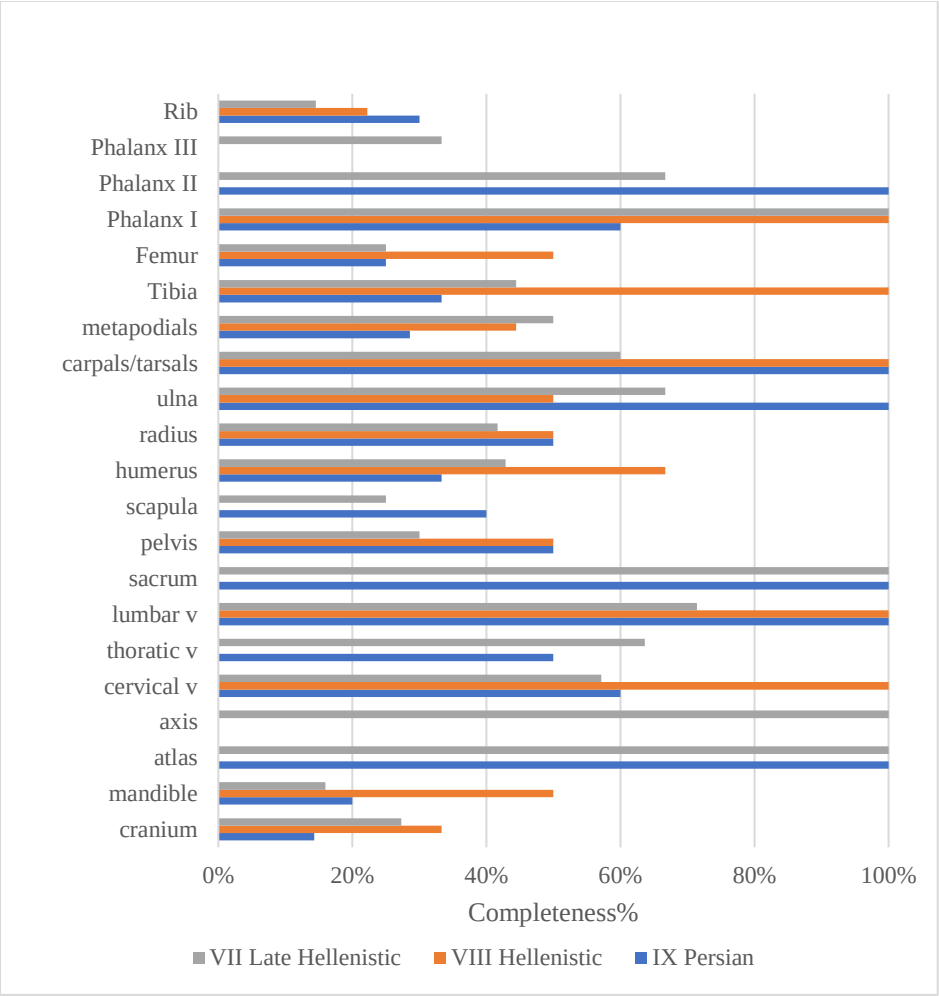


5.6.2.6. Fragmentation of Nebi Samuel

Comparing the completeness percentage of caprine elements (MNE/ NISP) between the Persian, Hellenistic, and Late Hellenistic assemblages suggest each assemblage is moderately fragmented. Structurally compact bones such as phalanges, carpals, tarsals, and vertebrae are

mostly complete, whereas long bones and cranium are 30-50% complete (Figure 5.26). This pattern may suggest that there was an exploitation of marrow from the long bones.

FIGURE 5.26. COMPLETENESS (MNE/NISP) OF THE PERSIAN, HELLENISTIC, AND LATE HELLENISTIC ELEMENTS FOR CAPRINES (SHEEP AND GOAT) FROM NEBI SAMUEL



5.6.3 Animal Demographics of Nebi Samuel

Due to the small size of the Persian and Hellenistic assemblages from Nebi Samuel, a demographic analysis was limited in these assemblages.

5.6.3.1 Caprine Age Profiles of Nebi Samuel

The caprine assemblages from Nebi Samuel were aged based on epiphyseal fusion, following Zeder (2006) and tooth-wear, following Payne (1973). Age estimation based on tooth-wear of caprine can only be assessed in the Persian and Late Hellenistic, as there were no age-able teeth in the Hellenistic assemblage.

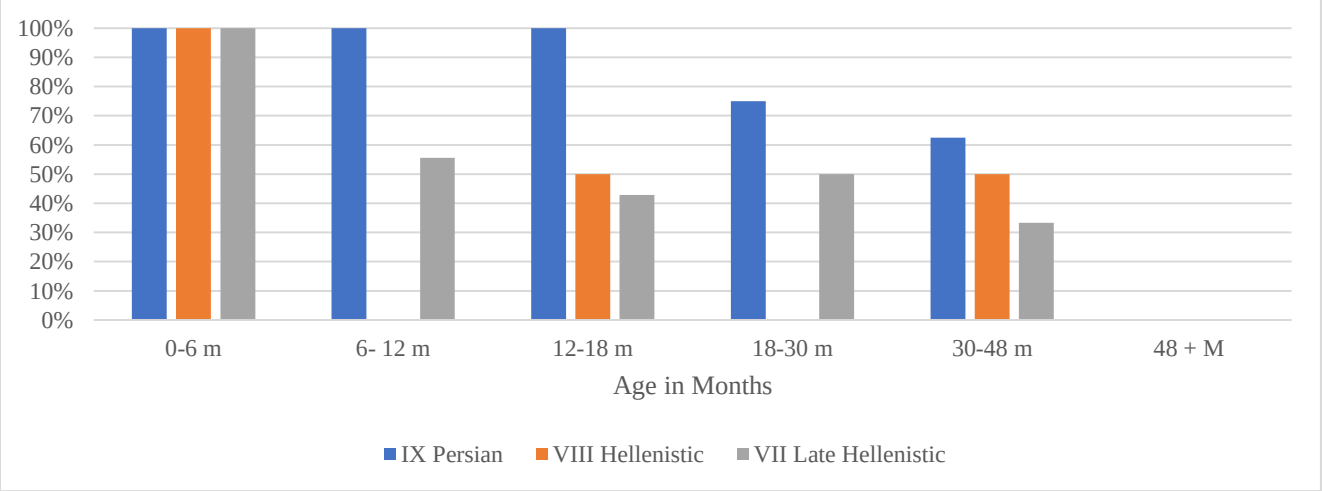
The caprine survivorship percentage (%fused bones) in the Persian assemblage suggests a culling around three to four years of life, with most caprine surviving to this point (Figure 5.28; Table 5.64). This pattern suggests caprine were exploitation geared towards wool and other secondary products. There was no epiphyseal fusion evidence for caprine over four years of age, whereas tooth-wear analysis suggests that at least one caprine was kept past four years (Figure 5.28; Table 5.65). The epiphyseal fusion of caprine in the Hellenistic assemblage is limited, but there is evidence for some caprine surviving past three to four years of life (Figure 5.28). Caprine survivorship in the Late Hellenistic assemblage has a sharp decrease at six months to one year of life with a regular culling with 33% surviving to three to four years (Figure 5.28; Table 5.64). Similar to the other assemblages, there is no epiphyseal fusion evidence for caprine survivorship past four years of age, but tooth-wear analysis suggests the maintenance of caprine past four years (Table 5.65). Culling patterns in the Late Hellenistic suggests a portion of the herd was killed off, or possibly sold-off, young with a small portion being maintained for secondary products.

TABLE 5.64. UNFUSED AND FUSED ELEMENTS OF CAPRINES (NISP BASED) BY PHASE OF NEBI SAMUEL. AGING BASED ON ZEDER (2006).

Caprine Fusion			Phase IX Persian			Phase VIII Hellenistic			Phase VII Late Hellenistic		
Element	Portion	Fused Age Range (zeder)	Total	Unfused	%UF	Total	Unfused	%UF	Total	Unfused	%UF
Radius	Proximal	0-6 months	0	0	0%	0	0	0%	2	0	0%
Humerus	Distal	6-12 months	1	0	0%	0	0	0%	4	2	50%
Pelvis		6-12 months	0	0	0%	1	1	100%	3	0	0%
Scapula		6-12 months	1	0	0%	0	0	0%	2	2	0%
Phalanx II		12-18 months	1	0	0%	0	0	0%	4	2	50%
Phalanx I		12-18 months	5	0	0%	2	1	0%	3	2	67%
Tibia	Distal	18-30 months	3	1	33%	0	0	0%	2	0	0%
Metapodial	Distal	18-30 months	1	0	0%	0	0	0%	4	3	75%
Calcaneus		30-48 Months	1	0	0%	0	0	0%	1	1	100%
Femur	Proximal	30-48 Months	2	1	50%	0	0	0%	1	1	100%
Femur	Distal	30-48 Months	4	2	50%	0	0	0%	2	1	50%
Ulna	Proximal	30-48 Months	0	0	0%	0	0	0%	1	1	0%
Radius	Distal	30-48 Months	0	0	0%	2	1	50%	3	2	67%
Tibia	Proximal	30-48 Months	1	0	0%	0	0	0%	1	0	0%
Humerus	Proximal	48+ months	0	0	0%	0	0	0%	0	0	0%

FIGURE 5.28

A. MORTALITY PROFILE OF CAPRINE BY PHASE OF NEBI SAMUEL BASED ON EPIPHYSEAL FUSION (ZEDER 2001).



B. MORTALITY PROFILE OF SHEEP AND GOATS BY PHASE OF NEBI SAMUEL BASED ON EPIPHYSEAL FUSION (ZEDER 2001).

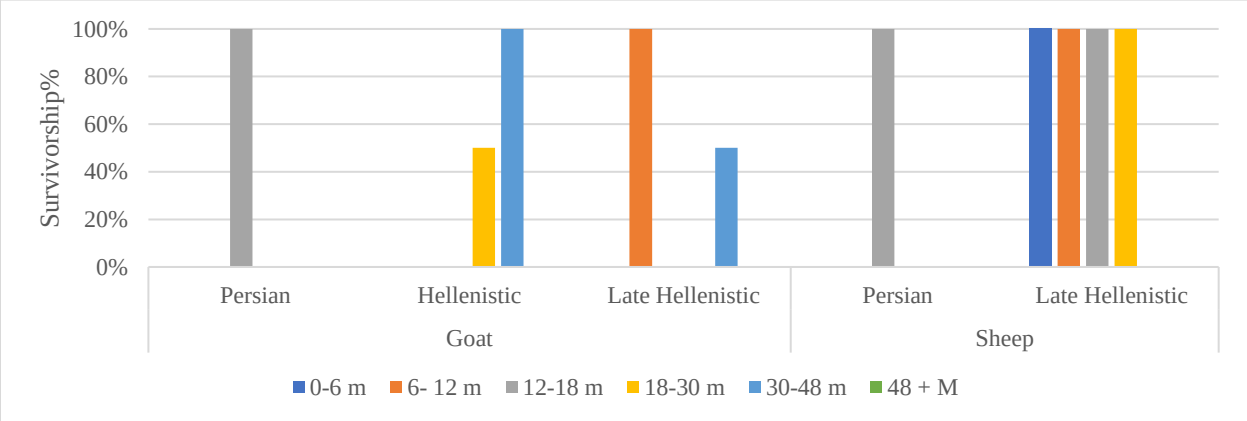


TABLE 5.65. AGING OF CAPRINES, BY PHASE OF NEBI SAMUEL, BASED ON TOOTH WEAR OF THE MANDIBULAR DP4 AND M3, BASED ON PAYNE 1973.

Tooth-wear	IX Persian	VII Late Hellenistic
F		1
G/H	1	1
I		2

5.6.3.2 Cattle Age Profiles of Nebi Samuel

The sample size of age-able cattle bones is minimal in the Persian and Late Hellenistic. The Persian and Hellenistic assemblages suggest the representation of both juveniles and adults (Table 5.66). The epiphyseal fusion of cattle in the Late Hellenistic suggests cattle survived to 3.5 years of life, with no presence of older cattle present (Table 5.66). This culling of cattle suggests secondary products were not the primary exploitation of cattle and that they were partially exploited for meat.

TABLE 5.66. UNFUSED AND FUSED ELEMENTS OF CATTLE (NISP BASED) FOR NEBI SAMUEL. AGING BASED ON SILVER (1969).

Cattle Fusion			Phase IX Persian			Phase VIII Hellenistic			Phase VII Late Hellenistic		
Element	Portion	Age	Total	Unfused	%Unfused	Total	Unfused	%Unfused	Total	Unfused	%Unfused
Pelvis		7-10 m	0	0	0%	0	0	0%	0	0	0%
Scapula		7-10 m	2	1	0%	1	0	0%	1	0	0%
Radius	Proximal	12-18 m	4	0	0%	2	0	0%	4	0	0%
Humerus	Distal	12-18 m	2	0	0%	0	0	0%	2	0	50%
2nd Phalanx		1.5 y	2	0	0%	2	0	0%	2	0	0%
1st Phalanx		1.5 y	1	0	0%	1	0	100%	1	0	100%
Tibia	Distal	2-2.5 y	0	0	0%	2	1	50%	1	1	100%
Metapodial	Distal	2-2.5 y	3	0	0%	1	0	0%	3	0	0%
Femur	Proximal	3.5 y	2	1	50%	1	0	100%	2	1	50%
Calcaneus		3.5-4 y	1	1	100%	0	0	0%	1	1	100%
Femur	Distal	3.5-4 y	0	0	0%	0	0	0%	0	0	0%
Ulna	Proximal	3.5-4 y	0	0	0%	0	0	0%	0	0	0%
Radius	Distal	3.5-4 y	0	0	0%	0	0	0%	0	0	0%
Tibia	Proximal	3.5-4 y	1	0	0%	0	0	0%	0	0	0%
Humerus	Proximal	3.5-4 y	1	1	100%	1	0	0%	1	1	0%

5.6.3.3. Caprine and Cattle Body Part Frequencies at Nebi Samuel

In each phase, all parts of caprine (sheep/goat group combined with medium mammal group for the sake of analysis) were present, with a prevalence of cranial and mandibular elements followed by limb elements (i.e., humerus, radius, tibia, and femur) and metapodials (based on MAU values, Table 5.67). Preference of fore and hindlimb elements varied by phase, with the Persian assemblage favoring the hindlimb's femur and tibia versus the Hellenistic and Late Hellenistic assemblages favoring the forelimb's humerus, radius, and ulna (Table 5.67).

All body parts of cattle were present in the Hellenistic and Late Hellenistic assemblages with a prevalence of cranial elements and both fore and hindlimbs (based on MAU values, Table 5.68). In the Persian assemblage, only cranial, vertebrae, forelimbs, and phalanges of cattle were present, with these portions also being the most prevalent (Table 5.68)

Examining factors that could influence bone survivorship, bone structural density was not a significant factor (compared to MNE values; Persian Pearson's r= 0.43, p= 0.18; Hellenistic Pearson's r=0.54, p= 0.15; Late Hellenistic Stage Pearson's r= 0.25, p= 0.26). In addition, no significant relationship was found between caprines bone survivorship (MAU%) and food utility index (FUI; Metcalfe and Jones (1988)) in the Persian (Pearson's r= 0.19, p=0.33), Hellenistic Pearson's r= 0.79, p=0.0.6) or Late Hellenistic (Pearson's r= 0.65, p=0.12).

TABLE 5.67. SKELETAL ELEMENTS FREQUENCIES OF CAPRINE BY PHASE OF NEBI SAMUEL.

Caprine Body Part Frequencies	Phase IX Persian				Phase VIII Hellenistic				Phase VII Late Hellenistic			
Element	NISP	MNE	MAU*i*	MAU%	NISP	MNE	MAUi	MAU%	NISP	MNE	MAUi	MAU%
Cranium	7	1	1.00	50%	3	1	1.00	67%	22	6	6.00	100%
Mandible	5	1	0.50	25%	4	2	1.00	67%	25	4	2.00	33%
Atlas	2	2	2.00	100%	0	0	0.00	0%	1	1	1.00	17%
Axis	0	0	0.00	0%	0	0	0.00	0%	1	1	1.00	17%
Cervical V	5	3	0.60	30%	1	1	0.20	13%	7	4	0.80	13%
Thoracic V	4	2	0.15	8%	0	0	0.00	0%	11	7	0.54	9%
Lumbar V	3	3	0.43	21%	1	1	0.14	10%	7	5	0.71	12%
Sacrum	1	1	1.00	50%	0	0	0.00	0%	1	1	1.00	17%
Pelvis	2	1	0.17	8%	2	1	0.17	11%	10	3	0.50	8%
Sternum	0	0	0.00	0%	0	0	0.00	0%	0	0	0.00	0%
Scapula	5	2	1.00	50%	0	0	0.00	0%	8	2	1.00	17%
Humerus	3	1	0.50	25%	3	2	1.00	67%	14	6	3.00	50%
Radius	4	2	1.00	50%	6	3	1.50	100%	12	5	2.50	42%
Ulna	1	1	0.50	25%	2	1	0.50	33%	3	2	1.00	17%
Carpals/Tarsals	2	2	0.09	5%	2	2	0.09	6%	10	6	0.27	5%
Metapodials	7	2	0.50	25%	9	4	1.00	67%	12	6	1.50	25%
Tibia	6	2	1.00	50%	1	1	0.50	33%	9	4	2.00	33%
Femur	8	2	1.00	50%	2	1	0.50	33%	16	4	2.00	33%
Patella	0	0	0.00	0%	0	0	0.00	0%	0	0	0.00	0%
Phalanx I	5	3	0.38	19%	2	2	0.25	17%	4	4	0.50	8%
Phalanx II	1	1	0.13	6%	0	0	0.00	0%	3	2	0.25	4%
Phalanx III	0	0	0.00	0%	0	0	0.00	0%	3	1	0.13	2%
Rib	20	6	0.46	23%	9	2	0.15	10%	55	8	0.62	10%

TABLE 5.68. SKELETAL ELEMENTS FREQUENCIES OF CATTLE BY PHASE OF NEBI SAMUEL.

Cattle Body Part Frequencies	IX Persian				VIII Hellenistic				VII Late Hellenistic			
Element	NISP	MNE	MAUi	MAU%	NISP	MNE	MAUi	MAU%	NISP	MNE	MAUi	MAU%
Cranium	2	1	1.00	100%	4	1	1.00	100%	6	1	1.00	67%
Mandible	4	1	0.50	50%	2	1	0.50	50%	5	3	1.50	100%
Atlas			0.00	0%			0.00	0%	2	1	1.00	67%
Axis			0.00	0%			0.00	0%			0.00	0%
Cervical V			0.00	0%	2	1	0.20	20%	3	1	0.20	13%
Thoracic V	1	1	0.08	8%	2	1	0.08	8%	1	1	0.08	5%
Lumbar V	1	1	0.14	14%	3	2	0.29	29%	2	1	0.14	10%
Sacrum			0.00	0%			0.00	0%			0.00	0%
Pelvis			0.00	0%	3	1	0.17	17%	2	1	0.17	11%
Sternum			0.00	0%			0.00	0%			0.00	0%
Scapula			0.00	0%	3	1	0.50	50%	2	1	0.50	33%
Humerus	1	1	0.50	50%	2	1	0.50	50%	8	2	1.00	67%
Radius	3	1	0.50	50%	5	2	1.00	100%	4	2	1.00	67%
Ulna	1	1	0.50	50%			0.00	0%	2	1	0.50	33%
Carpals/Tarsals			0.00	0%	4	3	0.14	14%	7	6	0.27	18%
Metapodials	3	2	0.50	50%	3	2	0.50	50%	6	2	0.50	33%
Tibia			0.00	0%	4	2	1.00	100%	1	1	0.50	33%
Femur			0.00	0%	2	1	0.50	50%	5	2	1.00	67%
Patella			0.00	0%			0.00	0%	1	1	0.50	33%
Phalanx I	2	2	0.25	25%	3	3	0.38	38%	1	1	0.13	8%
Phalanx II	2	1	0.13	13%	1	1	0.13	13%	2	1	0.13	8%
Phalanx III			0.00	0%			0.00	0%	3	3	0.38	25%
Rib	6	3	0.23	23%	8	2	0.15	15%	20	4	0.31	21%

5.6.3.4. Body Part Frequencies of Game and Chicken at Nebi Samuel

Chicken and game animals comprised a considerable portion of the Late Hellenistic assemblage, such as red deer, fallow deer, and gazelle. Their relative abundance allows for an exploration of their body parts frequencies in order to understand what portions of chicken were consumed and regarding hunted animals, which portions were brought back to the site.

Body part frequencies of chicken in the Late Hellenistic suggest a focus on limb elements such as the ulna and radius (Table 5.69). These portions relate to wing consumption. Other portions of the chicken present are elements related to the consumption of breast meat, specifically the sternum and scapula (Table 5.69). The absence of chicken cranial and phalanges suggests chicken that was decollated elsewhere, and portions present represent only consumed remains in the Late Hellenistic (Serjeantson 2013: 164). However, there is a potential bias that these elements are small and may not have been collected.

Considering the body parts of gazelle, red deer, and fallow deer as a combined big game group suggests the elements present in the Late Hellenistic represent selective portions of the body, with a prevalence of cranial and mandibular elements followed by limb and foot elements (based on MAU values, Table 5.70). This pattern suggests game animals were butchered at the kill site with meat bearing portions brought back to the site. The abundance of cranial remains may allude to the keeping of animal trophies from the hunt.

TABLE 5.69. CHICKEN BODY PART INDICES IN LATE HELLENISTIC NEBI SAMUEL

Gallus Body Part Frequencies	VII Late Hellenistic			
Element	NISP	MNE	MAUi	MAU%
Coracoid	1	1	0.50	20%
Cranium	0	0	0.00	0%
Carpometacarpus	1	1	0.50	20%
Radius	3	2	1.00	40%
Femur	0	0	0.00	0%
Fibula	0	0	0.00	0%
Furcula	1	1	1.00	40%
Humerus	1	1	0.50	20%
Lumbosacral	1	1	1.00	40%
Metatarsus	3	1	0.50	20%
Pelvis	2	1	0.17	7%
Scapula	4	3	1.50	60%
Phalanx I	1	1	0.13	5%
Phalanx II	0	0	0.00	0%
Phalanx III	0	0	0.00	0%
Phalanx IV	0	0	0.00	0%
Phalanx Wing	0	0	0.00	0%
Sternum	2	1	1.00	40%
Tibiotarsus	1	1	0.50	20%
Ulna	6	5	2.50	100%
Vertebrae	0	0	0.00	0%

TABLE 5.70. SKELETAL ELEMENTS FREQUENCIES OF WILD SPECIES (GAZELLE, FALLOW DEER, RED DEER, AND ROE DEER) IN LATE HELLENISTIC NEBI SAMUEL

Game Body Part Frequencies	VII Late Hellenistic			
Element	NISP	MNE	MAUi	MAU%
Cranium	4	2	2.00	100%
Mandible	2	1	0.50	25%
Atlas/Axis	0	0	0.00	0%
Vertebrae	0	0	0.00	0%
Sacrum	0	0	0.00	0%
Pelvis	0	0	0.00	0%
Sternum	0	0	0.00	0%
Scapula	3	1	0.50	25%
Humerus	5	4	2.00	100%
Radius	1	1	0.50	25%
Ulna	0	0	0.00	0%
Carpals/Tarsals	0	0	0.00	0%
Metapodials	3	2	0.50	25%
Tibia	3	2	1.00	50%
Femur	2	1	0.50	25%
Patella	0	0	0.00	0%
Phalanx I	2	2	0.25	13%
Phalanx II	1	1	0.13	6%
Phalanx III	0	0	0.00	0%

5.6.3.5 Sexing of Cattle at Nebi Samuel

The sexing of cattle based on the distal breadth of metacarpals (following Davis et al. 2012) suggests the cattle in the sub-phase assemblages are primarily females (Bd<63mm; measurements in Appendix II). This result should be treated with caution as it is based on four samples. These results should be treated with caution as they are based on one metacarpal per phase.

5.6.4 Summary of Nebi Samuel

Taphonomic processes, such as weathering, gnawing, and root etching, affected each assemblage. The taphonomic processes in the Late Hellenistic suggest these remains were exposed to environmental conditions and scavengers for a considerable amount of time. Similarly, regardless of phase, destructive intrusion by roots affected the assemblages.

The Persian, Hellenistic, and Late Hellenistic periods in Nebi Samuel are dominated by domestic livestock. The role of caprine in the assemblages is relatively similar, with both sheep and goats being equally present, male-dominated, and presence of all body parts with a focus on the use of cranial and limb elements. The main difference in caprine exploitation between the assemblages was in their culling strategy, with the Persian focusing on wool, the Hellenistic on milk and wool, and the Late Hellenistic on meat and wool. The diverse modes and aims of the caprine culling practices suggest complex and varied subsistence strategies were employed either at different points in the history of Nebi Samuel. One interesting aspect of caprine exploitation is the few remains of caprine older than three and a half years, suggesting the possibility that caprine were sold once they reached 'Market-Age.'

Cattle exploitation is similar in each assemblage with a culling strategy that was geared towards some older cattle, most likely used in draught work, and some younger cattle for meat.

The frequency of cattle in each assemblage is between 16-47% of the assemblage. The dominance of cattle, especially in the Hellenistic assemblage, speaks to the agricultural nature of hinterland sites. Wild species also contributed to the animal economy of Hellenistic and Late Hellenistic Nebi Samuel. Wild species including primarily red deer, fallow deer, and gazelles, were hunted and quartered before being transported to the city. In most cases, their heads were also carried back, presumably as trophies or for other activities.

Other low-frequency species present in the Late Hellenistic such as mice and rats, suggest commensal species live among the residents, as well as the presence of donkey suggests pack animals were present at Nebi Samuel. Fish present in the Late Hellenistic assemblage were imported from the Mediterranean Sea. The two fragments identifiable down to species, gilt-head seabream, and barbel, are also two of the most common fish in Jerusalem around the same time (see Area M2, Table 5.30).

5.7 Khirbet er-Ras

The animal remains from Khirbet er-Ras were identified by L. Sapir-Hen, and analysis of the database was conducted by the author. The small assemblage from Khirbet er-Ras limited the results to a species list per context, taphonomic agents when present, and an exploration into what body parts of animals were present to have a generalized idea of the animal use of a village site in Jerusalem during the Iron Age II, Persian, and Hellenistic periods.

5.7.1 Species Represented at Khirbet er-Ras

A total of 17 remains (NISP) were derived from the Iron Age II, 10 (NISP) from the Persian, and 24 from the Hellenistic (Table. 4.71). Caprines are the most dominant species in every assemblage, representing between 75-79% of each assemblage (Table 5.71). Distinguishable

sheep and goats suggest a ratio of 1:1 in the Iron Age II and 2:1 in the Hellenistic. There were no distinguishable sheep and goats in the Persian period. Other species present in the Iron Age II are cattle (N: 1), pig (N: 1), a small mammal (N: 1), and a medium bird (N: 1), most likely chicken (Table 5.72).

The Persian assemblage, in addition to caprine, also included medium bird (N: 2). The Hellenistic assemblage included large mammals (N: 3), donkey (N: 1), and medium bird (N: 1). Wild species are nearly absent in every assemblage.

TABLE 5.71. NUMBER OF IDENTIFIED SPECIMENS (NISP), MINIMUM NUMBER OF INDIVIDUALS (MNI), AND PERCENTAGE OF SPECIES FROM KHIRBET ER-RAS

Kh, er Ras	Species	Common Name	Iron Age II			Persian (with intrusions)			Hellenistic		
			NISP	MNI	NISP%	NISP	MNI	NISP%	NISP	MNI	NISP%
Domesticated Ungulates	*Capra hircus*	Goat	1	1	6%				2	1	8%
	Ovis aries	Sheep	1	1	6%				4	1	17%
	Caprine size	Sheep or Goat	11	2	65%	8	1	75%	13	2	54%
	Bos taurus	Cow	1	1	6%						
	A Size	Large Mammal							3	1	13%
	Sus scrofa domesticus	Pig	1	1	6%						
	Equus asinus	Donkey							1	1	4%
Wild Mammals	*C size*	Small Mammal	1	1	6%						
Aves	*Medium aves*	Medium Bird	1	1	6%	2	1	25%	1	1	4%
TOTAL			17	8	100%	10	2	100%	24	7	100%

5.7.2 Taphonomic Analysis of Khirbet er-Ras

Taphonomic analysis of Khirbet er-Ras was limited to weathering, burning, carnivore gnawing, and butchery due to the limited amount of remains. Evidence of pathologies, rodent gnawing, and root etching are absent in the assemblages.

5.7.2.1 Weathering of Khirbet er-Ras

The weathering pattern of the bones from Khirbet er-Ras falls solely between stages 0-3 of Brehensmeyer's guide (1978: 157) (Table 5.72). Suggesting the bones were covered quickly after disposal (three years or less).

TABLE 5.72 TOTAL OF FRAGMENTS RECORDED IN EACH WEATHERING STAGE (STAGES ACCORDING TO BEHRENMEYER 1978) FROM IRON AGE II, PERSIAN, AND HELLENISTIC KHIRBET ER-RAS.

Kh. er-Ras	1	2	3	4	5	6
Iron Age II	2	10	1			
Persian	1	2	1			
Hellenistic	7	14	1			
Total	10	22	3			

5.7.2.2 Burned Remains Collected from Khirbet er-Ras

Burning and charring evidence from Khirbet er-Ras was limited to only identified fragments. Of identified fragments, ca. 6% of the Iron Age II, ca. 20% of the Persian, and ca. 4% of the Hellenistic assemblages showed evidence of burning or charring (Table 5.73). Burned fragments in the Iron Age II and Persian related only to caprine, whereas burned fragments in the Hellenistic relate to caprine and donkey (Table 5.73).

TABLE 5.73. COUNT OF BURNED BONES BY BURN SCALE, AND SPECIES FROM KHIRBET ER-RAS: SCALE: B-: SLIGHTLY BURNED, B: BURNED, AND B+: FULLY CALCIFIED

Kh. er-Ras	Iron Age II	Persian		Hellenistic
Species	*B-*	*B-*	*B+*	*B-*
Caprine	1	1	1	1
Donkey				1
Total	1	2		1

5.7.2.3 Animal Activity at Khirbet er-Ras

Animal scavenging by carnivores is present only in the Iron Age II and Persian assemblages from Khirbet er-Ras (Table 5.74). Carnivore gnawing is present on 12% of the Iron Age II and 20% of the Persian assemblages.

TABLE 5.74: TOTAL COUNT AND PERCENTAGE OF GNAWING IN KHIRBET ER-RAS BY PERIOD.

Kh. er-Ras	Carnivore Gnawing	%
Iron Age II	2	12%
Persian	2	20%

5.7.2.5 Butchery and Cut Marks in Khirbet er-Ras

Evidence of cut marks and butchery were present in every assemblage. Humans modified a total of 18% of the Iron Age II assemblage. Modifications in the Iron Age II are present only on caprine and included a polished astragalus (Table 5.75). The Persian period assemblage also only had evidence of cut marks on caprine, and they represent 20% of the Persian assemblage (Table 5.75). The Hellenistic assemblage was 25% cut and includes the butchery of caprines and cattle (Table 5.75).

TABLE 5.75 CUT MARKS (NISP) FOR DOMESTIC MAMMALS BASED ON THE TYPOLOGY OF BINFORD (1984) FOR KHIRBET ER-RAS.

Kh. Er-Ras		Cut	Dismember	Polished	Total
Hellenistic	Caprine		1		6
	Cattle	1			
	Goat		2		
	Sheep	1	1		
Persian	Caprine	2			2
Iron Age II	Caprine	1	1	1	3

5.7.3 Animal Demographics of Khirbet er-Ras

Due to the small size of the assemblages from Khirbet er-Ras, a demographic analysis was limited to body part frequencies. There was not enough data to create aging profiles or sexing profiles for Khirbet er-Ras.

5.7.3.1. Body Part Frequencies of Animals from Khirbet er-Ras

Body part frequencies from Khirbet er-Ras was limited to a count of elements by species. There was not enough data to produce other frequencies, such as a minimum number of elements or minimal animal units. From the available data, it appears that most parts of caprine are present in the Iron Age II and Hellenistic assemblages (Table. 5.76). Common elements are cranial and mandibular elements in the Hellenistic and Persian assemblages, as well as long bones, specifically humeri in the Hellenistic and femurs in the Iron Age II (Table 5.76). Cattle body parts present are primarily ribs in both the Iron age II and Hellenistic assemblages. Avian elements present in the Iron Age II and Hellenistic are solely cranial remains, suggesting non-edible portions were present in these assemblages.

TABLE 5.76 COUNT OF SKELETAL ELEMENTS BY SPECIES AND PERIOD. MINIMUM NUMBER OF ELEMENTS (MNE) IN PARENTHESES WHEN AVAILABLE.

Kh. Er-Ras	Hellenistic				Persian		Iron Age II				
Element	Cattle	Caprine	Bird	Donkey	Caprine	Bird	Cattle	Caprine	Bird	Small Mammal	Pig
Cranium		1	1					1	1		
Mandible	1	4 (2)		1	1						
Atlas						1					
Axis					1			1			
Thoracic v		1									
Pelvis		1									
Scapula		1						1			
Humerus		5 (2)			1						
Ulna											1
Carpals/tarsals		2 (1)						2 (2)			
Metapodials		3 (2)						1			
Tibia					1	1		1			
Femur		1						3 (1)			

Ribs	3				2		1			1	

5.7.4 Summary of Khirbet er-Ras

Domestic livestock dominates the Iron Age II, Persian, and Hellenistic village settlements of Khirbet er-Ras. The frequency of cattle in all periods is low (less than 10% of livestock), per the immediate local environment of the site, which is less suitable for agriculture (Rubin 2000; Gadot 2015). The lower frequency of cattle at Khirbet er-Ras suggests that Khirbet er-Ras's population focused on caprine herding rather than agriculture throughout its history. The presence of pig in the Iron Age II may attest to the need for additional meat during this time. Burning and butchering evidence at Khirbet er-Ras suggests the remains present in the assemblages relate to consumption refuses. Avian remains in the Iron Age II and Hellenistic assemblages probably do not relate to consumption refuse as cranial remains are not consumable portions.

Chapter Six: Discussion

Faunal remains from Jerusalem, and its hinterland studied as part of this research, paired with the wealth of assemblages previously published, allows for exploration in the *longue durée* perspective of animal use in urban and rural contexts of the 8th through 2nd centuries BCE. The specific sociocultural aspects of Jerusalem's history during these centuries allows for an intra-site analysis of Jerusalem's animal economy, an inter-site analysis with its hinterland, and a reassessment of the foodways mentioned in the biblical texts.

6.1 Urban Jerusalem

The urbanism of Jerusalem is well attested in the Iron Age IIB (8th century BCE), Iron Age IIC (7th century BCE), and Late Hellenistic (2nd century BCE) periods. The majority of faunal assemblages presented in this research derive from strata dated to these periods. It is not surprising that periods with the densest accumulation of faunal assemblages also represent demographic peaks for the site: more people, more refuse. The enigmatic periods of Jerusalem, specifically the Babylonian, Persian, and Early Hellenistic (6th–3rd centuries BCE), consequently have fewer assemblages. Thus, the conclusions of these periods must be taken as preliminary until more datasets are available for intra-site analysis. Nevertheless, from the available data at hand, it is clear that the past populations in Jerusalem took part in complex economic decisions when it came to what food they consumed and what animals they used.

In zooarchaeology, a possible indicator of social and ethnic distinctions between members of an increasingly hierarchical society is conspicuous consumption, meaning the consumption of distinctive foodstuffs in a specific manner (Zeder and Arter 1994: 105). Status-related practices and conspicuous consumption is reflected in the diversity of species exploited,

the relative abundance of domestic versus wild taxa in an assemblage, body part frequencies, and butchery marks (Ashby 2002: 39). These aspects aid in contextualizing the assemblages and allows us to explore differences in the use of animals in various locations/neighborhoods within ancient Jerusalem.

The exact location of Jerusalem's cult throughout the first half of the 8th through to the 2nd century BCE is unknown, and many scholars have proposed numerous possible sites.[53] Regardless of its location, what is unanimously accepted is a historical memory of a national cult and its importance within the region. The economic draw of the cult, in the form of tithing, sacrificing, and redistribution of these offerings, shaped not only those who came to inhabit the city or those who visited it but generated a unique economic situation that allowed an urban settlement to develop. Urban centers typically contain a greater diversity of cultic customs than rural villages, in addition to being directly affected by the royal and national cult, in comparison to the rural sphere (Davies 2010). The religious variation between urban and rural spheres will be a guiding theory in the following sections.

6.1.1 Diachronic Understanding of Jerusalem's Animal Economy

The *longue durée* perspective of this research allows us to conduct two forms of intra-site comparisons between various areas of the same site as well as between multiple assemblages from different sites within Jerusalem, such as the Givati Parking Lot, Southeastern Ridge (i.e., City of David), the Stepped-Stone Structure (Area G), and the Western Wall Plaza excavations, depending on the period.

[53] Knauf 2000; Finkelstein, Lipschits, and Koch 2011; DeGroot and Geva 2015; Gadot and Uziel 2017.

6.1.1.1 Jerusalem in the Iron Age IIB-C

Previous research of Jerusalem's Iron Age II animal economies identifies Jerusalem as a 'consumer city.' As a consumer, its animal economy focused on the consumption of 'market-aged' male caprine (sheep and goat) and meat-rich body parts, which differed markedly from its rural hinterland that concentrated on female caprine and secondary product production (Sapir-Hen et al. 2016).

Going forward, the term 'market-aged' needs to be better clarified in the context of urban animal exploitation. If an animal is defined as 'market-aged' it means the age when the livestock animal reaches its prime weight versus cost of rearing, roughly around one, one-and-a-half, to two years of age (deFrance 2009). In zooarchaeological material this age can be linked to a meat exploitation strategy that sees a culling of livestock around 12-18 months or around 2-2.5 years (Payne 1973; Vigne and Helmer 2004).[54] There is an issue in zooarchaeological scholarship on the socioeconomic status of 'meat-focused exploitation" and "market-aged' livestock, both designations are based on the same mortality profiles but first is considered low status and the latter is considered high status. This contradiction and its subsequent use complicates the following discussion of urban consumption and subsistence patterns in Iron Age II Jerusalem,

Jerusalem has an unprecedented thirteen comparable assemblages from seven different areas throughout the site dated to the Iron Age IIA–B that include both public and domestic contexts. Jerusalem's Iron Age II comparable assemblages are from the Ophel excavations south of the temple mount (Building C and D; Horwitz and Tchernov 1989), the Western Wall Plaza excavations (Sapir-Hen in press; Sapir-Hen et al. 2016), the Giv'ati Parking Lot excavations

[54] Epiphyseal fusion of skeletal elements that would be indicators of these age groups would be the first and second phalanx (Group C, according to Zeder 2006), in addition to the distal metapodials and distal tibia (Group D, according to Zeder 2006).

(Area M1; Bar-Oz and Raban-Gerstel 2013), multiple reports from the City of David including Area D1, Strata 12 and 14 (Horwitz 1996; Horwitz and Tchernov 1996), and the Spring Tower (Area's C/H; Marom and Agha in press) (Figure 6.1).

Zooarchaeological studies from Jerusalem also include several ichthyological assemblages from the Ophel in Building's C and D (Lernau and Lernau 1989), the City of David in Area's D1, D2, E1, E3 and G (Lernau and Lernau 1992), as well as the enormous assemblage from the 'Rock-Cut' pool near the Siloam Tunnel (Reich et al. 2007).[55] The faunal assemblage from Area D3 on the cliffs of the Southeastern Ridge, dated to the Iron Age IIB (8th century BCE), adds another perspective of Jerusalem's consumption habits, animal economy, and allows for a detailed comparison of urban provisioning.

The volume of data available through an in-depth comparison of these assemblages allows us to explore the social, economic, and urban provisioning of a major urban site in the Iron Age IIB. Comparing faunal reports by various authors raises a handful of problems, from preservation variation, inter- versus intra-site variability, as well as discrepancies between analytical methods. In addition, the number of assemblages is extensive but also constrained, as some of them cannot be isolated into sub-periods: Iron Age IIA (9th century BCE) or Iron Age IIB (8th century BCE). Faunal assemblages from the Iron Age IIC are limited to Building 100 in Area M2 and Str. 10B/C of the Stepped Stone Structure (Area G, City of David; Tamar and Bar-Oz 2015; Lernau 2015). These two assemblages represent material from the 586/7 BCE destruction. As such, they represent a destruction event and a unique context that is independent

[55] The specific species of fish found in these contexts were discussed in Section 2.2.2.1.2.

of the earlier Iron Age II assemblages. Nonetheless, this division of collected zooarchaeological data is indispensable in any attempt to reconstruct the exploitation processes of the past.

In terms of the general trends of livestock consumption in Iron Age IIB Area D3, sheep and goats were primarily utilized for their meat, with exploitation geared towards 'market-aged' animals, with preference of high and low meat bearing parts from the forelimbs. Access to meat-rich and meat-poor portions of market aged caprine, along with its archaeological location on the outskirts of town, indicate this area as consumers and specifically lower socioeconomic consumers. The frequency of cattle in Area D3 is low (less than 10% of livestock), per the immediate local environment of the site, which is less suitable for agriculture (Rubin 2000; Sasson 2005; Gadot 2015). The low frequency of cattle in Area D3 is similar to the frequency of cattle found at the Western Wall Plaza (Sapir-Hen et al. 2016) and Ophel (Horwitz and Tchernov 1989), while the other comparable assemblages have a cattle frequency of ~20% (Area D1, Horwitz 1996; Giv'ati Area M1, Bar-Oz and Raban-Gerstel 2013).

The difference in cattle frequencies in different sectors of Jerusalem could relate to several realities: (1) the frequency of cattle may relate to consumption patterns of public verses domestic context, in which cattle is used within public or sacrificial activities; (2) the consumption of cattle may relate to low verses high status, in which cattle beef is identified as a higher status meat; (3) the public areas of Jerusalem are involved in dry-farming and the use of cattle for agricultural production. The latter option can be dismissed as dry-farming was not conducted within the urban core of Jerusalem, but rather in its neighboring hinterland. The various interpretations illustrate the complex issue of identifying socioeconomic status within the boundaries of zooarchaeology, that may be clarified through a more detailed inter-site comparison between domestic, public, high, and low status assemblages.

In order to contextualize the domestic consumption pattern of Area D3 and contend with the issue of socioeconomic variation, we need to compare to the other faunal and ichthyological assemblages within the broad scheme of Iron Age II Jerusalem, (Table 6.1). Following the interpretations of previously published faunal assemblages from Jerusalem:

- **Area M1** of the Givati Parking Lot was defined as a domestic space with a subsistence strategy geared towards meat exploitation based on the culling of young caprines (Bar-Oz and Raban-Gerstel 2013). Bar-Oz and Raban-Gerstel attribute the exploitation of young sheep to urban processes (2013: 354). The socioeconomic status of this area has generally been interpreted as high status based on the archaeological finds in the area (Ben-Ami 2013), although we cannot assess that from the point of the faunal assemblage.

- **Area D1** in the City of David was defined as a domestic low-status area based on the faunal assemblage and the area's archaeological context on the outside of the city wall on the slopes of the Kidron Valley (Horwitz 1996; DeGroot and Bernick-Greenberg 2012). The faunal assemblage from Area D1 indicates a subsistence strategy geared towards meat with the culling of young caprines, focus on meat-rich body parts with some evidence of waste stock in the form of cranial and lower limb elements, as well as evidence for imported fish (Horwtiz 1996; Lernau and Lernau 1992).

- **Ophel Building's C and D** was defined as a public high-status area based on the faunal assemblage and the area's archaeological context up at the top of the Southeastern Ridge, near the location of the cult (Horwitz and Tchernov 1989; Mazar and Mazar 1989). The faunal assemblage from the Ophel indicates a subsistence strategy geared towards meat from 'market aged' caprines, meaning young caprines, as well as the use of caprines for secondary products, like milk and wool (Horwitz and Tchernov 1989). The Ophel was provided with meat-rich body parts and imported fish, such as Nile Perch and White Grouper (*ibid*; Lernau and Lernau 1989).

- **Western Wall Plaza** faunal assemblage derived from collapse and construction refuse located on the northeastern slope of the Western Hill (Sapir-Hen et al. 2016). The subsistence strategy present in the fill material indicates the use of caprines for secondary products and the provisioning of meat-rich body parts (*ibid*). The assemblage was interpreted as reflecting urban consumption patterns in comparison to the more rural animal economy present at Tel Moẓa (*ibid*).

- **Spring Tower** (Area's C/H) located on the western slopes of the Kidron Valley near the Gihon spring was interpreted as a public space based on its archaeological context and low-status based on its faunal assemblage (Marom and Agha in press). Marom and Agha base their assessment on the theoretical framework that within a complex urban setting, that high-status groups will receive male animals in the prime market age of two or three years, and low-status groups are expected to have received males but mainly female animals past their reproductive age (*ibid*). The subsistence strategy present at the Spring Tower focuses on the exploitation of caprines from meat (*ibid*), similar to the young caprines or 'market aged' animals in other Iron Age assemblages and the provision of meat bearing fore and hindlimbs. Marom and Agha also identified more females than male caprines which they deem as an anomaly in urban settings and suggest the assemblage is representative of town-dwellers who were outside of a central redistributive system (*ibid*).

- **'Rock-Cut' Pool** assemblage is unlike the other assemblages, in that, is includes no mammalian remains and only includes thousands of ichthyological remains. The fish species present at the "Rock-Cut' Pool indicate the presence of fish that are not found in other assemblages, such as parrotfish (*Scaridae*), tuna (*Scombridae*), and bluefish (*Pomatomidae*) (Reich et al. 2007).

Many of these assemblages describe similar results but the researchers interpreted them slightly differently—the overall homogeneity and inconsistence methodological parameters between these assemblages complicate contextualizing Area D3 within the larger scheme. In reviewing the raw zooarchaeological data available (Tables 6.2, 6.3, 6.4, and 6.5): Area D3 was akin to Area D1, the Spring Tower, and the Givati Parking Lot, based on the subsistence strategy, frequency of species, and archaeological context. Going beyond the zooarchaeological data and looking closer at the specific architecture, stratigraphy, loci of these contexts, it appears the Area D3 is the most archaeologically parallel to Area M1 in the Givati Parking Lot.

The archeological context of Area M1's assemblage is defined as poorly constructed walls (W984, W987) in Stratum XII and Stratum XI built into the rock scarp (Ben-Ami 2013: Fig. 2.8). The domestic structures on the slopes of the Tyropoeon Valley and the Southeastern Ridge resemble a similar phenomenon in which domestic structures constructed clinging to the

rock scarp as Jerusalem expanded, were quickly abandoned, and covered, as more advantageous areas were settled in the hills around Southeastern Ridge. The faunal remains between Area M1 and Area D3 are also similar with a focus on young ‘market aged' caprines.

A further comparison indicates the most homogenous aspect of the Iron Age II assemblages is the inclusion of all skeletal elements of caprine, with a similar focus on the consumption of upper and lower limb elements in each assemblage (Table 6.5). Socioeconomic exploitation of limb elements is based on the assessment that the upper limbs (humerus, scapula, femur, pelvis) are meat-rich versus the lower limbs (radius, ulna, tibia) are meat-poor. In general, the upper and lower forelimbs are generally more frequent based on MAU% in all areas of Iron Age II Jerusalem except in the Western Wall Plaza, where hindlimbs are equally common (Table 6.1; Table 6.5).

Consumption of the forelimb is imbued with cultic and social meaning in the biblical texts as well as throughout the entire ancient Near East. Distribution of specific cuts among the cultic and royal elite reflected an individual’s rank within the temple’s hierarchy (Waerzeggers 2010: 258). Such as the *imittu* (zag.lu, zag) or shoulder cut designated to the king and the priesthood.[56] This sacrificial act is reminiscent of the sacrificial system detailed in the biblical texts, most notably the redistribution of the right limb to the priests in Leviticus 7: 28–37.

The preference of forelimbs regardless of economic status, public or domestic context throughout Jerusalem in the Iron Age IIB suggests meat consumption from the redistribution mechanics of sacrifice. The preference of forelimbs in lower status domestic contexts, such as Area D3’s frequency of lower forelimb radii, suggest this area was provisioned with the meat-

[56] Uruk– SWV 117:23’3’, AUWE 11 179; Babylon– Baker 2004 no. 58; Sippur– BM 43095; Borsippa– BM 102276 no. 166, BM 82617, BM 85443, BM 26511 no. 35

poor portions of a religiously charged cut of the animal. An alternative interpretation could be elite-emulation in a low-status domestic context, however elite-emulation in urban spaces is problematic in hierarchical societies in which redistribution mechanics could also play a role in the distribution of animal portions.

The generalized homogeny of consumer consumption habits within Jerusalem in the Iron Age IIB is also evident in the presence of fish bones, at several sites including Area D3. As mentioned previously Jerusalem's nearest water source, the Gihon, does not support fish habitation, implying the fish were sourced or imported from somewhere else. Fish species present in Iron Age II Jerusalem derive from several water sources, including the Mediterranean Sea, the Nile River, and the Bardawil Lagoon.

The taxonomic abundance of fish between the different areas is relatively similar, with the most common fish being seabreams (*Sparidae*) (Table 6.3; Figure 6.2). The second most common fish is mullet (*Mugilidae*), except at the Ophel, where groupers (*Epinephelus*) are the second most common (Figure 6.2). Higher frequencies of groupers and Nile Perch (*Lates nilotic*) may relate to their size, as these fish are larger than the other fish present or to their luxury status. Although we could posit the large size of Nile Perch and groupers influenced their status as a luxury import. The Rock-Cut Pool has the most extensive diversity of species; this is even more evident when in comparison to the diversity of species in each area to the pool (for rarefaction see Figure 6.3). The fish species present in the Ophel, City of David, and Area D3 are present within the Rock-Cut Pool, and we could posit that this pool may be a possible location of the fish trade in Jerusalem, especially as there is no significance between the pool and distinct areas (Pool versus D3 Pearson's: $p=0.89$, $r=0.002$).

In summary, the urban consumption pattern of Iron Age IIB Jerusalem is nuanced and homogenous. The upper sector of the city, represented by the Ophel and the Western Wall Plaza excavations, are primarily public buildings, and the material is coming from large fills. The animal economy of these spheres is based on meat consumption and secondary products, like wool and milk. The higher economic trend of these areas is due to their proximity and relationship with the cult. Additional public contexts, such the Spring Tower (Area C/H) and the Rock-Cut Pool represent an economic pattern best understood as consumer-based provisioning with assemblages comprising of 'market-aged' and older caprine, meat-rich, and meat-poor portions, as well as imported fish in the case of the Rock-Cut Pool (Table 6.1). Area D1, Area D3, and the Givati Parking Lot are domestic dwellings located on the cliffs of the Southeastern Ridge, built as the city expanded rapidly, and there was a need for new neighborhoods. These areas are typified as low-status due to their archaeological contexts. Their designation as low-status is based on subsistence strategies geared toward meat, lower quality body parts, and imported fish is not entirely accurate.

The only difference between higher and lower socioeconomic status contexts is in the slight inclination for meat-bearing elements in the high-status contexts. However, the preference for meaty and non-meaty parts are present in each assemblage. Therefore, there is no stark difference between the two sectors in their animal economy and food consumption. Low-status domestic contexts, therefore, should be understood as an urban consumers, or even posit the reality of a middle class. Their designation as lower is only in relation to the building fashion of dwelling built upon rock scarp. Thus, Area D3 is consumer of middle socioeconomic status, as it is similar to both higher and lower status areas, such as Area M1, Area D1, and Area G.

The homogenous nature of Jerusalem's animal economy throughout the site is best understood as a conglomeration of elites and non-elites sharing neighborhoods and consuming in similar manners, as well as the potential emulation of consumption patterns by the middle classes. Overall, the city of Jerusalem, regardless of economic class, public or residential areas, preferred 'market-aged' caprine and the upper forelimbs, which possibly relates to the redistribution of sacrificial offerings or cultural meat portion preference. Regardless of socioeconomic status, fish was purchased and consumed in all areas of the city, reinforcing Jerusalem's dependency on trade and imports, which further reflects its urban status.

FIGURE 6.1. MAP OF IRON AGE IIB JERUSALEM. MAP COURTESY OF I. BEN EZRA

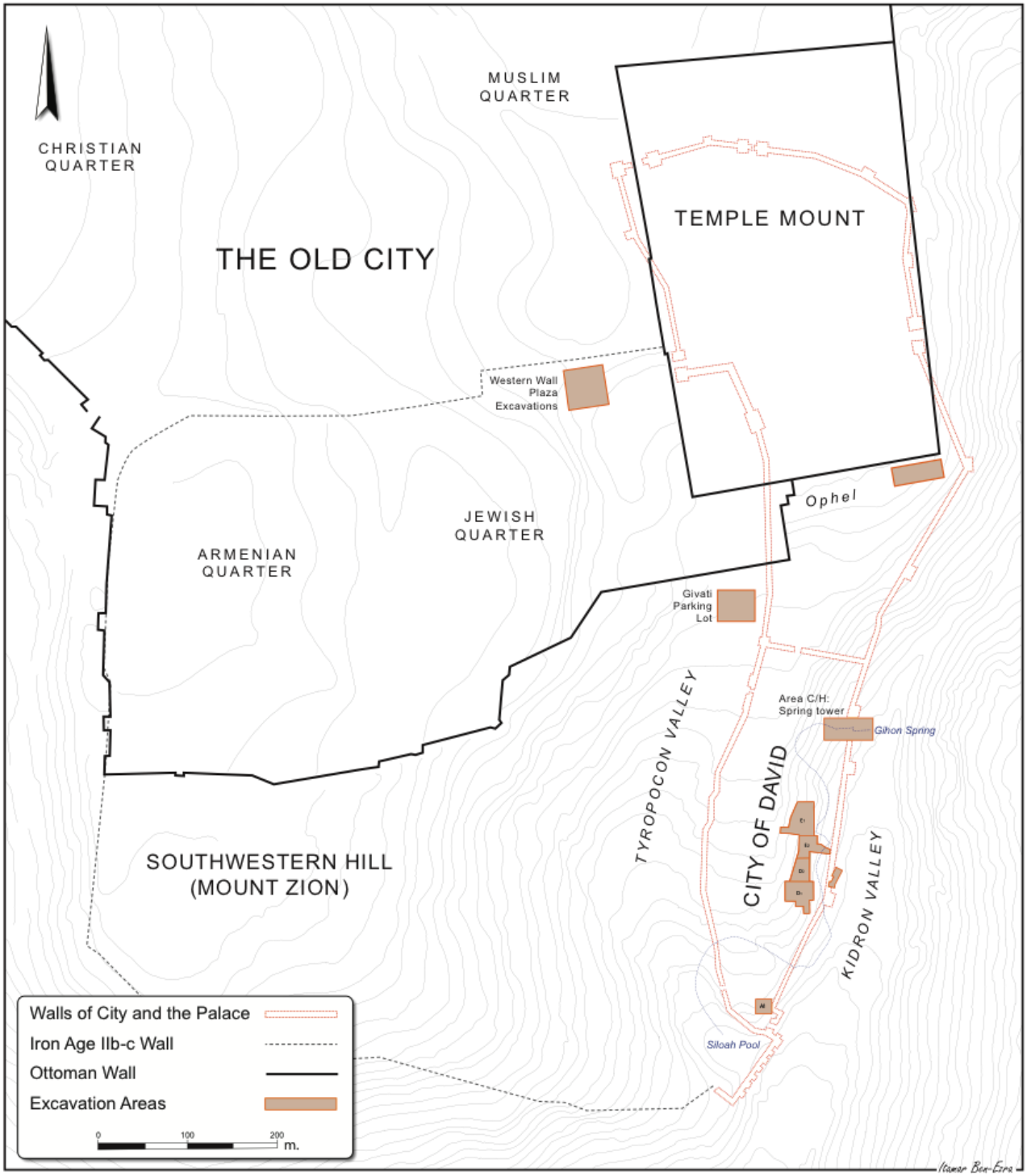


TABLE 6.1 SUMMARY OF COMPARABLE IRON AGE II FAUNAL ASSEMBLAGES

Context	Area	Dating	Citation	Sheep and Goat Exploitation	Cattle Exploitation	Economic Status
Domestic	City of David: Area D3	8th century BCE	This Study	Meat, meat-rich and meat-poor portions	Traction, meat-rich and meat-poor portions	Low
	City of David: Area D1, Str. 14-12	10th - 8th century BCE	Horwtiz 1996	Meat and secondary products, meat-poor portions		Low
	Givati: Area M1	9th - 7th century BCE	Bar-Oz and Raban-Gerstel 2013	Meat, meat-rich and meat-poor portions	Meat-poor portions	Low/ High?
Public	Ophel: Building C and D	8th - 6th century BCE	Horwitz and Tchernov 1989	Meat, meat-rich portions		High
	Western Wall Plaza	8th - 6th century BCE	Sapir-Hen et al. 2016	Meat and wool, meat-rich portions	Meat and traction, meat-rich portions	High
	Spring Tower, Str. 9-8	late 9th - late 8th century BCE	Marom and Agha in press	Meat, meat-rich and meat-poor portions	Traction, meat-rich and meat-poor portions	Low/High?

TABLE 6.2: NUMBER OF IDENTIFIED SPECIMENS BY AREA AND STRATUM OF IRON AGE IIB JERUSALEM

Iron Age II	Species	Common Name	Area D3		Giv'ati: Area M1		Area D1: Stratum 14		Area D1: Stratum 12		Area C and H: Str. 9		Area C and H: Str. 8		WWP: Construction Fills		WWP: Collapse and Fills		Ophel: Above Floor		Ophel: Below Floor	
			This Study		Bar-Oz and Raban-Gerstel 2013		Horwitz 1996; Horwitz and Tchernov 1996		Horwitz 1996; Horwitz and Tchernov 1996		Marom and Agha in press		Marom and Agha in Press		Sapir-Hen et al 2016		Sapir-Hen et al 2016		Horwitz and Tchernov 1989		Horwitz and Tchernov 1989	
			NISP	NISP %	NISP	NISP %	NISP	NISP %	NISP	NISP %	NISP	NISP %	NISP	NISP %	NISP	NISP%	NISP	NISP%	NISP	NISP %	NISP	NISP %
Domesticated Ungulates	*Capra hircus*	Goat	27	3.4%	5	5.6%					67	3.8%	9	5.4%	59	9.0%	149	7.8%				
	Ovis aries	Sheep	28	3.5%	7	7.8%					73	4.1%	4	2.4%	39	5.9%	140	7.3%				
	Caprine size	Sheep or Goat	624	78.8 %	54	60.0 %	558	88.2 %	212	80.0 %	1356	76.9 %	131	78.9 %	478	72.5%	1323	69.2%		82%		88%
	Bos taurus	Cow	83	10.5 %	20	22.2 %	94	14.8 %	48	18.1 %	218	12.4 %	20	12.0 %	55	8.3%	179	9.4%		8%		4%
	Sus scrofa domesticus	Pig			2	2.2%	1	0.2%	2	0.8%	11	0.6%	1	0.6%	2	0.3%	7	0.4%				
	Equus asinus	Donkey	6	0.8%			1	0.2%			7	0.4%					2	0.1%		2%		0.2%
	Canis familiaris	Domestic Dog	7	0.9%			1	0.2%			4	0.2%			1	0.2%	14	0.7%				
Wild Mammals	*Gazella gazella*	Mountain gazelle	5	0.6%			1	0.2%			5	0.3%			5	0.8%	7	0.4%				0.5%
	Lepus capensis	Hare	2	0.3%											2	0.3%	2	0.1%				
	Cervidae	Deer					2	0.3%	1	0.4%	2	0.1%										0.2%
	Dama mesopotamica	Mesopotamian Fallow Deer													1	0.2%	1	0.1%				
	Cervus elaphus	Red Deer													2	0.3%	2	0.1%				
	Felis sylvestris	Cat									1	0.1%						0.0%				
Aves	Small Aves	Small Bird													6	0.9%	27	1.4%	1	2%		
	Medium aves	Medium Bird	1	0.1%							18	1.0%	1	0.6%	4	0.6%	22	1.2%				
	Large aves	Large Bird															5	0.3%				
	Gallus gallus	Chicken	4	0.5%	2	2.2%	1	0.2%									5	0.3%	1	2%	5	1.1%
	Columba sp.	Pigeon/ Rock Dove															1	0.1%			11	2.3%
	Anser sp.	Goose					1	0.2%	1	0.4%					4	0.6%	11	0.6%	2	4%	6	1.2%
	Alectoris chukar	Partridge	2	0.3%			3	0.5%	1	0.4%							1	0.1%			9	1.8%
	Anas platyrhynchos	Mallard Duck															6	0.3%			3	0.6%
Rodents	*Rodentia*	Rodent	3	0.4%											1	0.2%	7	0.4%				
Reptiles	*Testudo graeca*	Tortoise									1	0.1%										
TOTAL			792	100%	90	100%	663	100%	265	100%	1763	100%	166	100%	659	100%	1911	100%	42	100%	454	100%

TABLE 6.3: NUMBER OF IDENTIFIED SPECIMENS (NISP) OF FISH (*PISCES*) BY AREA OF IRON AGE IIB JERUSALEM

Iron Age II Pisces		Rock-Cut Pool (Reich et al. 2007)		Ophel (Lernau and Lernau 1989)		City of David (Lernau and Lernau 1992)		City of David: Area D3 (This Study)	
Scientific Name	Common Names	NISP	N%	NISP	N%	NISP	N%	NISP	N%
Clariidae Clarias gariepinus	African sharp tooth catfish	216	3.99%	5	10.64%	20	10.93%	2	3.64%
Bagridae	Bagrid catfish	1	0.02%						
Sparidae	Porgies	3058	56.48%			91	49.73%	20	36.36%
Sparidae Sparusu aurata	Gilt-Head Sea Bream	517	9.55%	18	38.30%			13	23.64%
Pagrus coeruleostictus	Blue-Spotted Sea Bream	38	0.70%	1	2.13%				
Lithognatus mormyrus	Striped Sea Bream	14	0.26%					2	3.64%
Pagellus sp.	Sea Bream	1	0.02%						
Cyprinidae barbus barbus	Common Barbel								
Mugilidae	Mullets	1023	18.90%	2	4.26%	21	11.48%	11	20.00%
Mugil cephalus	Flathead gray Mullet	11	0.20%						
Liza ramada	Thinlip Grey Mullet	10	0.18%						
Lates Nilotic	Nile Perch	136	2.51%	8	17.02%	29	15.85%	4	7.27%
Cichlidae	Mouth Breeders (Tilapia)	100	1.85%	2	4.26%	2	1.09%	1	1.82%
Tristramella sacra	Long Jawed Tristram's St. Peters Fish	2	0.04%						
Serranidae	Groupers/Seabass	29	0.54%			13	7.10%		
Epinephelus sp.	Grouper	13	0.24%	10	21.28%				
Micteroperca Rubra	Comb Grouper	2	0.04%						
Sciaenidae	Meagres	115	2.12%						
Argyrosomus regius	Meagre	74	1.37%	1	2.13%	7	3.83%		
Sciaena umbra	Brown Meagre	2	0.04%						
Dicentrarchus labrax	European Seabass	2	0.04%						
Scombridae	Tuna	2	0.04%						
Carangidae	Jacks and Pompons	3	0.06%						
Sarocentron rubrum	Red Soldierfish	1	0.02%						
Pomatomus saltatix	Bluefish	1	0.02%						
Scaridae	Parrotfish	1	0.02%						
Elasmobranchii	Sharks or Rays	39	0.72%					2	3.64%
Anguilla Anguilla	Eels	3	0.06%						
Total		5414	100.00%	47	100.00%	183	100.00%	55	100.00%

FIGURE 6.2 FREQUENCY OF FISH IN IRON AGE IIB JERUSALEM

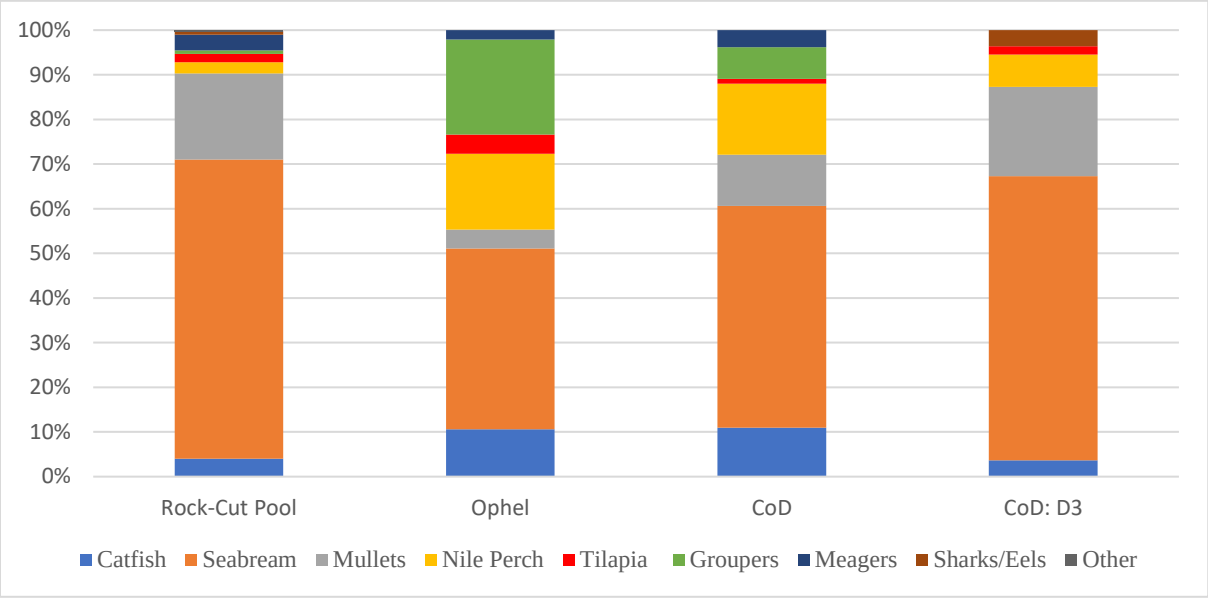


FIGURE 6.3 RAREFACTION OF FISH IN IRON AGE IIB JERUSALEM: A. OPHEL, B. CITY OF DAVID, C. CITY OF DAVID AREA D3 (THIS STUDY).

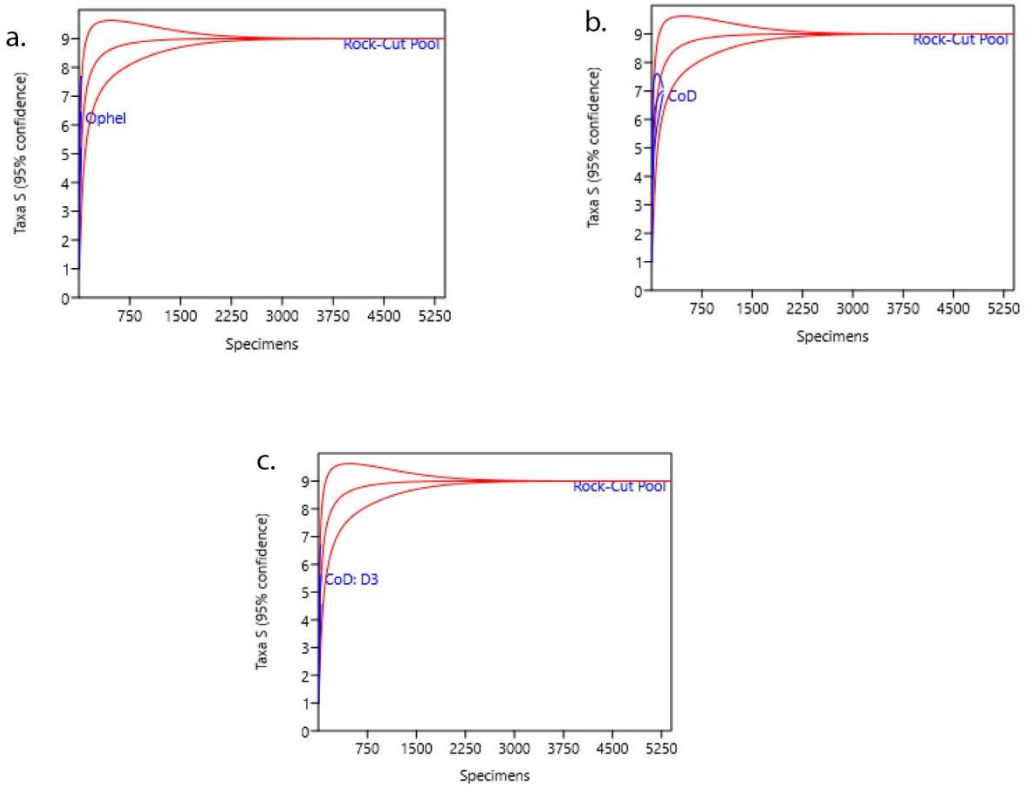


TABLE 6.4. AGING OF IRON AGE IIB CAPRINE BY AREA BASED EPIPHYSEAL FUSION, FOLLOWING ZEDER 1994. F = FUSED, UF= UNFUSED

Caprine Aging	Area D3			Area M1: Str. 7-9			Area D1: Str. 14			Area D1: Str. 12			Area C and H: Str. 9			Area C and H: Str. 8			WWP: construction fills			WWP: collapse debris		
	(This Study)			Bar-Oz and Raban-Gerstel 2013			Horwitz 1996			Horwitz 1996			Marom and Agha in press			Marom and Agha in press			Sapir-Hen et al 2016; in press			Sapir-Hen et al 2016; in press		
Element	F	UF	%UF	F	UF	%UF	F	UF	%UF	F	UF	%UF	F	UF	%UF	F	UF	%UF	F	UF	%UF	F	UF	%UF
P. Radius	20	3	13%				0	0	0%	0	0	0%	17	0	0%	8	0	0%	9	1	10%	31	1	3%
Group A, 0-6	20	3	13%	0	0	0%	0	0	0%	0	0	0%	17	0	0%	8	0	0%	9	1	10%	31	1	3%
D. Humerus	14	1	7%				27	4	13%	16	3	16%	25	0	0%	2	1	33%	2	0	0%	36	0	0%
Pelvis	8	2	20%				0	0	0%	0	0	0%	17	5	23%	2	0	0%	0	0	0%	16	1	6%
Scapula	3	1	25%				0	0	0%	0	0	0%	11	4	27%	0	1	100%	0	0	0%	14	2	13%
Group B, 6-12	25	4	14%	0	0	0%	27	4	31%	16	3	16%	53	9	15%	4	2	33%	2	0	0%	66	3	4%
Phalanx 2	12	3	20%				3	0	0%	4	1	20%	30	11	27%	0	4	100%	18	3	14%	43	11	20%
Phalanx 1	8	8	50%				9	4	31%	14	2	13%	29	20	41%	3	1	25%	16	6	27.27%	58	26	31%
Group C, 12-18	20	11	35%				12	4	25%	28	3	10%	59	31	34%	3	5	63%	34	9	21%	101	37	27%
D. Tibia	9	2	18%	0	1	100%	2	2	50%	5	2	29%	5	3	38%	1	2	67%	6	2	25%	22	10	31%
D. Metapodial	7	8	53%	1	0	0%	3	8	73%	7	10	59%	30	26	46%	5	4	44%	4	5	56%	18	20	53%
Group D, 18-30	16	10	38%	1	1	50%	5	10	67%	12	12	50%	35	29	54%	6	6	50%	10	7	70%	40	30	43%
Calcanius	3	2	40%	0	1	100%	0	0	0%	0	0	0%	7	15	68%	2	0	0%	5	2	29%	2	6	75%
P. Femur	2	13	87%				5	9	64%	3	5	63%	5	25	83%				6	5	45%	13	19	59%
D. Femur	4	3	43%	1	1	50%	7	2	22%	0	3	100%	2	5	71%				2	8	80%	1	8	89%
P. Ulna	2	2	50%				0	0	0%	0	0	0%	0	2	100%				0	0	0%	7	6	46%
D. Radius	0	5	100%	0	1	100%	6	7	54%	1	1	50%	7	15	68%	1	0	0%	1	4	80%	9	11	55%
P. Tibia	3	4	57%				2	2	50%	1	1	50%	1	2	67%				0	0	0%	12	3	20%
Group E, 30-48	14	29	67%	1	3	75%	20	20	50%	5	10	56%	22	64	74%	2	0	0%	14	19	58%	44	53	55%
P. Humerus	2	10	83%				2	2	50%	2	0	0%	2	15	88%				0	0	0%	0	0	0%
Group F, 48+	2	10	83%	0	0	0%	2	2	50%	2	0	0%	2	15	88%				0	0	0%	0	0	0%
GRAND TOTAL	97	67	41%	2	4	67%	66	40	38%	63	28	35%	188	148	44%	23	13	36%	69	36	34%	282	124	31%

TABLE 6.5. SKELETAL ELEMENT FREQUENCIES OF CAPRINES BY AREA OF IRON AGE IIB JERUSALEM

Caprine Skeletal Frequencies		Area D3		Area M1		Area's C and H Str. 9		Area's C and H Str.8		WWP: construction Fill		WWP: Collapse debris	
		This Study		Bar-Oz and Raban-Gerstel 2013		Marom and Agha in press		Marom and Agha in press		Sapir-Hen in press		Sapir-Hen in press	
Body Portion	Element	MNE	MAU%	MNE	MAU%	MNE	MAU%	MNE	MAU%	MNE	MAU%	MNE	MAU%
Head	Cranium	3	1.8%	1	1%	5		2			35%	5	44%
	Mandible	4	6.7%	3	8%	6	100%	6	21%			18	
Trunk	Atlas	2	40.0%	1	33%	5	36%	1	7%	2	33%	3	18%
	Axis	1	20.0%		0%	4	29%			2	28%	3	12%
	Cervical V	6	24.0%		0%	24	36%	1	7%	5	14%	10	9%
	Thoracic V	7	10.8%	8	21%	58	36%	1	7%	5	5%	17	5%
	Lumbar V	12	34.3%		0%	26	29%	1	7%	5	12%	17	14%
	Pelvis	6	20.0%	1	6%	24	86%	3	14%	10	71%	29	85%
Forelimb	Scapula	5	50.0%	1	17%	26	93%	3	14%	9	64%	19	56%
	Humerus	8	80.0%	1	100%	23	86%	4	14%	10	71%	28	82%
	Radius	10	100.0%	6	17%	12	43%	6	21%	14	100%	33	97%
	Ulna	3	30.0%	1	50%					5	35%	13	38%
Hindlimb	Tibia	5	50.0%	1	33%	16	57%	3	14%	12	86%	31	91%
	Femur	5	50.0%	2	0%	22	79%	3	14%	11	78%	31	91%
Feet	Carpals/Tarsals	9	8.2%	3	3%					52	19-35%	117	19-31%
	Metapodials	7	35.0%	2	8%	34	64%	2	7%	14	34-64%	30	41-47%
	Phalanx I	12	30.0%	2	4%	69	64%	6	7%	25	42%	74	54%
	Phalanx II	13	32.5%	1	0%	55	50%	4	7%	24	43%	50	37%
	Phalanx III	6	15.0%		0%	29	29%	3	7%	14	25%	36	26%

6.1.1.1.1 Jerusalem on the Eve of the 587/6 BCE Destruction

The faunal remains from Building 100 in the Givati Parking Lot allow for a unique glance into the animal use of a monumental building destroyed in the Babylonian destruction of 587/6 BCE; especially in comparison to destruction dumps (i.e., fills) in Area G. The number of assemblages dated to the Iron Age IIB is unprecedented, but there are significantly less dated to the Iron Age IIC, which may relate to the destruction of only elite houses by the Babylonians (Jer 52:13).

The animal economy depicted in Building 100 is similar to the fills in the Stepped Stone Structure (Area G; Tamar and Bar-Oz 2015) (Table 6.6; 6.7; Figure 6.4). Building 100 follows the same pattern as the public/high-status areas in the Iron Age IIB in that sheep and goats were exploited for their meat and their secondary products. Additionally, there was a focus on forelimb consumption. Exploring if these forelimbs in Building 100 are akin to the consumption of the priestly tithe (Lev 7: 28-32) is questionable in Room's A and B but is distinct in Room C. In Room C there is a dominance of rights versus left forelimbs compared to the other rooms (Figure 6.5).

Additional similarities between the Stepped Stone Structure fill and Area M2 are their frequency of cattle around 7% (Table 6.6). A low frequency of cattle is in line with the carrying capacity of the region and suggests conservation of cattle for traction (Sasson 2005). Differences between the contexts suggest a contrast in avian usage, with a greater frequency of birds in Area M2 with 8%, versus the Stepped Stone Structure, fills with 4% (Table 6.6). The most common bird in Area M2 was chicken, whereas the Stepped Stone Structure had a prevalence of pigeons and an absence of chicken (Table 6.6; Tamar and Bar-Oz 2015: Table 13.1). Chicken is a consumption fowl, whereas pigeons and partridges have a cultic association (Altmann and

Spiciarich 2020; Spiciarich 2020), which implies a difference in consumption or cultic use of birds between the contexts.

The rooms in Building 100 also suggest different species are exploited at varying frequencies in each room, such as Room's A and B, have a variety of birds, rodents, reptiles, and fish, whereas Room C has a near absence of these species (Table 6.28). The subsistence strategy and potential evidence for the priestly tithe in Building 100, along with its similarity to the fills in the Stepped Stone Structure and the Western Wall Plaza excavations, leads to the determination of this building as a public high-status area.

Luxury consumables in the form of fish were prevalent throughout Building 100's rooms and in the fills of the Stepped Stone Structure. Following the Iron Age IIB trend, popular fish in this building were catfish, seabream, and mullets (Table 6.8). Fish were identified predominately in Room A and B (Table 6.28). There is a minimal presence of fish in Room C, the same room that had evidence of right forelimbs, and this may relate to the division of activity spaces within the building. Fish imports from Building 100 suggest the trade network from Egypt and the Coastal Plain, evident in the preceding Iron Age IIB, was maintained through the end of the Iron Age II, with fish sourced from Nile River, Bardawil Lagoon in the Sinai Peninsula, and the Mediterranean Sea.

A unique aspect of Building 100's assemblage is that this context has clear evidence of destruction (Shalom et al. 2019). Trying to discern if the destruction of the building or consumption practices caused charring on 14% of the assemblage is equivocal. Building 100 has the highest frequency of burned remains for the Iron Age II but is not the highest frequency of burned remains in Jerusalem when compared to burned frequencies diachronically (Table 6.9; Table 6.17). Other assemblages from Jerusalem that have a higher or similar frequency of burned

remains are the Persian period fills in the Stepped Stone Structure with 14.5% burned and a Late Hellenistic floor in Area M1 (Str. VIII; L.808, L.795) with 36.4% burned (Table 6.9). The latter has the highest frequency of burned remains but does not relate to a destruction event. The burned remains from Late Hellenistic Area M1 relate to the localized food activities (see Section 6.1.1.4). Bones can withstand high temperatures and were not affected during the destruction processes that occurred in Building 100 or were only minorly affected, as only a minor portion of the assemblage was charred. Burned remains in Building 100 included snakes and rodent bones, suggesting these species were present at the destruction of the room or consumed by squatters that sheltered in the ruins of Building 100 after its destruction.

TABLE 6.6: NUMBER OF IDENTIFIED SPECIMENS BY AREA AND STRATUM OF IRON AGE IIC JERUSALEM

Iron Age IIC	Species	Common Name	Area G: Stepped Stone Structure Str. X B/C		Area M2: Building 100 Phase IX	
			Tamar and Bar-Oz 2015		This Study	
			NISP	NISP%	NISP	NISP%
Domesticated Ungulates	*Capra hircus*	Goat	45	1.88%	45	4.91%
	Ovis aries	Sheep	59	2.46%	33	3.60%
	Caprine size	Sheep or Goat	1981	82.54%	630	68.78%
	Bos taurus	Cow	165	6.88%	27	2.95%
	A Size	Large Mammal			26	2.84%
	Equus asinus	Donkey	2	0.08%	1	0.11%
	Canis familiaris	Domestic Dog	9	0.38%	1	0.11%
Wild Mammals	*Gazella gazella*	Mountain gazelle	3	0.13%	15	1.64%
	Canis/Gazella size	Small mammal			11	1.20%
	Cervus elaphus	Red Deer			1	0.11%
	Capreolus capreolus	Roe Deer			1	0.11%
	Dama mesopotamica	Fallow Deer	19	0.79%	2	0.22%
	Lepus capensis	Hare	2	0.08%		
	Pedetes capensis	Spring Hare			1	0.11%
	Vulpes vulpes	Red Fox			1	0.11%
	Felis sylvestris	Cat	1	0.04%		
Aves	*Alectoris chukar*	Chukar Partridge	20	0.83%	11	1.20%
	Anser Anser	Domestic Goose	3	0.13%	3	0.33%
	Columba livia	Rock Pigeon/Dove	12	0.50%	1	0.11%
	Gallus gallus	Chicken			40	4.37%
	Small Aves	Small Bird	12	0.50%	2	0.22%
	Medium aves	Medium Bird	50	2.08%	17	1.86%
	Large Aves	Large Bird	5	0.21%		
Rodentia	*G-size*	Rodent	10	0.42%	12	1.31%
	Rattus rattus	Rat			1	0.11%
Reptilia/Anura	*Reptilia*	Snake			33	3.60%
	Anura	Frog or Toad			1	0.11%
	Testudo graeca	Tortoise	2	0.08%		
Total			2400	100%	916	100%

TABLE. 6.7. SKELETAL ELEMENT FREQUENCIES OF CAPRINES BY AREA OF IRON AGE IIC JERUSALEM

Caprine Skeletal Frequencies		Area G	Area M2: Phase IX IAIIC	
		Tamar and Bar-Oz 2015	This Study	
Body Portion	Element	MAU%	MNE	MAU%
Head	Cranium	70%	3	67%
	Mandible	80%	7	78%
Trunk	Atlas	45%	2	44%
	Axis		2	44%
	Cervical V		4	18%
	Thoracic V	45%	8	14%
	Lumbar V		11	35%
	Pelvis	100%	7	26%
Forelimb	Scapula	95%	3	33%
	Humerus	85%	7	78%
	Radius	60%	5	56%
	Ulna	45%	9	100%
Hindlimb	Tibia	60%	4	44%
	Femur	50%	3	33%
Feet	Carpals/Tarsals	75%	40	40%
	Metapodials	30-60%	8	44%
	Phalanx I	40%	15	42%
	Phalanx II		13	36%
	Phalanx III		11	31%

FIGURE 6.4 AGING OF IRON AGE IIC CAPRINES FROM AREA G (STEPPED STONE STRUCTURE; TAMAR AND BAR-OZ 2015) AND AREA M2 (BUILDING 100; THIS STUDY).

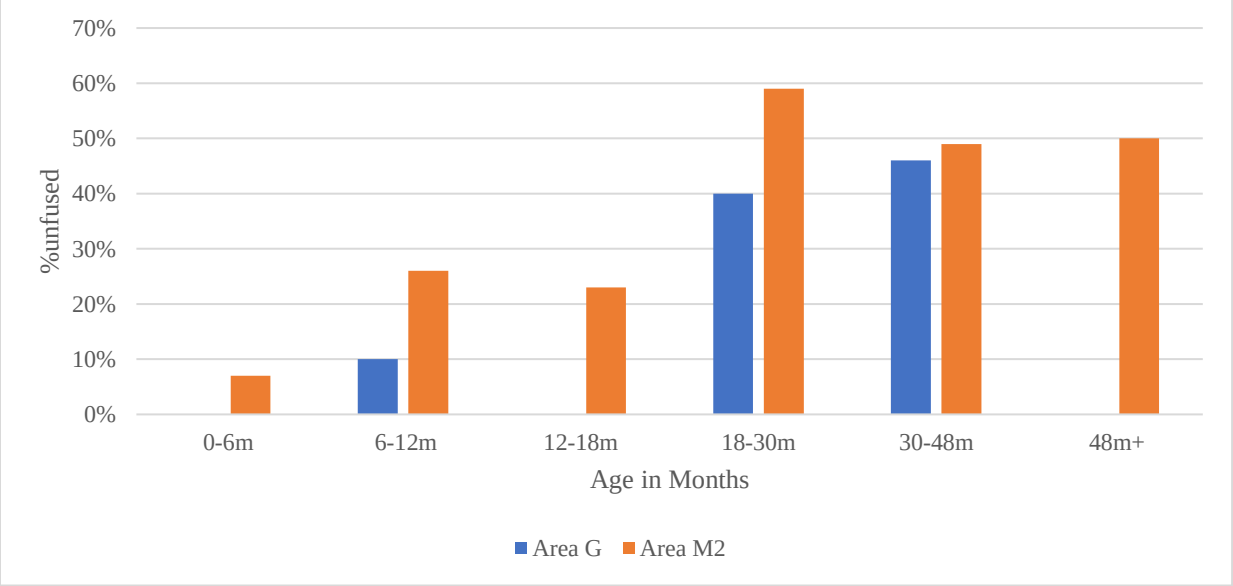


FIGURE 6.5 NUMBER COUNT OF RIGHT VERSUS LEFT FORELIMBS (SCAPULA, HUMERUS, RADIUS, AND ULNA) IN AREA M2'S BUILDING 100 (PHASE IX)

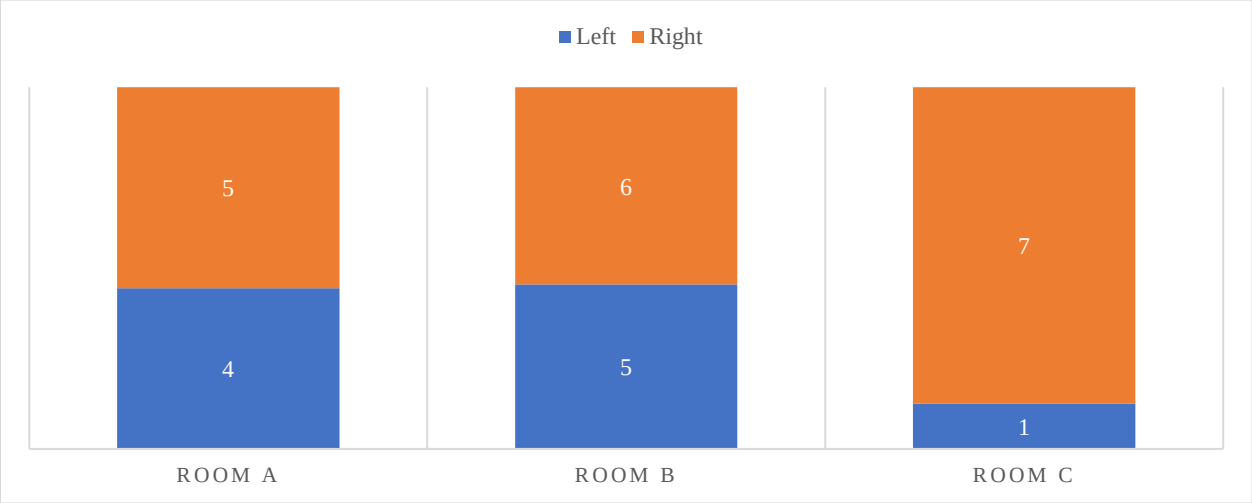


TABLE. 6.8 NUMBER OF IDENTIFIED SPECIMENS (NISP) OF FISH (*PISCES*) BY AREA OF IRON AGE IIC JERUSALEM

Species	Common Name	Area G: Stepped Stone Structure, Str. X B/C[57]		Area M2 Phase IX_ Iron Age IIC	
		Lernau 2015		This Study	
		NISP	NISP%	NISP	NISP%
Clariidae Clarias gariepinus	African sharp-tooth catfish	27	40.30%	17	18.89%
Centropomidae Lates niloticus	Nile Perch			3	3.33%
Sparidae sp.	Porgies	30	44.78%	22	24.44%
Sparidae Sparusu aurata	Gilt-head seabream			16	17.78%
Sparidae Sparusu mormyrus	Striped seabream			3	3.33%
Mugilidae	Mullets	5	7.46%	17	18.89%
Cyprinidae Barbus barbus	Common Barbel			3	3.33%
Serranidae	Groupers			4	4.44%
Serrenidae epinephelus aeneus	White Grouper			1	1.11%
Scianidae Argyrosomus regius	Meagre	5	7.46%	1	1.11%
Elasmobranch	Shark or Ray			3	3.33%
Total		67	100%	90	100.00%

[57] The NISP of Area G's fish were not separated by stratum (Lernau 2015: Table 16.1), but common species (i.e., porgies, mullets, drums, and catfish) were separated by layer to compare size (Lernau 2015: Table 16.3-16.6), thus only exact counts of these species can be compared from this area.

TABLE. 6.9. FREQUENCY OF BURNED FAUNAL REMAINS IN JERUSALEM FROM THE IRON AGE II BY AREA.

Period	Area/Site in Jerusalem	Context	Burned %	Citation
Iron Age II	Ophel	Public	NA	Horwitz and Tchernov 1989
	Western Wall Plaza: Construction	Public	4.2%	Sapir-Hen et al. 2016; Sapir-Hen in Press
	Western Wall Plaza: Collapse	Public	8.8%	Sapir-Hen et al. 2016; Sapir-Hen in Press
	Area M1: Stratum IX- XII	Public	1.1%	Bar-Oz and Raban-Gerstel 2013
	Area G: Iron Age IIB	Fill	3.1%	Tamar and Bar-Oz 2015
	Area M2: Phase IX	Public/ Destruction Layer	14%	This Study
	Area G: Iron Age IIC	Fill	3.4%	Tamar and Bar-Oz 2015
	City of David: Strata 12-14	Domestic	NA	Horwitz 1996
	City of David: Area D3	Domestic	3.2%	This Study
	Area C and H	Public	6.1%	Marom and Agha in press

6.1.1.2 Jerusalem in the Babylonian Period

In the aftermath of the Babylonian destruction in 587/6 BCE, there is an assumption that Jerusalem was deserted and slowly repopulated in the late 6th through 4th centuries BCE. The material culture at this time did not instantaneously change with the destruction, but slowly developed over time, like any other technology (Barkai 1992; Lipschits 1997; Barstad 1996; 2001; Freud 2018). New insight into the ceramic developments of the transitional Babylonian period (586-534 BCE) has uncovered occupation in Jerusalem and its hinterland dated to this time (Freud 2018).

Fills in Area G (Stepped Stone Structure, Str. 10/9), at the summit of the Southeastern Ridge, are identified as Babylonian based on the inclusion of some Iron Age IIC type ceramics in addition to the inclusion of types that do not date to the Iron Age IIC, such as bowls with outfolded rims, kraters with wedge rim decorations, unusual size and shaped decanters, and the use of Moẓa clay (Freud 2018: plate 18-20; Mazar 2015).[58] These fills in Area G also include the only faunal remains dated to this transitional phase.

[58] The fills in Area G have been argued by some scholars to represent the *terminus ante quem* for the Northern Tower, thus it should be dated to the Late Hellenistic (Hasmonean) period (Na'aman 2011; Steiner 2011: 313; Geva 2012; Finkelstein 2018: 25). According to a review of the ceramics, these fills are stratified, and the pottery is clearly dated to the 6th century BCE (Freud 2018; Freud per comm).

From the available data, the animal economy of the Babylonian period of Jerusalem was focus primarily on the use of sheep and goat, with more sheep utilized, for secondary products and meat (Tamar and Bar-Oz 2015: Table 13.1-13.3). All body part aspects were present in Area G's fills with a focus on meat-poor elements, such as the crania, feet, and lower hindlimb's tibia (*ibid*: 502), suggesting this material may represent butchery waste or the consumption of lower quality parts. This understanding has to be taken with caution as the assemblage was affected by density-mediated attrition, which produces a 'head and foot' pattern (*ibid*; Marean and Frey 1997).

The frequency of cattle is also low, approximately 5% (*ibid*: Table 13.1), suggesting the climate and post-destruction pressures at this time affected livestock rearing during the Babylonian period. Consumption of fish is also present in the fills and suggests the consumption of porgies and catfish (Lernau 2015). These species derive primarily from Egyptian water sources, although catfish could have been present in the Yakon River (Lernau 2015; Lernau per comm).[59] Tamar and Bar-Oz concluded that the animal economy of the Babylonian period of Jerusalem is that of a consumer-producer system that utilized livestock for both meat and secondary products (2015: 508).

An initial hypothesis of what a Babylonian period animal economy would look like would propose a meat-focused exploitation pattern and the full use of the animal, based on the biblical assumption that only the poor remained. In some ways, what is present in the fills, from Area G, fits this pattern, but what was unexpected was the use of animals for secondary products. One would assume those that remained would be hungry and consume what they had regardless

[59] Origin of catfish is equivocal. The species, African sharp-tooth catfish (*Clariidae Clarias gariepinus*), is present in the Nile River but also in the Yarkon River, O. Lernau suggest at this time they were primarily imported from Egypt, however they could have also been picked up along the Yarkon as this is the nearest fish source to Jerusalem.

of livestock's other benefits. The consumer-producer economy depicted in Str. 10/9 of Area G is also reminiscent of the animal economy of the prior Iron Age II, suggesting the ceramic continuity that is present in the transitional phase of the Iron Age to the Persian period is present from the perspective of animal use, as well. Those that resided in Jerusalem similarly utilized animals and their products as they had before the destruction of 587/6 BCE.

6.1.1.3 Jerusalem in the Persian Period

As it stands, we know that Jerusalem and its hinterland were occupied in the Persian period.[60] The extent to which Jerusalem was occupied is obscured. Those that remained rebuilt Jerusalem, reused the same structures that already existed, and only minorly modified the spaces with the addition of new walls (Shalev et al. 2020; Shiloh 1964: 14, 20-21; DeGroot and Bernick-Greenberg 2012: 19-22). In this way, the occupational pattern of Jerusalem resembles 'crisis architecture' or a 'squatter settlement' (Zuckerman 2007); both of these terms imply a sense of poverty.

Faunal remains from the Persian period are best represented by the material from Area M2 of this study, as this assemblage is the only one from the direct living context of floors and accumulation in a building, dated to the early Persian period (6th–5th centuries BCE; Shalev et al. 2020). Comparative assemblages originate from the 'gravel dumps' of quarrying activity in Area D2 (Square G-15; Shiloh 1984: 8-9; Horwitz 1996), and the stratified fill in Area G (Str. 9B; Mazar 2015: 22; Tamar and Bar-Oz 2015).[61] The fills in Area G also include two dog burials

[60]Shiloh 1984: 8-9; DeGroot and Bernick-Greenberg 2012: 19-22; Gadot 2015; Mazar 2015: 22; Shalev et al. 2020.
[61] The fills of Str. 9B of Area G (late 6th through 5th centuries BCE) was used by Mazar to date the Norther Tower to the Persian period (2015: 22). This dating however remains under debate and many scholars prefer dating the tower to the Late Hellenistic period, as a component of the Hasmonean construction of the "First Wall" (see, Steiner 2011: 313; Geva 2012; Finkelstein 2018: 25).

dated to this period in time (Raban-Gerstel et al. 2015).

The animal economy of the Persian period predominantly focuses on the exploitation of caprine for meat and secondary products, based on the mortality profiles of Area M2 and Area G (Figure 6.6; Table 6.10; Tamar and Bar-Oz 2015: Table 13.2 and 13.3). Sheep in Area M2 were predominantly exploited for wool, whereas goats were likely exploited for meat, based on mortality profiles and mixture analysis (see Section 5.3.3). The dual usage of caprine for meat and secondary products seems to be a continual pattern for Jerusalem, as this pattern is present in the periods prior.[62] The ratio between sheep and goat differ between the assemblages, with more goats than sheep in Area M2 (1:1.15) and more sheep than goats in Area G (1.4:1; Tamar and Bar-Oz 2015: 500). These ratios are nearly equal. The difference is due to consumption and disposal aspects related to the unknown – possibly cultic – origin of the fill material in Area G versus the preference for goat meat and milk in Area M2.

Comparing the body part frequencies of caprine suggest all skeletal elements are present in each assemblage (Table 6.11), suggesting the localized butchery of livestock occurred in the city. Each assemblage depicts different frequencies for preferred body parts, but universally there is a predilection for limbs, both forelimbs, and hindlimbs (Table 6.11). Body parts common in Area G are limbs and lower extremities (metapods and phalanges) (Tamar and Bar-Oz 2015), suggesting consumption of meaty and non-meaty parts, possibly butchery refuse. Area D2 and Area M2 body part exploitation is similar, with a focus on the truncal parts, which would be heavy with meat, and some limb elements (Table 6.11; Horwitz 1996). Only in Area M2 is there

[62] See epiphyseal fusion of caprines discussed in Section 6.1.1.1 and 6.1.1.2.

a high frequency of cranial remains; this may relate to the in-house slaughtering of animals or an attempt to use all possible resources available.

Frequencies of cattle also differ between the assemblages with cattle representing 5% in Area G (Tamar and Bar-Oz 2015: 501), 25% in Area D2 (Horwitz 1996), and 8% in Area M2 (Table 6.10). The high frequency in Area D2 is a direct reflection of a small, hand-picked assemblage (N: 36; Horwitz 1996). Cattle frequencies of Area G and Area M2 frequencies are both low enough to posit the limited exploitation of cattle in Jerusalem (Table 6.10). Low cattle frequencies may be due to the region's natural available resources, that was exacerbated due to the climatic dry phase, and their role in agricultural production as needed draft animals (Sasson 2005; Langgut and Lipschits 2017). The mortality profile of cattle suggests some portion of the herd was exploited for meat with the culling of cattle at one and half years and three years in both Area M2 and Area G (Table 5.37; Tamar and Bar-Oz: 501).

Avian exploitation varies between the assemblages (Table 6.10). The most common bird, likely consumed, in Area M2 is chicken, representing approximately 7.5% of the entire assemblage, 10% when including the medium aves category (Table 6.10). Chicken in Area G represents less than one percent of that assemblage, if combined it with the medium aves category, that frequency goes up to 5% (Table 6.10). The most common bird in Area G is partridge with one percent, but also includes a wide array of birds including duck, geese, doves, and falcons (Table 6.10; Tamar and Bar-Oz: Table 13.1). The presence of doves and partridges in the Area G's fills versus their low frequency of partridge and absence of dove in Area M2 indicate differences between domestic context and the origin of the fill's material. Doves, pigeons, and partridges are symbolic, and this could allude to the fill's cultic origin (Altmann and Spiciarich 2020). Domestic consumption of chicken in Area M2 is further supported by

evidence of the entire body being present, a slight preference of hens (59%) over cocks (40%), roasting, and butchery markings (see, Section 5.3).

Other underrepresented taxa, specifically fish, is also noted in other Persian period assemblages. Fish from the Persian period were identified in Area G (Lernau 2015). In comparison to the fish from Area M2, there is a greater variety of species recorded in Area M2 (Table 6.11).[63] The most common fish in the Persian assemblage are mullets and porgies, but there is also the presence of catfish, tilapia, barbel, meagre, and Nile Perch (Table 6.11). The fish present suggests there were trade and imports from the Yarkon and Nile Rivers, the Bardawil Lagoon, and the Mediterranean Sea.

The animal economy of Jerusalem in the Persian period maintains its consumer-producer pattern that is depicted in earlier periods when the city was considered urban. Those in control of the region, the Achaemenids, like the empires before them, focused on maintaining agricultural production and securing taxes (Grabbe 2011: 169). It is not surprising then, that the main livestock animals– sheep and goats– were exploited in similar manners to produce both meat and secondary products, like wool. The exploitation of young cattle, a critical decision that would take agricultural power away from fields, indicates that cattle dairying was an aspect of the animal economy in the Persian period. Pastoral processes associated with dairying include killing off young livestock in order to preserve the mother's milk (Vigne and Helmer 2007); at the same time, it provides young tender meat to the consumers or functioned as sacrificial offerings.

Animal exploitation presented in Area M2, as well as in the fills of Area G, represents a higher socioeconomic subsistence pattern, that is reinforced by the presence of fish. Fish, as

[63] The NISP of Area G's fish were not separated by stratum (Lernau 2015: Table 16.1), but common species (i.e., porgies, mullets, drums, and catfish) were separated by layer to compare size (Lernau 2015: Table 16.3-16.6), thus only exact counts of these species can be compared from this area.

stated above, is a luxury consumable, especially in an inland site with no direct fish source (see Section 6.1.2.1). The presence of fish in the Persian phase of Area M2 (Phase VIII) indicates a high to luxury status of food consumed in the context of 'crisis-architecture' or a 'squatter settlement.' Those that occupied this space lived in the ruins of Building 100, destruction debris had filled many of the rooms and was not cleared for reoccupation (Shalev et al. 2020). Located on the northwestern side of the Southeastern Ridge, this area could have been on the outskirts of the city, with the main settlement on the mound (Finkelstein, Koch, and Lipschits 2011). Even if Area M2 was within the city limits in the Persian period, there is a disconnect between the status of the spaces where people lived versus the status of the food they consumed.

High socioeconomic consumption of food in a low socioeconomic dwelling context, calls into question how archaeology interprets status. Interpretation of a population's status based on the construction quality of dwellings, such as the shabby walls built into the rock scarp of the Iron Age IIB or the squatter occupation of the Persian period, cannot hold on its own. Those residing in Jerusalem had greater access to diverse foodstuffs, including imports and game meat, regardless of where, how, or when they live in the city. The determination of a context's socioeconomic status has to be based on a holistic assessment of finds therein, including specifically the remains of foodstuffs.

A counter-argument is that the consumption of fish in these contexts reflects elite emulation. This perspective places the population of Jerusalem into a dichotomy: elite and non-elite. It ignores the complex reality of an urban city in the 8th through 2nd centuries BCE, whose population included merchants, craftspeople, and traders. This portion of the population's status would straddle between elite and non-elite. The presence of merchants and foreign traders in Jerusalem is mentioned in Nehemiah (1:8, 7:2, 13:15-22), ostensibly during the reign of

Artaxerxes I, but they are also present when the city was under the Neo-Assyrian hegemony (Geva 1982; Edelman 2006). The sophisticated social hierarchy of those that resided in Jerusalem in the Persian period disputes the biblical notion that only the poor remained (Jer 52:16) or at least suggests that those that returned had greater access to luxury consumables, dairy products, and tender meat. In addition, there is a disparity in disposal activities between the consumption of food and its discarding, as well as disposal activities between public or elite contexts may be the result of shared spaces in hierarchical societies. In general, the contextualization of socioeconomic status must move beyond the binary of high- or low-status and try to discern patterns representative of non-elites that straddle this binary.

TABLE 6.10. NUMBER OF IDENTIFIED SPECIMENS BY AREA AND STRATUM OF BABYLONIAN AND PERSIAN JERUSALEM

Persian	Species	Common Name	Area G: Str. 9/10_Babylonian		Area G: Str. 9 Persian		Area M2 Phase VIII Persian		Area D2: Str. IX Persian	
			Tamar and Bar-Oz 2015		Tamar and Bar-Oz 2015		This Study		Horwitz 1996	
			NISP	NISP%	NISP	NISP%	NISP	NISP%	NISP	NISP%
Domesticated Ungulates	*Capra hircus*	Goat	9	1.36%	20	3.43%	91	3.43%		
	Ovis aries	Sheep	13	1.96%	22	3.77%	79	2.98%		
	Caprine size	Sheep or Goat	547	82.50%	439	75.30%	1874	70.66%	27	75.00%
	Bos taurus	Cow	32	4.83%	25	4.29%	142	5.35%	9	25.00%
	A Size	Large Mammal					97	3.66%		
	Canis familiaris	Dog	1	0.15%	8	1.37%	6	0.23%		
	Sus scrofa domesticus	Pig					3	0.11%		
	Camelus dromedarius	Arabian Camel			3	0.51%				
	Equus asinus	Donkey	1	0.15%			3	0.11%		
Wild Mammals	*Canis/Gazella size*	Small mammal					15	0.57%		
	Gazella gazella	Gazelle	1	0.15%	1	0.17%	13	0.49%		
	Cervus elaphus	Red Deer					1	0.04%		
	Capreolus capreolus	Roe Deer					4	0.15%		
	Dama mesopotamica	Fallow Deer	4	0.60%	3	0.51%				
	Lepus capensis	Cape Hare	1	0.15%			1	0.04%		
	Pedetes capensis	Spring Hare								
	Vulpes vulpes	Red Fox	1	0.15%	1	0.17%	1	0.04%		
Aves	*Alectoris chukar*	Partridge	18	2.71%	6	1.03%	12	0.45%		
	Anas platyrhynchos	Mallard Duck			2	0.34%				
	Anser anser	Domestic Goose	2	0.30%	1	0.17%	3	0.11%		
	Columba livia	Rock Pigeon/Dove	1	0.15%	5	0.86%				
	Gallus gallus	Chicken	1	0.15%	1	0.17%	200	7.54%		
	Falconidae	Falcon			1	0.17%				
	Small Aves	Small Bird	8	1.21%	10	1.72%	11	0.41%		
	Medium Aves	Medium Bird	17	2.56%	29	4.97%	51	1.92%		
	Large Aves	Large Bird	2	0.30%	2	0.34%	1	0.04%		
Rodentia	*G-Size*	Rodents					30	1.13%		
	Mus musculus	Mouse	2	0.30%			3	0.11%		
	Rattus rattus	Rat	1	0.15%	3	0.51%				
	Martes Fiona	Beech Marten								
	Spalax ehrenbergi	Mole-Rat								
	Soricidae	Shrew					1	0.04%		
Reptilia	*Reptilia*	Snake					8	0.30%		
	Testudo graeca	Tortoise	1	0.15%	1	0.17%		0.00%		
Anura	*Anura*	Frog or Toad					2	0.08%		
Total			663	100%	583	100%	2652	100%	36	100.00%

TABLE 6.11. SKELETAL ELEMENT FREQUENCIES OF CAPRINES BY AREA AND STRATUM OF BABYLONIAN AND PERSIAN JERUSALEM

Caprine Skeletal Frequencies		Area G: Str. 9/10 Babylonian	Area G: Str. 9 Persian	Area M2: Phase VIII Persian		Area D2: Str. IX Persian
		Tamar and Bar-Oz 2015	Tamar and Bar-Oz 2015	This Study		Horwitz 1996
Body Portion	Element	MAU%	MAU%	MNE	MAU%	NISP%
Head	Cranium	100%	35%	12	100%	11%
	Mandible	75%	45%	12	50%	
Trunk	Atlas	13%	10%	7	58%	44%
	Axis	13%	10%	7	58%	
	Cervical V			26	43%	
	Thoracic V	65%	45%	36	23%	
	Lumbar V			40	48%	
	Pelvis	75%	90%	10	14%	
Forelimb	Scapula	50%	70%	4	17%	11%
	Humerus	50%	60%	11	46%	
	Radius	50%	70%	17	71%	
	Ulna	40%	35%	10	42%	
Hindlimb	Tibia	80%	40%	10	43%	30%
	Femur	40%	100%	9	38%	
Feet	Carpals/Tarsals	65%	90%	83	31%	4%
	Metapodials	60	30-55%	24	50%	
	Phalanx I	75%	60%	38	40%	
	Phalanx II	75%	60%	24	25%	
	Phalanx III	75%	60%	23	24%	

FIGURE 6.6 AGING OF PERSIAN CAPRINES FROM AREA G (TAMAR AND BAR-OZ 2015) AND AREA M2 (THIS STUDY).

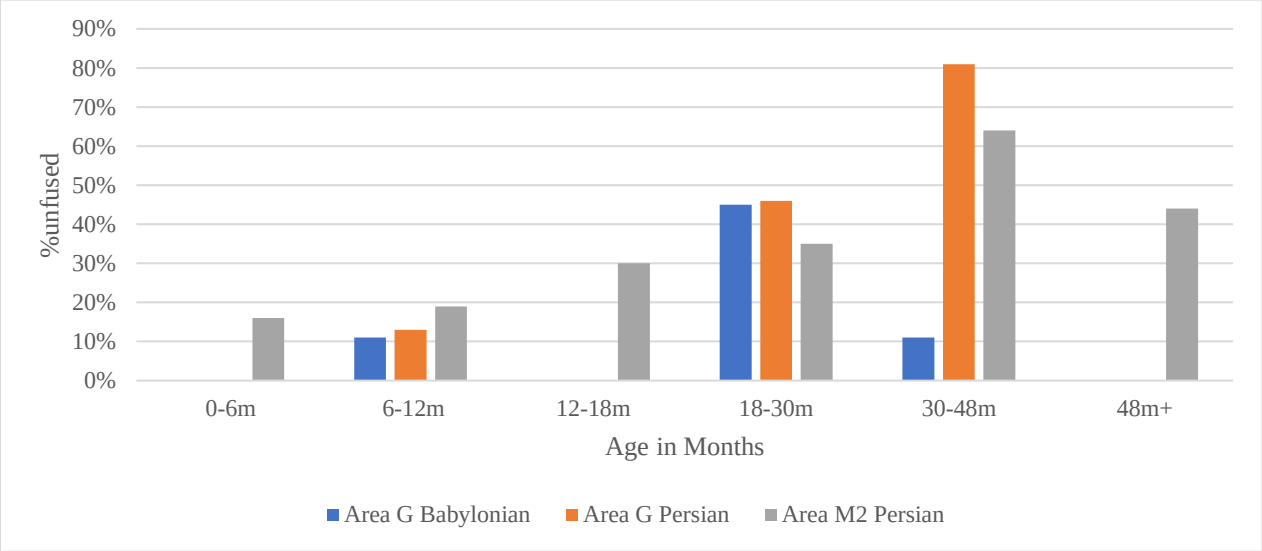


TABLE. 6.12 NUMBER OF IDENTIFIED SPECIMENS (NISP) OF FISH (*PISCES*) BY AREA OF BABYLONIAN AND PERSIAN JERUSALEM

Species	Common Name	Area G: Str. 9/10 Babylonian		Area G: Str. 9 Persian		Area M2 Str. VIII Persian	
		Lernau 2015		Lernau 2015		This Study	
		NISP	NISP%	NISP	NISP%	NISP	NISP%
Pisces Size	Fish					27	20.3%
Clariidae Clarias gariepinus	African Sharp-Tooth Catfish	80	38.1%	40	29.6%	16	12.0%
Sparidae sp.	Porgies	108	51.4%	84	62.2%	25	18.8%
Sparidae Sparusu aurata	Gilt-Head Seabream					12	9.0%
Cyprinidae Barbus barbus	Common Barbel					5	3.8%
Mugilidae	Mullets	19	9.0%	9	6.7%	27	20.3%
Muglilidae mugil cephalus	Flathead Gray Mullet					1	0.8%
Muglilidae liza ramada	Thinlip Grey Mullet					1	0.8%
Lates Nilotic	Nile Perch					4	3.0%
Cichlidae	Mouth Breeders					7	5.3%
Serranidae	Groupers					4	3.0%
Serrenidae epinephelus aeneus	White Grouper	3	1.4%	2	1.5%	1	0.8%
Scianidae Argyrosomus regius	Meagre					1	0.8%
Carangidae	Jacks and Pompons					1	0.8%
Elasmobranch	Shark or Ray					1	0.8%
Total		210	100%	135	100%	133	100%

6.1.1.4 Jerusalem in the Early Hellenistic

This study is the first to put forth assemblages dated to the Early Hellenistic (4th to mid-2nd centuries BCE, see Appendix I); to be exact, Area M2's assemblage dates to 3rd through early 2nd centuries BCE (Shalev et al. 2020). Thus, in terms of historical considerations, Area M2's assemblage dates to the Seleucid period of Jerusalem.[64] The remainder of assemblages dated to the broad Hellenistic period is representative of the Late Hellenistic (mid-2nd – mid-1st centuries BCE).[65]

Early Hellenistic faunal assemblages from Jerusalem derive from three contexts: Building 110 in Area M2, which is a monumental administrative/public building built with a façade and ashlars (Shalev et al. 2020). A residential/domestic structure in Area M5 (Area 50; Shalev et al. 2020). Installations in the domestic structure of Area M5 included a tabun, with a neighboring pit (L.5092). The pit was studied as a separate assemblage as it represents specific disposal activities that are individual to its context. Comparing these three assemblages allows for a comparison between public and domestic activities within a neighborhood of Seleucid Jerusalem.

Sheep and goat exploitation are the focus of the animal economy in the Early Hellenistic. There is a preference for goats in every area, and this is most pronounced in the pit (L.5092) in which there is evidence of at least three goats and one sheep, based on the minimum number of individuals (Table 6.13). Goat in the ancient Near East is regarded as less favorable than sheep, as sheep were the preferred sacrificial meat (Kozuh 2010). The climate during the Early Hellenistic is characterized as a moist phase compared to the drier phase of the Persian period

[64] There is a chronological gap in this research from the late Persian (4th century BCE) through the Ptolemaic period of the Early Hellenistic (3rd century BCE).
[65] See, Section 6.1.1.5.

(Langgut and Lipschits 2017), which would support sheep pastoralism over goat pastoralism. Suggesting two models: first, pastoralists at this time were still recovering from the Persian dry phase or, second, these areas had less access to redistributed sheep offerings from the cult.

Comparing the subsistence strategy between the public and domestic contexts suggest both areas focused on dairying and consumption of sub-adult caprine (Figure 6.7). This pattern is not reflected in the subsistence strategy of the pit, which depicts a proclivity for caprine under a year of life, a pattern that suggests a focus on meat consumption (Figure 6.7).

Another unique aspect of the pit is its inclusion of only consumable animals, especially in comparison to the public structure in Area M2. Animals present in the pit are only sheep, goats, cattle, some game and minimal chicken (Table 6.13). Fauna in Area M2 includes a wide arrange of species, including birds and rodents, that are not present in Area M5, indicating the pit was sealed and did not include commensal species common in public contexts (Table 6.7). Fish is present in both the public and domestic contexts but is absent in the pit (Table 6.27; Table 6.42). A pit full of consumable animals with an absence of fish may suggest the pit contains animals that were used in the neighboring tabun, as fish were likely smoked and salted before being imported and not cooked freshly (Van Neer et al. 2004).

Body part frequencies of caprine suggest a focus on fore and hindlimbs in both domestic and public contexts (Figure 6.8). Differences between the areas suggest the public context had greater access to meaty body parts with the preference for truncal parts, such as ribs, whereas extremities (phalanges and metapods) were utilized in the domestic contexts pit (Figure 6.8). The pit also contained elements that contain less meat, such as cranial and lower limbs, that discarded as they are non-consumable (Table 6.8). The use of these parts is generally associated with lower socioeconomic usage of animals, as these portion are considered meet-poor. Initially, the

prevalence of goat extremities in the pit resembled butchery refuse from cultic activities (Ekroth 2016). Comparing if any of the contexts had a propensity for more right versus left limbs, that could reflect cultic practices, suggest they are equally present with no dominance of one or the other (Figure 6.9).

The only indication that this pit may be sacrificial is in the age of caprine, where there is an apparent culling of caprine at six months to one year of age and then again later around four years (Figure 6.7). This sharp kill-off pattern is typical of subsistence pattern that is geared toward meat (Payne 1973), but is also the same age of caprine in sacrificial pits in the southern Levant (see Hazor− Lev-Tov and McGeough 2007, Kehati 2017; Mount Ebal− Horwitz 1987; Dan− Greer 2013; Jerusalem− Lernau 1995). Age of animals in sacrificial pits tend to reflect 'market-aged' animals; a term meaning when the livestock animal has maturated to a point where they are more expensive to keep and therefore sold for their meat.

The pit remains are likely the result of activities occurring in the dwelling; therefore, they require an explanation beyond cultic. The answer may lie in the goat extremities and taphonomic aspects of the pit in comparison with the other remains from Area M5. Remains from the pit were moderately butchered (8%) and burned (7%). Complete, non-articulated, extremities in the pit may be explained as the hooves were broken down and boiled down in order to make animal glue (Wei, Ma, and Schreiner 2012; O'Connor, Solazzo, and Collins 2015; Hu, Zhang, and Zhang 2015).

Animal glue is a standard product used in craft production to seal bullae in painting, woodworking, and textile production (Feugère 2002; O'Connor, Solazzo, and Collins 2015). Glue from hooves is produced through a process of hydrolysis that liquifies the keratin and proteins into a sticky substance. Boiling is hard to identify and may be evident in the shiny

texture of the extremities (Figure 5.17; Greenfield and Beattie 2017). It is more probable that the refuse in the pit is representative of craft and consumption activities that occurred in the dwelling.

In the Area M5, there is also the presence of medullary bone in chicken, though could lead to the hypothesis that egg consumption was occurring in the Early Hellenistic. Chicken and other birds are relatively uncommon in Early Hellenistic faunal assemblages from this study (Table 6.13). The frequency of chicken during this period is typically greater than five percent (Perry-Gal et al. 2015: Dataset S1), which is different from the monumental public structure and the domestic contexts average of less than five percent (Table 6.13). Contemporaneous assemblages from Jerusalem have a higher frequency of chicken, with 18% in Area M1 (Bar-Oz and Raban-Gerstel 2013), and 14% of Area D2 (Horwitz 1996).[66] An assumption is that chicken was used mainly as entertainment in cockfights (Perry-Gal et al. 2015); however, this cannot be substantiated without sexing of fowl. Hens, as well as, cocks, regardless of their use in cockfighting, would eventually be utilized for consumption. As a hypothesis, the presence of egg-laying hens in the pit assemblage is an indicator that chicken eggs were a contributor to subsistence strategies. Further, the removal of an egg-laying hen from the subsistence cycle, meaning the cessation of a secondary protein source, supports the need for meat in the Hellenistic domestic context.

Exploring socioeconomic differences between the public and domestic contexts in the Early Hellenistic is straightforward and depicts a similar dichotomy that is present in earlier periods. The monumental public building in Area M2 had greater access to meat and secondary

[66] The exact dating of Area M1 Str. VIII and Area D2 Str. VIII is broadly Hellenistic spanning from the 4th through 2nd centuries BCE, if they are pre- or post- Hasmonean, cannot be determined with certainty.

products, as well as diverse wild species and fish, which would indicate a higher socioeconomic status. In comparison to the domestic contexts in Area M5, whose subsistence strategy was geared towards meat, but also had access to secondary products. Consumption and exploitation patterns in the domestic context suggest a lower socioeconomic or craft producer status. The Early Hellenistic is a period of transformation between the reconstruction and repopulation of the previous periods into a renewed urban city. Intricate socioeconomic patterns are evident in the faunal remains that indicate Jerusalem was urban again, with a producer-consumer economy, imports, and craft production occurring in the city.

TABLE 6.13. NUMBER OF IDENTIFIED SPECIMENS BY AREA AND STRATUM OF EARLY HELLENISTIC JERUSALEM.

Early Hellenistic	Species	Common Name	Area M2 Phase VII			Area M5: Phase III Pit L.5092			Area M5: Combined Phase IIIb-c		
			NISP	MNI	NISP%	NISP	MNI	NISP%	NISP	MNI	NISP%
Domesticated Ungulates	*Capra hircus*	Goat	36	3	2.7%	43	3	9.9%	18	3	5.9%
	Ovis aries	Sheep	35	4	2.7%	4	1	0.9%	13	4	4.3%
	Caprine size	Sheep or Goat	936	9	71.4%	324	4	74.7%	221	8	72.9%
	Bos taurus	Cow	98	2	7.5%	29	1	6.7%	13	2	4.3%
	A Size	Large Mammal	82	2	6.3%	19	1	4.4%	20	3	6.6%
	Canis familiaris	Dog	13	2	1.0%				1	1	0.3%
	Sus scrofa domesticus	Pig	3	1	0.2%						
	Equus asinus	Donkey	3	1	0.2%						
Wild Mammals	*Canis/Gazella size*	Small mammal	11	1	0.8%	5	1	1.2%	2	2	0.7%
	Gazella gazella	Gazelle	6	1	0.5%	5	1	1.2%	1	1	0.3%
	Cervus elaphus	Red Deer	3	2	0.2%						
	Capreolus capreolus	Roe Deer	1	1	0.1%						
	Dama mesopotamica	Fallow Deer	1	1	0.1%	2	1	0.5%			
	Lepus capensis	Cape Hare			0.0%				2	1	0.7%
	Vulpes vulpes	Red Fox			0.0%						
Aves	*Alectoris chukar*	Partridge	2	1	0.2%						
	Anser anser	Domestic Goose	2	1	0.2%						
	Gallus gallus	Chicken	51	5	3.9%	3	1	0.7%	5	4	1.7%
	Small Aves	Small Bird	2	1	0.2%						
	Medium Aves	Medium Bird	9	1	0.7%				5	3	1.7%
	Large Aves	Large Bird	2	1	0.2%				2	1	0.7%
Rodentia	*G-Size*	Rodents	5	1	0.4%						
	Mus musculus	Mouse	1	1	0.1%						
	Martes fiona	Beech Marten	1	1	0.1%						
Reptilia	*Reptilia*	Snake	8	1	0.6%						
Total			1311	44	100%	434	14	100%	303	33	100%

FIGURE 6.7 AGING OF EARLY HELLENISTIC CAPRINES FROM AREA M2 AND M5

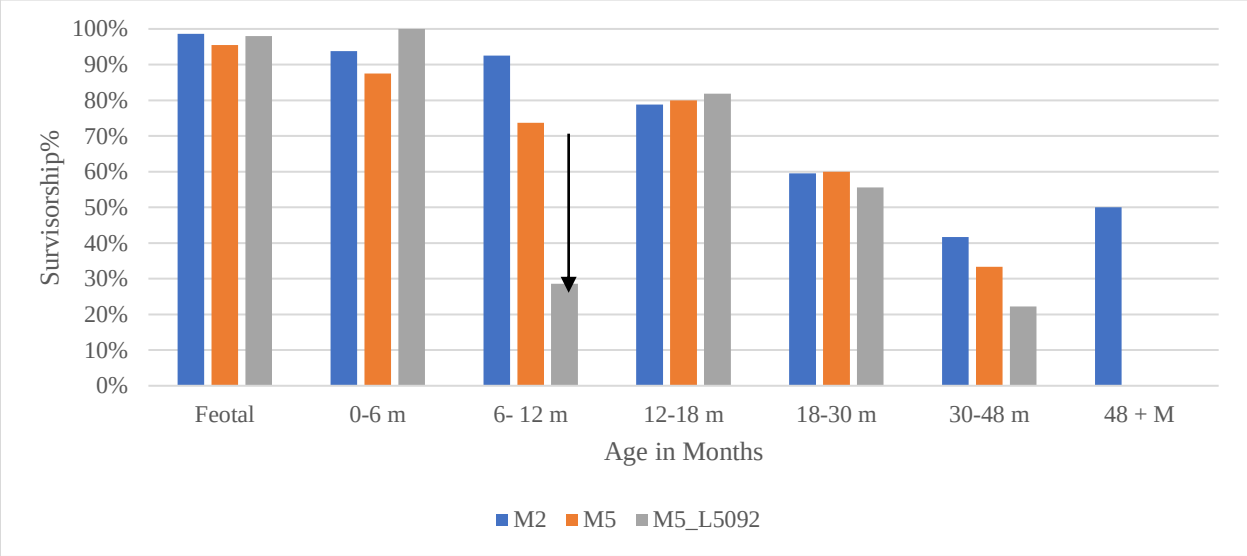


FIGURE 6.8 SKELETAL ELEMENT FREQUENCY OF CAPRINES BY AREA AND CONTEXT OF EARLY HELLENISTIC JERUSALEM.

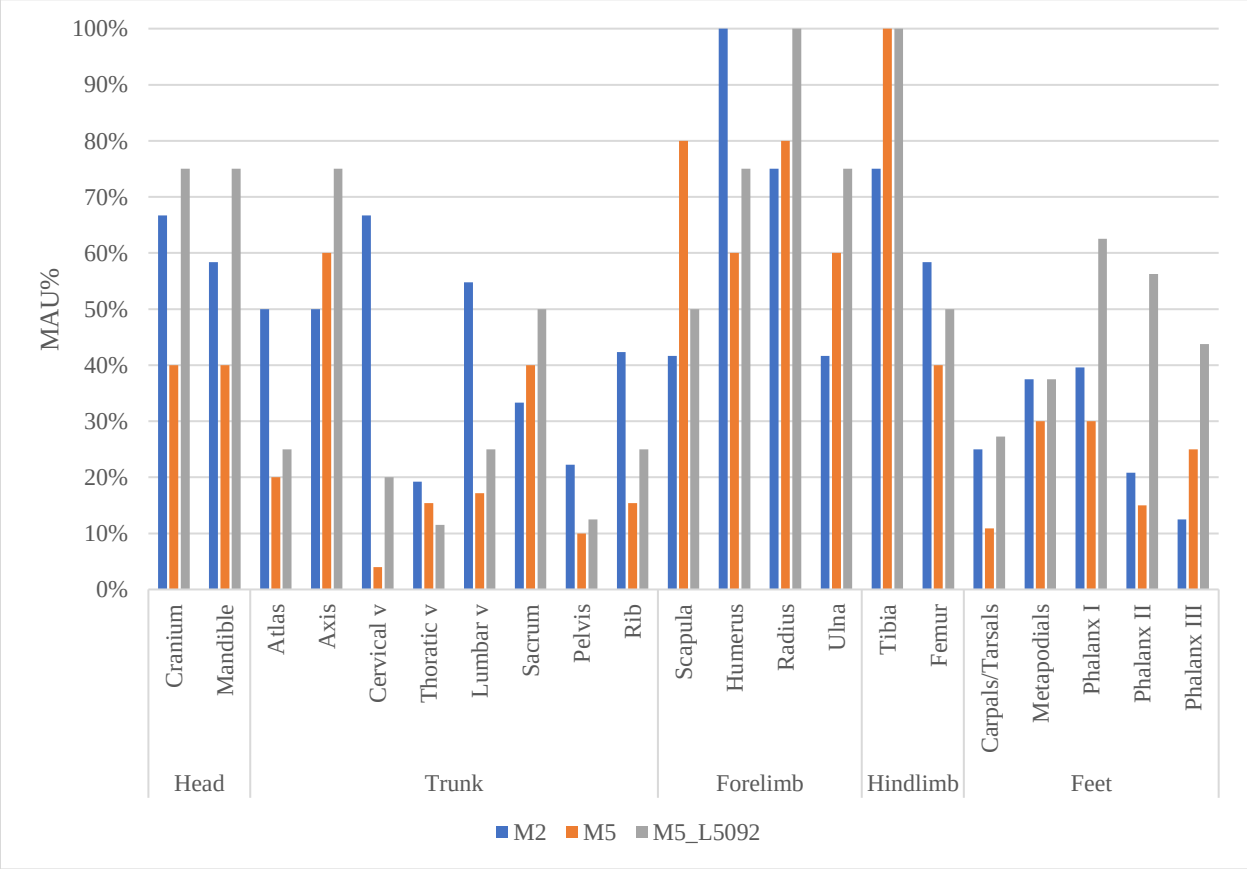
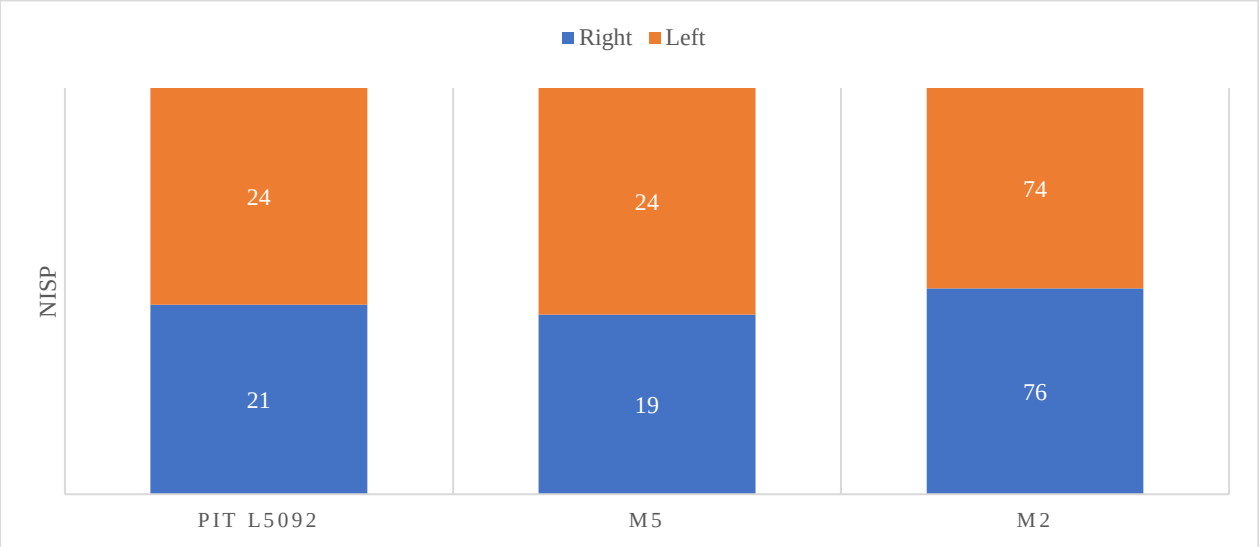


FIGURE 6.9 NUMBER OF RIGHT VERSUS LEFT FORELIMBS (SCAPULA, HUMERUS, RADIUS, AND ULNA) IN EARLY HELLENISTIC AREA M2 (BUILDING 110; PHASE. VII) AND AREA M5 (PHASE. III AND PIT L.5092)



6.1.1.5 Jerusalem in the Late Hellenistic (Hasmonean)

The mid to late 2nd century BCE in Judaea is represented by a transition from Seleucid suzerainty to Hasmonean independence. The archaeology of Jerusalem in the Hellenistic period is defined by pre-Hasmonean or Hasmonean occupation. Jerusalem's social situation is discussed in the context of religious and political conflict between and amongst foreign rulers and the local elite (Babota 2014 and references therein). Scholarship focusing on this period of Jerusalem, as well as greater Judaea, are typically focused on the processes and extent of Hellenization.

Archaeologically, Hellenization is marked by changes in material culture, such as the style of ceramics use but also in the foods consumed (Perry Gal et al. 2015; Regev 2017; Sandhaus 2020). Literary evidence from this period suggests that some aspects were adopted, while others were rejected (1 Macc; 2 Macc). In trying to identify 'Hellenized' animal exploitation there is no noticeable feature like you have in other subfields, such as the introduction of the ceramic casserole in Idumaea and Judaea (Sandhaus 2013; 2020). Faunal

indicators of Judean identity as well as Hellenism is nuanced and may be evident in a drastic change in animal use in comparison to prior periods, such as the rise or adoption of minor species in the overall animal economy. There is a proposal that the rise of chicken consumption is an influence of Hellenism (Perry Gal et al. 2015). At the same time, the avoidance of pig and catfish may indicate Judean identity, following the biblical texts (Leviticus 11; Deuteronomy 14). Up until now, our understanding of food habits and consumption in Late Hellenistic Jerusalem was based on three areas: Area D2 (Horwitz 1996; Horwitz and Tchernov 1996), Area M1 (Bar-Oz and Raban-Gerstel 2013), and 7 Shone Halakhot Street (Bouchnick 2018).

The assemblage from 7 Shone Halakhot Street in the Jewish Quarter relates to a small quarrying activity (Bouchnick 2018). Faunal remains from Area D2, Stratum VII, relates to terrace walls on the eastern edge of the Southeastern Hill (Shiloh 1984: 8-9).[67] Area M1 in the Givati Parking Lot relates to two superimposed plaster floors and a wall (W969) that are dated to the second half of the 2nd century BCE based on ceramic typology (Ben Ami 2013: Plan 2.7; Sandhaus 2013).[68]

New assemblages presented in this study are from Area D3 on the Southeastern Ridge, three phases of Area M2 and the glacis in Area M4 (Stratum VIII) from the Givati Parking Lot (Table 6.14). The Late Hellenistic of Area M2 includes multiple phases of accumulation in a public building (Phase VI, Va-b, and IV). These phases are all representative of the same historical Hasmonean period, and specifically, Phase V that is one unit. Phase VI in Area M2 relates to the glacis that is present in Area M4 (Stratum VIII); as such, the assemblage from Area M4 is immense and is the best representation of this architectural element (Table 6.14). The

[67] Shiloh divided stratum VII into two phases, VIIA and VIIB, this separation was not maintained in the faunal analysis and were studied as one unit.
[68] The floors from Area M1 were studied as a complete faunal assemblage (Bar-Oz and Raban-Gerstel 2013).

assemblage from Area D3 on the slopes on the Kidron Valley represents refuse material discarded on the outskirts of the city (Gadot per comm.)

The animal economy of Jerusalem in the Late Hellenistic primarily focuses on exploiting caprine for their secondary products (Table 6.15; Figure 6.10). Depending on the sub-phase or area, the subsistence pattern varied between a focus on wool and milk (Table 6.15; Figure 6.10). The diverse modes and aims of the caprine culling practices suggest complex and varied subsistence strategies were employed either at different points during the Late Hellenistic period or in different areas of the city where the refuse was deposited or accumulated. Ratios of sheep to goats throughout Jerusalem, are relatively equally, suggesting herd security was a priority of the pastoralists (Redding 1981).

Preference of male and female caprine present in the Late Hellenistic vary by location and species within the neighborhood of Givati Parking Lot, specifically between Area M2 and Area M4. Goats in the constructional glacis fills of Area M4 are predominately males, for meat consumption, whereas those in Area M2 are predominately females indicating a focus on dairy (Figure 5.6; Figure 5.15). A difference also exists between the area in their exploitation of sheep. Rams and ewes are present in both areas, but they are more equally probable in Area M4 than in Area M2, in which there is a greater probability of ewes (Figure 5.6; Figure 5.15).. Sheep exploitation between the areas reflects a differences in refuse accumulations, secondary product exploitation of dairy and wool, as well as preference of ewes in the public spaces of Late Hellenistic Jerusalem.

Across the site, the most common body part of caprine is cranial, and hindlimb remains (Table 6.16). The presence of cranial and feet elements in every assemblage is indicative of livestock butchery occurred inside the city. Fluctuations in the use and consumption of other

parts represent differences that relate to the particular context and socioeconomics of the assemblages. Public spaces (Area M2, Str. V and IV), terraces (Area D2), quarry (7 Shone Halakhot Street), and refuse on the slopes of the Kidron (Area D3) had greater access to meat bearing ribs, vertebrae, and forelimbs (Table 6.16). Forelimbs are present in every area but are the most frequent in Area M1 and 7 Shone Halakhot Street, which is counter to their low frequency in Area M4's glacis. The sheer dominance of cranial remains overshadows the body part frequencies in Area M4 (Table 6.16). The volume of cranial remains, specifically horncores in Area M4, go beyond usual consumption refuse and are the result of other anthropogenic processes that occurred in the city.

The abundance of butchered remains in Area M4's glacis is one of the highest frequencies of such activities recorded, to date, for ancient Jerusalem, regardless of chronological period (see Table 6.17 for comparison to other sites). Butchery and cutmark evidence depict a wide variety of activities, primarily focusing on craft processing that included skinning, primary, and secondary butchery. The frequency of skinning in the glacis relates directly to the number of cut horn cores in the assemblage (Figure 5.8).

Cut horn cores are also noted in Area M1, and their butchery was linked to debris from bone-working industries (Bar-Oz and Raban-Gerstel 2013: Fig. 23.4). The use of caprines, specifically goat horn cores in urban environments, is linked to the preparation of goat skins (Prummel, 1978; Serjeantson, 1989; Bartosiewicz, 2006; 2009). Based on the frequency and style of butchery, it implies that this material derives from a butcher or tannery refuse, hypothetically from the redistribution of animal parts. Following the assumption that all aspects of animals provide a use, the skin of an animal would be traded or sold to tanners, and the butcher would separate the remainder of the animal for consumables or other crafts.

The frequency of cattle throughout Jerusalem at this time rises (Table 6.15; Table 6.17). Cattle in the glacis in Area M4 and public spaces in Area M2 depict a subsistence strategy that focuses on some older cattle, used in draught work, and some younger cattle for meat (Figure 5.5; Table 5.37). This pattern is also similar to Area M1, a portion of the cattle herd is culled before three years of age for meat (Bar-Oz and Raban-Gerstel 2013: Table 23.2). In terms of body part frequencies of cattle, there is a focus on lower limbs and meat poor elements, such as crania, mandibles, metapodials, and phalanges, in each assemblage (Table 6.18). Comparing the frequency of cattle to Jerusalem's faunal assemblages dated to before and after the Hellenistic period suggest that the relatively higher frequency of cattle, in the public spaces of Jerusalem, such as Area M1, M2, and M4, is diachronically consistent (Table 6.17). This pattern implies that this sector of the city had greater access to cattle and its products over time. Cattle are generally the most common species after sheep and goats, except in Area M1, where chicken is more prevalent (Table 6.15).

Chicken remains are relatively common in the Late Hellenistic; this is in line with the majority of other Levantine sites (Perry-Gal et al. 2015: Dataset S1). The inflation of chicken consumption as a faunal indicator for Hellenistic influence may be evident in Area M1, where chicken represent 18% (Bar-Oz and Raban-Gerstel 2013), and City of David Area D2 where birds represent 14% of the total assemblage (Horwitz and Tchernov 1996). Exploring the frequency of chicken and other birds throughout the Givati Parking Lot in the Late Hellenistic suggests the 18% from Area M1 is an anomaly that does not fit with the pattern of less than eight percent (Table 6.15; Section 6.1.2.1). The drastic difference in chicken frequency between the areas does not suggest a lesser degree of Hellenization in Area M2 and M4 but instead points to

the specific activities occurring in different sectors of the city, such as craft production or consumption habits in public contexts.

Fish are present in Late Hellenistic but in a minimal frequency in Area M2 and M4 (>1%). Evidence of fish was mentioned in Area M1 but was not included in the frequencies of species, nor were the fragment counts per species (Bar-Oz and Raban-Gerstel 2013: 350-351). Of the 25 fragments of fish mentioned in Area M1, they identified Nile Perch, Seabream, and Groupers (*ibid*). These species are also present in Area M2, Stratum V, and indicate trade with Egypt and the Mediterranean Coast.

Wild species also contributed to the animal economy of Late Hellenistic Jerusalem. Gazelles, fallow deer, and other game animals are present in low frequencies throughout Jerusalem's history, except in the glacis fills of Area M4 and the fills of Area D2 where they represent approximately five percent (Table 6.15). Body part frequencies, according to Area M4, suggest game animals were hunted and quartered before being transported to the city. In rare cases, their heads were also carried back, presumably as trophies or for other activities. Other low-frequency species, such as domestic dogs and pigs, are also present in the Late Hellenistic (Table 6.5). In Stratum IV of Area M2, the remains of a nearly complete puppy, under a year and a half old, was identified, suggesting pets lived within the city walls. Indicating the strict purity laws that are present in assemblages of the subsequent Early Roman period were not employed at this time (Bar-Oz et al. 2007; Spiciarich et al. 2017).

TABLE 6.14. STRATIGRAPHY FOR LATE HELLENISTIC FAUNAL ASSEMBLAGES IN THIS STUDY AND COMPARATIVE ASSEMBLAGES

Late Hellenistic Faunal Stratigraphy		Ben-Ami and Tchekanovetz			Gadot and Shalev		Shiloh		Gadot
Period	Date	Stratum	Givati: Area M1 (Bar-Oz and Raban-Gerstel 2013)	Givati: Area M4 (This Study)	Phase	Givati: Area M2 (This Study)	Stratum	City of David: Area D2 (Horwitz 1996)	City of David: Area D3 (This Study)
Hellenistic	Mid-2nd century - Mid-1st century BCE	8	8		4	4	7	7A	7
					5a	5a			
					5b	5b			
					5c	5c			
				8d glacis	6 glacis	6 glacis		7B	
				8c-1 glacis					
				8c-2 glacis					
				8b					
				8a					

FIGURE 6.10 AGING OF CAPRINES FROM LATE HELLENISTIC JERUSALEM

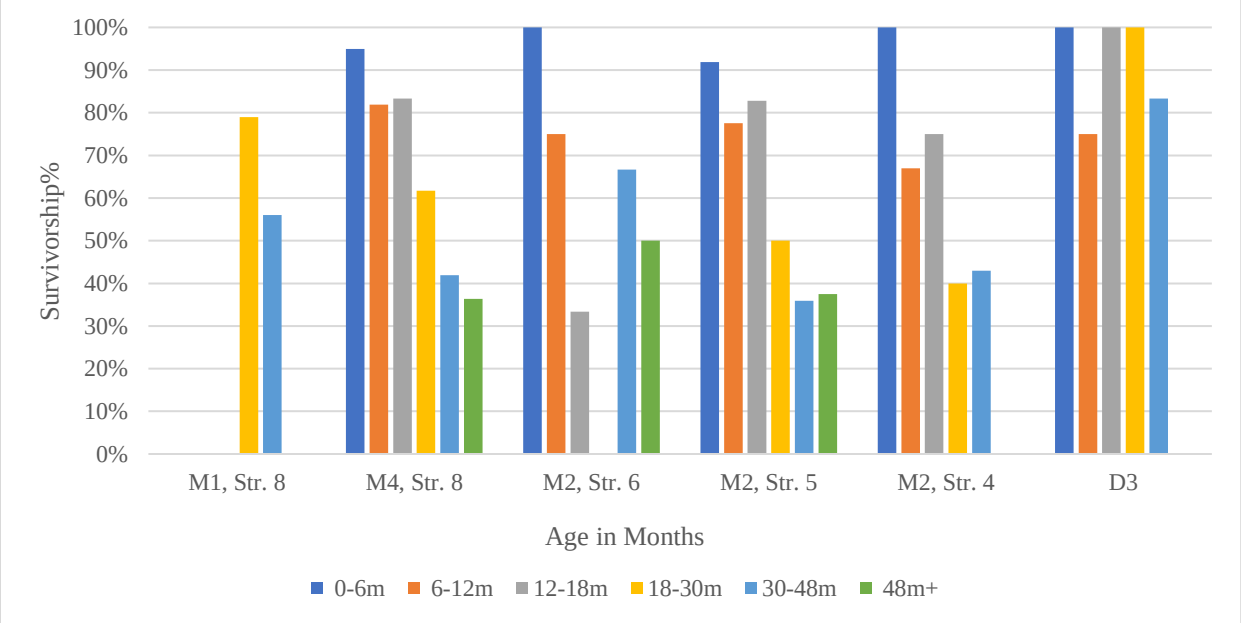


TABLE 6.15 NUMBER OF IDENTIFIED SPECIMENS BY AREA AND STRATUM OF LATE HELLENISTIC JERUSALEM

Late Hellenistic	Species	Common Name	City of David: Area D3			M4 Str. VIII Glacis			Area M2 Str. VI Glacis			Area M2 Str. V			M2 Str. IV			Area D2 Str. VII			Area M1 Str. VIII			7 Shone Halakhot Street	
			This Study			This Study			This Study			This Study			This Study			Horwitz 1996; Horwitz and Tchernov 1996			Bar-Oz and Raban-Gerstel 2013			Bouchnick 2018	
			NISP	MNI	NISP%	NISP	MNI	NISP%	NISP	MNI	NISP%	NISP	MNI	NISP%	NISP	MNI	NISP%	NISP	MNI	NISP%	NISP	MNI	NISP%	NISP	NISP%
Domesticated Ungulates	*Capra hircus*	Goat	7	2	5.6%	213	24	4.4%	3	1	2.5%	157	9	3.9%	4	1	2.7%				22	2	3.2%	5	4.7%
	Ovis aries	Sheep	7	2	5.6%	221	22	4.6%	3	1	2.5%	159	18	4.0%	2	1	1.3%				26	4	3.8%	3	2.8%
	Caprine size	Sheep or Goat	90	3	71.4%	2803	54	58.4%	80	3	67.2%	2665	37	66.7%	82	3	55.0%	28	1	54.9%	392	8	56.7%	63	59.4%
	Bos taurus	Cow	9	2	7.1%	820	18	17.1%	8	1	6.7%	330	5	8.3%	9	1	6.0%	10	1	19.6%	120	2	17.4%	25	23.5%
	A Size	Large Mammal	7	2	5.6%	325	5	6.8%	13	1	10.9%	288	3	7.2%	17	1	11.4%								
	Canis familiaris	Dog	1	1	0.8%	28	5	0.6%				14	1	0.4%	24	1	16.1%	1	1	2.0%				1	0.9%
	Sus scrofa domesticus	Pig				9	3	0.2%				9	1	0.2%							4	1	0.6%	3	2.8%
	Camelus dromedarius	Arabian Camel				1	1	0.02%																	
	Equus asinus	Donkey				2	1	0.04%				4	1	0.1%										2	1.8%
Wild Mammals	*Canis/Gazella size*	Small mammal	1	1	0.8%	20	3	0.4%				16	1	0.4%											
	Gazella gazella	Mountain gazelle				60	5	1.3%				33	3	0.8%				1	1	2.0%					
	C size	Small Mammal																							
	Cervus elaphus	Red Deer				2	2	0.04%				6	1	0.2%											
	Capreolus capreolus	Roe Deer				1	1	0.02%	1	1	0.8%														
	Dama mesopotamica	Fallow Deer				125	9	2.6%				13	2	0.3%	1	1	0.7%	4	1	7.8%					
	Lepus capensis	Hare				1	1	0.02%				1	1	0.03%											
	Pedetes capensis	Spring Hare																							
	Vulpes vulpes	Red Fox				2	1	0.04%				2	1	0.1%											
Aves	*Alectoris chukar*	Partridge				19	7	0.4%	1	1	0.8%	12	2	0.3%											
	Anas platyrhynchos	Mallard Duck				1	1	0.02%				2	2	0.1%											
	Anser anser	Domestic Goose				1	1	0.02%	1	1	0.8%	1	1	0.03%				1	1	2.0%					
	Columba livia	Rock Pigeon/Dove	2	1	1.6%	1	1	0.02%				1	1	0.03%				4	1	7.8%					
	Gallus gallus	Domestic Chicken				131	18	2.7%	9	2	7.6%	246	15	6.2%	7	2	4.7%	2	1	3.9%	127	14	18.4%	4	3.7%
	Corvus corvus	Crow										2	1	0.1%											
	Circaetus gallicus	Short-toed Snake Eagle													1	1	0.7%								
	Small Aves	Small Bird										1	1	0.03%											
	Medium aves	Medium Bird				10	4	0.2%				30	2	0.8%	2	1	1.3%								
	Large Aves	Large Bird	2	1	1.6%	1	1	0.02%																	
Rodentia	*G-Size*	Rodents										2	1	0.1%											
	Mus musculus	Mouse																							
	Rattus rattus	Rat																							
	Martes fiona	Beech Marten										1	1	0.03%											
	Spalax ehrenbergi	Mole-Rat										1	1	0.03%											
	Sorcicidae	Shrew																							
Reptilia	*Reptilia*	Snake										1	1	0.03%											
Anura	*Anura*	Frog or Toad																							
Total			126	15	100%	4797	188	100%	119	12	100%	3997	113	100%	149	13	100%	51	8	100%	691	31	100%		

TABLE 6.16 SKELETAL ELEMENT FREQUENCIES OF CAPRINES BY AREA AND STRATUM OF LATE HELLENISTIC JERUSALEM

Caprine Skeletal Frequency		Area D3		Area M4 Str. VIII Glacis		Area M2 Str. V		Area M2 Str. IV		Area M1 Str. VIII		Area D2	7 Shone Halakhot Street
		This Study		This Study		This Study		This Study		Bar-Oz and Raban-Gerstel 2013		Horwitz 1996	Bouchnick 2018
Body Portion	Element	MNE	MAU%	MNE	MAU%	MNE	MAU%	MNE	MAU%	MNE	MAU%	NISP%	MNE
Head	Cranium	2	100%	119	100%	13	70%	2	100%	13	90%	14.50%	2
	Mandible	1	25%	90	13%	14	38%	1	25%	16	18%		10
Trunk	Atlas	1	50%	20	34%	11	59%	1	50%	1	14%	25.00%	1
	Axis	1	50%	13	22%	11	59%	1	50%	2	28%		
	Cervical V	3	30%	58	19%	46	50%	1	10%				
	Thoracic V	1	4%	82	11%	79	33%	1	4%	18	19%		1
	Lumbar V	4	29%	96	23%	88	68%	3	21%				
	Pelvis	1	8%	59	17%	13	12%	1	50%	7	16%		4
Forelimb	Scapula	1	25%	32	27%	23	62%	1	25%	9	62%	28.50%	3
	Humerus	1	25%	64	54%	29	78%	3	75%	12	83%		8
	Radius	4	100%	50	42%	25	68%	1	25%	10	69%		4
	Ulna			13	11%	14	38%	1	25%	6	41%		3
Hindlimb	Tibia	2	50%	55	46%	37	100%	3	75%	11	76%	25%	3
	Femur	2	50%	39	33%	19	51%	3	75%	3	21%		3
Feet	Carpals/Tarsals	5	11%	47	4%	71	17%	3	7%	24	55%	7%	
	Metapodials	3	38%	68	29%	32	43%	4	50%	29	100%		15
	Phalanx I	3	19%	76	16%	68	46%	3	19%	13	22%		1
	Phalanx II	2	13%	17	4%	30	20%	1	6%	11	19%		
	Phalanx III			3	1%	11	7%	0	0%	7	12%		

TABLE 6.17. DIACHRONIC COMPARISON OF CATTLE, BURNING, AND BUTCHERY FREQUENCIES FORM ARCHAEOLOGICAL EXCAVATIONS OF JERUSALEM. HIGHEST FREQUENCY IN RED,

Period	Area/Site in Jerusalem	Context	Cattle %	Burned %	Butchery %	Citation
Iron Age II	Ophel	Public	4-8%	NA	1.2%	Horwitz and Tchernov 1989
	Western Wall Plaza	Public	6-8%	NA	NA	Sapir-Hen et al. 2016
	Area M1: Stratum VII	Public	22.2%	1.1%	5.5%	Bar-Oz and Raban-Gerstel 2013
	Area M2: Phase IX	Public	5.8%	14%	3.6%	This Study
	Area G: Iron IIB	Fill	7.0%	3.1%	5.2%	Tamar and Bar-Oz 2015
	Area G: Iron IIC	Fill	5.0%	3.4%	4.8%	Tamar and Bar-Oz 2015
	City of David: Strata 12-14	Domestic	~19.6 %	NA	NA	Horwitz 1996
	City of David: Area D3	Domestic	9.8%	3.2%	5.7%	This Study
Persian	Area G	Fill	5.0%	14.5%	4.6%	Tamar and Bar-Oz 2015
	City of David: Stratum. 9	Fill	25.0%	NA	NA	Horwitz 1996
	Area M2: Str. VIII	Domestic	9%	4%	4%	This Study
Hellenistic	Area M1: Stratum VIII	Public	17.4%	36.4%	1.7%	Bar-Oz and Raban-Gerstel 2013
	Area M2: Phase IV	Pubic	17.4%	3%	7.4%	This Study
	Area M2: Phase V	Public	15.5%	4%	8.3%	This Study
	M2: Phase VII	Public	13.8%	7%	6.2%	This Study
	Area M4: Str. VIII Early	Fill/Glacis	31.9%	0.2%	13%	This Study
	Area M4: Str. VIII Late	Fill/Glacis	20.9%	2.3%	14%	This Study
	Area M4: Str. VIII Hasmonean	Fill/Glacis	18.3%	2.4%	14%	This Study
	City of David: Area D3	Fill/Domestic	8.7%	7.5%	4.3%	This Study
	City of David: Stratum 7	Domestic	23.0%	NA	NA	Horwitz 1996
Roman	Ophel	Public	7.0%		4.1%	Horwitz and Tchernov 1989
	Area M1: Stratum VII	Public	23.9%	1.3%	7.2%	Bar-Oz and Raban-Gerstel 2013
	Kidron Landfill: Areas C and L	Cultic and Domestic Fill	27.0%	5.0%	6.7%	Bouchnick 2011; Bar-Oz et al 2007
	City of David: Stratum 6	Domestic	29.0%	NA	NA	Horwitz 1996
	Temple Mount	Public	33.5%	NA	NA	Reich et al. 2015
	Kidron Landfill: Area D3	Domestic Fill	13.0%	14.2%	7.0%	Spiciarich et al. 2017

TABLE 6.18 MINIMUM NUMBER OF ELEMENTS (MNE) OF CATTLE IN LATE HELLENISTIC JERUSALEM

Cattle		Area D3	Area M4 Str. VIII Glacis	Area M2 Phase. V	Area M2 Phase. IV	Area M1 Str. VIII
		This Study	This Study	This Study	This Study	Bar-Oz and Raban-Gerstel 2013
Body Portion	Element	MNE	MNE	MNE	MNE	MNE
Head	Cranium	1	54	2	1	
	Mandible	3	40	3	1	
Trunk	Atlas		6	2	1	
	Axis		3	1		
	Cervical V		18	4	1	
	Thoracic V	1	22	15	1	
	Lumbar V		11	6	1	
	Pelvis		12	5		2
Forelimb	Scapula		6	3		
	Humerus		10	3	1	2
	Radius	1	8	4		1
	Ulna		12	3		2
Hindlimb	Tibia		11	4		1
	Femur		8	4	1	
Feet	Carpals/Tarsals		36	19	2	5
	Metapodials	1	20	7	1	6
	Phalanx I	1	26	13	0	10
	Phalanx II	2	28	15	3	9
	Phalanx III	2	20	17	1	4

6.1.2 Imports, Trade, Markets, and Craft Production in Jerusalem

Beyond the needs of subsistence, animals were useful for a variety of economic and material needs. Redistribution of animals from the cult to the market and from the market to the people is present throughout Jerusalem's history. Our understanding of Jerusalem's animal economy is based on the exploitation of livestock; however, the presence of underrepresented taxa, such as birds and fish, allude to other mechanisms that contributed to Jerusalem's economy. In order to assess the socioeconomic reality of Jerusalem in the 8th through 2nd centuries BCE, there has to be an advancement beyond the dichotomy of rich and poor, elites and non-elites, and even between priests and laity.

Periodic or permanent markets were used by all levels of society and functioned as a

place for locals to trade goods and services. Goods produced by and for the market were likely locally produced. Representation of the entire carcass indicates livestock were locally butchered and redistributed within the city of Jerusalem. Livestock uses went beyond just their meat, dairy, and wool. Craft production is evident during the Hellenistic periods in the Givati Parking Lot excavation but may also be present throughout Jerusalem's history.

Trade and imported goods also contributed to the physical and abstract market of Jerusalem. We know of imported goods in the Hellenistic periods based on the presence of Rhodian amphorae, Black Attic Ware, and Eastern Sigillata A Ware in Area M1 (Ben-Ami 2013; Sandhaus 2013). Importantly, these ceramics place Jerusalem within the Hellenistic worldview (Sandhaus 2013: 84). Jerusalem always existed within the regional, if not supra-regional, zeitgeist. Its regional standing is evident in the faunal remains, specifically in the form of fish but also birds too. This section will explore different aspects of Jerusalem's market, both physical and abstract, in terms of the goods produced and those that produced them. Further, this section will dive into the presence of minor species and how they function in the animal economy of Jerusalem.

6.1.2.1 Underrepresented Taxa: Birds and Fish

The most underrepresented taxa within zooarchaeology are those with the smallest most fragile bones. They are rarely collected and even less so incorporated into the discussion of the animal economy of a site. Refined methodologies and implementation of stricter sieving protocols facilitated the retrieval of small, overlooked faunal remains. As it pertains to the assemblages included in this study, all assemblages were collected by hand with the exception of the assemblages from Area D3 and Area M2, that implemented intensive wet and dry sieving

strategies. Taphonomic biases were considering in the assessment of avian and ichthyological remains.

The main focus of most animal economies in the 8th through 2nd BCE is on livestock: sheep, goats, and cattle. Notwithstanding, those in Jerusalem also had access to a wide variety of species that included game animals, birds, and fish. Jerusalem's perennial water sources, the Gihon, does not sustain fish habitation. Fish in Jerusalem derive from outside of the region into the city. Similarly, some of the avian species' present are not endemic to the environs of Jerusalem and therefore require some form of trade and imports.

6.1.2.1.1 Fish in Jerusalem

Evidence of trade, in terms of consumables and objects, is based on the presence of species that are endemic or non-native to the local environs (Van Neer et al. 2004). Located in the Central Hill country, fish are not endemic to Jerusalem; thus, all fish identified in archaeological context must have originated from elsewhere. As a hypothesis, we could propose that fresh fish were brought to Jerusalem and spawned in the 'Rock-Cut Pool' or fresh fish were sold at the Fish Gate, mentioned in Nehemiah. This hypothesis is doubtful, although it would solve the question of why there is so much evidence for fish consumption in Jerusalem. Transport of fresh fish in the 8th through 2nd centuries BCE was limited to a 50 kilometers distance (Van Neer et al. 2004). Major port cities on the Mediterranean coast, such as Ashdod, Ashkelon, and Yavne-Yam, are all over 60 kilometers distance from Jerusalem.

With the idea of fresh fish in Jerusalem nullified, the only way fish came into Jerusalem was in a dehydrated or salted form. Dehydration of meat and fish allows for long-distance travel as well as delay in bacterial decay (Van Neer et al. 2004). Fish producers needed a way to preserve fish for extended periods as large hauls of fish were seasonal, based on the spawning

seasons when they aggregate in shallow waters and are numerous. Fisheries and fish centers in northern Africa are well known from the Bardawil Lagoon, where Gilt-head seabream (*Sparidae sparusu aurata*) spawn (Guy et al. 2018), and Scombroaria [Mackerel Town], mentioned by Strabo (*Athenaios* 2.120b-121c, trans Gulick).

Large-scale trade of fish and other foodstuffs into Jerusalem is documented as early as the Iron I and continued throughout the first millennium BCE (Figure 6.10; Lernau and Lernau 1989; Van Neer et al. 2003; Reich et al. 2007). The principal trader of fish exports in the region was Egypt, based on isotopic studies of Gilt-head seabream and the presence of Nilotic species at sites throughout the Levant (Lernau and Lernau 1989; Guy et al. 2018). Egyptian involvement in the southern Levant is well attested until the mid–9th century BCE (Redford 1992: 339–343; Ben-Dor Evian 2011). Political disintegration in Egypt starting in the second half of the 9th century BCE brought about Egypt's retreat from the southern Levant (Redford 1992: 315–319; Taylor 2000: 338–352), although their interest never wanes, from the battle of Carchemish to the Ptolemies. Egypt's interests are present each time a new empire comes to power and takes over the region. Direct or indirect trade with Egypt, via the presence of Nilotic and Bardawil fish, is continuous throughout the remainder of the first millennium BCE, even in periods of low demography (Figure 6.11).

Ichthyological assemblages from Jerusalem allow us to track general trends throughout time and posit inter-site trends for the Iron Age II. For example, the Ophel in the Iron Age II has a higher frequency of groupers (*Epinephelus*) compared to the domestic dwellings along the Southeastern Ridge (Area D2 and D3), as well as the Rock-Cut pool (Figure 6.11). Grouper in modern Mediterranean fare is a delicacy (Çakırlar et al., 2014). Grouper, as an elite delicacy in the past, has been proposed at Tell Abu Hawam in the Late Bronze Age (Zohar and Artzy 2019),

indicating the continuity of groupers elite status. If indeed grouper, along with Nile Perch, are delicacies, then it supports a difference in access to certain fish between elite and domestic contexts of Iron Age IIB Jerusalem.

A major trend throughout Jerusalem is the preference for seabream, specifically Gilt-head seabream. Seabream (i.e., porgies) is the most prevalent grade of fish until the Early Hellenistic (Figure 6.11). The Early Hellenistic assemblages are akin to the Seleucid period, and these assemblages have a greater frequency of fish that derived from the Mediterranean, Galilee, and river sources. Seabream is still present in the Early Hellenistic, but only in Area M2, a public building (Figure 6.11). It is not inconceivable that the Seleucids limited the amount of fish imported from Egypt, home of their rival Ptolemies or the reverse, that the Ptolemies limited the number of exports into regions controlled by their rivals.

When we explore body parts of fish present in Jerusalem a pattern also emerges. Body part frequencies of fish are based only on the fish present in Area M2, as this area has one of the largest assemblage included in this study. Fish species present with only vertebrae, and missing their heads include catfish and barbel (Figure 6.12). Indicating catfish were dried and possibly unidentifiable to the consumers. Fish imported whole are mullets, tilapia, sea bream, Nile Perch, and groupers (Figure 6.12). Body parts of groupers also include the cleithrum, a portion that is removed in the drying of fish (Zohar and Artzy 2019). It is possible that groupers were smoked or salted whole leaving this bone in place; however, typically, it is an indication of fresh fish (Zohar and Artzy 2019). Fresh fish in an inland site would also distinguish between high and low status, in which fresh fish is luxury in comparison to dried fish. Remains of cartilaginous fish (shark) present are only teeth, suggesting these were decorative items and not consumed.

Fish use and consumption throughout Jerusalem's history enable us to identify patterns in the animal economy of the site that were previously obscured. Major aspects include the continuity of fish trade and consumption into Jerusalem in the Babylonian, Persian, and Early Hellenistic. These periods were previously understood as less urban and impoverished. Access to fish and long-distance trade of objects puts into question the urban and impoverished status of Jerusalem in these periods. Trade with Egypt was maintained throughout but was limited in the Early Hellenistic, possibly as a result of Seleucid influences.

Fish prohibited in the Hebrew Bible, those without fins and scales, such as catfish and shark, are present in Jerusalem. In the case of shark, they were likely not consumed, but catfish were consumption fare. The lack of cranial remains of catfish, compared to other Egyptian or Mediterranean fish that did include their heads, suggest this may have been deliberate or related to processing. Without their heads, catfish would be unidentifiable in the market, and the consumers would be unaware of what fish they were purchasing. If this deception was purposeful by the merchants and producers of catfish is difficult to ascertain and only complicate the determination if this fish is prohibited or permissible.

FIGURE 6.11 FREQUENCY OF FISH SPECIES IN JERUSALEM FROM THE IRON AGE IIB THROUGH LATE HELLENISTIC.

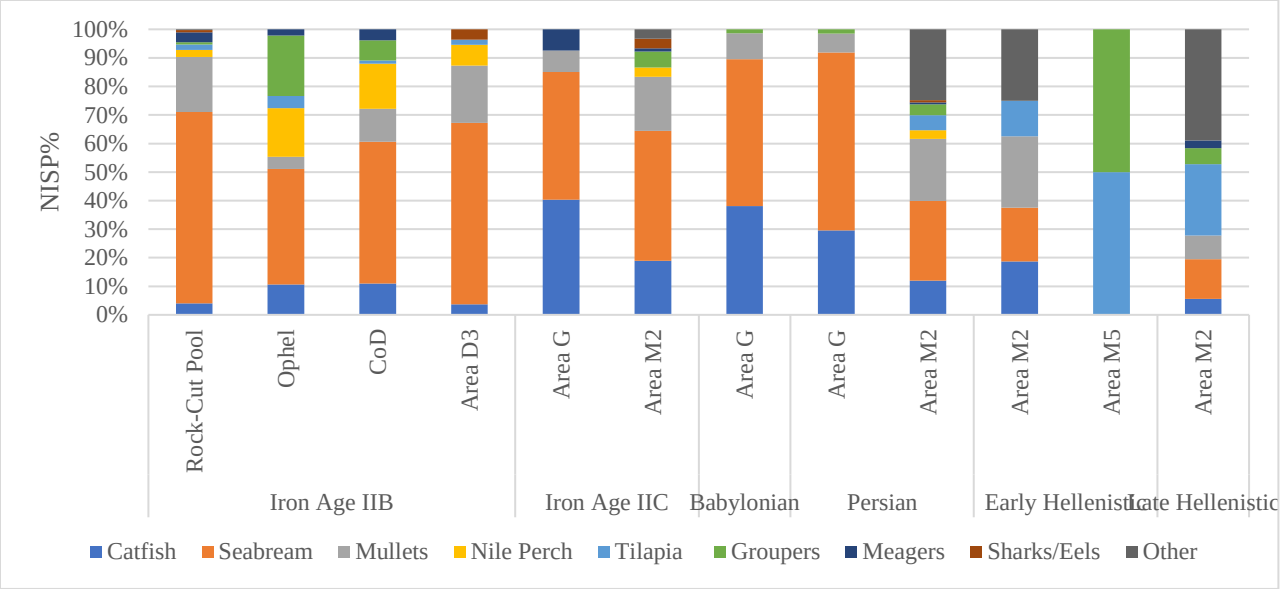
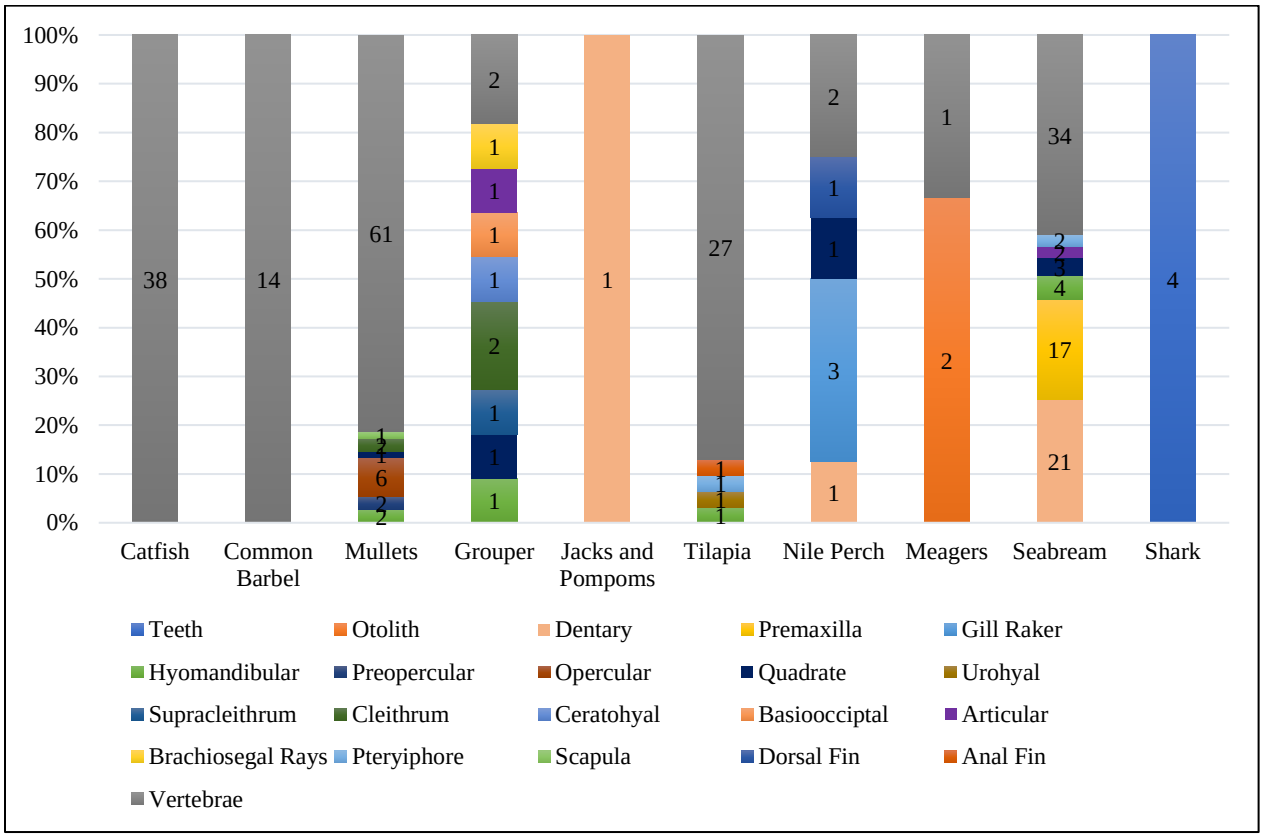


FIGURE 6.12 FREQUENCY OF FISH BODY PARTS FROM GIVATI AREA M2 (ALL PHASES)



6.1.2.1.2 Birds in Jerusalem.

Pigeons, ducks, and geese, as well as many wild avian species, have been exploited in the southern Levant since the Palaeolithic (Kersten 1991). Birds and the exploitation of birds by humans are typically overlooked in faunal assemblages, as their frequency is generally lower than the main species of domesticated livestock (i.e., sheep, goats, cattle, and donkey). This is due to avian remains being more susceptible to taphonomic processes because of their low bone density and their smaller size, causing them to be easily missed in hand-picked assemblages. However, we know from literary, epigraphic, and iconographic sources that birds played an integral role in cult practices, banquets, and feasts (Lambert 1970; Levine, de Tarragon, and Robertson 1997: 299–301; Koch 2014). Avian remains are present at many sites, including Jerusalem, in every period, allowing for the possibility of inter-site and diachronic study.

A few far-reaching factors may have impacted the use and exploitation of birds in Jerusalem during the 8th through the 2nd centuries BCE. The first is political factors, namely the oscillations of hegemonies and the emergence of empires. Political changes and military campaigns impacted the demographics, sedentism, agropastoralism, and economy of Jerusalem. Second are environmental factors, specifically the arid phase during the Early Persian period and the wetter phase of the Early Hellenistic (Langgut and Lipschits 2017). A significant dry phase can impact the size of forests, as well as the amount of precipitation and rainfall, directly affecting both the habitation of avian species and human agricultural practices.

Evidence of aviculture in the Negev Desert during the Byzantine period (4th–7th centuries C.E.) has indicated that pigeon fancying for agricultural fertilizer was particularly advantageous in arid or dry environments (Ramsay et al. 2016; Marom et al. 2018; Tepper et al. 2018b). Societies facing and recovering from economic stress because of climate change may

also be indicated by the increased exploitation of wild taxa, such as birds, as an alternative food-source (Hole 1994).

The final factors that may impact the presence of birds during these periods relate to religious and cultic practices. Animism and bird cults are known in neighbouring regions, namely from Egypt and Mesopotamia (Russell 2011). In the Hebrew Bible, birds are mentioned as analogies, metaphors, sacrifices, and as food (Altmann and Spiciarich 2020). A considerable portion of biblical scholarship on birds has focused on the philology and identification of birds (see Aharoni 1938; Driver1955a, 1955b, 1958). While the identification of specific avian species is currently still debated and questioned in biblical scholarship, the historical memory and literary influences of the Hebrew Bible may have affected the use and exploitation of birds in Jerusalem, during the periods of biblical authorship.

Partridge, dove, geese, and ducks are all indigenous to the variety of ecological habitats in the Levant, whereas chicken (*Gallus gallus*) was introduced. The earliest chicken remains collected in the Near East originate in Iran, Anatolia, and Syria during the 3rd millennium B.C.E. (Benecke1994). Evidence of chicken in the southern Levant first appear in the Middle Bronze Age II layers (Stratum VIII; 1750/1700–1650/1600 B.C.E.) of Shiloh, a site not far from Jerusalem, also located in the Central Hill region (Hellwing, Sade, and Kishon 1993).

Inter-site analysis of Jerusalem's aviculture in the Iron Age IIB–C illustrates socioeconomic differences in the utilization of different avian species (Figure 6.13). Evidence of pigeons and doves is widespread in the Iron Age II, but they are the most prevalent at the Stepped Stone Structure, Western Wall Plaza (WWP), and Ophel areas of Jerusalem, which may relate to their geographical region, as well as their cultic association. The least common avian

species in the Iron Age II is duck and is only present at the Western Wall Plaza and Ophel (Figure 6.13). The presence of waterfowl in Jerusalem, in all periods but most dominate in the Iron Age IIB (Figure 6.14), is unique in that it is outside of the aqueous habitat (e.g., lakes, rivers, marshes, etc.) of both geese and ducks, suggesting some mode of trade was involved.

Jerusalem's Ophel, an area known to be of higher socioeconomic positioning, based on the area's subsistence strategies (see, Horwitz and Tchernov 1989), as well as its proximity to the Temple, reinforces the elite nature of the area. The Ophel has the greatest diversity of birds, including imported geese and ducks, as well as evidence for turtledove (*Streptopelia turtur*, marked as 'other' in Figure 6.13).[69] Comparatively, birds identified in the residential areas of Jerusalem, along the Southeastern Ridge of the Kidron Valley, are primarily chicken (35%) and partridge (35%), some geese (20%), and little pigeon (10%), following Horwitz and Tchernov (1989: 146). Chicken in the Iron Age II is most prominent in domestic assemblages located in dwellings built into the rock scarp (Area D3 and M1). Further, the presence of chicken in these contexts indicates their exploitation as consumption animals. The distribution and frequency of imported birds in Jerusalem during the Iron Age II attest to the urban nature of the city as well as its dependence on trade foodstuffs.

Jerusalem's location is between Mediterranean and Irano-Turanian climates (Danin 1988; Neumann 2010), an ideal location for pigeons and partridges who dwell in rocky outcrops. Pigeons, doves, and partridges were utilized in cultic and agricultural practices, making them valuable commodities. The presence of these game birds in Jerusalem is consistently in locations near the mount and in fills (Figure 6.13). Partridge dominates the assemblage from Stepped

[69] Turtledove is mentioned at the sacrificial bird in the Septuagint.

Stone Structure (Area G) in both the Babylonian and Persian periods (Figure 6.13; Tamar and Bar-Oz 2015). These periods represent a climatic dry phase in which pigeons and partridges would thrive-in. Persian bird frequencies in neighbouring Area M2, a public building, is dominated by chicken, in particular hens, which is a stark difference compared to the fill in the Stepped Stone Structure (Figure 6.13). This difference may reflect a difference between activities occurring in public spaces of Jerusalem compared to refuse used for fills by the Northern Tower in Area G.

Chicken dominates the aviculture of the Early Hellenistic in Jerusalem. Chicken is the most common bird in both domestic and public contexts (Area M5 v. Area M2; Figure 6.13). Beyond chicken, other birds present in the public context include partridge and goose. Goose has been linked to elite consumption patterns and was a mainstay in craft production, with their exploitation for medicine and feathers (Koch 2014; Spiciarich 2020). In domestic contexts, there is only evidence of chicken. Chicken remains present in Area M5's pit (L.5092) are of hens, via the presence of medullary bone (Figure 4.22). The incubation of chicken eggs is present in Ptolemaic Egypt via the writing of Diodorus Siculus (Rostovtzeff 1967). It is rare to find evidence of chicken eggshells as they decompose quickly. Therefore, the presence of medullary bone in Area M5's pit may hint at the presence of egg-laying hens and consumption of chicken eggs during this period.

The Late Hellenistic continues the trend of chicken presence within domestic and public contexts (Figure 6.13). Pigeon remains are only present in the fills and terraces along the outside of the city in Areas D2 and D3, whereas partridge is present in the fills of the glacis (Area M4) and public context of Area M2. Differences between the presence of pigeon versus partridge may

be related to locations of columbaria and difference in the status of partridge consumption, in which partridge is a delicacy compared to the pigeon.

When exploring the frequency of prominent avian species throughout Jerusalem's history, there is a pronounced increase of chicken starting in the Persian period (Figure 6.14). Prior to the Persian period, chicken was present, but there was also a wider variety of birds, such as ducks, geese, partridges, and pigeons. Perry-Gal et al. attributed the rise in chicken frequencies to the Hellenistic period and as a marker of Hellenistic influence (2015). Hellenism and chicken affiliate with each other because of the presence of cocks on Greek coins and ceramics (Davis 2007) and their mention by Theognis of Megara in the 6th century BCE (Figueira and Nagy 1985). In Jerusalem, the expansion of chicken begins a few centuries earlier in the Persian period. The Greek writer Aristophanes refers to chicken as the 'Persian bird' or 'Median Bird' because they were imported from Persia to Greece (Houlihan and Goodman 1986; Toussaint-Samet 2009). Avian remains from Jerusalem argue against chicken as a reflection of Hellenistic influence, and instead, the influence should be attributed to the Persians.

FIGURE 6.13 FREQUENCY OF BIRDS BY AREA AND CHRONOLOGICAL PERIOD.

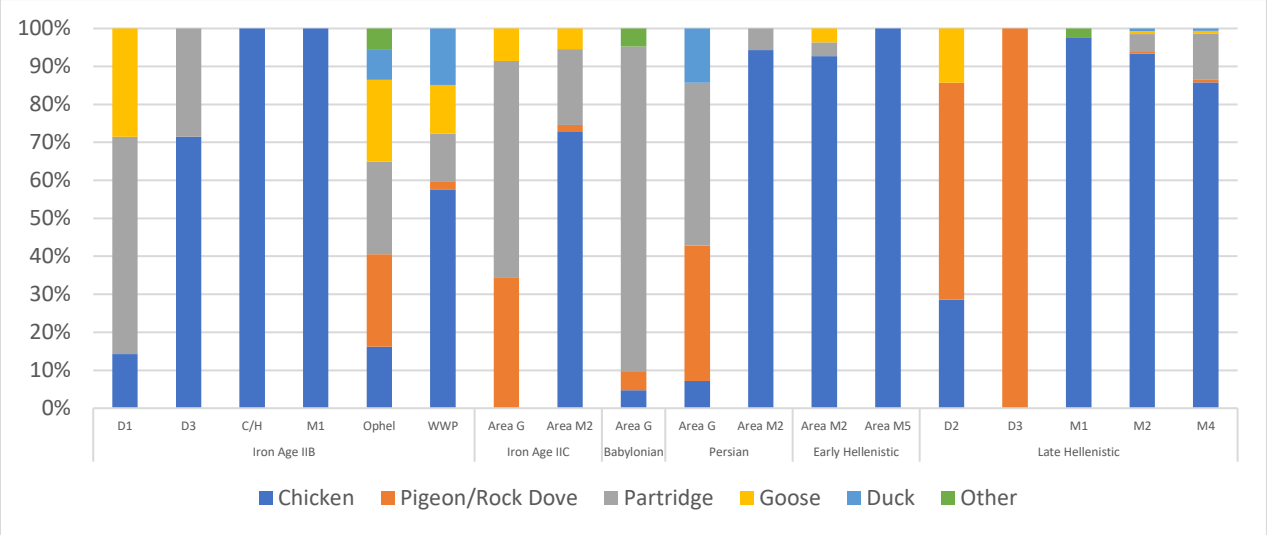
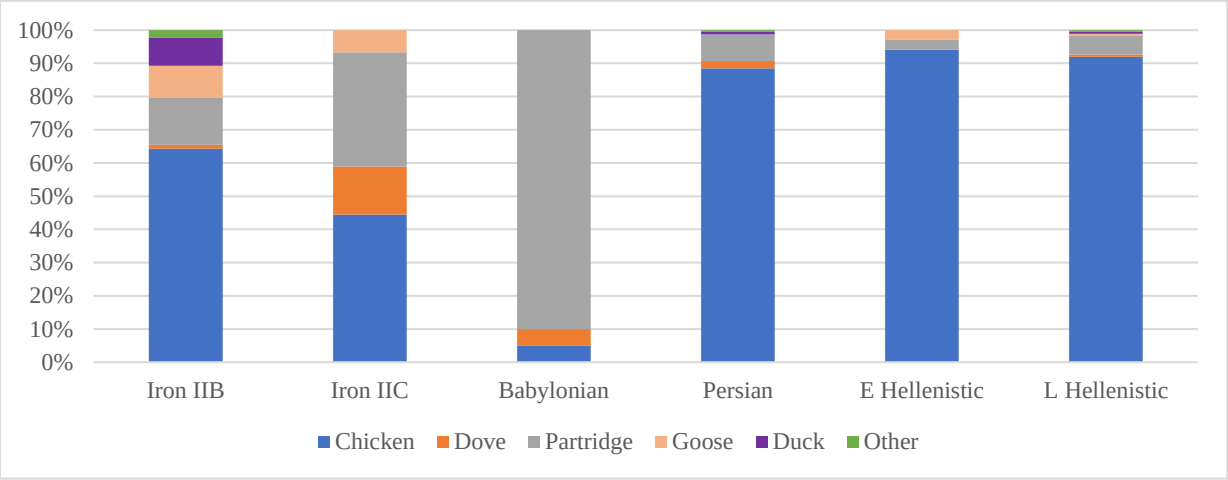


FIGURE 6.14. FREQUENCY OF MAJOR AVIAN SPECIES IN JERUSALEM BY PERIOD



6.1.2.2 Producers, Consumers, Butchers and Craftspeople

Producer and consumer relationships within zooarchaeology are integral in understanding a site's animal economy and the status of specific contexts. Producer assemblages are defined by having an animal economy focused on agricultural livestock, animals for primary and secondary products, the entire skeletal anatomy present, and direct contact with herders (Zeder 1988; Crabtree 1990). Consumer assemblages are defined by containing only consumable animals, market-aged animals, and select portions of meat (*ibid*). Each faunal assemblage from Jerusalem included in this study depicted elements of both producers and consumers.

Jerusalem has characteristically been deemed a consumer population with animals, meat, and by-products produced by hinterland agropastoralists (Sapir-Hen et al. 2016). The presence of a cultic institution reinforces this narrative with animals and other goods offered and redistributed. Under closer examination of the faunal remains, it is apparent that Jerusalem is not solely a consumer but a producer of primary and secondary animal products. The *chaîne opératoire* of livestock products includes primary and secondary producers, redistribution chains,

and, eventually, consumers (Figure 6.15). Primary producers are the livestock producers, ostensibly those in the hinterland, or herds residing directly on the outskirts of the city. Secondary producers would include the butchers, craftspeople, and the cult (Figure 6.15). Butchers associated with the market, cult, or independent butchers played a crucial role in Jerusalem's economy. Butchers are associated with the redistribution of meats as well as other primary by-products, such as skins, marrow, horns, and bones, that aid in crafting of tools and other objects.

Textual evidence from the butchers of Ezida and the cult of Eanna, give us a window into how butchers and other specialists would have interacted with the cult and the redistribution of sacrificial and non-sacrificial meats (BM 29226 no. 112; BM 26511 no. 35). Butchers were most likely not a part of the priesthood but a middleman between the cult and market, though we only have textual evidence for this in Ezida (Waerzeggers 2010: 268). Animals distributed to butchers as well as to outside contractors, specialists, and craftspeople included animals that the cult designated as non-sacrificial.[70] A non-sacrificial animal would be goats, older sheep, or female caprine brought by a private individual. These livestock offerings are regarded as less prestigious because they were not young male sheep (Kozuh 2010).

Faunal assemblages from Early Hellenistic–Area M5 and Late Hellenistic–Area M4 include refuse that indicates the presence of butcheries, tanneries, and craft production that occurred within the city walls of Jerusalem. Area M5 in the Givati Parking Lot excavation is a domestic context in Jerusalem as it includes a tabun with a neighboring pit (L.5092; Figure 6.16). This pit was deliberate and used to deposit refuse from the adjacent tabun. As discussed

[70] BIN 174: 24, 31; BM 114558; BM 113264; UCP 9/2 24: 28; YOS 17 360: iv 6-41.

previously, the remains in the pit are not reflective of cultic consumption practices; instead, they represent consumption and craft production refuse (see, Section 6.1.1.4). Remains in this pit include complete, non-articulated, lower limbs, and extremities of at least three goats and one sheep (Table 6.13). For caprines, these parts provide little caloric intake and are indicative of refuse (Metcalfe and Jones 1988). Another use for these parts would be in collagen and glue production (O'Connor, Solazzo, and Collins 2015). Animal glue was a standard adhesive used in sealing practices, woodworking, weaving, painting, amongst others (Feugère 2002).

Identifying these bones as related to glue production over other uses is based on how glue production uses animals and nuances of boiling bones. Beyond glue, boiling bones is a process of extracting collagen for soup, extracting grease, and defleshing and softening bones for modifications (Greenfield and Beattie 2017). Processes related to extracting grease and collagen would result in fractured bones (*ibid*), of which the bones from the pit are not (Figure 5.17). Compact bones, like carpals, tarsals, and phalanges, develop a progressively lighter in color because they rapidly degrease (*ibid*). The molecules in heated water abrade the uneven surfaces of bones, creating a smooth texture (White 1992). The bones from the pit are pale white, smooth, and have evidence of bone loss (Figure 5.17). Color variation and completeness of the bones are due to the complete portion including skin and ligaments being boiled in order to soften the keratin cover of the hooves; rather than complete decollagenization that would result in a uniform color and fractured bones (Greenfield and Beattie 2017). The faunal assemblage from the pit (L.5092) is distinctive and the result of complex processes of craft production that occurred in urban Jerusalem.

Area M5 is just one example of secondary producers in Jerusalem. The glacis in Area M4 (Str. VIII), is an enormous collection also containing the remains of craft products. The

remains in the glacis hint at several products and processes, such as the production of *shofars*, as hypothesized by the excavation team (A. Shatil and A. Zilberstein per comm), intense butchery, and tannery production of leathers. Jerusalem has a long history of producing leather goods, and we know by the Ottoman period, it was the second-largest guild within the city (Cohen 2000: 85-98). One of the defining features of the glacis assemblage was the abundance of horn cores, with many of them bearing sawing and cut marks. Removal of horns is a part of the skinning process (Binford 1981; 1984).

The glacis is not the only area with similarly cut horn cores during the Late Hellenistic. Area M1, nearby the glacis, also had evidence of sawed horns, that were related to debris from bone-working industries (Bar-Oz and Raban-Gerstel 2013: Figure 23.4). The presence of horncores in urban contexts a signifying aspect to the preparation of animal skin for leathers (Schmid 1968, 1973; Prummel 1978; Serjeantson 1989; Bartosiewicz 2006). Horncores are not the only evidence for tannery refuse within the glacis, other finds in the glacis and the nature of Jerusalem as a site, hint that the refused used for the glacis' construction was from a tannery. Further, it allows us to posit the existence of a tannery in Hellenistic Jerusalem.

A site-based requirement of a tannery is access to water, which expounds why tanneries are present near rivers and lakes; however, a spring will suffice (Bartosiewicz 2006; 2009). The perennial Gihon water-spring and Jerusalem's extensive water system would have provided enough water for production needs. Processing the hide required salts, but if salts were not available, then tree bark rich is tannic acids could be used (*ibid*). Some of the slanting fills that composed the glacis was ash and plaster (Zilberstein 2019). Interestingly, the bones from the glacis are scarcely burnt (>3%). They indicate that the ash layers were not the result of processes related to the construction of the glacis, but rather that the ash and bones derive from different

areas of the same production zone. Simply, the glacis was not burned *in situ*, if it were the glacis' faunal assemblage would have a higher frequency of burning.

Palynological analysis of the plaster-like chalk layers of the glacis, in Area M4, identified many well-preserved pollen grains (Langgut 2017). The main pollen present was olive (*Olea europaea)* but also included several trees high in tannic acids, such as deciduous oak types (*Quercus calliprinos* and *Quercus ithaburensis*) as well as terebinth (*Pistacia*) (Langgut 2017: 214, Table 2). The presence of these pollens in the glacis signifies that those in Jerusalem had access to tannic acids for production. If the charcoal and ash included in the glacis is representative of tree burning for a tannery is unknown, as identification of the charcoal is ongoing (Zilberstein per comm.).

Zooarchaeological elements, beyond the horncores, also support an argument for tannery refuse. Tanning process related to hair removal required pounding animal dung into the hide or soaking the hide in a solution of crushed animal brains that are rich in emulsifying oils (Bartosiewicz 2006; 2009). Cranial remains in the glacis, in addition to the cranial remains present in each assemblage included in this research, are never found complete. One hypothesis of this pattern could be attributed to the use of animal brains in craft production. It is unlikely that this resource was unused and discarded with other refuse, and it is assumed if the entire animal was utilized, so were its brains.

The frequency of wild species would also be higher in tannery refuse assemblages, representing about five to seven percent of the assemblage (Bartosiewicz 2009). Wild speciesin almost every assemblage included in this study is approximately one to two percent; however, the glacis has a higher frequency of around five to seven percent (Table 5.13; Table 6.15). The body part frequencies of game in tannery refuse assemblages would also depict a 'schlepp effect'

pattern (Perkins and Dally 1968:106; Bartosiewicz 2006; 2009), which is identical to what is present in the glacis (Table 5.26).[71] The expected mature older age of animals in tannery refuse assemblages is also present in the glacis material.

All these aspects: the spring, trees high in tannic acids, horncores, use of animal brains, game animals, the 'schlepp effect,' and the age of animals, indicate a tannery is present in Jerusalem. Construction material for the glacis was collected from the waste of craft producers in the city as it was available and needed removal. We can hypothesize where this location existed. Tanning is an odorous craft, and architectural features would include wood or plaster line pits; thus, we can posit its location on the outskirts of the city away from domestic contexts.

Bones in the glacis also depict direct evidence of the presence of butchers in Jerusalem. Evidence derives from the volume of bones with cut marks in the subphases of the glacis, as this assemblage contained the highest cut and butchered frequency to date (Table 6.17). The cut mark evidence depicts a wide variety of activities, primarily focusing on initial skinning and dismemberment, followed by filleting. The main difference between the subphases is present in the relatively higher frequency of skinning in the Hasmonean Stage, which may be related to the higher frequency of cut horns in that subphase (Table 5.19). It implies, based on the frequency and style of butchery that this material derives from human processes of butchery and possibly a tannery as well.

[71] *Schlepp*-effect, is term coined by Perkins and Daly (1968:106) within the context of an Early Neolithic settlement near Suberde in Anatolia. Their idea was that distal extremity bones of large game such as red deer would have been left in the hide that was used to drag back meat to the settlement following off-site butchering.

FIGURE 6.15 CHAÎNE OPÉRATOIRE OF LIVESTOCK IN JERUSALEM'S ECONOMY

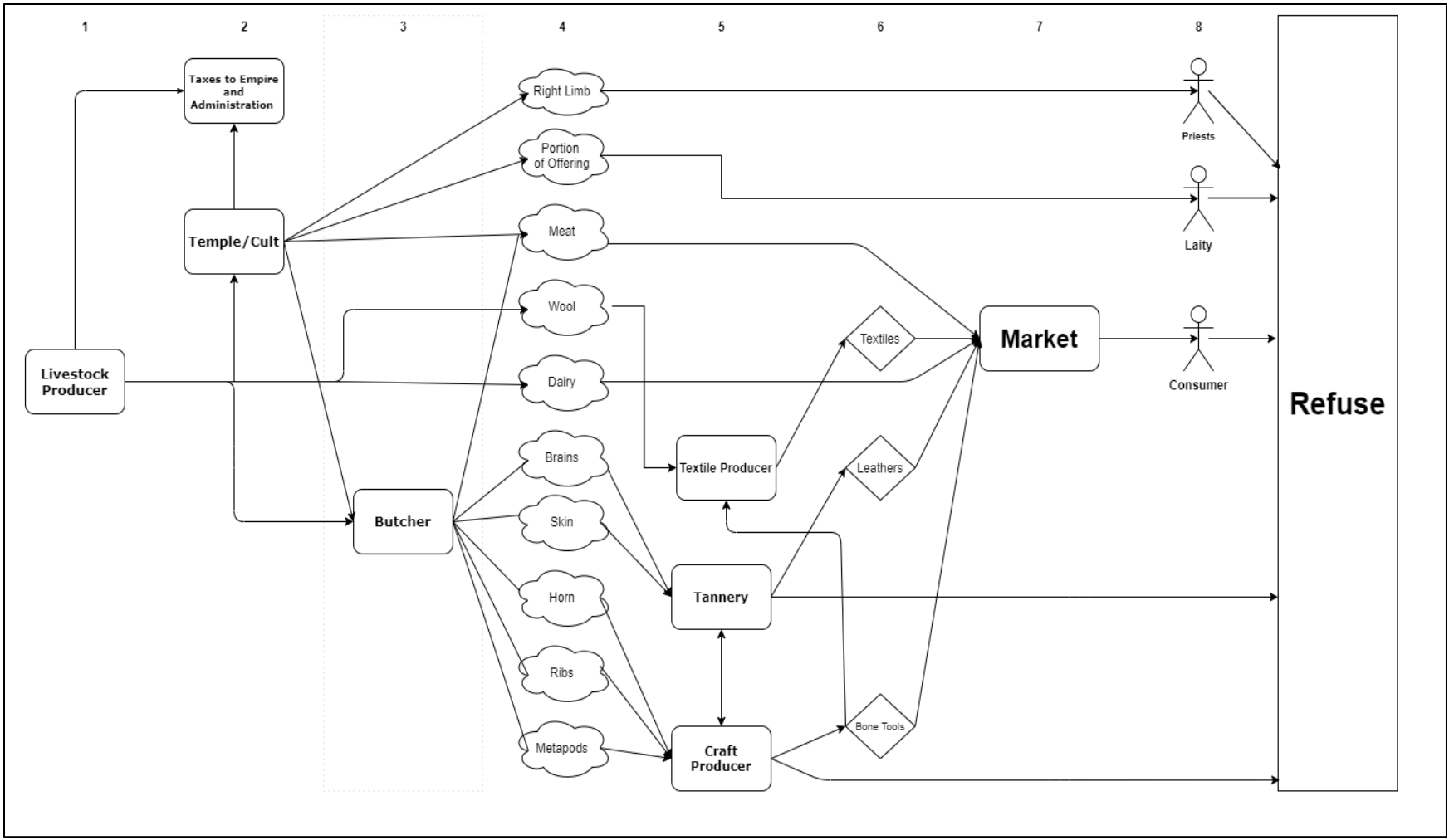


FIGURE 6.16 GIVATI PARKING LOT AREA M5, PHASE III

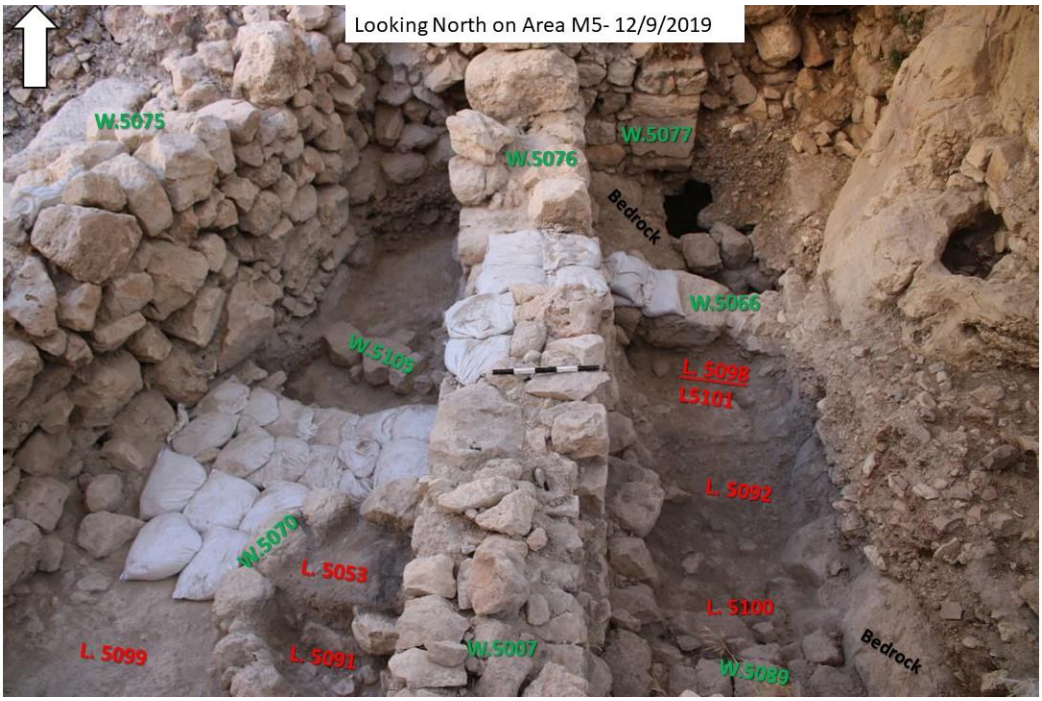
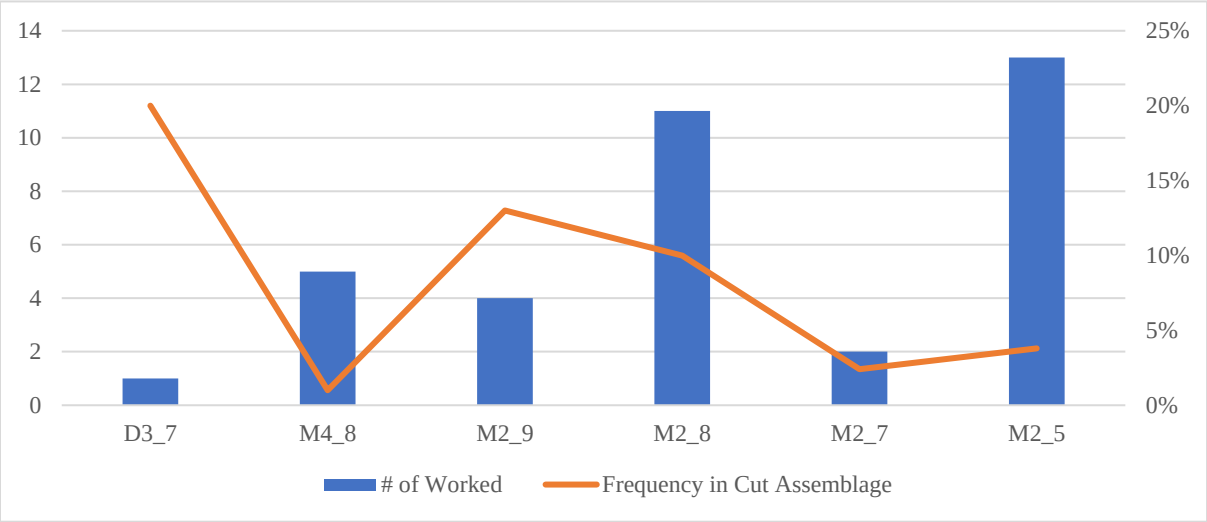


FIGURE 6.17 RELATIVE FREQUENCY AND COUNT OF WORKED BONES (SPATULAS) IN CUTMARK ASSEMBLAGES BY AREA AND STRATA OF JERUSALEM.

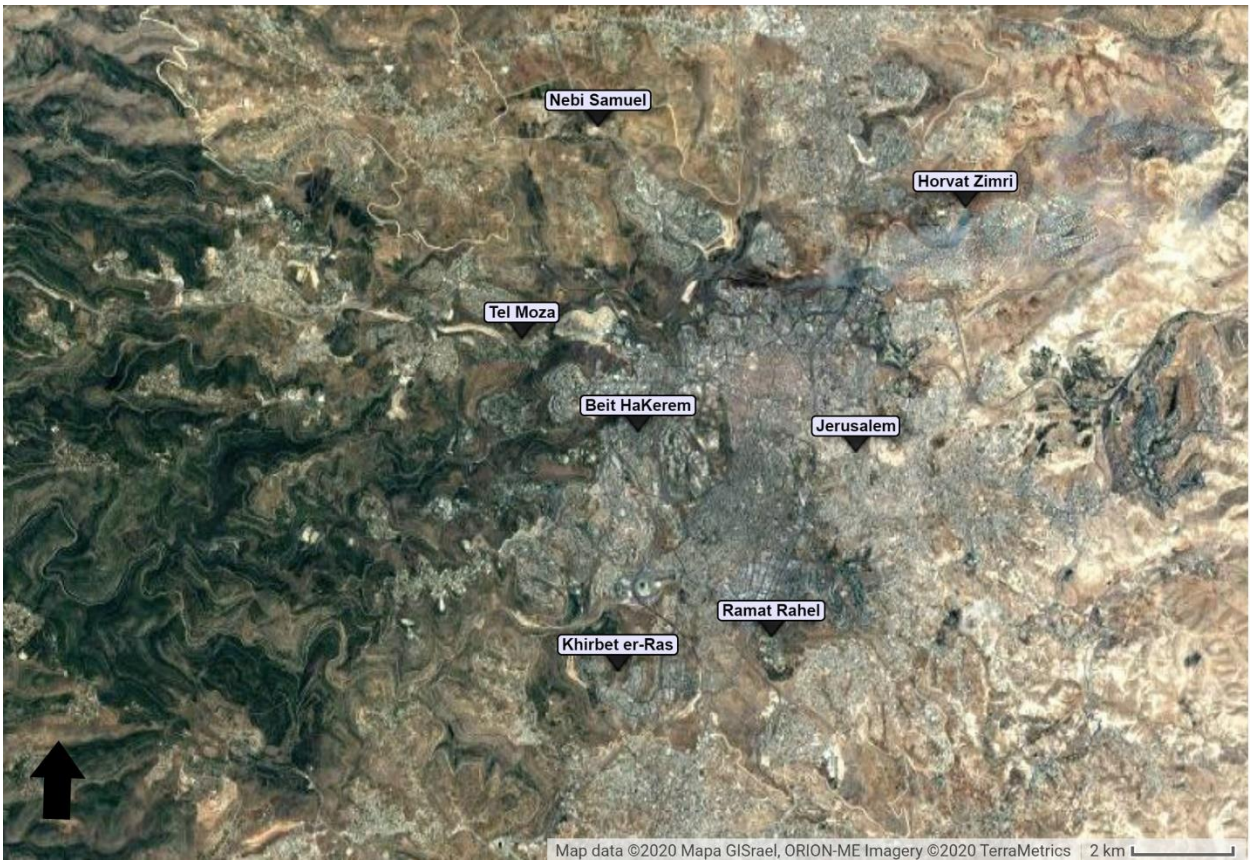


6.2 Rural Jerusalem – The Hinterland

Jerusalem's rural agrarian hinterland was a central location for the region to produce a litany of crops, such as olive oil, wine, and cereal grains. Jerusalem's environment has a low carrying capacity and depended on its north, west, and southern hinterland to supply the city with produce, livestock, and taxes (Rubin 2000; Adams 2014; Gadot 2015). Settlements in the hinterland are situated between two central valleys: Nahal Soreq and Nahal Refaʿim. Nahal Soreq and its major agricultural center of Tel Moẓa is associated with storing and producing cereals (Greenhut and DeGroot 2009), whereas olive and viticulture are associated with Nahal Refaʿim (Fulton forthcoming).

One of the reoccurring tasks facing agricultural production was the efficient harnessing of animal power and its impact on fruitful cultivation (Adam 2014: 85). The livestock exploited at sites throughout Jerusalem's hinterland can provide clues for us to understand what the agricultural or pastoral function of a site was. This section will explore livestock exploitation between sites in the hinterland as well as how the hinterland functioned in comparison to Jerusalem. The main chronological periods under exploration are the Iron IIB, Iron IIC, Persian, and broad Hellenistic period. Faunal assemblages from hinterland sites presented in this research are considerably smaller than their Jerusalem counterparts, as such additional comparable assemblages will also be included (Figure 6.18).

FIGURE 6.18. MAP OF HINTERLAND SITES



6.2.1 Jerusalem's Hinterland in the Iron Age II

Jerusalem expanded dramatically in the 8th century BCE, its hinterland, on the other hand, did not expand until the 7th century BCE (Gadot 2015). The influence of the Assyrians and the need to produce oil, wine, grains, and wool for taxes is a cause for the demographic expansion in the 7th century BCE. Hinterland assemblages dated to the 8th century BCE are limited to Tel Moẓa, Stratum V (Sapir-Hen et al. 2016), and Ramat Raḥel, building phase I (Fulton forthcoming). Faunal assemblages dated to the 7th century BCE are Khirbet er-Ras and Beit HaKerem, both presented in this research, and will be compared to Ramat Raḥel, building phase II and pit (L.14109) (Fulton et al. 2015; Fulton Forthcoming), as well as to Tel Moẓa, Stratum IV (Sapir-Hen et al. 2016).

6.2.1.1 Jerusalem's Hinterland in the Iron Age IIB

Our understanding of Jerusalem and its hinterland in the 8th century BCE is currently presumed to focused on agriculture and producing caprine secondary products, as well as providing caprine and cattle meat to Jerusalem (Sapir-Hen et al. 2016). This understanding is based on the comparison between Tel Moẓa and the Western Wall Plaza excavation in Jerusalem, conducted by Sapir-Hen et al. (2016). The comparative assemblage for Jerusalem relates to collapse and fills in the public areas of Jerusalem and has been attributed to a higher socioeconomic status (see Section 6.1.1.1).

Comparing Tel Moẓa as well as Ramat Raḥel, to a domestic context in Jerusalem reinforce major differences in caprine and cattle exploitation between Jerusalem and its hinterland, already identified by Sapir-Hen et al. (2016; Table 6.19; Figure 6.19; 6.20). Cattle frequencies between the site differ significantly (*ibid*). Tel Moẓa has the greatest frequency of cattle, followed by Ramat Raḥel and then Jerusalem (*ibid*; Table 6.19). This pattern reflects what we already assume about the agricultural focus and intensity of these sites: Tel Moẓa focused on cereal cultivation, Ramat Raḥel on viticulture, and Jerusalem as a livestock consumer. Tel Moẓa also has greater evidence for caprine and cattle body parts typically discarded during butchery, such as metapodials and phalanges, as well as more evidence of the upper forelimb's humerus (*ibid*; Figure 6.19).

Mortality profiles of caprines and cattle from Tel Moẓa and Jerusalem also indicate intricate subsistence patterns differed between the sites (Figure 6.20). Caprines at Tel Moẓa are partially culled early around six months of age, and this is an expectation if dairying is the focus of caprine exploitation (Payne 1973; Figure 6.20A). Caprines at Tel Moẓa continue to depict a subsistence pattern geared towards secondary products, whereas caprines in Jerusalem indicate

meat was the subsistence focus (Figure 6.20A). Culling of cattle at Tel Moẓa is at an earlier age than the cattle present in Jerusalem; still, the subsistence pattern of Tel Moẓa focuses on maintaining older cattle for traction and other secondary products (Figure 6.20B). Cattle in the domestic area of Jerusalem (Area D3) had access to only older cattle (Figure 6.20B). These cattle are older than the cattle at Tel Moẓa and suggest that Jerusalem was provided with meat from cattle once they were no longer needed in the fields for traction.

Comparing Tel Moẓa to either the higher socioeconomic Western Wall Plaza or the domestic Area D3 in Jerusalem indicates similar processes already noted by Sapir-Hen et al. (2016). Tel Moẓa was an agricultural powerhouse that focused on dairying of livestock, cultivating cereals and supplying Jerusalem with a variety of goods and services. Ramat Raḥel, in the neighboring Nahal Refaʿim, focused more on agricultural products that require little animal power, such as wine and oil (Fulton Forthcoming).[72] Jerusalem's demographic expansion in the 8th century BCE required additional goods produced in the hinterland, and this is evident in the faunal remains.

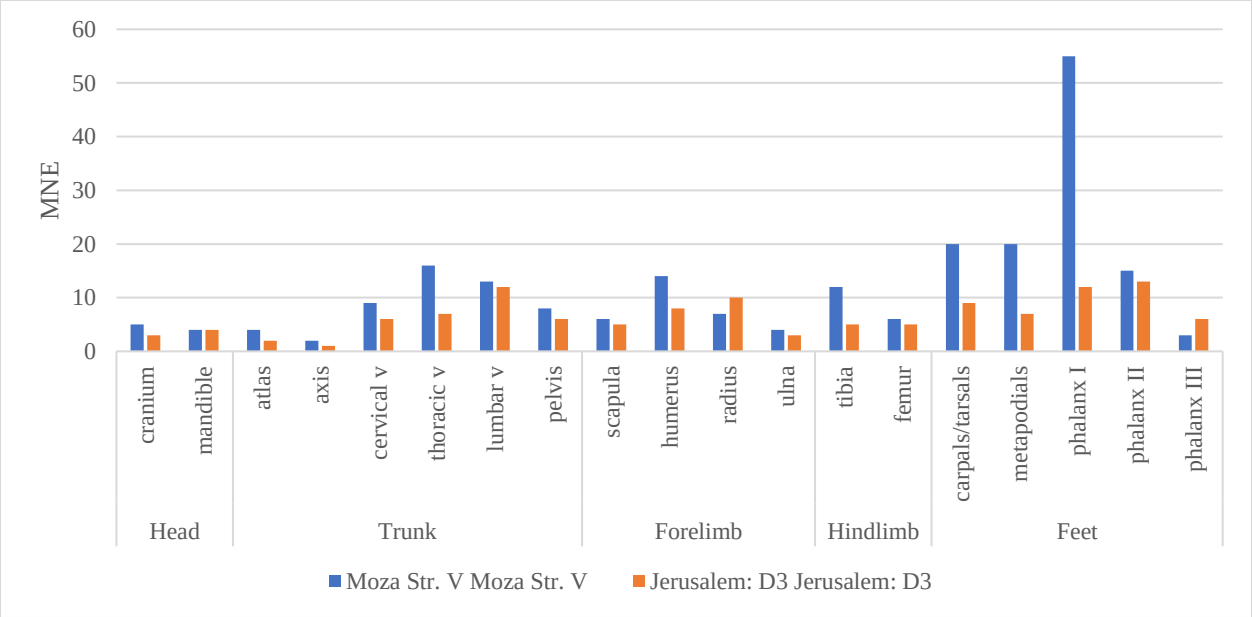
[72] Caprine and cattle demographic data for Ramat Rahel was not available for comparison.

TABLE. 6.19 NUMBER OF IDENTIFIED SPECIMENS BY SITE, AREA, AND STRATUM OF JERUSALEM AND ITS HINTERLAND IN THE IRON IIB

Iron IIB Hinterland	Species	Common Name	Ramat Raḥel, Phase I	Tel Moẓa Str. V		Jerusalem: Area D3	
			Fulton Forthcoming	Sapir-Hen et al. 2016		This Study	
			NISP%	NISP	NISP%	NISP	NISP%
Domesticated Ungulates	*Capra hircus*	Goat		73	5.53%	27	3.20%
	Ovis aries	Sheep		60	4.55%	28	3.32%
	Caprine size	Sheep or Goat	88%	777	58.86%	624	73.93%
	Bos taurus	Cow	11%	388	29.39%	50	5.92%
	A Size	Large Mammal				33	3.91%
	Sus scrofa domesticus	Pig		15	1.14%		
	Canis familiaris	Dog				7	0.83%
	Equus asinus	Donkey				6	0.71%
Wild Mammals	*Cervus/Dama*	Deer		1	0.08%		
	Gazella gazella	Mountain gazelle		6	0.45%	5	0.59%
	Cervus elaphus	Red Deer					
	Lepus capensis	Hare				2	0.24%
	C Size	Small Mammal				7	0.83%
Aves	*Alectoris chukar*	Chukar Partridge				2	0.24%
	Columba livia	Rock Pigeon/Dove				2	0.24%
	Gallus gallus	Chicken				4	0.47%
	Medium aves	Medium Bird					
Rodentia	*Rodentia*	Rodent				3	0.36%
Pisces	*Pisces*	Fish				44	5.21%
TOTAL			100%	1320	100%	844	100%

FIGURE 6.19 MINIMUM NUMBER OF ELEMENT BETWEEN TEL MOẒA, STR. V AND AREA D3 IN JERUSALEM.

A. Caprine



B. Cattle

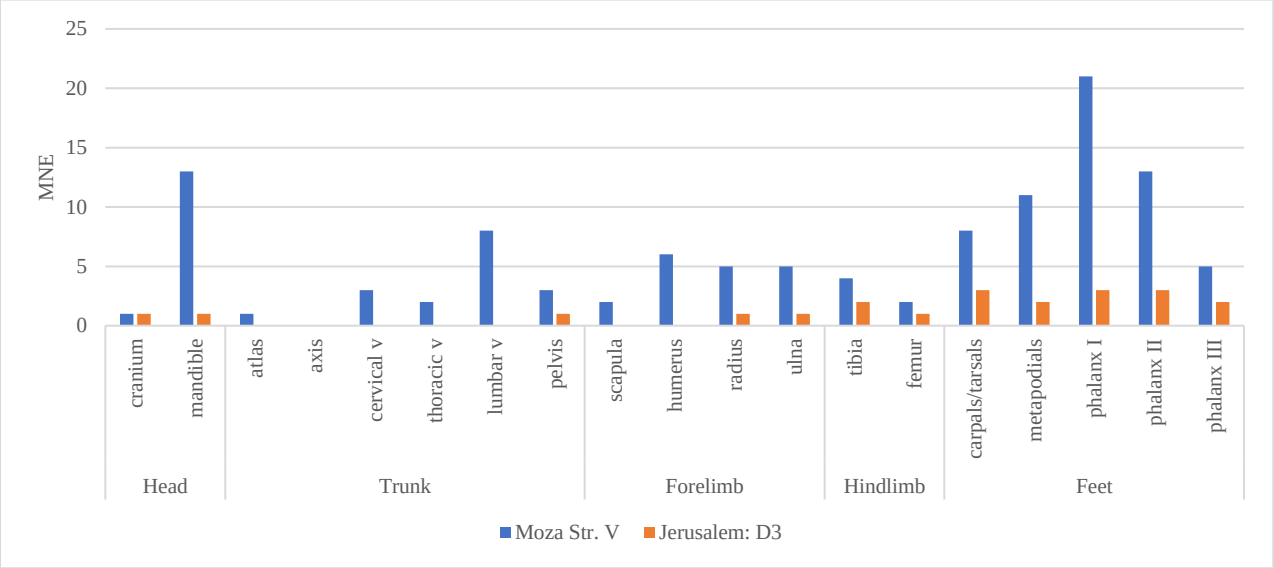
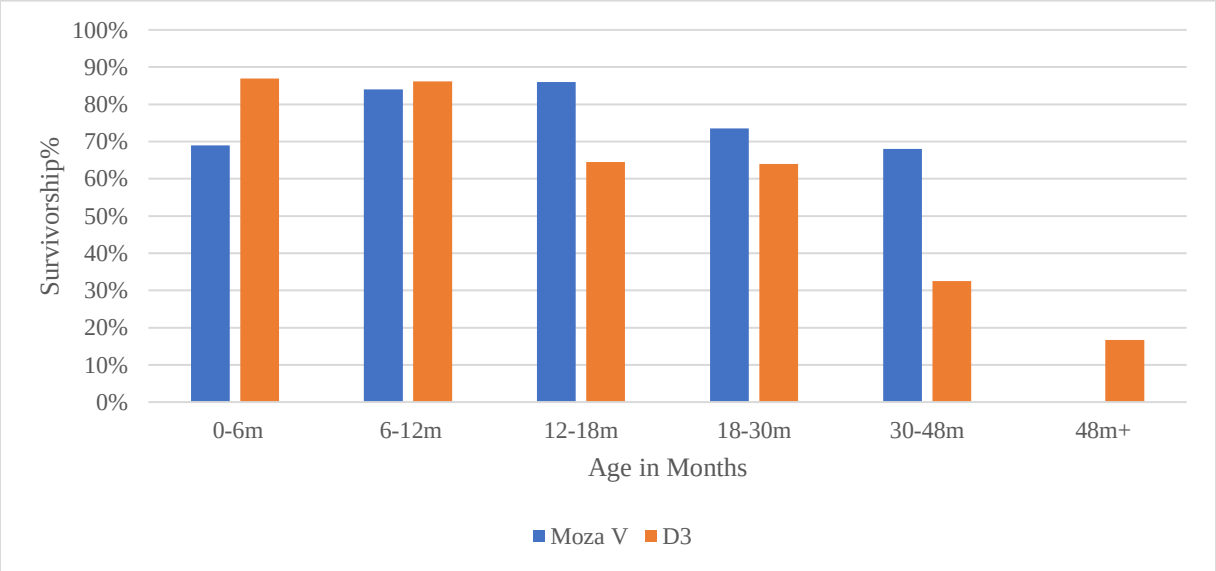
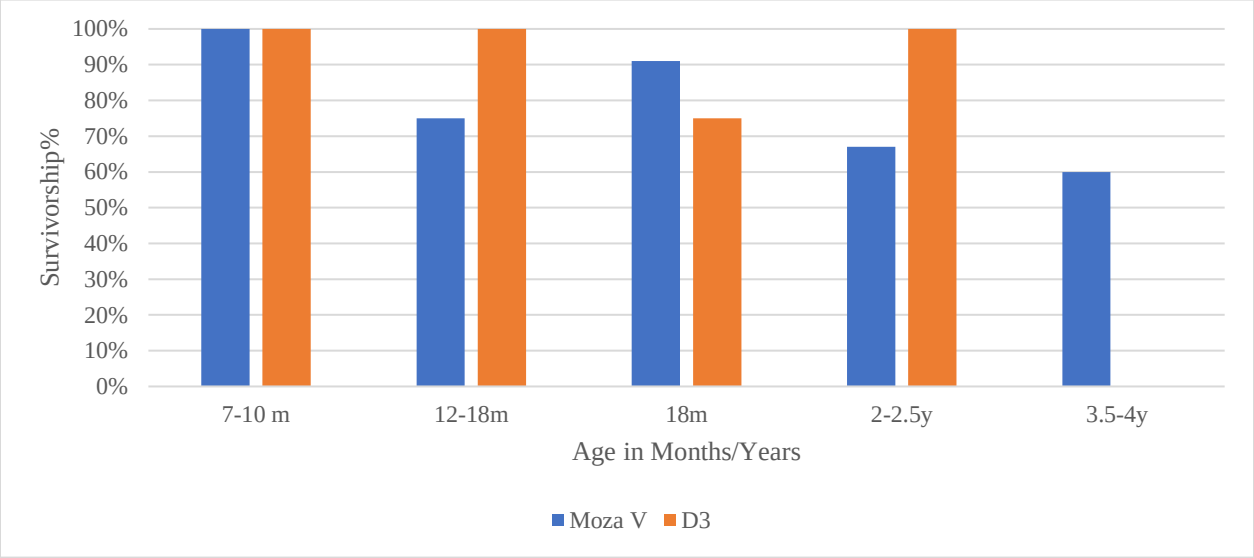


FIGURE 6.20. COMPARISON OF IRON IIB MORTALITY PROFILES FROM MOẒA, STR. V AND JERUSALEM, AREA D3, BASED ON EPIPHYSEAL FUSION

A. Caprine



B. Cattle



6.2.1.2 Jerusalem's Hinterland in the Iron Age IIC

Sapir-Hen et al.'s (2016) theory that hinterland sites are the livestock producers for Jerusalem continues into the Iron IIC. The Iron IIC sees an expansion of settlements at this time, and as such, there are several comparable faunal assemblages.

Continuity of hinterland sites with small frequencies of cattle is maintained through the Iron IIC (Table 6.19). A low frequency of cattle is per the immediate local environment of these sites which is less suitable for agriculture (Rubin 2000; Gadot 2015). The only site in the hinterland that has a frequency higher than ten percent is Tel Moẓa (Sapir-Hen et al. 2016; Table 6.19). Tel Moẓa is further west of the watershed line, and its location within Nahal Soreq allowed for this site to be engaged in highly intensive agriculture. The majority of other Iron IIC hinterland sites focused on caprine herding and dairying rather than the plow-based agriculture of Tel Moẓa.

Pig remains are present at three of the hinterland sites: Khirbet er-Ras, Beit HaKerem, and Tel Moẓa (Table 6.19). The size of Khirbet er-Ras and Beit HaKerem faunal assemblages are small. Relative frequencies of uncommon species at these sites are higher than sites with larger assemblages. Nevertheless, pigs were present. Their presence can be expounded against the backdrop of demographic growth.

The presence of pigs at sites during the Iron Ages is due to urban centers and their need to feed a rapidly expanding population (Sapir-Hen et al. 2013). Jerusalem's hinterland was not an expanding urban center but still had to contend with demanding factors that affected their meat consumption decisions. Under the Assyrian and Babylonian authority, there was a need for the hinterland to produce wool and other agropastoralists products for taxes. Preservation of livestock for secondary products would limit the availability of lamb, mutton, and beef for consumption and provide a reason to explore alternative meat options for a growing population–pork.

Subsistence patterns between the hinterland and Jerusalem suggest both regions focused on producing secondary products and using cattle for labor (Figure 6.21). Caprine in the hinterland were maintained longer at higher survivorship rates than in Jerusalem (Figure 6.21A). The age of consumed cattle in Jerusalem was considerably younger than in the hinterland, indicating greater access to tender beef. Subsistence patterns between the urban and rural spheres reinforce the notion that the hinterland were livestock producers and Jerusalem were the consumers. In Jerusalem, preservation of some portion of the livestock for secondary products is present, but in comparison to the survivorship of caprines and cattle in the hinterland suggests that the hinterland was consuming older animals consistently (Figure 6.21).

Examination of body parts frequencies from Iron Age IIC Jerusalem indicates the consumption of meat-rich part and local preparation of animals. Comparing the body part frequencies of hinterland sites to Jerusalem suggests both regions locally prepared their meat, with the presence of the entire animal present (Figure 6.22). Comparing the minimum number of elements (MNE) between Tel Moẓa and Jerusalem (Area M2) suggest there is a significant difference in utilization of caprines (p=0.006; X^2=36.12; df=18, Cramer's v= 0.3) but not of cattle (p=0.56; X^2=16.42; df=18, Cramer's v= 0.4). Tel Moẓa has a higher frequency of forelimbs, and limbs in general, this pattern could relate to the presence of a hinterland cult at the site (Kisilevitz 2013; 2015) or the sites higher socioeconomic status (Figure 6.22A). Whereas, Jerusalem indicates more extremities, that were refuse of primary butchery (Figure 6.22A).

Distinguishing the socioeconomic status of hinterland sites is not as clear cut as in an urban center. Both Ramat Raḥel and Tel Moẓa depict a high socioeconomic status usage of animals. The remaining hinterland sites, such as Beit HaKerem and Khirbet er-Ras, cannot be classified into the dichotomy of higher or lower socioeconomic status. These sites are small individual houses or farmsteads with small faunal assemblages that indicate a greater focus on raising of caprine for secondary products than plow-based agriculture.

The pit (L.14109) in Ramat Raḥel is a prime example of elite feasting habits. The pit included two sheep, select parts of a cow, seven partridges, one goose, seven catfish, three gilt-head seabreams, and one barbel (Fulton et al. 2015; Table 6.19). Consumption of each of these species holds economic or cultural significance that can be associated with a higher socioeconomic status. The sheep at the feast were between three to six months of age (Fulton et al. 2015). Meat from young animals is a delicacy as it is very tender, and economically it removes any future by-products. Partridge was a local bird that was regularly consumed in the

environs but also was an acceptable sacrifice, indicating a cultural significance to their consumption (Altmann and Spiciarich 2020). The presence of geese consumption has been linked to elites since the Late Bronze Age, and their cultural status is maintained through the Iron Ages (Koch 2014; Spiciarich 2020). Imported delicacies in the form of Egyptian fish were also present at Ramat Raḥel's feast (Fulton et al. 2015).

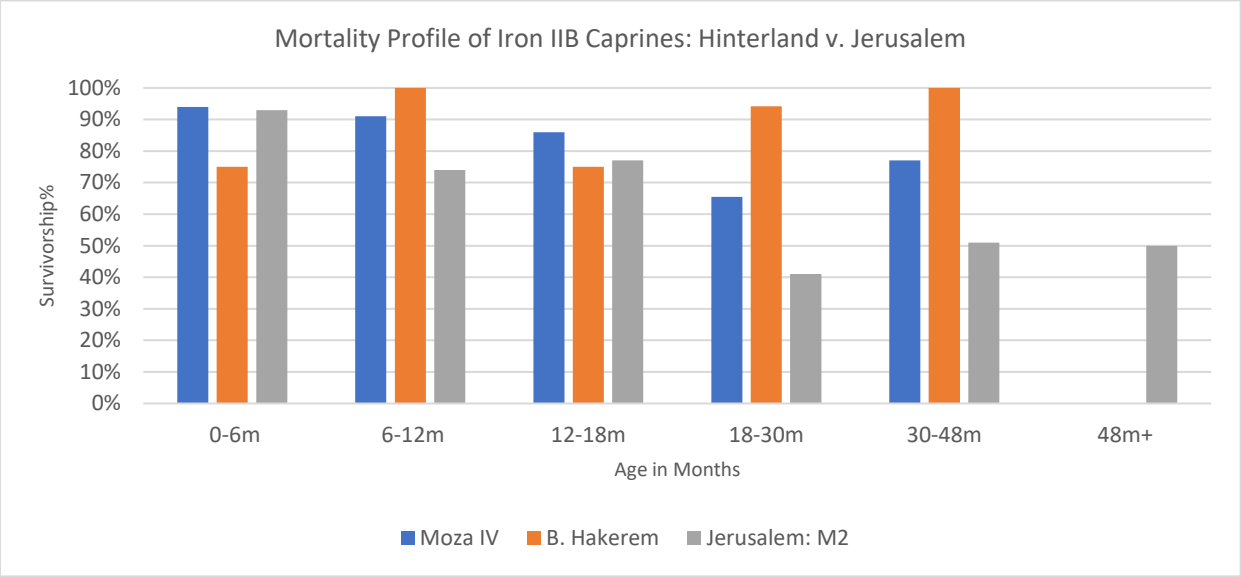
Not all hinterland producers focused on the same cash crops or livestock. Environmental conditions in different parts of the hill country influence the agricultural and pastoral products produced. On a superficial level contextualizing the hinterland and Jerusalem's relationship in the Iron IIC is described as a producer-consumer relationship. This dichotomy undervalues the intricate patterns reflected in the hinterland's animal economy. According to cuneiform sources, major temple cities would typically have outside contractors that resided in the hinterland, to manage livestock herds (YOS 7 143). These contractors were considered business-people with a financial interest in both the temple's livestock and agricultural products (Kozuh 2014: 68). These individuals likely had substantial wealth (Kozuh 2010: 535). Faunal remains from Tel Moẓa and Ramat Raḥel, along with cuneiform texts, support the notion of elites residing and producing goods in the hinterland.

TABLE. 6.19 NUMBER OF IDENTIFIED SPECIMENS BY SITE, AREA, AND STRATUM OF JERUSALEM AND ITS HINTERLAND IN THE IRON IIC.

7th-century Hinterland	Species	Common Name	Khirbet er-Ras			Beit HaKerem			Ramat Raḥel, Phase II	Ramat Raḥel, Favissa (L.14109)			Tel Moẓa Str. IV		Jerusalem Area M2	
			This Study			This Study			Fulton Forthcoming	Fulton et al. 2015			Sapir-Hen et al. 2016		THIS STUDY	
			NISP	MNI	NISP%	NISP	MNI	NISP%	NISP%	NISP	MNI	NISP%	NISP	NISP%	NISP	NISP%
Domesticated Ungulates	*Capra hircus*	Goat	1	1	6%	18	4	6%					59	6%	45	5%
	Ovis aries	Sheep	1	1	6%	15	3	5%		91	2	63%	28	3%	33	4%
	Caprine size	Sheep or Goat	11	2	65%	255	5	78%	78%				552	59%	630	69%
	Bos taurus	Cow	1	1	6%	28	2	9%	11%	11	1	8%	284	30%	27	3%
	A Size	Large Mammal				5	1	2%							26	3%
	Sus scrofa domesticus	Pig	1	1	6%	1	1	0.3%					12	1%		
	Canis familiaris	Dog													1	0.1%
	Equus asinus	Donkey											2	0.2%	1	0.1%
Wild Mammals	*C size*	Small Mammal	1	1	6%										11	1%
	Cervus/Dama	Deer											2	0.2%		
	Gazella gazella	Mountain gazelle				1	1	0.3%					3	0.3%	15	2%
	Cervus elaphus	Red Deer				1	1	0.3%							1	0.1%
	Capreolus capreolus	Roe Deer													1	0.1%
	Dama mesopotamica	Fallow Deer													2	0.2%
	Pedetes capensis	Spring Hare													1	0.1%
	Vulpes vulpes	Red Fox													1	0.1%
Aves	Small Aves	Small Bird							11%						2	0.2%
	Medium aves	Medium Bird	1	1	6%	3	1	1%		3	1	2%			17	2%
	Alectoris chukar	Partridge								38	7	26%			11	1%
	Anser anser	Greylag Goose								1	1	1%			3	0.3%
	Columba livia	Rock Pigeon/Dove													1	0.1%
	Gallus gallus	Chicken													40	4%
Rodentia	*G-size*	Rodent													12	1%
	Rattus rattus	Rat													1	0.1%
Reptilia/Anura	*Reptilia*	Snake													33	4%
	Anura	Frog or Toad													1	0.1%
TOTAL			17	8	100%	327	18	100%	100%	144	12	100%	942	100%	916	100%

FIGURE 6.21 COMPARISON OF IRON IIC MORTALITY PROFILES FROM TEL MOẒA, STR. IV AND JERUSALEM BASED ON EPIPHYSEAL FUSION

A. Caprines



B. Cattle

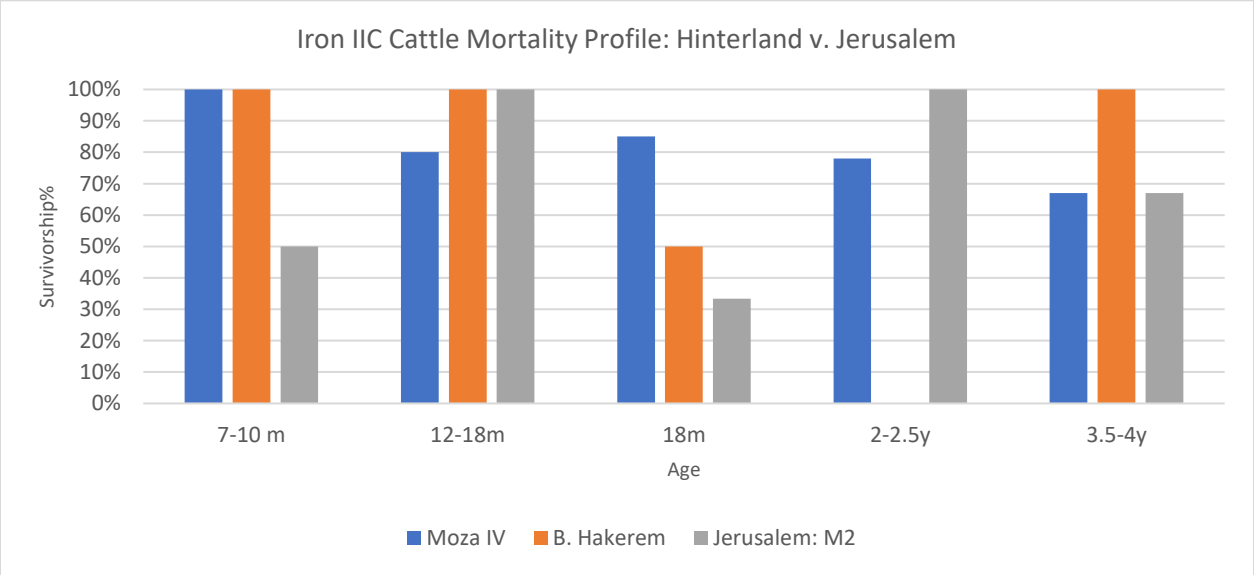
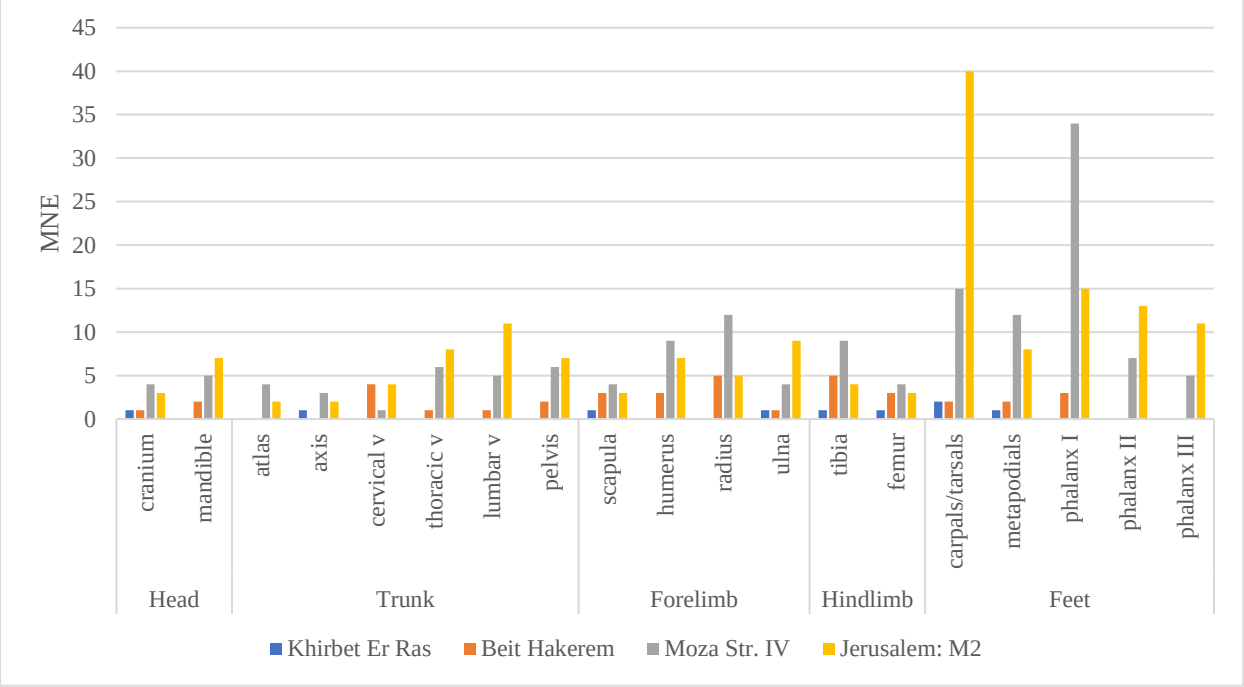
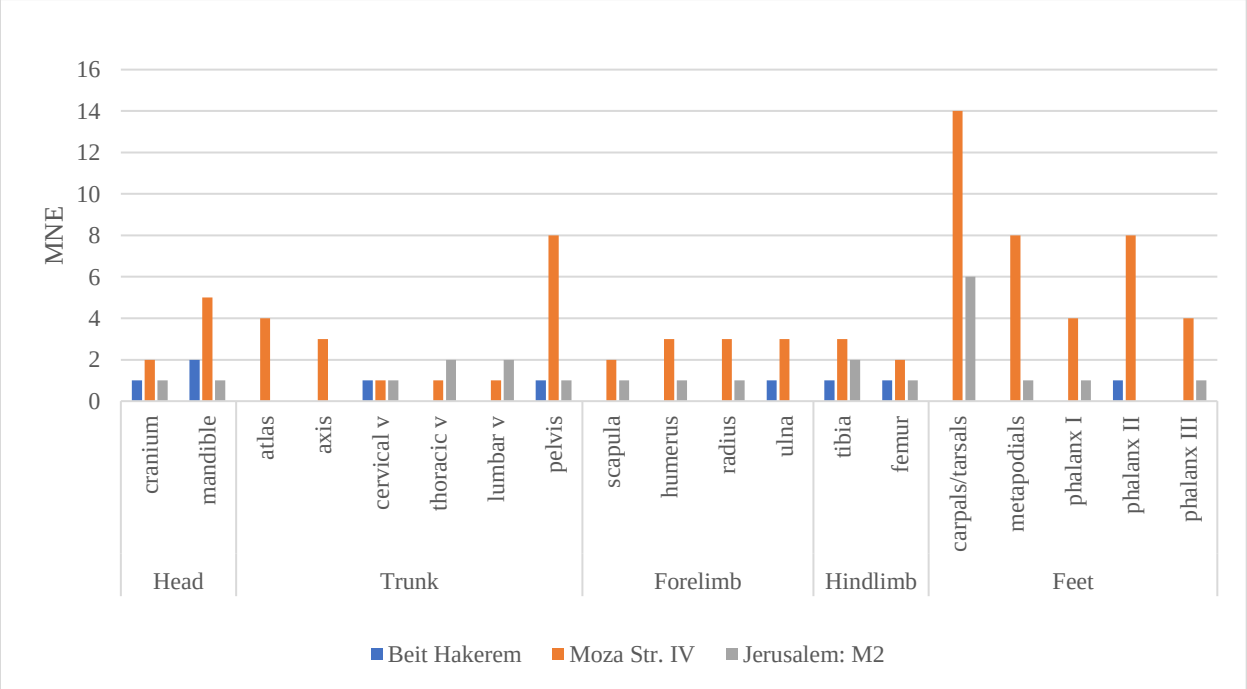


FIGURE 6.22 MINIMUM NUMBER OF ELEMENT OF CAPRINE AND CATTLE BETWEEN THE HINTERLAND AND JERUSALEM IN THE IRON IIC

A. Caprine



B. Cattle



6.2.2 Jerusalem's Hinterland in the Persian and Hellenistic Periods

Rural consumption patterns in the Persian and Hellenistic periods are underrepresented in scholarly literature. There are very few faunal assemblages from Jerusalem, and its hinterland dated to the 6th through 2nd centuries BCE. As such, the faunal assemblages included in this study and its comparison to Jerusalem will allow us to understand the animal economy of rural and urban spheres during periods of political and cultural change.

6.2.2.1 Jerusalem's Hinterland in the Persian Period

Following the Babylonian campaign, there is an assumption that Jerusalem was emptied and left abandoned, this would cause a ripple effect, and rural activity in the hinterland would shrink. The number of settlements in Jerusalem's hinterland in the Persian period is two times larger than the number of settlements in the Iron IIB (Gadot 2015). Further, many of the hinterland sites that are settled in the Iron IIC continued into the Persian period. One such site, Ramat Raḥel, has been argued to replace Jerusalem as the political and administrative center of Judah, now Yehud (Lipschits and Gadot 2008; Lipschits et al. 2012; Gadot 2015).

Faunal assemblages in Jerusalem's hinterland dated to the Persian period include Nebi Samuel (i.e., Nebi Samwil), Horvat Zimri (Horwtiz 1993), and Ramat Raḥel (Fulton forthcoming). These sites represent a wide arrange of contexts. Nebi Samuel is one of the sites identified with biblical Mizpah (Albright 1923; Magen and Har-Even 2007), an essential administrative site after the fall of Jerusalem according to the biblical texts.[73] Nebi Samuel's biblical identification aside, the faunal remains derive from floors and rooms below the Hellenistic quarter (D. Taubman per comm.). Horvat Zimri is a small fortress to the northeast of

[73] Identification of biblical Mizpah has also been attributed to Tell en-Nasbeh (Zorn 1993).

Jerusalem (Horwitz 1993). Faunal remains from Ramat Raḥel relate to a Babylonian-Persian pit in Area D1 (L.13174; Fulton forthcoming); as such, it represents another unique assemblage that may relate to refuse or feasting habits.

There is a notable rise in the frequency of cattle in the Persian hinterland (Table 5.20). The majority of sites are above ten percent, with the lowest frequency recorded at Ramat Raḥel with 13% (Table 5.20; Fulton Forthcoming). Persian Jerusalem (Area M2) maintained a low frequency of cattle, as was common in the periods prior. Higher frequencies of cattle at Nebi Samuel and Horvat Zimri indicate a focus on plow-based agriculture. The mortality profile of cattle at Nebi Samuel indicates some portion was culled under a year old for dairying, and the remainder being maintained for agricultural labor (Figure 5.23B). Comparing the mortality profile of cattle between the hinterland and Jerusalem indicate a continuous pattern of younger cattle consumed in Jerusalem than the hinterland (Figure 5.23B). Body part frequencies of cattle indicate they were not butchered in the hinterland but elsewhere as there is a minimal presence of cranial and feet portions (Table 5.21). There is no significant difference in the utilization of cattle body parts between the hinterland and Jerusalem ($p=0.59$; $X^2=15.93.12$; $df=18$, Cramer's $v= 0.46$).

At the majority of hinterland sites as well as Jerusalem, the ratio of sheep to goats is roughly equal, with no drastic difference between the species (Table 5.20). Ramat Raḥel, however, indicates a ratio of 2:1 with more sheep than goats (Fulton Forthcoming). Herds comprising more sheep than goats indicate an economic focus on wool; however, since the material derives from a pit, it could relate to a cultural preference of consuming sheep over goats (Sapir-Hen 2019a). Caprine demographics of the pit included 'market-aged' livestock between six months to three years of age, represented by meat-rich body parts (i.e., femur and pelvis) with

evidence of butchery (Fulton Forthcoming: Fig. 12.4). The remains from Area D1's pit are reminiscent of urban consumption patterns present in Jerusalem during the Iron Ages. We can speculate that Ramat Raḥel in the Persian period was not producing their livestock, or at least on a small local level, similar to Jerusalem during its demographic peaks.

Nebi Samuel, a site also linked to an administrative role, was producing livestock and secondary products. The mortality profile of caprines from Nebi Samuel and Horvat Zimri indicates maintaining livestock for secondary products. Jerusalem also maintained caprines for secondary products, but in comparison to Nebi Samuel and Horvat Zimri, caprines in Jerusalem were killed-off younger (Figure 5.23A). Body part exploitation of caprines indicates a focus on meat-rich limbs and truncal portions, and there is no significant difference in utilization between the hinterland and Jerusalem ($p=0.34$; $X^2=19.73$; $df=18$, Cramer's $v= 0.21$).

The presence of pig in Persian Yehud is culturally significant because Deuteronomy and Leviticus were in a period of composition and redaction (Watts 2007: 1-19; Leuchter 2010: 353); thus, sumptuary laws in these texts have more relevance. Ramat Raḥel's pit in Area D1 includes the only presence of pig in the hinterland (2%; Table 5.20). Jerusalem also has a minor percentage of pig in the Persian period (0.1%). Grand conclusions regarding proof or absence of the pig taboo cannot base themselves on these minuscule percentages. However, it is clear the Persian populations did not abstain from pork consumption, and the rationale behind their consumption is unknown. Possible reasons for pig consumption in such low frequencies could relate to biblical sumptuary laws not being followed by the laity, foreign residents, or a need to feed a growing population.

The Persian period is undoubtedly a period of regrowth. There was a need to sustain a growing population in Jerusalem and its hinterland. An increase in the frequency of chicken is a

reflection of this need. A stark rise in chicken is present in Jerusalem during the Persian period.[74] Nebi Samuel, in the Persian period, boasts a seven percent frequency of chicken; this is the same relative frequency of chicken in Persian Jerusalem (Table 5.20). Chicken is absent in the hinterland during the Iron II and is clearly evident only in urban Jerusalem. The dispersal of chicken starting in an Iron II urban context into the hinterland during the Persian period indicates a radical change in the animal economy of the hinterland. Chicken is a quickly maturating meat source, provides eggs, used in entertainment (i.e., cockfighting), and in addition can act as a commensal, eating the waste of humans. These traits influenced the popularity of chicken and their general adoption into the everyday animal economy of the hill country.

Comparing the faunal remains between Jerusalem and its hinterland during the Persian period suggests a relationship was maintained. The livestock animals present in Jerusalem are younger for meat consumption compared to those in the hinterland. The butchery of livestock, namely cattle, did not occur in the hinterland but by secondary producers, residing elsewhere. Hinterland producers generated livestock and secondary products for more sites than just Jerusalem. Ramat Raḥel was also a 'consumer' site that may have produced some livestock on a small local scale, similar to Jerusalem. Major changes to the animal economy of the hill country occurred in the Persian period, specifically a general rise in the utilization of cattle and chicken.

[74] See, Section 6.1.2.1.2

TABLE 6.20 NUMBER OF IDENTIFIED SPECIMENS OF JERUSALEM AND ITS HINTERLAND IN THE PERSIAN PERIOD

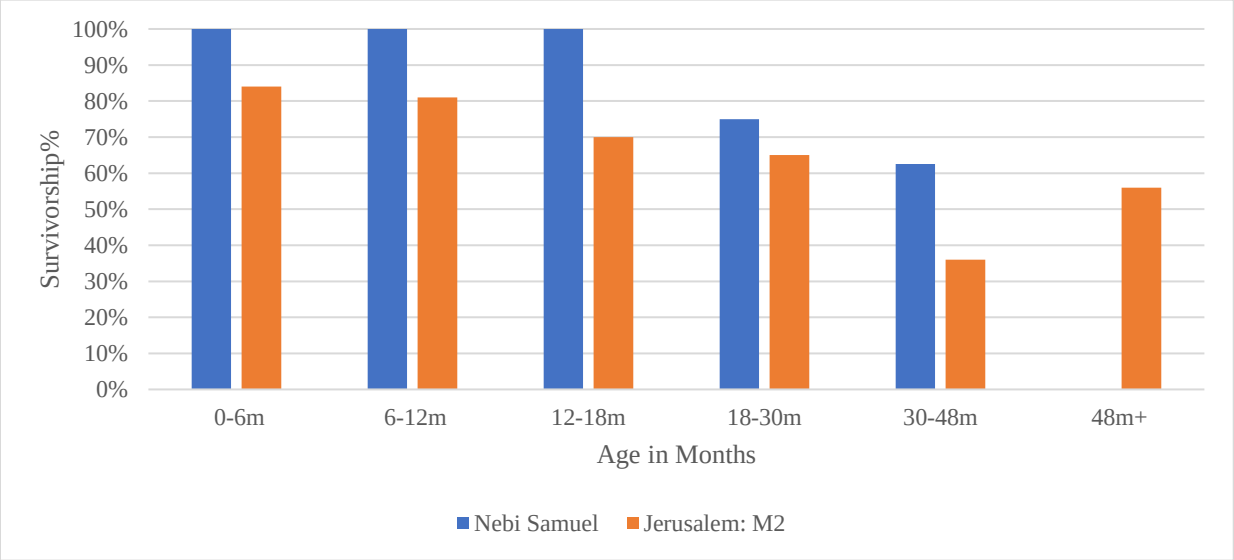
Persian Hinterland	Species	Common Name	Nebi Samuel		Horvat Zimri		Ramat Rahel, Area D1: L.13174		Jerusalem: Area M2	
			This Study		Horwitz 1993		Fulton Forthcoming		This Study	
			NISP	NISP%	NISP	NISP%	NISP	NISP%	NISP	NISP%
Domesticated Ungulates	*Capra hircus*	Goat	4	2.8%			3	1.2%	91	3.5%
	Ovis aries	Sheep	3	2.1%			6	2.4%	79	3.0%
	Caprine size	Sheep or Goat	85	59.9%	44	65%	179	71.3%	1874	71.1%
	Bos taurus	Cow	15	10.6%	19	28%	33	13.1%	142	5.4%
	A Size	Large Mammal	11	7.7%					97	3.7%
	Canis familiaris	Domestic Dog			3	4%	12	4.8%	6	0.2%
	Sus scrofa domesticus	Pig					5	2.0%	3	0.1%
	Camelus dromedarius	Camel					1	0.4%		
	Equus asinus	Donkey	1	0.7%			3	1.2%	3	0.1%
Wild Mammals	*Ibex nubiana* (ibex)	Ibex					2	0.8%		
	Gazella gazella	Gazelle	3	2.1%			1	0.4%	13	0.5%
	Cervus elaphus	Red Deer							1	0.0%
	Capreolus capreolus	Roe Deer							4	0.2%
	Dama mesopotamica	Fallow Deer	2	1.4%						
	Lepus capensis	Cape Hare							1	0.0%
	Vulpes vulpes	Red Fox					1	0.4%	1	0.0%
Aves	*Alectoris chukar*	Partridge					4	1.6%	12	0.5%
	Anas platyrhynchos	Mallard Duck	1	0.7%						
	Anser anser	Domestic Goose							3	0.1%
	Gallus gallus	Chicken	10	7.0%	2	2%			200	7.6%
	Small Aves	Small Bird	2	1.4%					11	0.4%
	Medium Aves	Medium Bird	3	2.1%					52	2.0%
Rodentia	*G-Size*	Rodents	1	0.7%			1	0.4%	30	1.1%
	Mus musculus	Mouse	1	0.7%					3	0.1%
	Rattus rattus	Rat								
	Soricidae	Shrew							1	0.0%
Reptilia	*Reptilia*	Snake							8	0.3%
	Testudo greaca	Tortoise								
Anura	*Anura*	Frog or Toad							2	0.1%
Total			142	100%	68	100%	251	100%	2637	100%

TABLE 6.21. BODY PART FREQUENCIES OF CAPRINE AND CATTLE IN PERSIAN JERUSALEM AND ITS HINTERLAND

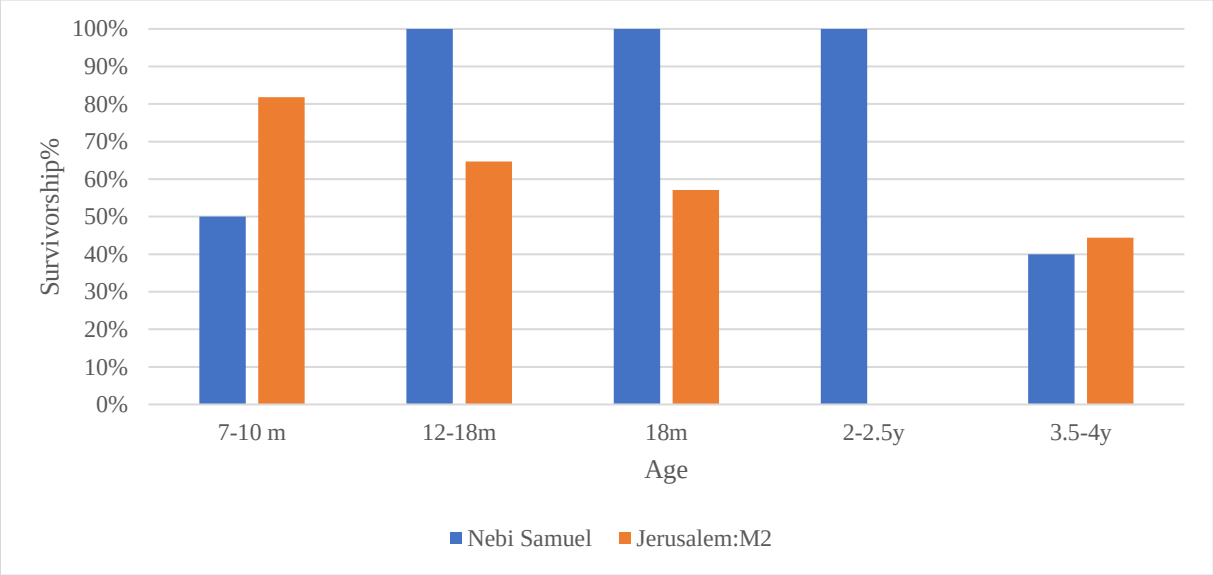
Skeletal Frequency		Caprine			Cattle		
		Horvat Zimri	Nebi Samuel	Jerusalem: M2	Horvat Zimri	Nebi Samuel	Jerusalem: M2
Body Portion	Element	NISP%	MNE	MNE	NISP%	MNE	MNE
Head	Cranium	16%	1	12	23%	1	2
	Mandible		1	12		1	2
Trunk	Atlas	14%	2	7	23%		1
	Axis			7			1
	Cervical V		3	26			2
	Thoracic V		2	36		1	2
	Lumbar V		3	40		1	2
	Pelvis		1	10			2
Forelimb	Scapula	32%	2	4	31%		3
	Humerus		1	11		1	1
	Radius		2	17		1	3
	Ulna		1	10		1	2
Hindlimb	Tibia	36%	2	10	23%		2
	Femur		2	9			2
Feet	Carpals/Tarsals	2%	2	83	0%		18
	Metapodials		2	24		2	2
	Phalanx I		3	38		2	7
	Phalanx II		1	24		1	3
	Phalanx III			23			5

FIGURE 6.23 COMPARISON OF PERSIAN MORTALITY PROFILES OF CAPRINE AND CATTLE FROM NEBI SAMUEL AND JERUSALEM BASED ON EPIPHYSEAL FUSION

A. Caprine



B. Cattle



6.2.2.2 Jerusalem's Hinterland in the Hellenistic Period

Faunal assemblages dated to the Hellenistic period are representative of the Late Hellenistic/Hasmonean period (mid-2nd to mid-1st century BCE). Our understanding of how the hinterland and Jerusalem developed in the period of regrowth from the end of the Persian period through the Ptolemaic and Seleucid periods (i.e., Early Hellenistic) remains enigmatic. Faunal assemblages from Jerusalem's hinterland dated to the Late Hellenistic include Khirbet er-Ras and two strata from Nebi Samuel. The assemblage from Khirbet er-Ras is small, and the primary representative for the hinterland at this time is Nebi Samuel. The faunal remains from Nebi Samuel derive from rooms and floors of a domestic quarter (see Figure 1.7; 1.8).

The animal economy of Nebi Samuel's domestic context will be placed in comparison to two contexts of Jerusalem: public–Area M2 and constructional refuse–Area M4. One of the distinct changes over time in the hinterland as well as in Jerusalem is the general rise in cattle frequencies. Cattle frequencies at Nebi Samuel rise from 18% in the Persian period to 47% in

Stratum 8 and 20% in Stratum 7 (Table 6.20; Table 6.22). Similarly, the frequency of cattle also rises in Jerusalem (Area M2) from 9% in the Persian to 15.5% in the Late Hellenistic (Table 6.20; Table 6.22). In Late Hellenistic Jerusalem, cattle were primarily utilized for meat consumption, whereas at Nebi Samuel, they were preserved for traction (Figure 6.24B). Body part frequencies between the sites do not vary, with both sites having high frequencies of cranial and forelimbs elements (Table 5.23; NS v. M2: p=0.80; X^2=12.7.12; df=18, Cramer's v= 0.28; NS v. M4: p=0.72; X^2=14.07.12; df=18, Cramer's v=0.19).

Ratios of sheep to goat in the hinterland indicate a slight preference for sheep, but most of the ratios are nearly equal with slightly more sheep than goats (Table 6.22). The only site with a definitively higher frequency of sheep over goats is Khirbet er-Ras. Caprine in the hinterland were culled between six months to one year of age, noticeably younger than the caprine from Jerusalem (Figure 6.24A). Caprine in the Late Hellenistic were killed-off at a younger age both in the hinterland and in Jerusalem, then in the periods prior. While some were maintained for secondary products, there is a conspicuous demand for meat during the Late Hellenistic. This demand may reflect the demographic growth of the regions or an increase of cultic sacrificial activity as a result of the establishment of the Hasmonean monarchy. Utilization of caprine body parts did not significantly vary between sites, both focused on cranial and meat-rich body parts (Table 6.23; NS v. M2: p=0.99; X^2=5.62.12; df=18; NS v. M4: p=0.92; X^2=10.09.12; df=18). Indicating that each site was in control over its slaughtering and butchering decisions.

A unique feature of Nebi Samuel's Late Hellenistic faunal assemblage was its inclusion of seven percent game animals, comprising of gazelle, red deer, and fallow deer (Table 6.22). Jerusalem's Area M4 also included one of the highest frequencies of wild speciesrecorded in Jerusalem– 5% (Table 6.22). Elite hunting is a prominent activity in the Late Hellenistic. At no

other point in Jerusalem or its hinterland's faunal history has the game species been so present. The fact that there is an influx of wild taxa present at both Jerusalem and its hinterland signals a development in elite behaviors throughout the region. Body part frequencies of the game animals suggest a homogenous 'schlepp effect' with mainly limb and extremities present at Nebi Samuel and Jerusalem (Area M4) (Table 6.24A). However, the wild species brought back to Jerusalem included more truncal portions, suggesting a preference for consuming venison and their secondary use in craft production. The presence of wild species at Nebi Samuel indicates that elites and elite activities occurred throughout the hinterland and not just in Jerusalem.

The animal economy of Late Hellenistic Jerusalem and its hinterland is uncharacteristic in comparison to the previous periods. Chicken consumption is present in every site in the Late Hellenistic, in higher frequencies than the Iron Ages, albeit still in minor frequencies (5-10%). Their use in the Late Hellenistic was primarily for meat consumption as only meat-rich fowl portions are present (Table 6.24B). Consumption and hunting of game animals are not present in the region until the Late Hellenistic, marking a unique development in the animal economy.

Cattle were exploited primarily for meat in the urban center and as traction power in the hinterland. In general, the frequencies of cattle are higher in the Late Hellenistic than in previous periods. Later in the Early Roman period of Jerusalem, the rise in cattle was attributed to an apogee of cultic activity (Reich 2015). Beyond the borders of the southern Levant, a rise in the exploitation of cattle in the Classical periods is ascribed to an increase in population density in regions that were once occupationally sparse (Trixl et al. 2017).

Culturally, we could attribute the rise of cattle to the establishment of the Hasmonean monarchy. The merger of cult and political spheres on the outset would not have a direct effect on the animal economy unless there were an increase in cultic or elite activity that would require

additional sacrificial offerings (Reid 1996; McInerney 2010). In the Late Hellenistic, Jerusalem and its hinterland are in a period of cultic and demographic growth. It is not out of the realm to posit that the increase of cattle relates to corresponding reaction to both these social and economic needs. Another aspect that we could attribute to rise of cattle in this period is the change in climate, specifically a wetter phase in comparison to the drought of the Persian period (Langgut and Lipschits 2017). A wetter phase in the Hellenistic period would increase the carrying capacity of the hill country, allowing for more cattle herds.

Sheep, goats, and cattle were all relatively exploited, depending on the cultic prescriptions. In the biblical texts, there is no preference for one animal over another; instead, it was dependent on what the sacrifice intended for: sin offering – bull (Exodus 29: 26), festival offering – fat (Exodus 23: 8), fellowship offering – ram, bull, or oxen (Exodus 20:24; 24:5; Leviticus 4:10; 9:4).

TABLE 6.22 NUMBER OF IDENTIFIED SPECIMENS OF JERUSALEM AND ITS HINTERLAND IN THE HELLENISTIC PERIOD

Hellenistic	Species	Common Name	Nebi Samuel Str. 8			Nebi Samuel Str. 7			Khirbet er-Ras			Jerusalem: M2			M4 Str. VIII Glacis		
			This Study			This Study			This Study			This Study			This Study		
			NISP	MNI	NISP %	NISP	MNI	NISP %	NISP	MNI	NISP %	NISP	MNI	NISP %	NISP	MNI	NISP %
Domesticated Ungulates	*Capra hircus*	Goat	3	1	2.8%	10	1	2.4%	2	1	8.0%	157	9	3.9%	213	24	4.4%
	Ovis aries	Sheep	1	1	0.9%	11	3	2.7%	4	1	17.0%	159	18	4.0%	221	22	4.6%
	Caprine size	Sheep or Goat	41	2	38.3%	218	5	52.5%	13	2	54.0%	2665	37	66.7%	2803	54	58.4%
	Bos taurus	Cow	29	1	27.1%	54	2	13.0%				330	5	8.3%	820	18	17.1%
	A Size	Large Mammal	22	2	20.6%	29	1	7.0%	3	1	13.0%	288	3	7.2%	325	5	6.8%
	Canis familiaris	Domestic Dog				1	1	0.2%				14	1	0.4%	28	5	0.6%
	Sus scrofa domesticus	Domestic Pig										9	1	0.2%	9	3	0.2%
	Camelus dromedarius	Camel													1	1	0.02%
	Equus asinus	Donkey				8	1	1.9%	1	1	4.0%	4	1	0.1%	2	1	0.04%
Wild Mammals	*Canis/Gazella size*	Small mammal	1	1	0.9%	2	1	0.5%				16	1	0.4%	20	3	0.4%
	Gazella gazella	Gazelle	4	1	3.7%	9	1	2.2%				33	3	0.8%	60	5	1.3%
	Cervus elaphus	Red Deer	1	1	0.9%	6	1	1.4%				6	1	0.2%	2	2	0.04%
	Capreolus capreolus	Roe Deer													1	1	0.02%
	Dama mesopotamica	Fallow Deer				8	1	1.9%				13	2	0.3%	125	9	2.6%
	Lepus capensis	Cape Hare				1	1	0.2%				1	1	0.03%	1	1	0.02%
	Vulpes vulpes	Red Fox				3	2	0.7%				2	1	0.1%	2	1	0.04%
Aves	*Alectoris chukar*	Partridge				2	1	0.5%				12	2	0.3%	19	7	0.4%
	Anas platyrhynchos	Mallard Duck										2	2	0.1%	1	1	0.02%
	Anser anser	Domestic Goose										1	1	0.03%	1	1	0.02%
	Columba livia	Rock Pigeon/Dove										1	1	0.03%	1	1	0.02%
	Gallus gallus	Chicken	5	1	4.7%	20	3	4.8%				246	15	6.2%	131	18	2.7%
	Corvus corvus	Crow										2	1	0.1%			
	Small Aves	Small Bird				1	1	0.2%				1	1	0.03%			
	Medium Aves	Medium Bird				9	2	2.2%	1	1	4.0%	30	2	0.8%	10	4	0.2%
	Large Aves														1	1	0.02%
Rodentia	*G-Size*	Rodents				2	1	0.5%				2	1	0.1%			
	Mus musculus	Mouse				5	1	1.2%									
	Rattus rattus	Rat				3	1	0.7%									
	Spalax ehrenbergi	Mole-Rat				1	1	0.2%				1	1	0.03%			
	Martes fiona	Beech Marten										1	1	0.03%			
Reptilia	*Testudo greaca*	Tortoise				1	1	0.2%									
	Reptilia	Snake										1	1	0.03%			
Anura	*Anura*	Frog or Toad				3	1	0.7%									
Total			107	11	100%	415	37	100%	24	7	100%	3997	113	100%	4797	188	100%

TABLE 6.23 BODY PART FREQUENCIES OF CAPRINE AND CATTLE IN HELLENISTIC JERUSALEM AND ITS HINTERLAND

Skeletal Frequency		Caprine					Cattle			
		Kh.er-Ras	Nebi Samuel Str. 8	Nebi Samuel Str. 7	Jerusalem: M2	Jerusalem: M4	Nebi Samuel Str. 8	Nebi Samuel Str. 7	Jerusalem: M2	Jerusalem: M4
Body Portion	Element	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE
Head	Cranium	1	1	6	2	119	1	1	2	54
	Mandible	2	2	4	1	90	1	3	3	40
Trunk	Atlas			1	1	20		1	2	6
	Axis			1	1	13			1	3
	Cervical V		1	4	1	58	1	1	4	18
	Thoracic V	1		7	1	82	1	1	15	22
	Lumbar V		1	5	3	96	2	1	6	11
	Pelvis	1	1	3	1	59	1	1	5	12
Forelimb	Scapula	1		2	1	32	1	1	3	6
	Humerus	2	2	6	3	64	1	2	3	10
	Radius		3	5	1	50	2	2	4	8
	Ulna		1	2	1	13		1	3	12
Hindlimb	Tibia		1	4	3	55	2	1	4	11
	Femur	1	1	4	3	39	1	2	4	8
Feet	Carpals /Tarsals	1	2	6	3	47	3	6	19	36
	Metapodials	2	4	6	4	68	2	2	7	20
	Phalanx I		2	4	3	76	3	1	13	26
	Phalanx II			2	1	17	1	1	15	28
	Phalanx III			1	0	3		3	10	20

TABLE 6.24 BODY PART FREQUENCIES OF MINOR SPECIES IN HELLENISTIC JERUSALEM AND ITS HINTERLAND

A. Game (Gazelle and Deer)

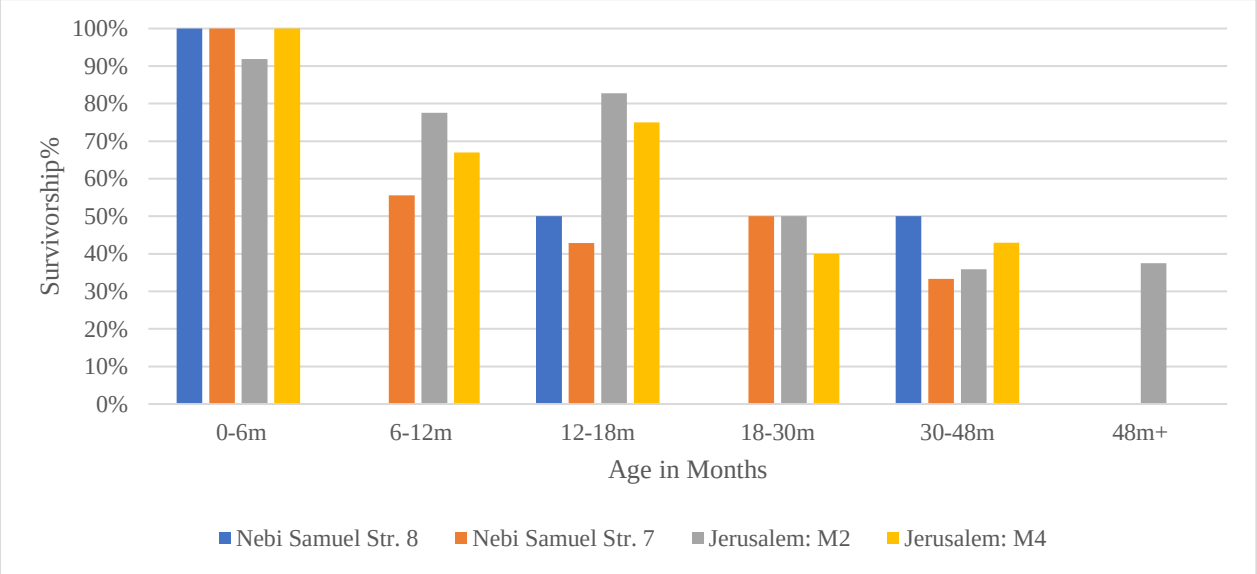
Game Skeletal Frequency		Nebi Samuel Str. 7	Jerusalem: M4
Body Portion	Element	MNE	MNE
Head	Cranium	2	4
	Mandible	1	5
Trunk	Atlas		1
	Axis		
	Cervical V		1
	Thoracic V		1
	Lumbar V		1
	Pelvis		10
Forelimb	Scapula	1	2
	Humerus	4	10
	Radius	1	7
	Ulna		3
Hindlimb	Tibia	2	7
	Femur	1	7
Feet	Carpals /Tarsals		6
	Metapodials	2	10
	Phalanx I	2	20
	Phalanx II	1	1
	Phalanx III		1

B. Chicken

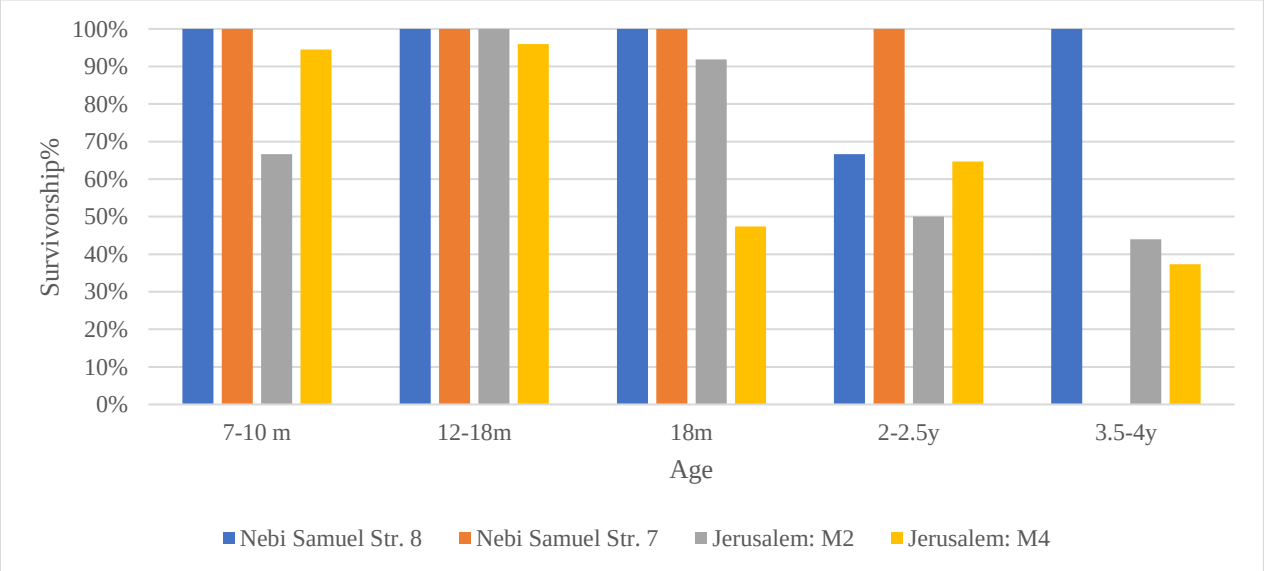
Chicken Skeletal Frequency		Nebi Samuel Str. 7	Jerusalem: M2
Body Portion	Element	MNE	MNE
Head/ Neck	Cranium		
	Vertebrae		1
Wing	Scapula	3	8
	Coracoid	1	9
	Humerus	1	11
	Radius	2	
	Ulna	5	9
	Carpometacarpus		2
Breast	Furcula	1	6
	Pelvis	1	9
	Lumbosacral	1	1
	Sternum	1	6
Leg	Femur		11
	Fibula		2
	Tibiotarsus	1	11
	Metatarsus	1	16
Extremities	Phalanx I	1	4
	Phalanx II		1
	Phalanx III		
	Phalanx IV		
	Phalanx Wing		

FIGURE 6.24 COMPARISON OF HELLENISTIC MORTALITY PROFILES OF CAPRINE AND CATTLE FROM NEBI SAMUEL AND JERUSALEM BASED ON EPIPHYSEAL FUSION

A. Caprine



B. Cattle



6.2.3 The Role of the Hinterland

The hinterland was the leading producer of livestock and other products, but this may not be entirely true. Defining the economic relationship of Jerusalem and its hinterland as 'consumer-producer' oversimplifies the complex nature of the hinterland. Within the boundaries of the hinterland, in each chronological horizon, exists differences in animal economies, horticulture, and overall function (Table 6.25). Faunal assemblages from the hinterland suggest a variety of products were produced based on the environmental conditions that allowed for specific animals or crops to persevere. Sites located west of the watershed in Nahal Soreq were better suited for cereal and grain production, whereas sites in Nahal Refaʿim were better suited for oil and wine production.

Archaeological faunal assemblages from Jerusalem's hinterland are representative of smaller and larger sites that each had different functions. In the Iron Age II, the site of Tel Moẓa functioned as a monumental collector and producer of cereals and grains, wool, dairy, and livestock, whereas smaller sites like the farmstead of Beit HaKerem focused on producing livestock with less intensive agricultural production. The initial theory of Jerusalem and its hinterland's relationship was built-off a comparison between Tel Moẓa and Jerusalem (Sapir-Hen et al. 2016). The animal economy of Tel Moẓa is extensive and diverse. The sheer intensification of agricultural production, based on the frequency of cattle and the presence of a granary complex, indicates this site functioned a middleman between the urban, rural, and even cultic spheres.

Biblical and extra-biblical sources suggest some portion of the priestly class or Levites resided in the hinterland and maintained herds destined for the sacrificial altar (Leviticus 27; Ezekiel 45:1-6; 48:8-14; Kozuh 2014; Gordon 2020). Priests typically relied on the labor of

farmhands and were not in direct contact with the livestock (Jursa 2010: 282-284). Intrinsically, the priests were an economic class that did not participate in production (Jursa 2010; Gordon 2020). Then what was their role in the hinterland?

Reviewing the archaeological evidence for the hinterland suggests cultic activities occurred outside of Jerusalem, specifically at the site of Tel Moẓa (Kisilevitz 2013; 2015). The animal economy of Tel Moẓa suggests this site had access to meat-rich portions, specifically the forelimbs (Sapir-Hen et al. 2016: Table 4a). If the priestly portion equates to these forelimbs is unknown. However, there does exist a sacrificial pit next to the altar in Tel Moẓa's temple complex (Kisilevitz 2013; 2015), which includes the remains of cultic sacrifice and consumption.[75] Intensive agropastoral production of wool, dairy, cereals, and grains suggest those that resided in and around Tel Moẓa had greater access to subsistence resources.

Further, we can posit the economic stability of Tel Moẓa based on the site's production of wool. The control over production and surplus of agricultural products and wool was the basis of economic power in the ancient Near East.[76] Differential access to resources indicate inequalities and social hierarchy, placing Tel Moẓa within a higher socioeconomic status. Therefore we can posit that the Tel Moẓa cult was staffed by priests residing in the hinterland that held some control over the production of goods, and more importantly, controlled the herds that were sacrificed and sold in Jerusalem.

Tel Moẓa was not the only site that has evidence of cultic or elite behaviors in the hinterland. Ramat Raḥel, by the nature of its administrative context, is not a standard hinterland site. The faunal remains from Ramat Raḥel, in both the Iron Age II and Persian periods, are

[75] The faunal assemblage from Tel Moẓa's sacrificial pit is currently being studied by L. Sapir-Hen.
[76] D'Altroy and Earle 1985; Zeder and Arter 1994; McCorriston 1997; Kozuh 2014; Hastorf 2016: 161

almost exclusively related to pits that indicate subsistence and consumption patterns that are more akin to Jerusalem then to Beit HaKerem, Khirbet er-Ras, or Horvat Zimri. Those that participated in the feasts, which in turn were deposited in pits at Ramat Raḥel (L.14109 and L.13174), had greater access to subsistence resources. Like the priestly class at Tel Moẓa, the administration elite at Ramat Raḥel were in control of the farmhands that produced the oil, wine, and livestock.

Livestock producers are present at each site, in every period. Small farmsteads and villages produced livestock for sale and their own subsistence needs. Overall, those in the hinterland consumed or utilized older sheep, goats, and cattle than those in Jerusalem. This trend is maintained throughout the 8th through 2nd centuries BCE, even in periods of political and environmental change. A change in the animal economy of the hinterland starts in the Persian period, with the integration of chicken into subsistence practices. Chicken may have been utilized as a quick and easy meat source to feed nuclear families during the climatic dry phase of the Persian period or as an available meat source for maintaining other livestock for secondary means. Another change to the animal economy of the hinterland occurs in the Hellenistic periods, with the conspicuous consumption of meat.

Nebi Samuel, in the Hellenistic period, does not function like an expected ‘producer’ site in the hinterland. The subsistence strategy of Nebi Samuel in the Hellenistic periods focuses on meat consumption of sheep, goats, and cattle. The limited use of cattle for agricultural labor and caprines for secondary products indicates a need to supply itself and possibly other sites with meat. There is a gradual demographic rise in the number of sites and urbanization in the hill country, as well as an intensification of religious practices occurring in Jerusalem with the rise Hasmonean Monarchy and unification between cult and kingdom. These aspects would create a

need to exploit livestock for meat. The Hellenistic faunal assemblage from Nebi Samuel indicates elite hunting activities suggesting those that resided at the site had enough time to pursue leisure activities and may not have been in direct control of the herds.

The sites of Tel Moẓa, Ramat Raḥel, and Nebi Samuel were occupied in the Iron Age II with the occupation at Ramat Raḥel and Nebi Samuel continuing into the Hellenistic period.[77] The faunal assemblages from these sites, along with the archaeological context, suggest an entangled settlement comprised of priests and administrative elites alongside agropastoral laborers. The presumption that the peripheral region around Jerusalem has less oversight or control by governing forces allowed for the hinterland to maintain social equality (Gadot 2015).

Administrative control over agricultural decisions and herding practices are present at Tel Moẓa, Ramat Raḥel, and Nebi Samuel. Whereas, small local decision making is present at sites such as Beit HaKerem and Horvat Zimri. Smaller sites, such as Beit HaKerem, Khirbet er-Ras, and Horvat Zimri, are all within seven kilometers of Jerusalem, but both Beit HaKerem and Khirbet er-Ras are closer to administrative sites than to Jerusalem. Only Horvat Zimri is independent of administrative oversight. If we assume administrative and other middlemen sites maintained control over smaller hinterland sites within a ca. three kilometers, then both Beit HaKerem, Khirbet er-Ras, as well as many other settlements in the Refaʿim and Soreq valleys could be regulated (Figure 6.25).

After the Neo-Babylonian campaign and destruction of Jerusalem in 587/6 BCE, the hinterland continued to be occupied and produce goods for subsistence and taxation. Continued maintenance of the hinterland transferred to administrative sites: Ramat Raḥel and Mizpah

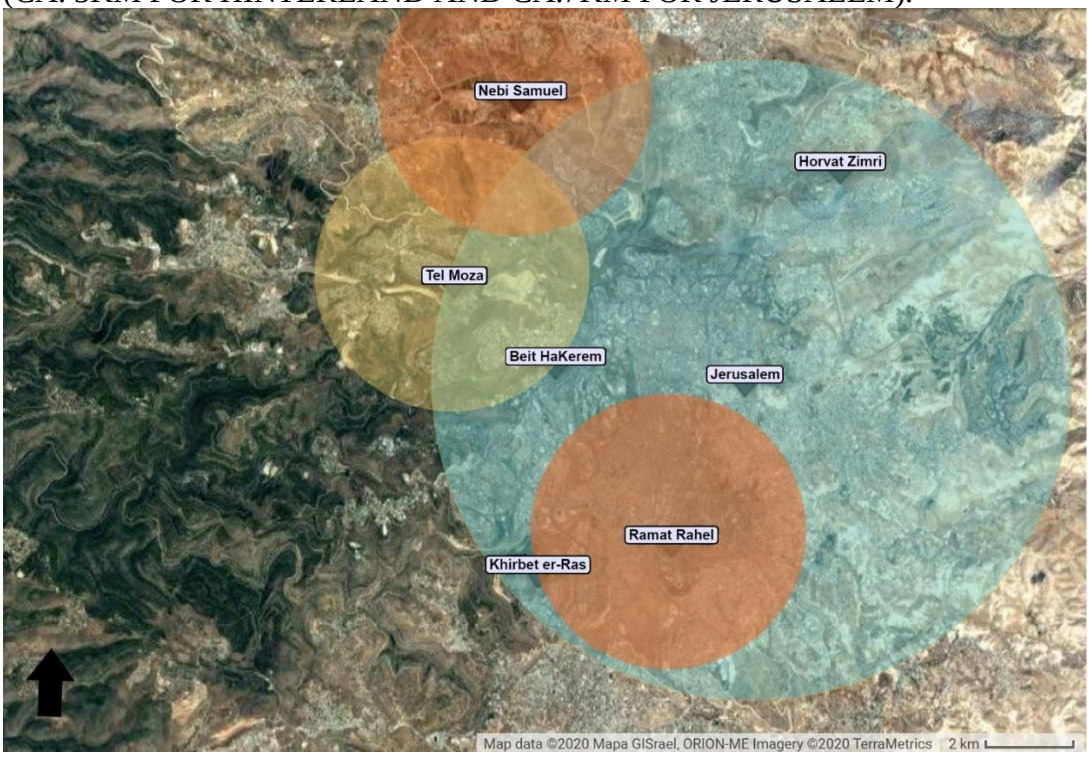
[77] Moza–Greenhut and DeGroot 2009; Ramat Rahel– Aharoni 1961; Lipschits et al. 2012; Fulton et al. 2015; Nebi Samuel– Magen and Har Even 2007; Taubman per comm.

(either Nebi Samuel or Tell en-Nasbeh). These sites could maintain livestock production after the social collapse of Jerusalem because they were already regulating the agricultural and livestock production of the region, to meet the needs of the empirical taxation.

TABLE 6.25 SUMMARY OF COMPARABLE HINTERLAND FAUNAL ASSEMBLAGES

Horizon	Area	Context	Sheep and Goats Exploitation	Cattle Exploitation	Pig	Agricultural/Pastoral Focus	Citation
Iron Age II	**Tel Moẓa: Str. V-IV**	Temple/ Granary	Dairying/Wool	Traction	X	Plow-Based Agriculture Grain / Dairy/ Wool/ Livestock	Sapir-Hen et al. 2016
	Ramat Raḥel: Building Phase I-II	Admin. Site	Secondary Products	NA		Viticulture/ Livestock	Fulton forthcoming
	Khirbet er-Ras	Village	NA	NA	X	Livestock	This Study
	Beit HaKerem	Farmstead	Secondary Products	Traction	X	Plow-Based Agriculture/ Livestock	This Study
Persian	**Nebi Samuel**	Admin. Site	Wool	Dairy and Traction		Plow-Based Agriculture/ Dairy/ Livestock/ Fowl	This Study
	Horvat Zimri	Fortress	Meat	Traction		Livestock/ Plow-Based Agriculture	Horwitz 1993
	Ramat Raḥel	Pit	Meat and Wool	NA	X	Viticulture/ Wool/ Livestock	Fulton forthcoming
Hellenistic	**Nebi Samuel**	Admin. Site	Meat and Dairy	Meat and Traction		Livestock/ Plow-Based Agriculture /Dairy/ Elite Hunting	This Study
	Khirbet er-Ras	Village	NA	NA		Livestock	This Study

FIGURE 6.25 MAP OF JERUSALEM'S HINTERLAND WITH RANGE OF INFLUENCE (CA. 3KM FOR HINTERLAND AND CA.7KM FOR JERUSALEM).



6.3 Reassessing the Biblical Dietary Laws

Scholarship regarding identity and cultic practices of the southern Levant fixate on the dietary laws codified in the Hebrew Bible (see Section 2.3). These studies have been used to identify populations (Hesse and Wapnish 1997; 1998; Bar-Oz et al. 2007; Sapir-Hen et al. 2013), to create ethnic boundaries (Hesse 1990; Finkelstein 1996; Bunimovitz and Lederman 2011), and to prove the legitimacy of the biblical text (Hübner 1989). One of the many issues in studying the biblical food laws, in archaeology specifically, is using texts that were composed and redacted at different points in time and then applying these texts to periods before their composition and transmission into society. The rationale behind this logic assumes that the scribal schools affiliated with the Jerusalem cult, in Judah, contributed significantly to the composition of the Hebrew Bible (Grabbe 2000; Van der Toorn 2009). Thus, the practices detailed in the text reflect local traditions and historical memories.

Historical memories of animal use in the Jerusalem cult may be preserved in the biblical texts. There are several ways animals were used that are depicted in the biblical texts. Their primary use beyond allegories and metaphors is as sacrificial offerings.[78] The culturally defining dietary laws overshadow the role of sacrifice in cultic practices. This section will reassess the main biblical statues that relate to the use and consumption of animals from the perspective of faunal remains from excavations in and around Jerusalem. By identifying what aspects of the

[78] Genesis 2:20; 22:13; Exodus 20:24; 24:5; 29:36-41; 32:6; 34:15; Leviticus 4:10, 9:4, 10:19, 14:19-30; 17:3-7; 23:19; Numbers 7; 15; Deuteronomy 12:16, 18:3-10; 1 Samuel 1:25; 6:14; 7:9, 15:21-22; 1 Kings 1:9, 19-25; 8:63; 1 Chronicles 15:26, 29:21; 2 Chronicles 7:5; 15:11; 29:33; Ezekiel 7:17; 8:35; Ps 66:15; Isaiah 1:11; 34:6; Jeremiah 7:21. These verses specifically mention sheep, goats, or cattle as sacrifices. There are roughly 350 mentions of sacrifice in the biblical texts.

dietary laws are present in the archaeological material, we can better understand the role of animals in ancient cults.

6.3.1 The Dietary Laws – A Reassessment

There are four foodways that zooarchaeological methodologies can be employed to understand the biblical dietary laws: prohibited and permissible animals, religious and sacrificial butchery, priestly tithe, and location of sacrificial offerings. Reassessment of these foodways is crucial in understanding the introduction and development of these biblical customs.

One idea is that the food laws chronicled in Deuteronomy 14 and Leviticus 11 developed as a reaction to the Neo-Babylonian political situation in the 6th century BCE and represent an intensified desire for community boundaries emphasized through shared rules of practice (Hastorf 2016: 230). The composition and redaction of the dietary laws post-date most of the Iron Age II and were under redaction and transmission from the late Iron Age IIC through Hellenistic periods. Along these lines, we could hypothesize that the dietary laws would be apparent in the faunal remains dated after the Neo-Babylonian campaign, and their presence before represents long-standing traditions.

6.3.1.1 Presence and Absence of Prohibited Species

Prohibition, as defined by the *Oxford English Dictionary*, is "the action of forbidding something, especially by law." In the Hebrew Bible, it is assumed that food prohibitions, or sumptuary laws, are dictated by the authority of Yahweh. In reality, the probable authority was the priestly scribes, dictating social, and possibly elitist norms. It is these norms that are the basis for the development of the food prohibitions in the biblical texts. Biblical scholarship's dialogue regarding the food prohibitions originates in their ambition to date and comprehend the lists of

animals in Leviticus 11 and Deuteronomy 14. Interdisciplinary research between archaeology and biblical studies has narrowed this discussion to the pig taboo.[79]

The frequency of pig in the region of Judah is characterized as insignificant and minimal (Sapir-Hen et al. 2013). Exploring the presence of pigs in Jerusalem and its hinterland, diachronically, indicates that the highest frequencies of pigs are at Iron Age II Khirbet er-Ras with 6% and Babylonian-Persian Ramat Raḥel with 2% (Figure 6.26). The frequency of pigs at Khirbet er-Ras can be dismissed, as the overall assemblage is small, and the frequency of a single fragment is amplified. The remains of pigs in the Jerusalem region throughout the 8th through 2nd centuries BCE is indeed paltry and insignificant. Notwithstanding, pigs are present– in Jerusalem's hinterland in the Iron Age II, in both Jerusalem and its hinterland in the Persian periods, and throughout the Givati neighborhood in the Hellenistic (Figure 6.26).

Jerusalem represents a cultural and religious pillar in the study of Judahite and Judean identity. In reference to Jerusalem precisely, placing the remains of pig within the dichotomy of presence versus absence as an indicator of cultural ethnicity is erroneous. Major urban centers would be host to diverse populations. From textual sources, we know Jerusalem played host to Tyrians (Nehemiah 13:16) and that the Philistines were present in the hinterland (2 Samuel 5:17-25; 1 Chronicle 14:8-16). Foreign armies were a mainstay in Jerusalem's population from the Assyrians to the Ptolemies, and unquestionably the Seleucids with their construction of the citadel (Acra). Complicating the discussion further is the role of the laity or secular individuals in ancient societies and how their consumption patterns are reflected in archaeological material. It cannot be assumed that the entire population of Jerusalem held themselves to the standards of the

[79]Douglas 1966; Hübner 1989; Hesse 1990; Milgrom 1991: 649; Finkelstein 1996; Harris 1997; Hesse and Wapnish 1997; 1998; Horwitz and Studer 2005; Grigson 2007; Bunimovitz and Lederman 2011; Sapir-Hen et al. 2013; Horwitz et al. 2018

priestly elite. Hence, it should not be a surprise that there was a discovery of a complete piglet hiding between storage jars in Area U of Jerusalem, dated to the Iron Age IIA (Sapir-Hen 2019b; Sapir-Hen, Uziel, and Chalaf in Press).

The complete and total absence of pig in Jerusalem and its hinterland is attested only in the Early Roman period (63 BCE - 70 CE) (Bar-Oz et al. 2007; Bouchnick 2010; Spiciarich et al. 2017). The social acculturation of a nationalized identity elucidates the absence of pig by the first centuries. Transformation into a singular national identity relates to the rise of the Hasmoneans and collective exposure to the biblical texts. The absence of pig between the Iron Age through Hellenistic periods of Jerusalem is present only in the hinterland during the Late Hellenistic period (Figure 6.26). A complete and total absence of pig is not evident at any point in Jerusalem's history prior to the Early Roman period. Does that indicate that those who resided in Jerusalem were not Judahite or Judean? The most likely answer is no; therefore, the discussion of identity in Jerusalem as well as Judah/Judea must base itself on more than the presence or absence of pig.

Pig is not the only prohibited species to be regularly consumed in Jerusalem. African catfish imported from the Nile River, or sourced from the Yarkon River, is present in every chronological horizon of Jerusalem (Figure 6.27). Similar to the presence versus absence of pig, the presence of catfish at a site can relate to a variety of factors such as the site's proximity to a source, trade relations, and archaeological retrieval strategies of the excavation. According to the Hebrew Bible, fish permissible for consumption are those with fins and scales (Leviticus 11:9-12; Deuteronomy 14:9-10). These verses are the basis for the prohibition of cartilaginous fish, such as sharks, rays, chimeras, as well as catfish. The designation of catfish as non-kosher

according to biblical laws is a notable debate in later rabbinical sources (*Tosafot*, Hullin 66b; *Avodah Zarah* 39b; 40a; *Bechorot* 7a).

One of the tractates mentions the need to be able to identify the head and spine of the fish (*Avodah Zarah* 39b). Interestingly, catfish body parts identified in this study of Jerusalem were exclusively vertebrae (Figure 6.28). There was an absence of cranial remains of catfish. This pattern of only catfish vertebrae present in Jerusalem is peculiar as other Egyptian imports, such as Gilt-Head Seabream and Nile Perch, include remains of cranial and axial elements (i.e., vertebrae). Before jumping to conclusions about Egyptians trying to sell Jerusalemites unkosher fish and removing their heads to obscure their taxonomic identification in the market.[80] A plausible rationale for the missing catfish heads is their removal in butchery processes related to salting and drying (Zohar and Cooke 1997). Producers would employ different styles of butchery depending on the size of the fish (*ibid*; Zohar and Artzy 2019). In some cases, the heavily impacted crania would be removed, whereas, in other species, hanging the fish by its head was instrumental (*ibid*). Accordingly, we can surmise that heavy and unconsumable heads of catfish were explicitly set aside in taphonomic processes related to production and transportation.

Catfish consumption is widespread in Jerusalem, Judah, and the wider southern Levant throughout the 8th through the 2nd centuries BCE.[81] The presence and relative frequency of catfish throughout Jerusalem's history, including throughout the Roman periods, when national identity is at its apex, signifies they were permitted to be sold and consumed. Their specific prohibition only arises with rabbinical literature (*Tosafot*, Hullin 66b; *Avodah Zarah* 39b; 40a; *Bechorot* 7a).

[80] This idea was proposed as a hypothetical reason. However, it seems implausible that the Egyptians maliciously imported headless catfish for over 600 years.
[81] Lernau and Lernau 1989; Van Neer et al. 2004; Reich et al. 2007; Lernau 2015

Shark, on the other hand, was a prohibited species following the faunal evidence. Cartilaginous fish vertebrae are common archaeological finds but are regularly misidentified as worked bone beads, even when there are no obvious beveled holes.[82] Evidence of axial cartilaginous remains would suppose consumption or use of shark for secondary products (i.e., oil and beads). The only remains of shark from Jerusalem are teeth (Figure 6.29), which relate to craft production and as decorative items. Therefore, we can rule out the consumption of shark within the boundaries of Jerusalem and its hinterland.

Using the presence or absence of specific species in the identification of cultural or ethnic identities must be done with caution. Retrojection of the animal lists in Leviticus 11 and Deuteronomy 14 on to archaeological contexts is only acceptable in periods after their composition and transmission into society, approximately around the 7th century BCE or later. Full acceptance of these lists as social norms is present only in the Early Roman and only emerged in the Late Hellenistic with the sociocultural influence of the Hasmoneans. The application of the lists in Leviticus 11 and Deuteronomy 14 onto earlier Iron Age or Bronze Age contexts, under the guise of proof of long-standing traditions, is unsubstantiated within the parameters set by archaeological and biblical interdisciplinary scholarship (Altmann, Angelini, and Spiciarich 2020).

[82] In every archaeological project I have participated in I have personally identified cartilaginous fish vertebrae. Commonly they were identified as worked bone.

FIGURE 6.26. THE RELATIVE FREQUENCY AND COUNT OF IDENTIFIED SPECIMENS (NISP) OF PIG IN JERUSALEM AND ITS HINTERLAND FROM THE IRON AGE II THROUGH HELLENISTIC PERIODS.

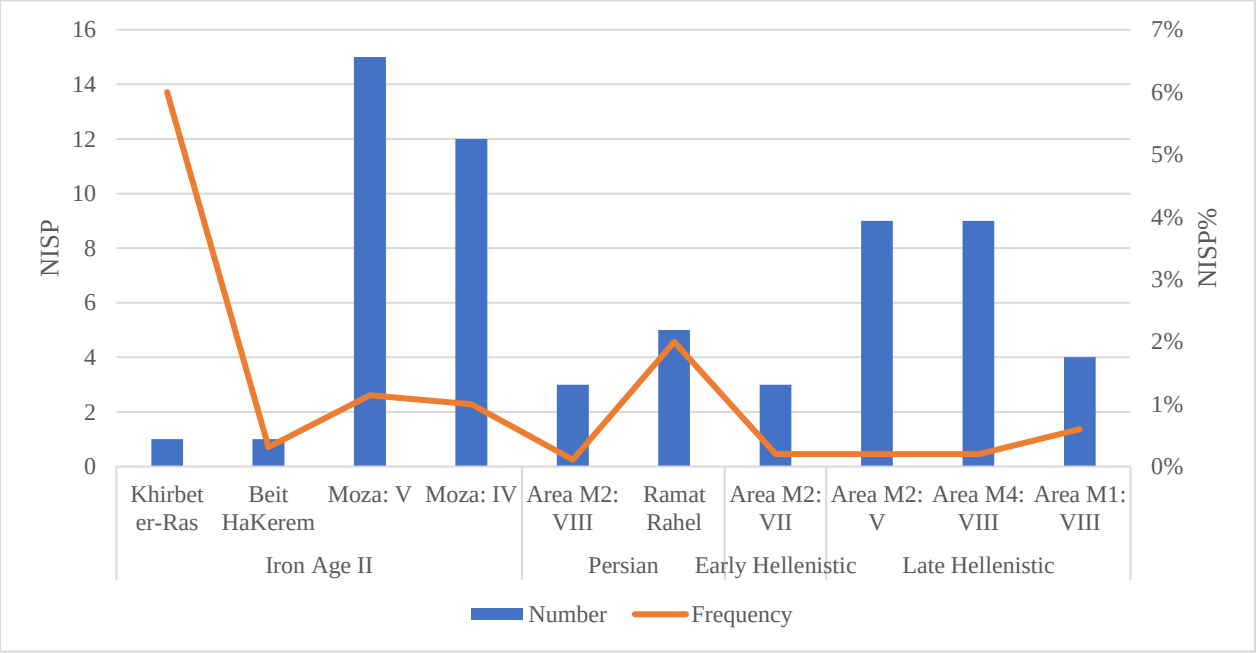


FIGURE 6.27. THE RELATIVE FREQUENCY AND COUNT OF IDENTIFIED SPECIMENS (NISP) OF AFRICAN CATFISH IN FISH ASSEMBLAGE FROM JERUSALEM AND ITS HINTERLAND FROM THE IRON AGE II THROUGH HELLENISTIC PERIODS.

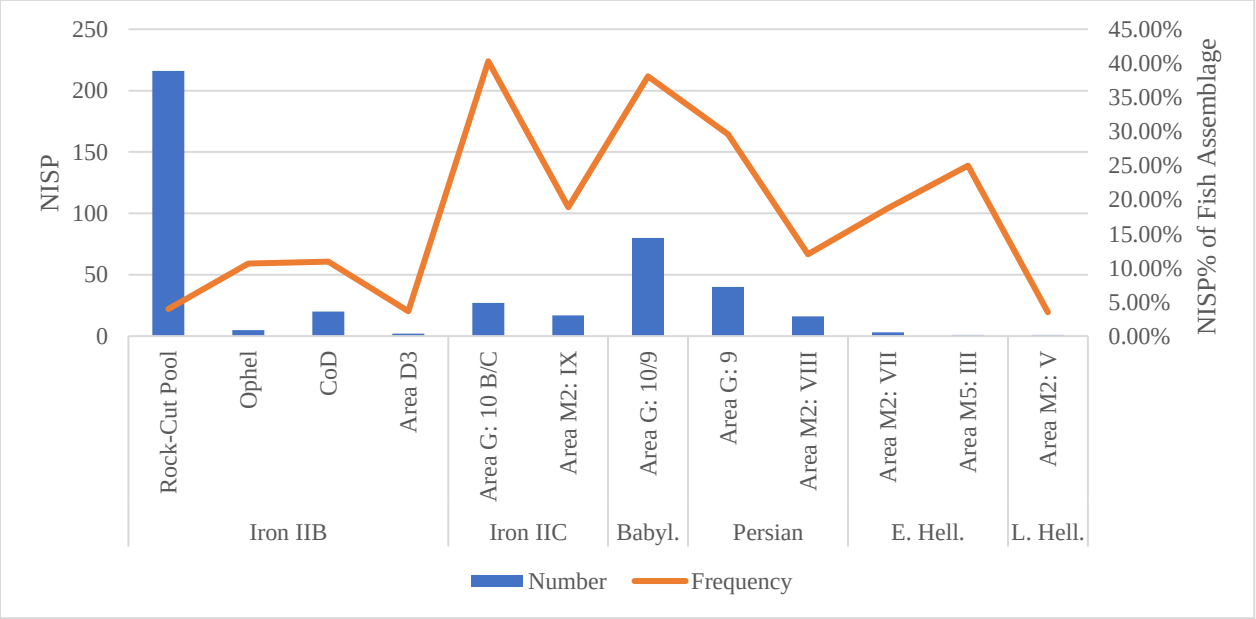


FIGURE 6.28. CATFISH (*CLARIAS GARIEPINUS*) VERTEBRAE FROM GIVATI AREA M2, PHASE IX-V.

FIGURE 6.29. SHARK (ELASMOBRANCHII) TEETH FROM GIVATI AREA M2, PHASE IX-V.

6.3.1.2 Religiously Prescribed Butchery

Trying to find evidence of religious butchery has a similar issue of presence versus absence. In every period, we have evidence of consumption and butchery in the form of cut marks. Different types of markings can help us to identify if the element was dismembered, filleted, skinned, or sawed in half. Generally, dismembering is the most common, followed by filleting. The frequency of different markings helps us decipher trends in usage. For example, there is a high frequency of primary butchery in the form of dismemberment in Iron Age II Area D3 or the high frequency of skinning in Late Hellenistic Area M4.

Later texts, like the Mishnah and Talmud, describe clear and precise ways of slaughtering and butchery.[83] In the practice of Porging (*Nikur*) marks on the bone are acceptable, whereas cut marks in the initial slaughter (*Shechita*) should be absent. As been mentioned before, the deliberate lack of marks on the atlas and axis vertebrae leads to a circular argument over presence versus absence (Cope 2004; 2016; Bouchnick 2010; Greenfield and Bouchnick 2010). Reviewing the frequency and presence versus absence of cut marks on cervical vertebrae in Jerusalem is ambiguous (Figure 6.30). Almost every area in Jerusalem throughout the Iron Age and Hellenistic periods has evidence of butchered cervical vertebrae, correlating the counts of these marks suggests they are insignificant (Pearson's: $p=0.908$, $r=0.0006$). Future exploration of this specific slaughtering practice should be done through faunal remains that derive directly from clear cultic context vis-à-vis pits near altars.

Area M2 has the longest occupation sequence in the study as well as represents a public and higher socioeconomic context. Therefore, it is a proper context to explore the presence of

[83] See, Section 2.3.2

religious butchery, as those who could afford or received sacrificial meats would conceivably be present in the context of Area M2. In an attempt to identify marking that could relate to Porging in Area M2, based on the markings identified by Cope (2004; 2016), suggests that roughly 12-15% of each phase has evidence of marks that relate to patterns of religious butchery (Table 6.26). Half of these markings, following Cope (2004; 2016), are not directly related to removing the sciatic nerve; therefore, when we examine marking that relates to the pelvis and hindlimbs, the frequency diminishes. It is difficult to associate specific cut markings to religious butchery as we cannot fully interpret the butchers' intention between primary butchery, dismemberment, or religious butchery or if they were all one process.

Evidence from religious butchery from Medieval Europe depicts intensive butchery modifications (Lisowski 2019), where the entire epiphysis is shaved-off, and the remaining sinew is scooped-off. Religiously butchered animals from post-Talmudic Europe have distinctive markings that include scooping, shaving, and uniform striations (Lisowski 2019: Fig. 1.13). Visually comparing the cut marks from the most modified assemblage included in this study, Late Hellenistic- Area M4, to material dated to after the rabbinical era in Medieval Europe (Figure 6.31; Lisowski 2019: Fig. 1.13), then it becomes apparent this style of butchery is not present in the Late Hellenistic of Jerusalem.

The intensive modifications associated with medieval and modern *Kashrut* butchery are not present on any material included in this study. Proto or earlier renditions of this style of butchery are also not present. Possible evidence for the prohibition of the sciatic nerve can be seen in the forelimb preference over the hindlimbs in the assemblages included in this study. If a specific style of butchery existed in the 8th through 2nd centuries BCE, it would be associated with sacrificial remains from a temple or cultic contexts. As such, there is no evidence for the

systematic butchery of animals in cultic or non-cultic pits in the southern Levant at any point in the Bronze, Iron, or Classical periods.[84]

FIGURE 6.30. FREQUENCY OF CUT VERSUS NOT CUT CERVICAL VERTEBRAE (ALTAS/AXIS) FROM JERUSALEM.

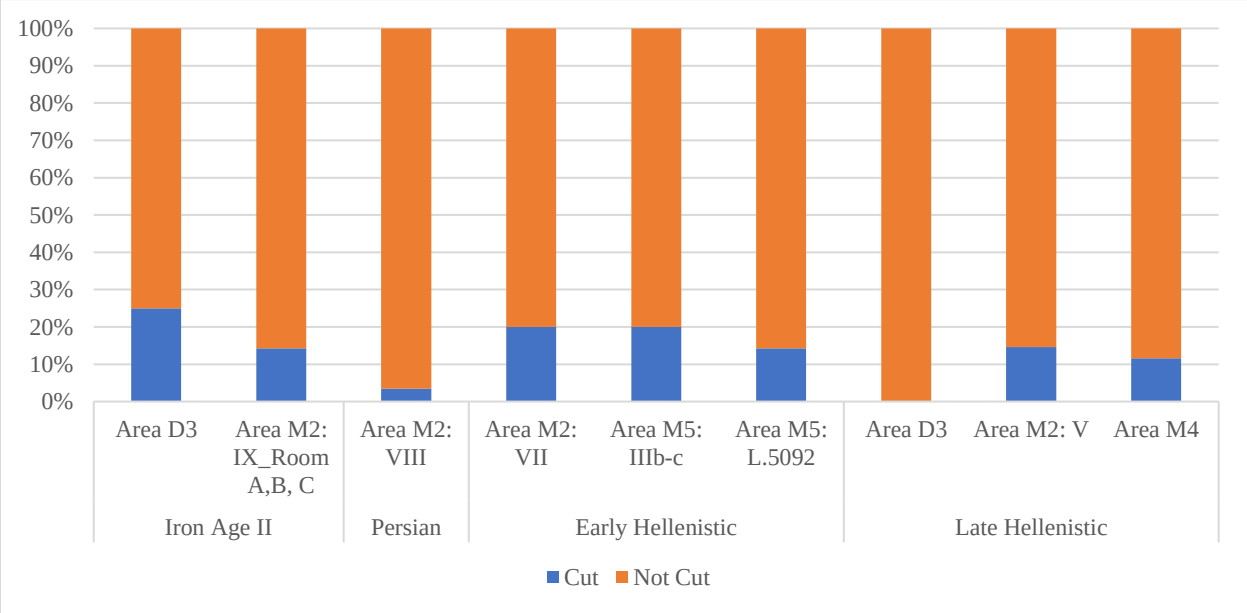


TABLE 6.26 COUNT OF CAPRINE AND CATTLE WITH CUT MARKS ASSOCIATED WITH RELIGIOUS BUTCHERY FROM AREA M2

Element	Style of Cut (Binford 1981;1984; Cope 2016)	M2_IX	M2_VIII	M2_VII	M2_V
Femur	Fp-1	3	1		
	Fp-3		2		3
Pelvis	PS-5				5
	PS-7	1	2	2	9
	PS-8			1	3
	PS-10		3	2	
Scapula	S-1		2	1	
Humerus	Hp-3				1
	Hp-4	1			4
	Hd-1		2		3
Radius	RCp-5		4	5	11
Tibia	Td-5				2
	Shaved				4
% of cut caprine and cattle assemblage		12%	15%	15%	15%

[84] See, Section 2.2.2.2.1: Table 2.6

FIGURE 6.31 COMPARISON OF RELIGIOUS BUTCHERY A. LISOWSKI 2019: FIG. 1.13; B. GIVATI -AREA M4, STR. VIII WITH CUT MARKS IN RED

6.3.1.3 The Reality of the Priestly Tithe

Consumption of the forelimb is charged broad sociocultural meaning in the biblical texts as well as throughout the entire ancient Near East (see Section 2.3.2.1). Distribution of specific cuts among the cultic and royal elite reflected an individual's rank within the temple's hierarchy (Waerzeggers 2010: 258). The prime cut intended for the king and the higher echelons of the priesthood was the *imittu* (zag.lu, zag) or shoulder cut.[85] This sacrificial act is reminiscent of the sacrificial system detailed in the biblical texts, most notably the redistribution of the right limb to the priests in Leviticus 7: 28–37.

The biblical texts specify that the *shôk* [שוק] should be offered to the priests as their portion of the sacrificial offering (Leviticus 7: 28–37). The forelimb is the priestly tithe, assuming the prohibition of the hindlimb due to the avoidance of blood consumption and the sciatic nerve in the hindlimbs. Further, the shoulder cut (i.e., humerus and scapula) was the most symbolic part of the animal to consume following the contemporary zeitgeist recorded in

[85] Uruk– SWV 117:23'3', AUWE 11 179; Babylon– Baker 2004 no. 58; Sippur– BM 43095; Borsippa– BM 102276 no. 166, BM 82617, BM 85443, BM 26511 no. 35

cuneiform texts (Waerzeggers 2010: 258).

The preference for the forelimbs regardless of economic status, public or domestic context is present throughout Jerusalem in the Iron Age IIB (Section 6.1.1.1). Indicating one's access to meat reflects the redistribution mechanics of the sacrificial cult. The preference of the forelimbs in domestic contexts, such as Area D3's frequency of the lower forelimb's radii, may indicate elite-emulation by the lower or middle classes of the city. A counter-argument for the preference of right over left is the statistical lack of significance in Area D3 (p=0.949; X^2=0.003, df=1, Cramer's v= 0.005). Therefore, the dwelling in Area D3 was not a priestly household that would hypothetically have greater access to right-sided limbs.

Iron Age IIC Jerusalem may have the only evidence of the priestly tithe in the rooms of the monumental building in Area M2 (Phase IX; Figure 6.32; 6.33). Each room had more rights than left, with a ratio of 7:1 in Room C (Figure 6.33). Comparing the counts of right and left forelimbs between the rooms and Area M2's entire Phase IX is significant (Figure 6.32; 6.33; p=2.66E-08; X^2=34.88, df=2, Cramer's v= 0.422), suggesting these rooms have a preference for the right forelimb. Reviewing the ratio of right to left forelimbs in the context of Area M2 indicates that Room C may have been used as a communal feasting space, based on the spatial orientation and faunal remains (Figure 6.33). Iron Age II Tel Moẓa also has a higher frequency of forelimbs (Sapir-Hen et al. 2016), but more research from the sacrificial pit near the altar is needed to see if the preference of forelimbs is cultically consistent.

Overall, the ratio of right to left throughout Jerusalem is slightly more rights than lefts in the Iron Age II and Persian periods (Figure 6.32). Only by the Early Hellenistic is there a small swing to more left than right forelimbs that continues into the Late Hellenistic (Figure 6.32). The presence of right-sided limbs is tied to specific social contexts. The context of the faunal

assemblages from Late Hellenistic Jerusalem included in this study, specifically Area's M4 and Area M5, did not derive from cultic practices; instead, they are the result of craft and domestic activities. Excluding the rooms in Area M2, Phase IX, the ratios of right versus left in Jerusalem are too minor to conclude any evidence of presence versus absence of the priestly tithe. The presence of the priestly tithe in Area M2's rooms reinforces the elite nature of this context and indicates the consumption of these portions outside of a temple complex.

Evidence of the priestly tithe has been noted in Tel Qiri's Iron I cultic contexts and at Mount Ebal (Ben-Tor 1980; Horwitz 1987). The continued presence of the priestly tithe in Iron Age IIC Jerusalem, along with biblical and cuneiform sources, indicates this biblical custom is a long-standing cultic practice without cultural or ethnic borders. The preference for the forelimb was a social construct that was shared between major cultic institutions from the Jerusalem cult to the cults in Babylonia (Waerzeggers 2010; Kozuh 2010; 2014). If this practice continued into the later classical periods is unknown until more remains are studied from cultic or elite contexts.

FIGURE 6.32. COUNT OF RIGHT VERSUS LEFT FORELIMB ELEMENTS (SCAPULA, HUMERUS, RADIUS, ULNA, AND METACARPAL) BY PERIOD, AREA, AND CHRONOLOGICAL HORIZON.

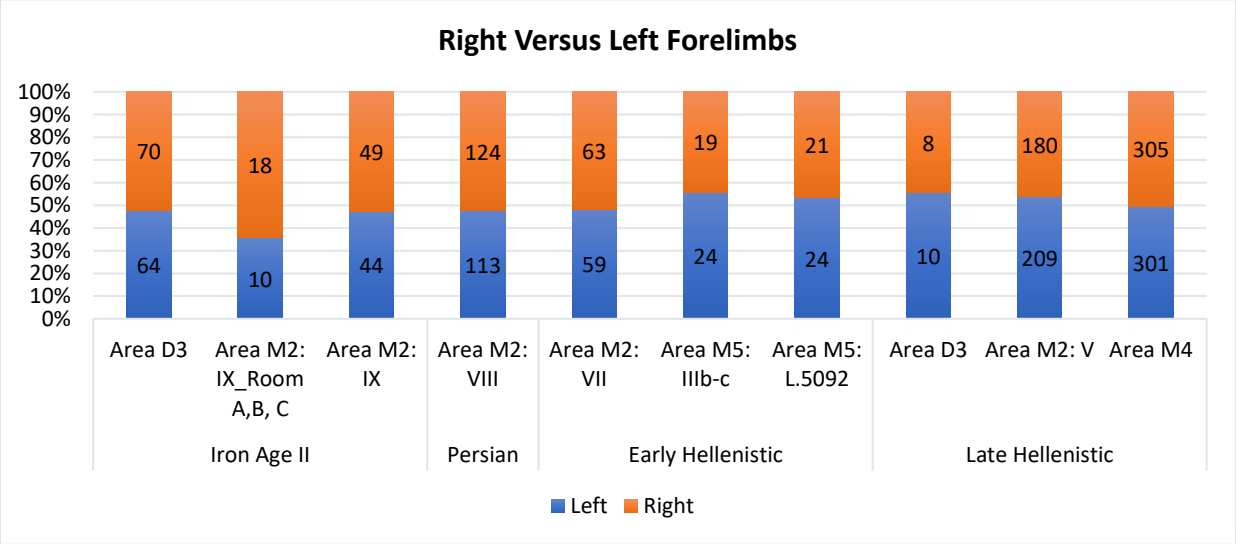
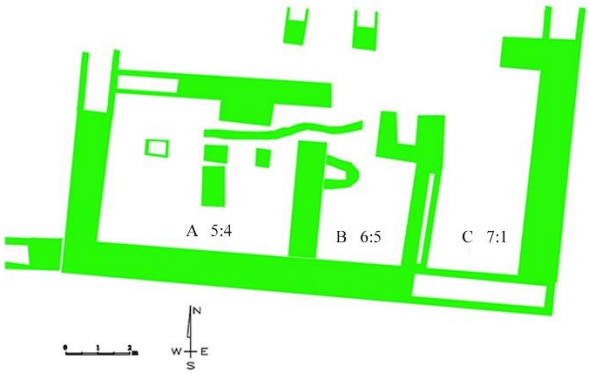


FIGURE 6.33 RATIO OF RIGHT TO LEFT FORELIMBS IN THE ROOMS OF AREA M2 IRON AGE IIC (PHASE IX) IN CONTEXT.



6.3.1.4 Sourcing of Sacrificial Livestock Herds

An instrumental aspect of a temple in an urban economy is its function as a reliable source of goods and services. In the specific case of temple economies, there was a continual need for sacrifices, in the forms of sheep, goats, and cattle. Cultic institutions were motivated to maintain herds that were designated for the sacrificial altar. Regularly temples would employ shepherds or prebends to provide care and maintenance over the temple or royal herds (YOS 7 143; Kozuh 2014). According to the book of Ezra, Achaemenid King Darius supplied the Jerusalem cult with a herd to be used as his sacrificial offerings, while the temple was being rebuilt (Ezra 6:6-14).

Following Deuteronomy 14:24-26, in which pilgrims are allowed to convert their offering into silver and spend their money at the cultic location, infers that there would be offerings for sale within the city or temple walls.[86] Isotopic studies from Early Roman Jerusalem indicate there was long-distance trade and shepherding of herds (Hartman et al. 2013). Isotopic studies

[86] This practice is known from the Early Roman period, according to Matthew 21:12.

are the preferred method to identify the location of herding activity as the method can indicate if livestock were raised in the immediate vicinity or from long-distance trade. As part of this research, isotopic studies were unavailable and the exploration, if the livestock present in Jerusalem was sourced from its hinterland or further away, is based on the metrical analysis. Regional variance can, at best, indicate if the herds derive from a single location, based on similarity in size, or if they vary in size, thus derive from different locations.

In order to examine whether a size variation exists that could stem from regional variation, measurements of first phalanxes from each area in Jerusalem and its hinterland were compared to measurements Tel Dor, by chronological horizon (Figure 6.34). Tel Dor was chosen as a reference because the inhabitants of Tel Dor raised and consumed caprines on-site (Sapir-Hen et al. 2014).[87] The use of phalanges to infer metrical differences includes some biases, such as differences between fore and hindlimb phalanges as well as size difference due to sexual dimorphism. First phalanxes were used in this study to propose a hypothetical model, as they are the most common element measured in Jerusalem and Dor's assemblages and represent caprines at least one and half years old, the expected age of sacrificial offerings.

A trend that becomes apparent in the regional variance of sheep and goats in Jerusalem is that the size variation of goats is more diverse than sheep in every period (Figure 6.34). This pattern is illustrated in the size variance of sheep and goats in the Late Hellenistic; where the greatest-length (GLpe) by proximal-breath (BP) for goats is a range from 34–47mm GLpe by 11–17mm BP, compared to sheep 35–44mm GLpe by 12–15mm BP. This observation is supported through a significant difference between the GLpe of Late Hellenistic sheep and goat

[87] First phalanx measurements for Tel Dor were provided by L. Sapir-Hen and can be found in Appendix III, and measurements for bones from this study can be found in Appendix II.

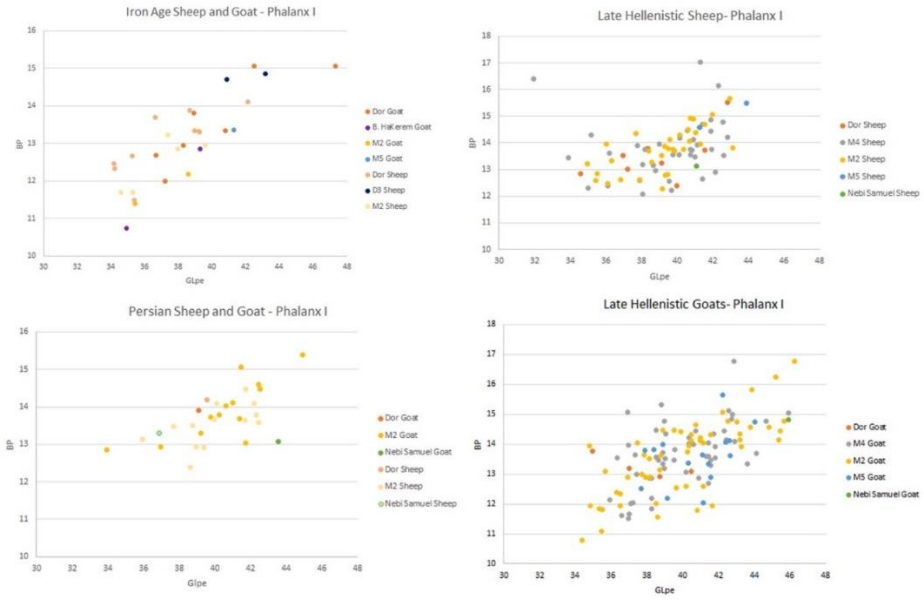
(p=0.005; X^2=113.2, df=78, Cramer's v= 0.136). The narrow spectrum of sheep sizes is also present in the Persian period.

This trend reinforces the cultic demand for sheep over goats. Sheep throughout the ancient Near East was the preferred sacrificial animal (Kozuh 2014; Sapir-Hen 2019a). Livestock offerings that were not young male sheep were redistributed to temple contractors, such as shepherds, butchers, or even Levites (BM 29226 no. 112; Deuteronomy 18:1-8; Joshua 13:14; Nehemiah 12:44, 47). Safeguarding sheep herds was certainly a motive for the Jerusalem cult to ensure religiously acceptable sacrifices. Jerusalem was not the only site to maintain control over their sacrificial herds; this practice has also been proposed at Iron Age Tel Dan (Arnold et al. 2015).

The other trend present in the regional variance of sheep and goat is that consistently Jerusalem's caprine are more diverse than Tel Dor but at the same time encompasses the caprine from Jerusalem's hinterland sites (Figure 6.34). The number of Tel Dor comparisons in the Iron Age and Persian period is minimal; thus, a direct connection between regional or local herding is equivocal. The appearance of Beit HaKerem and Nebi Samuel caprine in the middle of the Iron Age and Persian spectrums indicates that the livestock present in Jerusalem was in part supplied by the hinterland. Comparison between different areas in Late Hellenistic Jerusalem indicates that the caprine in Area M2 are diverse in comparison to the caprine in Area M4 and M5 (Figure 6.34). Therefore, we can posit different hinterland producers connected to particular producers in the urban sphere, in contrast to those in Area M2 who would receive meat through a wider redistribution chain than those in Area M4 and M5, who had relationships with craft and domestic activities.

In an attempt to understand the sourcing and herd location of sacrificial offerings, placed on the background Deuteronomy 14:24–26, indicates that at least a portion of sheep and goats present in Jerusalem was raised in the hinterland. Further, there was a specific herding system that placed sheep under protective care, and this trend continued throughout the Iron, Persian, and Hellenistic periods. Metrical analysis of Iron Age caprines from the Ophel (Buildings C and Dl) compared to Beer-Sheba (Phases IX-VI) demonstrate that caprine sizes are similar between the sites (Horwitz and Tchernov 1989: Table 4), indicating that the caprines were raised or herded in the Beer-Sheba and then imported into Jerusalem. Thus, we can assume Jerusalem employed a complex trade network of caprines starting in the Iron Ages and continued or was reinstated by the Early Roman (see Hartman et al. 2013).

FIGURE 6.34 METRICAL ANALYSIS OF SHEEP AND GOATS PHALANX I MEASUREMENTS (BPXGLPE) FROM JERUSALEM AND TEL DOR



6.3.2 Sacrificial Economy – A New Approach to Animals Use in Jerusalem's Cult

Jerusalem's archaeological scholarship places the site within the context of the biblical text, either as evidence for, as evidence against, or in an attempt to divorce Jerusalem from the texts. Therefore, a central focal point in the study of Jerusalem's faunal remains is on the sociocultural reality of the biblical food laws and how evidence for the food laws supports the religious identity of the site. In summarizing the evidence for the food laws discussed above:

- There is the presence of pigs in minor frequencies in each period. Regionally pigs never comprised a significant proportion of meat consumption, and their presence in Jerusalem and its hinterland should be understood through the heterogeneity of urban populations.
- Catfish are also present in every period but with relatively low frequencies. Catfish is more frequent than pig. Further, catfish was regularly consumed during the late Second Temple period indicating that the prohibition of catfish consumption (i.e., fish without scales) reflects Mishnaic and Talmudic sumptuary laws.
- Evidence for religious butchery (*Shechita* and *Nikur*) is absent. There is the general preference for the forelimbs over the hindlimbs, and this may reflect avoidance of the sciatic nerve (*Gid HaNashe*) following Genesis 32:33. The butchery patterns present in later Jewish settlements, based on the prescriptions detailed in the Talmud and Mishnah, are not present in Jerusalem prior to the destruction of the Second Temple in 70 CE. Implementation of these butchery practices should be related to religious activities dated to after the ceasing of sacrificial offerings in the Jerusalem cult, not before.
- Evidence of the priestly tithe, on the other hand, is more complicated. Evidence for the redistribution of the right forelimb was only present in one room, in one monumental building, in the 586 BCE destruction of Jerusalem. The presence or absence of the

priestly tithe is not limited to the Jerusalem cult. It was a common cultic practice in Babylonia's Ezida and Eanna Temples and Greece around the 6th –5th centuries BCE. Earliest archaeological evidence for the priestly tithe in the southern Levant dates to cultic contexts in the Iron Age I.

- Sheep and goat that made their way to Jerusalem's temple and market were raised locally as well as in the hinterland, maybe as far south as Beer Sheva. Sheep, specifically, was raised within similar vicinities, near or around Jerusalem, to ensure their sacrificial purity.

Direct evidence of the culturally identifying biblical sumptuary practices is absent in Jerusalem and its hinterland during the 8th through the 2nd centuries BCE. Of the biblical foodways that are present in Jerusalem relate directly to sacrificial practices, such as the priestly tithe and the raising of cult-owned herds. Redirecting the discussion of Jerusalem's religiosity from Deuteronomy 14 and Leviticus 11 to how animals in the Hebrew Bible are represented would attest to the leading role as sacrificial offerings.

In the future, discussion of Jerusalem's religious and economic status should be within the context of redistribution from the sacrificial requirements. Major cultic institutions to the north and east represent parallels for the potential cultic urban economy of Jerusalem, such as the Ezida temple of Borsippa or the Eanna Temple of Uruk. Evidence for these sites and how they use animals should be incorporated into the study of 'Sacrificial Economy.' Faunal evidence for sacrificial redistribution directly to consumers or to the market may be evident through a few lines of evidence: in the preference for forelimbs, in the mortality profiles of sheep, goats, and cattle, the dominance of sheep and male caprine, as well as in the dispersal of avian species (Table 6.27).

6.3.2.1 Redistribution of the Forelimb

Conspicuous consumption of the forelimb is intriguing because apart from its socio-cultural symbolism, the forelimb is not a high-utility portion. Typically, portions with the most utility would confer high socioeconomic status, and a universal preference for a medium utility portion is distinct. Comparative analysis between the faunal assemblages from each period highlights that while all parts of caprines are present in each area, there was a singular focus on the consumption of upper and lower limb elements (Table 6.27). In each period, the majority of sites prefer the forelimb; of course, there are exceptions to this rule.

For example, in the Late Hellenistic period of Jerusalem, forelimbs are present and common throughout the site except in Area M4's glacis. The archaeological and zooarchaeological context of the glacis in Area M4 as construction and craft refuse expound their limited presence. Contexts with the most significant frequency of forelimbs, specifically right-sided forelimbs, such as Building 100 in Area M2 of Iron Age IIC Jerusalem, does support the redistribution of forelimbs for consumption outside of the temple. Elite emulation of this practice may be present in the consumption of lower forelimbs (i.e., radius and ulna) in lower or middle socioeconomic status dwellings, such as Area D3 in the Iron Age IIB.

6.3.2.2 Sacrificial Livestock Demographics

The age of sacrificial offerings is a bit of a debate between the texts and reality. The biblical text specifies, in some cases, that sacrifices should be firstborns (Genesis 4:4; Exodus 13:12, 34:19; Leviticus 27:26; Numbers 18:15-17; Deuteronomy 12:6, 17, 14:23, 15:19; Nehemiah 10:36). Deuteronomy 15:19 even states that the first-born cannot be sheared, in the case of sheep, or put to work, in the case of cattle. This verse implies that these animals were completely and totally removed from the economic system. From a zooarchaeological perspective, there would be an

expectation that this pattern would be indicated by a culling around six months to one year of life. The decision to remove an animal from the economic system at such a young age, from a producer's standpoint, would be to preserve a mother's milk in dairy production or other secondary products.

When reviewing evidence for a culling around six months to one year, a pattern emerges. Cattle are commonly culled under a year of life after the Persian period and regularly in the Hellenistic period. The earliest evidence for juvenile cattle culling is in Persian Area M2 (Phase VIII) and continues into the Early Hellenistic (Phase VII). In the Late Hellenistic, this pattern is present in the Early Stage of the glacis in Area M4 (Phase VIIIc-I).

Culling of juvenile caprine is not present. The primary age of caprine culling in Jerusalem is around two to three years of age, the so-called 'market-aged' (Table 6.27). Sub-adult or market-aged caprine are the same age recorded in southern Levantine ritual pits from the Late Bronze Age (Hazor), through the Iron Age I (Mount Ebla), and Iron Age II (Tel Dan) (Table 2.6). How can we interpret this discrepancy between text and reality of the livestock's sacrificial age? As well as the difference in caprine and cattle culling practices?

A straightforward explanation is that pastoral producers were preserving resources and killing off burdensome males. Preservation needs would expound on why males are the preferred sex to sacrifice. Female livestock produce more secondary products than male livestock; therefore, they are too economically essential to remove from a herd. The requirement to sacrifice juvenile male livestock is a decision not made by the cult, but by the producers. In this

way, we can understand sacrificial practices as a partnership between cult and pastoralists. This explanation would also justify sacrificing animals at 'market-age' when they are at their prime.[88]

The evolution of juvenile cattle culling is understandable with Deuteronomy 15:19 as a frame of reference. The practice of culling juvenile cattle is first evident in the Persian period and widespread by the Late Hellenistic period of Jerusalem. These periods are around the same time as the composition and redaction of Deuteronomy. Requiring the exclusion of sacrificial livestock from secondary uses, such as agricultural labor or for wool, is more detrimental in the rearing of cattle. Maintaining and feeding cattle for sacrifice would pose an economic burden on the producer, especially since there would be no economic return on their investment. Whereas, maintaining a sheep, without shearing it, would not be as detrimental. Sheep herds are gregarious, and they are commonly picked off by prey species, incentivizing a producer to maintain a surplus for such an event. Additionally, rams reach puberty around six months of age and could be utilized to propagate more sheep, instead of sacrificing them outright.

The age and sex of sacrificial offerings are repeatedly mentioned in the biblical texts under the auspices that these are requirements of Yahweh or the cult. On the other hand, they also represent the logical economic decisions of agropastoral producers. Faunal evidence from sacrificial contexts, vis-à-vis pits in temples and near altars, as well as the primary age of livestock in Jerusalem, suggests the age and sex of sacrificial offerings reflect patterns and preferences of producers that were later codified in the texts.

[88] Prime meaning: meat weight versus expenditure

6.3.2.3 Cultic Use of Birds

The final indicators of Jerusalem's sacrificial economy are in the dispersal of bird species, where there is a greater frequency of pigeon and dove, the biblical *tor*, in elite areas possibly closer to the Temple compared to chicken in the residential contexts (Altmann and Spiciarich 2020 Spiciarich 2020). Cultic use and consumption of cultic sacrifices, specifically pigeons and doves, are also present in contemporary textual evidence.

The Ugaritic Rites for the Vintage text describes the autumnal grape harvest and wine production (KTU1.41//1.87, 1.95). Animals mentioned in the Rites for the Vintage include the standard male and female caprines (i.e., sheep and goats), but also the domestic pigeon twice and general birds twice (Levine, de Tarragon, and Robertson 1997: 299–301). The specific reference to domestic pigeon could imply either a specific species of a pigeon or a true domesticate, which may suggest that pigeons were kept domestically before the introduction of columbaria—often hewn or constructed stone structures. Archaeological evidence of pigeon fancying in columbaria is present as early as the Hellenistic period (3rd century B.C.E.; Tepper et al. 2018b).

Columbaria are useful for the harvesting of pigeon manure for fertilizing soils poor in mineral and organic matter. The nitrogen-rich pigeon manure was a vital fertilizer in viticulture and agriculture in arid environments (Ramsay et al. 2016; Marom et al. 2018). Archaeological evidence of pigeon fancying in the Levant before the Hellenistic period is relatively unknown. Old Kingdom Egyptian imagery of birds depicts geese and pigeons in aviaries, pens, and poultry yards (Kitchen 1999; Brewer 2002: 453), implying that pigeons and doves may have been kept domestically in installations that have not left behind material evidence.

From texts, we know humans had a close relations ship with birds (Lambert 1970; see STT. 341, K 10823, CT.41 5). The cultic use of birds as sacrificial animals arises in the Flood

narrative (Genesis 8:8–12) and is codified as a part of the Sinai sacrificial system in Leviticus 1:14; 7:26; 14:4–7, 49–53. However, the ritual system identifies only two birds as appropriate for sacrifice: the תור and the יונה, both identified currently as dove and pigeons. Doves and pigeons are referenced in the Hebrew Bible numerous times, in the story of Noah and the Flood (Genesis 8:8–12), as tithes and offerings (Leviticus 1:14; 5:7, 11; 12:6, 8; 14:22, 30; etc.), and as a symbol of endearment (Song 2:14; 4:1) amongst others. While some of these texts were edited and redacted in later periods, the sacrificial birds described represent the most common birds exploited in the region of Judah and Jerusalem during the Iron Age I and II (Altman and Spiciarich 2020: Fig 4; Fig 5). Pigeons and doves also account for 30% of bird remains from the Ophel, in Iron Age II Jerusalem (Horwitz and Tchernov 1989; Figure 6.13).

Philology debates over the translation of the domesticated nature of the sacrificial bird (*twr/* תור) have led to the hypothesis that domestic chicken is the sacrificial bird rather than dove or pigeon (Staubli 2008: 355). The distribution of chicken is minor in the Late Bronze Age and Iron Age I with limited but widespread distribution only occurring in the Iron Age II (Altmann and Spiciarich 2020: Fig. 5). Further, the complete dominance of chicken into the aviculture only materializes by the Persian period for Jerusalem (Section 6.1.2.1.2) and the Hellenistic period for the broad southern Levant (Perry-Gal et al. 2015).

Reassessing the spread of chicken from its first appearance at Shiloh in the Middle Bronze Age II through the Iron Age II, the rise of chicken first starts at small villages and trading posts such as Tel Michal and then gradually spreads out into the Levant (Altmann and Spiciarich 2020: Fig 3; Fig. 5). Chicken probably acted as a commensal with its presence primarily confined to domestic and residential contexts, such as in the residential Area G in Iron Age I Tel Dor, along with the residential areas of the Southeastern Ridge in Iron Age II Jerusalem, as well

as at the Iron Age II farmhouse of Beit HaKerem, and the Iron Age II dwellings at Bab-el Hawa (Altmann and Spiciarich 2020: Fig. 4; Fig. 5).

Within the cultic capital of Jerusalem during the Iron Age II, chicken and dove are present both near the cultic center at the Ophel but also in the residential areas along the Southeastern Ridge (Figure 6.13). Nevertheless, the frequency of chicken is greater in the residential areas, and the frequency of pigeon and doves is greater at the Ophel and Stepped Stone Structure (Figure 6.13). Bird frequencies lead to the conclusion that chicken was most likely exploited for consumption and cockfighting, whereas pigeons and doves were consumed, raised for fertilizer, and sacrificed. The hypothesis that domesticated chicken could be the sacrificial bird is further dismantled when looking into the subsequent Persian and Hellenistic, and Roman periods, when pigeons and doves are primarily identified only near the cultic area of Jerusalem (Figure 6.13; Spiciarich et al. 2017).

The cultic use of pigeons and doves in the Persian and Hellenistic are even more revealing as by these periods, chicken accounts for the majority of avian species present in Jerusalem (Figure 5.14). The use of pigeons and doves, according to the presence of columbaria, only intensifies after the Iron Ages. The presence of pigeons by the Late Hellenistic is only in Area D2 and Area D3 (Figure 5.13). These areas on the outskirts of the city are closer to the columbaria and may reflect their spatial position in the city. Whereas, partridge in the Late Hellenistic is present only in elite contexts, such as Area M2 (Figure 5.13).

The use of birds as sacrifices is essential in understanding the role of the laity in sacrificial practices. Pigeons, doves, and partridges represent the poor-persons sacrifice (Leviticus 5:7, 11; 12:8, 14:22, 30). The selling of pigeons in the temple is reiterated in the later New Testament (Matthew 21:12; Mark 11:15). Sacrificial practices were conducted by all levels

of society, regardless of their economic means. The cult supplied birds as well as livestock to the laity, in case the distance was too far for them to transport or afford their sacrifices and offerings (Deuteronomy 14:24-26).

TABLE. 5.27. PRESENCE OR ABSENCE OF ASPECTS RELATED TO SACRIFICIAL ECONOMY AND THE BIBLICAL FOODWAYS.

Period	Iron Age IIB						Iron Age IIC		Babyloni an	Persian			Early Hellenistic			Late Hellenistic					
Aspect/Area	D 1	D 3	C/ H	M 1	Oph el	WW P	M2	G	G	D 2	M 2	G	M 2	M 5	M5: L509 2	D 2	D 3	M 1	M 2	M 4	7 Shone
Forelimb's Favored	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X		X
Caprine Market Aged	X	X	X	X	X	X	X	X	X		X	X	X	X	X			X	X	X	
Cattle Market Aged		X				X	X				X	X	X						X	X	
Sheep Favored			X	X		X		X	X			X						X	X	X	
More Males		X			X	X					X		X						X	X	
More Females			X																		
Cattle >15%	X			X						X						X		X		X	X
Cattle <15%		X	X		X	X	X	X	X		X	X	X	X	X		X		X		
Doves					X	X	X	X	X			X				X	X		X	X	
Partridge	X	X			X	X	X	X	X		X	X	X						X	X	
Catfish		X			X		X	X	X		X	X							X		
Pig	X		X	X		X					X		X					X	X	X	X
Priestly Tithe							X														

Chapter Seven: Conclusion

The diachronic study of Jerusalem and its hinterland's animal economy, between the 8th through 2nd centuries BCE, can best be summarized as an urban center utilizing livestock for meat and secondary products that were redistributed throughout society through a variety of mechanisms, including the cult and directly from pastoralists in the hinterland. A holistic perspective of faunal remains, going beyond the use of mammals and studying the avian and ichthyological remains, alludes to intricate economic activities including trade networks with Egypt and the Coastal Plain. These networks were maintained throughout the first millennium BCE, including periods of low demography such as the Persian and Early Hellenistic periods.

The *longue durée* of Jerusalem social and economic development in the 8th through the 2nd centuries BCE indicate a continuity of an urban settlement with a stratified society that goes beyond rich and poor or elite and non-elite. The intricate urban economy present in the Iron Age IIB of Jerusalem continues into the Iron Age IIC. Remains from the 587/6 BCE destruction in Area M2 corroborate the presence of an elite priestly class sharing meals in the monumental Building 100. Continuity of elite consumption in Jerusalem continues well after the Neo-Babylonian destruction, in the ruins of Building 100. Faunal remains from the Babylonian fill in Area G, and the Persian period living-surface in Area M2 indicates the use of animals for meat and secondary products, as well as the consumption of imported fish.

Fish in Jerusalem was a luxury item. The presence of fish in the squatter settlement in the remains of Building 100 adds new complexity to the study of social identity in archaeology. The theory that those that 'remained' after the destruction of Jerusalem were poor non-elites is

compromised. Those that 'remained' consumed food in a similar manner as previous elites, that includes a wide array of fish, birds, and game.

Urban development in the Hellenistic periods of Jerusalem suggests continuity and establishment of a neighborhood between the western slopes of the Southeastern Ridge and the Tyropeon Valley. The Hellenistic period present in the Givati Parking Lot excavations indicate public, domestic, and craft production occurred in the same neighborhood. Evidence of craft production refuse in pits and the constructional fills of the Late Hellenistic imply the presence of craftspeople residing in the city. Merchant and craftspeople defy the social assumptions of low and high-status individuals. As such, we can propose a middle socioeconomic status of individuals in Hellenistic Jerusalem. The homogenous nature of Jerusalem's animal economy throughout its history is the social reality of priests, elites, craftspeople, and other specialists sharing neighborhoods and consuming in similar manners, with those residing in the city directly benefiting from the national cult.

Classification of Jerusalem as consumers and its hinterland as producers is an over-simplification of the economic relationship between the two entities. Administrative sites in the hinterland, such as Tel Moẓa, Ramat Raḥel, and Nebi Samuel, played an integral role in maintaining control over the region. The relationship between Jerusalem and its hinterland in the Iron Age IIB-C follows the theory proposed by Sapir-Hen et al. (2016), in which Jerusalem was supplied with caprines and secondary products by the hinterland. The monumentality of Tel Moẓa, goes beyond other hinterland sites, such as farmsteads and hamlets. Textual sources describe the presence of priests in Jerusalem's hinterland (Leviticus 27; Ezekiel 45:1-6, 48:8-14). Archaeology of Tel Moẓa, along with texts and the faunal remains, indicate the Tel Moẓa cult

was staffed by priests residing in the hinterland that held some control over the production of goods, and more importantly, controlled the herds that were sacrificed and sold in Jerusalem.

Occupation of the hinterland continues into the Persian and Hellenistic periods. After the destruction of Jerusalem, the hinterland continued to function as a producer for goods and services. A notable change in the animal economy of the hinterland starts in the Persian period, with the integration of chicken into subsistence practices. Chicken was utilized as a quick and easy meat source to feed nuclear families or as an available meat source for maintaining other livestock for secondary means. Another change to the animal economy of the hinterland occurs in the Hellenistic periods, with the conspicuous consumption of meat.

Conspicuous consumption of cattle meat in the Late Hellenistic is widespread between the hinterland and Jerusalem. The rise in the exploitation of young cattle can be attributed to the establishment of the Hasmonean monarchy. The exploitation of juvenile cattle in the Persian through Late Hellenistic is practical from the view of Deuteronomy 15:19. Maintenance of sacrificial cattle herds would pose an economic burden on the producer, especially since there would be no economic return on their investment. Offering them young to the cult would elevate the economic burden of pastoralists and, at the same time, provide tender meat to the national cult.

The economic impact of Jerusalem's sacrificial system is overshadowed mainly by modern scholarship's fascination with biblical food laws. The introduction of the biblical food laws into general society is a reaction to global events in the 6th century BCE that created a need for socially identifying norms. The presence of the culturally identifying biblical food laws is unsubstantiated in Jerusalem and its hinterland during the 8th through the 2nd centuries BCE. Pig and catfish taboos lead to a circular argument over presence versus absence that nominal

frequencies cannot support nor negate. Aspects of the food laws that are present in Jerusalem all relate to sacrificial practices such as the priestly tithe and the raising of cult-owned herds. Redirecting the discussion of Jerusalem's religiosity from Deuteronomy 14 and Leviticus 11 to how animals in the Hebrew Bible are historically represented attests to Jerusalem's sacrificial economy.

Broad themes of this research placed Jerusalem within the global worldview and allowed for a reassessment of producer and consumer status within urban settlements. Precise patterns of livestock producers, craft producers, and consumers are present within the zooarchaeological material present, which in turn aid in understanding the complex social hierarchy present within urban Jerusalem and its rural hinterland. A holistic view of Jerusalem and its hinterland faunal assemblages provided a new understanding of the exploitation of fish and birds in ancient animal economies. In light of historical and textual data paired with the faunal remains indicate Jerusalem's animal economy was a sacrificial economy that relied on its hinterland for goods and services, including as middlemen for trade imports.

References

Adams, S.L. 2014. *Social and Economic Life in Second Temple Judea*. Presbyterian Publishing Corp.

Aharoni, I. 1938. On Some Animals Mentioned in the Bible. *Osiris* 5: 461–478.

_____ 1943–1946: *Memories of a Hebrew Zoologist.* Jerusalem (Hebrew).

Aharoni, Y. 1961. Excavations at Ramat Rahel. *The Biblical Archaeologist* 24(4): 98–118.

Aharoni, Y. and Aharoni, M. 1976. The Stratification of Judahite Sites in the 8th and 7th Centuries BCE. *BASOR* 224: 73–90.

Albright, W.P. 1923. The Site of Mizpah in Benjamin. *Journal of the Palestine Oriental Society* 3: 110-121.

Algaze, G. 2018. Entropic Cities: The Paradox of Urbanism in Ancient Mesopotamia. *Current Anthropology* 59(1): 39–39.

Altmann, P., Angelini, A. and Spiciarich, A. 2020. *Food Taboos and Biblical Prohibitions: Reassessing Archaeological and Literary Perspectives.* Tübingen: Mohr Siebeck.

Altmann, P. and Spiciarich, A. 2020. Chickens, Partridges, and the/tor/of Ancient Israel and the Hebrew Bible. *Die Welt des Orients* 50(1): 2–30.

Amar, Z., Bouchnick, R., and Bar-Oz, G. 2010. The Contribution of Archaeozoology to the Identification of the Ritually Clean Ungulates Mentioned in the Hebrew Bible. *Journal of Hebrew Scriptures* 10: 1–14.

Amiran, R. and Eitan, A. 1970. Excavations in the Courtyard of the Citadel, Jerusalem, 1968–1969 (Preliminary Report). *IEJ* 20: 9–17.

Amit, D. 2009. *Model of Second Temple Jerusalem*. Jerusalem: The Israel Museum.

Ariel, D.T. and De Groot, A. 1996. *Excavations at the City of David Final Report IV* (Qedem 35). Jerusalem.

Arnold, E., Greer, J., Ilan, D., and Thareani, Y. 2015. Local Meals? Imported Sacrifices? An Isotopic Investigation of Animal Resources at Site of Tel Dan. Paper Presented at the Annual Meeting of ASOR: Atlanta, Georgia.

Ashby, S.P. 2002. The Role of Zooarchaeology in the Interpretation of Socioeconomic Status: A Discussion with Reference to Medieval Europe. *Archaeological Review from Cambridge*: 37–59.

Avigad, N. 1975. Excavations in the Jewish Quarter of the Old City, 1969-1971. In: Geva, H., ed. *Jerusalem Revealed: Archaeology in the Holy City 1968-1974*. Jerusalem: 41–51.

____1983. *Discovering Jerusalem*. Nashville.

Avigad, N., and Geva, H. 2000 Iron Age II Strata 9-7. In: Geva, H., ed. *Jewish Quarter Excavations in the Old City of Jerusalem*, vol. 1: *Architecture and Stratigraphy: Areas A, W and X-2; Final Report.* Jerusalem: Israel Exploration Society: 44–82.

Avni, G. and Seligman, J. 2006. Between the Temple Mount/Haram el-Sharif and the Holy Sepulcher: Archaeological Involvement in Jerusalem's Holy Places. *Journal of Mediterranean Archaeology* 19(2): 259.

Babota, V. 2014. *The Institution of the Hasmonean High Priesthood*. Brill, London.

Baker, H.D. 2004. *The Archive of the Nappāḫu Family* (*AfO* Beiheft 30). Vienna.

Baker, J. and Brothwell, D. 1980. *Animal Diseases in Archaeology*. London.

Barkai, G. 1992. The Iron Age II-III. In Greenberg, R., and Ben-Tor, A., eds. *Archaeology of Ancient Israel*. New Haven: 302–373.

Bar-Oz, G. 2004. *Epipalaeolithic Subsistence Strategies in the Levant: A Zooarchaeological Perspective*. Boston.

Bar-Oz, G., Bouchnik, R., Weissbrod, L., Mayer, B. and Reich, R. 2007. Holy Garbage: A Quantitative Study of the City-Dump of Early Roman Jerusalem. *Levant* 39: 1–12.

Bar-Oz, G. and Raban-Gerstel, N. 2013. The Faunal Remains. In: Ben-Ami, D., ed. *Jerusalem, Excavations in the Tyropoeon Valley (Giv`ati Parking Lot)* Vol. I. (IAA Reports 52). Jerusalem: 349–380.

Barstad, H.M.1996. *The Myth of the Empty Land: A Study in the History and Archaeology of Judah during the" Exilic" Period*. Scandinavian Univ. Press.

____2001. The Myth of the Empty Land. In: Lipschits, O., ed. *Judea and Judeans in the Neo-Babylonian Period.* Tel Aviv: 7–8.

Bartosiewicz, L. 2006. Animal Bones from the Medieval Settlement Otok (Gutenwerth) near Dobrava pri Škocjan, Slovenia. *Arheološki Vestnik* 37: 415–436.

____2009. Skin and Bones: Taphonomy of a Medieval Tannery in Hungary. *Journal of Taphonomy* 7(2): 91–107.

Baruch, Y. and Uziel, J. 2015. Tell el-Ful and Its Environs during the Second Temple and Late Roman Period. In: Baruch, E. and Faust, A., eds. *New Studies on Jerusalem* 21. Ramat Gan: 163–183.

Be'eri, R. 2012. Jerusalem, Shu'fat Ridge. *Hadashot Arkheologiyot* 124 (Hebrew). https://tinyurl.com/SBL2643b

Behrensmeyer, A.K. 1978. Taphonomic and Ecological Information from Bone Weathering. *Paleobiology* 4: 150–162.

Beit-Arieh, I. 1987. Tel-'Ira and Horvat ʿUza: Negev Sites in the Late Israelite Period. [*Cathedra* 42: 34–38 (Hebrew).

Ben-Ami, D. 2013. *Jerusalem, Excavations in the Tyropoeon Valley (Giv`ati Parking Lot)* Vol. I. (IAA Reports 52) Jerusalem.

Ben Ami, D. and Tchekhanovets, Y. 2015. ". . . and they also that were in the city of David in Jerusalem, who had made themselves a tower" (I Maccabees 14:36). In: Stiebel, G. D., Peleg-Barkat, O., Ben Ami, D. and Gadot, Y., eds. *New Studies in the Archaeology of Jerusalem and its Region,* Collected Papers, Vol. IX. Jerusalem: 313–322 (Hebrew).

____2016. "Then they built up the City of David with a high, strong wall and strong towers, and it became their citadel" (I Maccabees 1:33). In: Meiron, E., ed. *City of David Studies of Ancient Jerusalem* 11: 19–29.

Benecke, N. 1994. Der Mensch und seine Haustiere. *Stuttgart: Theiss*: 353–355 (German).

Ben-Dor Evian, S. 2011. Egypt and the Levant in the Iron Age I–IIA: The Ceramic Evidence. *Tel Aviv* 38: 94–119.

Ben-Tor, A. 1980. Yoqne'am Regional Project-Looks Beyond the Tell. *BAR* 6: 30–44.

Ben Tor, A., Zuckerman, S., Bechar, S., Sandhaus, D. 2017. *Hazor VII, The 1990-2012 Excavations: The Bronze Age*. Jerusalem.

Berlin, A. 2018. Land/Homeland, Story/History: The Social landscapes of the Southern Levant from Alexander to Augustus. In: Yasur-Landau, A., Cline, E.H. and Rowan, Y., eds. *The Social Archaeology of the Levant from Prehistory to the Present.* Cambridge University Press: 410–437.

Bilik, E. 1961. Clean Ungulates in the Bible. *Beth Mikra* 6: 28– 31 (Hebrew).

Billig, Y. 2007. Beth HaKerem. *New Studies in the Archaeology of Jerusalem and Its Region* 1:

135 (Hebrew).

Binford, Lewis R. 1981. *Bones: Ancient Men and Modern Myths*. New York: Academic Press.

____1984. Butchering, Sharing, and the Archaeological Record. *Journal of Anthropological Archaeology* 3: 235–257.

Biran, A. 1987. Tel-'Ira and 'Aro'er towards the End of the Judean Monarchy. *Cathedra* 42: 26–33 (Hebrew).

Blanton, R. and Feinman, G. 1984. The Mesoamerican World System. *American Anthropologist* 86: 673–682.

Bohannon, P., and Dalton, G. 1962. *Markets in Africa*. Evanston, IL.

Borowski, O. 1998. *Every Living Thing: Daily Use of Animals in Ancient Israel*. Walnut Creek, CA: Rowman Altamira.

Bouchnick, R. 2011. *Meat Consumption in Israel during the Late Second Temple Period*. Unpublished Ph.D. Dissertation, University of Haifa. Haifa (Hebrew).

____2018. Jerusalem, the Old City: The Faunal Remains. *Hadashot Arkheologiyot Excavations and Surveys in Israel* 130. http://www.hadashot-esi.org.il/images/Shone-Halakhot-zoo.pdf

Brewer, D. 2002. Hunting, Animal Husbandry and Diet in Ancient Egypt. In: Collins, B.J. ed. *A History of the Animal World in the Ancient Near East*. Leiden: 427–456.

Broshi, M. 1976. Excavations on Mount Zion, 1971–1972 (Preliminary Report), *IEJ* 26: 81–88.

Boulanger, G.A. 1907. *Zoology of Egypt: The Fishes of the Nile.* London.

Bourdieu, P. 1977. *Outline of a Theory of Practice*, translated by R. Nice. Cambridge.

Brown, R.D. 1983. *Antler Development in Cervidae.* Kingsville.

Bunimovitz, S., and Lederman, Z. 2011. Canaanite Resistance: The Philistines and Beth-Shemesh—a Case Study from Iron Age I. *BASOR* 364: 37–51.

Burkert, W. 1996. *Creation of the Sacred: Tracks of Biology in Early Religions.* Cambridge: Harvard University Press.

Burnside, J. 2016. At Wisdom's Table: How Narrative Shapes the Biblical Food Laws and Their Social Function. *JBL* 135: 223–245.

Cahill, J.M. 1998. David's Jerusalem: Fiction or Reality? It's there: The Archaeological Evidence Proves It. *BAR* 24(4): 34–41.

____2003. Jerusalem at the Time of the United Monarchy: The Archaeological Evidence. In: Cahill, J.M., Vaughn, A.G. and Killebrew, A.E., eds. *Jerusalem in Bible and Archaeology. The First Temple Period* (Society of Biblical Literature, Symposium Series 18). Leiden: 13–80.

Campbell, T. 1981. *Seven Theories of Human Society*, Oxford: Oxford University Press.

Çakırlar, C., Ikram, S. and Gates, M.H. 2016. New Evidence for Fish Processing in The Ancient Eastern Mediterranean: Formalised Epinephelus Butchery in Fifth Century BC Kinet Höyük, Turkey. *International Journal of Osteoarchaeology* 26(1): 3–16.

Carrier, J.G. 2012. *A Handbook of Economic Anthropology*. Northampton, MA: Edward Elgar Publishing.

Carter, C.E.1999. *The Emergence of Yehud in the Persian Period: A Social and Demographic Study.* JSOT Supplement Series 294. Sheffield: Sheffield Academic Press.

Carmichael, C. 2006. *Illuminating Leviticus: A Study of its Laws and Institutions in the Light of Biblical Narratives*. Baltimore: John Hopkins University Press.

Cheung, C., Jing, Z., Tang, J., Weston, D.A. and Richards, M.P. 2017. Diets, Social Roles, and Geographical Origins of Sacrificial Victims at the Royal Cemetery at Yinxu, Shang China: New Evidence from Stable Carbon, Nitrogen, and Sulfur Isotope Analysis. *Journal of Anthropological Archaeology* 48: 28–45.

Childe, V.G. 1950. The Urban Revolution. *Town Planning Review* 21(1): 3–6.

Chisholm, M. 1972. *Rural Settlement and Land Use: An Essay in Location*. New Jersey: Transaction Publishers

Cohen, A. 2000. *The Guilds of Ottoman Jerusalem*. Brill.

Collins, J.J. 2005. *Jewish Cult and Hellenistic Culture: Essays on the Jewish Encounter with Hellenism and Roman Rule.* Brill.

Cope, C. 2004. The Butchering Patterns of Gamla and Yodefat: Beginning the Search for 'Kosher' Practice. In: Jones, S., Van Neer, W., and Ervynck, A., eds. *Behaviour Behind Bones*. Oxford: 25–33.

____ 2016. Butchery Patterns. In: Syon, D., ed. *Gamla III: Shmarya Gutmann Excavations 1976–1989 Finds and Studies, Part 2.* IAA Report 59: 331–342.

Cowgill, G.L. 2004. Origins and Development of Urbanism: Archaeological Perspectives. *Annu. Rev. Anthropol.* 33: 525–549

Crabtree, P. J. 1990. Zooarchaeology and Complex Societies: Some uses of Faunal Analysis for the Study of Trade, Status, and Ethnicity. In Schiffer, M. B., ed. *Archaeological Method and Theory* 2. Tucson: University of Arizona Press: 155–205.

Dalix, A.-S., and Vila, E. 2007. Wild Boar Hunting in the Eastern Mediterranean from the 2nd to the 1st Millennium BC. In: Albarella, U., Dobney, K., Ervynck, A., Rowley-Conwy, P., eds. *Pigs and Humans: 10,000 Years of Interaction*. Oxford: Oxford University: 359–372.

D'Altroy, T.N. 2009. The Central Andean Region in Prehistory. In: Cunliffe, B.W., Gosden, C. and Joyce, R.A. eds., 2009. *The Oxford Handbook of Archaeology*. Oxford University Press: 471–490.

D'Altroy, T. N., and Earle, T.K. 1985, Staple Finance, Wealth Finance, and Storage in the Inka Political Economy, *Current Anthropology* 26: 187–206.

Davidovitz, U., Farhi, Y., Kol-Ya'akov, S., Har-Peled, M., Weinblatt-Krauz, D. and Alon, Y. 2006. Salvage Excavations at Ramot Forest and Ramat Bet-Hakerem: New Data Regarding Jerusalem's Periphery during the First and Second Temple Periods. *New Studies on Jerusalem* 11: 35-111.

Danin, A., 1988. Flora and Vegetation of Israel and Adjacent Areas. In: Yom Tov, Y., and Tchernov, E., eds. *The Zoogeography of Israel*. Dordrecht, Boston, Lancaster: 129–159; 251–276.

Davies, J.K. 1998. Ancient Economies: Models and Muddles. In: Parkins, H., and Smith, C. eds. *Trade, Traders and the Ancient City*. London, New York: Routledge: 225–256.

Davies, P. R. 1992. *In Search of 'Ancient Israel.'* JSOT Supplement Series 148. Sheffield.

____ 2010. Urban and Rural Religion. In: Stavrakopoulou, F. and Barton, J., eds. *Religious Diversity in Ancient Israel and Judah*. A&C Black: 104–117.

Davis, S.J.M. 1983. The Age Profiles of Gazelles Predated by Ancient Man in Israel: Possible Evidence for a Shift from Seasonality to Sedentism in the Natufian. *Paléorient:* 55–62.

____ 2007. Mammal and Bird Remains from the Iron Age and Roman periods at Castro Marim, Algarve (International Committee for Architectural Photogrammetry, Lisbon).

____2008. Thou Shalt Take of The Ram… The Right Thigh; For It is a Ram of Consecration… Some Zooarchaeological Examples of Body Part Preferences. In: D'Andria, F., Mazzorin, J.D.G. and Fiorentino, G. eds., *Uomini, piante e animali nella dimensione del sacro:*

seminario di studi di Bioarcheologia (28-29 giugno 2002): Convento dei Domenicani, Cavallino (Lecce). Edipuglia: 63–70.

Davis, S.J.M. Svensson, E.M., Albarella, U., Detry, C., Götherström, A., Pires, A.E. and Ginja, C. 2012. Molecular and Osteometric Sexing of Cattle Metacarpals: A Case Study from 15th century AD Beja, Portugal. *JAS* 39(5): 1445–1454.

deFrance, S.D. 2009. Zooarchaeology in Complex Societies: Political Economy, Status, and Ideology. *Journal of Archaeological Research* 17: 105–168.

De Groot, A. 2012. Discussion and Conclusions. In: De Groot, A. and Bernick-Greenberg, H., eds. *Excavations at the City of David 1978–1985 Directed by Yigal Shiloh.* Volume VIIA: *Area E: Stratigraphy and Architecture.* (Qedem 53). Jerusalem: 141–184.

De Groot, A. and Bernick-Greenberg, H. 2012. *Excavations at the City of David 1978-1985 Directed by Yigal Shiloh.* (Qedem 54). Jerusalem.

De Groot, A. and Weinberger-Stern, M. 2013. Wine, Oil and Gibeonites: Iron II–III at Kh. el-Burj Northern Jerusalem. *New Studies on Jerusalem* 19: 95–102 (Hebrew with English summary).

De Wette, W.M.L. 1830. "Dissertatio Critica Qua a Prioribus Deuteronomium Pentateuchi Libris Diversum, Alius Cuiusdam Recentioris Auctoris Opus Esse Monstratur". *Opuscula Theological*. Berlin: Reimerum: 149–168. Orig. 1805.

____ 1842. *A Critical and Historical Introduction to the Canonical Scriptures of the Old Testatment* (Vol. 2). CC Little and J. Brown.

D'Iatchenko, V., David, F., and Gratchev. I. 2007. Les animaux dans les pratiques funéraires du IXe-Xe siècle dans l'île de Tagar (bassin de l'Ienisseï): Comparaisons avec quelques données ethnographiques. In: Beyries, S. and Vaté, V., eds. *Les Civilisations du Renne d'hier et d'aujourd'hui: Approches ethnohistoriques, archéologiques et anthropologiques, XVIII Rencontres Internationales d'Archéologie et d'Histoire d'Antibes*. Antibes: 363–376.

Dietler, M. 1998. Consumption, Agency, and Cultural Entanglement: Theoretical Implications of Mediterranean Colonial Encounter. In: Cusick, J.G., eds. *Studies in Culture Contact: Interaction, Culture Change, and Archaeology*. Center for Archaeological Investigations, Southern Illinois University, Carbondale: 288–315.

____ 2007. Culinary Encounters: Food, Identity and Colonialism. In: Twiss, K. C., ed. *The Archaeology of Food and Identity*, Occasional Paper No. 34, Center for Archaeological Investigations, Southern Illinois University, Carbondale: 218–242.

Dietler, M. and Hayden, B. 2001. Digesting the Feast—Good to Eat, Good to Drink, Good to Think: An Introduction. In: Dietler, M. and Hayden, B., eds. *Feasts: Archaeological and Ethnographic Perspectives on Food, Politics, and Power*.Washington D.C: 1–20.

Dong, Z. 1997. Mixture Analysis and Its Preliminary Application in Archaeology. Journal of *Archaeological Science* 24: 141-161.

Douglas, M. 1966. *Purity and Danger: An Analysis of the Concepts of Pollution and Taboo.* New York.

____ 2003. *Purity and Danger: An Analysis of the Concepts of Pollution and Taboo.* Routledge.

Driesch von den, A. 1976. A Guide to the Measurement of Animal Bones from Archaeological Sites. MA Thesis, Harvard University, Peabody Museum of Archaeology and Ethnology. Cambridge.

Driver, G. R. 1955a. Birds in the Old Testament: I. Birds in Law. *PEQ* 87: 5–20.

____ 1955b. Birds in the Old Testament: II. Birds in Life. *PEQ* 87: 129–140.

____ 1958. Once Again: Birds in the Bible. *PEQ* 90: 56–58.

Earle, T.K. 1977. A Reapprisal of Redistribution: Complex Hawaiian Chiefdoms. In: Earle, T.K. and Ericson, J.E., eds. *Exchange Systems in Prehistory.* New York: Academic Press: 213–229.

____ 1997. *How Chiefs Came to Power: The Political Economy of Prehistory,* Stanford University Press, Stanford.

Edelman, D. 2005. *The Origins of the 'Second' Temple: Persian Imperial Policy and the Rebuilding of Jerusalem.* Equinox, London.

____ 2006. Tyrian trade in Yehud under Artaxerxes I: Real or Fictional? Independent or Crown Endorsed?. In: Lipschits, O. and Oeming, M., eds. *Judah and the Judeans in the Persian Period.* Winona Lake, IN: 207–246.

Edelstein, G. 2000. A Terraced Farm at Er-Ras. '*Atiqot* 40: 39–64.

Edelstein, G., Milevski, I., and Aurnat, S. 1998. *Villages, Terraces and Stone Mounds: Excavations at Manahat, Jerusalem, 1987–1989, Israel Antiquities Reports* 3: Jerusalem.

Eden, L., and Molot, M.A. 1992. *From Silent Integration to Strategic Alliance: The Political Economy of North American Free Trade (No. 17).* Centre for Trade Policy and Law = Centre de droit et de politique commerciale.

Ekroth, G. 2016. A View from The Greek Side: Interpretations of Animal Bones as Evidence for Sacrifice and Ritual Consumption. *Journal of Ancient Judaism* 7(1): 35–50.

Elgart-Sharon, Y. 2017. Settlement Patterns and Land Use in the Upper Soreq Area: Longue Durée Approach. Tel Aviv University: MA Thesis (Hebrew).

Elsner, J., and Rutherford, I. 2010. *Pilgrimage in Graeco-Roman and Early Christian Antiquity: Seeing the Gods*. Oxford.

Emberling, G. 2003. Urban Social Transformations and the Problem of the "First City": New Research from Mesopotamia. In: Smith, M.L., ed. *The Social Construction of Ancient Cities*. Washington D.C.: 254–268

Engels, F. 1942. *The Origin of the Family, Private Property, and the State, in the Light of the Researches of Lewis H. Morgan*. New York.

Eshel, H. 2000. Jerusalem under Persian Rule: The City's Layout and the Historical Background. In: Ahituv, S., and Mazar, A., eds. *The History of Jerusalem: The Biblical Period*. Yad Ben Zvi, Jerusalem: 327–344 (Hebrew).

Eshel, I. and Prag, K. 1995. *Excavations in Jerusalem 1961-1967: The Iron Age Cave Deposits on the South-East Hill and Isolated Burials and Cemeteries Elsewhere*. Oxford.

Falconer, S.E. and Savage, S.H. 1995. Heartlands and Hinterlands: Alternative Trajectories of Early Urbanization in Mesopotamia And The Southern Levant. *American Antiquity* 60(1): 37–58.

Fantalkin, A., and Tal, O. 2015. *Tell Qudadi: An Iron Age IIB Fortress on the Central Mediterranean Coast of Israel (with References to Earlier and Later Periods)*. Leuven: Peeters.

Faust, A. 1997. The Impact of Jerusalem's Expansion in the Late Iron Age on the Forms of Rural Settlement in Its Vicinity. *Cathedra* 84: 53–62 (Hebrew with English abstract).

____ 2000. The Rural Community in Ancient Israel during Iron Age II. *BASOR* 317: 17–39.

____ 2003. Judah in the Sixth Century BCE: A Rural Perspective. *PEQ* 135(1): 37–53.

____ 2004. The United Monarchy and Anthropology: A Note on the Debate over Jerusalem's Possible Status as a Capital. In: Baruch, E., and Faust, A. eds. *New Studies on Jerusalem* 10: 23–36 (in Hebrew).

____ 2005. The Settlement of Jerusalem's Western Hill and the City's Status in Iron Age II Revisited. *ZDPV (1953-)*, (H. 2): 97–118.

____ 2006. Jerusalem's Countryside during the Middle Bronze Age. *New Studies on Jerusalem* 12: 7–19.

____ 2007. Jerusalem's Hinterland and the City's Status in the Bronze and Iron Ages. *EI* 28: 165–178 (Hebrew with English summary p. 15*).

____ 2008. Settlement and Demography in Seventh Century Judah and the Extent and Intensity of Sennacherib's Campaign. *PEQ* 140(3): 168—194

____ 2010. The Large Stone Structure in the City of David: A Reexamination. *ZDPV*: 116–130.

____ 2012. *Judah in the Neo-Babylonian Period: The Archaeology of Desolation*. Atlanta.

Faust, A. and Weiss, E. 2005. Judah, Philistia, and the Mediterranean World: Reconstructing the Economic System of the Seventh Century BCE. *BASOR* 338(1): 71–92.

Feig, N. 1995. The Agricultural Settlement in the Jerusalem Area in Iron Age II. In: Safrai, Z. and Faust, A., eds. *Recent Innovations in the Study of Jerusalem* I. Tel Aviv: 3–7 (Hebrew).

____ 1996. New Discoveries in the Repha'im Valley, Jerusalem. *PEQ* 128: 3–7.

____ 2000. The Environs of Jerusalem in the Iron Age II. In: Ahituv, S. and Mazar, A., eds. *The History of Jerusalem: The Biblical Period*. Jerusalem: 387–409 (Hebrew).

____ 2003. Excavations at Beit Safafa: Iron Age II and Byzantine Agricultural Installations South of Jerusalem. *Atiqot* 44: 191–238.

Feig, N. and Abd Rabu, O. 1996. Jerusalem, Khirbet er-Ras. *Excavations and Surveys in Israel* 15: 74–75.

Feugère, M. 2002. *Weapons of the Romans*. Tempus.

Fiddes, N. 1991. *Meat, A Natural Symbol*, Routledge, London, New York.

Figueira T.J., and Nagy, G. 1985. *Theognis of Megara: Poetry and the Polis* Johns Hopkins Univ Press: Baltimore.

Figueras, P. 1991. Horvat Karkur'lllit. *Hadashot Arkheologiyot* 97: 82.

Finkelstein, I. 1994. The Archaeology of the Days of Mannaseh. In: King, P.J., Coogan, M.D., Exum, J.C. and Stager, L.E., eds. *Scripture and Other Artifacts: Essays on the Bible and Archaeology in Honor of Philip J. King*. Westminster John Knox Press: 169–187.

____1996. Ethnicity and the Origin of the Iron I Settlers in the Highlands of Canaan: Can the Real Israel Stand Up? *BA* 59: 198–212.

____2001. The Rise of Jerusalem and Judah: The Missing Link. *Levant* 33: 105–115.

____ 2003. The Rise of Jerusalem and Judah: The Missing Link. In: Vaughn, A.G. and Killebrew, A.E., eds. *Jerusalem in Bible and Archaeology: The First Temple Period* 18: 81–102.

____ 2006. The Last Labayu. King Saul and the Expansion of the First North Israelite Territorial Entity. In: Amit, Y., Zvi, E.B., Finkelstein, I. and Lipschits, O., eds. *Essays on Ancient Israel in Its Near Eastern Context. A Tribute to Nadav Na'aman*. Winona Lake, IN: 171–187.

____2008. Jerusalem in the Persian (and Early Hellenistic) Period and the Wall of Nehemiah. *JSOT* 32(4): 501–520.

____2010. A Great United Monarchy?. *Archaeological and Biblical Perspectives* 405: 3.

____2011. The" Large Stone Structure" in Jerusalem: Reality versus Yearning. *ZDPV:* 1–10.

____2015. Migration of Israelites into Judah after 720 BCE: An Answer and an Update. *Zeitschrift für die alttestamentliche Wissenschaft* 127(2): 188–206.

____2018a. Jerusalem and the Benjamin Plateau in the Early Phases of the Iron Age: A Different Scenario. *ZDPV* 134(2): 190–195.

____ 2018b. *Hasmonean Realities Behind Ezra, Nehemiah, and Chronicles: Archaeological and Historical Perspectives* (Vol. 34). SBL Press.

Finkelstein, I., Koch, I. and Lipschits, O. 2011. The Mound on the Mount: A Possible Solution to the Problem with Jerusalem. *Journal of Hebrew Scriptures 11*.

Finkelstein, I. and Na'aman, N. 2004. The Judahite Shephelah in the Late 8th and Early 7th Centuries BCE. *Tel Aviv* 31(1): 60–79.

Finkelstein, I. and Piasetzky, E. 2010. Radiocarbon Dating the Iron Age in the Levant: a Bayesian Model for Six Ceramic Phases and Six Transitions. *Antiquity* 84(324): 374–385.

Finkelstein, I. and Silberman, N.A. 2006. Temple and Dynasty: Hezekiah, the Remaking of Judah and the Rise of the Pan-Israelite Ideology. *Journal for the Study of the Old Testament* 30(3): 259–285.

Finkelstein, I., Singer-Avitz, L., Herzog, Z.E. and Ussishkin, D. 2007. Has King David's Palace in Jerusalem been Found?. *Tel Aviv* 34(2): 142–164.

Firmage, E. 1992. Zoology. In: Freedman, D.N. ed. *The Anchor Bible Dictionary*. New York: Doubleday: 1109–1167.

Fischler, C. 1988. Food, Self, and Identity. *Social Sciences Information* 27: 275–293.

Fitchen, J.M. 1988. Hunger, Malnutrition and Poverty in the Contemporary United States: Some Observations on Their Social and Cultural Context. *Food and Foodways* 2: 309–333.

Fox, R.G. 1977. *Urban Anthropology: Cities in their Cultural Settings.* Prentice Hall.

Franken, H. J., and Steiner, M. L. 1990. *Jerusalem II: Excavations in Jerusalem 1961–1967, Vol. II: The Iron Age Extramural Quarter on the South West Hill*. Oxford.

Franklin, M. 2001. The Archaeological and Symbolic Dimensions of Soul Food: Race, Culture, and Afro-Virginian Identity. In: Orser Jr., C. E., ed. *Race, Material Culture, and the Archaeology of Identity*. Salt Lake City: 88–107.

Freud, L. 2018. Judahite Pottery in the Transitional Phase between the Iron Age and the Persian Period: Jerusalem and its Environs. Tel Aviv University Ph.D. Dissertation (Hebrew).

Frost, F. 1999. Sausage and Meat Preservation in Antiquity. *Greek, Roman, and Byzantine Studies* 40(3): 241–252.

Fulton, D. Forthcoming. The Faunal Remains. In: Lipschits, O., Gadot, Y., and Freud, L., eds. *Ramat Rahel vol. IV.*

Fulton, D., Gadot, Y., Kleiman, A., Freud, L., Lernau, O., Lipschits, O. 2015. Feasting in Paradise: Feast Remains from the Iron Age Palace of Ramat Rahel and Their Implications. *BASOR* 374: 29–48.

Garcia, J.C.M. 2016. Economies in Transition: Trade, "Money", Labour and Nomads at the turn of the 1st Millennium BCE. In: Garcia, J.C.M., ed. *Dynamics of Production in the Ancient Near East.* Oxford: Oxbow Books: 1–28.

Gadot, Y. 2011. The Rural Settlement Along Nahal Rephaim from the Middle Bronze Age Until the Hellenistic Period: A Fresh Look from Kh. Er Ras. *New Discoveries in Jerusalem* 17: 43–61 (Hebrew with English summary).

____ 2014. Preliminary Report on the Excavations at Jerusalem's Southeastern Hill, Area D3. *Hebrew Bible and Ancient Israel* 3(2): 279–292.

____ 2015. In the Valley of the King: Jerusalem's Rural Hinterland in the 8th-4th Centuries BCE. *Tel Aviv* 42(1): 3–26.

Gadot, Y., Elgart-Sharon, Y., Ben-Melech, N., Davidovich, U., Avni, G., Avni, Y. and Porat, N. 2018. OSL dating of Pre-Terraced and Terraced Landscape: Land Transformation in Jerusalem's Rural Hinterland. *JAS Reports* 21: 575–583.

Gadot, Y., Mizrahi, S., Freud, L., and Gellman, D. 2019. What Kind of Village Is This? Buildings and Agroeconomic Activities Northwest of Jerusalem during the Iron IIB–C Period. In: Lipschits, O. and Capek, F., eds. The Last Century in the History of Judah. SBL Press: 87–116.

Gadot, Y. and Uziel, J. 2017. The Monumentality of Iron Age Jerusalem Prior to the 8th Century BCE. *Tel Aviv* 44(2): 123–140.

Garnsey, P. 1999. *Food and Society in Classical Antiquity*. Cambridge University Press.

Genz, H. 2003. Cash Crop Production and Storage in the Early Bronze Age Levant. *Journal of Mediterranean Archaeology* 16: 59–78.

Geva, H. 1979. The Western Boundary of Jerusalem at the End of the Monarchy. *IEJ* 29: 84–91.

____ 1983. Excavations in the Citadel of Jerusalem, 1979–1980. *IEJ* 33: 55–71.

____ 2002. Jerusalem between the 8th and the 7th Centuries BCE. *New Studies on Jerusalem 8*: 21–24 (Hebrew).

____ 2003a. Summary and Discussion of Findings from Areas A, W and X-2. In: Geva, H., ed. *Jewish Quarter Excavations in the Old City of Jerusalem, II.* Jerusalem: 501–552.

____ 2003b. Western Jerusalem at the End of the First Temple Period in Light of the Excavations in the Jewish Quarter. In: Vaughn, A.G., and Killebrew, A.E. eds. *Jerusalem in the Bible and Archaeology: The First Temple Period*. Atlanta: 183–208.

____2011. On the "New City" of Second Temple Jerusalem: The Archaeological Evidence. In: Galor, K. and Avni, G., eds. *Unearthing Jerusalem, 150 Years of Archaeological Research in the Holy City*. Winona Lake, IN: 299–312.

____ 2012. Remarks on the Archaeology of Jerusalem in the Persian Period. *New Studies in the Archaeology of Jerusalem and Its Region* 6: 66–79 (Hebrew).

____ 2014. Jerusalem's Population in Antiquity: A Minimalist View 1. *Tel Aviv* 41(2): 131–160.

Geva, H., and Avigad, N. 2000. Area W: Stratigraphy and Architecture. In: Geva, H., ed. *Jewish Quarter Excavations in the Old City of Jerusalem*, vol. 1: *Architecture and Stratigraphy: Areas A, W and X-2, Final Report.* Jerusalem: 131–197.

Geva, S. 1982. Archaeological Evidence for the Trade between Israel and Tyre?. *BASOR* 248(1): 69–72.

Gibbons, A. 2012. The Ultimate Sacrifice. *Science* 336 (6083): 834–837.

Gibson, S. 1987. The 1961–67 Excavations in the Armenian Garden, Jerusalem. *PEQ* 119: 81–96.

Gibson, S., and Barkay, G. 1977. Qiryat Yovel—Manahat. *Hadashot Arkheologiyot* 61–62: 30–31 (Hebrew).

Gibson, S. and Edelstein, G. 1985. Investigating Jerusalem's Rural Landscape. *Levant* 17: 139–155.

Gifford-Gonzalez, D.P. 1989. Ethnographic Analogues for Interpreting Modified Bones: Some Cases from East Africa'. In: Bonnichsen, R., and Sorg, M.H., eds. *Bone Modefication.* University of Maine Center for the Study of the First Americans: Orono: 179–246.

Gitin, S. 1998. Philistia in Transition: The Tenth Century BCE and Beyond. In: Gitin, S., Mazar, A. and Stern, E., eds. *Mediterranean Peoples in Transition: Thirteenth to Early Tenth Centuries BCE.* Jerusalem: 162–183.

Glennie, P. 1998. Consumption, Consumerism and Urban Form: Historical Perspectives. *Urban Studies* 35(5-6): 927–951.

Goodman, M. 1999. The Pilgrimage Economy of Jerusalem in the Second Temple Period. In: Levine, L.I., ed. *Jerusalem: Its Sanctity and Centrality to Judaism, Christianity, and Islam.* New York: 59–67.

Goody, J. 1982. *Cooking, Cuisine, and Class. A Study in Comparative Sociology*. Cambridge University Press, Cambridge.

Goren, M. 1974. The Freshwater Fishes of Israel. *Israel Journal of Ecology and Evolution* 23(2): 67–118.

_____ 1983. Fresh Water Fishes of Israel. *Biology and Taxonomy. Tel Aviv: Kibbutz Hameuchad.* (Hebrew).

Gordon, B.D. 2020. *Land and Temple: Field Sacralization and the Agrarian Priesthood of Second Temple Judaism* (Vol. 87). Walter de Gruyter GmbH & Co KG. Berlin.

Grabbe, L.L. 2000. *Judaic Religion in the Second Temple Period: Belief and Practice from the Exile to Yavneh*. Routledge.

_____ 2010. *An Introduction to Second Temple Judaism: History and Religion of the Jews in the Time of Nehemiah, the Maccabees, Hillel, and Jesus*. Bloomsbury Publishing.

_____ 2011. Synagogue and Sanhedrin in the First Century. *PB Handbook for the Study of the Historical Jesus, vol. 4*. Brill: 1723–1745.

Grant, A. 1982. The Use of Tooth Wear as a Guide to the Age of Domestic Ungulates. In: Wilson, B., Grigson, C., and Payne, S., eds. *Ageing and Sexing Animal Bones from Archaeological Sites.* Oxford: 91–108.

_____ 1991. Economic or Symbolic? Animals and Ritual Behaviour. *Sacred and Profane* 32: 109–114.

Greenberg, R. and Cinamon, G. 2011. Excavations at Rogem Gannim, Jerusalem: Installations of the Iron Age, Persian, Roman and Islamic Periods. '*Atiqot* 66: 79–106.

Greenfield, H.J. 2002. Sexing Fragmentary Ungulate Acetabulae. In: Ruscillo, D., ed. *Recent Advances in Aging and Sexing Animal Bones.* 9th ICAZ Confrence: Durham: 68–86.

Greenfield, H.J. and Beattie, A. 2017. A Practical Macroscopic Approach for Distinguishing Burned and Boiled Bones in Zooarchaeological Assemblages. In: Gilbert, A., Lev-Tov, J. and Wapnish, P., eds., *The Wide Lens in Archaeology: Honoring Brian Hesse's Contributions to Anthropological Archaeology, vol. 2*. Winona Lake, IN: 43.

Greenfield, H.J. and Bouchnick, R. 2010. Kashrut and Shechita – The Relationship between Dietary Practices and Ritual Slaughtering of Animals on Jewish Identity. In: Amundsen-Meyer, L., Engel, N., and Pickering, S., eds. *Identity Crisis: Archaeological Perspectives on Social Identity: Proceedings of the 42nd (2010) Annual Chacmool Archaeology Conference, University of Calgary, Calgary, Alberta.* Calgary.

Greenhut, Z. and De Groot, A. 2009. Tel-Moza in Context. In: Greenhut, Z. and De Groot, A., *Salvage Excavations at Tel Moza: The Bronze and Iron Age Settlements and Later Occupations.* (IAA Reports 39). Jerusalem: 215–233.

Greer, J.S. 2013. *Dinner at Dan: Biblical and Archaeological Evidence for Sacred Feasts at Iron Age II Tel Dan and Their Significance*. Brill.

Grigson, C. 2007. Culture, Ecology and Pigs from the 5th to 3rd Millennium BC around the Fertile Crescent. In: Albarella, U., Dobney, K., Ervynck, A., and Rowley, P., eds. *Pigs and Humans. 10 000 Years of Interaction*. Oxford: Oxford University Press: 83–108.

Guy, S.V., Tütken, T., Zohar, I., Pack, A., Sivan., Lernau, O., Gilnoa, A., and Bar-Oz, G. 2018. Tooth Oxygen Isotopes Reveal Late Bronze Age Origin of Mediterranean Fish Aquaculture and Trade. *Scientific Reports* 8(1): 1–10.

Halivni, D. 2009. *Midrash, Mishnah, and Gemara: the Jewish Predilection for Justified Law*. Cambridge, MA.

Hannestad, L. 2012. The Seleucid Kingdom. In: Potts, D., ed. *A Companion to the Archaeology of the Ancient Near East, vol. 2*. Blackwell Publishing: 985–1000.

Harris, E., and Lewis, D.M. 2016. Introduction: Markets in Classical and Hellenistic Greece. In: Harris, E.M., Lewis, D.M. and Woolmer, M., eds. *The Ancient Greek Economy: Markets, Households and City-States*. Cambridge: 1–40.

Harris, M. 1985. *Good to Eat, Riddles of Food and Culture*. Allen and Unwin, London.

_____1997. The Abominable Pig. In: Counihan, C. and van Esterik, P., eds. *Food and Culture: A Reader*. London: 67–79.

Harris, M., and Ross, E. 1987. *Food and Evolution*. Philadelphia.

Hartman, G., Bar-Oz, G., Bouchnick, R. and Reich, R. 2013. The Pilgrimage Economy of Early Roman Jerusalem (1st century BCE -70 CE) Reconstructed from the ∂^{15}N and ∂^{13}C Values of Goat and Sheep Remains. *JAS* 40(12): 4369–4376.

Hastorf, C.A. 1990. The Effect of the Inka State on Sausa Agricultural Production and Crop Consumption. *American Antiquity* 55(2): 262–290.

_____2016. *The Social Archaeology of Food: Thinking about Eating from Prehistory to the Present*. Cambridge University Press.

Hawkes, K., Hill, K. and O'Connell, J.F. 1982. Why Hunters Gather: Optimal Foraging and the Aché of Eastern Paraguay. *American Ethnologist* 9(2): 379–398.

Hawkes, K., and O'Connell, J. 1992. On Optimal Foraging Models and Subsistence Transitions, *Current Anthropology* 33(1): 63–66.

Hayden, B. 2001. Fabulous Feasts. A Prolegomenon to the Importance of Feasting. In: In: Dietler, M. and Hayden, B., eds. *Feasts: Archaeological and Ethnographic Perspectives on Food, Politics, and Power*. Washington D.C.: 23–64.

_____2014. *The Power of Feasts from Prehistory to the Present Day.* Cambridge

_____ 2016. *Feasting in Southeast Asia.* Honolulu.

Hellwing, S., Sade, M., and Kishon, V. 1993. Faunal Remains. In: Finkelstein, I., ed. *Shiloh: The Archaeology of a Biblical Site*. Monograph Series of the Institute of Archaeology Tel Aviv University 10. Tel Aviv: Institute of Archaeology of Tel Aviv University, Publications Section: 309–325.

Hesse, B. 1990. Pig Lovers and Pig Haters: Patterns of Palestinian Pork Production. *Journal of Ethnobiology* 10: 195–225.

Hesse, B., and Wapnish, P. 1997. Can Pig Remains be used for Ethnic Diagnosis in the Ancient Near East? In: Silberman, N. A., and Small, D. B., eds. T*he Archaeology of Israel: Constructing the Past, Interpreting the Present*. Sheffield: 238–270.

_____1998. Pig Use and Abuse in the Ancient Levant: Ethnoreligious Boundary- Building with Swine. In: Nelson, S. ed. *Ancestors for the Pigs: Pigs in Prehistory*. University of Pennsylvania Museum of Archaeology and Anthropology, Philadelphia: 123–135.

Hole. F. 1994. Environmental Instabilities and Urban Origins. In: Stein. G., and Rothman. M.S., eds. *Chiefdoms and Early States in the Near East: The Organizational Dynamics of Complexity*. Monographs in World Prehistory 18. Madison: 121–152.

Honkanen, P., Olsen, S.O. and Verplanken, B. 2005. Intention to Consume Seafood—the Importance of Habit. *Appetite* 45(2): 161–168.

Horwitz, L.K. 1987. Faunal Remains from the Early Iron Age site on Mount Ebal. *Tel Aviv* 14(2): 173–189.

____1993. Animal Remains from Horvat Zimri. Unpublished.

____1996. Faunal Remains from Areas A, B, D, H, and K. In: Ariel, D. and De Groot, A., eds. *Excavations at the City of David Final Report IV*. (Qedem 35). Jerusalem: 302–337.

Horwitz, L.K., Gardeisen, A., Maeir, A.M., Hitchcock, L.A., Lev-Tov, J., Gilbert, A. and Hesse, P. 2017. A Contribution to the Iron Age Philistine Pig Debate. In: Gilbert, A., Lev-Tov, J. and Wapnish, P. eds., *The Wide Lens in Archaeology: Honoring Brian Hesse's Contributions to Anthropological Archaeology*. ISD LLC: 93–116.

Horwitz, L. K. and Studer, J. 2005. Pig Production and Exploitation during the Classical Periods in the Southern Levant. *Archaeozoology of the Near East* 6: 222–239.

Horwitz, L.K. and Tchernov, E. 1989. Subsistence Patterns in Ancient Jerusalem: A Study of Animal Remains. In: Mazar, E. and Mazar. B., eds. *Excavations in the South of the Temple Mount.* (Qedem 29). Jerusalem: 144–154.

____1996. Bird Remains from Areas A, D, H, and K. In: Ariel, D. and De Groot, A., eds. *Excavations at the City of David Final Report IV*. (Qedem 35). Jerusalem: 298–301.

Houlihan P.F., and Goodman, S.M.1986. *The Birds of Ancient Egypt*. Warminster, UK.

Houston, W. 1993. *Purity and Monotheism: Clean and Unclean Animals in Biblical Law*. Sheffield.

Hu, W., Zhang, H. and Zhang, B. 2015. Identification of Organic Binders in Ancient Chinese Paintings by Immunological Techniques. *Microscopy and Microanalysis* 21(5): 1278–1287.

Hübner, U. 1989. Schweine, Schweineknochen und ein Speiseverbot im alten Israel. *VT* 39: 225–236.

Jacobs, J. 1969. *The Economy of Cities*. Vintage: New York.

Jamieson-Drake, D. W. 1991. *Scribes and Schools in Monarchic Judah: A Socio-Archaeological Approach.* The Social World of Biblical Antiquity Series 9. Sheffield.

Janusek, J.W. and Kolata, A.L. 2004. Top-Down or Bottom-Up: Rural Settlement and Raised Field Agriculture In The Lake Titicaca Basin, Bolivia. *Journal of Anthropological Archaeology* 23(4): 404–430.

Jursa, M., 2010. Aspects of The Economic History Of Babylonia in The First Millennium BC. *Economic Geography, Economic Mentalities, Agriculture, The Use of Money and The Problem of Economic Growth*. Alter Orient und Altes Testament Band 377: Münster

Keel, O. 2012. Paraphernalia of Jerusalem Sanctuaries and Their Relations to Deities Worshiped Therein during the Iron Age IIA–C. In: Kamlah, J., ed. *Temple Building and Temple Cult: Architecture and Cultic Paraphernalia of Temples in the Levant (2.–1. Mill. B.C.E.)* (ADPV 41). Wiesbaden: 317–342.

Kehati, R. 2017. The Animal Bones from the Favissa. In: Ben Tor, A., Zuckerman, S., Bechar, S., Sandhaus, D., eds. *Hazor VII, The 1990-2012 Excavations: The Bronze Age*. Jerusalem: 664–672.

Kenyon, K. M. 1965. Excavations in Jerusalem, 1964. *PEQ* 97: 9 20.

____ 1966. Excavations in Jerusalem, 1965. *PEQ* 98: 73 88.

____ 1974. *Digging Up Jerusalem*. London and Tonbridge.

Kersten, A. M. 1991. Birds from the Palaeolithic Rock Shelter of Ksar'Akil, Lebanon. *Paléorient*: 99–116.

Kipp, R. S. and Schortman, E. M. 1989. The Political Impact of Trade in Chiefdoms. *American Anthropologist* 91: 370–385.

Kisilevitz, S. 2013. Ritual Finds from the Iron Age at Tel Motza. *New Studies in the Archaeology of Jerusalem and its Region* 7: 38–46. (Hebrew).

____ 2015. The Iron IIA Judahite Temple at Tel Moza. *Tel Aviv* 42(2): 147–164.

Kislev, M. 2000. Taxonomic Identification of the Ten Kosher Ruminants. *Sinai* 125: 216–225 (Hebrew).

Kitchen, K.A., 1999. *Poetry of Ancient Egypt*. Åström.

Kline, R.G. and Cruz-Uribe, K. 1983. The Computation of Ungulate Age (Mortality) Profiles from Dental Crown Heights. *Paleobiology* 9 (1): 70–78.

Kloner, A. 1984 Re˙ov Hagay. *Excavations and Surveys in Israel* 3: 57–59.

____ 2003. *Survey of Jerusalem: The Northwestern Sector, Introduction and Indices*. Archaeological Survey of Israel, Jerusalem.

Knauf, E.A. 1991. King Solomon's Copper Supply. In: Lipiriski, E. ed. *Phoenicia and the Bible*. Orientalia Lovaniensia Analecta 44. Leuven: 167–186

____2000. Jerusalem in the Late Bronze and Early Iron Ages: A Proposal. *Tel Aviv* 27(1): 75–90.

____2005. The Glorious Days of Manasseh. In: Grabbe, L., ed. *Good Kings and Bad Kings: the Kingdom of Judah in the Seventh Century BCE. (The Seventh Meeting Of The European Seminar on Methodology in Israel's History met in Berlin, 21 July 2002)*. T & T Clark: 170–171.

____2009. Observation on Judah's Social an Economic History and the Dating of the Laws in Deuteronomy. *Journal of Hebrew Scriptures* 9*:* 1–8.

____ 2017. Was there a Refugee Crisis in the 8th/7th Centuries BCE? In: Lipschits, O., Gadot, Y., and Adams, M.J., eds. *Rethinking Israel Studies in the History and Archaeology of Ancient Israel in Honor of Israel Finkelstein.* Winona Lake, IN: 159–172.

Koch, I. 2012. The Political Organization of the Shephelah in the Iron Age I–IIa (1150–800 BCE). *Cathedra* 143: 45–64 (Hebrew).

____ 2014. Goose Keeping, Elite Emulation and Egyptianized Feasting at Late Bronze Lachish, *Tel Aviv* 41(2): 161–179.

Koch, I. and Lipschits, O. 2013. The Rosette Stamped Jar Handle System and The Kingdom of Judah at the End of The First Temple Period. *ZDPV*: 55–78.

König, H. E., Leibich, H. G., and Červeny, C. 2013. Nervous system (systema nervosum). In: König, H. E. and Leibich, H. G., eds. *Veterinary Anatomy of Domestic Mammals. Textbook and Colour Atlas*. Stuttgart: Schattauer Verlag: 465–536.

Kozuh, M., 2010. Lamb, Mutton, and Goat in the Babylonian Temple Economy. *Journal of the Economic and Social History of the Orient* 53(4): 531–578.

____2014. *The Sacrificial Economy: Assessors, Contractors, and Thieves in the Management of Sacrificial Sheep at the Eanna Temple of Uruk (ca. 625–520 BC)*. Winona Lake, IN.

Lach, Y. D. 2011. *Chullin Illuminated. A Color Guide to Animal Anatomy for Mesechta Chullin of the Talmud*. Jerusalem.

Lalhou, S. 1998. *Penser, manger: les représentations sociales de l'alimentation.* Paris (French).

Lambert, W.G. 1970. The Sultantepe Tablets: IX. The Birdcall Text. *Anatolian Studies* 20: 111–117.

Langgut, D. 2017. Palynological Analysis of the Glacis of the Seleucid Acra in Jerusalem: Duration of Construction and Environmental Reconstruction. In: Lipschits, O., Gadot, Y., and Adams, M.J., eds. *Rethinking Israel Studies in the History and Archaeology of Ancient Israel in Honor of Israel Finkelstein.* Winona Lake, IN: 207–220.

Langgut, D. and Lipschits, O. 2017. Dry Climate during the Early Persian Period and its Impact on the Establishment of Idumea. *Transeuphratène* 49:135–162.

Lapin, H. 2017. Temple, Cult, and Consumption in Second Temple Jerusalem. In: Tal, O. and Weiss, Z., eds. *Expressions of Cult in the Southern Levant in the Greco Roman Period* (Contextualizing the Sacred 6). Brepols: Turnhout.

Lemche, N. P. 1994. Is it Still Possible to Write a History of Israel? *Scandinavian Journal of the Old Testament* 8: 165–190.

Lemche, N. P., and Thompson, T. L.1994. Did Biran Kill David? The Bible in the Light of Archaeology. *JSOT* 64: 3–22.

Lernau, H. 1995. The Faunal Remains of Cave I. In: Eshel, I. and Prag, K., eds. *Excavations in Jerusalem 1961-1967: The Iron Age Cave Deposits on the South-East Hill and Isolated Burials and Cemeteries Elsewhere*. Oxford: 201–208.

Lernau, O. 2005. גדי מעין דגים עצמות/Fish Remains from'En Gedi. *'Atiqot/עתיקות*: 49-56.

____2015. Fish Bones. In: Mazar, E., ed. *The Summit of the City of David Excavations 2005-2008.* Jerusalem: 525–538.

Lernau, H., and Lernau, O. 1989. Fish Bone Remains. In: Mazar, E. and Mazar. B., eds. *Excavations in the South of the Temple Mount.* (Qedem 29). Jerusalem: 155–161.

____ 1992. Fish Remains. In: De Groot, A. and Ariel, D.T., eds. *Excavation at the City of David 1978-1985, Vol. III.* (Qedem 33). Jerusalem: 131–148.

Leuchter, M. 2010. The Politics of Ritual Rhetoric: A Proposed Sociopolitical Context for the Redaction of Leviticus 1-16. *Vetus Testamentum* 60(3): 345–365.

Levine, B., de Tarragon, J.-M., and Robertson, A. 1997. Ugaritic Rites for the Vintage. In: Hallo, W.W., ed. *The Contexts of Scripture, Vol. 1: Canonical Compositions from the Biblical World*. Brill, Leiden: 299–301.

Levine, L. I. 2002. *Jerusalem: Portrait of the City in the Second Temple Period (538 BCE–70 CE)*. Philadelphia, PA.

Lev-Tov, J. 2003. 'Upon What Meat Doth this our Caesar Feed...?' A Dietary Perspective on Hellenistic and Roman Influence in Palestine. In: Alkier, S. and Zangenberg, J., eds. *Zeichen aus Text und Stein. Studien auf dem Weg zu einer Archaeologie des Neuen Testaments*. Francke-Verlag, Tübingen: 420–446.

Lev-Tov, J. and McGeough, K. 2007. Examining Feasting in Late Bronze Age Syro-Palestine through Ancient Texts and Bones. In: Twiss, K.C. ed., *The Archaeology of Food and Identity. Southern Illinois University, Center for Archaeological Investigations, Occasional Paper* 34: 85–111.

Lipschits, O.1997. The "Yehud" Province under Babylonian Rule (586-39 B.G.E.): Historic Reality and Historiographic Conceptions. Tel-Aviv University: Ph.D. dissertation. (Hebrew).

____ 1998. Nebuchandrezzar's Policy in Hattu-Land and the Fate of the Kingdom of Judah. *UF* 30: 467–488.

____ 2003. Demographic Changes in Judah between the Seventh and the Fifth Centuries B.C.E. In: Lipschits, O. and Blenkinsopp, J. eds. *Judah and the Judeans in the New-Babylonian Period.* Winona Lake, IN: 323–376.

____ 2005. *The Fall and Rise of Jerusalem: Judah Under Babylonian Rule*. Winona Lake, IN.

____ 2006. Achaemenid Imperial Policy, Settlement Processes in Palestine, and the Status of Jerusalem in the Middle of the Fifth Century B.C.E. In: Lipschits, O. and Oeming, M. eds. *Judah and the Judeans in the Persian Period.* Winona Lake, IN: 19–52.

____ 2011a. Jerusalem between Two Periods of Greatness: The Size and Status of Jerusalem in the Babylonian, Persian, and Early Hellenistic Periods. in: Lipschits, O. and Grabbe, L.L. *Judah between East and West: The Transition from Persian to Greek Rule (ca. 400-200 BCE).* The Library of Second Temple Studies, T&T Clark International: 163–175.
Or:
____ 2011. Shedding New Light on the Dark Years of the "Exilic Period": New Studies, Further Elucidation, and Some Questions Regarding the Archaeology of Judah as an "Empty Land. In: Kelle, B., Ames, F.R., and Wright, J.L. eds. *Interpreting Exile: Interdisciplinary Studies of Displacement and Deportation in Biblical and Modern Contexts*. SBL's Ancient Israel and Its Literature series. Atlanta: 57–90.

____ 2011b. Persian Period Judah: A New Perspective. In: Jonker, L., ed. *Texts, Contexts and Readings in Postexilic Literature: Explorations into Historiography and Identity Negotiation in Hebrew Bible and Related Texts*, FAT 2/53. Tübingen:187–212.

____ 2018. The Changing Faces of Kingship in Judah under Assyrian Rule. In: Gianto, A. and Dubovský, P., eds. *Changing Faces of Kingship in Syria-Palestine 1500–500 BCE.* Ugarit-Verlag: 115–138.

____ 2019. The Long 7th Century. In: Čapek, F., and Lipschits, O. *The History of Judah*. Prague: 7–42.

Lipschits, O. and Gadot, Y. 2008. Ramat Rahel and the Emeq Rephaim Sites: Links and Interpretations. *New Studies in the Archaeology of Jerusalem and its Region: Collected Papers* 2: 88–96 (Hebrew).

Lipschits, O., Gadot, Y. and Langgut, D. 2012. Ramat Raḥel during the Babylonian and Persian Periods: The Archaeology of a Royal Edifice. *Transeuphratene* 41: 57–79.

Lipschits, O., Oeming, M., Gadot, Y. and Arubas, B. 2011. Palace and Village, Paradise, and Oblivion: Unraveling the Riddles of Ramat Raḥel. *NEA* 74: 2–49.

Lipschits, O., and Tal, O. 2007. The Settlement Archaeology of the Province of Judah: A Case Study. In: Lipschitz, O., Knoppers, G.N. and Albertz, R., eds. *Judah and the Judeans in the Fourth Century BCE*. Winona Lake, IN: 33–52.

Lisowski, M. 2019. The Identification of Jewish Patterns of Food Preparation and Consumption: A Zooarchaeological Approach to the Medieval and Early Modern Evidence from Central-Eastern Europe. University of Sheffield: Ph.D. Dissertation.

Lundbom, J.R. 2013. *Deuteronomy: A Commentary*. Grand Rapids: Eerdmans.

Lyman, R. L. 1994. *Vertebrate Taphonomy*. Cambridge.

____2008. *Quantitative Paleozoology*. Cambridge.

Macalister, R. A. S. and Duncan, J. G. 1926. *Excavations on the Hill of Ophel, Jerusalem 1923 1925* (Palestine Exploration Fund Annual 4). London.

Maeir, A.M., and Shai, I. 2016. Reassessing the Character of the Judahite Kingdom: Archaeological Evidence for Non-Centralized, Kinship-Based Components. In: Ganor, S., ed. *From Sha'ar Hagolan to Shaaraim: Essays in Honor of Prof. Yosef Garfinkel*. Jerusalem: 323–340.

Magen, I., and Dadon, M.1995. Nebi Samuel Excavations. In: *Twenty First Archaeological Conference in Israel. Abstract of Lectures.* Jerusalem: 16–17.

Magen, Y., and Har-Even, B. 2007. Persian Period Stamp Impressions from Nebi Samwil. *Tel Aviv* 34(1): 38–58.

Magness, J. 2012. *The Archaeology of the Holy Land: from the Destruction of Solomon's Temple to the Muslim Conquest*. Cambridge.

Makarewicz, C.A. 2016. Toward an Integrated Isotope Zooarchaeology. In: Grupe, G., and McGlynn, G., eds. *Isotopic Landscapes in Bioarchaeology.* Berlin: 189–209.

Marcus, J. 1983. On the Nature of the Mesoamerican City. In: Vogt, E.Z, and Leventhal, R.M., eds. *Prehistoric Settlement Patterns: Essays in Honor of Gordon R. Willey.* Alburquerque: University of New Mexico Press: 195–242.

Marean, C.W., and Frey, C.J. 1997. Animal Bones from Caves to Cities: Reverse Utility Curves as Methodological Artifacts. *American Antiquity* 62(4): 698–711.

Marean, C.W. and Spencer, L.M. 1991. Impact on Carnivore Ravaging on Zooarchaeological Measures of Elements Abundance. *American Antiquity* 56: 545–658.

Marom, N. and Agha, N. Unpublished Report. Faunal Remains from the City of David- Area C, H.

Marom, N., and Bar-Oz, G. 2009. Culling Profiles: The Indeterminacy of Archaeozoological Data to Survivorship Curve Modeling of Sheep and Goat Herd Maintenance Strategies. *JAS* 36(5): 1184–1187.

Marom, N., Lev Tov, J., Kehati, R. 2017. Zooarchaeological Reports. In: Ben Tor, A., Zuckerman, S., Bechar, S., Sandhaus, D., eds. *Hazor VII, The 1990-2012 Excavations: The Bronze Age*. Jerusalem: 661–669.

Marom, N., Rosen, B., Tepper, Y., and Bar-Oz, G. 2018. Pigeons at the Edge of the Empire:

Bioarchaeological Evidences for Extensive Management of Pigeons in a Byzantine Desert Town in the Southern Levant. *PLoS One* 13: e0193206.

Marom, N., and Zuckerman, S. 2012. The Zooarchaeology of Exclusion and Expropriation: Looking Up from the Lower City in Late Bronze Age Hazor. *Journal of Anthropological Archaeology* 31(4): 573–585.

Marx, K. 1939 [1867], *Capital, vol. 1*, International Publishers, New York.

Mazar, A. 2006. Jerusalem in the 10th Century B.C.E. The Glass Half Full. In: Amit, Y., Ben Zvi, E., Finkelstein, I. and Lipschits, O., eds. *Essays on Ancient Israel in Its Near Eastern Context: A Tribute to Nadav Na'aman*. Winona Lake, IN: 255–272.

Mazar, A., and Ramsey, C.B. 2008. 14C Dates and the Iron Age Chronology of Israel: A Response. *Radiocarbon* 50(2): 159–180.

Mazar, E. and Mazar, B. 1989. *Excavations in the South of the Temple Mount: The Ophel of Biblical Jerusalem* (Qedem 29). Jerusalem.

Mazar, E. 2007. Preliminary Report on the City of David Excavations 2005 at the Visitors Center Area. Jerusalem.

____2008. The Steppe Stone Structure in the City of David in Light of the New Excavations in Area G. *New Studies on Jerusalem* 14: 25–40.

____2009. The Palace of King David, Excavations at the Summit of the City of David. Preliminary Report of Seasons 2005 – 2007. Jerusalem.

____ 2015a. *The Ophel Excavations to the South of the Temple Mount 2009–2013.* Jerusalem.

____ 2015b. *The Summit of the City of David Excavations 2005–2008.* Jerusalem.

McBride, W. S., and McBride, K. A. 1987. Socioeconomic Variation in a Late Antebellum Southern Town: The View from Archaeological and Documentary Sources. In: Spencer-Wood, S.M., ed. *Consumer Choice in Historical Archaeology*. New York: 143–161.

McCorriston, J. 1997. The Fiber Revolution: Textile Extensification, Alienation, and Social Stratification in Ancient Mesopotamia. *Current Anthropology* 38(4): 517–549.

McInerney, J. 2010. The Cattle of the Sun: Cows and Culture in the World of the Ancient Greeks. Princeton University Press.

McKee, L. W. 1999. Food Supply and Plantation Social Order: An Archaeological Perspective. In: Singleton, T., ed., *I, Too, Am American: Studies in African American Archaeology*. Charlottesville: 218–239.

Meiri, M., Huchon, D., Bar-Oz, G., Boaretto, E., Horwitz, L.K., Maeir, A.M., Sapir-Hen, L., Larson, G., Weiner, S., and Finkelstein, I. 2013. Ancient DNA and Population Turnover in Southern Levantine Pigs-Signature of the Sea Peoples Migration? *Scientific Reports* 3: 3035–3043.

Meyers, C. 2010. Household Religion. In: Stavrakopoulou, F. and Barton, J., eds. *Religious Diversity in Ancient Israel and Judah*. New York: 118–134.

Milgrom, J. 1991. Leviticus 1–16. *Anchor Bible*. New York.

____ 1993. The rationale for biblical impurity. *Journal of the Ancient Near Eastern Society* 22(1): 107–111.

Monchot, H. 1999. Mixture Analysis and Mammalian Sex Ratio among Pleistocene Mouflon of Arago Cave, France. *Quaternary* Research 52: 259-268.

Naʾaman, N. 1987. Negev in the Last Century of the Kingdom of Judah. *Cathedra* 42: 4–15 (Hebrew).

____1991. The Kingdom of Judah under Josiah. *Tel Aviv* 18: 3–71.

____1992. Canaanite Jerusalem and Its Central Hill Country Neighbours in the Second Millennium B.C.E. *UF* 24: 275 – 291.

____1994. Hezekiah and the Kings of Assyria. *Tel Aviv* 21(2): 235–254.

____1996. The Contribution of The Amarna Letters to the Debate on Jerusalem's Political Position in the Tenth Century BCE. *BASOR* 304(1): 17–27.

____2007a. The Northern Kingdom in the Late Tenth – Ninth Centuries BCE. In: Williamson, H.G.M., ed. *Understanding the History of Ancient Israel (Proceedings of the British Academy 143).* Oxford: 399 – 418.

____2007b. When and How Did Jerusalem Become a Great City? The Rise of Jerusalem as Judah's Premier City in the Eighth-Seventh Centuries BCE. *BASOR* 347(1): 21–56.

____ 2008. Sojourners and Levites in the Kingdom of Judah in the Seventh Century BCE. *Zeitschrift für Altorientalische und Biblische Rechtsgeschichte* 14: 237–279.

____2009a. Saul, Benjamin, and the Emergence of Biblical Israel. *Zeitschrift für die Alttestamentliche Wissenschaft* 121: 211–224; 335–349.

____ 2009b. The Growth and Development of Judah and Jerusalem in the Eighth Century BCE: A Rejoinder. *RB* 116: 321–335.

____ 2011. Does Archaeology Really Deserve the Status of a 'High Court' in Biblical Historical Research? In: Becking, B.E.J.H., and Grabbe, L.L., eds. *Between Evidence and Ideology* (Oudtestamentische Studiën 59). Leiden: 165–183.

____ 2012. Biblical and Historical Jerusalem in the Tenth and Fifth – Fourth Centuries BCE. *Biblica* 93: 21– 42.

____2013. The Kingdom of Judah in the 9th Century BCE: Text Analysis versus Archaeological Research. *Tel Aviv* 40(2): 247–276.

____2014. Dismissing the Myth of a Flood of Israelite Refugees in the Late Eighth Century BCE. *Zeitschrift für die Alttestamentliche Wissenschaft* 126: 1–14.

Nadelman, Y. 1993. Jerusalem, Pisgat Ze'ev D (H. Zimri). *Excavations and Surveys in Israel* 12: 54–56.

Nihan, C. 2011. The Laws about Clean and Unclean Animals in Leviticus and Deuteronomy and Their Place in the Formation of the Pentateuch. In: Dozeman, T., Schmid, K., Schwartz, B., eds., *The Pentateuch. International Perspectives on Current Research* (FAT 78) Tübingen: 401–432.

O'Conner, T. 2000. *The Archaeology of Animal Bones.* College Station.

O'Connor, S. Solazzo, C., and Collins, M. 2015. Advances in Identifying Archaeological Traces of Horn and Other Keratinous Hard Tissues. *Studies in Conservation* 60(6): 393–417.

Parkins, H. 2005. The 'Consumer City' Domesticated? The Roman City in élite Economic Strategies. In: Parkins, H., ed. *Roman Urbanism: Beyond the Consumer City*. New York: Routledge: 81–108.

Pauketat, T.R. 2000. The tragedy of the commoners. In: Dobres, M.-A., Robb, J. (Eds.), Agency in Archaeology. Routledge, London, pp. 123–139.

Payne, S. 1973. Kill-off Patterns in Sheep and Goats: The Mandibles from Asvan Kale. *Anatolian Studies* 23: 281–304.

Perry-Gal, L., Erlich, A., Gilboa, A. and Bar-Oz, G. 2015. Earliest Economic Exploitation of Chicken Outside East Asia: Evidence from the Hellenistic Southern Levant. *PNAS* 112(32): 9849–9854.

Perkins, D., and Daly, P.1968. A Hunters' Village in Neolithic Turkey. *Scientific American* 219(5): 97–106.

Polanyi, K. 1944. *The Great Transformation: The Political and Economic Origins of Our Time*. Boston.

____ 1957. The Economy as Instituted Process. In: Polanyi, K., Arensberg C., and Pearson. H., eds. *Trade and Market in the Early Empires*. Glencoe: 243–269.

Polanyi, K., Arensberg C., and Pearson. H. 1957. *Trade and Market in the Early Empires*. Glencoe.

Politis, G.G., and Saunders, N. J. 2002. Archaeological Correlates of Ideological Activity: Food Taboos and Spirit-Animals in an Amazonian Rainforest Hunter-Gatherer Society. In: Miracle, P. and Milner, N., eds. *Consuming Passions and Patterns of Consumption.* McDonald Institute Monographs. Cambridge: McDonald Institute for Archaeological Research: 113–130

Powers, W.K., and Powers, Marla M.N. 1984. Metaphysical Aspects of an Oglala Food System. In: Douglas, M., ed. *Food in the Social Order: Studies of Food and Festivities in Three American Communities*. New York: 40–96.

Prag, K. 1995. Summary of the Reports on Caves I, II, and III and Deposit IV. In: Eshel, I., and Prag, K., eds. *Excavations in Jerusalem 1961-1967: The Iron Age Cave Deposits on the South-East Hill and Isolated Burials and Cemeteries Elsewhere*. Oxford: 209–220.

Prummel, W. 1978. Animal Bones from Tannery Pits of Hertogenbosch. *Berichten van de Rijksdienst voor het Oudheidkundig Bondemonderzoek* 28: 399–422.

Raban-Gerstel, N., Agha, N., Sapir-Hen, L., and Bar-Oz, G. 2015. The Dog Burials: Zooarchaeological, Taphonomic and Pathological Analysis. In: Mazar, E., ed. *Summit of the City of David*. Jerusalem: 487–496.

Radcliffe-Brown A.R. 1922. *The Andaman Islanders, A Study in Social Anthropology*. Cambridge.

Ramsay, J., Tepper, Y., Weinstein-Evron, M., Bratenkov, S., Liphschitz, N., Marom, N., and Bar-Oz, G. 2016. For the Birds—An Environmental Archaeological Analysis of Byzantine Pigeon Towers at Shivta (Negev Desert, Israel). *JAS Reports* 9: 718–727.

Raphael, K. 2015. Jerusalem, The Jewish Quarter. *Hadashot Arkheologiyot Excavations and Surveys in Israel* 127. http://www.hadashot-esi.org.il/Report_Detail_Eng.aspx?id=23802&mag_id=122

Rapuano, Y., and Onn, A. 2004. An Iron Age Structure from Shu'afat Ridge, Northern Jerusalem. *'Atiqot* 47: 119–129.

Redding, R.W. 1981. Decision Making in the Subsistence Herding of Sheep and Goats in the

Middle East. University of Michigan: Ph.D. Dissertation.

Redfield, R. 1953. *The Primitive World and Its Transformations.* Ithaca.

Redford, D.B. 1992. *Egypt, Canaan, and Israel in Ancient Times*. Princeton.

Regev, E. 2017. The Hellenization of the Hasmoneans Revisited: The Archaeological Evidence. *Advances in Anthropology* 7(4): 175–196.

Reich, R. and Shukron, E. 2000a. City-Walls and Water Channels from the Middle Bronze II and Late Iron Age in the City of David New Evidence from the 2000 Season. *New Studies on Jerusalem* 6: 5-8 (Hebrew).

____2000b. Jerusalem, City of David. *Hadashot Arkheologiyot: Excavations and Surveys in Israel* 112: 82–83 (Hebrew).

____2004. The History of the Gihon Spring in Jerusalem. *Levant* 36: 211–223.

____2007. Some New Insights and Notes on the Cutting of the Siloam Tunnel. In: Meiron, E., ed. In: Meiron, E., ed. *City of David Studies of Ancient Jerusalem (The 8th Annual Conference)*. Jerusalem: 133–161 (Hebrew).

____2008a. The History of the Archaeological Excavations in the City of David (1867–2007). In: Meiron, E., ed. *City of David Studies of Ancient Jerusalem (The 9th Annual Conference).* Jerusalem: 13–42 (Hebrew).

____ 2008b. The Date of City-Wall 501 in Jerusalem. *Tel Aviv* 35: 114-122.

____ 2009. The Recent Discovery of a Middle Bronze II Fortification in the City of David, Jerusalem. In: Meiron, E., ed. *City of David Studies of Ancient Jerusalem (The 10th Annual Conference).* Jerusalem: 13–34 (Hebrew).

____ 2010. A New Segment of the Middle Bronze Fortification in the City of David. *Tel Aviv* 37: 141–153.

Reich, R., Lernau, O. and Shukron, E. 2007. Recent Discoveries in the City of David, Jerusalem. *IEJ* 57: 153–169.

Reid, A.1996. Cattle Herds and the Redistribution of Cattle Resources. *World Archaeology* 28(1): 43–57.

Reitz, E. and Wing, E., 2008. *Zooarchaeology* (Second Edition). Cambridge.

Rosen, S.A. 1997. Craft Specialization and the Rise of Secondary Urbanism: A View from the Southern Levant. In: Aufrecht, W.E., Mirau, N.A. and Gauley, S.W., eds. *Urbanism in*

Antiquity: from Mesopotamia to Crete (*Journal for the Study of the Old Testament Supplement Series* 244. Sheffield: 82–91.

Rostovtzeff, M. 1967. A Large Estate in Egypt in the Third Century B.C. *Studia Historica* 52.

Rowley-Conwy, P. 2018. Zooarchaeology and the Elusive Feast: from Performance to Aftermath. *World Archaeology* 50(2): 221–241.

Rubin, R. 2000. Jerusalem and Its Environs: The Impact of Geographical and Physical Conditions on the Development of Jerusalem. In: Ahituv, S. and Mazar, A., eds. *The History of Jerusalem—The Biblical Period*. Jerusalem: 1–12 (Hebrew).

Russell, N. 2011. *Social Zooarchaeology: Humans and Animals in Prehistory*. Cambridge.

Saayman, A, Saayman, M., and Gyekye, A. 2014. Perspectives on the Regional Economic Value of a Pilgrimage. *International Journal of Tourism Research* 16: 407–414.

Sade, M. 2009 . The Archaeozoological Remains. In: Greenhut, Z. and De Groot, A., eds. *Salvage Excavations at Tel Moza: The Bronze and Iron Age Settlements and Later Occupations*. Jerusalem: 197–208.

Sandhaus, D. 2013. The Hellenistic Pottery. In: Ben-Ami, D. eds. *Jerusalem, Excavations in the Tyropoeon Valley (Giv`ati Parking Lot), Vol. I*. (IAA Reports 52). Jerusalem: 83–108.

____ 2020. Continuity, Innovation and Transformation in Cooking Habits. The Central and Southern Shephelah between the Late Fourth and the First Centuries BCE. In: Altmann, P., Angelini, A., and Spiciarich, A., eds. *Food Taboos and Biblical Prohibitions*. Tübingen: 107–120.

Sapir-Hen, L. In Press. Animal Remains from the Iron Age Building Complex: Economy and Organization. In: Weksler-Bdolah, S. and On, A. eds. *The Western Wall Plaza Excavations IV: The Iron Age.* (IAA Reports). Jerusalem.

____ 2019a. Late Bronze and Iron Age Livestock of the Southern Levant: Their Economic and Symbolic Roles. *Tel Aviv* 46(2): 227–236.

____ 2019b. Pigs in Iron Age Jerusalem. Paper Presented at the Annual Meeting of ASOR: San Diego, CA.

Sapir-Hen, L., Bar-Oz, G., Gadot, Y., and Finkelstein, I. 2013. Pig Husbandry in Iron Age Israel and Judah: New Insights Regarding the Origin of the "Taboo". *ZDPV* 129: 1–20.

Sapir-Hen, L., Bar-Oz, G., Sharon, I., Gilboa, A. and Dayan, T. 2014. Food, Economy, and Culture at Tel Dor, Israel: A Diachronic Study of Faunal Remains From 15 Centuries of Occupation. *BASOR* 371(1): 83–101.

Sapir-Hen, L., Gadot, Y., and Finkelstein, I. 2014. Environmental and Historical Impacts on Long Term Animal Economy: The Southern Levant in the Late Bronze and Iron Ages. *Journal of the Economic and Social History of the Orient* 57(5): 703–744.

____ 2016. Animal Economy in a Temple City and Its Countryside: Iron Age Jerusalem as a Case Study. *BASOR* 375: 103–118.

Sapir-Hen, L., Uziel, J., Chalaf, O. In Press. Everything but the Oink: On the Discovery of an Articulated Pig in Iron Age Jerusalem and it's Meaning to Judahite Consumption Practices. *NEA*

Sasson, A. 2005. Economic Strategies and the Role of Cattle in The Southern Levant in the Bronze and Iron Age. *Archaeozoology of the Near East VI: Proceedings of the Sixth International Symposium on the Archaeozoology of Southwestern Asia and Adjacent Areas*: 208–221.

Sered, S. 2002. Towards a Gendered Typology of Sacrifice: Women and Feasting, Men and Death in an Okinawan Village. In: Baumgarten, A.I., ed. *Sacrifice in Religious Experience* Vol. 93. Leiden: 13–38.

Sergi, O. 2013. Judah's Expansion in Historical Context. *Tel Aviv* 40(2): 226–246.

____ 2015. On the Origins of Judah, between Jerusalem and Benjamin. *New Studies in the Archaeology of Jerusalem and Its Region* 9: 50–73.

____ 2017. The Emergence of Judah as a Political Entity between Jerusalem and Benjamin. *ZDPV* 133: 1-23.

Serjeantson, D. 1989. Animal Remains and the Tanning Trade. In: Serjeantson, D., and Waldron, T., eds. *Diet and Crafts in Towns*. (BAR British Series 199). Oxford: 129–146.

____ 2013. *Birds.* Cambridge.

Serra Mallol, C. 2010. Manger du chien à Tahiti: une affirmation identitaire? *Anthropozoologica* 45: 157–172 (French).

Shalev, Y., Shalom, N. Bocher, E. and Gadot, Y. "New Evidence on the Location and Nature of Iron Age, Persian and Early Hellenistic Period Jerusalem. *Tel-Aviv* 47: 149-172.

Shalom, N., Shalev, Y., Uziel, J., Chalaf, O., Lipschits, O., Boaretto, E. and Gadot, Y. 2019. How to Destroy a City? New Archaeological Evidence of the Babylonian Campaign to

Jerusalem. In: Peleg-Barkat, O., Zelinger, Y., Gadot, Y. and Uziel, J., eds. *New Studies in the Archaeology of Jerusalem and Its Region* 13. Jerusalem (Hebrew).

Shanks, H. 1999. Everything You Ever Knew about Jerusalem Is Wrong (Well, Almost). *BAR* 25/6: 20–29.

Shiloh, Y. 1984. *Excavations at the City of David I: 1978 1982, Interim Report of the First Five Seasons.* (Qedem 19). Jerusalem.

Shipman, P., Foster, G., and Schoeninger, M.J. 1984. Burnt Bones and Teeth: An Experimental Study of Colour, Morphology, Crystal Structure and Shrinkage. *JAS* 3: 307–325.

Silver, I.A. 1969. The Ageing of Domestic Animals. In: Brothwell, D. and Higgs, E., eds. *Science in Archaeology.* New York: 283–302.

Simo, P. 2003. Assyria's Expansion in the Eighth and Seventh Centuries and Its Long-Term Repercussions in the West. In: Dever, W., and Gitin, S., eds. *Symbiosis, Symbolism, and the Power of the Past: Canaan, Ancient Israel, and Their Neighbors from the Late Bronze Age through Roman Palaestina*. Winona Lake, IN: Winona Lake, IN: 99–111.

Simoons, F. 1994. *Eat Not This Flesh: Food Avoidances from Prehistory to the Present.* Madison: University of Wisconsin Press.

Small, D. 2006. Factoring the Countryside into Urban Populations. In: Storey, R., Liu, L., Blom, D.E., Boldsen, J.L., Nelson, S.M., Cascio, E.L., Bagnall, R.S., Gorenflo, L.J., Junker, L.L., Kusimba, C. and Williams, B.A., eds. *Urbanism in the Preindustrial World: Cross-Cultural Approaches*. Tuscaloosa: University of Alabama Press: 317–329.

Smith, M.E. 2007. Form and Meaning in the Earliest Cities: A New Approach to Ancient Urban Planning. *Journal of Planning History* 6(1): 3–47.

Smith, M. L. 2015. Feasts and Their Failures. *Journal of Archaeological Method and Theory 22*: 1215–1237.

Smith, R. H. 1990. The Southern Levant in the Hellenistic Period. *Levant* 22(1): 123–130.

Smith, S. T. 2003. Pharaohs, Feasts, and Foreigners: Cooking, Foodways, and Agency on Ancient Egypt's Southern Frontier. In: Bray, T., ed., *The Archaeology and Politics of Food and Feasting in Early States and Empires*. New York: 39–64.

Smith, W.R.1889. *Lectures on the Religion of the Semites: First series. The Fundamental Institutions*. New York.

Soulier, M.C., and Costamagno, S. 2017. Let the Cutmarks Speak! Experimental Butchery to Reconstruct Carcass Processing. *JAS* 11: 782–802.

Spiciarich, A. 2020. Birds in Transition: Bird Exploitation in the Southern Levant During the Late Bronze Age, Iron Age I, and Iron Age II. *BASOR* 383(1): 61–78.

Spiciarich, A., Gadot, Y., Sapir-Hen, L. 2017. The Faunal Evidence from Early Roman Jerusalem: The People behind the Garbage. *Tel Aviv* 44 (1): 98–117.

Staubli, T. 2008. Hiihneropfer im Alten Israel: Zu Verstandnis von Lev 1,14 im Kontext der antiken Kulturgeschichte. In: Römer, T., ed. *The Book of Leviticus and Numbers.* Leuven: Peeters: 355–369.

Stephens, D. W., and Krebs, J.R. 1986. *Foraging Theory*. Princeton.

Steiner, M.L. 1994. Re-dating the Terraces of Jerusalem. *IEJ*: 13–20.

____2001. *Excavations by Kathleen M. Kenyon in Jerusalem, 1961–1967, Volume III: The Settlement in the Bronze and Iron Ages.* (Copenhagen International Series 9). Sheffield.

____2011. The Persian Period City Wall of Jerusalem. In: Finkelstein, I., and Na'aman, N., eds. *The Fire Signals of Lachish: Studies in the Archaeology and History of Israel in the Late Bronze Age, Iron Age, and Persian Period in Honor of David Ussishkin*. Winona Lake, IN: 307–317.

Stern, E. 2001. *Archaeology of the Land of the Bible, Volume II: The Assyrian, Babylonian, and Persian Periods (732–332 BCE)*. The Anchor Yale Bible Reference Library.

Stiner, M. C., Kuhn, S. L., Weiner, S. and Bar-Yosef, O. 1995. Differential Burning, Recrystallization, and Fragmentation of Archaeological Bone. *JAS* 22 (2): 223–237.

Stavrakopoulou, F., and Barton, J. 2010. *Religious Diversity in Ancient Israel and Judah*. New York.

Stokes, P. 2000. A Cut above the Rest? Officers and Men at South Shields Roman Fort." In: Rowley-Conwy, P., ed. *Animal Bones, Human Societies*. Oxford: 145–151.

Storchan, B. 2017. Jerusalem, Ramat Shelomo, *Hadashot Arkheologiyot* 129 (Hebrew): https://tinyurl.com/SBL2643h

Sweet, R.F.G. 1997. Writing as a Factor in the Rise of Urbanism. In: Aufrecht, W.E., Mirau, N.A. and Gauley, S.W., eds. *Urbanism in Antiquity: from Mesopotamia to Crete* (*JSOT Supplement Series* 244). Sheffield: 35–49.

Symmons, R. 2005. New Density Data for Unfused and Fused Sheep Bones, and a Preliminary Discussion on the Modelling of Taphonomic Bias in Archaeofaunal Age Profiles. *JAS* 32 (11): 1691–1698.

Tal, O. 2006 *The Archaeology of Hellenistic Palestine: Between Tradition and Renewal*. Jerusalem: Bialik Institute (Hebrew).

Tamar, K. and Bar-Oz, G. 2015. Zooarchaeological Analysis of the Faunal Remains. In: Mazar, E., ed. 2015. *The Summit of the City of David Excavations 2005-2008.* Jerusalem: 497–510.

Telldahl, Y., Svensson, E.M., Götherström, A. and Storå, J. 2012. Osteometric and Molecular Sexing of Cattle Metapodia. *JAS* 39(1): 121–127.

Tepper, Y., Erickson-Gini, T., Farhi, Y. and Bar-Oz, G. 2018a. Probing the Byzantine/Early Islamic Transition in the Negev: The Renewed Shivta Excavations, 2015–2016. *Tel Aviv* 45(1): 120–152.

Tepper, Y., Weissbrod, L., Fried, T., Marom, N., Ramsay, J., Weinstein-Evron, M., Aharonovich, S. Liphschitz, N., Farhi, Y., Yan, X., Boaretto, E., and Bar-Oz, G. 2018b. Pigeon-Raising and Sustainable Agriculture at the Fringe of the Desert: A View from the Byzantine Village of Saʿadon, Negev, Israel. *Levant* 50(1): 1– 23.

Teugels, G.G.1982. Preliminary Results of a Morphological Study of Five African Species of the Subgenus *Clarias* (Pisces; Clariidae). *Journal of Natural History* 16(3): 439– 464.

Thareani-Sussely, Y. 2007. The 'Archaeology of the Days of Manasseh' Reconsidered in the Light of Evidence from the Beersheba Valley. *PEQ* 139(2): 69– 77.

Thomas, R. 2007. They Were What They Ate: Maintaining Social Boundaries through the Consumption of Food in Medieval England. In: Twiss, K. C., ed. *The Archaeology of Food and Identity, Occasional Paper No. 34*. Center for Archaeological Investigations, Southern Illinois University, Carbondale: 130–151.

Thompson, T. L. 1992. *Early History of the Israelite People: From the Written and the Archaeological Sources*. (Studies in the History 4). Brill.

Tomé, C., and Vigne, J. –D. 2003. Roe Deer (*Capreolus capreolus*) Age at Death Estimates: New Methods and Modern Reference Data for Tooth Eruption and Wear, and for Epiphyseal Fusion. *Archaeofauna* 12: 157– 173.

Toussaint-Samat, M. 2009. *A History of Food.* UK.

Trigger, B. G. 2003. *Understanding Early Civilizations*. Cambridge.

Trixl, S., Steidl, B. and Peters, J. 2017. Archaeology and Zooarchaeology of the Late Iron Age-Roman Transition in the Province of Raetia (100 BC–100 AD). *European Journal of Archaeology* 20(3): 431–450.

Tsoukala, V. 2009. Honorary Shares of Sacrificial Meat in Attic Vase Painting: Visual Signs of Distinction and Civic Identity. *Hesperia*: *The Journal of the American School of Classical Studies at Athens* 78: 1–40.

Twiss, K. C. 2008. Transformations in an Early Agricultural Society: Feasting in the Southern Levantine Pre-Pottery Neolithic. *Journal of Anthropological Archaeology* 27: 418–442.

____ 2012. The Archaeology of Food and Social Diversity. *Journal of Archaeological Research* 20(4): 357–395.

Ussishkin, D. 2003. Solomon's Jerusalem: The Text and the Facts on the Ground. *Jerusalem in Bible and Archaeology: The First Temple Period* 18: 103.

____ 2006a. The Borders and De Facto Size of Jerusalem in the Persian Period. In: Lipschits, O. and Oeming, M., eds. *Judah and the Judeans in the Persian Period.* Winona Lake, IN: 147–166.

____ 2006b. Sennacherib's Campaign to Philistia and Judah: Ekron, Lachish, and Jerusalem. *Essays on Ancient Israel in Its Near Eastern Context: A Tribute to Nadav Na'aman*. Winona Lake, IN: 339.

____ 2016. Was Jerusalem a Fortified Stronghold in the Middle Bronze Age? —An Alternative View. *Levant* 48(2): 135–151.

Uziel, J. and Szanton, N. 2015. Recent Excavations Near the Gihon Spring and Their Reflection on the Character of Iron II Jerusalem. *Tel Aviv* 42 (2): 233–250.

Van Driel, G.1993. Neo-Babylonian Sheep and Goats. *Bulletin on Sumerian Agriculture* 7: 219–258.

Van Neer, W., Lernau, O., Friedman, R., Mumford, G., Poblóme, J. and Waelkens, M. 2004. Fish Remains from Archaeological Sites as Indicators of Former Trade Connections in The Eastern Mediterranean. *Paléorient*: 101–147.

Vigne, J.D., Audouin, F., Lefèvre, C., Marinval-Vigne, M.-C., Pichon, J., and Poplin, F. 1987. Introduction à l'acte du colloque: La découpe et le partage du corps à travers le temps et l'espace. *Anthropozoologica Special Issue*: 115–119 (French).

Vigne, J.D., and Helmer, D. 2007. Was Milk a "Secondary Product" in the Old World Neolithisation Process? Its Role in the Domestication of Cattle, Sheep And Goats. *Anthropozoologica* 42(2): 9–40.

Vincent, H. 1912. *Jerusalem: recherches de Topographie, d archeologie et d histoire*. Paris (French).

Von Thünen, J.H. 1826. *Der isolierte Staat. Beziehung auf Landwirtschaft und Nationalökonomie*. Hamburg (German).

Waerzeggers, C.A.H. 2010. The Ezida Temple of Borsippa: Priesthood, Cult, Archives. *Achaemenid History* 15. Leiden.

Wapnish, P. and Hesse, B. 1988. Urbanization and the Organization of Animal Production at Tell Jemmeh in the Middle Bronze Age Levant. *JNES* 47(2): 81–94.

Warren, C. and Conder, C.R. 1884. *The Survey of Western Palestine III: Jerusalem.* London.

Watts, J. W. 2007. *Ritual and Rhetoric in Leviticus: from Sacrifice to Scripture*. Cambridge.

Wei, S., Ma, Q. and Schreiner, M. 2012. Scientific Investigation of the Paint and Adhesive Materials Used in the Western Han Dynasty Polychromy Terracotta Army, Qingzhou, China. *JAS* 39(5): 1628–1633.

Weill, R. 1920. *La Cité de David. Campagne de 1913–1914*. Paris (French).

Weismantel, M. 1988. *Food, Gender and Poverty*. Prospect Heights.

Wiessner, P. 2001. Of Feasting and Value: Enga Feasts in a Historical Perspective. In: Dietler, M., and Hayden, B., eds. *Feasts: Archaeological and Ethnographic Perspectives on Food, Politics and Power*. Washington D.C.: 115–143.

Wilk, R.R. 2006. *Home Cooking in the Global Village: Caribbean Food from Buccaneers to Ecotourists*. London.

Wolf, E. R. 1955. Types of Latin American Peasantry: A Preliminary Discussion. *American Anthropologist* 57: 452–471.

Wood, J. G. 1869. *Bible Animals*. London and Ontario.

Zeder, M. A. 1984. Meat Distribution at the Highland Iranian Urban Center of Tal-E Malyan. *Animals and Archaeology* 3: 279–307.

____1988. Understanding Urban Process through the Study of Specialized Subsistence Economy in the Near East. *Journal of Anthropological Archaeology* 7(1): 1–55.

____1991. *Feeding Cities: Specialized Animal Economy in the Ancient Near East*. Washington D.C..

____1998. Pigs and Emergent Complexity in the Ancient Near East. In: Nelson, S. ed. A*ncestors for the Pigs: Pigs in Prehistory*. Museum of Archaeology and Anthropology, University of Pennsylvania. Philadelphia: 109–122.

____ 2001. A Metrical Analysis of a Collection of Modern Goats (*Capra hircus aegargus* and *C. h. hircus*) from Iran and Iraq: Implications for the Study of Caprine Domestication. *JAS* 28(1): 61–79.

____2006. Reconciling Rates of Long Bone Fusion and Tooth Eruption Wear in Sheep (ovis) and Goat (Capra). In: Ruscillo, D., ed. *Recent Advances in Aging and Sexing Animal Bones.* Oxford: 87–118.

Zeder, M.A., and Arter, S.R., 1994. Changing Patterns of Animal Utilization at Ancient Gordion. *Paléorient* 20(2): 105–118.

Zeder, M. A., and Lapham, H. 2010. Assessing the Reliability of Criteria Used to Post-Cranial Bones in Sheep, Ovis, and Goats, Capra. *JAS* 37: 2887–2905.

Zilberstein, A. 2019. "On Your Walls, City of David": The Line of the Western Fortification of the City of David during the Hellenistic Period, in Light of New Finds. *New Studies in the Archaeology of Jerusalem* 13: 31–50.

Zimhoni, O. 1997. Two Ceramic Assemblages from Lachish Levels III and II. *Studies in the Iron Age Pottery of Israel:* 211–262.

Zohar, I. and Artzy, M., 2019. The Role of Preserved Fish: Evidence of Fish Exploitation, Processing and Long-Term Preservation in the Eastern Mediterranean During the Late Bronze Age (14th–13th Century BCE). *JAS Reports* 23: 900–909.

Zohar, I. and Cooke, R.G. 1997. The impact of salting and drying on fish bones: preliminary observations on four marine species from Parita Bay, Panama. *Archaeofauna* 6: 59–66.

Zorn, J.R. 1993. Tell en Nasbeh: A Re-Evaluation of the Architecture and Stratigraphy of the Early Bronze Age, Iron Age and Later Periods. University of California at Berkley: Ph.D. Dissertation.

Zuckerman, S. 2007. Anatomy of a Destruction: Crisis Architecture, Termination Rituals and the Fall of Canaanite Hazor. *Journal of Mediterranean Archaeology* 20(1): 3–32.

Appendix I: Stratigraphy of Jerusalem

I. City of David/ Southeastern Hill

City of David			Shiloh											Gadot
Period	Date	Stratum	Area A1	Area A2	Area H1	Area B	Area D1	Area D2	Area E1	Area E2	Area E3	Area G	Area J	Area D3 (This Study)
Medieval or Later	14-20 c. CE	1	1		1				1					
Islamic-Ayyubid	7-13 c. CE	2	2A	2	2									
			2B											
Byzantine	6-7th	3		3A	3A							3		
	4-6th			3B	3B									
Late Roman	1-3rd c. CE	4												
Early Roman	1st c. CE	5			5	5	5	5	5	5	5	5		
Early Roman	37 BC-70 CE	6	6	6	6	6	6	6	6		6	6	6	6
Hellenistic (Hasmonean)	2nd half of 2nd century to 1st c. BCE	7	7		7	7?	7	7	7	7	7	7		
Early Hellenistic	4-2nd c. BCE	8					8	8	8	8	8			8
Persian	6-4th c. BCE	9			pt		9	9	9			9		
Iron II	2nd half of 7th century to 586 BCE	10			pt	10		10	10	10	10	10	10	
Iron II	7th c. BCE	11				11		11	11	11	11		11	
Iron II	8th. C. BCE	12	12-partial			12	12 later phases ?	12	12	12	12		12	12?
Iron II	9th c. BCE	13	13-partial						13				13	
Iron II	10t. C. BCE	14				14	14		14			14	14	
Iron I	12-11th c. BCE	15					15		15					
LB II	14-13th. C. BCE	16							16			16		
MB IIA-B	18th c. BCE	17							17 A and B*					
Late MB I/ MB II?	18th c. BCE	18							18					
EB II	29?th c. BCE	19							19?					
EB 1	31st c. BCE	20				20			20	20	20			
Chalcolithic	4th. Mil.	21				21			21	21				

II. South of Temple Mount/ Ophel

Ophel/ South of Temple Mount			Mazar and Mazar						
Period	Dating	Stratum	Area G	Area C	Area VI	Area XV	Area XV	Area VII	Area I
Medieval	14-20th c. CE	1		1					
Ayyubid	7-13th c. CE	2		2					
Late Byzantine	6-7th c. CE	3A		3b	3	3	3		
Byzantine	4-6th c. CE	3B		3a					
Late Roman	1-4th c. CE	4		4b				4	4
				4a					
Herodian/ ER	1st C. CE	5							
Herodian/ ER	37 BCE- 70 CE	6	6						
Hellenistic/Hasmonean	1st c. BCE	7A	7A						
Hellenistic/Hasmonean	2nd half of 2nd c. BCE	7B							
Early Hellenistic	4th-2nd c. BCE	8							
Late Persian	5-4th c. BCE	9A							
Early Persian	6-5th c. BCE	9B	9B						
Babylonian	6th c. BCE	9, 10	9, 10						
Late Iron IIB	6th c. BCE	10A-1	10A-1						
Late Iron IIB	6th c. BCE	10A-2	10A-2						
Late Iron IIB	2nd half of 7th century to 586 BCE	10 B/C	10 B/C						
Late Iron IIB	7th c. BCE	11							
Early Iron IIB	8th c. BCE	12							
Late Iron IIA	9th c. BCE	13							
Early Iron IIA	10th c. BCE	14	14						
Iron I	12-11th c. BCE	15	15						
LB II	14-13th. C. BCE	16	16						
MB IIA-B	18th c. BCE								
MB IIA-B	18th c. BCE								
EB II	29?th c. BCE								
EB 1	31st c. BCE								
Chalcolithic	4th. Mil.								

III. Western Hill- Jewish Quarter Excavation

Jewish Quarter		Avigad		
Period	Date	Area A	Area W	Area X-2
Medieval or Later	14-20 c. CE			
Islamic-Ayyubid	7-13 c. CE	1	1	
Byzantine	6-7th	2	2	
	4-6th			
Late Roman	1-3rd c. CE	3		
Early Roman	1st c. CE	4	3a	
		4a	3b	
Early Roman	37 BC-70 CE	5		4
Hellenistic (Hasmonean)	2nd half of 2nd century to 1st c. BCE	6	4	5
				6
			5	7
Early Hellenistic	4-2nd c. BCE			
Persian	6-4th c. BCE			
Iron II	2nd half of 7th century to 586 BCE	7	6	8
Iron II	7th c. BCE	8	7a	9
			7b	
			7c	
			7d	
Iron II	8th. C. BCE	9		
Iron II	9th c. BCE			
Iron II	10t. C. BCE			
Iron I	12-11th c. BCE			
LB II	14-13th. C. BCE			
MB IIA-B	18th c. BCE			
Late MB I/ MB II?	18th c. BCE			
EB II	29?th c. BCE			
EB 1	31st c. BCE			

Chalcolithic	4th. Mil.			

IV. Western Hill- Tyropoeon Valley

Givati Parking Lot		Ben-Ami and Tchekanovetz			Gadot and Shalev		
Period	Date	Stratum	Area M1	Area M4 (This Study)	Phase	Area 10 (This Study)	Area 50 (This Study)
Early Islamic	10th c. CE	1	1				
Early Islamic	9-10th c. CE	2	2				
Early Islamic	9-10th c. CE	3	3				
Early Islamic	9th c. CE	4	4				
Byzantine	5-7th c. CE	5	5b				
			5a				
Late Roman-Early Byzantine	4-5th c. CE	6	6b				
			6a		1	1	
Early Roman	1st c. BCE-CE	7	7		2	2	
Late Hellenistic/ Early Roman					3	3	
Hellenistic	2nd c. BCE	8	8		4	4	
					5a	5a	
					5b	5b	
					5c	5c	
				8d glacis	6 glacis	6 glacis	
				8c-1 glacis			
				8c-2 glacis			
				8b			
				8a			
Early Hellenistic	3-2nd c. BCE				7a	7a	3b
					7b	7b	3c
Persian	5-4th c. BCE				8	8	
Iron III	late 7th-6th c. BCE	9	9		9 (586 BCE)	9 (586 BCE)	
Iron III/ Iron IIC	7th c. BCE	10	10		10?	10?	4
Iron IIB	8-7th c. BCE	11	11c				
			11b				
			11a				
Iron IIA	9th c. BCE	12	12				

Appendix II: Measurements

I. Goat (Capra hircus)

Element	Site	Period	Loci	Measurements			
Phalanx I				Glpe	Bp	Sd	Bd
206	Area D3	Iron Age II	1168	37.21	12	10.1	11.52
750	Area D3	Late Hellenistic	1134	42.46	15.07	12.38	13.11
829	Area D3	Iron Age II	1183	40.76	13.35	10.67	12.1
1337	Area D3	Iron Age II	1186	36.65	12.7	11.67	12.34
159	Area M4	Late Hellenistic	4080	36.36	13.55	10.72	11.73
227	Area M4	Late Hellenistic	4080	37.09	12.01	9.87	11.51
313	Area M4	Late Hellenistic	4080	41.43	14.04	11.1	12.98
600	Area M4	Late Hellenistic	4089		13.34	10.94	12.69
642	Area M4	Late Hellenistic	4089	41.55	13.46	10.92	12.46
648	Area M4	Late Hellenistic	4089	38.88	13.33	10.02	11.57
747	Area M4	Late Hellenistic	4089	38.96	13.2	11.5	12.45
915	Area M4	Late Hellenistic	3796	38.27	12.87	9.94	11.12
1000	Area M4	Late Hellenistic	3796	40.61	14	10.53	12.49
1002	Area M4	Late Hellenistic	3796	38.63	13.47	11.7	11.65
1119	Area M4	Late Hellenistic	3928	40.74	14.44	12.82	14.8
1120	Area M4	Late Hellenistic	3928	37.41	13	11.07	12.13
1121	Area M4	Late Hellenistic	3928	36.98	13.98	12.25	13.68
1122	Area M4	Late Hellenistic	3928	41.44	12.68	10.51	11.87
1238	Area M4	Late Hellenistic	3929	39.25		11.28	12.38
1262	Area M4	Late Hellenistic	3928	41.82	13.93	12.38	13.59
1266	Area M4	Late Hellenistic	3928	45.9	15.05	13.44	14.57
1457	Area M4	Late Hellenistic	3928	37.36	13.65	11.21	12.22
1458	Area M4	Late Hellenistic	3928	38.26	12.19	9.58	10.67
1511	Area M4	Late Hellenistic	4024	44.13	13.7	11.51	13.83
1554	Area M4	Late Hellenistic	4008	43.62	13.35	11.48	13.24
1642	Area M4	Late Hellenistic	4008	40.19	13.06	10.57	12.41
1741	Area M4	Late Hellenistic	4008	39.51	13.47	10.01	11.37
1744	Area M4	Late Hellenistic	4008	41.83	13.53	11.03	13.95
1917	Area M4	Late Hellenistic	4008	42.59	15.12	12.31	14.18
1919	Area M4	Late Hellenistic	4008	36.99	11.67	10.5	11.72
1922	Area M4	Late Hellenistic	4008	42.78	14.99	12.83	14.31
1923	Area M4	Late Hellenistic	4008	39.06	14.34	12.01	13.19
1924	Area M4	Late Hellenistic	4008	42.75	14.84	13.55	14.24
1925	Area M4	Late Hellenistic	4008	36.57	11.62	9.83	10.97
2290	Area M4	Late Hellenistic	4089			11.17	11.41
2533	Area M4	Late Hellenistic	3928	40.35	14.22	10.51	12.67
2648	Area M4	Late Hellenistic	3928	38.52	14.46	12.77	14.03
2731	Area M4	Late Hellenistic	3928	36.95	11.51	9.43	11.33
2804	Area M4	Late Hellenistic	4002	40.34	14.01	11.62	12.54
2806	Area M4	Late Hellenistic	4002	37.23	12.04	10.47	11.89
2838	Area M4	Late Hellenistic	4002	41.45	13.58	10.57	13.22
3007	Area M4	Late Hellenistic	3997	38.12	12.87	9.96	12.05
3574	Area M4	Late Hellenistic	3796	36.94	15.08	12.8	13.19

3577	Area M4	Late Hellenistic	3796	38.8	15.33	12.19	14.09
3596	Area M4	Late Hellenistic	4080	42.86	16.77	14.92	16.45
3640	Area M4	Late Hellenistic	4080	41.31	13.59	11.08	12.46
3648	Area M4	Late Hellenistic	4080	41.72	14.35	12.98	14.82
3827	Area M4	Late Hellenistic	3997	40.89	12.87	11.78	13.08
3922	Area M4	Late Hellenistic	3991	39.55	13.82	11.47	13.29
4010	Area M4	Late Hellenistic	3991	41.55	13.29	12.34	13.64
4059	Area M4	Late Hellenistic	3996	38.97	14.76	12.37	13.95
4060	Area M4	Late Hellenistic	3996	42.92	14.1	11.72	
4061	Area M4	Late Hellenistic	3996	42.3	14.45	10.87	13.21
4168	Area M4	Late Hellenistic	4080	38.88	13.72	11.37	12.61
4169	Area M4	Late Hellenistic	4080	42.43	14.15	10.38	12.93
4202	Area M4	Late Hellenistic	4080	38.27	11.84	9.76	11.45
4651	Area M4	Late Hellenistic	3928	38.51	13.57	11.09	13.59
4698	Area M4	Late Hellenistic	3928	39	13.51	12.14	13.72
4701	Area M4	Late Hellenistic	3928	44.67	14.77	13.37	15.75
4705	Area M4	Late Hellenistic	3928	35.92	12.15	10.52	11.32
366	Beit Hakerem	Iron Age II	60	39.28	12.87	10.58	12.08
478	Beit Hakerem	Iron Age II	66	34.91	10.76	8.78	10.13
15	Area M2	Late Hellenistic	1023	38.2	12.88	10.27	11.04
116	Area M2	Late Hellenistic	1023	40.46	14.33	12.41	15.36
117	Area M2	Late Hellenistic	1023	37.73	13	10.44	11.76
171	Area M2	Late Hellenistic	1021	23.21	13.86	10.89	11.38
245	Area M2	Late Hellenistic	1022	42.53	14.76	12.82	14.36
246	Area M2	Late Hellenistic	1022	40.97	14.21	12.02	13.91
641	Area M2	Early Hellenistic	1070	43.21	14.35	12.18	13.64
705	Area M2	Early Hellenistic	1070	37.85	13.65	11.2	12.86
777	Area M2	Early Hellenistic	1070	45.67	14.78	13.93	13.77
1132	Area M2	Late Hellenistic	1041	39.53	14.47	12.24	13.04
1265	Area M2	Late Hellenistic	1040	43.19	14.15	11.75	13.15
1497	Area M2	Late Hellenistic	1037	36.28	12.39	10.49	11.29
1564	Area M2	Late Hellenistic	1044	40.47	14.11	11.91	12.66
1881	Area M2	Late Hellenistic	1025	43.85	15.83	12.64	14.8
2014	Area M2	Late Hellenistic	1025	25.93	14.63	10.41	12.61
2199	Area M2	Late Hellenistic	1108	34.81	13.95	12.1	12.84
2204	Area M2	Late Hellenistic	1108	45.22	16.24	13.9	15.51
2301	Area M2	Late Hellenistic	1128	45.37	14.15	10.6	12.17
2481	Area M2	Iron Age II	1139	39.18	13.34	10.98	12.13
2722	Area M2	Late Hellenistic	1048	38.9	14.47	12.64	13.91
2723	Area M2	Late Hellenistic	1048	37.47	14.04	12.4	13.69
2724	Area M2	Late Hellenistic	1048	46.27	16.78	16.6	14.6
2871	Area M2	Late Hellenistic	1045	43.8	14.57	12.17	13.99
3058	Area M2	Late Hellenistic	1049	38.61	11.56	10.33	11.68
3313	Area M2	Early-Late Hellenistic	1057	44.56	15.89	14.38	15.22
3412	Area M2	Late Hellenistic	1056	34.83	11.94	10.21	11.16
3450	Area M2	Late Hellenistic	1060	41.13	14.05	11.37	12.05
3597	Area M2	Late Hellenistic	1036	36.52	11.93	10.54	10.98
3668	Area M2	Late Hellenistic	1035	40.29	13.75	11.94	12.81
3760	Area M2	Late Hellenistic	1035	40.97	14.12	11.88	14.07
3806	Area M2	Late Hellenistic	1036	41.65	11.95	9.69	11.8

4287	Area M2	Early-Late Hellenistic	1074	40.33	13.4	10.44	12.5
4737	Area M2	Persian	1166	42.41	14.61	11.86	14.14
5178	Area M2	Early-Late Hellenistic	1054	39.69	23.28	10.78	12.39
5186	Area M2	Early-Late Hellenistic	1054	39.15	13.9	10.24	12.85
5237	Area M2	Late Hellenistic	1061	40.19	12.58	11.28	12.97
5252	Area M2	Late Hellenistic	1055	40.82	11.79	10.31	11.44
5301	Area M2	Early-Late Hellenistic	1054	42.37	13.22	11.55	13.23
5371	Area M2	Late Hellenistic	1055	40.75	14.64	10.74	12.39
5372	Area M2	Late Hellenistic	1055	38.12	13.52	11.64	13.19
5467	Area M2	Late Hellenistic	1050	45.44	14.45	12.95	13.32
5469	Area M2	Late Hellenistic	1050	43.3	13.93	12.12	12.31
5514	Area M2	Late Hellenistic	1055	36.92	12.89	12.6	13.36
5648	Area M2	Late Hellenistic	1055	41.57	14.33	13.47	14.09
5684	Area M2	Early Hellenistic	1064	44.81	14.57	12.28	13.75
5788	Area M2	Late Hellenistic	1068	37.94	12.89	10.01	11.13
5848	Area M2	Late Hellenistic	1067	39.91	14.43	11.55	13.32
5849	Area M2	Late Hellenistic	1067	38.52	12.01	9.01	10.95
5850	Area M2	Late Hellenistic	1067	35.32	11.83	9.21	11
6004	Area M2	Late Hellenistic	1031	40.34	13.95	10.84	12.53
6395	Area M2	Late Hellenistic	1033	35.49	11.81	9.72	10.73
6432	Area M2	Late Hellenistic	1030	36.51	12.33	10.63	11.37
6433	Area M2	Late Hellenistic	1030	41.14	12.6	11.09	12.72
6483	Area M2	Late Hellenistic	1033	35.69	13.08	10.18	12.86
7075	Area M2	Early Hellenistic	1080	42.23	15.06	11.93	12.98
7868	Area M2	Early Hellenistic	1016	39.66	12.53	9.78	11.42
8101	Area M2	Late Hellenistic	1013	38.72	13.14	11.48	13.08
8226	Area M2	Late Hellenistic	1017	43.03	14.74	14.15	15.17
8254	Area M2	Late Hellenistic	1014	38.77	13.61	11.81	14.29
8882	Area M2	Iron Age II	1420	35.4	11.4	9.24	10.72
9557	Area M2	Persian	1346	44.9	15.41	12.12	15.1
10480	Area M2	Iron Age II	1510	38.58	12.19	10.53	11.21
10734	Area M2	Persian	1377	41.37	13.69	10.61	11.53
10865	Area M2	Persian	1377	33.94	12.86	10.74	10.86
10866	Area M2	Persian	1377	36.95	12.95	9.93	11.18
11148	Area M2	Persian	1426	40.23	13.8	12.94	14.6
11149	Area M2	Persian	1426	40.61	14.04	11.14	11.66
11217	Area M2	Persian	1432	41.72	13.05	11.36	13.11
11419	Area M2	Persian	1427	42.51	14.49	12.63	13.68
11858	Area M2	Late Hellenistic	1367A	34.39	10.79	8.97	10.48
12268	Area M2	Persian	1214	39.18	13.32	11.56	13.07
12487	Area M2	Early Hellenistic	1178	35.47	11.09	9.56	10.89
12541	Area M2	Persian	1133	41.43	15.07	12.95	13.9
12878	Area M2	Persian	1113	39.75	13.74	10.31	12.21
12972	Area M2	Persian	1113	40.97	14.12	12.88	14.31
8552	Area M5	Late Hellenistic	5092	41.11	13.65	11.79	13.56
8553	Area M5	Late Hellenistic	5092	39.13	12.19	9.82	11.96
8555	Area M5	Late Hellenistic	5092	38.88	14	12.86	13.46
8556	Area M5	Late Hellenistic	5092	38.4	13.81	12.7	13.23

8560	Area M5	Late Hellenistic	5092	37.69	12.52	10.24	12.04
8561	Area M5	Late Hellenistic	5092	41.15	12.04	9.61	12.08
8783	Area M5	Late Hellenistic	5092	41.46	13.33	11.7	13.8
8784	Area M5	Late Hellenistic	5092	42.66	13.62	13.26	14.14
8785	Area M5	Late Hellenistic	5092	42.41	14.06	12.6	14.39
8786	Area M5	Late Hellenistic	5092	37.89	13.79	12.51	12.97
8787	Area M5	Late Hellenistic	5092	41.56	12.9	11.24	12.63
9146	Area M5	Late Hellenistic	5084	42.62	14.13	12.12	14.21
9147	Area M5	Late Hellenistic	5084	44.03	14.74	12.6	14.36
9149	Area M5	Late Hellenistic	5084	40.32	13.36	11.44	13.35
9330	Area M5	Late Hellenistic	5102	42.22	15.65	14.02	14.96
9366	Area M5	Iron Age II	5101	41.28	13.37	11.43	13.47
776	Nebi Samuel	Hellenistic	1315	45.93	14.82	13.86	14.44
272	Nebi Samuel	Persian	1378	43.54	13.08	12.38	13.01

Element	Site	Period	Loci	Measurements			
Phalanx II				Glpe	Bp	Sd	Bd
9	Area D3	Iron Age II	1170	29.06	15.28	12.25	11.84
1031	Area D3	Iron Age II	1193	24.39	12.25	9.06	9.16
1032	Area D3	Iron Age II	1193	25.51	10.74	8.77	8.98
1035	Area D3	Iron Age II	1193	25.02	13.19	11.83	10.6
1315	Area D3	Hellenistic	1154	22.54	12.81	9.6	9.59
427	Area M4	Late Hellenistic	4080	21.43	12.62	10.14	9.85
647	Area M4	Late Hellenistic	4089	25.01	13.93	11.17	11.48
2295	Area M4	Late Hellenistic	4089	24.07	13.51	10.9	11.69
2650	Area M4	Late Hellenistic	3928	26.08	12.67	8.74	9.29
2849	Area M4	Late Hellenistic	4002	23.38	13.19	9.56	10.51
4115	Area M4	Late Hellenistic	4080	26.82	12.18	9.53	10.4
4323	Area M4	Late Hellenistic	4080	25.47	12.8	9.73	9.32
4324	Area M4	Late Hellenistic	4080	27.73	14.17	10.61	11.4
4393	Area M4	Late Hellenistic	4080	23.7	13.22	10.79	10.31
16	Area M2	Late Hellenistic	1023	24.39	11.56	8.07	8.98
72	Area M2	Late Hellenistic	1020	24.57	12.7	9.51	10.05
251	Area M2	Late Hellenistic	1022	25.86	14.97	12.07	12.21
1102	Area M2	Late Hellenistic	1040	23.46	12.61	10.05	9.81
1129	Area M2	Late Hellenistic	1041	25.88	12.59	9.28	9.74
1131	Area M2	Late Hellenistic	1041	21.71	14.28	10.71	10.71
2150	Area M2	Late Hellenistic	1108	27.13	16.21	13.18	13.69
2230	Area M2	Late Hellenistic	1128	24.85	12.96	10.52	10.73
2559	Area M2	Early Hellenistic	1086	27.43	14.24	12.37	11.53
2728	Area M2	Late Hellenistic	1048	24.76	11.88	9.21	10.23
3059	Area M2	Late Hellenistic	1049	28.54	14.36	11.32	11.61
3425	Area M2	Early-Late Hellenistic	1057	27.03	12.09	9.35	10.02
3600	Area M2	Late Hellenistic	1036	35.52	12.59	9.02	9.81
3771	Area M2	Late Hellenistic	1036	30.98	18.04	14.26	14.29
4010	Area M2	Late Hellenistic	1036	27.83	12.35	10.14	9.94
4288	Area M2	Early-Late Hellenistic	1074	25.82	13.96	11.53	10.76
4289	Area M2	Early-Late Hellenistic	1074	27.2	12.32	9.77	10.18
4596	Area M2	Late Hellenistic	1150	26.29	11.77	9.28	9.62

4886	Area M2	Persian	1166	26.32	14.07	12.28	12.31
5184	Area M2	Early-Late Hellenistic	1054	27.25	13.96	11.91	11.68
6006	Area M2	Late Hellenistic	1031	27.26	13.1	10.44	10.79
6189	Area M2	Late Hellenistic	1030	31.71	12.74	9.76	10.62
6325	Area M2	Late Hellenistic	1032	22.91	11.92	9	9.21
6485	Area M2	Late Hellenistic	1033	27.81	14.3	11.34	12.33
7763	Area M2	Late Hellenistic	1011	28.8	14.03	12.36	11.47
8109	Area M2	Late Hellenistic	1013	25.66	14.41	11.95	12.07
8336	Area M2	Iron Age II	1574	21.83	12.5	10.28	10.26
9613	Area M2	Iron Age II	1347	28.45	14.32	12.12	10.84
9628	Area M2	Iron Age II	1386	24.51	12.15	10.1	10.01
9634	Area M2	Persian	1346	23.44	13.01	11.45	10.43
9958	Area M2	Iron Age II	1212	22.5	10.49	8.35	8.43
10309	Area M2	Persian	1197	23.05	11.82	10.53	9.98
10335	Area M2	Iron Age II	1212	27.33	12.72	10.62	9.15
10394	Area M2	Persian	1515	26.09	14.32	13.04	12.43
10735	Area M2	Persian	1377	23.54	12.7	11.33	9.89
10736	Area M2	Persian	1377	24.24	13.22	12.02	11.3
10837	Area M2	Iron Age II	1321	23.56	12.6	9.03	9.89
10884	Area M2	Persian	1377	24.65	13.3	11.1	10.65
11083	Area M2	Iron Age II	1494	24.48	12.4	10.18	9.62
11292	Area M2	Early Hellenistic	1433	28.45	14.42	11.8	10.37
11423	Area M2	Persian	1427	28.45	14.72	11.56	11.02
11458	Area M2	Persian	1426	25.65	12.52	11.01	9.66
11977	Area M2	Late Hellenistic	1367	24.77	14.15	12.75	11.06
12808	Area M2	Persian	1113	25.7	12.56	9.2	9.8
12880	Area M2	Persian	1113	29.12	15	12.91	12.07
12952	Area M2	Persian	1113	25.74	14.84	12.37	12.14
8563	Area M5	Late Hellenistic	5092	23.63	13.24	11.04	10.79
8564	Area M5	Late Hellenistic	5092	26.33	13.75	9.94	11.03
8565	Area M5	Late Hellenistic	5092	25.97	11.76	9.23	9.82
8566	Area M5	Late Hellenistic	5092	25.31	13.59	11.18	11.25
8567	Area M5	Late Hellenistic	5092	24.14	13.54	12.44	11.02
8778	Area M5	Late Hellenistic	5092	23.55	13.24	11.7	10.81
8779	Area M5	Late Hellenistic	5092	24.86	12.11	10.51	9.55
8780	Area M5	Late Hellenistic	5092	26.14	11.8	10.62	9.51
8781	Area M5	Late Hellenistic	5092	28.07	14.26	11.57	12.38
8782	Area M5	Late Hellenistic	5092	27.89	12.58	10.49	9.89
9152	Area M5	Late Hellenistic	5084	23.64	12.49	9.28	9.18
9153	Area M5	Late Hellenistic	5084	27.59	14.15	11.13	11.97
9154	Area M5	Late Hellenistic	5084	29.98	14.31	11.33	11.38
9384	Area M5	Late Hellenistic	5095	27.8	12.02	9.81	9.47
9435	Area M5	Late Hellenistic	5099	22.67	11.23	9.34	9.45
274	Nebi Samuel	Persian	1382	22.96	12.58	9.66	8.35

Astralagus	Site	Period	Loci	GL1	GLm	D1	Bd
134	Area D3	Iron Age II	1162	32.06	29.55	17.42	20.21
659	Area M4	Late Hellenistic	4089	30.77	29.11	17.15	20.14
1910	Area M4	Late Hellenistic	4008	31	29.06	11.39	19.79

309	Beit Hakerem	Iron Age II	64	33.05	31.37	18.86	16.73
62	Area M2	Late Hellenistic	1020	32.09	30.4	18.79	21.21
234	Area M2	Late Hellenistic	1022	34.5	32	17.93	21.09
1765	Area M2	Late Hellenistic	1025		30.84	17.68	20.83
2088	Area M2	Late Hellenistic	1108	31.35	29.83	16.15	19.19
2556	Area M2	Early Hellenistic	1086	35.47	33.95	18.96	22.64
3259	Area M2	Late Hellenistic	1060	37.8	34.55	19.41	24.54
4111	Area M2	Late Hellenistic	1062	34.71	32.61	17.33	21.85
4290	Area M2	Early-Late Hellenistic	1074	32.94	30.89	17.35	20.58
5563	Area M2	Late Hellenistic	1050	30.84	29.32	17.14	19.04
7801	Area M2	Late Hellenistic	1013	32.97	30.74	17.56	22.37
7911	Area M2	Late Hellenistic	1013	31.47	29.49	17.33	19.61
9742	Area M2	Persian	1297	32.03	29.97	17.84	20.02
9971	Area M2	Persian	1297	29.84	28.44	16.09	19.13
10279	Area M2	Iron Age II	1330	30.38	28.41	17.98	18.31
10305	Area M2	Late Hellenistic	1264	32.29	30.13	17.75	19.97
11289	Area M2	Early Hellenistic	1433	33.49	31.61	18.56	21.43
12629	Area M2	Persian	1133	33.74	32.15	18.83	21.18
9145	Area M5	Late Hellenistic	5084	28.44	26.65	16.14	17.68
9225	Area M5	Iron Age II	5066	31.46	30.18	18.25	19.79
669	Nebi Samuel	Late Hellenistic	480	31.62	29.49	17.58	19.21

Radius	Site	Period	Loci	BP	BFp	Dp	SD	Bd	BFd	DD
335	Area D3	Hellenistic	1169	34.2	32.48					
96	Area M4	Late Hellenistic	4080					34.1	29.83	25.31
178	Area M4	Late Hellenistic	4080	32.53	31.1		19.64			
519	Area M4	Late Hellenistic	4080	31.29	29.4					
596	Area M4	Late Hellenistic	4089	37.21	35.36					
829	Area M4	Late Hellenistic	3796					35.55	25.9	21.95
830	Area M4	Late Hellenistic	3796	37.24	24.08	19.93				
976	Area M4	Late Hellenistic	3796	35.17	33.67	19.83				
1353	Area M4	Late Hellenistic	3928	32	27.33	19.63				
1356	Area M4	Late Hellenistic	3928	30.57	24.68	18.61				
1679	Area M4	Late Hellenistic	4008	35.11	31.64	18.47				
1713	Area M4	Late Hellenistic	4008	34.5	32.39	18.19				
1754	Area M4	Late Hellenistic	4008	32.86	29.97	17.5				

1852	Area M4	Late Hellenistic	4008					30.83	27.34	20.45
1944	Area M4	Late Hellenistic	4008	34.7	31.31	17.92				
2767	Area M4	Late Hellenistic	3928					35.18	30.85	25.12
2877	Area M4	Late Hellenistic	4002					28.55	27	21.35
2942	Area M4	Late Hellenistic	4002					30.45	28.39	19.14
2949	Area M4	Late Hellenistic	4002					31.33	27.43	21.98
3023	Area M4	Late Hellenistic	3997	36.11	33.2	18.07	19.97			
3034	Area M4	Late Hellenistic	3997	32.65	31.29	17.16				
3205	Area M4	Late Hellenistic	4080	35.19	33.18	19.6				
3503	Area M4	Late Hellenistic	3796					33.53	28.4	23.53
3679	Area M4	Late Hellenistic	4080					28.67	26.12	19.91
3884	Area M4	Late Hellenistic	3991	35.62	31.69	18.74				
4427	Area M4	Late Hellenistic	4080	31.35	29.57	16.84				
4447	Area M4	Late Hellenistic	4080	31.2	29.79	15.73				
4626	Area M4	Late Hellenistic	3928					30.41	24.57	22.21
453	Beit Hakerem	Iron Age II	66	33.66	32.32					
1374	Area M2	Late Hellenistic	1040	37.29	34.9					
4101	Area M2	Late Hellenistic	1061	34.31	31.02	17.8				
4260	Area M2	Early-Late Hellenistic	1074	39.47	37.6					
4408	Area M2	Early-Late Hellenistic	1074	37.7	35.64					
8297	Area M2	Late Hellenistic	1015	37.11	33.75					
9584	Area M2	Persian	1346	35.05	31.62					
9645	Area M2	Persian	1349	39.09	34.68					
1374	Area M2	Late Hellenistic	1040	37.29	34.9					
4101	Area M2	Late Hellenistic	1061	34.31	31.02	17.8				
8831	Area M5	Late Hellenistic	5092	34.21	30.63					
9294	Area M5	Late Hellenistic	5084	35.92	32.67					
9329	Area M5	Late Hellenistic	5102	33.74	32.37					
817	Nebi Samuel	Hellenistic	1315						31	19.45

Ulna	Site	Period	Loci	LO	DPA	SDO	BPC
178	Area M4	Late Hellenistic	4080		24.53		23.08

Element	Site	Period	Loci	Measurements		
Metacarpals				Bp	Bd	GL
308	Area M4	Late Hellenistic	4080		32.8	
376	Area M4	Late Hellenistic	4080		26.22	
1275	Area M4	Late Hellenistic	3928	27.18	29.27	
1761	Area M4	Late Hellenistic	4008		26.8	
2124	Area M4	Late Hellenistic	4032	27.98	30.07	
2149	Area M4	Late Hellenistic	4032		25.44	113.76
2715	Area M4	Late Hellenistic	3928	27.86	30.06	
2896	Area M4	Late Hellenistic	4002		33.01	
3775	Area M4	Late Hellenistic	4080	24.38	26.98	
4727	Area M4	Late Hellenistic	3928		29.52	
433	Area M2	Late Hellenistic	1022		28.41	

4629	Area M2	Persian	1189		25.39	
10022	Area M2	Persian	1208		25.1	
10768	Area M2	Persian	1377	25.23		123.34
12276	Area M2	Persian	1214		26.04	
9342	Area M5	Iron Age II	5094			30.3
Metatarsals	Site	Period	Loci	Bp	Bd	GL
816	Area M4	Late Hellenistic	4089		27.49	
1236	Area M4	Late Hellenistic	3928		25.5	
1274	Area M4	Late Hellenistic	3926		26.24	
1751	Area M4	Late Hellenistic	4008	22.87	27.6	
1755	Area M4	Late Hellenistic	4008		25.04	
1942	Area M4	Late Hellenistic	4008	24.96	27.69	113.17
3197	Area M4	Late Hellenistic	4080		26.02	
3838	Area M4	Late Hellenistic	3997		26.99	
3948	Area M4	Late Hellenistic	3991		27.56	
4017	Area M4	Late Hellenistic	3991			
2994	Area M2	Late Hellenistic	1049		26.53	
6275	Area M2	Late Hellenistic	1028		26.52	
Metapodial	Site	Period	Loci	Bp	Bd	GL
57	Area M4	Late Hellenistic	4080		27.38	
688	Area M4	Late Hellenistic	4089		30.94	

Calcaneus	Site	Period	Loci	GL	GB
1124	Area M4	Late Hellenistic	3928	60.25	19.03
1336	Area M4	Late Hellenistic	3928	55.7	19.78
2278	Area M4	Late Hellenistic	4058	65.26	22.04
2858	Area M4	Late Hellenistic	4002	57.56	21.32
3318	Area M4	Late Hellenistic	3119	62.71	19.7
4167	Area M4	Late Hellenistic	4080	60.48	20.78
4695	Area M4	Late Hellenistic	3928	60.38	21.02
3606	Area M2	Late Hellenistic	1036	64.2	23.21
3898	Area M2	Late Hellenistic	1036	59.44	21.16
5559	Area M2	Late Hellenistic	1050	63.59	20.7
6076	Area M2	Late Hellenistic	1033	64.43	20.92
6328	Area M2	Late Hellenistic	1032	58.71	19.69
11355	Area M2	Persian	1427	62.68	21.48
9501	Area M5	Late Hellenistic	5099	58.05	20.41

Humerus	Site	Period	Loci	Dp	Bd	Bt
2	Area D3	Iron Age II	1170	14.05		29.53
3	Area D3	Iron Age II	1170	16.65	33.77	31.01

87	Area M4	Late Hellenistic	4080		33.24	32.36
211	Area M4	Late Hellenistic	4080		32.17	30.73
510	Area M4	Late Hellenistic	4080	16.69	33.46	31.91
1359	Area M4	Late Hellenistic	3928	16.6	33.31	32.78
1433	Area M4	Late Hellenistic	3928	16.08	33.32	31.35
1581	Area M4	Late Hellenistic	4008	16.92	31.57	30.34
2774	Area M4	Late Hellenistic	3928	14.37	30.36	29.84
3037	Area M4	Late Hellenistic	3997	15.5	34.13	31.93
3100	Area M4	Late Hellenistic	3997	17.82	35.74	34.66
3143	Area M4	Late Hellenistic	4080	18.21	36.4	35.92
3600	Area M4	Late Hellenistic	4080	16.45	35.33	34.77
3831	Area M4	Late Hellenistic	3997	15.14	31.09	30.67
3843	Area M4	Late Hellenistic	3997	15.71	33.4	30.83
3930	Area M4	Late Hellenistic	3991	14.37	30.28	29.71
3941	Area M4	Late Hellenistic	3991	17.18	34.25	34.06
4434	Area M4	Late Hellenistic	4080	14.99	31.52	29.98
4483	Area M4	Late Hellenistic	3928	16.68	31.08	29.64
175	Beit Hakerem	Iron Age II	64	11.29	38.55	34.76
101	Area M2	Late Hellenistic	1023	14.08	31.7	30.21
607	Area M2	Early Hellenistic	1070	16.5	31.55	30.71
943	Area M2	Early Hellenistic	1070	16.22	33.34	30.68
1054	Area M2	Late Hellenistic	1040	15.2	32.15	31.73
1121	Area M2	Late Hellenistic	1041	16.07	34.23	32.84
1296	Area M2	Late Hellenistic	1044	14.75	31.58	30.83
1297	Area M2	Late Hellenistic	1044	16.5	34.19	33.64
1521	Area M2	Late Hellenistic	1039	17.43	32.17	31.47
2089	Area M2	Late Hellenistic	1108	14.64	30.79	30.63
2916	Area M2	Late Hellenistic	1046	16.86	31.52	30.74
3718	Area M2	Late Hellenistic	1061	16.9	34.66	34.04
3738	Area M2	Late Hellenistic	1036	15.31	30.97	30.16
3758	Area M2	Late Hellenistic	1035	16.38	34.34	34.08
4077	Area M2	Late Hellenistic	1062	16.34	33.58	30.72
4404	Area M2	Early-Late Hellenistic	1074	16.11	32.33	31.82
5538	Area M2	Late Hellenistic	1055	17.85	34.67	
6487	Area M2	Late Hellenistic	1033	16.46	34.9	32.64
8044	Area M2	Late Hellenistic	1014	15.1	29.27	28.98
10591	Area M2	Iron Age II	1513	16.92	34.39	34.2
10630	Area M2	Iron Age II	1516	15.55	31.36	30.96
8630	Area M5	Late Hellenistic	5092	17.62	31.63	30.87
8810	Area M5	Late Hellenistic	5092	19.29	36.19	33.5
94	Nebi Samuel	Late Hellenistic	6202	15.75	30.81	30.23

II. Sheep (Ovis aries)

Element	Site	Period	Loci	Measurements			
Phalanx I				Glpe	Bp	Sd	Bd
205	Area D3	Iron Age II	1168	40.87	14.71	11.48	13.42
898	Area D3	Iron Age II	1153	41.95		11.26	12.53
108	Area M4	Late Hellenistic	4080	39.75	13.58	11.26	12.92
893	Area M4	Late Hellenistic	3796	39.53	12.57	10.23	11.61
973	Area M4	Late Hellenistic	3796	38.99	13.97	11.46	12.17

974	Area M4	Late Hellenistic	3796	39.65	12.23	10.39	11.67
1118	Area M4	Late Hellenistic	3928	38.03	13.19	10.9	12.49
1127	Area M4	Late Hellenistic	3928	41.4	14.71	11.56	12.67
1128	Area M4	Late Hellenistic	3928	33.88	13.45	11.41	12.07
1339	Area M4	Late Hellenistic	3928	40.96	13.5	10.34	12.54
1340	Area M4	Late Hellenistic	3928	41.41	12.66	11.02	11.36
1641	Area M4	Late Hellenistic	4008	42.6	13.54	11.13	12.13
1742	Area M4	Late Hellenistic	4008	40.12	14.2	11.97	13.86
1926	Area M4	Late Hellenistic	4008	38.06	12.08	9.98	11.46
2010	Area M4	Late Hellenistic	4035	37.87	12.59	10.61	12.71
2498	Area M4	Late Hellenistic	W2024	38.69		11.77	13.35
2641	Area M4	Late Hellenistic	3928	31.9	16.43	14.24	13.57
2644	Area M4	Late Hellenistic	3928	41.88	14.88	12.97	14.32
2802	Area M4	Late Hellenistic	4002	40.79	13.73	12.47	14.05
2805	Area M4	Late Hellenistic	4002	41.27	17.04		16.29
2873	Area M4	Late Hellenistic	4002	36.07	12.41	9.68	10.48
2940	Area M4	Late Hellenistic	4002	41.91	13.78	10.99	12.65
3003	Area M4	Late Hellenistic	3997	41.09	13.95	10.84	12.39
3005	Area M4	Late Hellenistic	3997	41.87	14.46	11.89	14.02
3316	Area M4	Late Hellenistic	3991	42.55	14.81	12.75	14.35
3317	Area M4	Late Hellenistic	3991	37.75	13.9	11.74	12.45
3374	Area M4	Late Hellenistic	3796	40.72	13.78	10.8	12.65
3411	Area M4	Late Hellenistic	3796	42.12	12.91	10.67	11.86
3576	Area M4	Late Hellenistic	3796	34.99	12.33	9.76	11.05
3597	Area M4	Late Hellenistic	4080	40.57	14.47	11.81	12.94
3710	Area M4	Late Hellenistic	4080	38.75	12.98	10.68	11.75
3711	Area M4	Late Hellenistic	4080	42.31	16.16	12.16	13.79
3864	Area M4	Late Hellenistic	3991	38.62	13.16	10.33	12.4
3882	Area M4	Late Hellenistic	3991	40.1	13.57	10.62	12.75
3920	Area M4	Late Hellenistic	3991	40.74	13.56	10.54	12.19
4012	Area M4	Late Hellenistic	3991	42.82	14.23	12.03	13.83
4225	Area M4	Late Hellenistic	4080	38.15	13.77	9.95	12.13
4548	Area M4	Late Hellenistic	3928	40.87	14.15	11.47	11.92
4571	Area M4	Late Hellenistic	3928	35.14	14.32	11.2	11.62
4573	Area M4	Late Hellenistic	3928	36.17	13.63	10.31	11.55
75	Area M2	Late Hellenistic	1020	39.72	13.77	11.24	13.12
204	Area M2	Late Hellenistic	1022	22.34	13.3	10.75	10.6
205	Area M2	Late Hellenistic	1022	20.17	13.25	10.3	9.76
244	Area M2	Late Hellenistic	1022	35.39	12.61	9.86	11.16
430	Area M2	Late Hellenistic	1022	42.95	15.67	12.39	14.73
648	Area M2	Early Hellenistic	1070	35.11	11.72	9.37	10.72
704	Area M2	Early Hellenistic	1070	43.53	16.02	13.69	14.78
1104	Area M2	Late Hellenistic	1040	41.95	15.09	12.51	13.72
1130	Area M2	Late Hellenistic	1041	39.59	14.15	11.03	13.46
1133	Area M2	Late Hellenistic	1041	37.65	14.36	11.24	12.38
1446	Area M2	Late Hellenistic	1039	34.94	13.23	10.26	12.28
2205	Area M2	Late Hellenistic	1108	41.03	14.41	12.26	13.34
2300	Area M2	Late Hellenistic	1128	36.1	12.48	10.21	11.39
2642	Area M2	Late Hellenistic	1045	39.15	12.3	9.9	11.24
3040	Area M2	Late Hellenistic	1045	36.3	13.34	10.84	12.32
3122	Area M2	Late Hellenistic	1047	39.27	13.89	11.5	13.12
3214	Area M2	Early-Late Hellenistic	1057	40.26	13.79	9.98	11.62

3601	Area M2	Late Hellenistic	1036	37.87	12.62	10.53	11.17
3805	Area M2	Late Hellenistic	1036	39.32	12.81	9.98	11.93
4597	Area M2	Late Hellenistic	1150	38.56	13.29	11.09	12.47
4885	Area M2	Persian	1166	37.68	13.5	10.49	12.34
5187	Area M2	Early-Late Hellenistic	1054	38.59	14.58	11.78	13.22
5218	Area M2	Late Hellenistic	1055	41.53	14.7	11.95	14.63
5236	Area M2	Late Hellenistic	1061	39.48	13.81	13.38	13.29
5253	Area M2	Late Hellenistic	1055	41.28	13.96	11.97	13.66
5367	Area M2	Late Hellenistic	1055	39.44	12.82	10.72	12.27
5368	Area M2	Late Hellenistic	1055	40.9	14.91	11.32	13.47
5466	Area M2	Late Hellenistic	1050	36	13.96	11.15	11.96
5519	Area M2	Late Hellenistic	1055	40.61	14.52	13.27	13.42
5647	Area M2	Late Hellenistic	1055	36.8	12.64	11.17	12.96
6005	Area M2	Late Hellenistic	1031	39.82	13.7	10.78	13.27
6187	Area M2	Late Hellenistic	1030	40.68	14.09	10.92	13.31
6233	Area M2	Late Hellenistic	1028	40.11	14.31	12.11	12.98
6322	Area M2	Late Hellenistic	1032	39.09	13.54	11.69	13.15
6323	Area M2	Late Hellenistic	1032	40.74	14.93	12.42	13.53
6376	Area M2	Late Hellenistic	1030	48.08	16.46	14.74	16.17
7317	Area M2	Late Hellenistic	1081	38.37	13.7	11.75	12.12
8349	Area M2	Iron Age II	1572	35.26	11.7	9.38	11.01
9743	Area M2	Persian	1297	40.08	14.11	11.62	12.71
9851	Area M2	Persian	1355	39.95	13.68	11.62	13.07
10260	Area M2	Persian	1355	39.37	12.92	10.49	11.58
10415	Area M2	Iron Age II	1516	34.57	11.71	9.14	10.4
10472	Area M2	Iron Age II	1510	37.34	13.23	10.34	11.86
10738	Area M2	Persian	1377	35.94	13.14	11.44	12.02
11201	Area M2	Iron Age II	1306	37.93	12.86	10.04	10.96
11218	Area M2	Persian	1432	42.32	13.8	11.36	13.1
11249	Area M2	Persian	1441	38.71	13.51	11.5	11.94
11420	Area M2	Persian	1427	38.95	12.94	10.53	11.83
11484	Area M2	Persian	1429	41.66	13.66	10.5	11.73
11516	Area M2	Persian	1396	42.16	14.11	11.73	12.94
11563	Area M2	Late Hellenistic	1367	43.1	13.83	12.09	13.38
11669	Area M2	Iron Age II	1369	39.56	12.95	10.06	12.53
11746	Area M2	Late Hellenistic	1367	35.51	12.85	10.56	12.04
11975	Area M2	Late Hellenistic	1367	40.32	13.76	11.47	12.49
12231	Area M2	Persian	1215	38.62	12.4	10.09	10.87
13617	Area M2	Persian	1215	42.44	13.6	11.47	13.44
12809	Area M2	Persian	1113	41.69	14.49	11.94	14.19
13016	Area M2	Early Hellenistic	1111	36.88	13.51	12.05	12.59
9148	Area M5	Late Hellenistic	5084	41.25	14.59	12.24	13.6
9463	Area M5	Late Hellenistic	5102	43.88	15.51	12.98	13.77
46	Nebi Samuel	Late Hellenistic	453	41.08	13.15	10.95	12.37
559	Nebi Samuel	Persian	1349	36.88	13.3	10.53	11.63

Element	Site	Period	Loci	Measurements	Element	Site	Period
Phalanx II				Glpe	Phalanx I		
832	Area D3	Iron Age II	1183	26.43	13.08	10.03	10.71
925	Area D3	Iron Age II	1193	26.49	12.25	9.1	9.86
945	Area D3	Iron Age II	1193	24.04	12.35	9.52	9.4
1033	Area D3	Iron Age II	1193	23.33	12.17	9.26	9.8

1198	Area D3	Iron Age II	1193	24.89	14.64	11.29	10.67
1357	Area D3	Iron Age II	1186	22.71	11.98	9.98	9.23
1450	Area D3	Iron Age II	1187	22.35	12.79	10.05	10.3
1064	Area M4	Late Hellenistic	3928	23.24	11.97	10.04	8.92
1454	Area M4	Late Hellenistic	3928	24.85	13.7	11.62	11.05
1552	Area M4	Late Hellenistic	4008	25.31	12.07	9.51	10.26
4708	Area M4	Late Hellenistic	3928	22.57	13.02	10.29	10.53
71	Area M2	Late Hellenistic	1020	24.02	11.82	9.69	9.99
114	Area M2	Late Hellenistic	1023	25.49	13.86	11.62	10.28
250	Area M2	Late Hellenistic	1022	23.62	13.09	11.07	10.35
647	Area M2	Early Hellenistic	1070	24.31	15.38	11.41	10.73
1099	Area M2	Late Hellenistic	1040	23.82	12.94	9.72	9.77
1266	Area M2	Late Hellenistic	1040	20.58	11.69	9.21	9.18
1514	Area M2	Iron Age II	1039	23.93	12.21	10.29	9.56
2256	Area M2	Iron Age II	1139	24.15	13.5	10.89	10.76
2588	Area M2	Early Hellenistic	1085	23.01	12.46	10.45	9.97
2839	Area M2	Late Hellenistic	1045	26.54	11.39	7.91	9.5
3100	Area M2	Late Hellenistic	1045	26.48	13.18	10.37	10.5
3114	Area M2	Late Hellenistic	1047	24.18	11.93	9.92	10.06
3164	Area M2	Late Hellenistic	1060	24.18	14.63	10.93	11.26
3424	Area M2	Early-Late Hellenistic	1057	24.08	12.98	9.61	9.87
3451	Area M2	Late Hellenistic	1060	26.06	13.23	9.71	10.04
3452	Area M2	Late Hellenistic	1060	26.41	14.4	11.87	11.81
3548	Area M2	Early-Late Hellenistic	1057	25.83	12.93	9.34	9.8
3599	Area M2	Late Hellenistic	1036	24.58	12.27	10.24	9.64
3734	Area M2	Late Hellenistic	1036	24.75	14.02	11.86	11.39
3735	Area M2	Late Hellenistic	1036	23.2	11.26	8.96	8.85
3761	Area M2	Late Hellenistic	1035	23.15	12.36	9.44	10.04
3871	Area M2	Late Hellenistic	1062	25.09	13.7	10.48	10.89
4099	Area M2	Late Hellenistic	1061	23.02	11.95	9.74	9.13
4221	Area M2	Late Hellenistic	1062	25.13	12.78	9.94	9.89
4372	Area M2	Early-Late Hellenistic	1074	24.84	14.25	11.9	10.72
4548	Area M2	Late Hellenistic	1078	24.04	13.75	10.12	10.14
5041	Area M2	Persian	1140	23.99	13.36	12.92	11.19
5255	Area M2	Late Hellenistic	1055	24.31	12.71	10.91	10.12
5303	Area M2	Late Hellenistic	1055	24.72	12.29	9.63	9.88
5464	Area M2	Late Hellenistic	1050	25.4	14.21	12.54	10.93
6234	Area M2	Late Hellenistic	1028	27.49	12.88	11.55	10.86
6373	Area M2	Late Hellenistic	1030	23.76	13.6	11.46	10.33
7004	Area M2	Early Hellenistic	1085	22.08	11.87	8.4	9.14
7081	Area M2	Early Hellenistic	1080	22.82	12.75	10.47	10.33
8179	Area M2	Late Hellenistic	1013	24.43	13.04	9.64	10.17
8225	Area M2	Late Hellenistic	1017	24.83	12.51	10.1	9.49
8259	Area M2	Late Hellenistic	1015	23.09	11.77	9.26	9.35
8377	Area M2	Iron Age II	1568	24.31	12.22	9.44	9.89
9624	Area M2	Persian	1346	26.25	13.26	10.31	9.87
10000	Area M2	Persian	1208	25.08	11.75	10.04	8.85
10261	Area M2	Persian	1355	24.6	12.51	9.58	9.74
10473	Area M2	Iron Age II	1510	25.63	12.93	10.34	10

10845	Area M2	Iron Age II	1279	22.43	10.76	9.34	8.41
10871	Area M2	Persian	1377	24.94	12.81	11.92	10.19
10883	Area M2	Persian	1377	23.41	11.77	9.05	9.6
11362	Area M2	Persian	1427	23.86	11.96	9.37	8.94
11457	Area M2	Persian	1426	25.02	13.91	11.35	11.18
11517	Area M2	Persian	1396	22.22	12.67	11.46	10.54
11635	Area M2	Late Hellenistic	1367	26.69	11.93	10.84	9.43
11708	Area M2	Late Hellenistic	1367	19.93	11.53	9.21	9.54
11747	Area M2	Late Hellenistic	1367	24.87	14.05	11.77	10.65
11748	Area M2	Late Hellenistic	1367	25.1	13.77	11.68	11.01
11811	Area M2	Iron Age II	1369	22.13	10.88	9.45	9.45
11859	Area M2	Late Hellenistic	1367A	23.42	12.57	9.44	9.86
11899	Area M2	Late Hellenistic	1367	25.3	11.77	10.27	9.4
11976	Area M2	Late Hellenistic	1367	27.42	12.22	11.05	10.31
12434	Area M2	Persian	1214	21.83	12.27	11.11	10.34
13031	Area M2	Persian	1113	26.71	12.98	10.74	10.21
761	Nebi Samuel	Late Hellenistic	479	24.4	11.76	8.83	9.37

Astralagus	Site	Period	Loci	GL1	GLm	D1	Bd
135	Area D3	Iron Age II	1162	29.95	27.96	18.84	19.68
747	Area D3	Late Hellenistic	1134	32.82	30.7	17.99	20.51
171	Area M4	Late Hellenistic	4080	35.12	33.4	19.65	21.99
812	Area M4	Late Hellenistic	4089	34.3	31.7	18.15	22.34
1911	Area M4	Late Hellenistic	4008	33.2	31.32	18.53	20.6
2171	Area M4	Late Hellenistic	4032	31.92	30.28	19.07	20.35
2404	Area M4	Late Hellenistic	4089	33.41	32.13	18.84	22.17
2854	Area M4	Late Hellenistic	4002	32.28	30.14	18.72	22.82
3518	Area M4	Late Hellenistic	3796	32.06	30.01	18.16	21.35
3862	Area M4	Late Hellenistic	3991	32.83	29.99	17.99	20.57
4400	Area M4	Late Hellenistic	4080	33.56	31.36	18.21	22.4
4566	Area M4	Late Hellenistic	3928		29.49		21.24
4567	Area M4	Late Hellenistic	3928	31.57	30.01	17.04	20.25
415	Area M2	Late Hellenistic	1020	32.45		18.62	
639	Area M2	Early Hellenistic	1070	31.13	28.6	18.05	19.98
1371	Area M2	Late Hellenistic	1040	32.97	30.29	18.26	20.67
1572	Area M2	Late Hellenistic	1044	31.4	28.46	16.94	19.85
1635	Area M2	Late Hellenistic	1025	30.85	30.13	17.83	20.12
2182	Area M2	Late Hellenistic	1108	29.44	27.97	18.81	20.03
2455	Area M2	Late Hellenistic	1128	30.68	29.1	17.43	20.44
2730	Area M2	Late Hellenistic	1048	32.79	30.91	18.56	21.78
3212	Area M2	Iron Age II	1139	33.62	31.35	19.53	22.78
3273	Area M2	Early Hellenistic	1158	31.49	29.98	17.84	21.57
4213	Area M2	Late Hellenistic	1062	30.48	29.19	16.84	19.29
4291	Area M2	Early-Late Hellenistic	1074	34.76	33.07	19.37	21.55
4400	Area M2	Early-Late Hellenistic	1074	32.82	31.31	18.61	22.21
4579	Area M2	Late Hellenistic	1150	29.11	27.1	16.17	19.38
5216	Area M2	Late Hellenistic	1055	32.77	29.86	17.28	20.51
6384	Area M2	Late Hellenistic	1030	36.65	22.59	21.11	22.52
9144	Area M5	Late Hellenistic	5084	29.71	28.58	18.28	19.48
9155	Area M5	Late Hellenistic	5084	31.45	29.42	18.02	20.87
77	Nebi Samuel	Late Hellenistic	6222	33.98	80.82	18.71	22.16

254	Nebi Samuel	Persian	1376	31.31	29.48	18.26	21.31
398	Nebi Samuel	Late Hellenistic	479	29.77	28.51	17.2	19.67
400	Nebi Samuel	Late Hellenistic	479	32.37	31.46	18.61	21.07

Radius	Site	Period	Loci	GL	PL	L1	BP	BFp	SD	Bd	BFd	Dp
755	Area D3	Late Hellenistic	1134				28.9	25.61				15.74
1006	Area D3	Iron Age II	1193				29.98	28.21				15.91
1014	Area D3	Iron Age II	1193				30.02	28.17				15.01
1018	Area D3	Iron Age II	1193				31.61	30.66				15.36
1019	Area D3	Iron Age II	1193				36.65	34.84				18.78
1245	Area D3	Hellenistic	1164							32.44	27.08	
254	Area M4	Late Hellenistic	4080				32.72	30.34	17.75			
571	Area M4	Late Hellenistic	4089				32.64	31.38				16.83
1014	Area M4	Late Hellenistic	3796				36.06	32.76				17.74
1054	Area M4	Late Hellenistic	3796				30.24	29.3				16.27
1325	Area M4	Late Hellenistic	3928				34.75	31.98				17.01
1705	Area M4	Late Hellenistic	4008				33.31	30.79				18.25
2070	Area M4	Late Hellenistic	4032				35.36	31.71				17.96
2159	Area M4	Late Hellenistic	4032				32.35	30.06				17.41
2252	Area M4	Late Hellenistic	4058				33.17	29.93				17.27
2373	Area M4	Late Hellenistic	4089				35.71	31.84				17.71
2377	Area M4	Late Hellenistic	4089				33.26	29.69				16.25
2496	Area M4	Late Hellenistic	W2024				37.8	34.55				19.01
2688	Area M4	Late Hellenistic	3928							30.96	28.43	20.7
2730	Area M4	Late Hellenistic	3928				31.94	29.6				17.33
2766	Area M4	Late Hellenistic	3928				33.87	31.69				17.61
2773	Area M4	Late Hellenistic	3928				39.11	34.96	20.4			19.56
2813	Area M4	Late Hellenistic	4002				38.19	35.83				21.14
2871	Area M4	Late Hellenistic	4002							31.47	25.87	21.55
2908	Area M4	Late Hellenistic	4002				34.51	32.69				18.35
2952	Area M4	Late Hellenistic	4002							30.13	25.44	19.01
3028	Area M4	Late Hellenistic	3997				34.64	32.47	19.7			18.51
3113	Area M4	Late Hellenistic	3997				33.74	30.99				17.46
3382	Area M4	Late Hellenistic	3796							31.08	27.2	20.85
3421	Area M4	Late Hellenistic	3796				30.75	30.32				16.43
3524	Area M4	Late Hellenistic	3796				35.57	32.15				17.61
3764	Area M4	Late Hellenistic	4080							34.66	30.44	21.33

3834	Area M4	Late Hellenistic	3997				33.41	30.54				17.43
3885	Area M4	Late Hellenistic	3991				32.07	28.74				16.52
4018	Area M4	Late Hellenistic	3991				33.41	29.53				18.12
4082	Area M4	Late Hellenistic	3996				39.93	35.52				19.21
4209	Area M4	Late Hellenistic	4080				34.56	32.7				17.88
4442	Area M4	Late Hellenistic	4080				34.49	32.31				
4448	Area M4	Late Hellenistic	4080				29.62	27.29				15.7
4726	Area M4	Late Hellenistic	3928				34.98	32.11				18.27
172	Beit Hakerem	Iron Age II	64				33.94	29.49				
173	Beit Hakerem	Iron Age II	64				35.08	32.24				
316	Beit Hakerem	Iron Age II	64				33.93	32.68				
328	Beit Hakerem	Iron Age II	60				35.3	32.8				
396	Beit Hakerem	Iron Age II	66				28.19	25.27				
451	Beit Hakerem	Iron Age II	66							34.19	26.54	23.76
954	Area M2	Early Hellenistic	1070							35	28.03	
2157	Area M2	Late Hellenistic	1108	156.32	147.28	146.29	33.69	30.28	16.15	31.97	26.56	
2244	Area M2	Late Hellenistic	1128				35.16	31.33	19.69			
3379	Area M2	Late Hellenistic	1128				35.15	30.49				
3764	Area M2	Late Hellenistic	1035				35.8	31.8				
3829	Area M2	Late Hellenistic	1036				35.25	29.77	18.17			
4465	Area M2		1071				33.13	29.93	17.52			
5192	Area M2	Early-Late Hellenistic	1054				38.11	35.23				
5914	Area M2	Early Hellenistic	1064				33.33	29.74	18.08			
6027	Area M2	Late Hellenistic	1031				35.74	31.59				
6448	Area M2	Late Hellenistic	1028				32.64	30.15				
7919	Area M2	Late Hellenistic	1013				36.51	33.9	19.45			
8207	Area M2	Late Hellenistic	1013				31.57	30.2	17.8			
9876	Area M2	Iron Age II	1330				33.29	29.82				
12324	Area M2	Persian	1215				33.91	31.43	19.83			
9275	Area M5	Late Hellenistic	5084				37.16	34.31				
110	Nebi Samuel	Late Hellenistic	6202				34.37	31.1	17.65			
111	Nebi Samuel	Late Hellenistic	6202				33.36	30.62	16.89			

Ulna	Site	Period	Loci	LO	DPA	SDO	BPC

396	Beit Hakerem	Iron Age II	66		24.3		17.81

Humerus	Site	Period	Loci	Dd	BD	BT
172	Area M4	Late Hellenistic	4080	15.11	31.97	30.64
994	Area M4	Late Hellenistic	3796	16.81	37.05	35.29
1233	Area M4	Late Hellenistic	3928	17.67	37.13	34.51
1357	Area M4	Late Hellenistic	3928	17.12	34.8	33.96
1562	Area M4	Late Hellenistic	4008	16.77	32.06	30.03
1756	Area M4	Late Hellenistic	4008	16.23	31.51	31.38
2209	Area M4	Late Hellenistic	4059	17.25	32.66	31.31
2302	Area M4	Late Hellenistic	4089	15.56	30.85	30.51
2523	Area M4	Late Hellenistic	3928	17.31	39.43	34.81
2915	Area M4	Late Hellenistic	4002	18.42	36.9	34.83
3025	Area M4	Late Hellenistic	3997	15.48	31.36	30.2
3147	Area M4	Late Hellenistic	4080	15.97	36.7	32.51
3328	Area M4	Late Hellenistic	3991	16.27	32.81	29.32
3330	Area M4	Late Hellenistic	3991	16.66	34.32	31.45
3605	Area M4	Late Hellenistic	4080	16.55	33.77	33.01
3727	Area M4	Late Hellenistic	4080	16.38	32.28	31.99
3931	Area M4	Late Hellenistic	3991	15.9	31.71	30.27
3936	Area M4	Late Hellenistic	3991	16.38	36.35	34.46
4174	Area M4	Late Hellenistic	4080	16.55	34.83	31.94
4214	Area M4	Late Hellenistic	4080	16.19	30.32	30.79
4431	Area M4	Late Hellenistic	4080	16.71	33.15	33.11
4554	Area M4	Late Hellenistic	3928	16.19	32.51	31.59
4688	Area M4	Late Hellenistic	3928	17.09	33.89	32.86
471	Area M2	Early Hellenistic	1070	19.77	35.66	34.16
608	Area M2	Early Hellenistic	1070	16.59	33.69	32.55
620	Area M2	Early Hellenistic	1070	20.4	43.75	41.29
1447	Area M2	Late Hellenistic	1039	15.78	28.92	28.99
1522	Area M2	Late Hellenistic	1039	16.5	33.98	33.61
2591	Area M2	Late Hellenistic	1045	15.15	33.13	31.82
2918	Area M2	Late Hellenistic	1046	17.81	33.34	30.8
3246	Area M2	Early-Late Hellenistic	1057	16.47	33.3	31.37
3380	Area M2	Late Hellenistic	1128	15.73	33.43	33.19
3737	Area M2	Late Hellenistic	1036	14.87	32.34	30.15
4212	Area M2	Late Hellenistic	1062	17.17	31.15	29.66
4897	Area M2	Persian	1166	17.85	33.64	32.61
5537	Area M2	Late Hellenistic	1055	15.71	33.19	32.62
6401	Area M2	Late Hellenistic	1033	15.67	31.72	31.19
11180	Area M2	Persian	1426	19.95	38.7	36.73
11185	Area M2	Persian	1426	18.01	32.68	31.57
11350	Area M2	Early Hellenistic	1433	15.9		31.07
11738	Area M2	Late Hellenistic	1367	17.47	37.02	34.06
12681	Area M2	Persian	1113	16.15	35.11	34.19
13034	Area M2	Persian	1113	16.29	31.65	31.19
96	Nebi Samuel	Late Hellenistic	6202	16.96	30.8	30.3

Calcaneus	Site	Period	Loci	GL	GB
843	Area M4	Late Hellenistic	3796	64.04	22.01
1337	Area M4	Late Hellenistic	3928	58.94	21.28

1556	Area M4	Late Hellenistic	4008	61.4	21.1
1644	Area M4	Late Hellenistic	4008	61.5	21.62
2277	Area M4	Late Hellenistic	4058	62.27	21
3319	Area M4	Late Hellenistic	3119	60.12	20.35
3603	Area M4	Late Hellenistic	4080	65.96	23.56
3830	Area M4	Late Hellenistic	3997	62.8	20.83
238	Area M2	Late Hellenistic	1022	67.7	24.19
3256	Area M2	Late Hellenistic	1060	65.07	22.01
4189	Area M2	Late Hellenistic	1062	62.29	21.96
4580	Area M2	Late Hellenistic	1150	59.4	21.23
5561	Area M2	Late Hellenistic	1050	65.79	21.45
6278	Area M2	Late Hellenistic	1030	64.63	20.53
6430	Area M2	Late Hellenistic	1030	59.19	21.6
6986	Area M2	Early Hellenistic	1080	62.94	22.89
8850	Area M2	Iron Age II	1403	60.1	18.01
11288	Area M2	Early Hellenistic	1433	62.36	
11739	Area M2	Late Hellenistic	1367	67.3	20.93

Element	Site	Period	Loci	Measurements		
Metacarpals				Bp	Bd	GL
93	Area M4	Late Hellenistic	4080		27.83	
205	Area M4	Late Hellenistic	4080		30.82	
453	Area M4	Late Hellenistic	4080		26.78	
841	Area M4	Late Hellenistic	3796	22.93	26.53	109.39
1694	Area M4	Late Hellenistic	4008		26.86	
3381	Area M4	Late Hellenistic	3796		26.71	
3950	Area M4	Late Hellenistic	3991	27.46	28.62	
3951	Area M4	Late Hellenistic	3991	26.1	26.58	
3952	Area M4	Late Hellenistic	3991	29.09	30.63	
4468	Area M4	Late Hellenistic	3928		29.23	
1059	Area M2	Late Hellenistic	1040	23.57	29.23	135.63
2960	Area M2	Late Hellenistic	1049		27.33	
3693	Area M2	Late Hellenistic	1035		26.83	
3949	Area M2	Late Hellenistic	1061	25.78		
6015	Area M2	Late Hellenistic	1031		27.54	130.76
8033	Area M2	Late Hellenistic	1017		29	
8094	Area M2	Late Hellenistic	1013	23.49	26.57	121.37
941	Area M2	Early Hellenistic	1070		29.82	
1271	Area M2	Late Hellenistic	1044		27.1	
1886	Area M2	Late Hellenistic	1025		25.96	
4187	Area M2	Late Hellenistic	1062		26.28	
7903	Area M2	Late Hellenistic	1016		26.98	
9777	Area M2	Persian	1355		26.54	
12151	Area M2	Late Hellenistic	1367A		27.92	
9749	Area M2	Persian	1297		27.47	
10395	Area M2	Iron Age II	1515	25.87	27.56	125.39
10405	Area M2	Iron Age II	1516		26.09	
9234	Area M5	Late Hellenistic	5102			25.58
Metatarsals						
772	Area M4	Late Hellenistic	4089		30.14	
1352	Area M4	Late Hellenistic	3928		26.04	
1941	Area M4	Late Hellenistic	4008		27.2	

2213	Area M4	Late Hellenistic	4059		27.07	
3202	Area M4	Late Hellenistic	4080		25.51	
3949	Area M4	Late Hellenistic	3991		27.01	
4073	Area M4	Late Hellenistic	3996		27.95	
4722	Area M4	Late Hellenistic	3928		26.65	
4723	Area M4	Late Hellenistic	3928		26.7	
2156	Area M2	Late Hellenistic	1108		28.08	
2503	Area M2	Late Hellenistic	1108		28.59	
6398	Area M2	Late Hellenistic	1033		24.5	
7801	Area M2	Late Hellenistic	1012		26.57	
Metapodial						
163	Area M4	Late Hellenistic	4080		27.8	
230	Area M4	Late Hellenistic	4080		25.24	
3021	Area M4	Late Hellenistic	3997		30.07	
3844	Area M4	Late Hellenistic	3997		24.76	
365	Beit Hakerem	Iron Age II	60		25.72	

III. Caprines (Sheep and/or Goat)

Element	Site	Period	Loci	Measurements		
Metacarpals				Bp	Bd	GL
1007	Area D3	Iron Age II	1193	24.2		
253	Area M4	Late Hellenistic	4080	25.08		
324	Area M4	Late Hellenistic	4080	25.89		
512	Area M4	Late Hellenistic	4080		27	
694	Area M4	Late Hellenistic	4089	27.63		
768	Area M4	Late Hellenistic	4089	24.85		
919	Area M4	Late Hellenistic	3796	30.28		
920	Area M4	Late Hellenistic	3796	26.75		
1012	Area M4	Late Hellenistic	3796	28.71		
1345	Area M4	Late Hellenistic	3928	27.24		
1346	Area M4	Late Hellenistic	3928	26.82		
1521	Area M4	Late Hellenistic	4024	26.75		
1558	Area M4	Late Hellenistic	4008	23.77		
1696	Area M4	Late Hellenistic	4008	27.03		
1753	Area M4	Late Hellenistic	4008	24.6		
1851	Area M4	Late Hellenistic	4008	25.58		
1928	Area M4	Late Hellenistic	4008	26.26		
2071	Area M4	Late Hellenistic	4032	31.49		
2127	Area M4	Late Hellenistic	4032	24.18		
2537	Area M4	Late Hellenistic	3928	25.56		
2639	Area M4	Late Hellenistic	3928	25.89		
2701	Area M4	Late Hellenistic	3928	25.9		
3020	Area M4	Late Hellenistic	3997	27.94		100.81
3280	Area M4	Late Hellenistic	4089	24.58		
4016	Area M4	Late Hellenistic	3991	23.76		114.65
4081	Area M4	Late Hellenistic	3996	24.34		
4161	Area M4	Late Hellenistic	4080	24.98		
4261	Area M4	Late Hellenistic	4080	26		
4486	Area M4	Late Hellenistic	3928	35.07		
4549	Area M4	Late Hellenistic	3928	26.47		
Metatarsal			Loci	Bp	Bd	GL
27	Area M4	Late Hellenistic	4080	24.25		
173	Area M4	Late Hellenistic	4080	22.64		
293	Area M4	Late Hellenistic	4080	22.66		

296	Area M4	Late Hellenistic	4080	23.2		
1132	Area M4	Late Hellenistic	3928	22.48		
1135	Area M4	Late Hellenistic	3928	22.58		
1143	Area M4	Late Hellenistic	3928	24.52		
1599	Area M4	Late Hellenistic	4008	22.69		
1936	Area M4	Late Hellenistic	4008	22.02		
1947	Area M4	Late Hellenistic	4008	23.05		
2167	Area M4	Late Hellenistic	4032	26.04		
2539	Area M4	Late Hellenistic	3928	23.14		
3016	Area M4	Late Hellenistic	3997	22.53		
3017	Area M4	Late Hellenistic	3997		25.39	
3384	Area M4	Late Hellenistic	3796	23.27		
4175	Area M4	Late Hellenistic	4080	22.69		
4215	Area M4	Late Hellenistic	4080	25.6		
4506	Area M4	Late Hellenistic	3928	21.58		

Scapula	Site	Period	Loci	GLP	LG	BG	SLC
899	Area D3	Iron Age II	1153	31.56	23.74	22.16	
463	Beit Hakerem	Iron Age II	66	34.7	25.52	23.2	
256	256	Late Hellenistic	1022	35.08	28.01	21.75	
595	595	Early Hellenistic	1070	37.47	26.71	24.57	
2144	2144	Late Hellenistic	1108	39.55	32.28	24.25	
2145	2145	Late Hellenistic	1108	36.29	28.3	24.2	
2291	2291	Late Hellenistic	1128	35.05	26.6	23.81	22.91
2002	2002	Late Hellenistic	1049	37.53	28.17	25.09	
3611	3611	Late Hellenistic	1036	31.16	25.73	21.63	
3810	3810	Late Hellenistic	1036	34.42	28.55	22.06	
4311	4311	Early-Late Hellenistic	1074	33.64	27.48	23.17	
4600	4600	Late Hellenistic	1150	35.66	28.86	23.67	
6210	6210	Late Hellenistic	1030	40.27	32.33	25.41	23.63
10659	10659	Persian	1377	38.89	30.71	26.81	
10811	10811	Iron Age II	1467	34.48	27.97	20.4	
11168	11168	Persian	1426	33.39	27.44	23.1	
11210	11210	Persian	1426	39.97	33.16	27.13	
11377	11377	Persian	1427	24.18	28.62	23.08	
11378	11378	Persian	1427	37.64	30.92	25.09	
12338	12338	Persian	1215	41.5	32.77	25.38	
12591	12591	Persian	1113	37.56	28.04	23.67	
9128	Area M5	Late Hellenistic	5084			27.24	
9245	Area M5	Late Hellenistic	5090		24.57	22.15	
9267	Area M5	Late Hellenistic	5084	37.76	30.53	23.23	
9339	Area M5	Iron Age II	5094	36.36	28.09	25.22	
763	Nebi Samuel	Persian	1374	42.57	30.91	29.37	

Humerus	Site	Period	Loci	Bp	Dp	Bd	Bt
4	Area D3	Iron Age II	1170		15.53		29.39
268	Area M2	Late Hellenistic	1022		18.17	31.95	31.67
1274	Area M2	Late Hellenistic	1044		16.3	32.79	32.52
1478	Area M2	Late Hellenistic	1040	40.2			
2679	Area M2	Late Hellenistic	1045		15.35	33.82	31.99
3070	Area M2	Late Hellenistic	1049		17.15	30.92	30.59
3447	Area M2	Late Hellenistic	1060		17.12		34.58
3626	Area M2	Late Hellenistic	1036		17.5	32.53	32.05
4035	Area M2	Late Hellenistic	1036		15.37	31.77	30.08
9650	Area M2	Persian	1349		18.17	35.82	34.13
9916	Area M2	Iron Age II	1330		16.41		32.5
10336	Area M2	Iron Age II	1516		14.68	31.06	30.12
8631	Area M5	Late Hellenistic	5092		15.42	32.49	32.04
8634	Area M5	Late Hellenistic	5092		17.2	37.21	37.22

Radius	Site	Period	Loci	Bp	BFp	SD	Bd	Bfd	Dp
835	Area D3	Iron Age II	1183	35.92	32.59				17.66
3379	Area M4	Late Hellenistic	3796	34.84	32.6				19.42
251	Beit Hakerem	Iron Age II	64	35.23	33.63				
85	Area M2	Late Hellenistic	1021				30.95	25.12	21.8
99	Area M2	Late Hellenistic	1023				28.84	25.83	20.22
100	Area M2	Late Hellenistic	1023	33.52	30.83				
140	Area M2	Late Hellenistic	1022				29.74	26.97	20.21
168	Area M2	Late Hellenistic	1021	31.95	30.06				
229	Area M2	Late Hellenistic	1022	37.07	32.83	18.29			
2505	Area M2	Late Hellenistic	1108	29.91	28.62				
2598	Area M2	Late Hellenistic	1045				30.57	27.18	21.25
4574	Area M2	Persian	1166	31.87	25.48	17.31			
5243	Area M2	Late Hellenistic	1061				32.36	27.48	22,83
5604	Area M2	Late Hellenistic	1050	36.17	32.15				
5712	Area M2	Early Hellenistic	1064	31.17	29.07				
5891	Area M2	Late Hellenistic	1067	38.12	35.59				

6028	Area M2	Late Hellenistic	1031				29.25	25.83	20.2
6855	Area M2	Late Hellenistic	1003				31.94	27.13	21.5
7348	Area M2	Early Hellenistic	1080			17.47	31.23	26.35	20.55
8219	Area M2	Late Hellenistic	1012	33.94	30.06	18.27			
8390	Area M2	Iron Age II	1568				32.24	28.08	22.1
9752	Area M2	Persian	1297				32.84	28.58	23.06
9915	Area M2	Iron Age II	1330				33.06	27.97	22.61
10197	Area M2	Late Hellenistic	1263				31.3	27.59	21.43
10255	Area M2	Persian	1355				32.12	27.48	22.77
10757	Area M2	Persian	1377				28.91	26.61	17.89
11003	Area M2	Late Hellenistic	1273	31.51	29.72				
11347	Area M2	Early Hellenistic	1433				31.96	27.88	20.85
12480	Area M2	Persian	1214				30.12	26.2	21.93
12569	Area M2	Persian	1113	35.46	32.25				
12821	Area M2	Persian	1113			17.48	32.62	25.81	23.04
12896	Area M2	Persian	1113				31.43	26.24	20.64
9193	Area M5	Late Hellenistic	5085	34.58	30.99				
9202	Area M5	Iron Age II	5083	27.17	26.59				
9468	Area M5	Late Hellenistic	5102				31.24	27.8	22.55

Ulna	Site	Period	Loci	LO	DPA	SDO	BPC
1137	Area M4	Late Hellenistic	3928	43.8	28.74	23.86	21.48
1355	Area M4	Late Hellenistic	3928	41.21	27.62	23.6	18.02
452	Beit Hakerem	Iron Age II	66				17.73
1206	Area M2	Late Hellenistic	1037	43.3		24.47	20.58
8220	Area M2	Late Hellenistic	1012	40.01	26.39	22.55	18.58
10489	Area M2	Iron Age II	1528	40.93	27.44	22.77	16.98
10759	Area M2	Persian	1377	36.87	22.64		19.97
12202	Area M2	Persian	1216	43.15	28.14	24.64	19.1
9343	Area M5	Iron Age II	5094	44.91	31.48	24.12	19.65

Cervical Vertebra	Site	Period	Loci	GLPa	Bpacr	Bpacd
1257	Area D3	Hellenistic	1164	45.5	40.08	

Mandibular M3	Site	Period	Loci	L	B
1136	Area D3	Iron Age II	1186	27.27	21.37
43	Area M4	Late Hellenistic	4080	23.07	7.81
479	Area M4	Late Hellenistic	4080	24.33	7.91
1889	Area M4	Late Hellenistic	4008	25.12	9
1992	Area M4	Late Hellenistic	4035	25.75	8.61
2286	Area M4	Late Hellenistic	4058	26.86	10.42
2886	Area M4	Late Hellenistic	4002	21.71	8.64
3000	Area M4	Late Hellenistic	4002	25.03	9.51
4233	Area M4	Late Hellenistic	4080	26.38	9.86

4425	Area M4	Late Hellenistic	4080	25.95	10.64
4582	Area M4	Late Hellenistic	3982	25.55	8.99
337	Beit Hakerem	Iron Age II	60	22.81	8.93
375	Beit Hakerem	Iron Age II	66	21.57	7.94

Tibia	Site	Period	Loci	Bp	Dp	SD	Bd	Dd
1428	Area D3	Iron Age II	1168				27.25	21.46
84	Area M4	Late Hellenistic	4080				29.27	21.85
625	Area M4	Late Hellenistic	4089				28.49	21.54
690	Area M4	Late Hellenistic	4089				28.03	22.53
874	Area M4	Late Hellenistic	3796				31.1	22.91
1074	Area M4	Late Hellenistic	3928				28.6	22.05
1350	Area M4	Late Hellenistic	3928				30.15	23.17
1429	Area M4	Late Hellenistic	3928				27.11	19.95
1590	Area M4	Late Hellenistic	4008				28.82	22.02
1613	Area M4	Late Hellenistic	4008				29.05	21.89
1757	Area M4	Late Hellenistic	4008				29.54	22.13
1770	Area M4	Late Hellenistic	4008				29.79	22.35
1855	Area M4	Late Hellenistic	4008				28.2	21.46
2125	Area M4	Late Hellenistic	4032				30.21	23.26
2488	Area M4	Late Hellenistic	W2024				27.91	21.1
2490	Area M4	Late Hellenistic	W2024				30.26	22.71
2538	Area M4	Late Hellenistic	3928				28.55	22.48
2586	Area M4	Late Hellenistic	3928				27.69	21.44
2785	Area M4	Late Hellenistic	3928				26.28	21.26
2807	Area M4	Late Hellenistic	4002				25.13	19.82
2817	Area M4	Late Hellenistic	4002				28.74	23.78
2958	Area M4	Late Hellenistic	4002				28.06	21.15
3011	Area M4	Late Hellenistic	3997				28.85	22.29
3029	Area M4	Late Hellenistic	3997				28.25	20.22

3303	Area M4	Late Hellenistic	4089				32.3	24.45
3573	Area M4	Late Hellenistic	3796				28.06	20.98
3611	Area M4	Late Hellenistic	4080	43.1	35.97			
3908	Area M4	Late Hellenistic	3991	32.59	25.08			
3910	Area M4	Late Hellenistic	3991	30.2	23.55			
3938	Area M4	Late Hellenistic	3991				26.97	19.91
4173	Area M4	Late Hellenistic	4080				31.65	23.01
4212	Area M4	Late Hellenistic	4080	47.79	45.63			
4480	Area M4	Late Hellenistic	3928				27.94	20.31
4620	Area M4	Late Hellenistic	3928				25.77	19.92
4716	Area M4	Late Hellenistic	3928	32.13	24.2			
225	Area M4	Late Hellenistic	4080				27.26	22.81
624	Area M4	Late Hellenistic	4089				31.09	23.26
766	Area M4	Late Hellenistic	4089				28.23	20.25
1363	Area D3	Iron Age II	1187				27.33	20.27
303	Beit Hakerem	Iron Age II	72				27.27	21.37
382	Beit Hakerem	Iron Age II	66				27.39	21.9
398	Beit Hakerem	Iron Age II	66				26.1	21.14
460	Beit Hakerem	Iron Age II	66				27.58	21.8
171	Beit Hakerem	Iron Age II	64	26.71	21.18		26.71	21.18
213	Beit Hakerem	Iron Age II	64	27.19	23.07		27.19	23.07
459	Beit Hakerem	Iron Age II	66	27.75	23.78		27.75	23.78
461	Beit Hakerem	Iron Age II	66	27.95	21.09		27.95	21.09
65	Area M2	Late Hellenistic	1020				25.22	19.35
221	Area M2	Late Hellenistic	1022				29.41	23.22
222	Area M2	Late Hellenistic	1022				26.69	22.04
224	Area M2	Late Hellenistic	1022				28.24	22.33

226	Area M2	Late Hellenistic	1022				26.28	21.18
252	Area M2	Late Hellenistic	1022				28.3	22.66
586	Area M2	Early Hellenistic	1070				28.02	21.97
623	Area M2	Early Hellenistic	1070				29.48	25.69
728	Area M2	Early Hellenistic	1070				29.18	23.56
730	Area M2	Early Hellenistic	1070				27.63	20.76
994	Area M2	Early Hellenistic	1070	45				
1379	Area M2	Late Hellenistic	1040				27.74	20.79
1884	Area M2	Late Hellenistic	1025				27.64	23.22
2255	Area M2	Iron Age II	1139				29.68	21.93
3052	Area M2	Late Hellenistic	1045				28.38	23.1
3053	Area M2	Late Hellenistic	1045				28.49	20.66
3154	Area M2	Late Hellenistic	1047				31.97	23.84
3175	Area M2	Late Hellenistic	1060				30.03	22.15
3215	Area M2	Early-Late Hellenistic	1057				31.13	22.87
3262	Area M2	Late Hellenistic	1060				29	21.59
3628	Area M2	Late Hellenistic	1036				29.52	21.98
3845	Area M2	Late Hellenistic	1062				31.76	25.33
4000	Area M2	Late Hellenistic	1036				28.18	22.23
4143	Area M2	Late Hellenistic	1063				30.58	24.19
4293	Area M2	Early-Late Hellenistic	1074	40.18				
4406	Area M2	Early-Late Hellenistic	1074	46.55	50.01			
5223	Area M2	Late Hellenistic	1055				26.44	20.68
5261	Area M2	Late Hellenistic	1055				26.96	20.64
5407	Area M2	Late Hellenistic	1050				29.69	24.65
6039	Area M2	Late Hellenistic	1031				29.14	21.39
6127	Area M2	Late Hellenistic	1030				30.89	22.91

6506	Area M2	Late Hellenistic	1028				32.29	24.33
7003	Area M2	Early Hellenistic	1085				29.19	22.1
7130	Area M2	Early Hellenistic	1084	44.2	46.61			
8042	Area M2	Late Hellenistic	1014	43.12	42.46			
9105	Area M2	Iron Age II	1404				30.58	24.03
9559	Area M2	Persian	1346				27.29	22.11
10223	Area M2	Persian	1197	45.22	43.6			
10253	Area M2	Persian	1355				25.97	19.66
10408	Area M2	Iron Age II	1516				25.93	19.75
10565	Area M2	Iron Age II	1517				24.91	19.36
11067	Area M2	Iron Age II	1235				25.98	20.23
12006	Area M2	Late Hellenistic	1367				27.3	22.55
12007	Area M2	Late Hellenistic	1367				26.45	20.89
12230	Area M2	Persian	1215				29.98	22.05
8603	Area M5	Late Hellenistic	5092				31.16	24.84
8607	Area M5	Late Hellenistic	5092				24.95	18.56
8608	Area M5	Late Hellenistic	5092				30.42	21.91
8816	Area M5	Late Hellenistic	5092				31.9	23.51
9323	Area M5	Late Hellenistic	5102				28.1	22.42
312	Nebi Samuel	Late Hellenistic	480	43.85	41.08	17.5		
404	Nebi Samuel	Late Hellenistic	479				28.36	21.43
670	Nebi Samuel	Late Hellenistic	480				27.28	20.26

Patella	Site	Period	Loci	GB	GL
1300	Area D3	Iron Age II	1179		28.48
1126	Area M4	Late Hellenistic	3928	24.66	36.25
2851	Area M4	Late Hellenistic	4002	20.2	27.2
4694	Area M4	Late Hellenistic	3928	20.16	30.02
63	Area M2	Late Hellenistic	1020	24.54	33.29
370	Area M2	Late Hellenistic	1022	20.96	28.79
1461	Area M2	Late Hellenistic	1039	23.46	35.02
2729	Area M2	Late Hellenistic	1048	22.19	28.8
2838	Area M2	Late Hellenistic	1045	25.02	31.81
3898	Area M2	Late Hellenistic	1036	21.06	33.02
5375	Area M2	Late Hellenistic	1055	23.14	
5445	Area M2	Early Hellenistic	1052	19.49	
8112	Area M2	Late Hellenistic	1013	20.61	29.02
11625	Area M2	Late Hellenistic	1367	20.79	26.12

9338	Area M5	Iron Age II	5094	22.93	34.74

Femur	Site	Period	Loci	Bp	BTr	DC	SD	Bd	Dd
288	Area D3	Iron Age II	1171					40.32	44.76
67	Area M4	Late Hellenistic	4080	45.88		20.03			
1359	Area M4	Late Hellenistic	3928					39.91	
3501	Area M4	Late Hellenistic	3796	41.8	30.15	21.94			
4440	Area M4	Late Hellenistic	4080	43.53	23.84	20.79			
254	Area M2	Late Hellenistic	1022	2.98	26.9	20.05			
3170	Area M2	Late Hellenistic	1060					40.03	49.18
4300	Area M2	Early-Late Hellenistic	1074	48.59	29.63	25.76	18.58		
4407	Area M2	Early-Late Hellenistic	1074	47.15	29.71	21.74			
4544	Area M2	Late Hellenistic	1078		26.41	23.47			
91	Nebi Samuel	Late Hellenistic	6202					41.87	43.96

Scapula	Site	Period	Loci	GLP	LG	BG	SLC
119	Area M4	Late Hellenistic	4080	34.88	25.36	22.32	20.55
216	Area M4	Late Hellenistic	4080	35.5	25.38	23.52	20.32
277	Area M4	Late Hellenistic	4080	38.72	27.25	24.44	
565	Area M4	Late Hellenistic	4089	32.82	25.33	19.94	
527	Area M4	Late Hellenistic	4089	33.85	26.48	22.37	
885	Area M4	Late Hellenistic	3796	30.28	23.19	21.76	
930	Area M4	Late Hellenistic	3796	38.52	29.71	24.49	
1022	Area M4	Late Hellenistic	3796	37.85	26.88	22.11	
1056	Area M4	Late Hellenistic	3796	37.14	26.55	22.87	
1239	Area M4	Late Hellenistic	3928	35.75	23.4	22.5	
1525	Area M4	Late Hellenistic	4024	36.12	27.63	22.51	
1648	Area M4	Late Hellenistic	4008	32.64	25.08	24.34	

1717	Area M4	Late Hellenistic	4008	33.93	24.73	23.07	
2230	Area M4	Late Hellenistic	4059	36.43	30.58	25.52	
2529	Area M4	Late Hellenistic	3928	29.21	22.97	20.81	
2550	Area M4	Late Hellenistic	3928	32.81	24.27	20.85	
2775	Area M4	Late Hellenistic	3928	31.59	26.88	21.72	
3077	Area M4	Late Hellenistic	3997	34.79	27.07	21.48	
3356	Area M4	Late Hellenistic	3991	36.61	27.28	24.33	
3790	Area M4	Late Hellenistic	4080	34.47	26.07	20.71	
3983	Area M4	Late Hellenistic	3991	35.54	26.79	21.51	
4243	Area M4	Late Hellenistic	4080	36.16	30.02	22.52	
4663	Area M4	Late Hellenistic	3928	33.49	23.68	22.06	20.34
4764	Area M4	Late Hellenistic	3928	30.91	24.01	17.54	

Cranium	Site	Period	Loci	27	29	30	26	28
3561	Area M4	Late Hellenistic	3796	52.47	21.24	20.87		
3990	Area M4	Late Hellenistic	3991	69.87	23.82		56.31	21.23

Atlas	Site	Period	Loci	GL	BFcr	BFcd	Lad	H
845	Area M2	Early Hellenistic	1070	50.9	40.15	44.17	24.14	34.94

Cuboid	Site	Period	Loci	GB	GL
61	Area M2	Late Hellenistic	1020	27.18	21.84
195	Area M2	Late Hellenistic	1023	23.18	19.05
237	Area M2	Late Hellenistic	1022	24.96	22.05
1373	Area M2	Late Hellenistic	1040	26.8	22.89
2298	Area M2	Late Hellenistic	1128	23.73	19.9
2304	Area M2	Early Hellenistic	1085	23.75	20.31
2640	Area M2	Late Hellenistic	1045	26.42	22.14
3607	Area M2	Late Hellenistic	1036	24.03	21.07
4011	Area M2	Late Hellenistic	1036	25.47	22.02
4142	Area M2	Late Hellenistic	1063	26.4	22.97

4581	Area M2	Late Hellenistic	1150	27.41	24.9
4736	Area M2	Persian	1166	24.96	20.43
5257	Area M2	Late Hellenistic	1055	26.89	23.3
5522	Area M2	Late Hellenistic	1055	29.94	22.96
5854	Area M2	Late Hellenistic	1067	22.92	21.43
7345	Area M2	Early Hellenistic	1080	27.91	22.68
8308	Area M2	Late Hellenistic	1014	27.67	23.26
8329	Area M2	Iron Age II	1569	25.22	21.07
8914	Area M2	Iron Age II	1409	25.81	23.02
10142	Area M2	Late Hellenistic	1264	29.9	23.78
10526	Area M2	Iron Age II	1511	25.46	22.71
11145	Area M2	Persian	1426	25.59	24.91
11260	Area M2	Iron Age II	1306	25.87	23.24

Pelvis	Site	Period	Loci	GL	LA	LAR
1172	Area M2	Late Hellenistic	1041		26.24	

IV. Cattle (Bos taurus)

Element	Site	Period	Loci	Measurements			
Phalanx I				Glpe	Bp	Sd	Bd
212	Area D3	Iron Age II	1187				26.06
117	Area M4	Late Hellenistic	4080	59.29	33.4	28.45	30.97
379	Area M4	Late Hellenistic	4080	65.63	29.49	25.01	26.69
482	Area M4	Late Hellenistic	4080	57.59	28.49	24.04	27.72
564	Area M4	Late Hellenistic	4089			23.66	26.46
827	Area M4	Late Hellenistic	3796	63.58	31.74	27.1	30.05
872	Area M4	Late Hellenistic	3796	58.85	31.89	26.2	28.68
1063	Area M4	Late Hellenistic	3928	54.44	24.17	20.39	22.89
1321	Area M4	Late Hellenistic	3928	56.3	29.4	24.21	26.05
1322	Area M4	Late Hellenistic	3928	60.26	25.96	21.95	23.45
1646	Area M4	Late Hellenistic	4008	65.63	29.63	23.67	27.48
1688	Area M4	Late Hellenistic	4008	63.15	28.85	23.24	25.2
2168	Area M4	Late Hellenistic	4032	64.58	32.38	26	28.81
2287	Area M4	Late Hellenistic	4089	61.07	28.22	24.48	28.12

2358	Area M4	Late Hellenistic	4089	57.08	24.23	22.15	23.8
2399	Area M4	Late Hellenistic	4089	53.01	26.08	22.56	24.2
2400	Area M4	Late Hellenistic	4089	60.05	29.77	26.7	27.82
2559	Area M4	Late Hellenistic	3928	58.3	25.56	21.96	27.6
2633	Area M4	Late Hellenistic	3928	55.44	24.36	21.71	22.93
4068	Area M4	Late Hellenistic	3996	59.4	30.27	26.13	27.67
4121	Area M4	Late Hellenistic	4080	56.7	28.72	25.41	26.24
4319	Area M4	Late Hellenistic	4080	50.56	25.16	22.28	24.59
4393	Area M4	Late Hellenistic	4080		30.41		
4576	Area M4	Late Hellenistic	3928		32.48		
1105	Area M2	Late Hellenistic	1040	54.81	29.34	26.28	27.46
1825	Area M2	Late Hellenistic	1025	53.98	24.76	21.02	23.86
3807	Area M2	Late Hellenistic	1036	51.52	22.62	18.97	22.23
4074	Area M2	Late Hellenistic	1062	60.4	29.04	25.32	27.1
4166	Area M2	Late Hellenistic	1061	59.01	27.23	23.76	24.54
4496	Area M2	Late Hellenistic	1075	57.14	25.44	21.26	23.03
4613	Area M2	Early Hellenistic	1158	60.3	27.67	23.57	25.55
4901	Area M2	Persian	1140	55.29	22	19.81	
5443	Area M2	Early Hellenistic	1052	61.99	32.15	27.5	29.6
5520	Area M2	Late Hellenistic	1055	53.66	23.26	21.25	23.59
5909	Area M2	Early Hellenistic	1064	57.23	24.55	22.55	23.72
6319	Area M2	Late Hellenistic	1032	53.39	27.13	22.37	23.75
6375	Area M2	Late Hellenistic	1030	56.93	25.06	21.27	22.32
6847	Area M2	Late Hellenistic	1003	53.91	26.54	22.5	23.92
10632	Area M2	Iron Age II	1521	54.8	30.11	25.92	26.14
10733	Area M2	Persian	1377	62.86	28.81	23.63	26.8
11974	Area M2	Late Hellenistic	1367	50.53	27.5	22.96	25.7
12486	Area M2	Early Hellenistic	1178	56.11	28.77	23.36	25.35
8789	Area M5	Late Hellenistic	5092	62.66	30.1	26.58	29.09
9270	Area M5	Late Hellenistic	5084	63.4	29.93	26.13	29.07
472	Nebi Samuel	Hellenistic	1318	53.12	26.12	21.37	23.67
863	Nebi Samuel	Persian	1349	65.92	28.98	25.09	28.17
Phalanx II			Loci	Glpe	Bp	Sd	Bd
6	Area D3	Iron Age II	1170	35.87	29.77	25.42	26.49
752	Area D3	Late Hellenistic	1134	43.62	29.2	26.94	24.16

1000	Area D3	Iron Age II	1193	40.8	32.33	28.23	26.98
287	Area M4	Late Hellenistic	4080			25.76	25.39
425	Area M4	Late Hellenistic	4080	41.86	30.86	28.78	25.65
426	Area M4	Late Hellenistic	4080	41.83	27.93	23.33	21.6
640	Area M4	Late Hellenistic	4089	45.54	28.87	23.95	24
641	Area M4	Late Hellenistic	4089	38.89	24.92	20.22	20.72
753	Area M4	Late Hellenistic	4089	39.49	25.81	21.15	21.11
1003	Area M4	Late Hellenistic	3796	39.1	24.1	20.93	19.74
1046	Area M4	Late Hellenistic	3796	40.13	28.48	22.81	21.95
1123	Area M4	Late Hellenistic	3928	39.99	26.33	23.29	22.27
1329	Area M4	Late Hellenistic	3928	42.68	28.06	24.73	25
1640	Area M4	Late Hellenistic	4008	41.33	26.9	23.05	23.98
1645	Area M4	Late Hellenistic	4008	38.74	25.48	19.69	21.16
1739	Area M4	Late Hellenistic	4008	37.55	25.05	20.69	21.36
1920	Area M4	Late Hellenistic	4008	40.18	27.46	23.69	23.85
2390	Area M4	Late Hellenistic	4089	37.2	27.78	22.19	23.52
2401	Area M4	Late Hellenistic	4089	39.59	25.01	21.92	22.03
2402	Area M4	Late Hellenistic	4089	36.18	25.87	18.84	20.05
2582	Area M4	Late Hellenistic	3928	38.45	27.26	22.56	23.97
2765	Area M4	Late Hellenistic	3928	42.04	27.47	22.81	22.94
2836	Area M4	Late Hellenistic	4002	38.03	25.34	20.6	20.29
2941	Area M4	Late Hellenistic	4002	38.81	24.84	18.77	20.04
3299	Area M4	Late Hellenistic	4089	40.3	24.98	21.2	21.03
3373	Area M4	Late Hellenistic	3796	37.55	27.72	23.64	24.02
3478	Area M4	Late Hellenistic	3796	38.48	27.2	23.21	22.8
3919	Area M4	Late Hellenistic	3991	37.71	25.93	20.49	21.9
2066	Area M4	Late Hellenistic	3996	42.34	28.3	23.23	24.3
4222	Area M4	Late Hellenistic	4080	40.41	29.04	22.85	23.3
4249	Area M4	Late Hellenistic	4080	38.52	27.22	22.26	27.2
4279	Area M4	Late Hellenistic	4080	38.17	25.29	20.68	21.77
4475	Area M4	Late Hellenistic	3928	39.16	24.57	21.37	22.43
4706	Area M4	Late Hellenistic	3928	41.67	25.76	21.94	21.48
4652	Area M4	Late Hellenistic	3928	30.35	17.5	14.64	14.72
142	Area M2	Late Hellenistic	1022	39.51	25.91	21.56	21.41
160	Area M2	Late Hellenistic	1023	56.94	26.61	22.3	25.79

241	Area M2	Late Hellenistic	1022	37.37	29.46	23.11	24.18
242	Area M2	Late Hellenistic	1022	35.75	24.42	19.68	21.22
243	Area M2	Late Hellenistic	1022	33.02	23.25	19.13	19.3
456	Area M2	Late Hellenistic	1022	43.63	28.14	23.93	24.76
525	Area M2	Early Hellenistic	1070	41.61	27.3	12.35	21.39
707	Area M2	Early Hellenistic	1070	36.65	23.99	20.86	19.86
1128	Area M2	Late Hellenistic	1041	41.25	28.41	22.48	23.37
1340	Area M2	Late Hellenistic	1044	42.2	27.91	23.87	21.47
1768	Area M2	Late Hellenistic	1025	36.91	24.22	18.75	20.16
2452	Area M2	Late Hellenistic	1128	39.93	26.62	22.42	23.73
2869	Area M2	Late Hellenistic	1045	37.38	23.8	18.86	19.94
3099	Area M2	Late Hellenistic	1045	37.07	23.32	20.36	19.21
3897	Area M2	Late Hellenistic	1036	35.6	22.59	17.85	18.43
4152	Area M2	Late Hellenistic	1063	33.95	22.99	20.17	19.82
5462	Area M2	Late Hellenistic	1050		33.78	25.5	27.09
5463	Area M2	Late Hellenistic	1050		24.46	21.91	21.8
5464	Area M2	Late Hellenistic	1050	42.43	30.58	25.77	26.84
6188	Area M2	Late Hellenistic	1030		32.43	27.14	25.84
6256	Area M2	Late Hellenistic	1028	35.91	24.81	20.44	19.37
6321	Area M2	Late Hellenistic	1032	35.44	25.74	23.11	21.76
6486	Area M2	Late Hellenistic	1033	42.53		20.93	21.56
6988	Area M2	Early Hellenistic	1086	43.4	29.77	26.29	23.72
7125	Area M2	Early Hellenistic	1084	42.48	27.97	23.97	24.27
8043	Area M2	Late Hellenistic	1014	38.05	26.05	20.25	20.38
8110	Area M2	Late Hellenistic	1013	37.76	23.72	18.65	20.62
10485	Area M2	Iron Age II	1528		29.89	26.02	26.92
10533	Area M2	Iron Age II	1523	37.95	24.28	20.53	20.09
11736	Area M2	Late Hellenistic	1367	37.73	26.36	21.86	21.22
11809	Area M2	Iron Age II	1369	35.64	25.83	20.69	21.63
8520	Area M5	Late Hellenistic	5092	42.13	28.5	24.19	23.55
8521	Area M5	Late Hellenistic	5092	40.93	30.51	24.7	25.06
8525	Area M5	Late Hellenistic	5092	40.69	30.61	25.6	
8790	Area M5	Late Hellenistic	5092	42.2	30.63	26.36	24.31
8791	Area M5	Late Hellenistic	5092	43.36	28.18	24.27	23.95
8792	Area M5	Late Hellenistic	5092	42.05	30.09	27.31	24.61

Element	Site	Period	Loci	Measurements		
Metacarpals				Bp	Bd	GL
278	Area M4	Late Hellenistic	4080		53.21	
402	Area M4	Late Hellenistic	4080		51.41	
902	Area M4	Late Hellenistic	3796	60.83		
1269	Area M4	Late Hellenistic	3928		54.28	
1934	Area M4	Late Hellenistic	4008	64.88		
2128	Area M4	Late Hellenistic	4932	45.31		
2311	Area M4	Late Hellenistic	4089	53.75		
3236	Area M4	Late Hellenistic	4089		51.89	
1804	Area M2	Late Hellenistic	1025	54.83		
2020	Area M2	Late Hellenistic	1025	53.99		
3833	Area M2	Late Hellenistic	1036	56.14		
6073	Area M2	Late Hellenistic	1033	54.72	54.63	202.96
6141	Area M2	Late Hellenistic	1030	46.84		
768	Nebi Samuel	Hellenistic	1315		39.12	
869	Nebi Samuel	Late Hellenistic	492		58.6	
Metatarsal			Loci	Bp	Bd	GL
9	Area M4	Late Hellenistic	4080	47.72		
33	Area M4	Late Hellenistic	4080	42.82		
493	Area M4	Late Hellenistic	4080	37.34		
494	Area M4	Late Hellenistic	4080		49.56	
1145	Area M4	Late Hellenistic	3928	47.06		
1447	Area M4	Late Hellenistic	3928	44.11		
2166	Area M4	Late Hellenistic	4032		52.85	
2630	Area M4	Late Hellenistic	3928	42.34		
3327	Area M4	Late Hellenistic	3991		51.05	
4234	Area M4	Late Hellenistic	4080	46.19		
3614	Area M4	Late Hellenistic	3796		51.43	
201	Area M2	Late Hellenistic	1022		51.79	
2155	Area M2	Late Hellenistic	1108	42.63		
3667	Area M2	Late Hellenistic	1035	47.5		
6219	Area M2	Late Hellenistic	1030	41.82		
16	Nebi Samuel	Late Hellenistic	451		54.37	

Astralagus	Site	Period	Loci	GL1	GLm	D1	Bd
999	Area D3	Iron Age II	1193	60.68	56.07	34.26	41.38
754	Area M4	Late Hellenistic	4089	65.24	59.97	366.49	35.99
1557	Area M4	Late Hellenistic	4008	57.81	53.98	33.44	34.43
2241	Area M4	Late Hellenistic	4058	58.98	55.23	34.44	38.33
2387	Area M4	Late Hellenistic	4089	67.2	60.7	36.96	42.2
844	Area M2	Early Hellenistic	1070	77.82	68.35	40.321	49.47
1118	Area M2	Late Hellenistic	1041	70.07	64.55	41.95	43.7
4578	Area M2	Late Hellenistic	1150	66.08	60.59	38.77	44.09
8307	Area M2	Late Hellenistic	1014	65.4	60.59	37.87	44.37
10291	Area M2	Persian	1355				36.2
11144	Area M2	Persian	1426	58.24	53.86	36.91	37.88
783	Nebi Samuel	Hellenistic	1315	58.63	54.85	33.26	38.72
818	Nebi Samuel	Hellenistic	1315	60.85	56.7	32.99	36.4

Cuboid	Site	Period	Loci	GB	GL
2015	Area M2	Late Hellenistic	1025	49.06	45.35
2639	Area M2	Late Hellenistic	1045	49.01	42.84
11717	Area M2	Late Hellenistic	1367	49.83	46.09

Calcaneus	Site	Period	Loci	GL	GB
12283	Area M2	Persian	1211	140.82	44.77

Radius	Site	Period	Loci	BP	BFp	Dp	SD	Bd	BFd
2482	Area M4	Late Hellenistic	W2024				65.06	52.8	36.22
4429	Area M4	Late Hellenistic	4080	87.27	78.67	44.17			
1458	Area M2	Late Hellenistic	1044			38.08		64.48	56.13
2097	Area M2	Late Hellenistic	1108	69.48	62.98				
3695	Area M2	Late Hellenistic	1061			38.8		55.32	52.18
3699	Area M2	Late Hellenistic	1061	81.25	73.03				
11587	Area M2	Late Hellenistic	1367			34.96		62.91	53.24
12012	Area M2	Late Hellenistic	1367	76.79	70.96				

Humerus	Site	Period	Loci	GL	BP	DP	BD	BT
3944	Area M2	Late Hellenistic	1061			34.61	66.41	69.37
379	Nebi Samuel	Late Hellenistic	479			30.06	69.93	64.32

Scapula	Site	Period	Loci	GLP	LG	BG
4526	Area M4	Late Hellenistic	3928	52.44	49.65	47.06

Tibia	Site	Period	Loci	Bp	Dp	Bd	Dd
1700	Area M4	Late Hellenistic	4008			55.09	38.1
322	Beit Hakerem	Iron Age II	57			54.84	42.61
4186	Area M2	Late Hellenistic	1062			57.84	43.57
12534	Area M2	Early Hellenistic	1178			54.83	41.27
379	Nebi Samuel	Late Hellenistic	479			56.76	42.12

V. Mountain Gazelle (Gazella gazella)

Element	Site	Period	Loci	Measurements			
Astralagus				GL1	GLm	D1	Bd
32	Area D3	Iron Age II	1170	27.18			17.04
4013	Area M4	Late Hellenistic	3991	31.41	29.09	16.85	19.67
4058	Area M4	Late Hellenistic	3996	30.19	28.27	17.95	19.49
7603	Area M2	Late Hellenistic/Early Roman	1008	28.77	25.9	16.55	18.91
12583	Area M2	Persian	1113	30.74	27.52	16.96	17.47

Cuboid	Site	Period	Loci	Species	GB	GL
4401	Area M2	Early-Late Hellenistic	1074	Gazella	24.31	21
2231	Area M2	Late Hellenistic	1128	Gazella	39.95	12.28
10435	Area M2	Iron Age II	1508	Gazella	22.4	18.68

Element	Site	Period	Loci	Measurements		
Metacarpals				Bp	Bd	GL
2397	Area M4	Late Hellenistic	4089	20.6		
3013	Area M4	Late Hellenistic	3997	20.75		

4508	Area M4	Late Hellenistic	3928	21.61		
4661	Area M4	Late Hellenistic	3928		24.76	
2605	Area M2	Late Hellenistic	1045	21.7		
Metatarsals				Bp	Bd	GL
2607	Area M2	Late Hellenistic	1045	20.05		
5209	Area M2	Late Hellenistic	1055	20.64	22.46	341.8
6445	Area M2	Late Hellenistic	1028	23.39		

Phalanx I	Site	Period	Loci	Glpe	Bp	Sd	Bd
331	Area M4	Late Hellenistic	4080	49.24	11.32	8	9.3
3903	Area M4	Late Hellenistic	3991	46.54	11.91	9	10.07
249	Area M2	Late Hellenistic	1022	36.69	11.64	9.1	10.24
2231	Area M2	Late Hellenistic	1128	39.95	12.28	8.37	9.71
11147	Area M2	Persian	1426	38.01	11.04	8.8	10.63
11483	Area M2		1429	42.7	10.66	7.71	9.12
12236	Area M2	Persian	1215	44.61	10.74	7.38	8.97
892	Nebi Samuel	Persian	1348	49.38	11.37	8.59	9.93
Phalanx II	Site	Period	Loci	Glpe	Bp	Sd	Bd
10739	Area M2	Persian	1377	22.84	9.69	7.48	8.59

Radius	Site	Period	Loci	BP	BFp	Dp	Bd	BFd	Dd
3044	Area M4	Late Hellenistic	3997	33.58	31.09	16.7			
3047	Area M4	Late Hellenistic	3997	30.82	28.43	16.77			
3610	Area M4	Late Hellenistic	4080				25.36	23.87	17.43

Humerus	Site	Period	Loci	G1	Bp	Dp	Bd	Bt
2495	Area M4	Late Hellenistic	W2024			15.41	30.63	30.19
1273	Area M2	Late Hellenistic	1044			15.55	28.14	26.1
4106	Area M2	Late Hellenistic	1061			15.58	29.24	25.76
4259	Area M2	Early-Late Hellenistic	1074		29.89			
11200	Area M2	Iron Age II	1306			15.45	27.49	23.86
11943	Area M2	Late Hellenistic	1367		37.29			

Scapula	Site	Period	Loci	GLP	LG	BG	SLC
3980	Area M4	Late Hellenistic	3991	36.25	25.13	25.43	

M3	Site	Period	Loci	L	B
4187	Area M4	Late Hellenistic	4080	19.93	7.47

Pelvis	Site	Period	Loci	LA	LAR
168	5309	Iron Age II	64	38.1	

Tibia	Site	Period	Loci	Bp	Dp	Bd	Dd
3739	Area M2	Late Hellenistic	1036			30.71	22.76
5800	Area M2	Late Hellenistic	1068			25.33	22.45

*VI. Fallow Deer (*Dama mesopotamica*)*

Element	Site	Period	Loci	Measurements		
Metacarpals				Bp	Bd	GL
202	Area M4	Late Hellenistic	4080	44.58		
Metatarsal				Bp	Bd	GL
403	Area M4	Late Hellenistic	4080	41.58		
2216	Area M4	Late Hellenistic	4059	44.66		

Element	Site	Period	Loci	Measurements			
Phalanx I				Glpe	Bp	Sd	Bd
112	Area M4	Late Hellenistic	4080	56.9	25.89	21.93	22.99
113	Area M4	Late Hellenistic	4080	59.66	26.88	22.72	26.4
115	Area M4	Late Hellenistic	4080	56.56	22.9	19.33	21.63
116	Area M4	Late Hellenistic	4080	58.6	25.37	22.9	25.85
161	Area M4	Late Hellenistic	4080	61.37	27.76	22.42	26.52
644	Area M4	Late Hellenistic	4089	44.37	14.06	11.25	12.79
828	Area M4	Late Hellenistic	3796	57.77	24.79	21.01	23.62
2199	Area M4	Late Hellenistic	4059	62.9		23.08	26.78
3095	Area M4	Late Hellenistic	3997	52.8	23.19	18.79	22.33
3595	Area M4	Late Hellenistic	4080	44.23	14.36	12.82	14.22
3639	Area M4	Late Hellenistic	4080	55.68	23.18	21.1	22.04
3653	Area M4	Late Hellenistic	4080	54.63	22.25	18.63	21.28
3708	Area M4	Late Hellenistic	4080	55.95	27.4	22.22	25.3

1767	Area M2	Late Hellenistic	1025	57.15	23.64	20.71	22.77
7209	Area M2	Early Hellenistic	1080		21.33	21.47	21.08
11146	Area M2	Persian	1426	49.77	16.01	12.98	13.18
8519	Area M5	Late Hellenistic	5092	66.43	28.81	23.99	27.5
47	Nebi Samuel	Late Hellenistic	453	50.23	17.64	12.8	16.48

Astragalus	Site	Period	Loci	GL1	GLm	D1	Bd
1459	Area M4	Late Hellenistic	3928	34.46	32.66	18.16	22.06
4505	Area M4	Late Hellenistic	3928	32.81	29.51	16.79	20.23

Radius	Site	Period	Loci	BP	BFp	Dp
3112	Area M4	Late Hellenistic	3997	36.88	34.63	18.25

Ulna	Site	Period	Loci	LO	DPA	SDO	BPC
1883	Area M2	Late Hellenistic	1025	45.91			

Humerus	Site	Period	Loci	Gl	Bp	Dp	Bd	Bt
3169	Area M2	Late Hellenistic	1060			17.5	35.28	33.77
3436	Area M2	Early-Late Hellenistic	1057			15.55	31.55	29.44
11924	Area M2	Late Hellenistic	1367			14.77	32.39	31.09
905	Area M4	Late Hellenistic	3796			16.84	35.65	32.53

Tibia	Site	Period	Loci	Bp	Dp	Bd	Dd
907	Area M4	Late Hellenistic	3796			31.27	23.16
3383	Area M4	Late Hellenistic	3796			32.17	23.22

Atlas	Site	Period	Loci	GB	GL	BFcr	Lad
820	Area M4	Late Hellenistic	3796	76.82	50.57	54.23	27.05

Scapula	Site	Period	Loci	GLP	LG	BG
97	Nebi Samuel	Late Hellenistic	6202	48.95	37.28	31.71

*VII. Red Deer (*Cervus elaphus*)*

Humerus	Site	Period	Loci	BP	Dp	Dd	BD	BT
4482	Area M4	Late Hellenistic	3928			18.84	37.9	37.1
279	Nebi Samuel	Late Hellenistic	486			30.59	66.92	61.8

Tibia	Site	Period	Loci	Bp	Dp	Bd	Dd
3263	Area M2	Late Hellenistic	1060			31.24	26.03
1	Nebi Samuel	Late Hellenistic	6203			43.89	37.12

Metatarsal	Site	Period	Loci	Bp	Bd	GL
3981	Area M2	Late Hellenistic	1062	39.85		

Astralagus	Site	Period	Loci	GL1	GLm	D1	Bd
813	Nebi Samuel	Hellenistic	1315	44.79	43.68	27.85	31.18

Cuboid	Site	Period	Loci	GB	GL
558	Area M2	Early Hellenistic	1070	25.75	22.46

Phalanx 1	Site	Period	Loci	Glpe	Bp	Sd	Bd
8047	Area M2	Late Hellenistic	1016	51.53	18.34	16.31	17.7

VII. Dogs (Canis familiaris)

Metapodials	Site	Period	Loci	Bp	Bd	GL
Metacarpal V						
1542	Area M2	Late Hellenistic	1039	7.57	5.77	38.02
Metacarpal II			Loci	Bp	Bd	GL
6140	Area M2	Late Hellenistic	1033	7.58	8.16	52.68
6531	Area M2	Late Hellenistic/Early Roman	1001	5.29	6.52	38
Metatarsal III			Loci	Bp	Bd	GL
2977	Area M2	Late Hellenistic	1049	7.36	6.54	57.9
Metatarsal II			Loci	Bp	Bd	GL
5461	Area M2	Early Hellenistic	1052	7.63	5.24	57.49

Ulna	Site	Period	Loci	LO	DPA	SDO	BPC
544	Area M4	Late Hellenistic	4089	33.19	26.91	23.94	19.35
562	Area M2	Early Hellenistic	1070		25.08	21.33	15.44

Humerus	Site	Period	Loci	Gl	Bp	Dp	Bd	Bt

6527	Area M2	Late Hellenistic/Early Roman	1001		21.07			

Radius	Site	Period	Loci	GL	PL	L1	BP	BFp	SD	Bd	BFd	Dp
6526	Area M2	Late Hellenistic/Early Roman	1001				12.15		8.52			
7431	Area M2	Late Hellenistic/Early Roman	1008				17.97	16.2	14.25	23.53	20.36	14.28
7636	Area M2	Late Hellenistic/Early Roman	1008				19.32					

Scapula	Site	Period	Loci	GLP	LG	BG	SLC
2528	Area M4	Late Hellenistic	3928	30.97	28.02	18.75	
6528	Area M2	Late Hellenistic/Early Roman	1001	20.46	18.91	13.17	

Tibia	Site	Period	Loci	Bp	Dp	Bd	Dd
4166	Area M4	Late Hellenistic	4080			19.85	13.18
6873	Area M2	Late Hellenistic/Early Roman	1002			21.14	15.76

Femur	Site	Period	Loci	Bp	BTr	DC	SD
292	Area M4	Late Hellenistic	4080	43.53	30.7	21.37	4

Cervical V.	Site	Period	Loci	Bpar	GLPa	Bpacd
667	Area M4	Late Hellenistic	4089	36.56	41	43.1
674	Area M4	Late Hellenistic	4089	41.9	34.29	37.7

Phalanx 1	Site	Period	Loci	Glpe	Bp	Sd	Bd
984	Area M2	Early Hellenistic	1070	22.28	7.4	5.89	7.25
3966	Area M2	Late Hellenistic	1035	41.78	12.75	10.75	11.64

Calcaneus	Site	Period	Loci	GL	GB
8050	Area M2	Late Hellenistic	1016	29.78	12.81
8230	Area M2	Late Hellenistic	1017	36.5	16.36

VIII. Roe Deer (Capreolus capreolus)

Tibia	Site	Period	Loci	Bp	Dp	Bd	Dd

11211	Area M2	Persian	1426			32.04	24.61
11765	Area M2	Late Hellenistic	1367			31.07	22.81

IX. Red Fox (Vulpes vulpes)

Femur	Site	Period	Loci	Bd	Dd
1916	Area M4	Late Hellenistic	Area M4	16.17	18.35

Scapula	Area	Period	Loci	GLP	LG	BG	HS	DHA	LD	SLC
12594	Area M2	Persian	1113	17.37	15.8	10.17				

X. Donkey (Equus asinus)

Calcaneus	Site	Period	Loci	GL	GB
4221	Area M4	Late Hellenistic	4080	87.09	42.74

Patella	Site	Period	Loci	GB	GL
4398	Area M2	Early/Late Hellenistic	1074	47.63	55.17

Radius	Site	Period	Loci	BP	BFp	Bd
39	Nebi Samuel	Late Hellenistic	453	55.05	49.38	26.14
383	Nebi Samuel	Late Hellenistic	479	65.15	59.78	34.74

Humerus	Site	Period	Loci	GL	GL1	GLC	BP	DP	Dd	BD	BT
13	Nebi Samuel	Late Hellenistic	6203				65.67	76.31			

XI. Pig (Sus scrofa domesticus)

Femur	Site	Period	Loci	Bp	BTr	DC
3107	Area M4	Late Hellenistic	3997	52.36	33.35	24.27

XII. Chicken (Gallus gallus)

Coracoid	Area	Period	Loci	GL	Lm	Bb	BF
1505	Area M2	Late Hellenistic	1046	48.71	45.55	11.04	
2176	Area M2	Late Hellenistic	1108	50.93	48.77	13.6	

4015	Area M2	Late Hellenistic	1036	54.33	51.5	10.96	
4258	Area M2	Late Hellenistic	1062	55.36	52.84	11.44	
4611	Area M2	Late Hellenistic	1150	45.59	43.54	11.22	12.24
8062	Area M2	Late Hellenistic	1016	48.36	47.42	11.61	14.02
10380	Area M2	Persian	1293	46.68	44.06	11.11	8.9
10382	Area M2	Persian	1293	46.12	43.9	10.83	8.68
12584	Area M2	Persian	1113	47.74	45.53	12.74	10.63

Scapula	Area	Period	Loci	GL	Dic
1203	Area M2	Late Hellenistic	1041	63.93	11.38
144	Area M2		1038		10.14
2842	Area M2	Late Hellenistic	1045		11.49
2956	Area M2	Late Hellenistic	1049		12.01
4562	Area M2	Early-Late Hellenistic	1071		10.94
8038	Area M2	Late Hellenistic	1017		12.2
10614	Area M2	Persian	1293		9.66
973	Nebi Samuel	Late Hellenistic	486		11.9
974	Nebi Samuel	Late Hellenistic	486		9.84

Humerus	Area	Period	Loci	GL	Bp	SC	Bd
400	Area M2	Late Hellenistic	1022				12.02
1316	Area M2	Late Hellenistic	1044				12.18
3539	Area M2	Late Hellenistic	1056			6.22	13.68
4107	Area M2	Late Hellenistic	1061	65.67	18.42	7.04	13.67
4214	Area M2	Late Hellenistic	1062	67.15	17.84	6.62	13.52
10383	Area M2	Persian	1293	61.34	16.85	6.49	12.44
10384	Area M2	Persian	1293	61.05	16.79	6.64	12.3

Radius	Area	Period	Loci	GL	SC	Bd
84	Area M2	Late Hellenistic	1020			5.95
10376	Area M2	Persian	1293	53.68	2.91	5.34
10377	Area M2	Persian	1293	52.14	2.47	5.91

Carpometacarpus	Area	Period	Loci	GL	L	Bp	Did
3992	Area M2	Late Hellenistic	1062	41.99	39.33	12.65	7.68

Femur	Site	Period	Loci	GL	Lm	Bp	Dp	SC	Bd	Dd
388	Area M2	Late Hellenistic	1022	67.61	63.27	13.17	8.87	4.99	12.35	10.37
1366	Area M2	Late Hellenistic	1044	69.51	66.05	14.15	9.19	5.63	12.95	11.11
1492	Area M2	Late Hellenistic	1044	73.64		14.71	10.19	6.6		
2177	Area M2	Late Hellenistic	1108			14.5	9.18			
4069	Area M2	Late Hellenistic	1061	75.77	70.59	15.15	11.24	6.16	14.85	15.4
5205	Area M2	Early-Late Hellenistic	1054	74.63	69.02	14.72	9.71	5.7	14.02	11.62
5682	Area M2	Late Hellenistic	1055			13.64	9.37			
7226	Area M2	Early Hellenistic	1086	70.3	65.71	13.6	9.8	6.1	13.23	10.66
10374	Area M2	Persian	1293	66.21	61.84	12.91	8.46	5.52	12	10.33
10375	Area M2	Persian	1293	66.57	60.96	12.67	8.59	5.51	12.03	10.02
11256	Area M2	Persian	1434			12.95	8.13			
11450	Area M2	Persian	1427			14.45	9.91			
11452	Area M2	Persian	1427						14.41	10.9
11701	Area M2	Late Hellenistic	1367						13.26	10.96
12598	Area M2	Persian	1113			13.7	9.4			
8650	Area M5	Late Hellenistic	5092					5.55	12.05	10.14
8651	Area M5	Late Hellenistic	5092			12.27	8.04			

Tibiotarsus	Site	Period	Loci	GL	La	Dip	SC	Bd	Dd
402	Area M2	Late Hellenistic	1022				5.25	9.66	10.41
442	Area M2	Late Hellenistic	1022			18.55			
463	Area M2	Late Hellenistic	1022			17.21			
694	Area M2	Early Hellenistic	1070					10.74	12.68
1015	Area M2	Early Hellenistic	1070					10.46	10.46

2197	Area M2	Late Hellenistic	1108					10.94	10.21
2529	Area M2	Late Hellenistic	1108					9.58	10.34
3083	Area M2	Late Hellenistic	1049			16.95	5.34		
3201	Area M2	Late Hellenistic	1060					11.22	12.49
3477	Area M2	Late Hellenistic	1060			15.98	5.8		
3957	Area M2	Late Hellenistic	1061				6.51	11.24	11.74
4049	Area M2	Late Hellenistic	1036					10.54	10.66
4068	Area M2	Late Hellenistic	1061	1112.93	108.19	17.9	6.19	10.55	12.04
4464	Area M2	Early-Late Hellenistic	1074				7.09	11.44	11.88
4768	Area M2	Persian	1166			11.11			
5687	Area M2	Early Hellenistic	1064				6.07	10.24	11.57
6387	Area M2	Late Hellenistic	1030				5.96	9.18	10.3
6480	Area M2	Late Hellenistic	1033			13.23			
7808	Area M2	Late Hellenistic	1013			20.64	6.49		
9625	Area M2	Persian	1346					11.23	11.56
10369	Area M2	Persian	1293			15.91	5.45		
10566	Area M2	Iron Age II	1517					10.2	11.63
10617	Area M2	Persian	1293			15.89	5.17		
10618	Area M2	Persian	1293					8.83	9.12
10619	Area M2	Persian	1293					9.03	9.66
12855	Area M2	Persian	1113				6.1	10.74	10.86
8652	Area M5	Late Hellenistic	5092			16.88	5.28		
9509	Area M5	Late Hellenistic	5099					8.17	9.59

Tarsometatarsus	Area	Period	Loci	GL	Bp	SC	Bd
38	Area M2	Late Hellenistic	1023		12.45		
1202	Area M2	Late Hellenistic	1041	69.8	11.32	5.48	11.51

1301	Area M2	Late Hellenistic	1044				10.82
4015	Area M2	Late Hellenistic	1036			5.93	12.78
4609	Area M2	Late Hellenistic	1150			5.58	11.23
9106	Area M2	Iron Age II	1404	61.81	10.22	4.81	10.28
10371	Area M2	Persian	1293	63.31	10.58	5.3	10.52
10372	Area M2	Persian	1293	64.17	10.49	5.32	10.71
10615	Area M2	Persian	1293				12.49
11073	Area M2	Iron Age II	1379	66.47	11.44	5.38	10.71

Ulna	Area	Period	Loci	GL	Dip	Bp	SC	Did
81	Area M2	Late Hellenistic	1020			9.2	5.61	
2843	Area M2	Late Hellenistic	1045				3.75	
4215	Area M2	Late Hellenistic	1062				5.38	9.1
8149	Area M2	Late Hellenistic	1013		10.49	7.21		
9535	Area M2	Persian	1349					8.29
9536	Area M2	Persian	1349					7.87
10385	Area M2	Persian	1293	60.2	8.5	7.44	3.89	8.05
10386	Area M2	Persian	1293	59.41	10.82	7.72	4.02	7.73
11304	Area M2	Early Hellenistic	1433		10.7	7.22		

XIII. Mallard Duck (Anas platyrhynchos)

Radius	Site	Period	Loci	GL	SC	Bd
3413	Area M2	Late Hellenistic	1056		2.44	
4171	Area M2	Late Hellenistic	1061		2.11	4.75

XIV. Crow (Corvus corvus)

Humerus	Site	Period	Loci	GL	Bp	SC	Bd
2469	Area M2	Late Hellenistic	1128	19.07	6.29	1.93	4.67

XV. Goose (Anser anser)

Coracoid	Site	Period	Loci	GL	Lm	Bb	BF

10792	Area M2	Iron Age IIC	1447	74.8	66.34		28.88

Femur	Site	Period	Loci	GL	Lm	Bp	Dp	SC	Bd	Dd
6711	Area M2	Late Hellenistic	1003						18.79	

Tibiotarsus	Site	Period	Loci	GL	La	Dip	SC	Bd	Dd
10914	Area M2	Persian	1377					17.27	16.56

XVI. Chukar Partridge (Alectoris chukar)

Coracoid	Area	Period	Loci	GL	Lm	Bb	BF
6331	Area M2	Late Hellenistic	1032		39.87		

Humerus	Area	Period	Loci	GL	Bp	SC	Bd
7364	Area M2	Early Hellenistic	1086	50.16	13.79	4.76	
10572	Area M2	Iron Age II	1507	51.4	14.33	5.17	10.91

Radius	Area	Period	Loci	GL	SC	Bd
1828	Area M2	Late Hellenistic	1025	44.23	2.12	5.26
10575	Area M2	Iron Age II	1507		2.13	

Tibiotarsus	Area	Period	Loci	GL	La	Dip	SC	Bd	Dd
37	Area M2	Late Hellenistic	1023				3.17	6.03	5.74
8063	Area M2	Late Hellenistic	1016					8.24	
8299	Area M2	Late Hellenistic	1015					8.11	8.14
10503	Area M2	Iron Age II	1522	81.08	78.2	12.43	4.07	7.35	7.29
10620	Area M2	Persian	1293					7.37	7.86

Tarsometatarsus	Area	Period	Loci	GL	Bp	SC	Bd
3752	Area M2	Late Hellenistic	1036		10.4	5.1	
8856	Area M2	Iron Age II	1415	47.85	8.63	4.29	9.55

Ulna	Area	Period	Loci	GL	Dip	Bp	SC	Did
9084	Area M2	Early Hellenistic	1412				2.45	3.32
10573	Area M2	Iron Age II	1507		8.93	6.22	3.21	6.73

XVII. Beech Marten (Martes fiona)

Humerus	Area	Period	Loci	Gl	Bp	Dp	Bd	Bt
3670	Area M2	Late Hellenistic	1035	25.62	5.13	1.86	5.56	3.7

XVIII. Lepus capensis (Cape Hare)

Tibia	Site	Period	Loci	Bp	Dp
9403	Area M5	Late Hellenistic	5099	12.57	10.75

Femur	Site	Period	Loci	Bp	Btr	Bd	Dd
9402	Area M5	Late Hellenistic	5099			6.92	6.12

Appendix III: Caprine Measurements From Tel Dor

I. Measurements of Sheep and Goat Phalanx I from Tel Dor (Provided By L. Sapir-Hen)

Period	Species	Assemblage Number	Glpe	Bp	Dp	Bd
Hellenistic	Ovis	5015				10.97
Hellenistic	Ovis	5043	39.96	12.41	15.21	11.42
Hellenistic	Ovis	5112	38.33	13.81	15.83	12.85
Hellenistic	Ovis	5703				13.99
Hellenistic	Ovis	5714				11.76
Hellenistic	Ovis	5779		13.61		
Hellenistic	Capra	5798	40.48	13.1	15.92	11.5
Hellenistic	Capra	5823	38.72	12.92	15.52	13.48
Hellenistic	Ovis	5874	36.92	13.54	16.03	12.26
Hellenistic	Ovis	5981				11.61
Hellenistic	Ovis	6085		14.06	15.93	12.52
Hellenistic	Ovis	6113	42.81	15.54	18.35	13.97
Hellenistic	Ovis	6168				11.71
Hellenistic	Capra	6278	37.01	13.19	15.04	12.74

Hellenistic	Ovis	6352	41.53	13.73	16.39	11.77
Hellenistic	Capra	6368	34.94	13.76	15.2	12.28
Hellenistic	Ovis	6505	37.17	13.04	16.13	13.3
Hellenistic	Ovis	8071	39.12	13.27	16.45	12.5
Hellenistic	Ovis	8397	34.55	12.87	15.54	11.75
Hellenistic	Ovis	8493	38.31	13.79	16.41	12.82
Hellenistic	Ovis	8588				12.84
Hellenistic	Ovis	8620		13.37	15.65	
Iron Age	Capra	5377	38.89	13.81	15.2	12.7
Iron Age	Ovis	5468	35.22	12.68	15.83	12.31
Iron Age	Ovis	5488	38.96	13.36	15.26	13.35
Iron Age	Ovis	5501	38.63	13.9	15.67	13.67
Iron Age	Ovis	5510	35.36	11.5	14.79	12.47
Iron Age	Ovis	5566	34.16	12.47	14.52	11.85
Iron Age	Ovis	5632				13.92
Iron Age I	Capra	5069	47.33	15.07	17.44	14.1
Iron Age I	Ovis	5079		11.56	14.9	
Iron Age I	Ovis	5127	34.18	12.35	14.96	11.85
Iron Age I	Ovis	8025	42.12	14.11	15.07	13.61
Iron Age II	Capra	4348	38.26	12.95	14.89	12.99
Iron Age II	Capra	4568		11.36	14.05	
Iron Age II	Ovis	4573	36.6	13.7	15.93	12.4
Iron Age II	Ovis	4594	39.24	13.31	16.71	12.63
Late Hellenistic	Ovis	5668				11.97
Persian	Capra	5184	39.07	13.91	16.16	12.77
Persian	Ovis	5317	39.54	14.2	15.76	13.05