

**Animal exploitation in the Upper Tigris River valley (Turkey)
between the 3rd and the 1st millennia BC**

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Hiermit erkläre ich, Rémi Berthon, geboren am 10.12.1982 in Annemasse (Frankreich), dass diese Abhandlung nach Inhalt und Form meine eigene Arbeit ist. Beiträge von anderen als meiner Person wurden deutlich als solche hervorgehoben. Diese Arbeit wurde weder im Ganzen noch in Teilen einer anderen Stelle im Rahmen eines Prüfungsverfahrens zur Begutachtung vorgelegt, veröffentlicht oder zur Veröffentlichung eingereicht. Die Regeln guter wissenschaftlicher Praxis der Deutschen Forschungsgemeinschaft wurden bei der Entstehung dieser Arbeit eingehalten.

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Abstract

The prehistory and ancient history of the Upper Tigris River valley (in southern Turkey) was poorly known until recently, due to a lack of archaeological researches. Since the last decade, numerous research projects are taking place in this area in order to document the cultural heritage which will be flooded by the lake of the Ilisu Dam in a near future. Despite the recent growth of archaeological investigations between the cities of Bismil and Siirt, many important fields of research haven't been targeted yet. It is the case for one of the main socioeconomic components of ancient societies: the exploitation of resources from animal origin. This large field of research encompasses many issues related to, among others, the use of the landscape, the economic system and the existence of cultural constraints. In order to answer these questions, the faunal remains from seven settlements were studied. These sites are located on the banks of the Tigris, Botan and Bitlis Rivers. Assemblages were selected from layers dated from the 3rd to the 1st millennia BC. This chronological range has the advantage to be represented in all the selected sites. It was also a period of rapid changes in the political background of the region, with well-defined economic and cultural entities. The study of the faunal remains enables to compare all these settlements in terms of subsistence strategies and socioeconomic choices. It appeared that a diversity of animal exploitation patterns existed in all the chronological phases considered. Besides the exploitation of the main domestic mammals such as cattle, pig and sheep and goat, the exploitations of red deer and equid were important variables. It is argued here that this variability is related to peculiar choices made by the communities inhabiting these settlements. Depending on the period, these choices seem to have been influenced by local environmental conditions on one hand and economic specializations on another hand. The variability in the patterns of animal exploitation should be taken into account when the issue of subsistence strategy is discussed at an inter-regional scale. Indeed, the Upper Tigris area, and especially the small rural settlements studied here, shows a picture much less homogeneous than expected. It is also argued that small settlements embedded in a rural environment should be also studied beside the main large urban settlements. These smaller settlements played an important role in the socioeconomic complexity of the Bronze and Iron Age. Finally, it is argued that small faunal assemblages have a great analytical value when they are studied by the same researcher in order to increase the possibility to compare them with each other. Considering several assemblages together, as it is possible in case of large-scale salvage programs, enables, with the help of multivariate analyses, to confirm the reliability of the patterns observed.

Zusammenfassung

Augrund fehlender archäologischer Forschungen sind die Frühgeschichte und die antike Vergangenheit des Oberen Tigris (in der Südtürkei) bis heute wenig bekannt. In den vergangenen 10 Jahren wurden viele Projekte in diesem Gebiet unternommen, um das kulturelle Erbe dieser Region zu dokumentieren, welche künftig vom Ilisu-Staudamm überflutet wird. Trotz der zunehmenden archäologischen Untersuchungen zwischen den Städten Bismil und Siirt, wurden einige wichtige Forschungsfelder kaum berücksichtigt, so auch die sozioökonomischen Faktoren früherer Gesellschaften: die Nutzung von Ressourcen tierischen Ursprungs. Dieses Thema beinhaltet die Aspekte der Landschaftsnutzung, dem Wirtschaftssystem und der kulturellen Eigenheiten. Zur Beantwortung dieser Fragen wurden Faunenreste aus archäologischen Grabungen in sieben Siedlungen an den Ufern der Flüsse Tigris, Botan und Bitlis untersucht. Die Materialsammlungen stammen aus Schichten, die vom 3. bis ins 1. vorchristliche Jahrhundert datieren und in allen ausgewählten Fundplätzen anzutreffen waren. Diese Zeitepoche war geprägt von rapiden Veränderungen der politischen Struktur dieser Region mit einem klar definierten ökonomischen und kulturellen Wesen. Die Untersuchung der Faunenreste ermöglicht es, alle Siedlungen bezüglich der Subsistenzstrategie sowie den sozioökonomischen Aspekten zu vergleichen. So scheint es, dass in allen chronologischen Phasen ein breites Nutzungsspektrum existierte. Neben den Haupt-Haustierarten wie Rind, Schwein, Schaf und Ziege, waren auch die Nutzung von Rotwild und Equiden wichtige Faktoren der Variabilität, die der spezifischen Auswahl der diese Siedlungen bewohnenden Gesellschaften zugrunde lag. Die Auswahl und Art der Tiernutzung wurde weiterhin – je nach Epoche – von den lokalen Umweltbedingungen sowie der wirtschaftlichen Ausrichtung beeinflusst. Diese Variabilität muss zur vergleichenden Betrachtung der Subsistenzstrategie auf überregionaler Ebene berücksichtigt werden. In der Tat zeigen das Obere Tigris und speziell die kleineren untersuchten Siedlungen, ein weniger homogenes Bild, als erwartet. Hierin wird die Notwendigkeit der Untersuchung kleinerer Siedlungen, eingebettet in eine ländliche Umwelt, neben den großen städtischen Siedlungen, deutlich; denn auch diese kleinen Siedlungen spielen eine wichtige Rolle in der sozioökonomischen Komplexität der Bronze- und Eisenzeit. Schließlich muss festgehalten werden, dass auch kleine Faunensammlungen großen analytischen Wert haben, wenn sie vom selben Forscher untersucht werden um die Möglichkeiten eines optimalen Vergleiches auszuschöpfen. Die zusammenfassende Betrachtung mehrerer Sammlungen – so wie es im Fall großflächiger Rettungsgrabungen möglich ist – und die Anwendung multivariater Analysen können die Aussagekraft der zu untersuchenden Aspekte bekräftigen.

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I. Introduction

A. Research problematic

The Upper Tigris area has been recently densely researched on an archaeological point of view with more than 20 archaeological excavations. All these projects aimed at documenting the cultural heritage in the basin of the future Ilisu Dam Lake. The cultural developments which took place in the area are now better known thanks to the study of numerous archaeological materials. However, the way animal resources were exploited in the area has not been studied in great details yet. The aim of this project was to fill up this gap for the Bronze and Iron Age periods (i.e. between the 3rd and 1st millennia BC).

The idea of a project focused on a regional scale rather than a single-site study was promoted by the rather rare high density of archeological excavations taking place between the cities of Bismil and Siirt. Salvage projects present, however, some disadvantages directly linked to their urgent nature. Most of the excavations took place during a few seasons and their aim was to document the history of the settlement but certainly not to excavate it in its integrality. As a result exposed areas can be small and the faunal remains only a few. The limited amount of time available for the excavations also directly influenced the collection methods. Flotation and sieving operations could not have been run on a regular basis. The quality of the faunal assemblages depends on the conditions described here above. Therefore, most of the faunal assemblages available had a limited quantity of faunal remains and were likely to lack of smaller elements. One of the challenges of this research was to extrapolate as much information as possible from these assemblages knowing in advance the limits of their scientific potential. In this regard the simultaneous investigation of several assemblages by the same researcher represents an important advantage to compensate some of the biases by a broader view. The comparison of several contemporary settlements within a well-defined geographical area (the Upper Tigris River Area) is a key element to allow the separate evaluation of several factors which could have influenced the patterns of animal exploitation. The sites situated in the Siirt area (Başur Höyük and Türbe Höyük) are close enough to have experienced the same environmental, political and cultural background. However, they are far enough from the other sites of the study to be used as “foreign elements” to test the homogeneity of the other settlements and to search for common denominators.

The sites considered in this study were small rural settlements in a period where large urban centers were already present. Considering the history of archaeological researches in Turkey, it is unlikely that these small sites would have been investigated outside of a salvage project. It is also why this research aims at understanding the socioeconomic organization of societies inhabiting smaller sites embedded in a rural environment. Besides stating which species were exploited and in which proportions, this study aims at defining more precisely discrete exploitation patterns in order to identify the peculiarity of each assemblage. The socioeconomic diversity of small rural sites is not very well known and probably underestimated. It was intended with this research to quantify this diversity.

In terms of chronological range, the choice to focus on a time span between the 3rd and the 1st millennia BC was not exclusively encouraged by the availability of several faunal assemblages for

these time periods. Several cultural and political developments took place in southern Anatolia and northern Mesopotamia during this rather short time span and it was very tempting to investigate their influence on the patterns of animal exploitation. In northern Mesopotamia, a new movement of urbanization started around 2600/2500 B.C. with an increase in social complexity. In northern Mesopotamia this phenomenon was characterized by a new way of mass production to feed these cities (Ur, 2010). This could be done by a focus on sheep and goat, an increase in cattle exploitation and a rarefaction of hunting (Clason and Buitenhuis, 1998). Whether this phenomenon also took place in the Upper Tigris area is not completely clear. However, it was considered that it would be a good chronological starting point to study the faunal remains. Unfortunately, this period is not very well represented in the Upper Tigris area. What could have been documented is rather dated to the very end of this period and the beginning the Middle Bronze Age.

In the Middle Bronze Age, P. Bartl presents the Upper Tigris area as a self-contained area where different spheres of interaction from the Euphrates region, northern Mesopotamia and eastern Anatolia, meet a distinctive local cultural complex (Bartl, 2005: 159). Bartl wonders if the confrontation of local culture and external influences could be reflected in other material remains or social organization. This is one of the main goals of this research: to define the patterns of exploitation of animal resources in the Upper Tigris area in order to be able to compare this important cultural and social marker with the ones known from neighbouring regions in similar periods. The Middle Bronze Age culture is a local phenomenon restricted to the Upper Tigris Valley between Diyarbakır and the Botan Valley with few connections to the regions located south of the Tur Abdin. In contrast, the Late Bronze Age material culture is clearly linked to northern Mesopotamia (Schachner, 2003: 151). Whether this assumption can be verified through animal exploitation could not be checked before, due to a lack a zooarchaeological work in the Upper Tigris River valley. It is in order to unable the targeting of this question in a near future, that this research was designed.

B. Geographic setting

1. Spatial definition

This research is tightly linked to the salvage projects of the cultural heritage which will be flooded in the reservoir lake of the Ilisu Dam. This area is strictly defined by the extent of the future lake from Bismil in the west to the village of Ilisu in the east along the valleys of the Tigris, Batman, Garzan and Botan Rivers. However, this definition is on one hand too restrictive compared to the geographical continuity west of Bismil and on another hand it encompasses rather distinct areas. Therefore, different terms will be used in the study. The Upper Tigris area can be more broadly defined as the region surrounded by the southeastern Taurus Mountains to the north, the Tur'Abdin Mountains to the south, from the Hazar Lake¹ in the west up to the Şeyhömer Mountains in the east. The Upper Tigris area includes the Tigris River Valley and the lower valley of the main tributaries up to Cizre where the Tigris Rivers enters the northern Mesopotamian plain (Fig. I.1). The Upper Tigris River Valley does not include the sites situated on the tributaries' banks such as Türbe Höyük and Başur Höyük. For more precision the names of the modern cities will be used. The Bismil-Batman transect refers to the broad alluvial plain west of the Tigris Canyon. In this area, Erol defines two

¹ Hazar Lake is the most west source of the Tigris, another one being the "Tigris Tunnel" in Birkleyn (Schachner, 2009a).

distinct geographical areas, the first one being around Diyarbakır and up to Batman with terraced plateaus surrounded by 800 to 900m high hills. The second area between Batman and Siirt is characterized by anticline formations (Erol, 1983: 160). There, the Tigris River, at least between Batman and the junction with the Garzan River, is much more narrow and sometimes described as the “Canyon”. The Siirt area will be a general term for the sites situated on the Botan and Bitlis Rivers Valleys. The Siirt area is of particular importance due to its location on main routes used by nomads to go from the winter pastures in the north Mesopotamian plain to the summer pastures situated in the high mountain range around Lake Van (Velibeyoğlu et al., 2002: 855, Algaze, 1989: 253).



Figure I.1. General map showing the location of Diyarbakır close to the source of the Tigris and the situation of the Upper Tigris River valley between montain ranges. Map courtesy S. Champlot.

2. Climate and vegetation

The Upper Tigris region is situated in the southeastern Anatolia climatic zone and therefore experiences mild and wet winters while the summers are hot and dry. Nowadays rainfall has an annual average of 500-700 mm which allows the cultivation of cereals without irrigation (Tab. I.1). Environmental indicators show that during the 3rd mill. and up to the mid- 2nd mill. BC, humidity levels were similar to those of today with the exception of two drought events ca. 2150 and 2050 BC. In the second half of the 2nd mill. BC the humidity was significantly lower than today (Kuzucuoğlu,

2007: 469). The Upper Tigris region is at the border between the southeastern Anatolia and the eastern Anatolia broad geographic regions. The main vegetation unit of this area is the Anatolian *Artemisia* steppe and wheat and barley are the traditional crops there (Zohary, 1973).

	Diyarbakır	Batman	Siirt
Elevation (m)	677	533	895
Mean Winter Temperature (°C)	3	3	4
Mean Winter Monthly Rainfall (mm)	72	80	94
Mean Summer Temperature (°C)	29	27	29
Mean Summer Monthly Rainfall (mm)	3	0	4
Rainfall Annual Average (mm)	500	600	700

Table I.1. Meteorological average values for the last 30 years from data of the Turkish State Meteorological Service (www.dmi.gov.tr).

3. Geology

The geomorphology and geoarchaeology of the region had only been studied in detail between Bismil and Batman (Doğan, 2005, Kuzucuoğlu, 2002). The higher terrains of the Tigris River Valley between Bismil and Batman consist in an erosional terrace 40m above river level. A second terrace, only preserved in some patches, is located 30m above river level. The erosion of Pleistocene terraces created small natural hills on which some settlements such as Giricano are located. Thick alluvial fill formed a terrace 9-10m above the river on which lies sites such as Müslümantepe and Kavuşan Höyük. Another terrace, 4-5m above the river and constituted of flood plain aggradation deposits, buried partly some of the earlier settlements of the area (Kuzucuoğlu, 2002: 768). Geomorphological analysis suggests that during a part of the period discussed in the study, approximately from the mid-3rd mill. BC to 1200 BC, there was an accumulation of sediments due to the flooding of the Tigris River and its tributaries. The areas situated on the banks of the river were therefore not suitable for habitation. After 1200 BC it seems that the Tigris River was in an incision period (Doğan, 2005: 80-2). The risk of flooding during the 3rd and 2nd mill. BC might be the best explanation for the geographic location of most of the sites. The position on natural hills or on the edge of the terraces offers the opportunity to overlook the plain and to avoid river floods. In recent times, serious flooding in the 1970s forced the villagers of Salat to move further inland (Şenyurt, 2002: 695). The importance of the flooding which took place in ancient time is attested by alluvial layers, sometimes thick enough to recover partly archaeological mounds (Şenyurt, 2002: 695). For instance, one phase of flood deposits started in the first half of the 3rd mill. B.C. and covered partly early settlements as well as the EBAI cemetery at Aşağı Salat. It is likely that the distance between the river and the different sites varied through the time, especially during the aggradation phase of the Tigris River. It also means that the river should have carried substantially more water in the 2nd mill BC. Consequently, the areas between the river and the sites could have been more wetlands than nowadays and would have served more as pastures for cattle and pigs than for agricultural purposes (Radner, 2004: 118).

Downstream Batman the geological situation is quite different. There the valley narrows between cliffs. Most of the terrain is constituted of eroded uplands and the density of settlements is lower than in the Bismil-Batman plain.

The situation is quite similar in the Siirt area. The Botan River, as well as the Bitlis River to a certain extent, flows mainly in canyons with very limited space for settlements or agricultural activities. Only along some 15km before its confluence with the Tigris River, the Botan River Valley widens and there some settlements occupy high terraces overlooking low terrains suitable for agriculture (Algaze, 1989: 252).

C. History of the region and archaeological researches

1. Diachronic overview of the region from the 3rd to the 1st mill. BC

In this study, different periods which took place between the 3rd and the 1st mill. BC will be considered. The following chronology will be used in the study²:

Period	Sub-period	Abbreviation	Approx. Dates
Early Bronze Age		EBA	2600-2000
Middle Bronze Age	MBA	MBA	2000-1600
MBA	Late MBA	LMBA	1600-1500
Late Bronze Age	Mitannian	Mit	1500-1300
LBA	Middle Assyrian	MAss	1300-1068
Iron Age	Early Iron Age	EIA	1068-882
IA	Neo-Assyrian	NAss	882-612

Table I.2. General chronological frame of the study. All dates are cal. BC.

a) Early Bronze Age (EBA)

In the second half of the 3rd mill. BC, an important phenomenon in northern Mesopotamia consisted in the appearance of large urban centers (Ur, 2010). This system was going along with a three-tier settlement hierarchy (particularly well documented in northern Jezireh see Wilkinson, 1994: 487-8). A large settlement (i.e. >50 ha) was surrounded by secondary centers (i.e. >10 ha) linked to smaller satellites of 1 to 5 ha. However, topographically fragmented terrains which restrict cultivable area are not so suitable to this hierarchic organization (Wilkinson, 1994: 489) and that is the case of the Upper Tigris area. Indeed no large settlement dated to the EBA has been excavated in the Upper Tigris area. Pir Huseyin, a site situated 40 km north-west of Bismil and therefore not inside the future Ilisu dam lake, is known to have been an important place in the late EBA since a stele of the Akkadian king Naram Sin (2254-2218 BC) was found in the nearby village in 1892. Although the site is not excavated yet, its surveyors suggest that the late EBA occupation could have reached an extension of 19 ha or more. Being therefore one the largest settlements of the Upper Tigris area at that period, it is suggested that it would locally correspond to the large urban centers which appeared in north Mesopotamia during the second half of the 3rd mill. B.C. (Peasnell and Algaze, 2010). In the 3rd mill. BC, the Diyarbakır-Batman area is characterized by ceramics corresponding to the northern Mesopotamian culture while the areas north of the Taurus Mountains present a ceramic of Caucasian origin called “Kuro-Araxes” (results of different excavations and surveys are compiled in Schachner, 2009b: fig. 241). There is unfortunately a lack of well preserved faunal assemblages from that period. It seems that some Middle Bronze Age settlements were installed at

² As explained above the period considered in this study starts with the northern Mesopotamian “second urban revolution” which took place in the second half of the 3rd mill. BC. Therefore only the middle and late phase of the Early Bronze Age are taken into consideration here.

the really end of the 3rd mill. BC on top of the Early Bronze Age remains, and destroying therefore most of them (e.g. in Hirbemerdon Tepe).

b) Middle Bronze Age (MBA)

Radiocarbon dating (Bartl, 2005: fig. 6) and analysis of the stratigraphy at Hirbemerdon Tepe have shown that the MBA could be divided in two phases which will be, for more clearness, designated here Early MBA and Late MBA. Even if the pottery tradition presents some differences between these two phases (Bartl, 2005: 158-9) it is not yet clear that any economic or social change occurred. During the MBA, the Upper Tigris region is bordered in the north-east by a different culture characterized by a painted ware. This “painted ware culture” is related to a pastoral, semi-nomadic and nomadic lifestyle. The high volcanic terrain and mountain slopes that lie in a range of 1,800-2,500m in the Süphan and Ağrı Mountains region are important summer pasturelands today and researchers assume that they had the same role in the MBA (Özfırat, 2005a). If the influence of the “painted ware culture” in the Upper Tigris area is difficult to assess in the archaeological remains, the connections with Mesopotamia are somehow attested as several cities are cited in the archives of Mari³ dated to the end of the 19th-beginning of the 18th cent. BC. (see Karg, 1999 for further references). The Upper Tigris River valley was also part of the great trade route connecting Assur to central Anatolia in the so-called Old Assyrian Period. At Üçtepe, one the main sites in the area at that period, an architectural complex was described as comparable to the large palaces known since the Assyrian Trade Colony Period in central Anatolia (Özfırat, 2005b: 55). However, the ceramic culture for the MBA in the Upper Tigris region is not similar to the ones known in central Anatolia, northeastern Anatolia or northern Mesopotamia (Özfırat, 2005b: 55, Schachner, 2009b: fig. 242). Even if Bartl recognizes some connections with the ceramic tradition of these neighbouring areas, the MBA ceramic tradition of the Upper Tigris area, called “red-brown wash ware” (RBWW) is mostly independent (Bartl, 2005: 159, see also fig.9 p. 160). This RBWW tradition is also present in the Siirt area, which strongly proves that the same cultural system spread from Diyarbakır on the west to the southeastern part of the Taurus Mountains range.

c) Late Bronze Age (LBA)

The Late Bronze Age in southeastern Anatolia is characterized by two main components, the Mitanni period and the Middle Assyrian period. Although Mitannian and Middle Assyrian ceramic cultures are difficult to distinguish from each other, the ceramic finds in the Diyarbakır-Batman-Siirt area clearly suggest that this region belong to these traditions (Schachner, 2009b: fig. 243). Therefore, during that phase the material culture is strongly related to the regions south of the Tur Abdin Mountains, namely Northern Mesopotamia.

(1) Mitannian Period (Mit)

The Heartland of the Mitannian State is the Jezireh south of the Taurus Mountains. This political entity was of Hurrian culture. During the 15th and 14th cent. BC, Üçtepe seems to have lost its importance and became a smaller settlement (Özfırat, 2005b: 59). However, it is known that the Upper Tigris basin played an important role in the later phase of the Mitanni State and the ancient city of Ta’idu (probably modern Üçtepe) became a capital at the end of the 14th cent BC (Wilhelm, 1989: 89).

³ Nowadays known as Tell Hariri, it is an important archaeological site on the banks of the Euphrates River close to the Syrian-Iraqi border.

(2) Middle Assyrian Period (MAss)

The Upper Tigris area, or at least the part south of the Tigris, was under Middle and then Neo-Assyrian influence from the 13th to the end of the 7th cent. BC with the exception of a hiatus from the mid-11th to the early 9th cent. BC. Assyrian power was established in the Upper Tigris River valley during the MAss but it does not seem that the Assyrians kings crossed the river. All their cities, Tušhan (modern Ziyaret Tepe), Ta'idu (modern Üçtepe) and Sinābu (modern Pornak⁴) are situated on the southern bank of the Tigris River (Radner and Schachner, 2001: 766). However, the left (northern) bank of the Tigris front of these cities was also under their influence as it can be seen from the ceramic finds (Schachner, 2009b: fig. 243) and the Middle Assyrian inscriptions belonging to the *dunnu* at Giricano. Due to the ductus used in the texts from Giricano, Radner (2004: 53-4) suggests that the Assyrian central administration had a strong influence even in distant regions as the Upper Tigris.

In term of agro-pastoral use of the area during the MAss, some of the settlements, at least Giricano⁵ (Radner, 2004: 69-70), correspond to a kind of rural establishment called *dunnu*. According to Wiggerman (2000), the *dunnu* was a fortified agricultural production center. This type of property was granted to a family by the King. Usually the owner of the *dunnu* stayed in a nearby city. For the case of Giricano, the owner of Dunnu-ša-Uzibi lived in Tušhu (nowadays known as Ziyaret Tepe), just across the river from Giricano (Radner, 2004: 71). The *dunnu* system clearly indicates that agricultural production was an important aim of the Middle Assyrian presence in the Upper Tigris area. This agricultural policy as well as the Middle Assyrian military presence could have created disadvantages for mobile pastoralists. Indeed, alteration of migration routes, the reduction of raiding possibilities or the expansion of cultivated lands would have pressured pastoralists and encouraged their sedentarization and in this case the rise of Aramean dynasties (Szuchman, 2007: 159-161). Assyrians lost the control on the Upper Tigris region because of the Arameans, tribal groups with diverse economic and mobility patterns⁶, shortly after 1068 BC. Indeed, the Upper Tigris region and the Tur'Abdin Mountains were the places of fights between Assyrians and Arameans during the first part of the 11th cent. BC. Due to this period of instability and the retreat of the Middle Assyrian organization, the *dunnu* system probably collapsed in the mid-11th century and then most of the sites were not occupied for a certain time.

d) Iron Age (IA)

(1) Early Iron Age (EIA)

Despite the Aramean victory on the Assyrians, there is no sign of Aramean occupation in the Bismil-Batman-Siirt area⁷ where the most common ceramic type for that period is the Early Iron Age Grooved Pottery which is also known from the regions west, north, northeast and in less extend south of the Upper Tigris area (Schachner, 2009b: fig. 244). This ceramic group, also published as Corrugated Wares is assumed to have been locally produced (Parker, 2003: 529-30). During the period 1050-882 BC, 19 sites are known from surveys in the Upper Tigris River Valley, 10 villages (1-

⁴ Pornak is a not yet excavated large mound situated close to the Tigris along the main Diyarbakır-Mardin road.

⁵ Most of the agricultural lands in the area were probably farmed under the *dunnu* system but the other *dunnu* known from the texts have not been yet assigned to a specific archaeological site.

⁶ Szuchman extensively discussed the assumption that Arameans were pastoralists and when they settled (Szuchman, 2007).

⁷ On the other hand Amēdi (modern Diyarbakır) was the capital city of an Aramaic tribe known as Bīt-Zamāni.

4ha) and 9 hamlets (<1ha) most of them situated on easily defensible positions (Parker, 2003: 529-30). There was no urban center in the Upper Tigris area during the Early Iron Age before the re-establishment of Tušhan by the Neo-Assyrians.

(2) Neo-Assyrian Period (NAss)

Assyrian power came back in 882 B.C., Tušhan was re-established as an Assyrian city by the king Ashurnasirpal II and became the capital city of a homonymous province which was part of the Assyrian Empire up to the end of the 7th cent. BC. The Assyrian influence is visible from the replacement of EIA Groovy Pottery by Assyrian imperial ceramics of which the production was more centralized (Parker, 2003: 535-6). At that time the Tigris River is seen as a border. The land south of the Tigris is known as the province of Tušhan with its homonym capital city. The land north of the Tigris, called land of Šubria, was a buffer state between Assyria and Urartu before being conquered by Assyrians in 673 B.C. These political and cultural borders are also clear in the ceramic tradition. Neo-Assyrian ceramic is only found on the right (western and southern) bank of the Tigris. Settlements immediately on the left (northern) bank of the Tigris or along tributaries flowing from the north display a distinct Iron Age ceramic tradition. Urartu ceramic is only found around Lake Van and not south of the Murat River (Schachner, 2009b: fig. 245). The area east of the Batman River is a rough terrain not so suitable to large settlements and was not of interest for the Assyrian Kings (Radner and Schachner, 2001: 760-5). No large settlement is known in the Botan and Garzan Rivers areas for the Early Iron Age and Neo-Assyrian period (Sağlamtimur and Ozan, 2007: 7) except a possible fort at the confluence of the Botan and Tigris Rivers (e.g. Çattepe) to control the river traffic going downstream the Assyrian Heartland (Parker, 2003: 551). It is likely that this area east of modern Batman and including modern Siirt was a buffer zone between the Uratian and Assyrian powers (Parker, 2001: 114-24; 148-57, Parker, 2003: 551-2).

The Neo-Assyrian strategy consisted in the integration of the Upper Tigris River valley to the empire focused to an *agricultural colonization* of this fertile area (Baştürk, 2010). Parker also argues for an economic interest leading the Assyrians to occupy the region. He supports the idea that the mountainous areas north of the Tigris were of prime economical importance, not only in the LBA but already in the MBA as timber and metal could be exploited (Parker, 2003: 540). The Neo-Assyrian occupation led to a higher density of settlements in the valley (29 instead of 19 for the EIA) most of them being newly founded. Most of the sites are located on the agricultural land. The settlement pattern shows a clear three-tier organization with a main settlement, Tušhan (Ziyaret Tepe) with 32ha was surrounded by smaller sites of ca. 5ha and hamlets of ca. 1ha. Assyrian put a lot of efforts in the area to turn the small settlement of Ziyaret Tepe in the EIA (ca. 3ha) into a provincial capital with large buildings and elite goods and strong administration (for the Neo-Assyrian tablets found at Ziyaret Tepe see Parpola in Matney et al., 2005: 29-31). Villages seem to have been involved in specialized productions but not in the herding of numerous sheep and goats. Instead the local animal economy is supposed to be based on domestic pigs. Parker justifies this hypothesis by the Assyrian imperial monopoly on some part of the economy like wool production (Parker, 2003: 541). When he wrote this hypothesis, Parker could only benefit from the analysis of the Boztepe faunal remains (Cavallo and Maliepaard in Parker and Creekmore, 2002: 56-9). This study provides unpublished data from other sites which will help in clarifying the patterns of animal economy in the Upper Tigris area during the NAss.

Shortly after the fall of the Assyrian center Niniveh in 612 BC, the organization of the Upper Tigris area completely changed. The administration centers and military garrison camps were largely deserted. Workshop working under the state control, trade using secured routes, transport of raw material to urban centers along the Tigris and the agricultural activities under state supervision went to an end due to the collapse of the centralized system (Köroğlu, 2008: 337). From an archaeological point of view, the Post-Assyrian occupations are usually badly known due to the erosion or later perturbation of the upper levels of the sites. However, medieval layers have been well studied at Ziyaret Tepe (Matney et al., 2009, Matney et al., 2007). After the end of the Assyrian state at the very end of the 7th cent. BC., the Upper Tigris area was probably under the control of the Medes and then belonging to an Achaemenid satrapy.

2. History of research

The Upper Tigris area has been described until recently as *terra incognita* by archaeologist. Early researches⁸ were quite limited. Between 1861 and 1863 J.G. Taylor traveled in the region and performed some researches notably in Üçtepe (named Kurkh at that time) (Taylor, 1865). In the last years of the 19th cent. AD, F.F.C. Lehmann-Haupt also visited the region and mentioned the medieval settlement of Hassankeyf as well as the site currently called Çattepe at the confluence of the Tigris and Botan Rivers (Lehmann-Haupt, 1910). In 1946, K. Kökten performed a survey in Diyarbakır district and adjacent areas (Kökten, 1947). The Diyarbakır-Batman-Siirt area attracted much more archaeologists after the beginning of the project initiated by R.J. Braidwood and H. Çambel in the early 1960s and which resulted in the famous excavations at the Neolithic site of Çayönü Tepesi (Çambel and Braidwood, 1980). From the 1970s, the Republic of Turkey has decided to build several dams on the Euphrates and Tigris Rivers as part of the Southeastern Anatolia Project (GAP). In this frame, the number of researches in the Upper Tigris River valley dramatically increased in order to record and protect the cultural heritage of the area. Between 1988 and 1990, a team under the direction of Guillermo Algaze surveyed a part of the Ilisu and Batman dam basin on the Tigris River (Algaze, 1989, Algaze, 1992, Algaze et al., 1991, Algaze and Rosenberg, 1991). In the same time, Üçtepe was excavated between 1988 and 1992 by a team from Istanbul Üniversitesi led by Prof. Dr. Veli Sevin (Sevin, 1989, Köroğlu, 1998, Özfırat, 2005b). The site is situated 10 km west of the city of Bismil and therefore just outside the area concerned by the salvage excavations due to the construction of the Ilisu dam. Since the end of the 1990s, surveys and excavations are going on in the Tigris River Valley west of the town of Bismil up to the village of Ilisu to the east and also on some tributaries' valleys (Tuna et al., 2004, Tuna and Öztürk, 1999, Tuna et al., 2001, Tuna and Velibeyoğlu, 2002).

⁸ An extensive review of early travels and researches in southeastern Turkey has been published by Günay and Whallon (1980).

3. Archaeological sites⁹

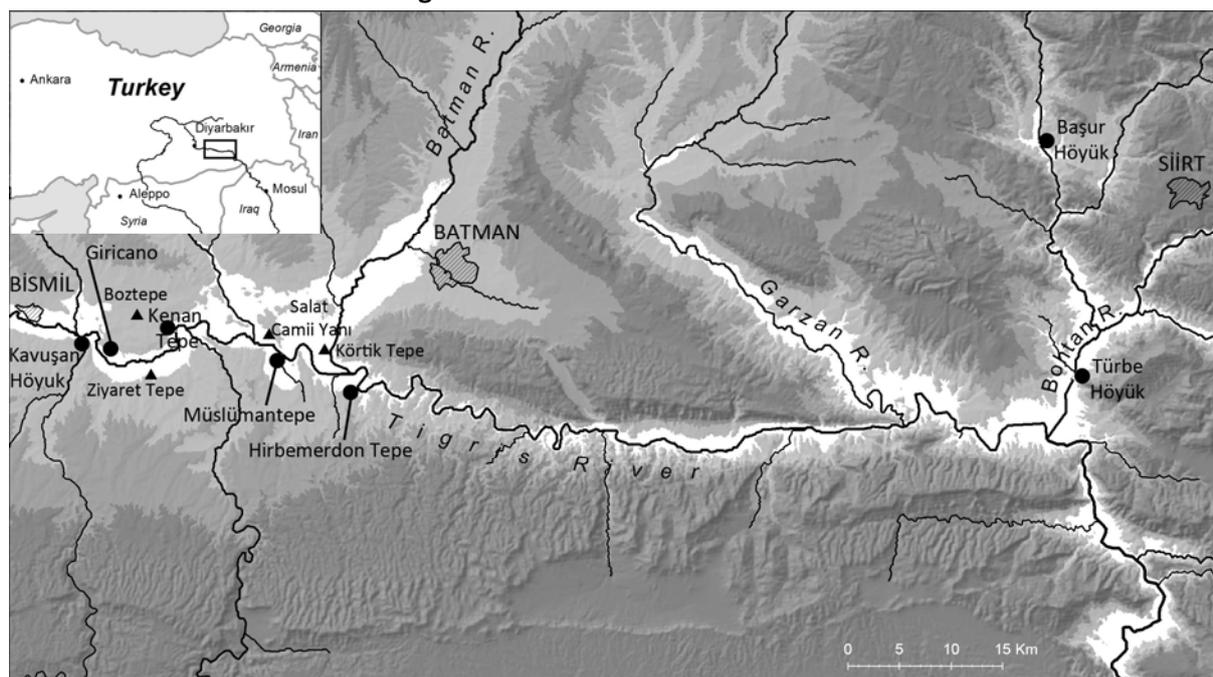


Figure 1.2. Location of the sites studied in this research (circles) and other sites mentioned (triangles). Map courtesy of Dr. Jason Ur.

a) *Kavuşan Höyük (KH)*

The site lies on the right (southern) bank of the Tigris, 10km southeast of Bismil at the confluence of the Tigris and Seyhan Rivers. The mound is on a terrace 7-8m above the river and partly eroded by river flooding (Kuzucuoğlu, 2002: 768, Doğan, 2005: 180). The upper point of the site is situated 538 m above sea level. The settlement covers an area of 1.3 ha for a size of 175x75x8m. After a survey in 2000, the team directed by Prof. Dr. Gülriz Kozbe from the Ege Üniversitesi in Izmir undertook excavations in 2001, 2002 and from 2005 to 2009 (Kozbe et al., 2004, Kozbe, 2007, Kozbe et al., 2008, Kozbe and Köroğlu, 2004, Kozbe et al., 2003, Kozbe et al., 2009) which are now followed by study seasons. The excavations revealed occupations layers dated from the MBA, Mit/MAss, EIA, NAss, Post-Assyrian and Medieval periods. Animal remains considered in this study were uncovered during the 2005, 2006 and 2007 seasons come from the Mit/MAss and NAss occupation levels.

(1) Mitanni and Middle Assyrian Period

In one excavation area (G7) animal bones were found in areas characterized by pebble floors and fire traces (Kozbe et al., 2008: 394). In another one (G8) animal bones were found in garbage pits together with ashes and metal slags.

(2) Neo-Assyrian Period

Close to 50 spindle whorl were found in the area F13. Kozbe suggests that the people living in the small size settlement of Kavuşan Höyük could have specialized in the production of textiles which would have been traded with the larger settlements of the area (Kozbe, 2007: 575-578). In the G14 area the features are linked to food-preparation activities. In the G7 area animal bones were found in

⁹ Archaeological sites of which unpublished faunal remains have been analyzed in the frame of this study are presented here. The sites are presented following a western to eastern order.

garbage pits (Kozbe et al., 2008: 392). Also in the area F13, the pit n°30 was full of heavily burnt animal bones (Kozbe et al., 2008: 392). This pit is situated at the same level as the human cremations found in pots. Although no human bones were found along with the burnt animal bones, one of the questions is whether this deposit of heavily burnt animal bones could be due to a ritual activity linked to the human cremations. In the area F12, more than 30 complete vessels close to *tandır* ovens were found in an area interpreted as a kitchen or a storage facility (Kozbe et al., 2009: 203). It is also known that grape production was an important economic activity during the Neo-Assyrian period at Kavuşan Höyük as features linked to wine production were excavated in the area G13 (Kozbe et al., 2009: 206-7).

b) Giricano (GT)

Giricano lies at the left (northern) bank of the Tigris in the Province of Diyarbakır, ca. 11km south-east of the city of Bismil. The medium-sized tell (ca. 170x120x25m) is situated on a natural elevation, remnant from a heavily eroded terrace 30m above river level (Doğan, 2005: 180), which protects the settlement from flooding. It was also an ideal site for controlling the river traffic (Radner, 2004: 1). The site has been excavated from 2000 to 2003 by a team of the Institut für Vorderasiatische Archäologie at the University of Munich directed by Dr. Andreas Schachner (Bartl, 2005, Radner, 2004, Schachner, 2004, Schachner, 2002, Schachner et al., 2002, Schachner and Schachner, 2003). The site has been settled since the 4th mill. BC up to the 1st mill. BC. However, the site was not occupied between the Chalcolithic period, not considered here, and the 2nd mill. BC.

(1) Middle Bronze Age

Three buildings which should have covered most of the tell (Schachner et al., 2002, Bartl, 2005: 158). The settlement at that time is considered as a small village probably connected to the large urban settlement of Ziyaret Tepe on the opposite side of the Tigris. However, the three buildings looking carefully planned do not correspond to the characteristics of a normal village settlement and most probably reflect the influence of a central authority. It is supposed (Bartl, 2005: 158) that this type of settlement (i.e. small planned centers) were used to control the cultivated land in the vicinity. This assumption might derive from the well known organization pattern *dunnu* of the following MAAss period. On the point of view of the ceramic assemblage, Giricano in the MBA is said to be close to Kenan Tepe (Bartl, 2005: 158). This might indicate that the MBA layers at Giricano, even if the stratigraphic sequence seems to cover a large part of the MBA, are mostly from the first third of the 2nd mill. BC.

A preliminary study of botanical remains (Pasternak in Schachner et al., 2002: 586, 607-8) showed that in the MBA all common cereal species were present with a domination of barley (*Hordeum vulgare*). Legumes were represented by lentil (*Lens culinaris*) and grass pea (*Lathyrus sativus*). The presence of grapevines (*Vitis* sp.) in the MBA sample is to be mentioned as an early example for the region.

(2) Middle Assyrian Period

Remains of the Middle Assyrian period were uncovered at Giricano on an area of ca. 240m² between 2000 and 2002 (Radner, 2004: 5, Schachner, 2002: 27-8) in the central part of the mound. These remains are situated directly above the level of the Mitannian period. With three to four Middle Assyrian strata, the archaeologists suggest a span of 120 to 160 years for this occupation at Giricano. The layers of the Middle Assyrian period have been disturbed by later pits and burials. The

latest phase of this period is characterized by pits used first for storage and only later used as rubbish dumps. The pit 01:53 (the largest of the site with 9m³) yielded a large amount for the site of faunal remains. This pit has been dug at the end the period through the older Middle Assyrian levels as well as Mittanian and Middle Bronze Age layers. It was probably used to store provisions like grain before being used as a rubbish dump. Close to the pit 01:53, texts on clay tablets have been discovered in a pottery vessel. They have been published by Radner (2004) and constitute a detailed source of information on agricultural activities and social organization at the site during the second quarter of the 11th cent. BC. Therefore, it is known that the settlement of Giricano was named *Dunnu-ša-Uzibi* during the Middle Assyrian period. This *dunnu* was linked to the city of Tušhu (nowadays Ziyaret Tepe) where its owner lived.

(3) Early Iron Age

The earliest level at the site belongs to the EIA period with the characteristic Groovy Pottery. However, the architectural remains are not well preserved and therefore it is difficult to reconstruct the context of the finds.

c) Kenan Tepe (KT)

The mound is on a high terrace formed by erosion some 30m above the river (Kuzucuoğlu, 2002: 768, Doğan, 2005: 180). The site lies on the left (northern) bank of the Tigris River, 10km east of Bismil. The part of the site which has not been eroded by the Tigris River covers approximately 4.5 ha. The highest point of the site is situated approx. 600m above sea level and almost 60m above the river. The site has been excavated between 2000 and 2007 by a team directed by Assoc. Prof. Bradley Parker of the University of Utah (Berthon, 2010, Creekmore, 2007, Parker, 2007, Parker, 2009, Parker et al., 2002a, Parker et al., 2004, Parker et al., 2003a, Parker et al., 2002b, Parker et al., 2003b, Parker et al., 2006, Parker et al., 2008, Parker et al., 2009, Parker and Swartz Dodd, 2003, Parker and Swartz Dodd, 2004, Parker et al., 2005, Swartz Dodd et al., 2005). The site was occupied during the Ubaid period (2nd quarter of the 5th mill. BC), the Late Chalcolithic and part of the EBA periods (mid-4th to mid-3rd mill. BC), the MBA and the EIA. However, the faunal remains studied here are only coming from the MBA layers in trench C and D whose study is under the direction of Lynn Swartz Dodd from the University of Southern California.

(1) Middle Bronze Age

After a gap in the occupation of the site in the second half of the 3rd mill BC, the MBA settlement was restricted to the higher mound which makes a small area of approx. 1.1ha. Even small, the MBA occupation appears to have been quite sophisticated with well-built stone structures interpreted as a domestic compound in Area C and a large public building and a street in Area D. Both sectors were equipped with pyrotechnical facilities. These installations, together with remains from metal processing, show that the economy of the settlement was at least partly dealing with metal as copper, low tin bronze and lead. Parker also considers wine and grain as secondary trade goods beside metal.

In Area C the animal bones come from activity surfaces and from pits within domestic complex with a working area and storage facilities. In Area D the faunal remains come mostly from accumulation of debris along the walls of the structures.

(2) Early Iron Age

After another occupation hiatus, there is no evidence for LBA occupation, remains of a EIA settlement were found directly above the MBA layers. An indigenous Anatolian village of a maximum size of 1.1 ha was settled around 1100-900 BC. Then, there is no sign of Neo-Assyrian occupation at the site.

d) Müslümantepe (MST)

Müslümantepe lies at the right (southern) bank of the Tigris in the Province of Diyarbakır, ca. 25km south-east of the city of Bismil. The mound is situated on both a terrace 9m above the river level and another one 4-5m above the river level. The site has been partly eroded by river flooding (Kuzucuoğlu, 2002: 767, Doğan, 2005). On the south the site is bordered by a natural hill. The site was first visited by Algaze and his team (Algaze et al., 1991) and then surveyed by E. Ay and his team in 1999 (Ay, 2001). Excavations started in 2000 and are still going on under the direction of Asst.Prof.Dr. Eyyüp Ay from the University of Gaziantep. The site is constituted of two mounds, Müslümantepe and Hıristiyantepe and a flat area known as the Cemetery 150 m south of the mounds. Müslümantepe mound was used as a cemetery in the Medieval Period which caused the disturbance of the Neo-Assyrian layers (Ay, 2002, Ay, 2004). On Müslümantepe and Hıristiyantepe, remains from the late 3rd and 2nd mill BC were mainly excavated. but the area was also settled during the Obeid period. In the Cemetery area, the archaeologists are working on period anterior to the 3rd mill. BC. The original size of the settlement is estimated up to 20 ha but a large part of it on the river side has been destroyed by floods and erosion. It is also likely that most of the IA and later layers are situated under the modern village¹⁰.

Two main periods, the MBA and MAss are represented in the faunal assemblage analyzed. Among the MBA remains, a burnt temple with in-situ objects have been discovered in 2008. In the same excavation sector a *bullae* dated to the Old Assyrian Trade Period was discovered in a storage facility. The find confirms the existence of roads used by the Assyrian merchants to go to central Anatolia through the Upper Tigris Valley. It is also a clue for the participation of this settlement into this trade network.

e) Hirbemerdon Tepe (HT)

Hirbemerdon Tepe lies at the right (southern) bank of the Tigris in the Province of Diyarbakır, ca. 30km south-east of the city of Bismil close to the confluence of the Batman and Tigris Rivers. The site is composed of a High Mound of ca. 1.5 ha and an Outer Town of ca. 2 ha. The archaeological researches started in 2003 under the direction of Dr. Nicola Laneri from the Istituto Italiano per l’Africa e l’Oriente (Laneri, 2006b, Laneri, 2008, Laneri, 2005, Laneri, 2006a, Laneri, 2007, Laneri et al., 2006, Laneri and Schwartz, 2008, Laneri et al., 2008, Laneri et al., 2009, Laneri et al., 2007). Even if some remains from the Chalcolithic Period (in the case the first half of the 4th mill. BC) have been found in the Outer Town, most of the occupation layers are dated from the 3rd to the 1st mill. BC and were excavated in the High Mound.

(1) Early Bronze Age

The earliest phases of the EBA period (i.e. EBA I-EBA II, ca. 3000-2500 cal. BC) have been reached in Area D and E on the southern and eastern sides of the High Mound (Crescioli and Laneri, in press). Remains of the latest phase of the EBA (i.e. EBA IV, ca. 2200-2000 cal. BC) are located

¹⁰ E. Ay personal communication in December 2010.

mainly on the northern side of the High Mound and were badly damaged during the construction of the MBA complex.

(2) Middle Bronze Age

One of the main phases of occupation at Hirbermerdon Tepe took place during the first half of the 2nd mill. BC. when the entire north side of the High Mound was covered by an architectural complex built of stone foundation walls with a mud-bricks superstructure. Because of the steep slope of the mound, the complex is organized on terraces connected by staircases, ramps and sloped outdoor spaces. The maximum extension of the complex is estimated to 5000 m² of which 1500 m² have been excavated. The complex combined different type of activities such as a ceremonial center and working areas. However, no residential area has been discovered yet. One of the specializations of the working area was linked to the transformation of grape, as a high concentration of grape seeds has been discovered during the excavations. Wine is known as a trade goods available from the Upper Tigris area during the MBA. The ceremonial sector, separated from the working sector by a street, consists of two buildings and two outdoor spaces. The larger outdoor space called *piazza* is considered as the place of public ceremonial activities (Laneri, 2011). Votive plaques (Abend et al., 2010) as well as other objects possibly linked to ceremonial activities and a large amount of animal bones were discovered on the floor of the *piazza*. This assemblage is dated to the earlier part of the MBA (i.e. MBA I, ca. 2000-1750 cal. BC) and is completed by the faunal remains found on the street bordering the ceremonial area. In the *piazza*, the upper fill of the outdoor space also contains a high density of bones. This posterior phase is dated to the later part of the MBA (ca. 1700-1550 cal. BC). This thick filling of the *piazza* and some adjacent areas is interpreted by the excavator as a ritual filling of the ceremonial center (Crescioli and Laneri, in press) although it is difficult to support this hypothesis with a zooarchaeological analyses. Faunal remains were also found in the rooms of the architectural complex but their chronological position within the MBA is more difficult to attest.

(3) Late Bronze Age

During the LBA (ca. 1550-1350 cal. BC) a few features were built above the fill sealing the *piazza*. This layer is unfortunately quite badly preserved due to its proximity with the slope (Crescioli and Laneri, 2011).

(4) Iron Age

After a period of abandonment, the site was re-occupied from the end of the 2nd mill. BC to the mid 1st mill. BC. At Hirbermerdon Tepe, the Iron Age is divided in two main phases: the EIA (1050-900 BC) and the NAss Period (900-610 BC) (Guarducci and Laneri, 2010). The EIA settlement on the High Mound was replaced in the NAss par temporary occupations characterized by numerous garbage pits.

f) Başur Höyük (BH)

Başur Höyük is located in the village of Aktaş, in the Botan Valley northwest of Siirt. The mound measures 250 x 150 m and is 15 m high. It was occupied from the 7th millennium. A five-year program of excavations is being undertaken by Haluk Sağlamtimur of Ege University. One of the most important layers at the site is the Uruk settlement of the second half of the 4th millennium BC (not

studied here as it is outside the chronological frame of this research). Remains of the 1st and 2nd millennia BC were found just below the surface¹¹.

g) Türbe Höyük (TH)

Türbe Höyük lies at the left (eastern) bank of the Botan River in the Province of Siirt, ca. 20km south-west of the city of Siirt and ca. 100km south-east of the city of Bismil. The point of confluence of the Botan and Tigris Rivers is situated 6 km south of Türbe Höyük. The site is situated on the edge of a high terrace overlooking low terrains suitable for agriculture (Algaze, 1989: 252). The site has been visited by different teams (Velibeyoğlu et al., 2002, Algaze, 1989, Algaze et al., 1991, Benedict, 1980) and then excavated between 2000 and 2007 by Yard.Doç.Dr. Haluk Sağlamtimur of the Ege Üniversitesi from Izmir (Sağlamtemir, 2004, Sağlamtimur and Ozan, 2007). The site is approximately 100x40m large. The site lies in a narrow flood plain between the Botan River on the west and the Şey Ömer Mountains on the east. The site could have been a stopover or a control point on the road linking Mesopotamia to the Bitlis area and the mountainous pasture lands of eastern Anatolia. The earliest remains in the site consist of graves dated back to the 6th millennium BC. Then the site was settled during the Halaf, Obeid and Uruk periods.

(1) Middle Bronze Age

The next occupation layer after the 4th mill dates to the MBA (ca. 1760-1510 cal BC from 14C analysis). The MBA architecture is made of stones. A tablet, unfortunately badly preserved, has been discovered during the excavations. Despite its fragmentary nature, this is a clue for the existence of a complex administrative background (Sağlamtimur and Ozan, 2007: Çiz.4b, Fot.3). The tablet fragment, studied by K. Radner, is dated to the end of the MBA around the mid 2nd mill. BC due to the ductus and vocabulary. The text is written in cuneiform script and Akkadian language, linking this region with Mesopotamia. Only a few words are preserved on the tablet. Interestingly, it is question of trade station and road but also of male sheep (ram or wether), lamb, ewe, weavers and textiles.

(2) Middle Assyrian Period

A fortress was built on the site during the Middle Assyrian period (14C 1300-1030 cal. BC) with a 70m long protective wall facing the Botan River. South of it, a dozen of buildings of no military nature were excavated. The last impressive architectural remains at Türbe Höyük date back to the Late Bronze Age as it seems that the site was abandoned then.

4. Zooarchaeological background

Even if the field of zooarchaeology will benefit from the important raise of excavations in the Upper Tigris area, the amount of published material is still quite low especially for the Bronze Age, Iron Age and later periods. Zooarchaeologists are involved in most of the current archaeological projects in this area but the results of their research are not published yet. Available faunal data are briefly listed below. Considering that more than 20 sites were excavated in the area of the future Ilisu Dam Lake, the amount of zooarchaeological data available is still low (Tab. I.3).

¹¹ H. Sağlamtimur personal communication in December 2010.

Site	Period	NISP	Reference
Körtik Tepe	PPNA	369	(Arbuckle and Özkaya, 2006)
Salat Camii Yanı	Pottery Neolithic	2014	(Miyake et al., 2009)
Kenan Tepe	Ubaid	392	(Parker et al., 2008)
Boztepe	Halaf and Iron Age	100	(Parker and Creekmore, 2002)
Ziyaret Tepe (Op. E)	From EBA to Iron Age	2745	Greenfield unpublished
Ziyaret Tepe	Iron Age and Medieval	2971	(Matney et al., 2009, Matney et al., 2011)
Ziyaret Tepe	Medieval	1059	Berthon unpublished

Table I.3. Overview of available zooarchaeological data from excavated sites located in the area of the future Ilisu Dam Lake.

II. Material and Methods

A. Definition of the assemblages

Among the faunal remains studied during this research, not all of them will be taken into account. Only selected assemblages will be analyzed. Due to the presence of several occupation layers on each site, the faunal remains will be analyzed and grouped in different assemblages representing each a chronological period and/or an archaeological context (Fig. III.34). An assemblage depends primarily on the loci that the zooarchaeologist decides to consider together. This decision was taken with the help of information provided by the excavators. Only loci without any suspicion of intrusion of material from older or younger levels were selected. Selected assemblages are dated between the 3rd and the 1st mill. BC and contain at least one hundred identified specimens (NISP \geq 100). This quantitative threshold aims to limit biased interpretations due to the consideration of assemblages containing only a small number of remains. The latter could not be representative enough of the animal exploitation which took place in a given place during a given chronological period. All assemblages do not have the same resolution depending on the site and chronological period. Differences are due to the quality of the chronological attribution (accuracy of the ceramic typology and range of the radiocarbon dates) and the discovery context (e.g. spatial resolution and relation with architectural features). In some cases, assemblages will be subdivided and considered both separately and jointly. The analysis of different combinations of loci aims to investigate intra-site variability as well as the homogeneity of chronological periods. Before a qualitative overview of the whole material, selected assemblages for each site are presented and discussed hereunder.

1. Kavuşan Höyük

a) *Late Bronze Age*

Due to the difficulty in the Upper Tigris area to sort the Mittanian from the Middle-Assyrian material cultures, the Late Bronze Age faunal assemblage will be considered as a whole, being a possible palimpsest of both sub-periods. Faunal remains were recovered on floors next to fire traces and from garbage pits. It is assumed that the faunal assemblage reflects domestic activities such as refuse of butchery and kitchen activities.

b) *Neo-Assyrian*

A Neo-Assyrian layer has been documented in details at Kavuşan Höyük. In these contexts, faunal remains are also related to food production activities and consumption refuses. One exception is constituted by pit n°30 (code BSG) which was filled by cremated bones and close to cremated human remains in urns. This pit will be designated following its locus code "BSG". The faunal composition of the "BSG" assemblage is very different from the assemblage yielded from other Neo-Assyrian features at the site. The presence of at least 14 almost complete skeletons of sheep and goat characterize the assemblage from pit "BSG". It is assumed that this is mainly due to the nature of the deposit. However, it should be also noted that heavy burning made the faunal remains difficult to identify and valorised smaller elements of medium size animals, rather than long bones of larger mammals. For these reasons the Neo-Assyrian faunal assemblage from Kavuşan Höyük does not

include the remains from pit “BSG” which will be analyzed separately. Furthermore, due to its peculiar nature “BSG” assemblage will not be directly comparable to the other assemblages which are issued from middens and fillings.

2. Giricano

a) Middle Bronze Age

The Middle Bronze Age faunal remains come from two different large buildings, “Geb. A” and “Geb. C”¹², the later being stratigraphically above the first one. Faunal remains were also recovered from Middle Bronze Age layers not attributed to any of these buildings. The larger assemblage comes from the “Geb. C” dated approximately to the second quarter of the 2nd mill. BC. The assemblage will be considered on its own. A large pithos containing the remains from several goats was excavated in “Geb. C”. The almost complete and well preserved 13 skeletons yielded an important number of remains which make a large part of the assemblage. The over-representation of caprine bones in “Geb. C”, due to this peculiar find, will be corrected for comparison with other assemblages (see hereunder in methods description). The other Middle Bronze Age assemblages being too small, they are added to the “Geb. C” assemblage in order to consider a global Middle Bronze Age pattern for Giricano Tepe.

b) Late Bronze Age

In Giricano Tepe, the Middle Assyrian layers have been sorted from other Late Bronze Age layers. They correspond to the use of the settlement as a *dunnu*. The faunal assemblage from the Middle Assyrian *dunnu* will be analyzed on its own. Smaller assemblages are attributed to Mittanian and Mittanian-Middle Assyrian layers. As it was not possible in all sites to sort clearly the Mittanian from Middle Assyrian assemblages, a global Late Bronze Age assemblage will be analyzed for Giricano, to be compared to the Late Bronze Age assemblages from the other sites. It is, however, clear that due to the number of remains recovered from the Middle Assyrian occupation, its faunal assemblage will clearly influence the global Late Bronze Age assemblage.

3. Kenan Tepe

a) Middle Bronze Age

The faunal assemblage from Kenan Tepe considered in this study comes from the Middle Bronze Age layers only. As no subdivision was seen during this period at Kenan Tepe, the assemblage will be considered as resulting from a continuous occupation event. However, the faunal remains were recovered in two distinct areas of the settlement, showing different architectural features which could reflect two rather different social and economic contexts (see the description of the site in Chapter I). Therefore, the assemblages from areas C and D will be analyzed separately to investigate intra-site variability and then together to provide a global Middle Bronze Age pattern of animal exploitation in this settlement.

¹² “Geb.” is the abbreviation of the German word from building “Gebäude”.

4. Müslümantepe

a) Middle Bronze Age

The Middle Bronze Age assemblage from Müslümantepe is comes from a well defined context. Indeed, the excavations focused for that period on a large building which could be linked to ceremonial activities and dated from the first quarter of the 2nd mill. BC, like the ceremonial sector at Hirbemerdon Tepe¹³.

b) Late Bronze Age

Part of the Late Bronze Age assemblage was recovered from Middle Assyrian contexts and will be treated as an independent Middle Assyrian assemblage. The other Late Bronze Age faunal remains come from Late Bronze Age layers not attributed to a specific sub-period. These faunal remains will be analyzed together with the Middle Assyrian ones in order to investigate a global Late Bronze Age pattern of animal exploitation at Müslümantepe.

5. Hirbemerdon Tepe

a) Middle Bronze Age

The assemblage comes from the rooms of the Architectural complex, the street 45 and the outdoor space *Piazza*. Material was collected on the floors and from homogeneous fill. Due to the ritual character of the *Piazza* (Laneri, 2011), the material on the floor of this space will be treated separately from the other MBA contexts. These two assemblages will be also treated as a whole in order to have a global image of the animal exploitation during the time of the Architectural Complex at Hirbemerdon. This phase took place somewhere between ca. 1975 and 1780 cal. BC (Laneri et al., forthcoming).

A second phase of the MBA at Hirbemerdon Tepe is represented by a fill sealing the *Piazza* and part of the Architectural Complex and immediately below a limited LBA installation (Crescioli and Laneri, 2011). This phase is posterior to the use of the Architectural Complex and therefore will be referred to as "Post. Arch. Compl." ("PAC" in the short version). This later phase of the MBA took place somewhere between ca. 1700 and 1500 cal. BC (Laneri et al., forthcoming, Crescioli and Laneri, 2011). Concerning the dating of the phases, each of them is situated in a 200 years' range but it is likely that they represent accumulation of remains over a shorter period.

b) Iron Age

In Hirbemerdon Tepe the Iron Age chronology has been described (Guarducci and Laneri, 2010) but the attribution of each locus to a specific sub-period could not have been achieved yet. Over 70% of the remains are attributed to the Iron Age, the rest being more finely dated to the Early Iron Age, Neo-Assyrian and Late Iron Age. Most of the Iron Age occupation at Hirbemerdon Tepe belongs to the Early Iron Age (Guarducci and Laneri, 2010) and therefore the Iron Age and smaller Early Iron Age assemblages will be grouped together under the label "IA", knowing that it is most likely to represent the patterns of the Early Iron Age (ca. 1050-900 cal. BC). However, the idea that this assemblage is a palimpsest of different periods of the 1st mill. BC cannot be ruled out.

¹³ Personal communication, Dr. Eyyüp Ay, December 2010.

6. Başur Höyük

a) *Middle Bronze Age*

In Başur Höyük only Middle Bronze Age material was processed. The assemblage was recovered in one single trench. Another contemporary area, characterized by a hearth and pebble floor, was interestingly clean of faunal remains.

7. Türbe Höyük

a) *Middle and Late Bronze Age*

At Türbe Höyük two assemblages are over the limit of 100 NISP. The first one is drawn from the floors and filling of the Middle Bronze Age occupation while the second one was recovered within the Middle Assyrian fortress of the Late Bronze Age.

B. Methods

The analysis of the faunal remains took place primarily in the field, in the excavation houses of the Hirbemerdon Tepe, Kavuşan Höyük, Müslüman Tepe and Başur Höyük archaeological projects. A portion of the material was studied in the storage rooms of the Ege Üniversitesi and Gaziantep Üniversitesi respectively in Izmir and Gaziantep, Turkey. To fill in the lack of osteological comparative collections in these locations, complete bones bearing characteristic criterion were selected from the archaeological assemblage to help with the use of criteria described in atlases, manuals and other publications (among others Barone, 1999, Pales and Garcia, 1981a, Pales and Garcia, 1981b, Pales and Lambert, 1971b, Pales and Lambert, 1971a, Hillson, 2005, Schmid, 1972, see other references in the identification section). In some cases the faunal material was sent to France or Germany and analyzed mainly in Kiel¹⁴ but also in Paris¹⁵ and Munich¹⁶ using the comparative collections of these laboratories.

In all these locations, faunal remains were counted, weighted and determined to the finest skeletal element and taxonomical position possible. The methods used and the conventions followed during these steps are detailed hereunder.

1. Quantification

Methods for counting and quantitatively analyzing faunal remains are diverse (Lyman, 2008: 58, Poplin, 1983, Poplin, 1977, Poplin, 1976a, Poplin, 1981). The most basic units used in this work are the Number of Remains (NR) and the Weight of Remains (WR) which include all remains; at whatever level they could have been identified. However, in the case of very fragmented specimens due to post-excavation conditions (transport, storage) or taphonomical issues such as strong weathering, the numerous and tiny freshly broken fragments were not counted. The reason for that was to limit an artificial growth of the NR (Poplin, 1976a: 63). As the goal of this study is to analyze the exploitation of animal resources, remains not identified to a certain taxonomical level will be of little analytical utility. Therefore, the most used quantification units will be the Number of Identified Specimens (NISP) and the Weight of Identified Specimens (WISP). NISP and WISP differ from NR and WR in that only identified faunal remains are taken into account. Concerning mammalian remains, a

¹⁴ Zoologisches Institut der Christian-Albrechts-Universität zu Kiel.

¹⁵ "Ostéothèque de l'UMR 7209" and "Collection ostéologique d'Anatomie comparée", Muséum national d'Histoire naturelle, Paris.

¹⁶ Staatssammlung für Anthropologie und Palaeoanatomie, München.

specimen is considered identified at the sub-family level (e.g. Caprinae for sheep and goat) even if most of them are attributed to a genus if not a species. However, rare taxa such as rodents and non-mammalian taxa will be included in the NISP and WISP at the class or order level. The WISP is not free of problems for the interpretation of animal exploitation (Lyman, 2008: 102-8). It is, however, used here to estimate the contribution of each taxon to the food-producing economy according to its size (Uerpmann, 1973: 310-1). Indeed, if a hare bone and a cattle bone are equivalent in the NISP, the WISP will rectify the importance of each one according to the quantity of animal product each species can provide. As most of the analyses in this work will derive from the NISP it has been decided to strengthen its analytical utility by using a corrected NISP (*corr.NISP*). The *corr.NISP* will be used only when assemblages will be compared to define their pattern of mammal exploitation. The focus on mammalian remains is justified by the non homogenous use of sieving techniques in the different excavations. As a result of the sample strategy issue the representation of non-mammalian taxa is biased and therefore they are not taken into account in the *corr.NISP*. For the same reason micro-mammals such as Rodentia, Erinaceomorpha and small Mustelidae are not considered in the *corr.NISP*. As it appeared that the hunt of red deer is an important characteristic of some of the assemblages, fragments of antler (unless there are still attached to the skull) are not counted in the *corr.NISP*. Thereby the relative representation of red deer will not be over-estimated due to the presence of numerous antler fragments which are not necessarily due to the consumption of deer meat in the settlement. In the *corr.NISP* a complete skeleton is counted as one remain. This decision represents a step toward the calculation of the Minimal Number of Individuals (MNI). The presence of whole skeletons is rare in the assemblages considered here and is mainly linked to taxa which are not predominant in the spectrum such as equid or dog¹⁷. The goal is to avoid giving too much importance to these taxa which the NISP is considering, when they are only represented by a handful of remains beside a whole skeleton (Tab. II.9-10). The Minimal Number of Individuals (MNI) is a general label covering a large number of sometimes diverging definitions (Lyman, 2008: tab.2.4). The advantage of the MNI, in theory, is to count each animal only once, whatever the number of bones preserved from this animal. The MNI also helps to compare taxa which do not have the same number of bones. However, the use of MNI depending on the method used to calculate it generates several problems (Lyman, 2008: 38-69, Poplin, 1976a, Poplin, 1976b). Therefore, it will not be used for itself but it is necessary to calculate the relative frequency of skeletal parts. In this study the MNI comes from the calculation of the Minimal Number of Element (MNE) for each given element. The MNE is calculated from the highest number of a bone part. Specimens having an unfused epiphysis are counted separately. The MNI derives from the highest MNE. It is close to Poplins' *NMI de fréquence* (Poplin, 1976a: 62) which is usually low but reliable, as no individual matching of bone was done. The frequency of a given skeletal part is calculated following the formula: $([MNE_i]100) / (MNI[\text{number of occurrences of } i \text{ in one skeleton}])$, where *i* is a bone or a skeletal portion (Lyman, 2008, 238: from J. Brain's work). As they were usually fragmented in the assemblage and difficult to determine to a relevant taxonomical level, skeletal parts as ribs and some vertebrae are not used in this calculation. Carpal bones and some tarsal bones are often underrepresented because of their size in assemblages picked by hand and eye. This is especially the case for species of the sheep and goat size and smaller. Therefore, for the tarsal bones only the calcaneum and talus are used in the MNI and skeletal representation calculations.

¹⁷ Exceptions are skeletons of Caprinae found in a pithos in the "Geb. C" at Giricano and in the pit "BSG" at Kavuşan Höyük (see details in the description of the assemblages).

2. Metrics

The importance of measurements for morphometrical identification, ageing and sexing of the specimens is well known (see examples in Chaix and Méniel, 2001: 53-61). The way measurements were used in this study is described in the following sections. Specimens were measured when the preservation state allowed it. This was done with a caliper to a precision of 0,1mm. Large lengths and circumferences were measured with a tape measure to a precision of 1mm. All measurements are expressed in mm. The measurements correspond generally to the descriptions given by von den Driesch (1976). Equid specimens were measured following Eisenmann (Eisenmann, 1986, Eisenmann and Mashkour, 2000). Additional measurements were also taken for the Suinae (Payne and Bull, 1988) and Caprinae (from different authors compiled in Fernández, 2001b: fig.1). Measurements on teeth of Bovidae follows Ducos (1968).

3. Identification

All zooarchaeological research depends on the identification of the specimens, or more precisely the attribution of each faunal remains to a skeletal part and a taxonomical category. This important step in the research is somehow subjective and highly related to the ability of the researcher, his training, his experience and the methods he used (Driver, 1992). The identification process depends on two categories of criteria which will be discussed separately. The first one deals with the morphology only and the second one uses metrical data. The attribution of a specimen to a taxonomical category implies the following of a biological classification (Table II.1). For the mammalian taxonomy, the names and classification used here correspond to those compiled by Wilson and Reeder¹⁸ (2005). However, domestic forms are designated with a specific name (following Gentry et al., 2004).

¹⁸ Rare exceptions will be justified in the part concerning the relevant taxon.

Scientific name	Common name
<i>Lepus europaeus</i>	European Hare
<i>Felis catus</i>	Domestic cat
<i>Panthera leo</i>	Lion
<i>Erinaceus concolor</i>	Southern White-Breasted Hedgehog
Rodentia	Rodents
<i>Spalax</i> sp.	Mole rat
<i>Meriones</i> sp.	Jird
<i>Canis familiaris</i>	Dog
<i>Canis lupus</i>	Wolf
<i>Vulpes vulpes</i>	Red fox
<i>Mustela</i> sp.	Weasel
<i>Equus</i> spp.	Horse, donkey and hybrids
<i>Equus caballus</i>	Horse
<i>Equus</i> cf. <i>caballus</i>	Horse size equid
<i>Equus asinus</i>	Donkey
<i>Equus</i> cf. <i>asinus</i>	Donkey size equis
<i>Equus hemionus</i> ssp.	Onager
<i>Sus domesticus</i>	Domestic pig
<i>Sus scrofa</i>	Wild boar
<i>Camelus</i> spp.	Camel or dromedary
Cervidae	Red deer or Mesopotamian fallow deer
<i>Cervus elaphus</i>	Red deer
<i>Dama mesopotamica</i>	Mesopotamian fallow deer
<i>Bos taurus</i>	Cattle
<i>Bos primigenius</i>	Aurochs
<i>Gazella</i> spp.	Gazelle
Caprinae	Domestic sheep and goat
<i>Capra hircus</i>	Domestic goat
<i>Ovis aries</i>	Domestic sheep
<i>C. aegagrus</i> / <i>O. orientalis</i>	Wild sheep and goat
<i>Capra aegagrus</i>	Wild goat (Bezoar)
<i>Ovis orientalis</i>	Wild sheep (Mouflon)
Aves	Birds
Anura	Frogs
Testudines	Tortoise and turtle
<i>Testudo graeca</i>	Spur-thighed tortoise
<i>Rafetus euphraticus</i>	Euphrates softshell turtle
Ichtyo	Fish
Malaco	Molluscs
Crustacea	Crustaceans

Table II.1. Common and scientific names used in this study. Taxonomical order for mammals from Wilson and Reeder (2005).

a) Morphological identification

The attribution to a skeletal part and a taxon can be made using the general shape of the skeletal part as well as specific criteria. These criteria, which have to be used in the light of comparative material, are more or less sensitive to variation factors such as sex, age or breed. If the reliability of a criterion is sometimes quantitatively tested in an assemblage of known origin, its validity is quite subject to the geographical and chronological origin of the archaeological assemblage, especially for domestic taxa (for the variability of criteria applied to sheep and goat remains see e.g. Clutton-Brock et al., 1990, Zeder and Lapham, 2010, Zeder and Pilaar, 2010). As it is not the aim of this work, and because the evaluation of morphological criteria is a study in itself, the references used will be mentioned, but the actual reliability of each criteria regarding the assemblage from the Upper Tigris Region will not be discussed here. As the archaeozoological literature is rich in publications aiming at identifying different taxa, the goal is not to produce an exhaustive list but rather to specify which ones were used in this research.

Common identifications, or at least indications of the taxonomical category, were made using common atlases for mammalian bones and teeth (Barone, 1999, Pales and Garcia, 1981a, Pales and Garcia, 1981b, Pales and Lambert, 1971b, Pales and Lambert, 1971a, Hillson, 2005, Schmid, 1972). Specific publications also consider juvenile mammals (Prummel, 1987a, Amorosi, 1989, Prummel, 1987b, Prummel, 1989, Prummel, 1988a).

In the Perissodactyla order, within the species belonging to the genus *Equus*, the discrimination between horse (*Equus caballus*), donkey (*Equus asinus*) and onager (*Equus hemionus*) can be made using morphological criteria on teeth and bones (Eisenmann, 1986, Mashkour, 2001, Vila, 1998, Helmer, 2000b, Uerpmann, 1986, Boessneck, 1987, Uerpmann, 1991, Eisenmann, 1980) although they are not always easy to use.

Among the order Artiodactyla, the distinction between Cervidae and Bovidae was made using the work of Prummel (1988b) concerning cattle (*Bos taurus*) and red deer (*Cervus elaphus*) and the ones of Fernández and Helmer to differentiate between roe deer (*Capreolus capreolus*) and Caprinae (Helmer and Rocheteau, 1994, Fernández, 2001b, Fernández, 2001a). Among the Camelidae, the work of Steiger (1990) is used to determine the one-humped camel (*Camelus dromedarius*) and the Bactrian camel (*Camelus bactrianus*). Among the Cervidae, the distinction between red deer (*Cervus elaphus*) and fallow deer (*Dama* sp.) using morphological criteria (Lister, 1996) did not give a full satisfaction, especially because the fallow deer in the Upper Tigris region are likely to be Mesopotamian fallow deer (*Dama mesopotamica*)¹⁹. Most of the literature about morphological identification concerns the genus *Capra* and *Ovis* as the sheep and goats are particularly difficult to distinguish. Numerous criteria have been described for the bones (Boessneck, 1969, Clutton-Brock et al., 1990, Fernández, 2001b, Fernández, 2002, Fernández, 2001a, Helmer and Rocheteau, 1994, Boessneck et al., 1964, Kratochvil, 1969, Prummel and Frisch, 1986, Zeder and Lapham, 2010) and teeth (Zeder and Pilaar, 2010, Payne, 1985, Helmer, 2000a, Halstead et al., 2002, Balasse and Ambrose, 2005), even if they are not always corroborated by quantitative tests (Fernández, 2001b, Zeder and Lapham, 2010, Zeder and Pilaar, 2010, Clutton-Brock et al., 1990, Fernández, 2001a).

¹⁹ Unlike Wilson and Reeder (2005) the Mesopotamian fallow deer is here considered as a species (Uerpmann, 1987) mainly to avoid confusion with the European fallow deer (*Dama dama*).

Outside the Mammalia class, basic identifications were attempted for birds (Cohen and Serjeantson, 1996) and frogs (Bailon, 1999).

b) Morphometrical identification

Here metrical data are employed to describe size and shape. Morphometrical criteria will be applied to all available specimens from the assemblage considered in this study, whatever the site or chronological level they come from. Morphometrical criteria are often less subjective than the morphological ones²⁰ but their efficiency depends on the overlapping between the groups. Criteria for which a sufficient amount of specimens²¹ is available will be illustrated.

(1) Genus *Equus*

The discrimination between the different species of the genus *Equus* is rather difficult. Most of the criteria do not clearly separate one species from another one and furthermore the possibilities of hybridization between these species blur the picture even more. When a specific attribution is not possible, remains are grouped in two categories: *caballus size* for horse and mule and *small equid sized* for donkey and onager.

(a) Dental remains

For the dental remains, the analyses performed follow the work of Eisenmann for the upper (1980) and lower teeth (1981). In these cases the metrical criteria are more effective on a row of teeth giving a general pattern for the jaw. In both cases the length (L) and breadth (B) of each tooth in the row are considered. For the upper teeth the length of the protocone (LP see Eisenmann and Mashkour, 2000: 15) is measured and a protocone indice (IP) is calculated²². For the lower teeth the length of the postflexid (LPF see Eisenmann and Mashkour, 2000: 15) is measured and a postflexid indice (IPF) is calculated²³. Very few teeth rows are available in the assemblage. In addition the patterns are difficult to interpret. For the upper teeth, the specimen KH00944 corresponds most likely to a donkey (*Equus asinus*) but the two specimens from Hirbemerdon Tepe, HM00625 and HM00144 shows mixed characters. Their length and breadth (Fig. II.1-2) correspond to the horse (*Equus caballus*) but their protocone is very short (Fig. II.3) and their protocone indices (Fig. II.4) even smaller than the ones from the donkey. In this case the possibility that the specimens from HM are hybrids should be considered.

²⁰ It implies however that the way the measurement should be taken is clearly indicated.

²¹ A sample of 30 individuals would be ideal.

²² $IP = LP \times 100 / L$ (Eisenmann, 1980).

²³ $IPF = LPF \times 100 / L$ (Eisenmann, 1981).

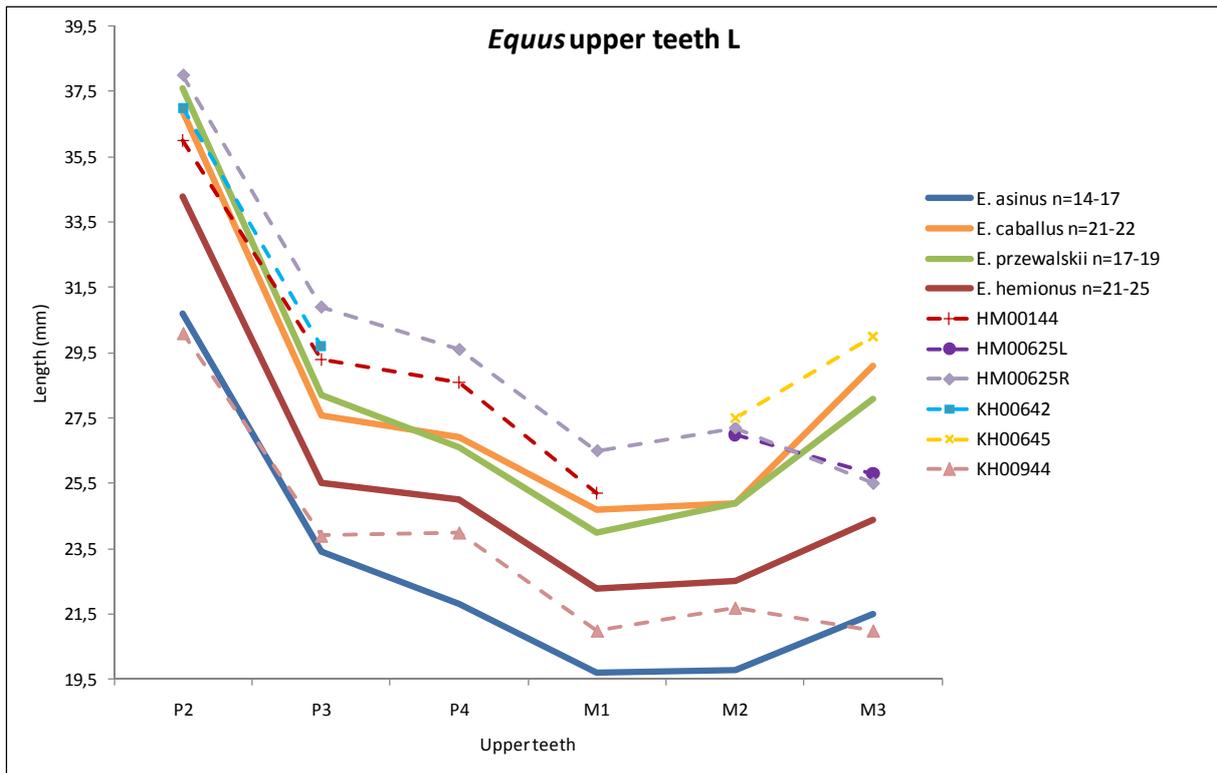


Figure II.1. Length of upper equid teeth. Reference data from Eisenmann (1980).

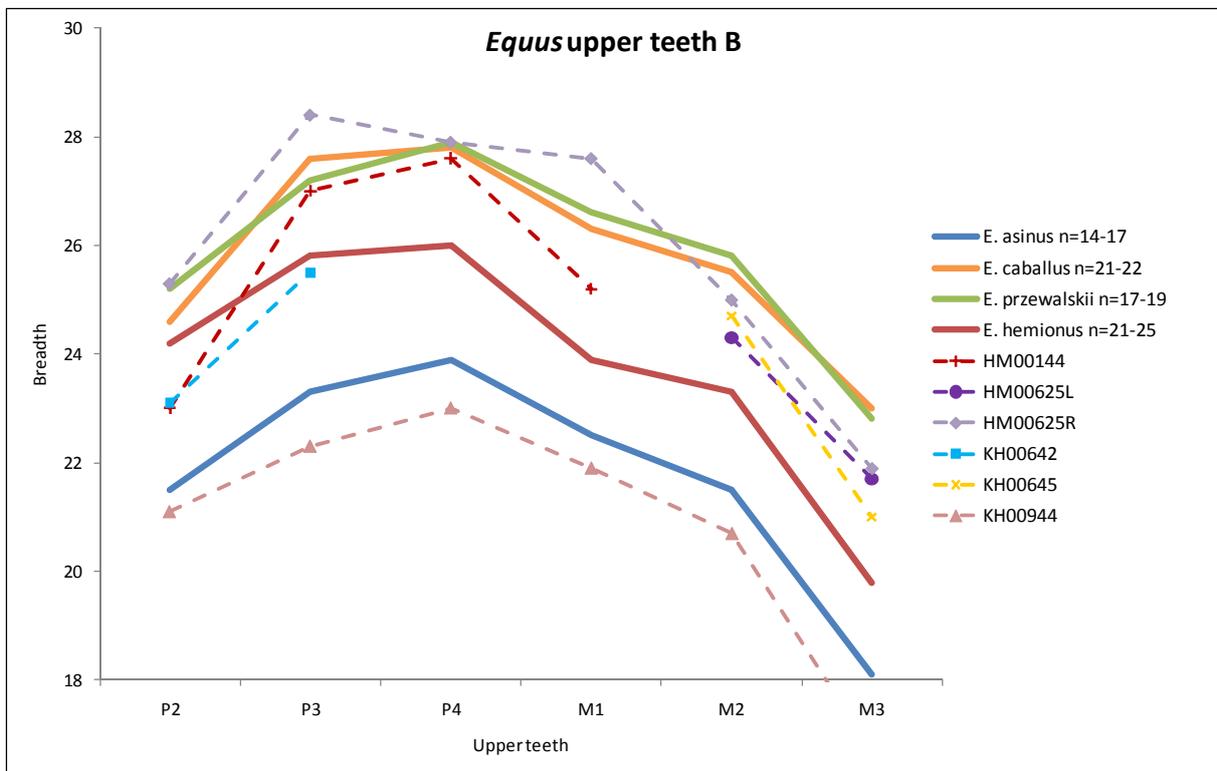


Figure II.2. Breadth of upper equid teeth. Reference data from Eisenmann (1980).

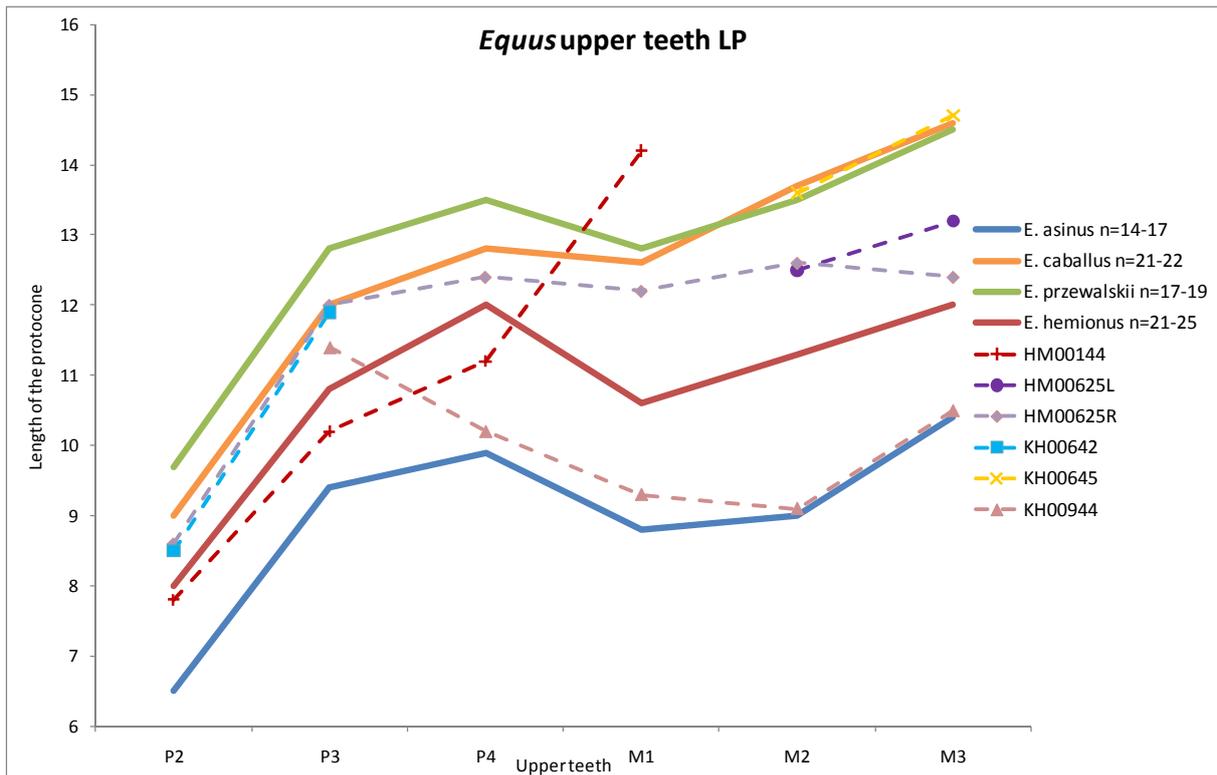


Figure II.3. Length of the protocone of upper equid teeth. Reference data from Eisenmann (1980).

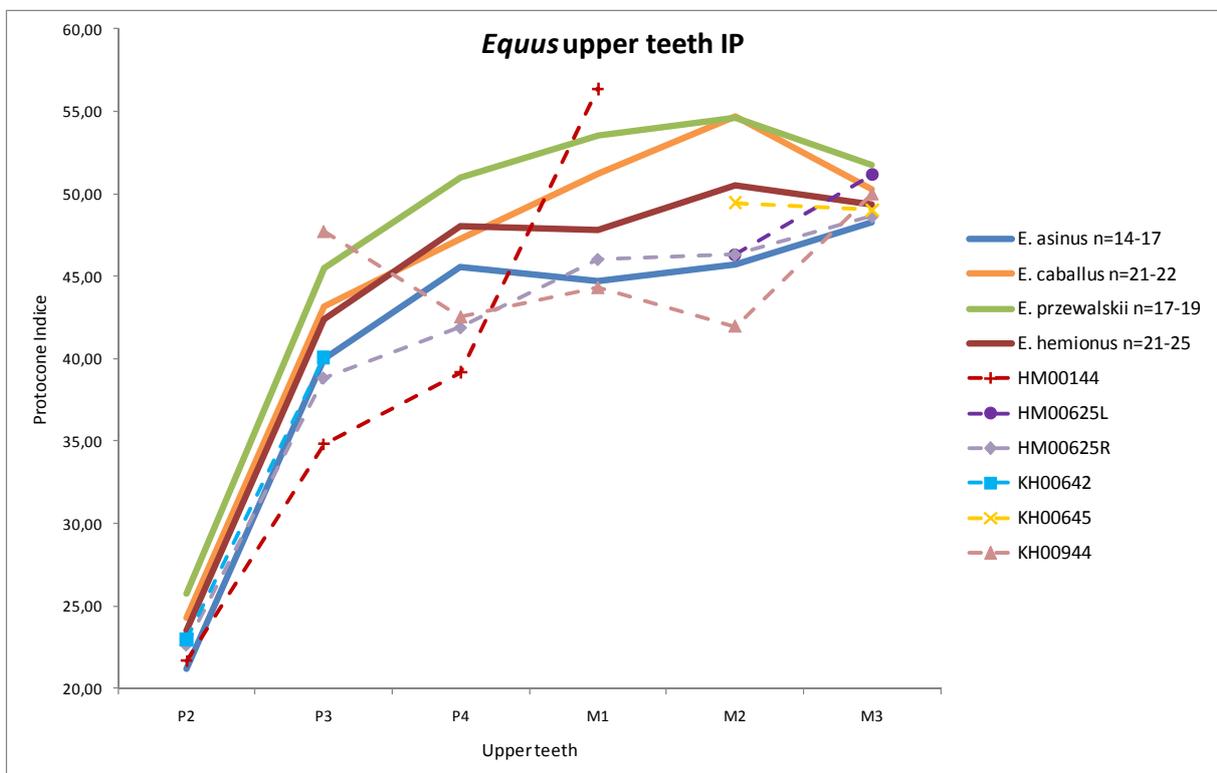


Figure II.4. Protocone indice of upper equid teeth. Reference data from Eisenmann (1980).

The situation is similar with the lower teeth, for which the archaeological specimens do not closely follow the comparative patterns (Fig. II.5-8). HM00625 and HM00141 (which correspond to the same specimen as HM00144) show a mixed pattern, which could be interpreted as hybrid

individuals. Even if its patterns are also unclear, HM02431 could likely correspond to an onager (*Equus hemionus*).

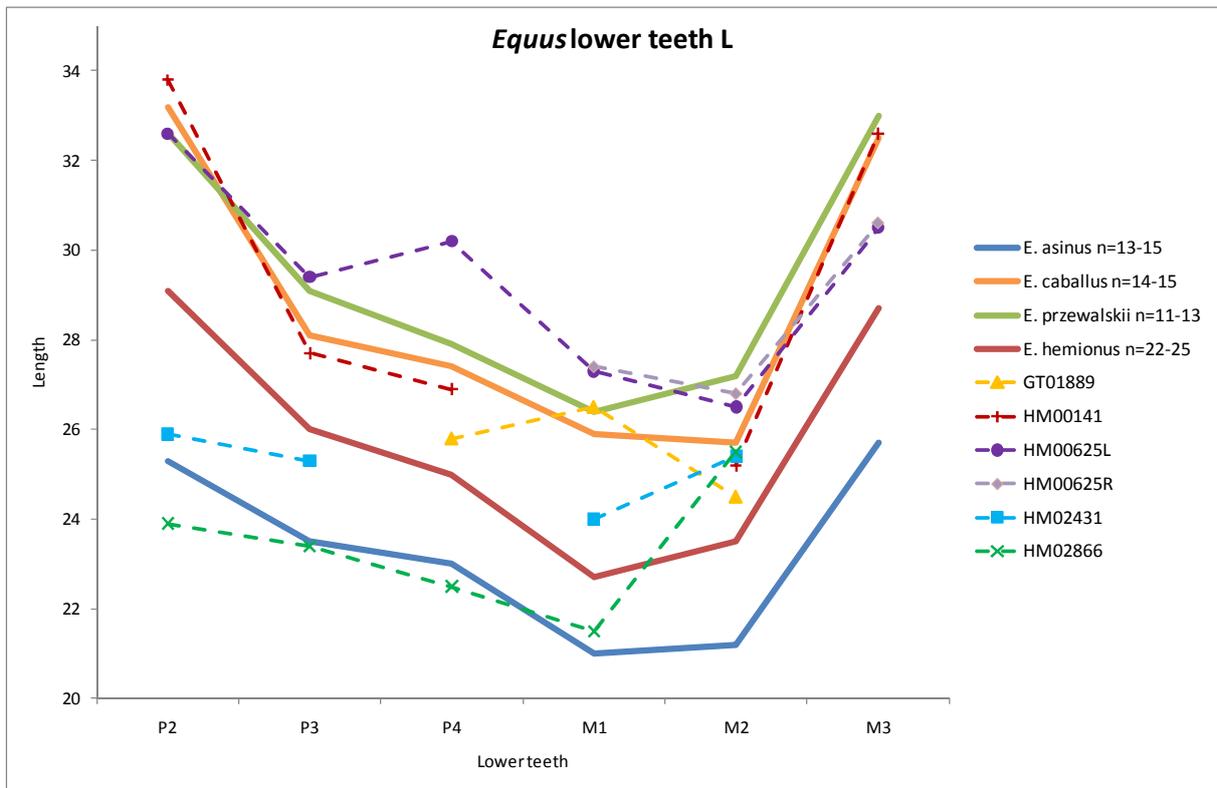


Figure II.5. Length of lower equid teeth. Reference data from Eisenmann (1981).

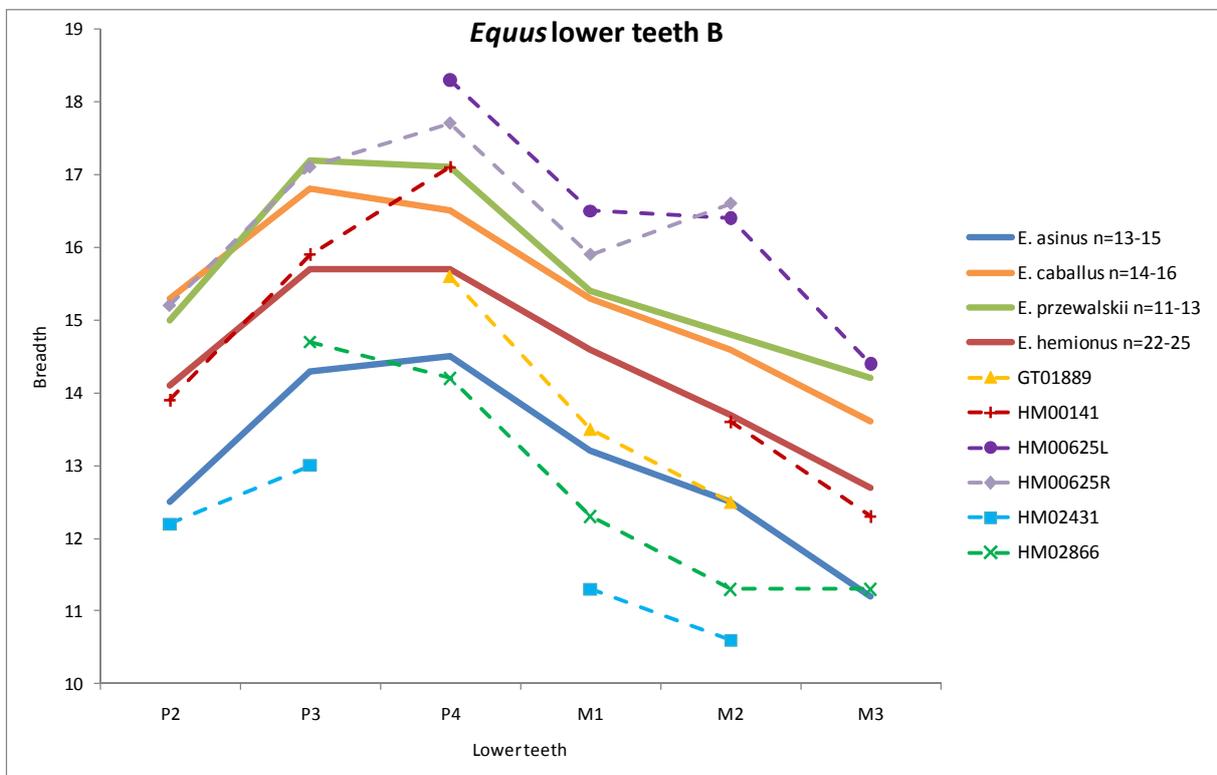


Figure II.6. Breadth of lower equid teeth. Reference data from Eisenmann (1981).

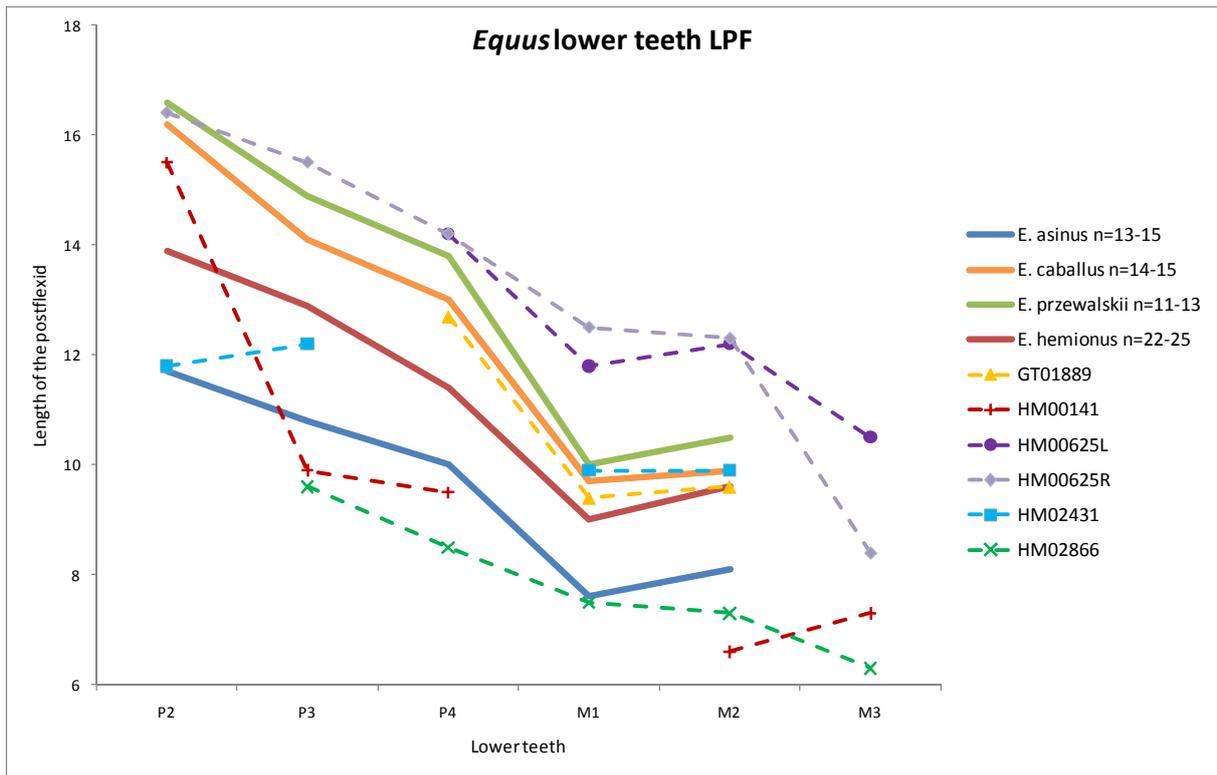


Figure II.7. Postflexid length of lower equid teeth. Reference data from Eisenmann (1981).

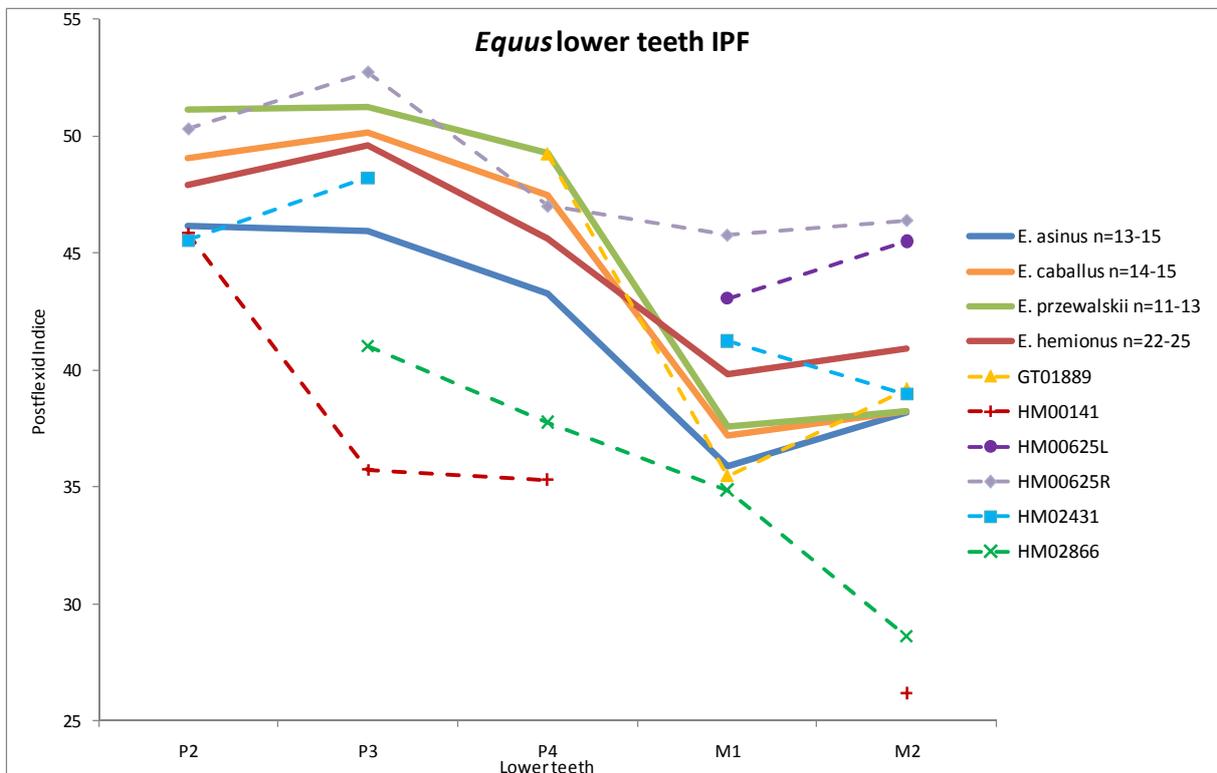


Figure II.8. Postflexid indice of lower equid teeth. Reference data from Eisenmann (1981).

(b) Post-cranial skeleton

The distal part of the radius allows discrimination between onager (*Equus hemionus*) and donkeys (*Equus asinus*). A clear line between the ulna distal condyle surface and the radius

articulation surface is characteristic of donkeys (Boessneck, 1987, drawn in Helmer, 2000b: 236-8). However, the line can sometimes be in a mediate stage or this part of the bone is not always well preserved. A metrical criterion was published by Uerpmann (1991: 25-26) using the breadth (B) and depth (D) of the medial condyle. The index $B \times 100/D$ is lower than 79.3 for onager (*Equus hemionus*) and greater than 75 for domestic and wild donkeys (*Equus asinus* / *Equus africanus*). The problem of the overlapping was solved by Helmer, using both morphological and metrical criteria (Helmer, 2000b: 236-8). However, there is no overlapping in the assemblage from the Upper Tigris Valley. All the specimens falling in the range of the donkey showed a clear line on the ulna condyle. Considering their size the specimens HM02699 and KH00395 belong to horse. At the limit of the lower index for donkey, the specimen MST00185 do not have a clear line visible, due to concretions, and the line for specimen KH00394 was not clearly visible. As the indexes for the donkey specimens are pretty well clustered in this assemblage (Fig. II.9), MST00185 and KH00394 are likely to belong to onager (*Equus hemionus* spp.).

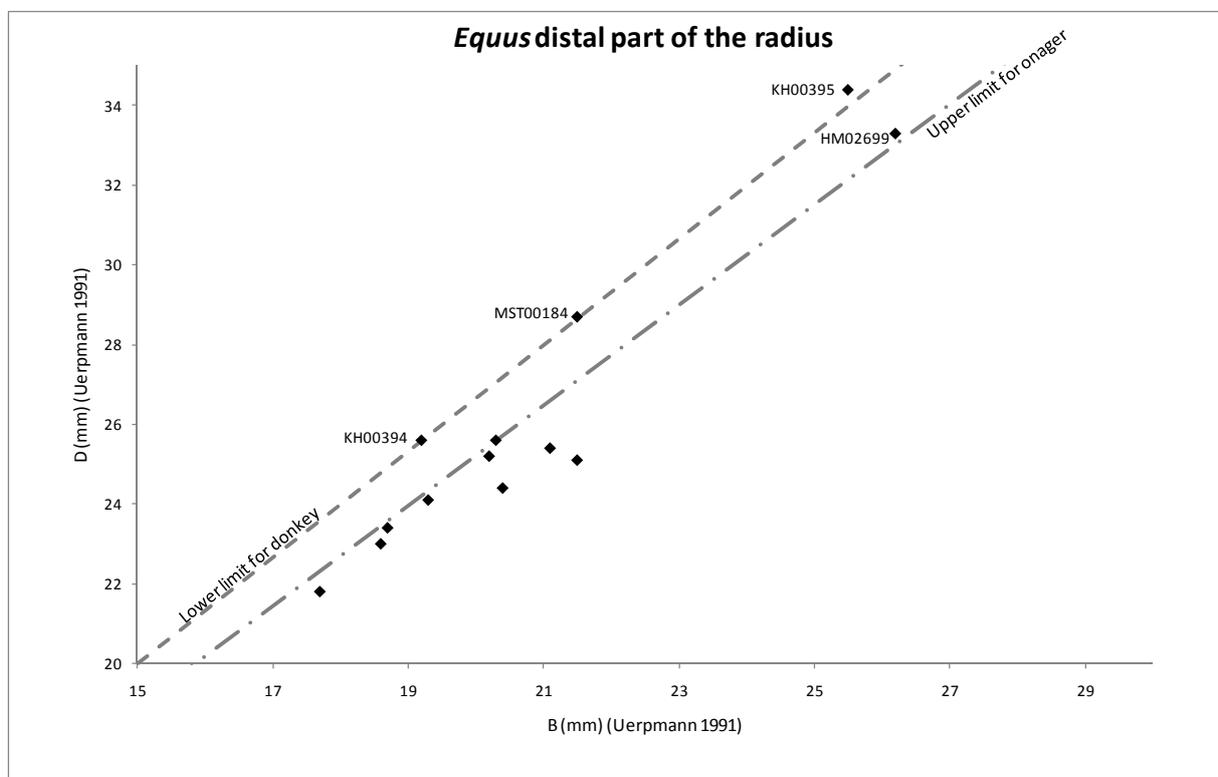


Figure II.9. Indice $B \times 100/D$ for the distal part of the equid radius. Measurements definitions and limits from Uerpmann (1991).

The identification of the metapodials and first phalanges were made following the work of Eisenmann and collaborators (Dive and Eisenmann, 1991, Eisenmann and Beckouche, 1986). Using ratio diagrams (Simpson, 1941: 23-5), several measurements from the same specimen are compared to the mean value of comparative material. What is represented on the diagram is the difference between the log of a specimen measurement and the log of the reference measurement. The reference used here is the mean value for the Persian onager (*Equus hemionus onager*). For the metacarpal (Fig. II.10) and metatarsal (Fig. II.11), only a couple of specimens could be measured. The patterns are, however, clearer than for the dental remains.

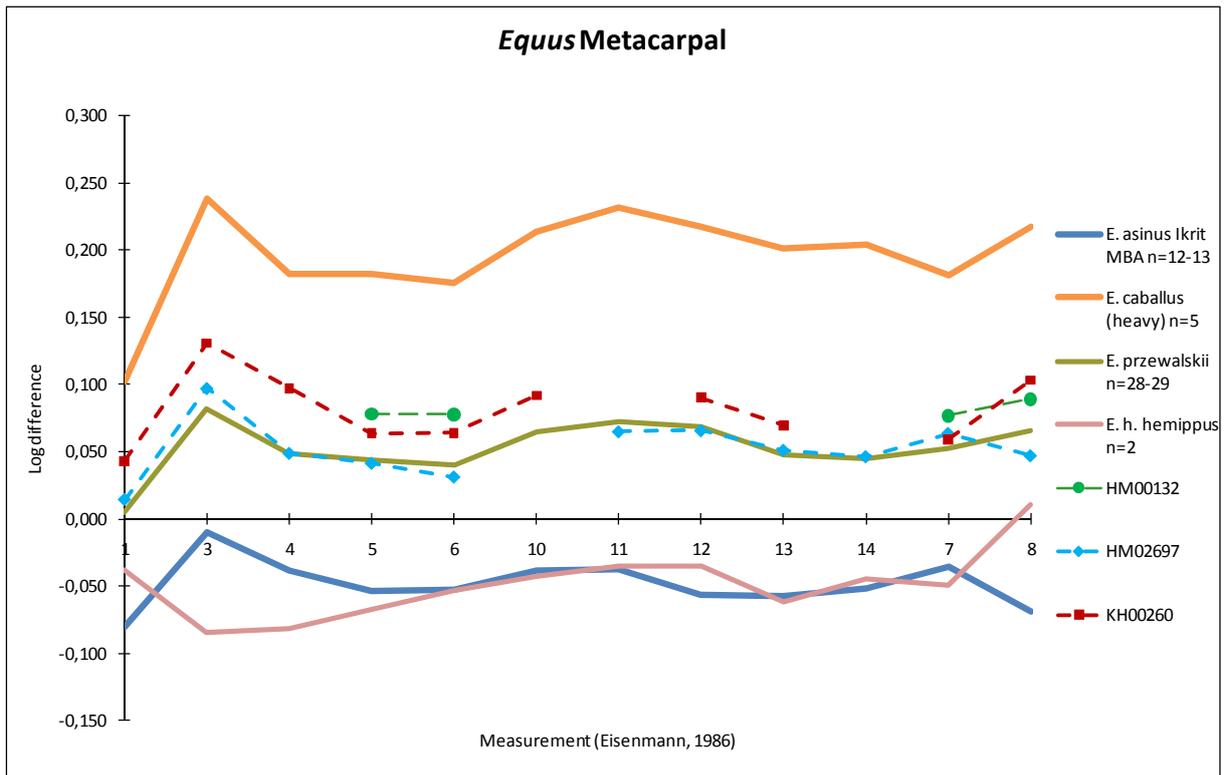


Figure II.10. Log ratio of equid metacarpals. Reference (line 0) is *Equus hemionus onager*. Reference data from Eisenmann and Beckouche (1986).

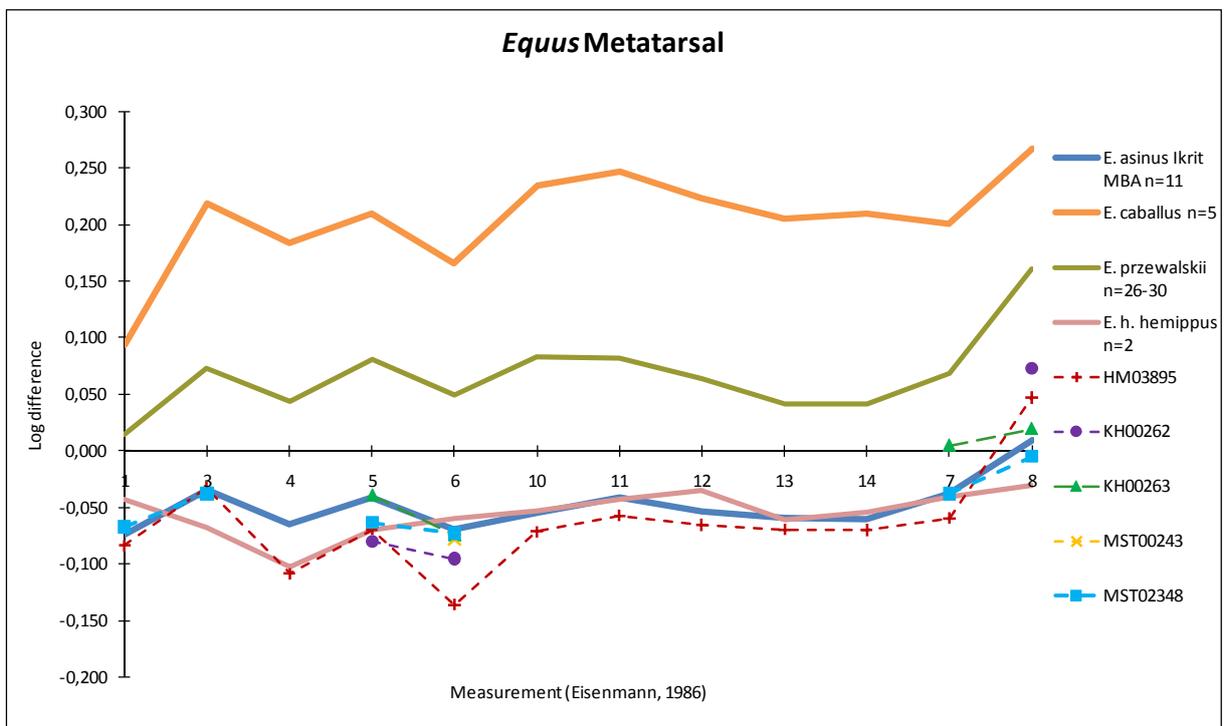


Figure II.11. Log ratio of equid metatarsals. Reference (line 0) is *Equus hemionus onager*. Reference data from Eisenmann and Beckouche (1986).

The identification of the first phalanges requires sorting the anterior phalanges from the posterior ones. This is possible with morphological criteria as, on anterior phalanges, the *trigonum*

phalanges is longer and the supra-articular tuberosities are situated closer to the distal end (Eisenmann and De Giuli, 1974). The archaeological specimens fit rather well to the comparative patterns. However, the posterior first phalange HM01507 shows some peculiarities and is quite slender (Fig. II.13). It is tentatively attributed to the onager group (*Equus hemionus* spp.).

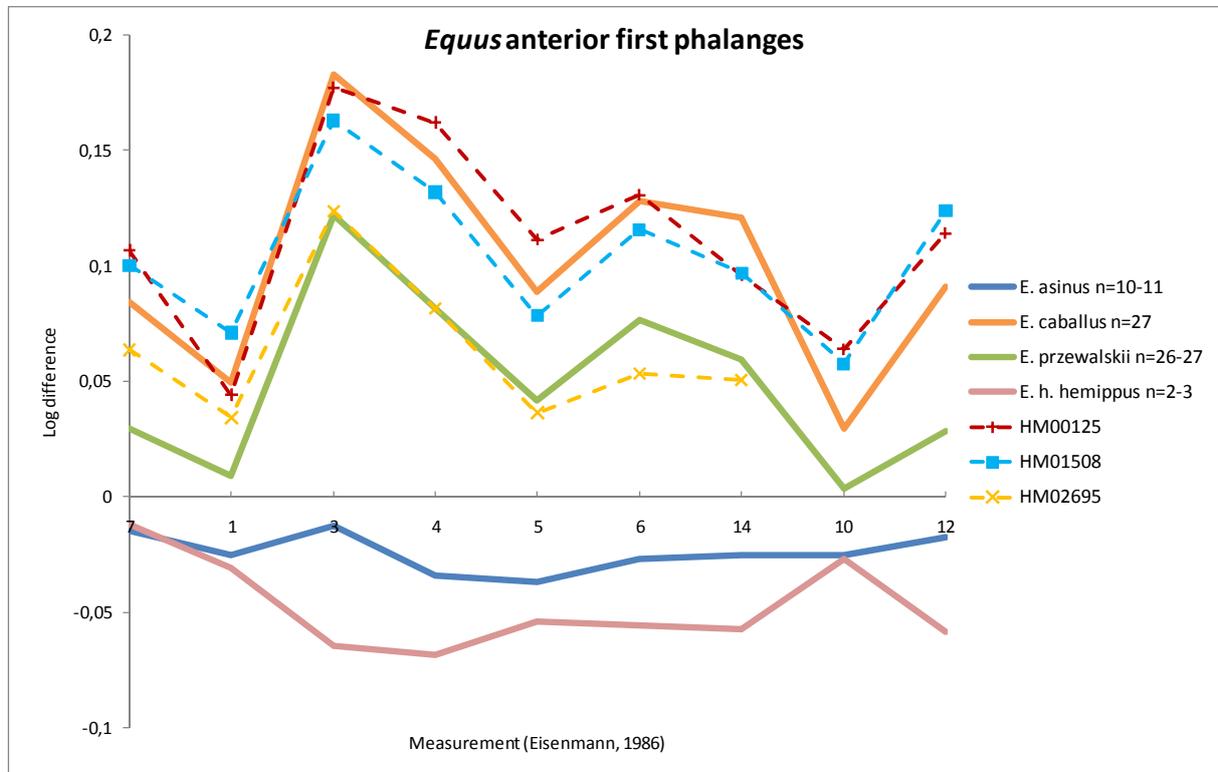


Figure II.12. Log ratio of equid anterior proximal phalanges. Reference (line 0) is *Equus hemionus onager*. Reference data from Eisenmann and Beckouche (1986).

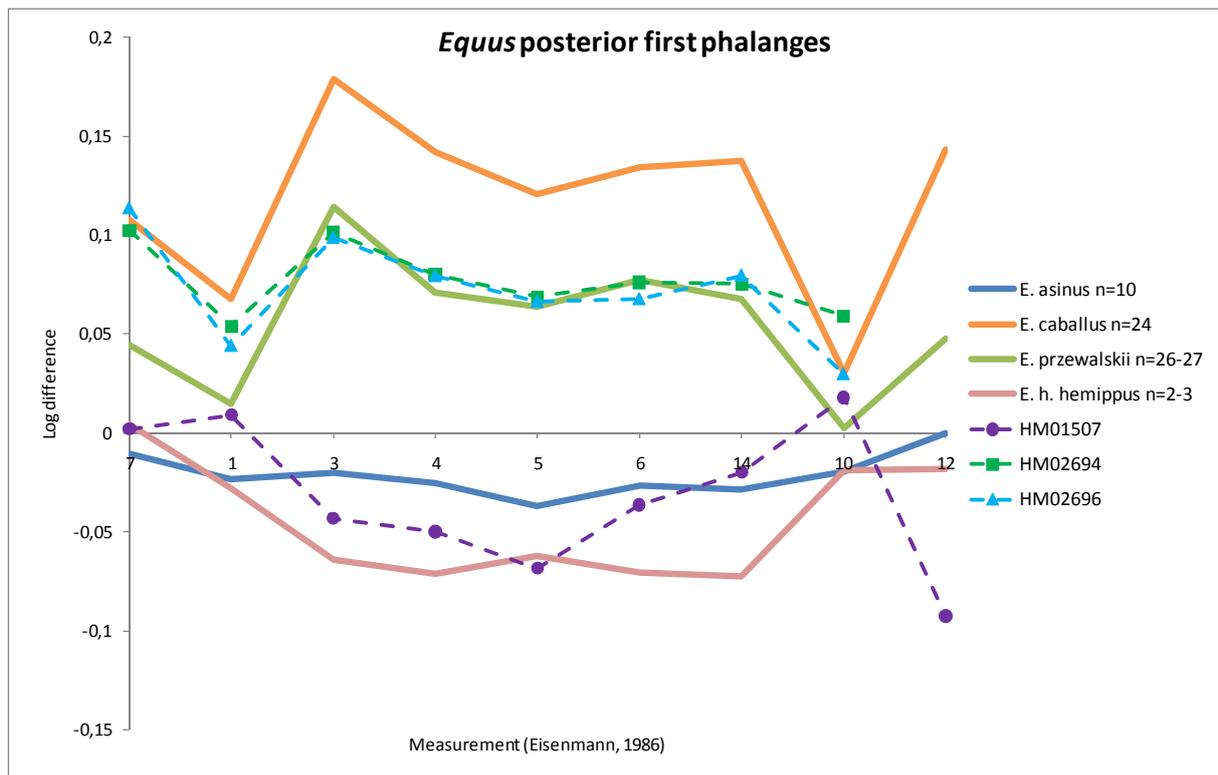


Figure II.13. Log ratio of equid posterior proximal phalanges. Reference (line 0) is *Equus hemionus onager*. Reference data from Eisenmann and Beckouche (1986).

(2) Genus *Sus*

In order to have an accurate picture of the animal-based economy, it is important to sort the domestic pig (*Sus domesticus*) from the wild boar (*Sus scrofa*). The wild boar is without doubt present in the region and therefore could be a common game species for the hunters. It is also already known that domestic pigs played an important role among the domestic species, at least during the MBA (Berthon, 2010). The distinction between the domestic and wild pigs is made here, following the work of Payne and Bull (1988). The main advantage is the use of a wild population from north-central Anatolia, some 800km north-west of the Upper Tigris area, but, however, somehow comparable with wild populations from southeastern Turkey. Depending on the tooth or bone, from 3 to 18 modern individuals, this allow, the estimation of the intra-population variation of the measurement. Furthermore, Payne and Bull (1988) tested the variation for each measurement according to 3 factors: age, sex, and individual variability. Only measurements with a low variation are used here and unfused modern specimens were removed from the sample. This method is, however, not free of problems. The modern sample is sometimes too small to define clearly the lower limit of the wild population. When a row of teeth was available, each tooth was considered, to decide whether the jaw should be attributed to a domestic or wild pig. For instance, the decision to determine a dental specimen as a wild or a domestic specimen was taken in priority considering the first or second molar and not the third, because the comparative measurements are not numerous enough to show clearly the lower limit of the wild population for the third molar, but also because this tooth is more variable than the first or second molar (Albarella and Payne, 2005: 596). It is also obvious that only a few measurements are used for the distinction between wild and domestic pigs (Fig. II.14): the width of the lower and upper deciduous fourth premolar, the width of the three lower and upper molars, the heigh of the humerus distal trochlea, the length of the pelvis acetabulum, the

breadth of the distal tibia and the lateral length of the talus. Therefore, a large amount of specimens are not included in the analysis. Some specimens are at the limit of both groups, but the main information is the general paucity of wild boar remains comparing to domestic pigs.

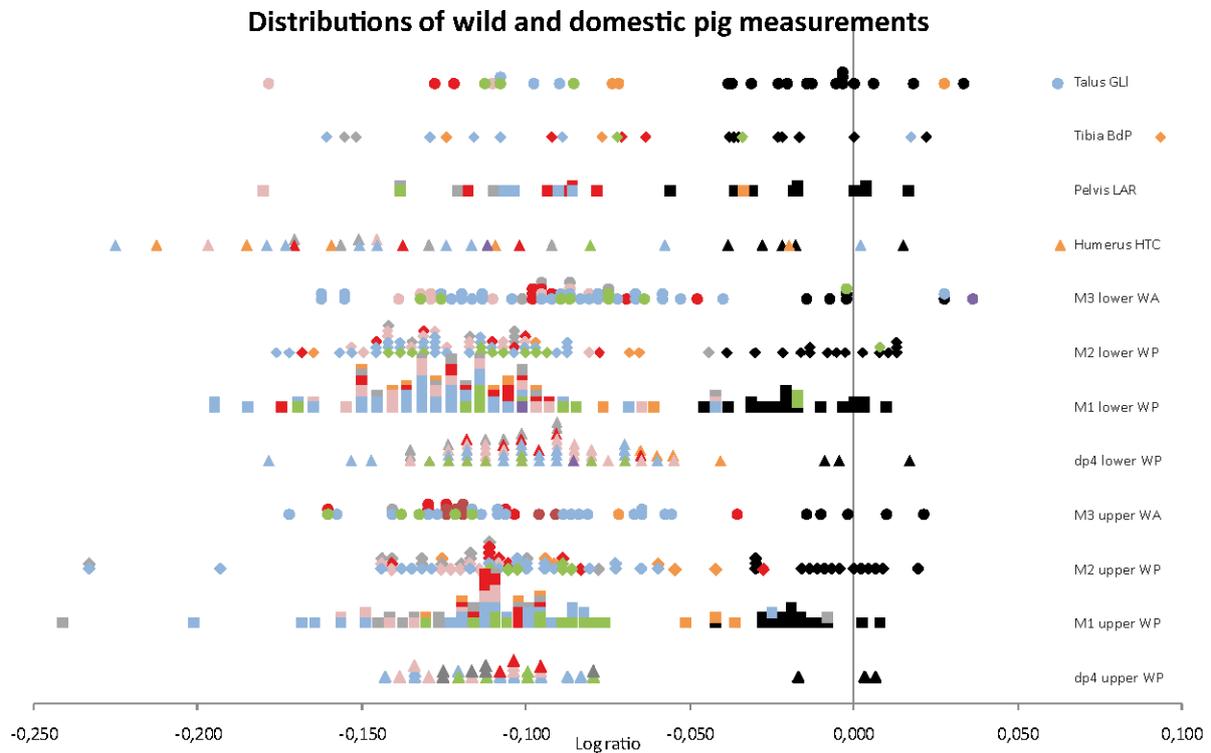


Figure II.14. Distribution of the log ratio of *Sus* sp. specimens from the Upper Tigris (in colors) and of wild boars from northern Turkey (in black). Each colour corresponds to one of the seven settlements (KH in pink, GT in green, KT in red, MST in blue, BH in purple and TH in orange). Wild boar measurements and standard values are taken from Payne and Bull (1988).

(3) Genus *Bos*

(a) Dental remains

As a preliminary step to the ageing methods (see hereunder), it is necessary to define the rank of loose molar teeth. In lower teeth, the third molar (M_3) is morphologically distinct with the shape of the paracone. To sort the first (M_1) from the second (M_2) lower molar measurements can be useful. Based on domestic cattle from England, it is been proposed that M_1 length is smaller than 21.5 mm and M_2 length is larger than 22 mm. Moreover, plotting the length and breadth of the teeth should help to sort the specimens falling into the 21.5–22 mm range (Beasley et al., 1993). However, the data from the Upper Tigris region presents a quite different pattern. According to teeth with an attested position in the jaw, M_1 length ranges between 18.9 and 23.8 mm while M_2 length goes from 22.4 to 26.3 mm. The two groups overlap only slightly with the exception of one M_1 (MST02108). This tooth has an important breadth which places it among the M_2 (Fig. II.15). As the presence of wild aurochs (*Bos primigenius*) is not excluded (see hereunder), it is possible to suppose that this specimen belongs to a wild cattle.

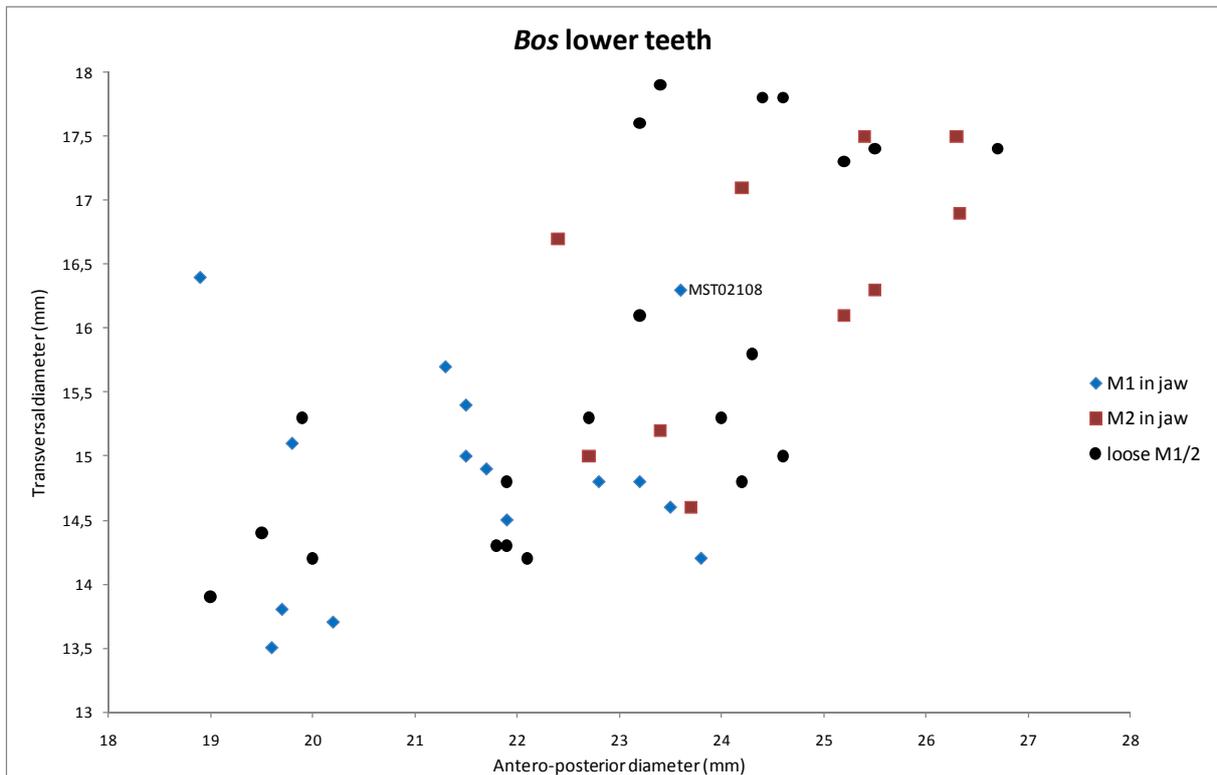


Figure II.15. Relation between the length and breadth of cattle lower first and second molars.

The same method has been applied to the upper teeth. The distinction between the first upper molars (M^1) and the second upper molars (M^2) seems to be even clearer in this assemblage than for the lower teeth (Fig. II.16).

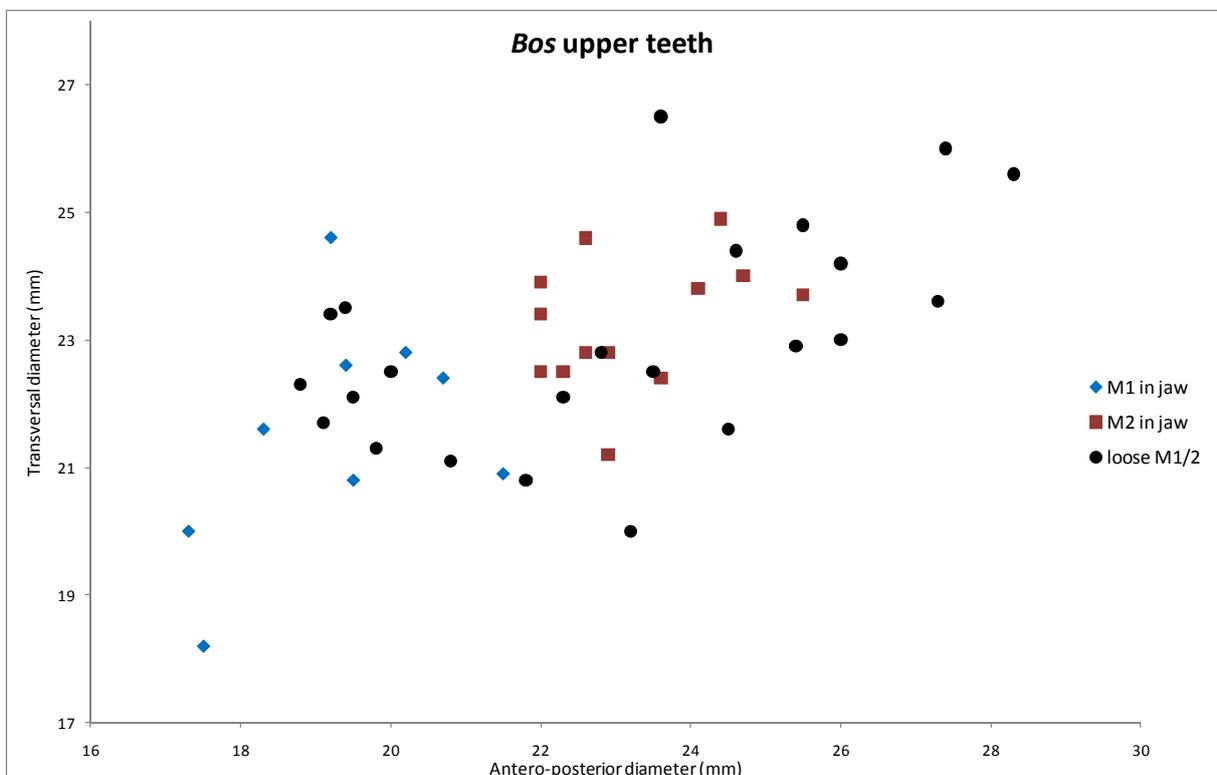


Figure II.16. Relation between the length and breadth of cattle upper first and second molars.

(b) Post-Cranial skeleton

In the Upper Tigris area both wild (*Bos primigenius*) and domestic (*Bos taurus*) cattle are to be expected in faunal remains (Uerpmann, 1987). It is known that domestic cattle are smaller than wild aurochs (Grigson, 1989: 78). To test whether specimens from the Upper Tigris area could be attributed to aurochs, the Log Size Index (LSI) technique was used. The LSI (Meadow, 1999) corresponds to what has been described here above for the distinction between wild and domestic pigs. Measurement values are converted into logarithms and compared to a standard logarithmic value for each measurement. The standard value comes from a specimen or the mean of several specimens. Contrary to the analysis of the pig remains, only post-cranial measurements are used for the study of the cattle size. Compared to the analysis of the pig remains, the LSI for cattle bones takes into account more measurements from more bones, even if it is not clearly known how sensitive they are to sex, age or individual variability. The results are shown using histograms grouping all the measurements from the Upper Tigris assemblage. When different measurements were taken on the same specimen, only the mean of the ratios is shown. The first histogram uses as reference a female *Bos primigenius* from Ullerslev, Denmark (Degerbøl and Fredskild, 1970, corrected measurements in Grigson, 1989: tabl.1) (Fig. II.17).

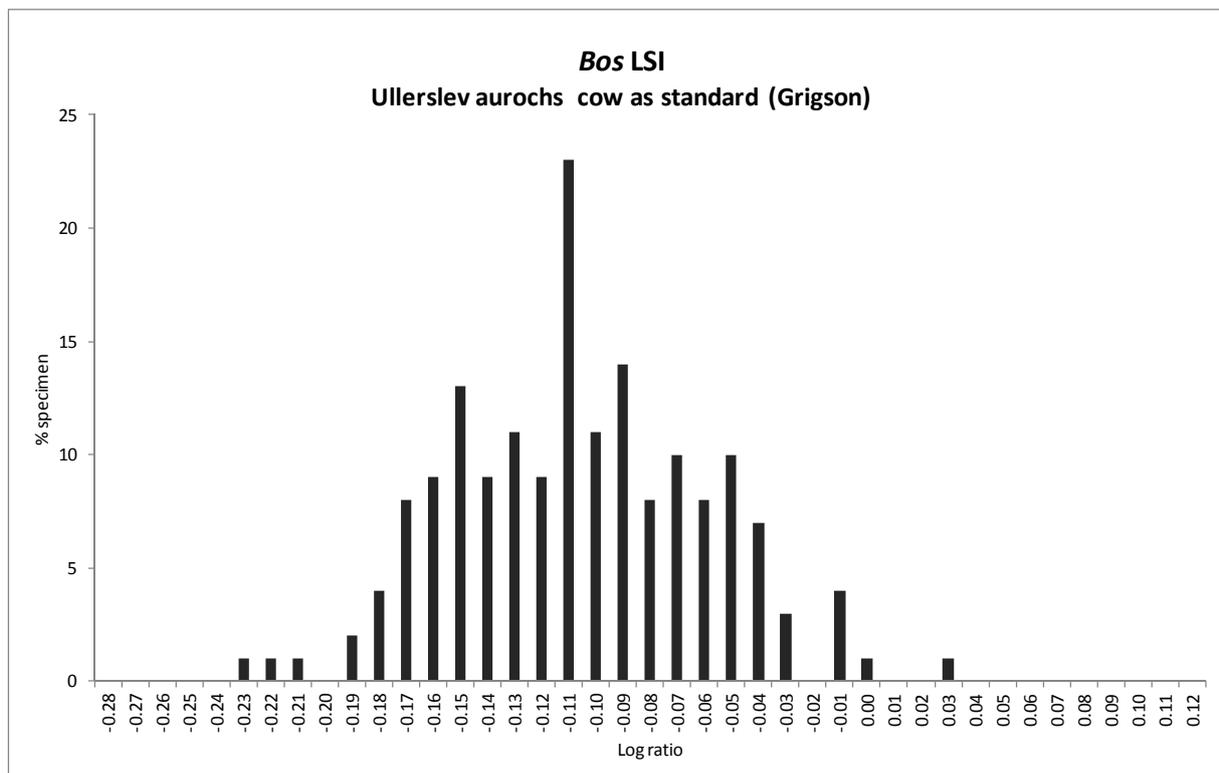


Figure II.17. Log ratio plot of cattle measurements. *Bos primigenius* standard is a cow from Ullerslev (Grigson, 1989: tab. 1). Mean is -0.11, median -0.11 and standard deviation 0.046.

The measurements are pretty well grouped except a few for which the log ratio is above -0,02²⁴. This limit corresponds to 2 σ . According to Grigson, female aurochs from the Near East can have a minimum value up to -0,08 and males a maximal value up to 0,10 (1989: fig. 4C). The question here is to decide whether the higher values of the assemblage represent actually wild aurochs or if they belong to large bulls. One aspect is the lack of very high values, meaning that only female

²⁴ Mean is -0.11, median -0.11 and standard deviation 0.046.

aurochs were hunted or that the specimens over -0.02 can be part of the domestic population. When each measurement for each skeletal part is plotted separately, most of the measurements over the 2σ (vertical line) are clearly separated from the other measurements (Fig. II.18). The largest Bd of the Metacarpal is considered as domestic cattle because the Bp from the same specimen gave a very low value. In all Metacarpal where both Bp and Bd were measured, the log ratio of the Bd is always bigger than the one of the Bp. The BT of the humerus, which is just on the -0.02 line, is also not considered as auroch because the measurement falls into the range of domestic cattle at Korucutepe (Boessneck and Driesch von den, 1975: 46).

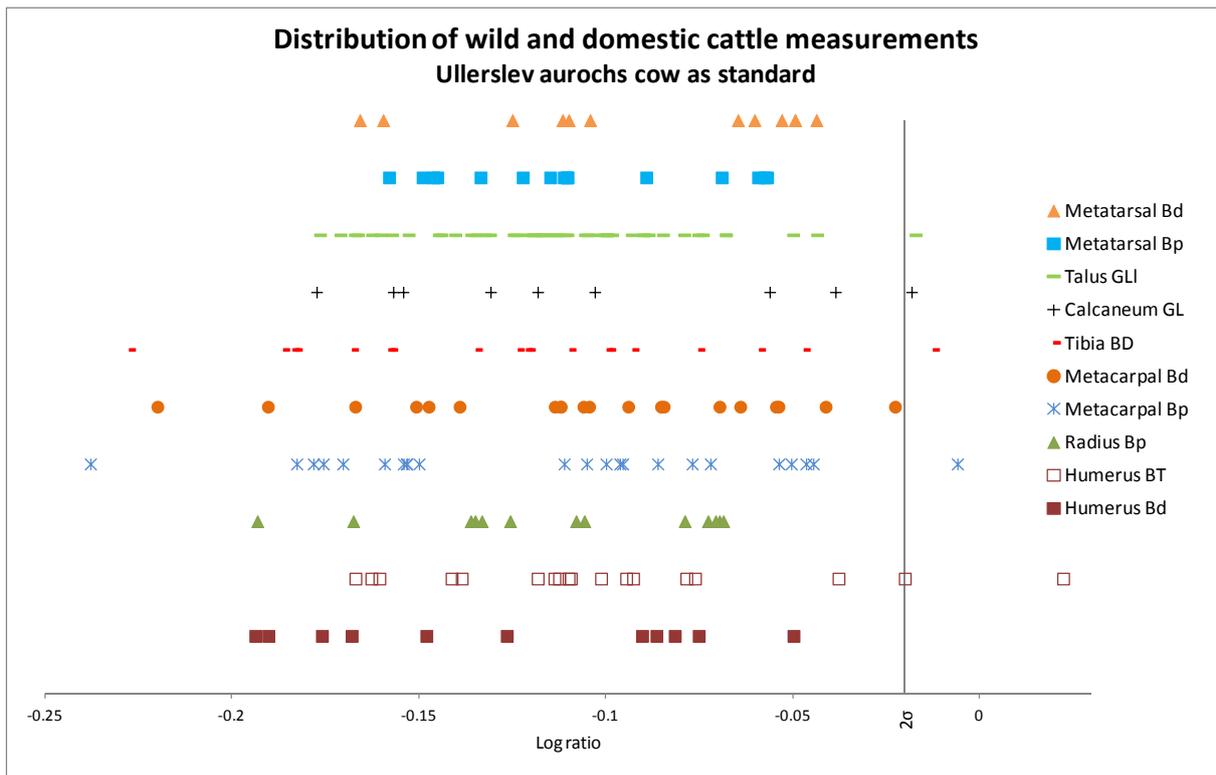


Figure II.18. Log ratio plot of cattle measurements, each dimension shown separately. *Bos primigenius* standard is a cow from Ullerslev (Grigson, 1989: tab. 1). The 2σ line is placed at -0.02 .

Other reference measurements were published by Meadow (1999: tab.1), they consist in mean values for the aurochs published by Degerbøl and Fredskild (1970). With this reference the 2σ value is at -0.05 ²⁵ (Fig. II.19). Specimens already determined hereabove as aurochs have a log ratio value over -0.05 .

²⁵ Mean is -0.14 , median -0.14 and standard deviation 0.046

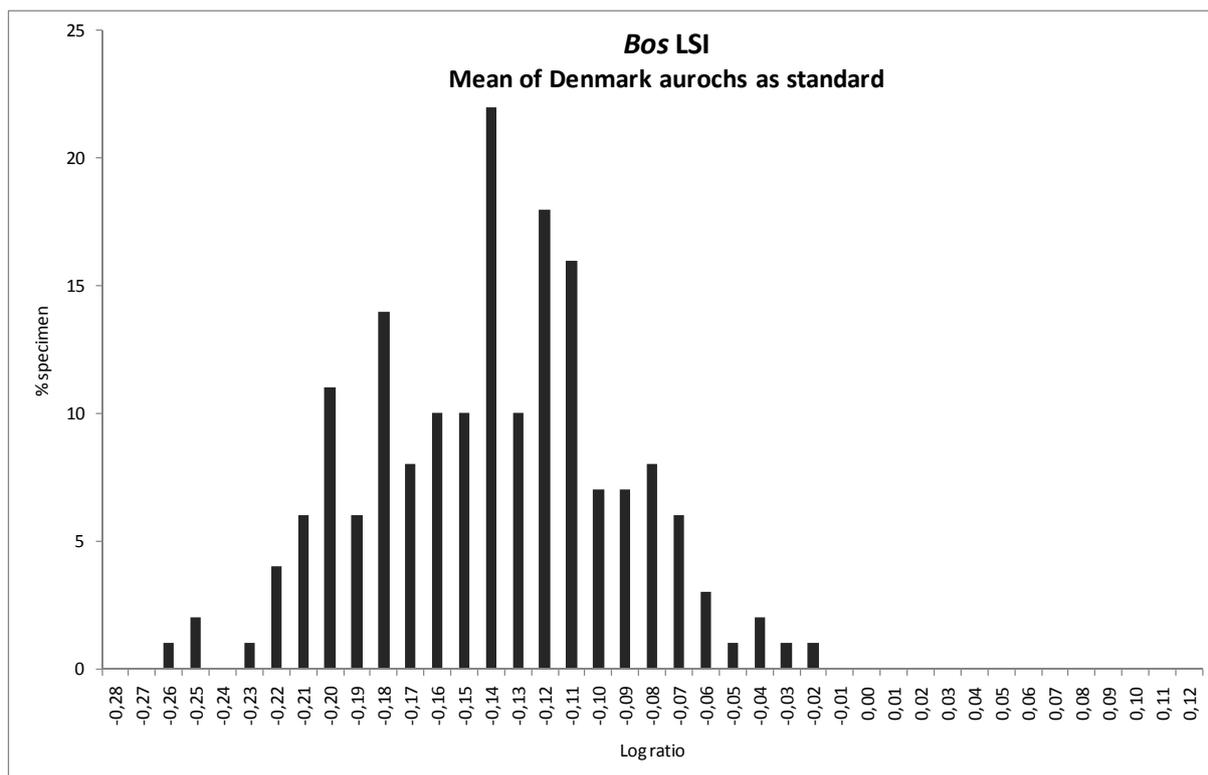


Figure II.19. Log ratio plot of cattle measurements. *Bos primigenius* standard is the mean of aurochs measurements from Denmark (Meadow, 1999: tab. 1). Mean is -0.14, median -0.14 and standard deviation 0.046.

When each measurement for each skeletal part is plotted separately, the measurements over the 2σ (vertical line) correspond to the specimens which appeared to be aurochs with the other reference (Fig. II.20). It is recommended not to use the phalanges in the LSI technique unless the posterior phalanges are sorted from the anterior ones. This has been done on some phalanges following morphological criteria (Dottrens, 1946). Only two of them are clearly above the measurements of the female aurochs from Denmark (Grigson, 1989).

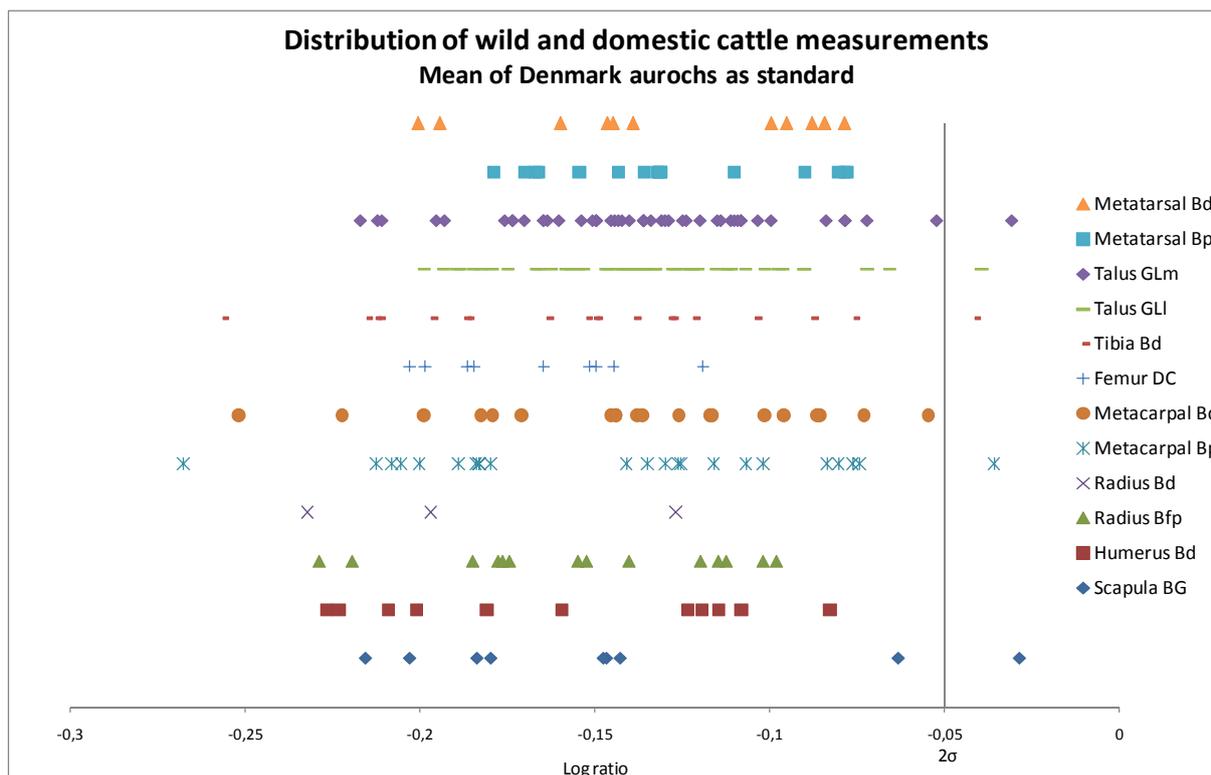


Figure II.20. Log ratio plot of cattle measurements, each dimension shown separately. *Bos primigenius* standard is the mean of aurochs measurements from Denmark (Meadow, 1999: tab. 1). The 2σ line is placed at -0.05 .

(4) Sub-Family Caprinae

(a) *Sorting the goat (Capra) for the sheep (Ovis)*

(i) *Scapula*

To sort the goat from the sheep scapula, two indexes were proposed by Boessneck, Müller and Teichert (1964) and another one by Fernández (2001a). The measurement ASG (Boessneck et al., 1964, named DEB in Fernández, 2001a: fig.1) goes from the base of the spine to the glenoïde cavity and is not easy to define precisely. The first index is $ASG/SLC^{26} \times 100$. Fernandez proposed also the index $ASG/GLP \times 100$. On the glenoïde cavity it is possible to calculate the index $BG/GLP \times 100$. For all these indexes, the sheep and goat values present a large overlap (Fernández, 2001a: 351-8). Therefore, only the extreme values can be attributed to either the sheep or the goat. What is proposed here is to look at the three indexes for each specimen (Fig. II.21). If one of the three values falls outside of the overlap, the specimen is considered as either a goat or a sheep. It has to be noted that this method allows identifying the genus of specimens of which some of the values are in the overlap range. No specimen shows values outside of the overlap corresponding to different species (eg. exclusive sheep value for one ratio and exclusive goat value for another one). The morphological diagnose (see references hereabove) was consistent with the results of the morphometrical indexes and therefore used when the indexes were situated in the overlap range. As a result it can be said that in the case of this assemblage, morphological criteria can help sorting the sheep from the goat even if the morphometrical values fall in an overlap.

²⁶ Except ASG all other measurements follow Driesch (1976).

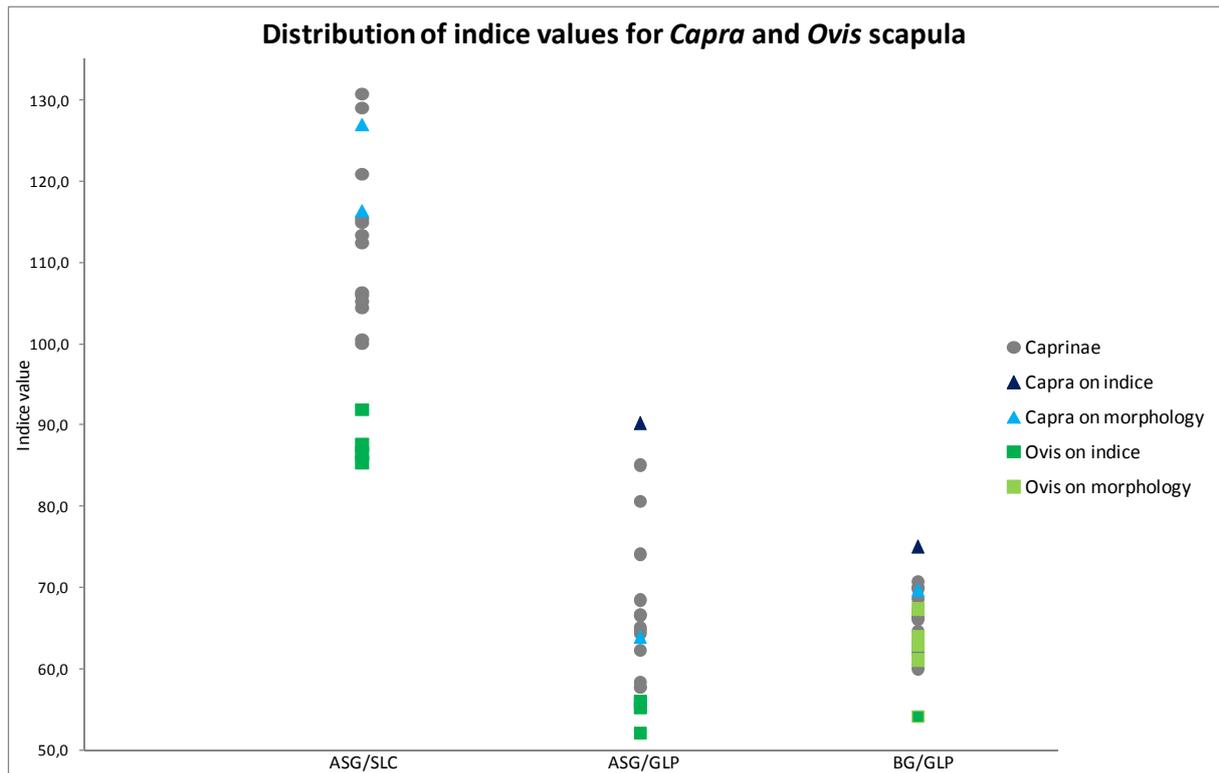


Figure II.21. Distribution of values of three different indice using measurements taken on the scapula.

(ii) *Humerus*

On the distal part of the humerus, the shape of the trochlea helps to sort the sheep from the goat and can be described by two indexes. The first one is $HMT/BTx100$ where HMT is the maximal (medial) height of the trochlea. The second one is $HT/BTx100$ where HT is the medial height of the trochlea²⁷. Different ranges have been published (Boessneck et al., 1964, Fernández, 2001a: 361-5, Helmer and Rocheteau, 1994: 20 for HMT/BT only). The largest ranges are used to give less but more secured attributions. The overlap is very important and therefore only a couple of extreme values can be attributed to the sheep or the goat. However, it confirms the attributions made on morphological criteria. A gazelle (*Gazella* sp.) was also determined both on morphological criteria and using the HMT/BT index (Helmer and Rocheteau, 1994).

²⁷ HMT and HT as described by Boessneck, Müller and Teichert (1964), BT following Driesch (1976).

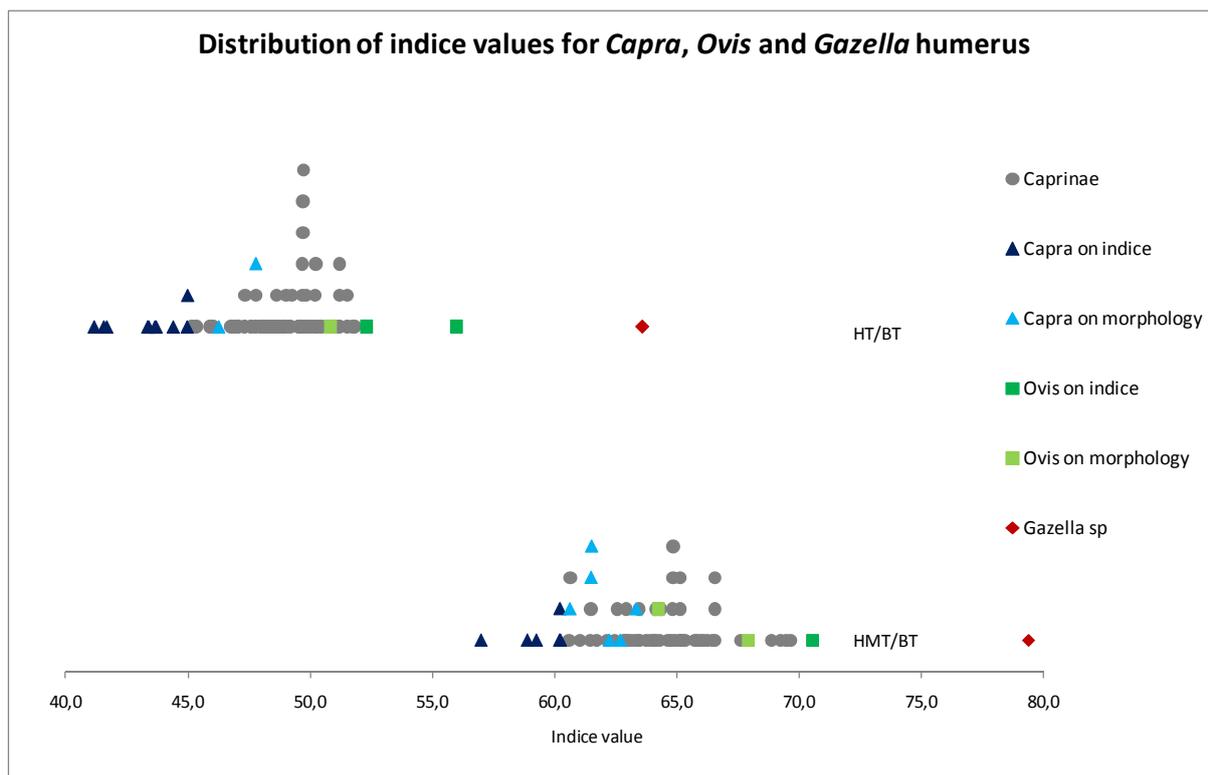


Figure II.22. Distribution of values of two different indice using measurements taken on the distal part of the humerus.

(iii) *Metacarpals*

The morphometrical criteria used to sort the sheep from the goat concern the distal part of the metacarpal, especially on the trochleae. It necessitates that the distal parts of the metacarpals were first distinguished from the distal parts of the metatarsals (Boessneck, 1969: fig.71, Boessneck et al., 1964). The results are not the same for the medial and lateral trochleae, which also implies that right and left metacarpals were distinguished (Prummel and Frisch, 1986: 576-7). The first index concerns the relation between the antero-posterior diameter of the peripheral condyle of the trochlea (DAPCp) and the antero-posterior diameter of the verticillus (DAPV)²⁸. This index is the result of the calculation $DAPCp/DAPV \times 100$. On the medial trochleae ($DAPCpm/DAPVmx100$), the index is said to be always over 63 for the sheep and below 63 for the goat (Boessneck, 1969, Boessneck et al., 1964). It is also reliable for the assemblage from the Upper Tigris area, except for one medieval specimen for which the index is 63.5 while all other criteria are coherent with an attribution to the goat. The same index applied to the lateral trochleae ($DAPCpl/DAPVlx100$) was not discussed by Boessneck but other data indicates that sheep specimens do not have a value below 61.1 (Fernández, 2001a: tab.3.86a, n=53). Data is too scarce for the modern goat specimens to evaluate a range (Fernández, 2001a: tab.3.86a, n=3). In the Upper Tigris assemblage the lateral trochleae values are coherent with the ones from the medial trochleae, except for the medieval specimen described above.

The second criterion concerns the antero-posterior diameter of the peripheral condyle of the trochlea (DAPCp) and the breadth of the trochleae (DTT)²⁹. No index was published at first but the

²⁸ Boessneck *et al.* (1964) described the measurement but the abbreviation is from Fernández (2001a).

²⁹ The measurement DTT was described by Payne (1969) but the abbreviation is from Fernández (2001a).

method consists rather in plotting the two measurements (Payne, 1969). Rowley-Conwy argued that this method is more reliable than the DAPCp/DAPV index (Rowley-Conwy, 1998). He also noticed that the medial trochleae were more distinctive than the lateral one. In the case of the Upper Tigris assemblage, the two groups are very close but do not overlap (Fig. II.23). In this case it is also possible to attribute to sheep or goat trochleae which were not lateralized.

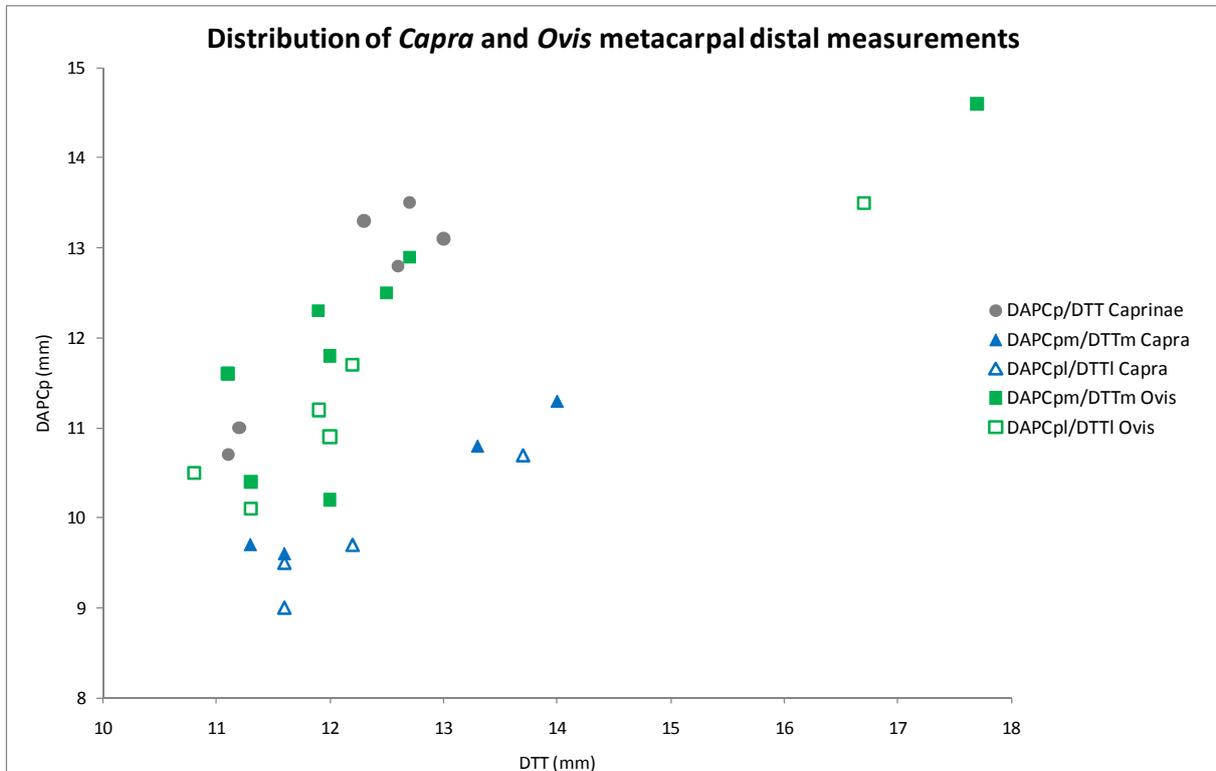


Figure II.23. Relation between the DTT and DAPCp measurements of the metacarpal. Attribution to sheep or goat were made using the indice DAPCp/DAPVx100.

(iv) *Calcaneum*

The relation between the length of the articular facet (for the malleolus) and the length of the articulation-free part of the lateral process is known as a morphological criteria (Boessneck et al., 1964). It has been proposed by Fernández to use the index LP/LCx100. LP is the length of the articulation-free part of the lateral process and LC is the length of the articular facet for the malleolus³⁰. The values given by Fernández have a large overlap range between 79.1 and 119.4. Indeed, only 5 values are strictly in the sheep range and none in the goat range. However, the sheep calcaneum were sorted from the goat calcaneum using morphological criteria not linked to the articular facet or the lateral process. The values for the LP/LCx100 index for the sheep and goat from the Upper Tigris area do not overlap. A few specimens did not have a clear morphology but they are all among the specimens attributed to the sheep (Fig.II.24).

³⁰ These measurements were defined by Clutton-Brock *et al.* (1990, see also Fernández, 2001a: fig.1).

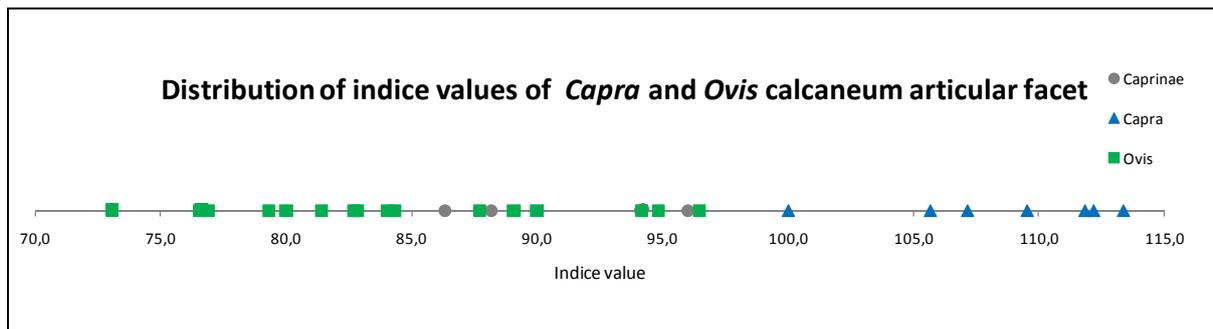


Figure II.24. Sheep and Goat calcaneum. Spread of the LP/LC*100 values. “Capra” and “Ovis” specimens are those identified on morphological criteria.

(v) *Metatarsal*

The morphometrical criteria for the metatarsal are the same as those used for the metacarpal. However, the criteria are said to be less efficient for the metatarsal (Rowley-Conwy, 1998, Fernández, 2001a, Boessneck, 1969, Boessneck et al., 1964). For the index DAPCpm/DAPVmx100, the sheep and goat values overlap in the range 59-62.5 (Boessneck, 1969, Boessneck et al., 1964). There is no sufficient modern data to apply the index to the lateral trochleae (DAPCpl/DAPVlx100).

The relation between the antero-posterior diameter of the peripheral condyle of the trochlea (DAPCp) and the breadth of the trochleae (DTT) was not considered by Payne for the metatarsal, but has been tested by Rowley-Conwy (1998). As for the metacarpal, Rowley-Conwy considers that this criterion is more reliable than the DAPCp/DAPV index, but it should only be used for the medial trochleae. For the Upper Tigris assemblage, one specimen, which was in the overlap range of the DAPCp/DAPV index appears to differ from the sheep group in the graphic (Fig. II.25).

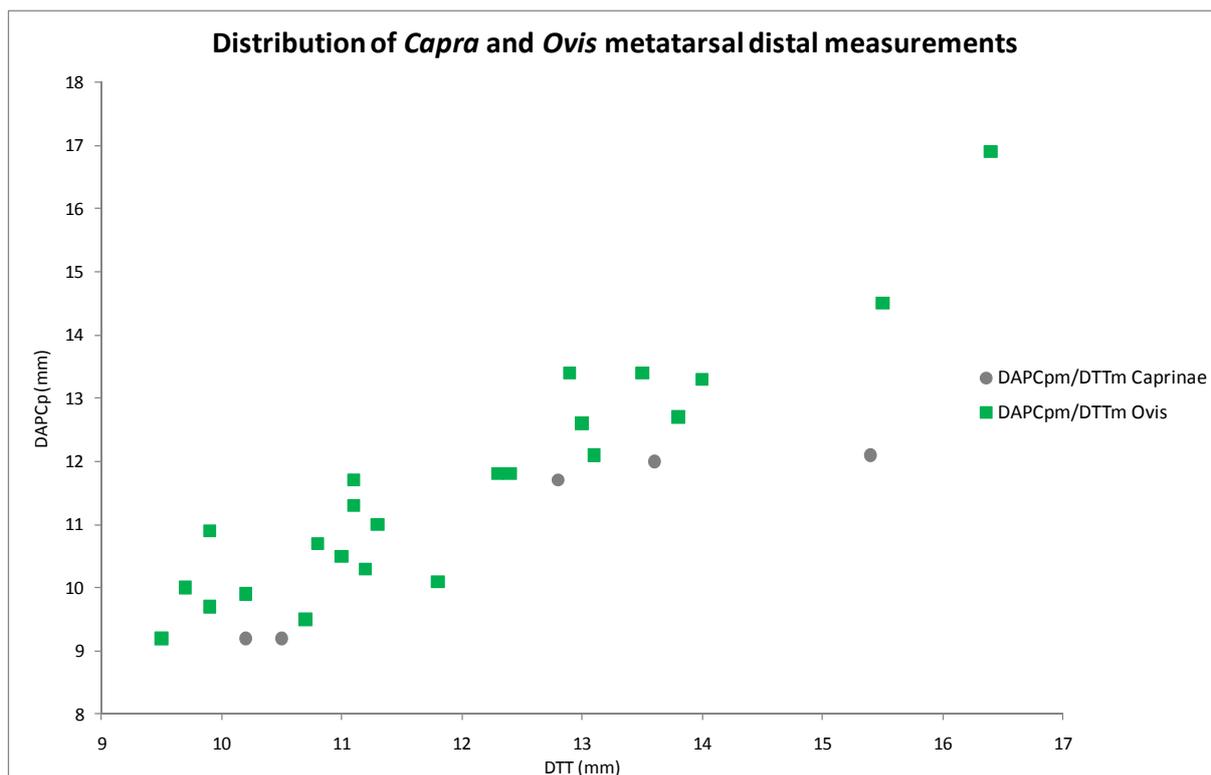


Figure II.25. Relation between the DTT and DAPCp measurements of the metatarsal. Attribution to sheep was made using the indice DAPCp/DAPVx100.

(b) *Genus Capra*

In the Upper Tigris area both wild (*Capra aegagrus*) and domestic (*Capra hircus*) goat are to be expected in faunal remains (Zeder, 2006a: fig.14). To test whether specimens from the Upper Tigris area could be attributed to wild goat, the Log Size Index (LSI) technique was used as for the cattle remains (see hereabove). The results are shown using histograms grouping all the measurements. When different measurements were taken on the same specimen, only the mean of the ratios is shown. The measurements used as comparison are the mean between a male and female *Capra aegagrus* from the Taurus Mountains in southern Turkey (Uerpmann and Uerpmann, 1994: 435, tab.14). The distribution of the 155 values is rather unimodal, with only a few specimens over the 2σ range³¹ (Fig. II.26). Zeder argued that change in size is not the best marker of domestication due to a low difference in the size of modern, wild and domesticated goats from Iran and the high impact of sexual dimorphism (Zeder, 2001, Zeder, 2006a). However, in the assemblage studied here, there is no specimen coming from a period of initial domestication. As domestic caprines were dominant in the economy of northern Mesopotamia and southern Anatolia at least since the 3rd mill. BC (Clason and Buitenhuis, 1997, Clason and Buitenhuis, 2000), the aim here is to differentiate a main group of actual domestic goats from a possible small amount of hunted wild specimens.

³¹ Mean is -0.04, median -0.04 and standard deviation 0.052.

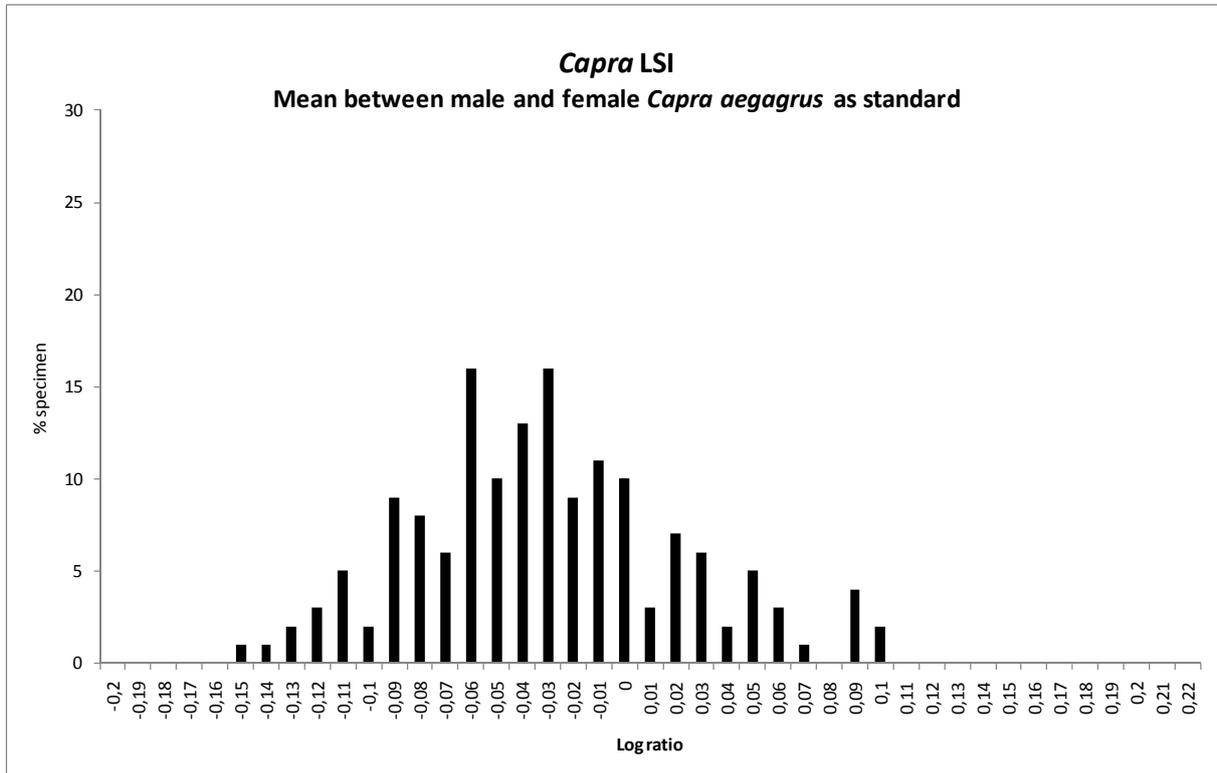


Figure II.26. Log ratio plot of goat measurements. *Capra aegagrus* standard is the mean between a male and female from the Taurus Mountains (Uerpman and Uerpman, 1994: 435, tab.14). Mean is -0.04, median -0.04 and standard deviation 0.052.

Plotting each measurement separately, it appears that the mean of each group differs considerably (Fig. II.27). Consequently not every measurement over 0.07 should be considered as a wild specimen. This decision has to be taken, considering the position of the extreme values in relation to the group of values from the same measurement (Fig. II.27).

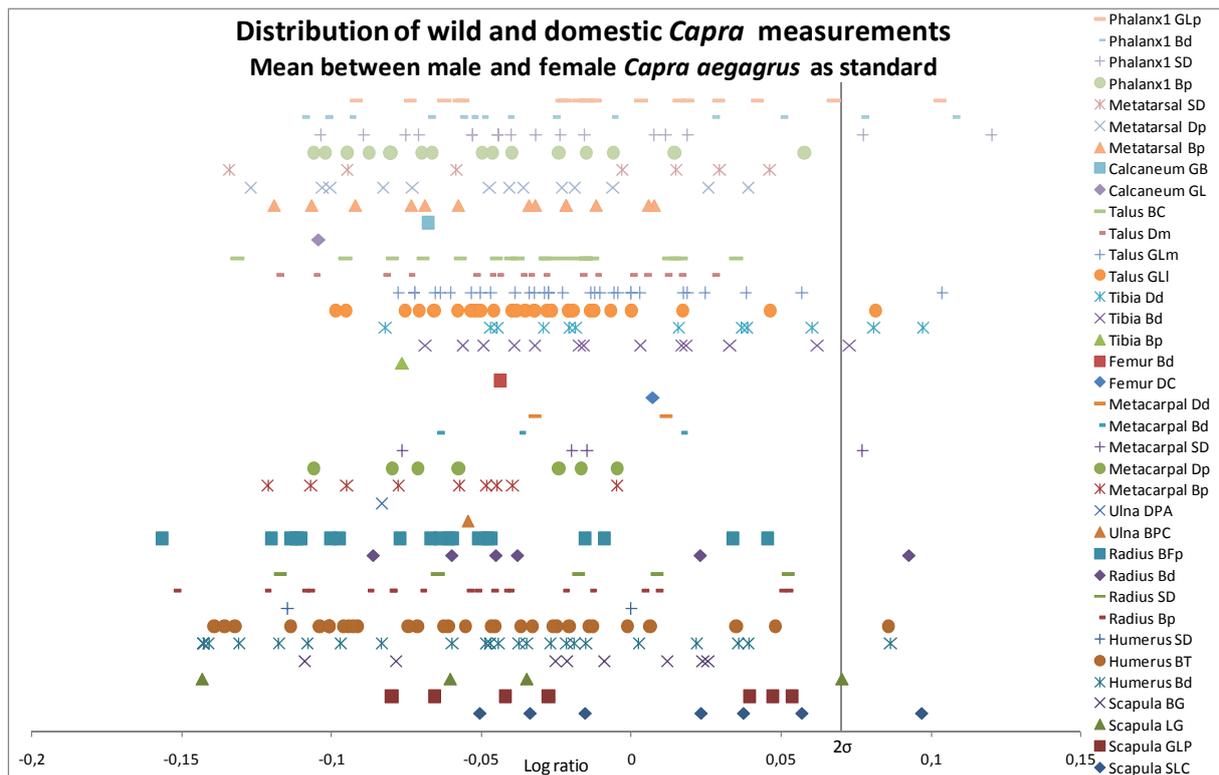


Figure II.27. Log ratio plot of goat measurements, each dimension shown separately. *Capra aegagrus* standard is the mean between a male and female from the Taurus Mountains (Uerpmann and Uerpmann, 1994: 435, tab.14). The 2σ line is placed at -0.065 .

(c) Genus *Ovis*

In the Upper Tigris area both wild (*Ovis orientalis*) and domestic (*Ovis aries*) sheep are to be expected in faunal remains (Zeder, 2006a: fig.14). To test whether specimens from the Upper Tigris area could be attributed to wild sheep, the Log Size Index (LSI) technique was used as for the cattle and goat remains (see hereabove). The results are shown using histograms grouping all the measurements. When different measurements were taken on the same specimen, only the mean of the ratios is shown. The measurements used as comparison are from a female *Ovis orientalis* from western Iran (Uerpmann and Uerpmann, 1994: 431, tab.12). The distribution of the 249 values is also quite unimodal with no strict separation of the few specimens above the 2σ range³² (Fig. II.28).

³² Mean is -0.00 , median -0.00 and standard deviation 0.043 .

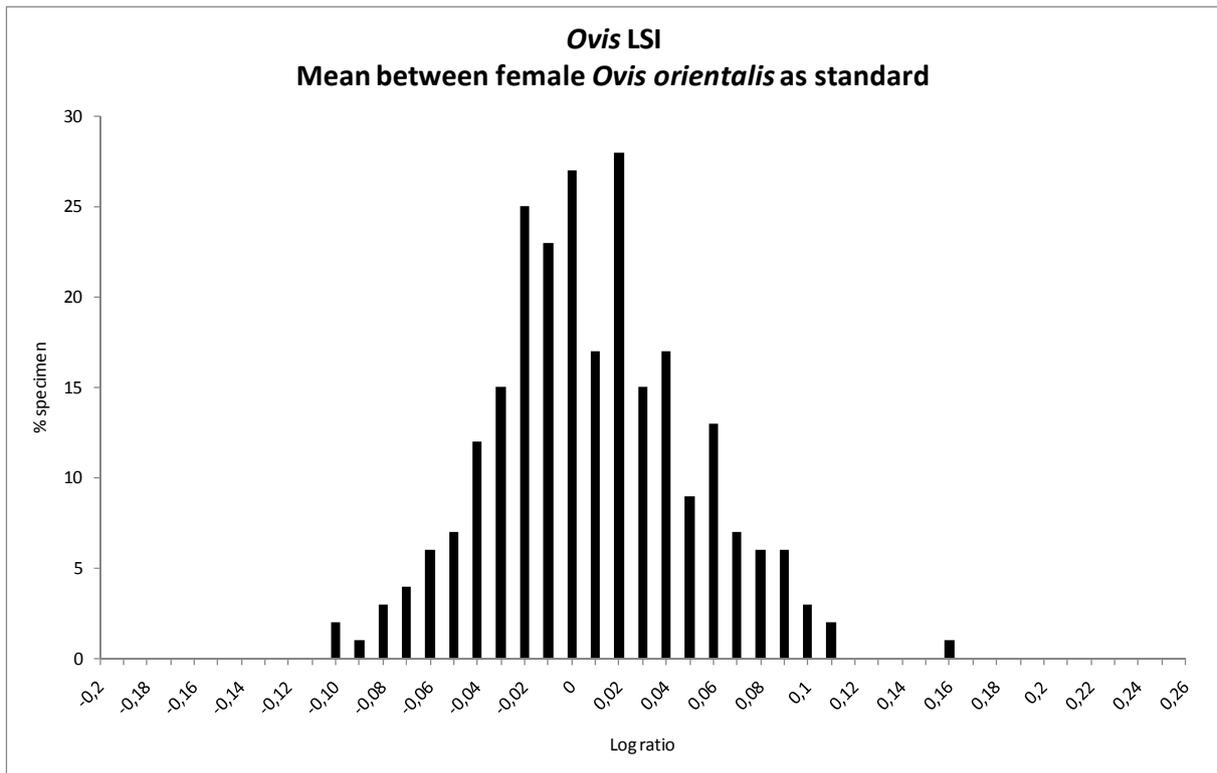


Figure II.28. Log ratio plot of sheep measurements. *Ovis orientalis* standard is a female from western Iran (Uerpman and Uerpman, 1994: 431, tab.12). Mean is -0.00, median -0.00 and standard deviation 0.043.

However, plotting each measurement separately, it appears that the mean of each group differs considerably. Consequently not every measurement over 0.09 should be considered as a wild specimen. This decision has to be taken considering the position of the extreme values in relation to the group of values from the same measurement (Fig. II.29).

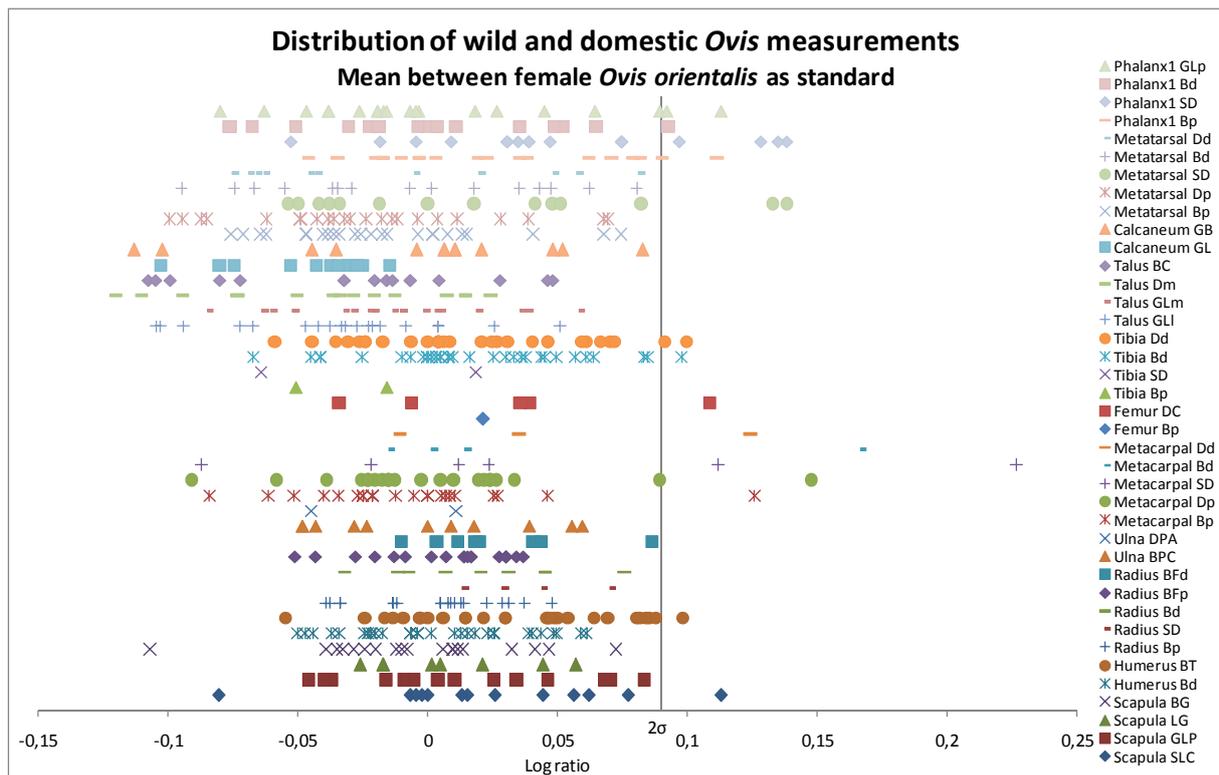


Figure II.29. Log ratio plot of sheep measurements, each dimension shown separately. *Ovis orientalis* standard is a female from western Iran (Uerpmann and Uerpmann, 1994: 431, tab.12). The 2σ line is placed at -0.09 .

4. Age determination

Determining the age at which an animal has been slaughtered is of primary importance to understand the patterns of exploitation of domestic animals. The quality and amount of an animal products (among others meat, fat, milk, wool) depend partly on the age of the individual. Therefore, age-related patterns of exploitation will give valuable evidence of the animal products which were primarily targeted. In the case of wild animals, the determination of the age at slaughtering can indicate if the hunting was highly selective, based on the age of the prey. Age data will mainly be used here for species which are significantly represented in a given assemblage.

a) Dental remains

Teeth can give two kinds of age information. The eruption of a tooth provides a *terminus ante quem* or a *terminus post quem* to determine the age at slaughtering. Eruption dates were given by different authors and usually they differ slightly, depending on the breed or population studied (Hillson, 2005: 223-44). These reference dates will be used for domestic cattle (Silver, 1969: 296), pig (Bull and Payne, 1982: 56-7), domestic sheep and goat (Zeder, 2006b: 117) and red deer (Brown and Chapman, 1991: 526 with additional references).

Once the tooth has erupted it will start to wear due to the mastication. This is a long time process which occurs up to the natural death of the animal or up to the eruption of a new tooth in the case of the deciduous teeth. The degree of wear therefore allows targeting a period in the life of the animal. The first possibility is to use the enamel patterns visible on the occlusal face (Payne, 1973, Grant, 1982). This method requires using lower jaws with several teeth preserved. For species with hypsodont (high crown) molars like the cattle, sheep, and goat, it is possible to consider the

height of the crown which decreases as the wear occurs (Ducos, 1968). In this case loose upper and lower teeth can be used.

Because they allow a finer age determination, methods based on wear stage or crown height will be used here. For domestic pigs an eruption and wear stage was recorded for each lower tooth (Grant, 1982) and then the dental specimen was attributed to an age class, according to Horard-Herbin's indications (Horard-Herbin, 1997: tab.25). Cattle upper and lower dental remains were attributed to age classes following Ducos who uses the index crown height/crown width for the molars (Ducos, 1968: 13). Lower dental remains of sheep and goat were attributed to age classes using wear patterns (Payne, 1973) and the Ducos method (values corrected by Helmer, see Vigne and Helmer, 2007: tab.1). On the upper teeth only Ducos method can be used. Red deer lower dental remains were attributed to age classes according to the wear (Brown and Chapman, 1991).

Some rules will be used in constructing the harvest profiles. First dental remains are counted and not the number of teeth. Therefore, a jaw fragment with 4 teeth will be registered only once. This is the number of identified dental specimens (NISPD). When a dental specimen cannot be securely attributed to a single class it is proportionally distributed in the different possible classes³³.

Harvest profiles can be built in different ways and the method used is clearly a matter of debate (see for instance Vigne and Helmer, 2007: 19-20). The percentage of each class is corrected to figure in the histogram. This is because age classes have various lengths (Ducos, 1968: 13, Vigne and Helmer, 2007: 20, fig.3). For sheep and goat, for example, the class A is represented by a unit of 2 months' length. The class EF, 2 years' long, is constituted of 12 units of 2 months' length. Therefore, the percentage for the EF class has to be spread between these 12 units. On whatever the correction is applied, numbers or percentages, and whatever the class used as base unit, here the smaller class, the culling pattern which means the relation between the classes remains identical. All harvest profiles shown in this work for a given taxa (cattle, pig and caprines) follow the same correction rules and are on the same scale. Therefore, they are all comparable with each other. Researchers using different methods are advised to go back to the raw data given here.

Survival diagrams are not used in this work. The conceptual reason for this choice is that the assemblages studied here cannot be viewed as the exhaustive representation of a herd. As argued in another chapter, not all area of each site has been excavated. Therefore, what is seen is the particular consumption pattern of a group of individuals within the site. This pattern is linked to the social status of the consumers and the place of consumption. The assemblage of one of the areas of a site could not represent the demography of the entire herd managed by the inhabitants of the settlement. Furthermore, due to the mobile pastoralism component of the region and the fact that the sites were very close to each other, it cannot be assumed that each settlement worked as a closed system. It cannot be excluded, and it should rather be expected, than some animals were extracted from the herd without ending in the faunal refuse of the site because of trade, exchange or other reasons. By the same token, animals could have been consumed at a site without originating from the herd managed by the inhabitants of a settlement. For all these reasons only harvest profiles reflecting consumption patterns are used here.

³³ A dental specimen which could be attributed to two different age classes counts for 0.5 in each class.

b) Post-cranial skeleton

One common method for ageing post-cranial bones is the timing of epiphyseal fusions. There are various issues, however, which make it difficult to interpret. Epiphyseal zones are sorted into different groups according to their fusion time. As for dental eruptions, this method only gives *terminus ante* and *post quem*. Another problem is the relative weakness of unfused bones compared to fused ones. This is particularly a problem for sheep and goat bones which are weaker than pig ones. A differential preservation would bias the analysis in favor of the older individuals (Payne, 1973: 283). This is what one can expect in assemblages where the fragmentation is high as it is the case here. Finally, it is difficult to evaluate how many individuals are represented in each of the fusion groups. A mixture between nearly complete skeletons from a given age group and a selection of elements for another age group will blur the results, as some individuals will not be represented in all fusion groups because of a lack of some skeletal elements. Despite these issues, epiphyseal fusion data will be used for pig and cattle (with fusion time according to Barone, 1999 : 76) when dental remains are rare, in order to provide a general kill-off pattern. This method will not be used for sheep and goat as, in addition to the disadvantages described above, it is usually difficult to reliably separate unfused bone from sheep and goat. Mortality profiles can be constructed for sheep and goat separately, based on lower dental remains and for sheep and goat together, based on upper dental remains.

5. Sex determination

If the patterns of animal exploitation are characterized by the relative representation of the different species and the age at which the animals are slaughtered, the differential treatment of males and females is also of particular importance. The consideration of this information depends, however, on the possibility to determine the sex of the specimens.

a) Domestic pigs (*Sus domesticus*)

Even if some measurements could show some sexual dimorphism (Payne and Bull, 1988), it is unlikely that metric data allows to sort the male from the female (Albarella and Payne, 2005: 597). The most dimorphic elements are the lower and upper canines (Hillson, 2005: 128, fig.1.89). Even though they are not really numerous in the assemblage, the male to female ratio can be evaluated from these specimens.

b) Domestic cattle (*Bos taurus*)

The morphology of the pelvis is known to show sexual differences (Grigson, 1982: 10, Greenfield, 2005). The attribution of sex using metrics is more difficult, as on one hand the methods usually require length to calculate gracility index (see references in Grigson, 1982, and also Chaix and Méniel, 2001: 81-2) and on the other hand the corpus of measurements is limited here. It seems, however, that among the complete metacarpals, all but one should be attributed to female. The distal breadth of the metacarpal itself should allow discrimination between male and female (Grigson, 1982). The spread of this measurement in the Upper Tigris assemblage (Fig. II.18) confirms this assumption. The spread of other measurements which could be sexually dimorphic, like the greatest length of the talus (Bartosiewicz, 1984, Grigson, 1982), shows also a limited number of male specimens. It could also be the case for the breadth of the humerus distal trochlea. Another possibility would be to sort the male from the female on the lower molars (Beasley et al., 1993: 311-4). It has been shown that for the wild cattle, the first lower molars allow to sort the male from the female (Helmer and Monchot, 2006: 223-4). In domestic cattle it also seems to be the most reliable

tooth for sexual dimorphism (Beasley et al., 1993: fig. 5). The surface at the collar (Helmer and Monchot, 2006: 223) is plotted against the length (Beasley et al., 1993: 312) (Fig. II.30). Three groups are more clearly separated by the length rather than by the surface at the collar. Chronological differences cannot explain the different groups, as specimens from the same level at Hirbemerdon Tepe for example are spread in the three groups. Therefore, it is likely that sexual dimorphism is involved here. The four larger specimens are attributed to male and the lower group to female. In the lack of archaeological specimens of known sex to compare with, it is difficult to discuss the nature of the middle group. According to the result of the sexual attribution on post-cranial remains, it is more logical to attribute this middle group also to female, but if a castrated individual should be present in the assemblage, it is not known where they would appear in the graphic.

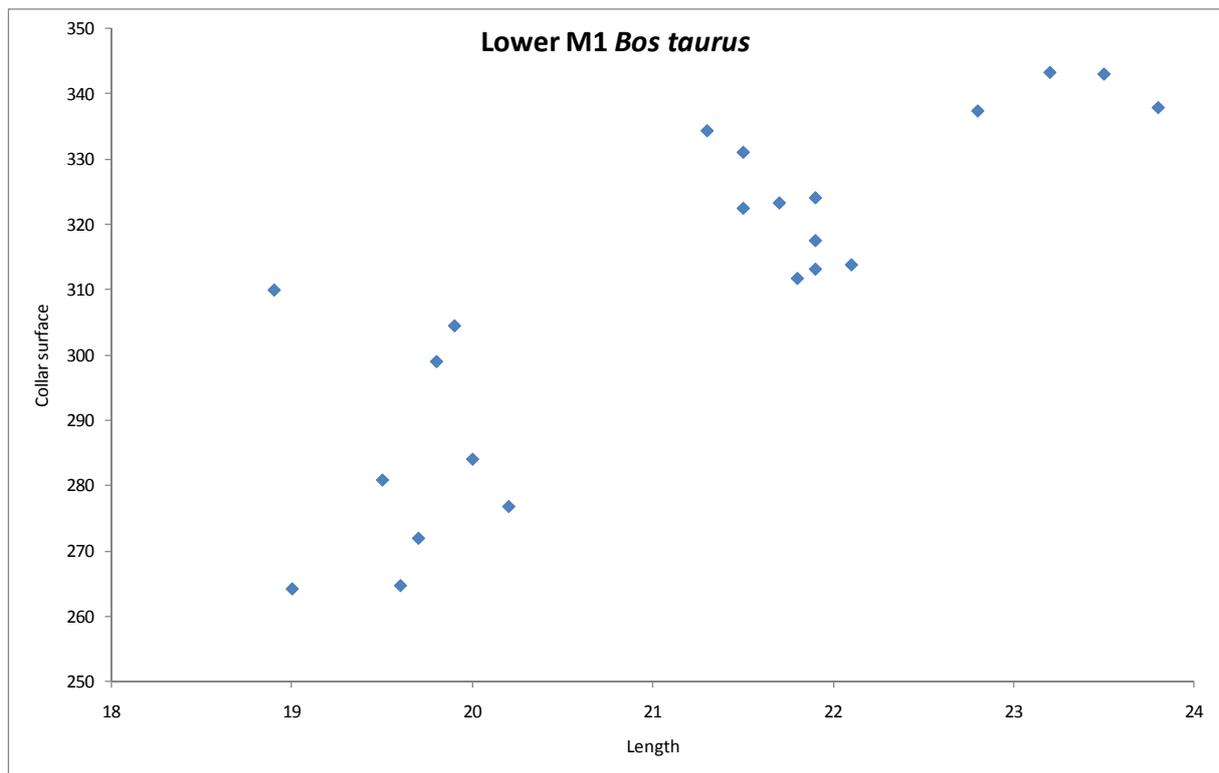


Figure II.30. Distribution of length and breadth measurements from domestic cattle first lower molars.

c) *Caprinae*

The sexual dimorphism in the sheep and goat remains is visible mainly in the pelvis (Greenfield, 2005, Boessneck, 1969: 344-8, Boessneck et al., 1964, Prummel and Frisch, 1986: 574-6). Other authors proposed to determine the sex of sheep and goat remains using measurement (Zeder, 2001, Studer, 1991, Rowley-Conwy, 2000). This possibility was, however, not fully investigated here due to the lack of complete bones for full length measurements and the general limited size of the assemblages.

C. Overview of the material

1. Identified and unidentified portions

The present study concerns 15,467 remains (NR) weighting almost 190kg (WR) (Tab. II.2-3). Only part of them was identified. NISP is 7,109 (Tab. II.5) and WISP over 130kg (Tab. II.6). The identified portion represents on average 45% of the NR and 72% of the WR. It is the result of an important fragmentation but also indicates the small size of the unidentified remains. With 72% of the WR, the identified portion is considered representative of the whole assemblage.

The proportion of identified remains differs in the various assemblages. In NR the three assemblages with the highest proportion of identified remains result from peculiar deposits (Fig. II.31). In the two Middle Bronze Age assemblages from Giricano, the almost complete 13 caprine skeletons found inside a pithos from "Geb. C" explain the over-representation of identified remains. The "BSG" assemblage at Kavuşan Höyük is also a peculiar case. On one hand the 14 almost complete sheep and goat explain a high number of identified remains and on the other hand the heavy fragmentation due to the severe burning of the bones did not allow every single scrap to be counted. The proportion of identified remains in the other assemblages indicates that this factor is not homogeneous in the different assemblages of the same site, neither in contemporaneous assemblages from different sites. It can be drawn from this observation that the proportion of identified remains does not primarily depend on the carefulness of faunal remains collection in a single excavation (e.g. collection of the only large and complete pieces). The proportion of identified remains, and therefore the impact of the fragmentation, is not completely related to a chronological period. The variability in the proportion of identified remains is due rather to the combination of the origin of the deposition (e.g. heavily fragmented bones due to butchery practices) and local taphonomical conditions. Considering the WR, the proportion of the identified portion shows more variability among the assemblages in the weight (and therefore size) of the identified and unidentified remains. It is, however, interesting to note that the three assemblages which show the highest representation of identified remains in NR do not stand so much above the other assemblages when the WR is considered (Fig. II.32). These three assemblages are characterized by a high number of almost complete caprine skeletons. It is indeed confirmed that the over-representation of the identified portion in the NR of these three assemblages is due to the presence of light bones (i.e. carpal bones, sesamoid, and phalanges). These light and small bones tend to be recovered less from fill assemblages where sieving was not carried out. Due to their light weight the impact of these bones on the proportion of the identified portion in the WR is much reduced.

The high representation of the identified portion in the WR indicates that the unidentified remains are mostly constituted of small fragments (Tab. II.4). The average weight by remain is 11g for the large-size animal category, 2.8g for the medium-size animal category and 0.8g for the small-size animal category. The global average weight by remain is 5.3g.

2. Overview of taxonomical classes

Before looking at the relative representation of different taxonomical classes, it has to be emphasized here again that almost all the remains were recovered without sieving techniques. The collection by hand and eye was done carefully as small-size faunal remains are not completely absent in the assemblage. However, in absence of sieving, it is very likely that small vertebrates are

underestimated in the assemblage (Payne, 1972). This bias affects less the main providers like the *triad* (domestic cattle, pig, sheep and goat) than non-mammalian taxa.

The average proportion of mammalian remains is 97.3% of the NISP (Tab. II.8). The representation of non-mammalian taxa varies in the different assemblages (Fig. II.33). They are well represented in the Late Bronze Age assemblages of Giricano. Sieving did occur in the Middle-Assyrian pit, which contained the tablets written in cuneiform (pit 01.053) but fish remains are also well represented in contemporary contexts which might not have been systematically screened. At Kavuşan Höyük, the Neo-Assyrian pit “BSG” only contains mammalian remains, which is an important piece of information in the definition of its peculiar nature.

	BH MBA	GT MBA	GT MBA	GT LBA	GT LBA	HM MBA	HM MBA	HM MBA	HM MBA Post Arch. Compl.	HM IA	KH LBA	KH IA NAss without pit BSG NR	KH IA NAss pit BSG NR	KT MBA	KT MBA	KT MBA	MST MBA	MST LBA	MST LBA	TH MBA	TH LBA	
	NR	global NR	Geb. C NR	global NR	MAss NR	global NR	Piazza NR	non Piazza NR	NR	NR	NR	NR	NR	global NR	area C NR	area D NR	NR	global NR	MAss NR	NR	NR	
Rodentia																	2	1				
<i>Spalax</i> sp.						1		1														
<i>Meriones</i> sp.												1										
<i>Lepus europaeus</i>	1					2	1	1	1		1						1	2			1	
<i>Erinaceus concolor</i>						1		1				2										
<i>Felis catus</i>										1												
<i>Panthera leo</i>									1													
<i>Canis familiaris</i>	1	3	2	4	2	104	73	31	12	43	10	5	1	16	4	12	8	9	4	2	1	
<i>Canis lupus</i>									1													
<i>Vulpes vulpes</i>	1			2	2									4		4			1			
<i>Mustela</i> sp.										1												
<i>Equus</i> spp.	2					4	1	3	7	17	13	7	1	6	3	3			2			
<i>Equus caballus</i>	1			3	2	38		38	14	1	3	2										
<i>Equus cf. caballus</i>		1	1	4	3	4		4	3	6	9	3										
<i>Equus asinus</i>						3		3	1	8	3	5							1			
<i>Equus cf. asinus</i>				1	1	5	1	4	6	16	9	4		2	1	1			4	3		
<i>Equus hemionus</i> ssp.										1	1											
<i>Sus domesticus</i>	16	26	15	159	123	325	110	215	132	91	111	68	6	237	80	157	47	109	45	35	31	
<i>Sus scrofa</i>	3			1	1	7	3	4	5		1			3		3					3	
<i>Camelus</i> spp.											1	1										
Cervidae						21	4	17	21	5											1	1
<i>Cervus elaphus</i>	4	3	3	58	56	178	91	87	75	29	7	2	5	6	3	3	25	32	15	2	2	
<i>Dama mesopotamica</i>						1	1		2	2												
<i>Bos taurus</i>	95	16	9	120	106	211	76	135	156	113	69	59	8	152	49	103	39	51	22	100	36	
<i>Bos primigenius</i>						1		1	1												1	
<i>Gazella</i> spp.												1										1
Caprinae	88	332	295	102	65	282	100	182	148	107	92	56	741	241	80	161	57	109	36	89	54	
<i>Capra hircus</i>	30	85	79	17	11	54	18	36	45	26	19	9	14	28	7	21	7	21	8	20	16	
<i>Ovis aries</i>	20	7	2	20	11	61	9	52	51	34	20	14	54	39	9	30	23	27	11	23	13	
<i>C. aegagrus / O. orientalis</i>						1	1		1					1	1							
<i>Capra aegagrus</i>														1		1					1	
<i>Ovis orientalis</i>						3	1	2	1			2									1	1
Aves	1	1	1	8	4	5	1	4						3		3	1	2	2	1		
Anura				1	1							1		1	1							
Testudines		1	1	11	11	10	1	9		1	4			1		1						1
<i>Testudo graeca</i>				1	1	6	2	4	2		6	1		2	1	1			1			
<i>Rafetus euphraticus</i>											2			1		1						
Ichtyo				27	13	5	2	3	3	5				2	2		1	4	4			
Malaco	4	8	4	10	5	27	4	23	6	5		3		4	2	2	2	2	1	3	2	
Crustacea											2											1
Unidentified	33	10	5	90	48	312	118	194	147	293	164	68		440	146	294	59	167	65	127	178	
Unidentified large size	15	4	1	32	28	64	13	51	10	39	52	36		7	2	5	12	20	5	8	3	
Unidentified medium size	1	4	4			71	17	54	11	3	17			5	2	3	8	4			4	
Unidentified small size				5	5	1		1				1										
Large-size mammals	134	37	12	126	115	548	236	312	226	258	141	110	8	123	44	79	64	147	52	67	40	
Medium-size mammals	147	92	46	252	205	408	161	247	248	247	311	128	479	459	160	299	167	451	146	184	158	
Small-size mammals	1	1		12	6	11	2	9		2	8	1	2	14	10	4	8	10	1		3	
TOTAL	598	631	480	1066	825	2775	1047	1728	1337	1352	1078	590	1319	1798	607	1191	531	1177	420	669	546	
Total of unique occurrences	15467																					

Table II.2. Number of remains (NR) from the different assemblages analyzed in this study. Assemblages in grey are included in the assemblage in white before them.

	BH MBA	GT MBA	GT MBA	GT LBA	GT LBA	HM MBA	HM MBA	HM MBA	HM MBA	HM MBA	KH LBA	KH IA NAss without pit BSG	KH IA NAss pit BSG	KT MBA	KT MBA	KT MBA	MST MBA	MST LBA	MST LBA	TH MBA	TH LBA	
	WR	global WR	Geb. C WR	global WR	MAss WR	global WR	Piazza WR	non Piazza WR	Arch. Compl. WR	WR	WR	WR	WR	global WR	area C WR	area D WR	WR	global WR	MAss WR	WR	WR	
Rodentia																	0.3	0.0				
<i>Spalax</i> sp.						2.0		2.0														
<i>Meriones</i> sp.												0.2										
<i>Lepus europaeus</i>	3.5					2.1	1.8	0.3	7.1		0.7						0.6	2.0			5.1	
<i>Erinaceus concolor</i>						0.9		0.9				1.1										
<i>Felis catus</i>											0.4											
<i>Panthera leo</i>									17.0													
<i>Canis familiaris</i>	36.7	18.2	14.0	10.4	4.4	530.8	262.1	268.7	93.8	357.0	49.6	64.1	2.9	140.2	21.3	118.9	50.2	55.5	22.2	36.2	6.6	
<i>Canis lupus</i>									5.7													
<i>Vulpes vulpes</i>	2.7			2.0	2.0																	
<i>Mustela</i> sp.											0.6											
<i>Equus</i> spp.	55.1					248.0	16.9	231.1	187.7	464.1	424.1	307.8	11.6	120.4	68.1	52.3						28.4
<i>Equus caballus</i>	65.9			489.7	93.3	3337.8		3337.8	2773.1	68.5	97.2	429.9										
<i>Equus cf. caballus</i>		47.5	47.5	852.4	342.4	409.3		409.3	541.3	455.7	677.2	233.2										
<i>Equus asinus</i>						88.1		88.1	56.6	310.0	308.3	860.6										24.1
<i>Equus cf. asinus</i>				29.4	29.4	199.0	14.8	184.2	328.8	824.8	274.3	161.6		78.4	14.0	64.4						71.2
<i>Equus hemionus</i> ssp.										28.5	166.9											38.3
<i>Sus domesticus</i>	255.2	100.2	61.5	1560.1	1134.5	4671.7	1490.6	3181.1	3055.0	2062.0	1670.3	1570.7	47.3	3107.1	971.7	2135.4	726.7	1170.0	742.3	729.7	635.4	
<i>Sus scrofa</i>	82.5			10.6	10.6	226.0	30.9	195.1	197.5		4.6			96.1		96.1						169.8
<i>Camelus</i> spp.											77.6	312.0										
Cervidae						1632.2	122.7	1509.5	1368.3	40.6												19.3
<i>Cervus elaphus</i>	285.4	391.1	391.1	1244.5	1039.2	5887.6	2828.0	3059.6	4527.6	1091.1	211.8	17.1	39.9	216.0	159.7	56.3	1129.4	763.3	428.7	85.7	453.4	
<i>Dama mesopotamica</i>						25.3	25.3		181.3	108.8												
<i>Bos taurus</i>	3107.0	399.9	290.2	4407.8	3957.0	7901.5	2848.2	5053.3	7839.4	4525.8	3082.0	2352.8	172.0	3502.3	1180.0	2322.3	1996.2	1925.8	1213.0	5303.2	1466.8	
<i>Bos primigenius</i>						141.0		141.0	59.1													302.5
<i>Gazella</i> spp.												3.3										3.2
Caprinae	657.6	1649.2	1429.7	786.1	522.3	1667.7	568.0	1099.7	1116.1	1094.8	659.6	565.4	1473.4	1087.0	321.1	765.9	343.9	624.0	208.4	895.3	369.6	
<i>Capra hircus</i>	448.5	308.8	285.3	269.1	180.3	1019.1	260.0	759.1	919.9	340.0	159.5	212.7	51.9	410.7	121.1	289.6	107.2	181.5	69.3	366.8	239.7	
<i>Ovis aries</i>	250.8	67.1	10.7	258.4	196.2	867.5	64.2	803.3	884.5	532.0	251.8	235.7	180.9	510.6	62.3	448.3	326.9	442.8	230.4	592.5	219.2	
<i>C. aegagrus / O. orientalis</i>						14.5	14.5		177.0					9.8	9.8							
<i>Capra aegagrus</i>														46.8	46.8							8.7
<i>Ovis orientalis</i>						65.6	39.7	25.9	128.4			59.5										20.9
Aves	2.9	0.3	0.3	15.4	0.6	6.8	0.7	6.1						1.4		1.4	22.7	5.8	5.8	0.8		
Anura				0.1	0.1							0.2		0.3	0.3							
Testudines		2.7	2.7	42.5	42.5	79.4	1.8	77.6		6.5	4.0			1.3		1.3						1.6
<i>Testudo graeca</i>				11.8	11.8	29.3	4.3	25.0	48.5		33.7	4.1		42.5	39.0	3.5						7.3
<i>Rafetus euphraticus</i>											12.3			6.3	6.3							
Ichtyo				24.6	12.1	16.9	1.1	15.8	22.3	30.4				1.7	1.7		0.7	3.3	3.3			
Malaco	11.3	33.3	15.1	54.5	24.7	97.4	29.5	67.9	19.9	10.7		5.7		3.6	0.2	3.4	15.2	19.5	15.4	18.1	5.4	
Crustacea											2.2											0.5
Unidentified	165.6	12.1	3.8	135.4	63.6	1232.7	380.0	852.7	828.2	1134.7	538.8	211.7		1068.5	288.3	780.2	191.0	444.2	188.6	977.5	889.6	
Unidentified large size	122.8	15.9	6.2	259.8	217.0	634.6	172.5	462.1	102.5	554.1	436.7	205.0		67.1	16.2	50.9	119.3	146.3	58.7	142.2	37.1	
Unidentified medium size	1.1	5.4	5.4			248.4	59.5	188.9	28.3	4.5	22.2			5.6	0.7	4.9	19.1	5.0				13.8
Unidentified small size				0.3	0.3	0.9		0.9				0.8										
Large-size mammals	1730.7	287.0	88.9	890.9	778.6	7942.9	3335.8	4607.1	4873.4	4267.2	2182.9	1280.3	45.2	1313.0	394.1	918.9	689.1	1696.5	716.6	1271.6	733.7	
Medium-size mammals	585.1	223.6	112.7	656.8	490.7	1678.4	697.9	980.5	1316.3	1309.5	1778.9	513.3	449.9	988.1	385.6	602.5	617.2	1271.4	464.0	772.6	587.6	
Small-size mammals	2.6	0.9		11.4	6.1	5.6	1.2	4.4		2.0	12.8	1.6	2.3	7.6	5.2	2.4	8.8	3.3	0.2			2.5
TOTAL	7873	3563	2765	12024	9160	40911	13272	27639	31705	19623	13141	9610	2477	12845	4060	8785	6365	8894	4405	11719	5925	
Total of unique occurrences	186675																					

Table II.3. Weight of remains (WR) in grams from the different assemblages analyzed in this study. Assemblages in grey are included in the assemblage in white before them.

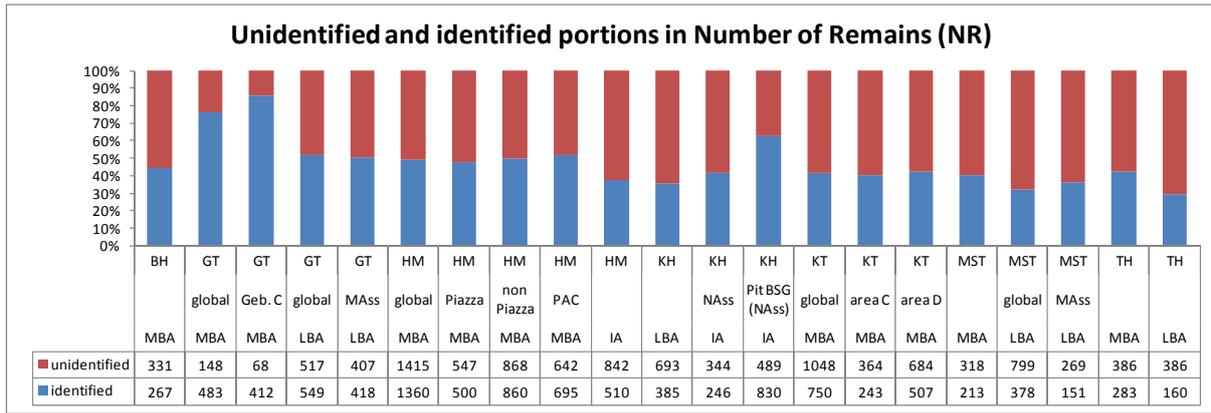


Figure II.31. Unidentified and identified portions in Number of Remains (NR).

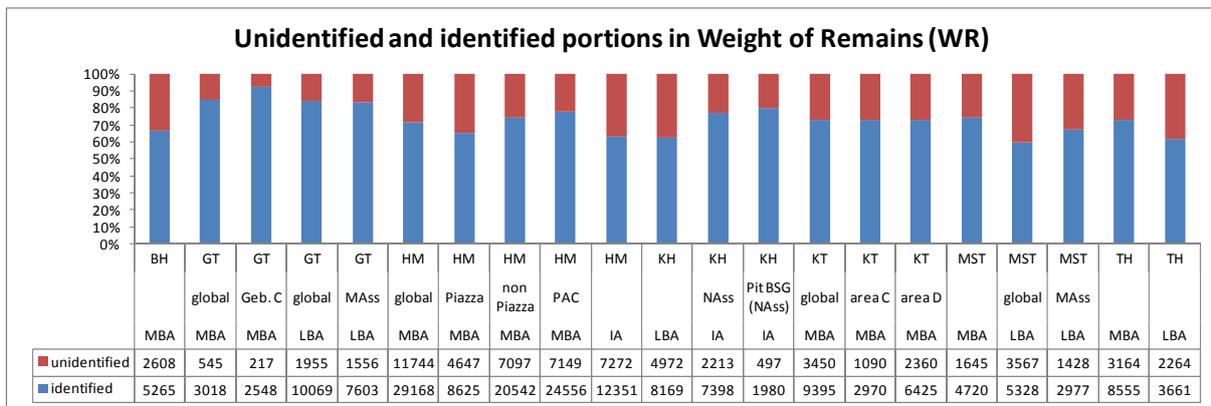


Figure II.32. Unidentified and identified portions in Weight of Remains (WR).

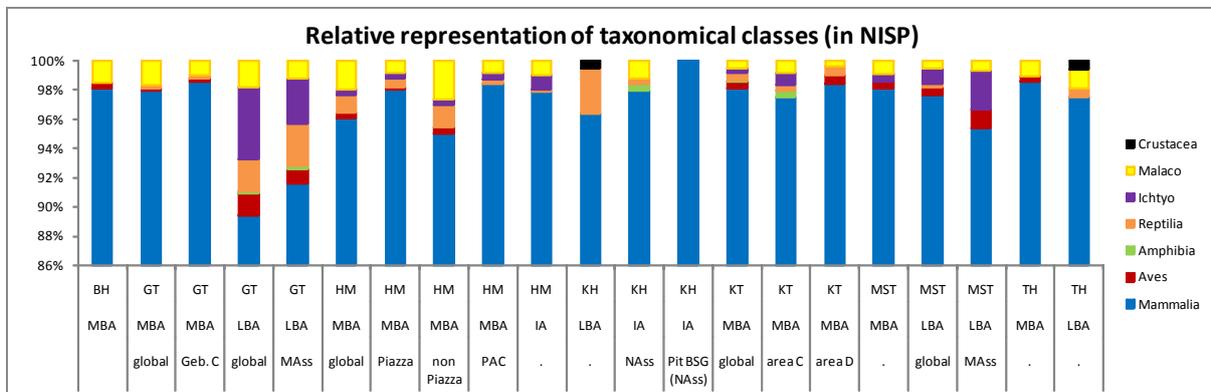


Figure II.33. Relative representation of taxonomical classes in percentage of NISP.

Average weight by unidentified remain	BH MBA	GT MBA global	GT MBA Geb. C	GT LBA global	GT LBA MAss	HM MBA global	HM MBA Piazza	HM MBA non Piazza	HM MBA Post Arch. Compl.	HM IA	KH LBA	KH IA NAss without pit BSG	KH IA NAss pit BSG	KT MBA global	KT MBA area C	KT MBA area D	MST MBA	MST LBA global	MST LBA MAss	TH MBA	TH LBA
Large-size	10.6	5.9	6.8	7.6	7.3	12.2	13.7	11.9	15.9	15.4	11.9	8.7	5.7	10.1	8.5	10.9	10.4	9.4	12.8	18.4	15.4
Medium-size	2.5	1.9	1.9	2.6	2.4	3.8	3.9	3.7	3.9	3.4	3.5	4.0	0.9	1.6	1.4	1.8	3.0	2.0	3.2	4.2	3.6
Small-size	2.6	0.9		0.5	0.5	0.7	0.6	0.7		1.0	1.6	1.2	1.2	0.5	0.5	0.6	1.1	0.3	0.2		0.8
All unidentified	5.2	2.9	4.4	3.6	3.4	5.6	6.1	5.4	9.9	6.6	5.7	4.6	2.6	4.1	3.5	4.4	4.8	3.9	5.4	11.3	6.6

Table II.4. Average weight of unidentified remains.

	BH MBA	GT MBA	GT MBA	GT LBA	GT LBA	HM MBA	HM MBA	HM MBA	HM MBA	HM IA	KH LBA	KH IA	KH IA	KT MBA	KT MBA	KT MBA	MST MBA	MST LBA	MST LBA	TH MBA	TH LBA
	NISP	global NISP	Geb. C NISP	global NISP	MAss NISP	global NISP	Piazza NISP	non Piazza NISP	Post Arch. Compl. NISP	NISP	NISP	NAss without pit BSG NISP	NAss pit BSG NISP	global NISP	area C NISP	area D NISP	NISP	global NISP	MAss NISP	NISP	NISP
Rodentia						1		1				1					2	1			
including <i>Spalax</i> sp.						1		1													
including <i>Meriones</i> sp.												1									
<i>Lepus europaeus</i>	1					2	1	1	1		1						1	2			1
<i>Erinaceus concolor</i>						1		1				2									
<i>Felis catus</i>											1										
<i>Panthera leo</i>									1												
<i>Canis familiaris</i>	1	3	2	4	2	104	73	31	12	43	10	5	1	16	4	12	8	9	4	2	1
<i>Canis lupus</i>									1												
<i>Vulpes vulpes</i>	1			2	2									4		4			1		
<i>Mustela</i> sp.											1										
<i>Equus</i> spp.	3	1	1	8	6	54	2	52	31	48	37	21	1	8	4	4			7	3	
including <i>Equus caballus</i>	1			3	2	38		38	14	1	3	2									
including <i>Equus cf. caballus</i>		1	1	4	3	4		4	3	6	9	3									
including <i>Equus asinus</i>						3		3	1	8	3	5						1			
including <i>Equus cf. asinus</i>				1	1	5	1	4	6	16	9	4		2	1	1			4	3	
<i>Equus hemionus</i> ssp.										1	1										
<i>Sus domesticus</i>	16	26	15	159	123	325	110	215	132	91	111	68	6	237	80	157	47	109	45	35	31
<i>Sus scrofa</i>	3			1	1	7	3	4	5		1	1		3		3				3	
<i>Camelus</i> spp.											1	1									
Cervidae	4	3	3	58	56	200	96	104	98	36	7	2	5	6	3	3	25	32	15	3	3
including <i>Cervus elaphus</i>	4	3	3	58	56	178	91	87	75	29	7	2	5	6	3	3	25	32	15	2	2
including <i>Dama mesopotamica</i>						1	1		2	2											
<i>Bos taurus</i>	95	16	9	120	106	211	76	135	156	113	69	59	8	152	49	103	39	51	22	100	36
<i>Bos primigenius</i>						1		1	1											1	
<i>Gazella</i> spp.												1									1
Caprinae	138	424	376	139	87	397	127	270	244	167	131	79	809	308	96	212	87	157	55	132	83
including <i>Capra hircus</i>	30	85	79	17	11	54	18	36	45	26	19	9	14	28	7	21	7	21	8	20	16
including <i>Ovis aries</i>	20	7	2	20	11	61	9	52	51	34	20	14	54	39	9	30	23	27	11	23	13
<i>C. aegagrus</i> / <i>O. orientalis</i>						4	2	2	2			2		2	1	1				2	1
including <i>Capra aegagrus</i>														1		1				1	
including <i>Ovis orientalis</i>						3	1	2	1			2								1	1
Aves	1	1	1	8	4	5	1	4						3		3	1	2	2	1	
Anura				1	1							1		1	1						
Testudines		1	1	12	12	16	3	13	2	1	12	1	4	1	3			1			1
including <i>Testudo graeca</i>				1	1	6	2	4	2		6	1	2	1	1			1			
including <i>Rafetus euphraticus</i>											2		1		1						
Ichtyo				27	13	5	2	3	3	5				2	2		1	4	4		
Malaco	4	8	4	10	5	27	4	23	6	5		3		4	2	2	2	2	1	3	2
Crustacea											2										1
Total	267	483	412	549	418	1360	500	860	695	510	385	246	830	750	243	507	213	378	151	283	160
Total of unique occurrences	7109																				

Table II.5. Number of Identified Specimens (NISP) in the studied assemblages. Assemblages in grey are included in the assemblage in white before them.

	BH MBA	GT MBA	GT MBA	GT LBA	GT LBA	HM MBA	HM MBA	HM MBA	HM MBA	HM MBA	KH LBA	KH IA	KH IA	KH IA	KT MBA	KT MBA	KT MBA	MST MBA	MST LBA	MST LBA	TH MBA	TH LBA
	WISP	global WISP	Geb. C WISP	global WISP	MAss WISP	global WISP	Piazza WISP	non Piazza WISP	Post Arch. Compl. WISP	WISP	WISP	NAss without pit BSG WISP	NAss pit BSG WISP	global WISP	area C WISP	area D WISP	WISP	global WISP	MAss WISP	WISP	WISP	
Rodentia						2.0		2.0					0.2					0.3	0.0			
including <i>Spalax</i> sp.						2.0		2.0														
including <i>Meriones</i> sp.												0.2										
<i>Lepus europaeus</i>	3.5					2.1	1.8	0.3	7.1		0.7							0.6	2.0		5.1	
<i>Erinaceus concolor</i>						0.9		0.9				1.1										
<i>Felis catus</i>											0.4											
<i>Panthera leo</i>									17.0													
<i>Canis familiaris</i>	36.7	18.2	14.0	10.4	4.4	530.8	262.1	268.7	93.8	357.0	49.6	64.1	2.9	140.2	21.3	118.9	50.2	55.5	22.2	36.2	6.6	
<i>Canis lupus</i>									5.7													
<i>Vulpes vulpes</i>	2.7			2.0	2.0												12.6		12.6		3.2	
<i>Mustela</i> sp.											0.6											
<i>Equus</i> spp.	121.0	47.5	47.5	1371.5	465.1	4282.2	31.7	4250.5	3887.5	2123.1	1781.1	1993.1	11.6	198.8	82.1	116.7				123.7	38.3	
including <i>Equus caballus</i>	65.9			489.7	93.3	3337.8		3337.8	2773.1	68.5	97.2	429.9										
including <i>Equus cf. caballus</i>		47.5	47.5	852.4	342.4	409.3		409.3	541.3	455.7	677.2	233.2										
including <i>Equus asinus</i>				88.1		88.1		56.6	310.0	308.3	860.6									24.1		
including <i>Equus cf. asinus</i>				29.4	29.4	199.0	14.8	184.2	328.8	824.8	274.3	161.6		78.4	14.0	64.4				71.2	38.3	
<i>Equus hemionus</i> ssp.										28.5	166.9											
<i>Sus domestica</i>	255.2	100.2	61.5	1560.1	1134.5	4671.7	1490.6	3181.1	3055.0	2062.0	1670.3	1570.7	47.3	3107.1	971.7	2135.4	726.7	1170.0	742.3	729.7	635.4	
<i>Sus scrofa</i>	82.5			10.6	10.6	226.0	30.9	195.1	197.5		4.6				96.1		96.1				169.8	
<i>Camelus</i> spp.											77.6	312.0										
Cervidae	285.4	391.1	391.1	1244.5	1039.2	7545.1	2976.0	4569.1	6077.2	1240.5	211.8	17.1	39.9	216.0	159.7	56.3	1129.4	763.3	428.7	105.0	457.3	
including <i>Cervus elaphus</i>	285.4	391.1	391.1	1244.5	1039.2	5887.6	2828.0	3059.6	4527.6	1091.1	211.8	17.1	39.9	216.0	159.7	56.3	1129.4	763.3	428.7	85.7	453.4	
including <i>Dama mesopotamica</i>						25.3	25.3		181.3	108.8												
<i>Bos taurus</i>	3107.0	399.9	290.2	4407.8	3957.0	7901.5	2848.2	5053.3	7839.4	4525.8	3082.0	2352.8	172.0	3502.3	1180.0	2322.3	1996.2	1925.8	1213.0	5303.2	1466.8	
<i>Bos primigenius</i>						141.0		141.0	59.1												302.5	
<i>Gazella</i> spp.												3.3										3.2
Caprinae	1356.9	2025.1	1725.7	1313.6	898.8	3554.3	892.2	2662.1	2920.5	1966.8	1070.9	1013.8	1706.2	2008.3	504.5	1503.8	778.0	1248.3	508.1	1854.6	828.5	
including <i>Capra hircus</i>	448.5	308.8	285.3	269.1	180.3	1019.1	260.0	759.1	919.9	340.0	159.5	212.7	51.9	410.7	121.1	289.6	107.2	181.5	69.3	366.8	239.7	
including <i>Ovis aries</i>	250.8	67.1	10.7	258.4	196.2	867.5	64.2	803.3	884.5	532.0	251.8	235.7	180.9	510.6	62.3	448.3	326.9	442.8	230.4	592.5	219.2	
<i>C. aegagrus</i> / <i>O. orientalis</i>						80.1	54.2	25.9	305.4			59.5		56.6	9.8	46.8				29.6	255.8	
including <i>Capra aegagrus</i>														46.8		46.8					8.7	
including <i>Ovis orientalis</i>						65.6	39.7	25.9	128.4			59.5									20.9	255.8
Aves	2.9	0.3	0.3	15.4	0.6	6.8	0.7	6.1						1.4		1.4	22.7	5.8	5.8	0.8		
Anura				0.1	0.1							0.2		0.3	0.3							
Testudines		2.7	2.7	54.3	54.3	108.7	6.1	102.6	48.5	6.5	50.0	4.1		50.1	39.0	11.1			7.3			1.6
including <i>Testudo graeca</i>				11.8	11.8	29.3	4.3	25.0	48.5		33.7	4.1		42.5	39.0	3.5			7.3			
including <i>Rafetus euphraticus</i>											12.3			6.3	6.3							
Ichtyo				24.6	12.1	16.9	1.1	15.8	22.3	30.4				1.7	1.7			0.7	3.3	3.3		
Malaco	11.3	33.3	15.1	54.5	24.7	97.4	29.5	67.9	19.9	10.7		5.7		3.6	0.2	3.4	15.2	19.5	15.4	18.1	5.4	
Crustacea											2.2											0.5
TOTAL	5265	3018	2548	10069	7603	29168	8625	20542	24556	12351	8169	7398	1980	9395	2970	6425	4720	5328	2977	8555	3661	
Total of unique occurrences	133633																					

Table II.6. Weight of Identified Specimens (WISP) in the studied assemblages. Assemblages in grey are included in the assemblage in white before them.

	BH MBA	GT MBA	GT MBA	GT LBA	GT LBA	HM MBA	HM MBA	HM MBA	HM MBA	HM IA	KH LBA	KH IA	KH IA	KT MBA	KT MBA	KT MBA	MST MBA	MST LBA	MST LBA	TH MBA	TH LBA
	%NISP	global %NISP	Geb. C %NISP	global %NISP	MAss %NISP	global %NISP	Piazza %NISP	non Piazza %NISP	Post Arch. Compl. %NISP	%NISP	%NISP	NAss without pit BSG %NISP	NAss pit BSG %NISP	global %NISP	area C %NISP	area D %NISP	%NISP	global %NISP	MAss %NISP	%NISP	%NISP
Rodentia						0.1		0.1					0.4				0.9	0.3			
including <i>Spalax</i> sp.						0.1		0.1													
including <i>Meriones</i> sp.													0.4								
<i>Lepus europaeus</i>	0.4					0.1	0.2	0.1	0.1		0.3						0.5	0.5		0.4	
<i>Erinaceus concolor</i>						0.1		0.1					0.8								
<i>Felis catus</i>											0.3										
<i>Panthera leo</i>									0.1												
<i>Canis familiaris</i>	0.4	0.6	0.5	0.7	0.5	7.6	14.6	3.6	1.7	8.4	2.6	2.0	0.1	2.1	1.6	2.4	3.8	2.4	2.6	0.7	0.6
<i>Canis lupus</i>									0.1												
<i>Vulpes vulpes</i>	0.4			0.4	0.5									0.5		0.8		0.3			
<i>Mustela</i> sp.											0.3										
<i>Equus</i> spp.	1.1	0.2	0.2	1.5	1.4	4.0	0.4	6.0	4.5	9.4	9.6	8.5	0.1	1.1	1.6	0.8		1.9	2.0		
including <i>Equus caballus</i>	0.4			0.5	0.5	2.8		4.4	2.0	0.2	0.8	0.8									
including <i>Equus cf. caballus</i>		0.2	0.2	0.7	0.7	0.3		0.5	0.4	1.2	2.3	1.2									
including <i>Equus asinus</i>						0.2		0.3	0.1	1.6	0.8	2.0						0.3			
including <i>Equus cf. asinus</i>				0.2	0.2	0.4	0.2	0.5	0.9	3.1	2.3	1.6		0.3	0.4	0.2		1.1	2.0		
<i>Equus hemionus</i> ssp.										0.2	0.3										
<i>Sus domesticus</i>	6.0	5.4	3.6	29.0	29.4	23.9	22.0	25.0	19.0	17.8	28.8	27.6	0.7	31.6	32.9	31.0	22.1	28.8	29.8	12.4	19.4
<i>Sus scrofa</i>	1.1			0.2	0.2	0.5	0.6	0.5	0.7		0.3			0.4		0.6				1.1	
<i>Camelus</i> spp.											0.3	0.4									
Cervidae	1.5	0.6	0.7	10.6	13.4	14.7	19.2	12.1	14.1	7.1	1.8	0.8	0.6	0.8	1.2	0.6	11.7	8.5	9.9	1.1	1.9
including <i>Cervus elaphus</i>	1.5	0.6	0.7	10.6	13.4	13.1	18.2	10.1	10.8	5.7	1.8	0.8	0.6	0.8	1.2	0.6	11.7	8.5	9.9	0.7	1.3
including <i>Dama mesopotamica</i>						0.1	0.2		0.3	0.4											
<i>Bos taurus</i>	35.6	3.3	2.2	21.9	25.4	15.5	15.2	15.7	22.4	22.2	17.9	24.0	1.0	20.3	20.2	20.3	18.3	13.5	14.6	35.3	22.5
<i>Bos primigenius</i>						0.1		0.1	0.1											0.4	
<i>Gazella</i> spp.												0.4									0.6
Caprinae	51.7	87.8	91.3	25.3	20.8	29.2	25.4	31.4	35.1	32.7	34.0	32.1	97.5	41.1	39.5	41.8	40.8	41.5	36.4	46.6	51.9
including <i>Capra hircus</i>	11.2	17.6	19.2	3.1	2.6	4.0	3.6	4.2	6.5	5.1	4.9	3.7	1.7	3.7	2.9	4.1	3.3	5.6	5.3	7.1	10.0
including <i>Ovis aries</i>	7.5	1.4	0.5	3.6	2.6	4.5	1.8	6.0	7.3	6.7	5.2	5.7	6.5	5.2	3.7	5.9	10.8	7.1	7.3	8.1	8.1
<i>C. aegagrus</i> / <i>O. orientalis</i>						0.3	0.4	0.2	0.3			0.8		0.3	0.4	0.2				0.7	0.6
including <i>Capra aegagrus</i>														0.1		0.2				0.4	
including <i>Ovis orientalis</i>						0.2	0.2	0.2	0.1			0.8								0.4	0.6
Aves	0.4	0.2	0.2	1.5	1.0	0.4	0.2	0.5						0.4		0.6	0.5	0.5	1.3	0.4	
Anura				0.2	0.2							0.4		0.1	0.4						
Testudines		0.2	0.2	2.2	2.9	1.2	0.6	1.5	0.3	0.2	3.1	0.4		0.5	0.4	0.6		0.3			0.6
including <i>Testudo graeca</i>				0.2	0.2	0.4	0.4	0.5	0.3		1.6	0.4		0.3	0.4	0.2		0.3			
including <i>Rafetus euphraticus</i>											0.5			0.1		0.2					
Ichtyo				4.9	3.1	0.4	0.4	0.3	0.4	1.0				0.3	0.8		0.5	1.1	2.6		
Malaco	1.5	1.7	1.0	1.8	1.2	2.0	0.8	2.7	0.9	1.0		1.2		0.5	0.8	0.4	0.9	0.5	0.7	1.1	1.3
Crustacea											0.5										0.6

Table II.7. Relative representation of different taxa in percentage of the NISP. Assemblages in grey are included in the assemblage in white before them.

	BH MBA	GT MBA	GT MBA	GT LBA	GT LBA	HM MBA	HM MBA	HM MBA	HM MBA	HM IA	KH LBA	KH IA	KH IA	KT MBA	KT MBA	KT MBA	MST MBA	MST LBA	MST LBA	TH MBA	TH LBA
	%WISP	global %WISP	Geb. C %WISP	global %WISP	MAss %WISP	global %WISP	Piazza %WISP	non Piazza %WISP	Post Arch. Compl. %WISP	%WISP	%WISP	NAss without pit BSG %WISP	NAss pit BSG %WISP	global %WISP	area C %WISP	area D %WISP	%WISP	global %WISP	MAss %WISP	%WISP	%WISP
Rodentia						0.01		0.01									0.01				
including <i>Spalax</i> sp.						0.01		0.01													
including <i>Meriones</i> sp.														0.00							
<i>Lepus europaeus</i>	0.07					0.01	0.02	0.00	0.03		0.01						0.01	0.04		0.06	
<i>Erinaceus concolor</i>						0.00		0.00				0.01									
<i>Felis catus</i>											0.00										
<i>Panthera leo</i>									0.07												
<i>Canis familiaris</i>	0.70	0.60	0.55	0.10	0.06	1.82	3.04	1.31	0.38	2.89	0.61	0.87	0.15	1.49	0.72	1.85	1.06	1.04	0.75	0.42	0.18
<i>Canis lupus</i>									0.02												
<i>Vulpes vulpes</i>	0.05			0.02	0.03									0.13		0.20		0.06			
<i>Mustela</i> sp.											0.01										
<i>Equus</i> spp.	2.30	1.57	1.86	13.62	6.12	14.68	0.37	20.69	15.83	17.19	21.80	26.94	0.59	2.12	2.76	1.82		2.32	1.29		
including <i>Equus caballus</i>	1.25			4.86	1.23	11.44		16.25	11.29	0.55	1.19	5.81									
including <i>Equus cf. caballus</i>		1.57	1.86	8.47	4.50	1.40		1.99	2.20	3.69	8.29	3.15									
including <i>Equus asinus</i>						0.30		0.43	0.23	2.51	3.77	11.63					0.45				
including <i>Equus cf. asinus</i>				0.29	0.39	0.68	0.17	0.90	1.34	6.68	3.36	2.18		0.83	0.47	1.00		1.34	1.29		
<i>Equus hemionus</i> ssp.										0.23	2.04										
<i>Sus domesticus</i>	4.85	3.32	2.41	15.49	14.92	16.02	17.28	15.49	12.44	16.69	20.45	21.23	2.39	33.07	32.71	33.24	15.40	21.96	24.93	8.53	17.36
<i>Sus scrofa</i>	1.57			0.11	0.14	0.77	0.36	0.95	0.80		0.06			1.02		1.50				1.98	
<i>Camelus</i> spp.											0.95	4.22									
Cervidae	5.42	12.96	15.35	12.36	13.67	25.87	34.50	22.24	24.75	10.04	2.59	0.23	2.02	2.30	5.38	0.88	23.93	14.33	14.40	1.23	12.49
including <i>Cervus elaphus</i>	5.42	12.96	15.35	12.36	13.67	20.19	32.79	14.89	18.44	8.83	2.59	0.23	2.02	2.30	5.38	0.88	23.93	14.33	14.40	1.00	12.38
including <i>Dama mesopotamica</i>						0.09	0.29		0.74	0.88											
<i>Bos taurus</i>	59.01	13.25	11.39	43.77	52.04	27.09	33.02	24.60	31.92	36.64	37.73	31.80	8.69	37.28	39.73	36.15	42.29	36.15	40.74	61.99	40.06
<i>Bos primigenius</i>						0.48		0.69	0.24											3.54	
<i>Gazella</i> spp.												0.04									0.09
Caprinae	25.77	67.09	67.72	13.05	11.82	12.19	10.34	12.96	11.89	15.92	13.11	13.70	86.18	21.38	16.98	23.41	16.48	23.43	17.07	21.68	22.63
including <i>Capra hircus</i>	8.52	10.23	11.20	2.67	2.37	3.49	3.01	3.70	3.75	2.75	1.95	2.88	2.62	4.37	4.08	4.51	2.27	3.41	2.33	4.29	6.55
including <i>Ovis aries</i>	4.76	2.22	0.42	2.57	2.58	2.97	0.74	3.91	3.60	4.31	3.08	3.19	9.14	5.43	2.10	6.98	6.93	8.31	7.74	6.93	5.99
<i>C. aegagrus</i> / <i>O. orientalis</i>						0.27	0.63	0.13	1.24			0.80		0.60	0.33	0.73				0.35	6.99
including <i>Capra aegagrus</i>														0.50		0.73				0.10	
including <i>Ovis orientalis</i>						0.22	0.46	0.13	0.52			0.80								0.24	6.99
Aves	0.06	0.01	0.01	0.15	0.01	0.02	0.01	0.03						0.01		0.02	0.48	0.11	0.19	0.01	
Anura				0.00	0.00							0.00		0.00	0.01						
Testudines		0.09	0.11	0.54	0.71	0.37	0.07	0.50	0.20	0.05	0.61	0.06		0.53	1.31	0.17		0.14			0.04
including <i>Testudo graeca</i>				0.12	0.16	0.10	0.05	0.12	0.20		0.41	0.06		0.45	1.31	0.05		0.14			
including <i>Rafetus euphraticus</i>											0.15			0.07	0.10						
Ichtyo				0.24	0.16	0.06	0.01	0.08	0.09	0.25				0.02	0.06		0.01	0.06	0.11		
Malaco	0.21	1.10	0.59	0.54	0.32	0.33	0.34	0.33	0.08	0.09		0.08		0.04	0.01	0.05	0.32	0.37	0.52	0.21	0.15
Crustacea											0.03										0.01

Table II.8. Relative representation of different taxa in percentage of the WISP (0.00 means <0.01). Assemblages in grey are included in the assemblage in white before them.

	BH MBA	GT MBA	GT MBA	GT LBA	GT LBA	HM MBA	HM MBA	HM MBA	HM MBA	HM MBA	KH LBA	KH IA NAss without pit BSG	KH IA NAss pit BSG	KT MBA	KT MBA	KT MBA	MST MBA	MST LBA	MST LBA	TH MBA	TH LBA	
		global	Geb. C	global	MAss	global	Piazza	non Piazza	Post Arch. Compl.	IA				global	area C	area D		global	MAss			
	corr. NISP	corr. NISP	corr. NISP	corr. NISP	MNI	corr. NISP																
<i>Felis catus</i>											1											
<i>Canis familiaris</i>	1	3	2	4	2	44	13	31	12	20	10	5	1	16	4	12	8	9	4	2	1	
<i>Equus</i> spp.	3	1	1	8	6	15	2	13	31	48	37	21	1	8	4	4		7	3			
including <i>Equus caballus</i>	1			3	2	1		1	14	1	3	2										
including <i>Equus cf. caballus</i>		1	1	4	3	2		2	3	6	9	3										
including <i>Equus asinus</i>						3		3	1	8	3	5						1				
including <i>Equus cf. asinus</i>				1	1	5	1	4	6	16	9	4		2	1	1		4	3			
<i>Sus domesticus</i>	16	26	15	159	123	325	110	215	132	91	111	68	1	237	80	157	47	109	45	35	31	
<i>Camelus</i> spp.											1	1										
<i>Bos taurus</i>	95	16	9	120	106	211	76	135	156	113	69	59	1	152	49	103	39	51	22	100	36	
Caprinae	138	89	41	139	87	397	127	270	244	167	131	79	14	308	96	212	87	157	55	132	83	
including <i>Capra hircus</i>	30	12	6	17	11	54	18	36	45	26	19	9		28	7	21	7	21	8	20	16	
including <i>Ovis aries</i>	20	7	2	20	11	61	9	52	51	34	20	14		39	9	30	23	27	11	23	13	
Total domestic mammals	253	135	68	430	324	992	328	664	575	439	360	233	18	721	233	488	181	333	129	269	151	
<i>Lepus europaeus</i>	1					2	1	1	1		1						1	2		1		
<i>Panthera leo</i>									1													
<i>Canis lupus</i>									1													
<i>Vulpes vulpes</i>	1			2	2									4		4		1				
<i>Equus hemionus</i> ssp.										1	1											
<i>Sus scrofa</i>	3			1	1	7	3	4	5		1			3		3					3	
Cervidae	4	1	1	48	48	181	92	89	78	32	4	2	1	5	3	2	23	27	14	1	1	
including <i>Cervus elaphus</i>	4	1	1	48	48	175	90	85	63	29	4	2	1	5	3	2	23	27	14	1	1	
including <i>Dama mesopotamica</i>						1	1		1	2												
<i>Bos primigenius</i>						1		1	1												1	
<i>Gazella</i> spp.												1										1
<i>C. aegagrus</i> / <i>O. orientalis</i>						4	2	2	2			2		2	1	1					2	1
including <i>Capra aegagrus</i>														1		1					1	
including <i>Ovis orientalis</i>						3	1	2	1			2									1	1
Total wild mammals	9	1	1	51	51	195	98	97	89	33	7	5	1	14	4	10	24	30	14	8	3	
TOTAL	262	136	69	481	375	1187	426	761	664	472	367	238	19	735	237	498	205	363	143	277	154	

 13 skeletons of Caprinae in pithos represented 348 elements and where counted as 13.
 1 Caballus skeleton with 40 remains counted as 1.
 1 Canis skeleton with 61 remains counted as 1.
 1 skeleton Canis with 24 remains counted as 1.
 MNI is justified by the presence of at least 14 almost complete Caprinae skeleton. For actual NISP see table II.5.

Table II.9. Corrected NISP (see text for explanations). Assemblages in grey are included in the assemblage in white before them.

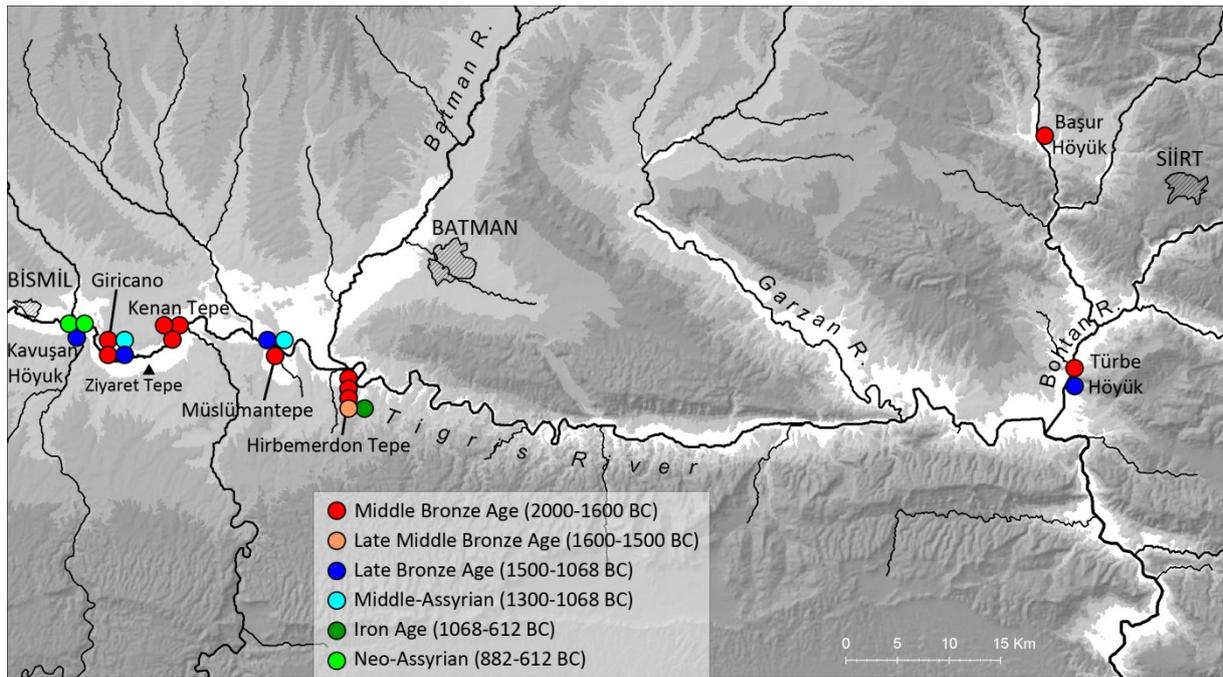


Figure II.34. Map of the Upper Tigris River area with the location of each assemblage by chronological period. Map courtesy of Dr. Jason Ur.

III. Analysis of the faunal remains in taxonomical order

A. Mammalia (mammals)

1. Rodentia (rodents)

Rodents are often considered as intrusive in archaeological layers due to their burrowing habits. It can be also the case for the rodent remains from the assemblages studied here. All of them were recovered from filling layers and not from sealed contexts. Among the 5 remains recovered only two were identified to the generic level. Mole rat (*Spalax* sp.) is common in the Near East both in modern and archaeological contexts. Living mostly underground it is usually intrusive in the archaeological layers. At least 5 species of jird (*Meriones* sp.) are known in eastern Anatolia (Kryštufek and Vohralík, 2001: 43). The mandibula found in the Neo-Assyrian layers at Kavuşan Höyük was not determined to the specific level and its contemporariness with the other faunal remains from the same layer cannot be assured.

2. Lagomorpha (hares, rabbits and pikas)

a) *Lepus europaeus* (brown hare)

European hare is the only Lagomorpha species present in the assemblage. Few remains were identified in most of the sites. As for the other small-size mammals their rarity in the assemblages might be partly due to the collecting method. Rare species have also statistically less chance of being recovered from relatively small samples. However, European hare did not play a major role in the animal exploitation at the studied sites. No remains bear cut marks or were burnt.

<i>Lepus europaeus</i> Skeletal part Number of remains	BH MBA	HM MBA Piazza	HM MBA non Piazza	HM MBA PAC	KH LBA	MST MBA	MST LBA global	TH MBA
Rd							1	
Pl		1						
Fm						1		1
Tb	1			1				
Mt III							1	
Mt IV					1			
Ph1			1					

Table III.1. Distribution of European hare (*Lepus europaeus*) remains.

3. Erinaceomorpha (hedgehogs)

a) *Erinaceus concolor* (southern white-breasted hedgehog)

Southern white-breasted hedgehog is the only species of the *Erinaceus* genus present nowadays in Anatolia (Kryštufek and Vohralík, 2001: 55-9) and its identification was confirmed on the mandibula (Niethammer and Krapp, 1990). A mandibula was recovered in the Middle Bronze Age layers at Hirbemerdon Tepe. A mandibula and a pelvic bone come from Neo-Assyrian layers at Kavuşan Höyük. There is no cut mark or burning evidence to indicate a specific exploitation of this species.

4. Carnivora (carnivores)

a) *Felidae (cats)*

(1) *Felis catus* (domestic cat)

Domestic cat is extremely rare as only one metacarpal IV was identified in the Late Bronze Age assemblage from Kavuşan Höyük. Domestic cat remains are also rare in Anatolian archaeological sites in general. A single remain was identified in Early Bronze Age layers from Kaman-Kalehöyük in central Anatolia (Atıcı, 2005: table 3) while two remains were tentatively attributed to domestic cat in the Middle Bronze Age site of Acemhöyük in Central Anatolia (Nicola and Glew, 1999: 109). The metacarpal IV in Kavuşan Höyük is interestingly burnt on its distal articulation (Fig. III.1).



Figure III.1. Distal metacarpal IV of a domestic cat (*Felis catus*) from Late Bronze Age layers at Kavuşan Höyük (KH00313). Burning on the antero-distal face.

(2) *Panthera leo* (lion)

Lion is the only large carnivore; in absence of any bear remain, to be represented in the assemblage. A complete metacarpal II was recovered from the Middle Bronze Age layer posterior to the use of the Architectural Complex in Hirbemerdon Tepe. This find does not completely clarify the question of the presence of the lion in the Upper Tigris River valley. Lion remains are rare but not completely absent from northern Mesopotamia in assemblages from the Bronze and Iron Ages. They have been identified in particular at Tal Seh Hamad (Becker, 2008), Arslantepe (Bartosiewicz, 1998, Bökönyi, 1983) and Tell Sabi Abyad (Cavallo, 2002). The fact that the lion bone from Hirbemerdon Tepe is a metacarpal, could indicate the use of lion pelts³⁴. In this case, considering lion pelts as valuable goods, it is difficult to assure without any doubt that lions were hunted in the vicinity of Hirbemerdon Tepe and not just subject to pelt trade.

b) *Canidae (wolves, dogs, foxes and related species)*

(1) *Canis familiaris* (domestic dog)

Dog remains were recovered from every assemblage but represent on average no more than 3% of the NISP. These remains do not come from particular type of deposits and are usually mixed up with other remains in fills or middens. The only exceptions are two complete dog skeletons, one on the floor of the Middle Bronze Age Piazza in Hirbemerdon Tepe and the other one in the Iron Age layers of the same site. Two dog remains exhibit cut marks. A mandibula from the Middle Bronze Age fill at Hirbemerdon Tepe bears cut marks on the lateral side under the articular process (Fig. III.2). Among the Late Bronze Age remains from Müslümantepe, a radius of a sub-adult dog (the epiphysis is unfused) exhibits a transversal cut mark on the posterior side of the distal epiphysis.

³⁴ It is suggested also in Arslantepe (Bartosiewicz, 1998: 225) and Tell Brak (pers. comm. Jill Weber).



Figure III.2. A domestic dog lower jaw from Middle Bronze Age Hirbemerdon Tepe (HM02919) exhibiting cut marks under the articular process.

(2) *Canis lupus* (wolf)

Two wild species of the genus *Canis* can be expected in southeastern Anatolia: wolf (*Canis lupus*) and golden jackal (*Canis aureus*). No remain was identified as golden jackal. Only one distal unfused epiphysis of femur could have been determinate as a wolf. It came from the Middle Bronze Age filling Posterior to the Architectural Complex at Hirbemerdon Tepe. This remain could not have been measured, but it was obviously much larger than all the domestic dog femur of the site.

(3) *Vulpes vulpes* (red fox)

Red fox remains are also rare. They represent less than 1% of the NISP in only a few assemblages. These remains (Table III.2) exhibit no cut mark or burning. The few remains occurring in the assemblages could result from opportunistic catch or episodic hunt for pelt.

<i>Vulpes vulpes</i> Skeletal part	BH MBA	GT LBA MAss	KT MBA area D	MST LBA
Number of remains				
Md			1	1
Hm	1			
Fm		1		
Mc IV			1	
Mc V			1	
Mtp		1	1	

Table III.2. Distribution of red fox (*Vulpes vulpes*) remains.

c) Mustelidae (weasels, martens and other small carnivores)

(1) *Mustela* (weasels)

Remains of weasel species probably suffered from the sampling methods as the other small-size vertebrates. One complete tibia was identified in the Late Bronze Age assemblage of Kavuşan Höyük but its specific attribution could not have been ascertained.

5. Perissodactyla (odd-toed ungulate)

a) Equidae (Horse, donkey and wild ass family)

Considering the difficulty of identification of equid remains (see Methods in Chapter II) to a specific level, two size-groups were made. The first one includes remains identified as horse (*Equus caballus*) and remains of horse size (possible horse and large-size hybrid). The second group includes remains identified as donkey (*Equus asinus*) and remains of donkey size (possible donkey and small-size hybrid). Only two remains are determinate as onager (*Equus hemionus*) and will be treated separately.

(1) *Equus caballus* / *Equus asinus* (horse, donkey and hybrids)

Equid remains are present in every assemblage, except in Middle Bronze Age Müslümanteppe and in the two assemblages of Türbe Höyük. It is, however, not a very common taxa with less than 2% of the corrNISP in most of the assemblages. In four other assemblages (Middle Bronze Age filling Posterior to the Architectural Complex and Iron Age in Hirbemerdon Tepe; Late Bronze Age and Neo-Assyrian assemblages in Kavuşan Höyük) equid remains represent a notable portion of the corrNISP (from 5 to 10%). In these four assemblages the horse-like/donkey-like ratio differs. At Hirbemerdon Tepe, in the Post Arch. Compl. assemblage there are 2.5 times more horse remains than donkey remains, while in the Iron Age assemblage donkey remains are 3 times more numerous than horse remains. At Kavuşan Höyük horse and donkey remains are well balanced in the Late Bronze Age assemblage, while in the Neo-Assyrian assemblage donkey outnumber horse (1.8:1). Equid remains are mixed with remains of other species in the archaeological deposits, except for a complete horse skeleton found in the Middle Bronze Age fill at Hirbemerdon Tepe. It has to be noticed that a few equid bones exhibit cut marks. An equid atlas vertebra from area C at Middle Bronze Age Kenan Tepe bears two chop marks on its ventral side. A donkey talus found on a Middle Bronze Age floor at Hirbemerdon Tepe exhibits a chop mark on its caudal side. A donkey tibia found on the same floor as well as 3 bones from Neo-Assyrian Kavuşan Höyük (an equid metapodial, a donkey humerus and a donkey metatarsal) exhibit fractures which could result from butchery activities. Evidence from dismembering of equids is rare and concerns mainly donkey. It is, however, not clear that this activity was linked to human consumption³⁵.

(2) *Equus hemionus* (onager)

From the selected assemblages, two remains were attributed to the onager group based on morphometrics (see Methods in Chapter II). They are a posterior first phalanx from Iron Age Hirbemerdon Tepe and a radius from Late Bronze Age Kavuşan Höyük. Onagers were common in northern Mesopotamia, also in the Late Bronze Age and Neo-Assyrian periods (Becker, 2008). They were also present north of the great Mesopotamian plain such as Neolithic Çayönü (Uerpmann,

³⁵ The use of equid bones in the bone industry or the feeding of animals such as dogs with equid meat can be also considered.

1987: fig.6) or Early Bronze Age Arslantepe (Bökönyi, 1993). The presence of onager in the Upper Tigris River valley is therefore not surprising. The denomination onager regroups different populations. Their taxonomy is quite complex and it appears that several different populations can be present in a same site, especially in northern Iran (Champlot, 2010: fig.52). For the remains from Hirbemerdon Tepe and Kavuşan Höyük, it was not possible to go beyond this specific identification.

6. Artiodactyla (even-toed ungulates)

a) Suidae (pigs)

(1) Sus domesticus (domestic pig)

Domestic pig is a very productive animal with a litter between 8 and 15 piglets (Rognon, 2006). It is primarily a meat-producer but older individuals provide also valuable fat. Bristles can be also an exploited side product. As part of the main domestic animals for food production, domestic pig remains are present in large quantities in every assemblage. Details of their exploitation are therefore highly informative to define consumption patterns.

(a) Kill-off pattern

The kill-off pattern of domestic pig was investigated through dental age and epiphyseal fusions. Dental age allows precise age classes, but not all assemblages could have been considered due to a low amount of lower dental remains. Here are presented only kill-off patterns based on more than 10 lower dental remains (Fig. III.3-13).

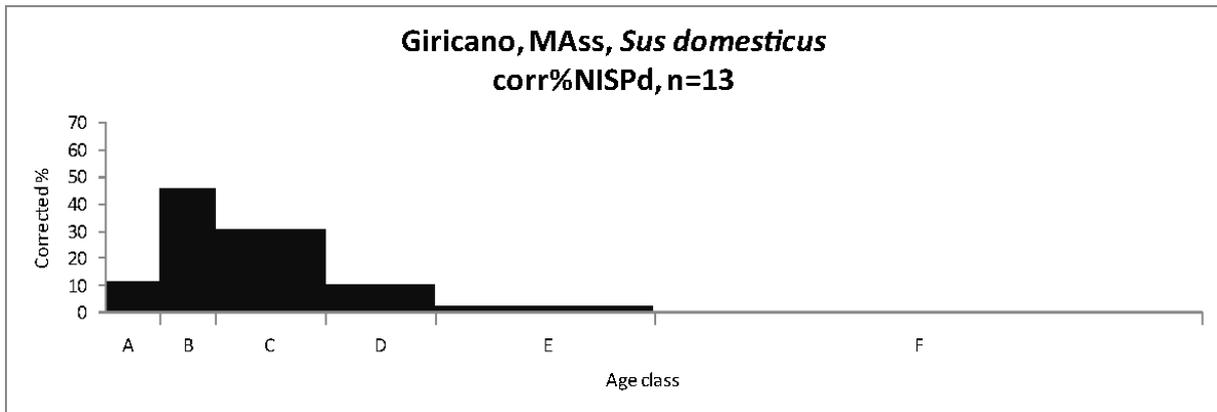


Figure III.3. Domestic pig kill-off pattern based on lower dental remains from Middle-Assyrian layers at Giricano. Age classes in years; A=0-0.5, B=0.5-1, C=1-2, D=2-3, E=3-5, F=5-10.

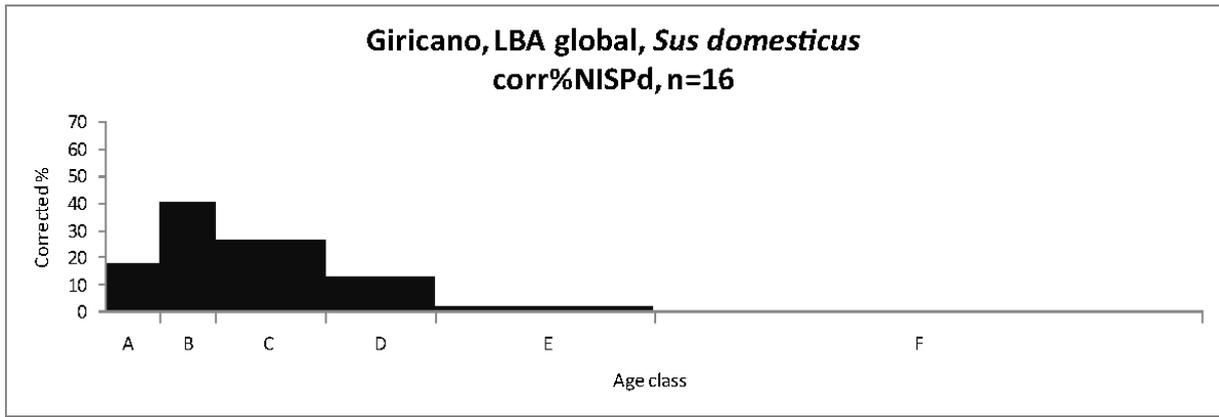


Figure III.4. Domestic pig kill-off pattern based on lower dental remains from all Late Bronze Age layers at Giricano. Age classes in years; A=0-0.5, B=0.5-1, C=1-2, D=2-3, E=3-5, F=5-10.

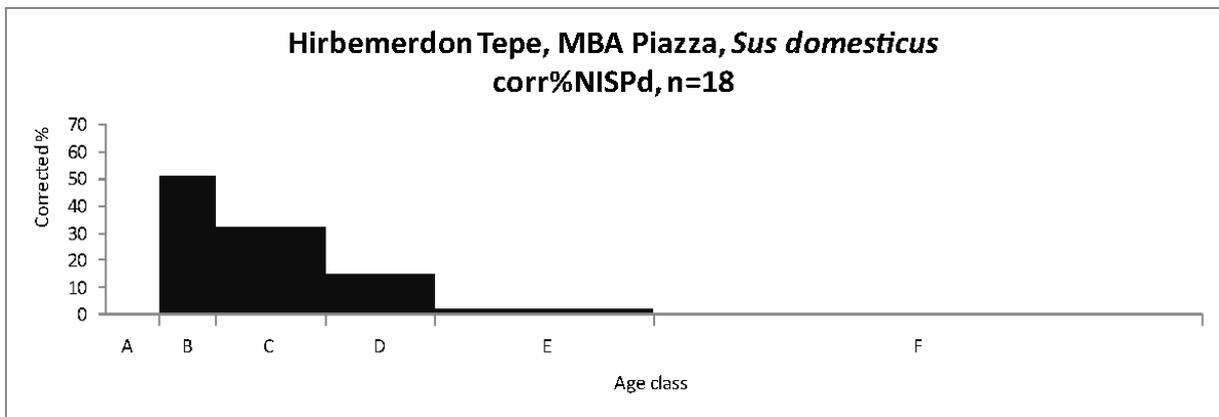


Figure III.5. Domestic pig kill-off pattern based on lower dental remains from the Middle Bronze Age Piazza at Hirbemerdon Tepe. Age classes in years; A=0-0.5, B=0.5-1, C=1-2, D=2-3, E=3-5, F=5-10.

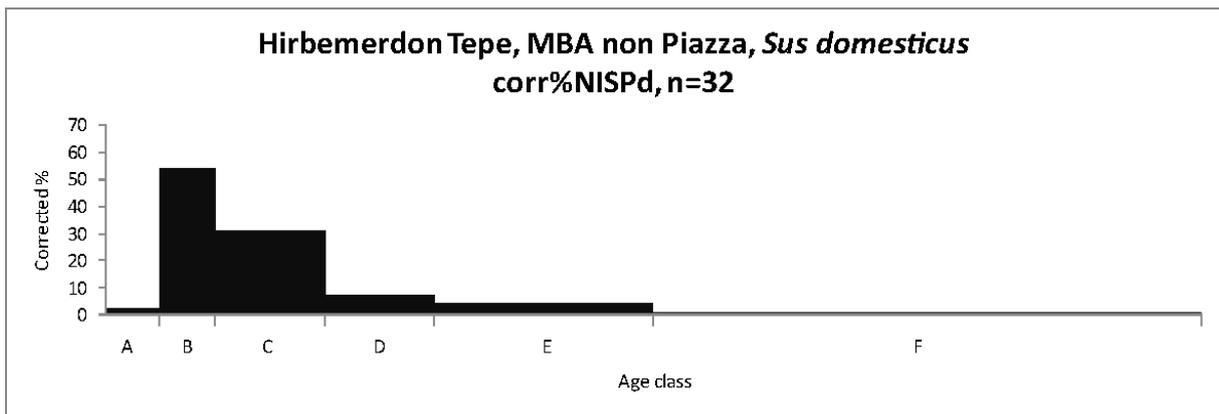


Figure III.6. Domestic pig kill-off pattern based on lower dental remains from the Middle Bronze Age layers (except Piazza) at Hirbemerdon Tepe. Age classes in years; A=0-0.5, B=0.5-1, C=1-2, D=2-3, E=3-5, F=5-10.

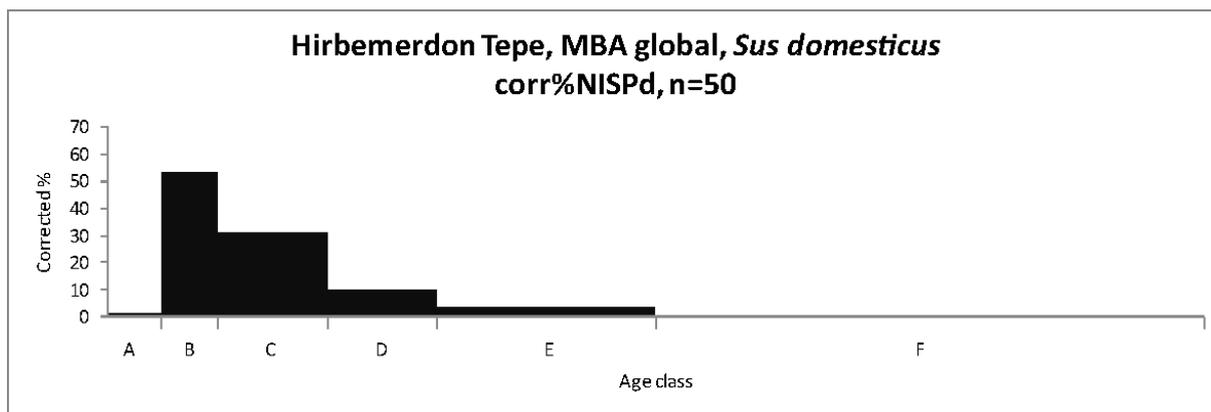


Figure III.7. Domestic pig kill-off pattern based on lower dental remains from all Middle Bronze Age layers at Hirbemerdon Tepe. Age classes in years; A=0-0.5, B=0.5-1, C=1-2, D=2-3, E=3-5, F=5-10.

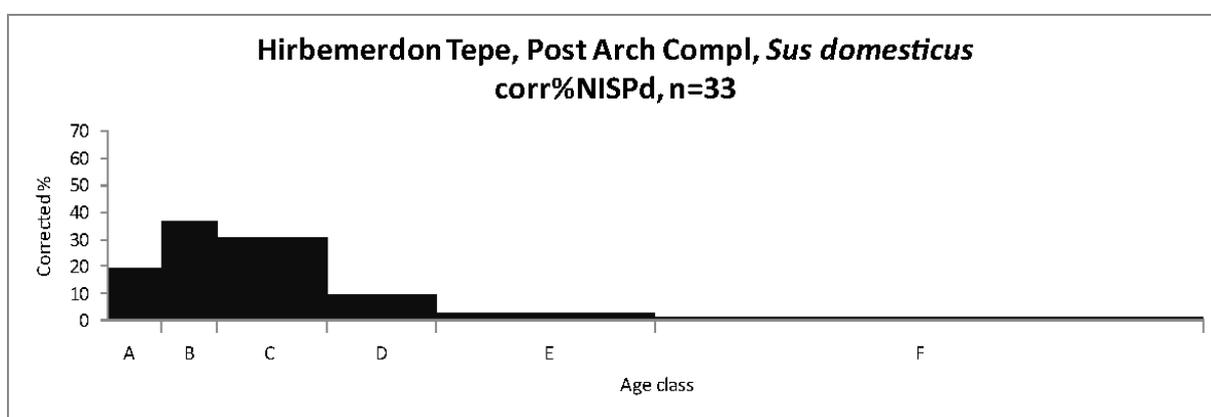


Figure III.8. Domestic pig kill-off pattern based on lower dental remains from Middle Bronze Age layers Posterior to the Architectural Complex at Hirbemerdon Tepe. Age classes in years; A=0-0.5, B=0.5-1, C=1-2, D=2-3, E=3-5, F=5-10.

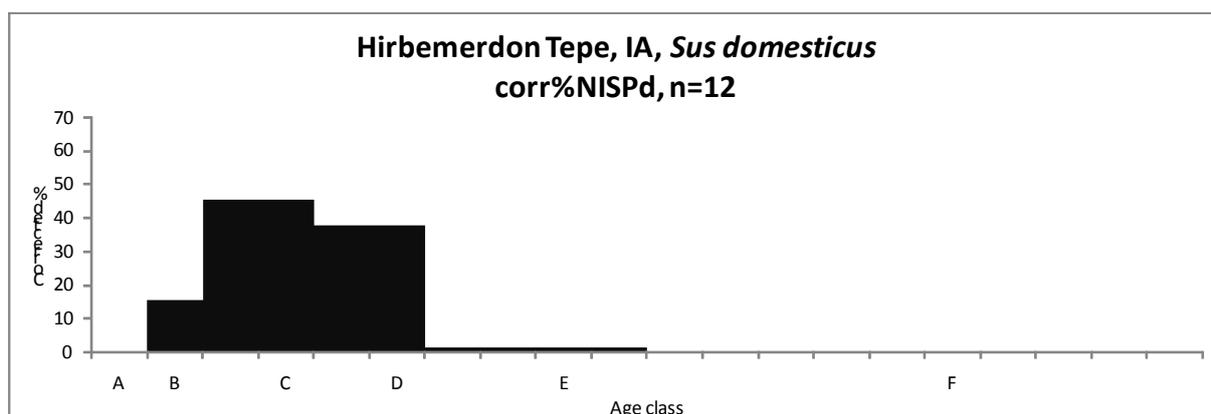


Figure III.9. Domestic pig kill-off pattern based on lower dental remains from Iron Age layers at Hirbemerdon Tepe. Age classes in years; A=0-0.5, B=0.5-1, C=1-2, D=2-3, E=3-5, F=5-10.

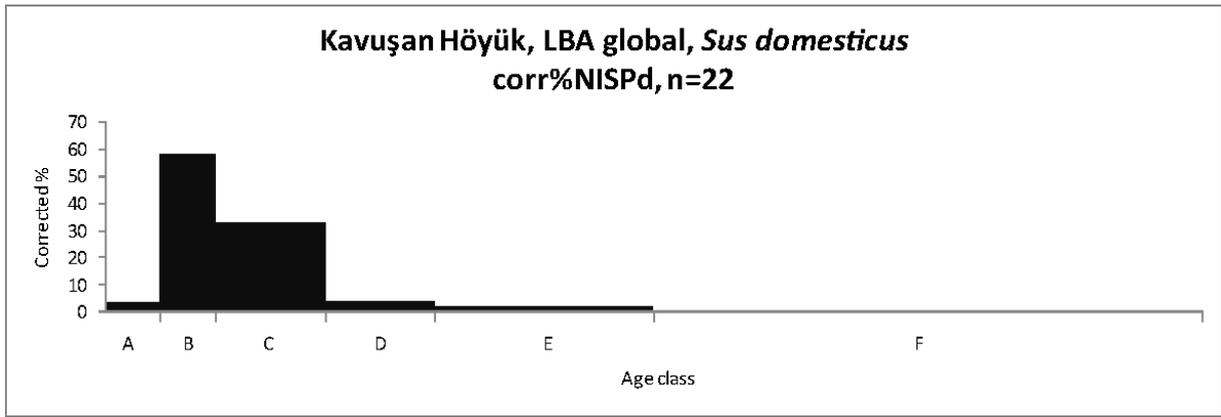


Figure III.10. Domestic pig kill-off pattern based on lower dental remains from Late Bronze Age layers at Kavuşan Höyük. Age classes in years; A=0-0.5, B=0.5-1, C=1-2, D=2-3, E=3-5, F=5-10.

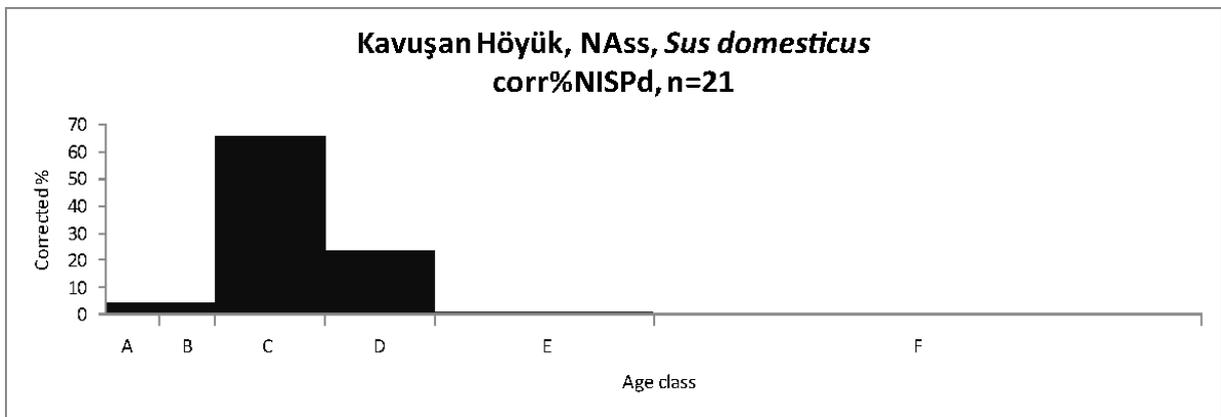


Figure III.11. Domestic pig kill-off pattern based on lower dental remains from Neo-Assyrian layers at Kavuşan Höyük. Age classes in years; A=0-0.5, B=0.5-1, C=1-2, D=2-3, E=3-5, F=5-10.

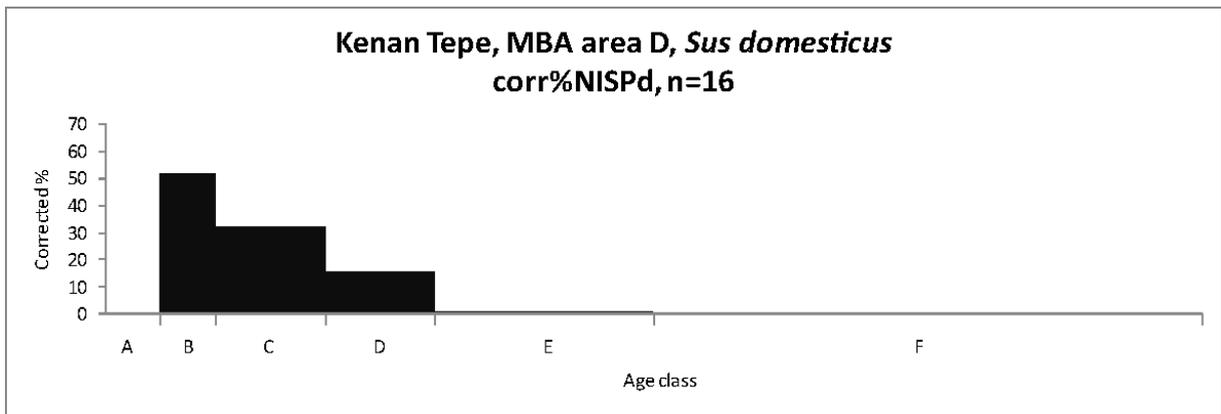


Figure III.12. Domestic pig kill-off pattern based on lower dental remains from Middle Bronze Age area D at Kenan Tepe. Age classes in years; A=0-0.5, B=0.5-1, C=1-2, D=2-3, E=3-5, F=5-10.

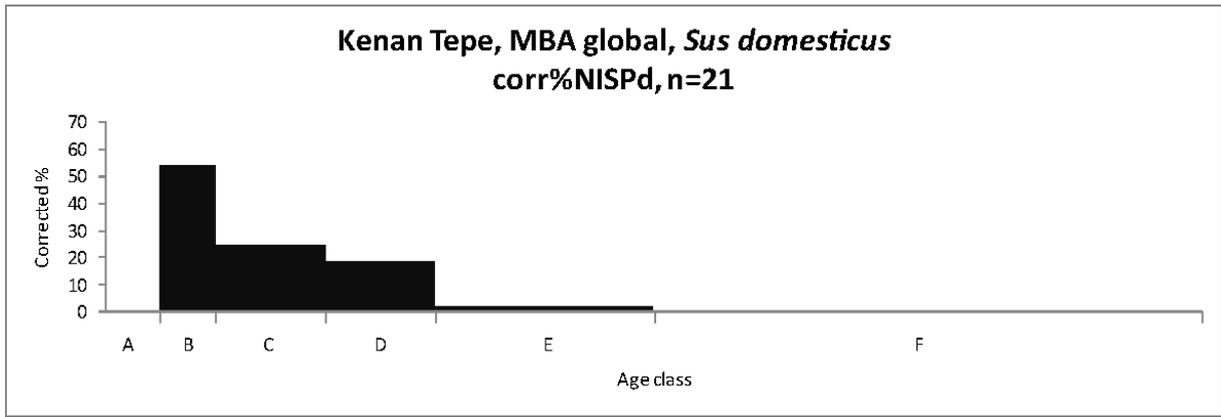


Figure III.13. Domestic pig kill-off pattern based on lower dental remains from all Middle Bronze Age layers at Kenan Tepe. Age classes in years; A=0-0.5, B=0.5-1, C=1-2, D=2-3, E=3-5, F=5-10.

It results from this analysis that pigs were mainly slaughtered before two years old. It is probably close to the age where pig reaches its optimal meat weight before producing more fat. The younger piglets were mainly preserved the six first months of their life except at Late Bronze Age Giricano and PAC Hirbemerdon Tepe. Correspondence Analysis shows a chronological pattern between Middle and Late Bronze Age assemblages on one side and Iron Age assemblages on the other side (Fig. III.14). Middle Bronze Age assemblages in general as well as Late Bronze Age Kavuşan Höyük are pretty well grouped and characterized by a focus on the B class (from 6 months to a year). Iron Age and Neo-Assyrian assemblages from Hirbemerdon Tepe and Kavuşan Höyük are apart due to an exploitation of pigs turned more toward more mature animals from 1 to 3 years old.

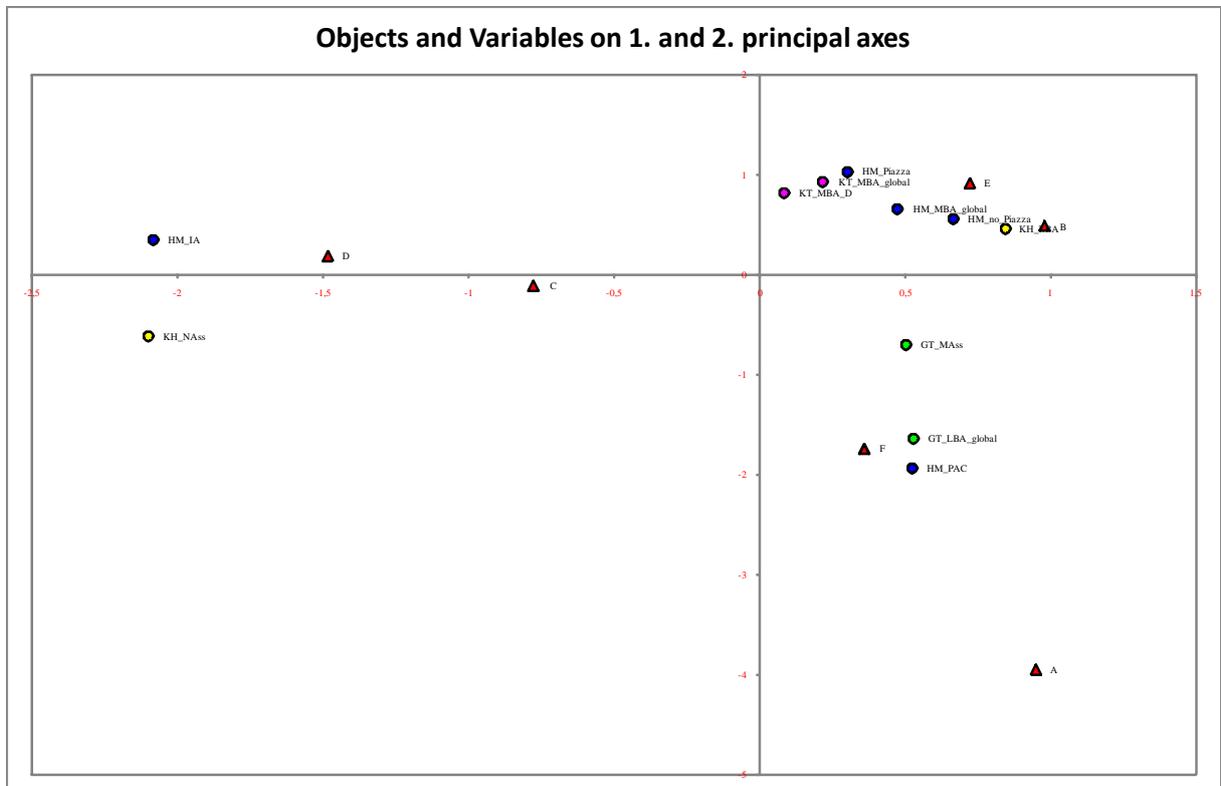


Figure III.14. Correspondence Analysis, using CAPCA software, for pig kill-off pattern with assemblages as objects and dental age classes as variables. Axis 1 explains 47.85% and Axis 2 35.32% of the variability.

Epiphyseal fusions provide also information on the culling strategy but do not perfectly corroborate with dental data. The third group of fusions takes place around 3-3.5 years which corresponds to the dental age class D. This is a minor issue considering the few dental remains from E and F classes. The main problem is the number of remains, which is also low in assemblages where it was already the case with dental remains. Moreover, the number of epiphyseal zones is not equally spread between the three groups. Therefore, one or two of the fusion groups do not usually contain enough data to provide strong information. One good example is the Iron Age assemblage at Hirbemerdon Tepe where 80% of the remains correspond to individuals which survived after the first year (Fig. III.15). The pattern corresponds to the one drawn from dental remains. On the contrary, epiphyseal fusion data from Neo-Assyrian assemblage at Kavuşan Höyük indicates that only 55% of the remains survived after the first year, which is in contradiction with the dental data (Fig. III.16).

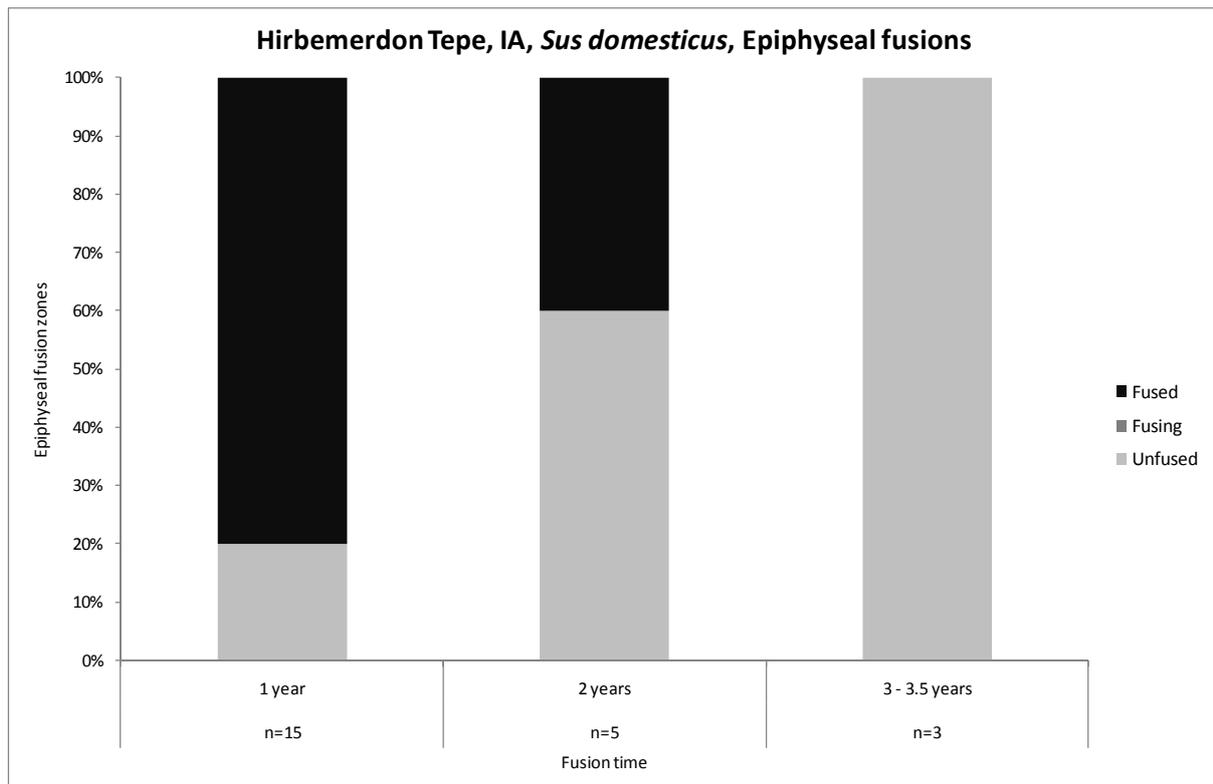


Figure III.15. Relative representation of fused, unfused and fusing domestic pig epiphysis according to the fusion time.

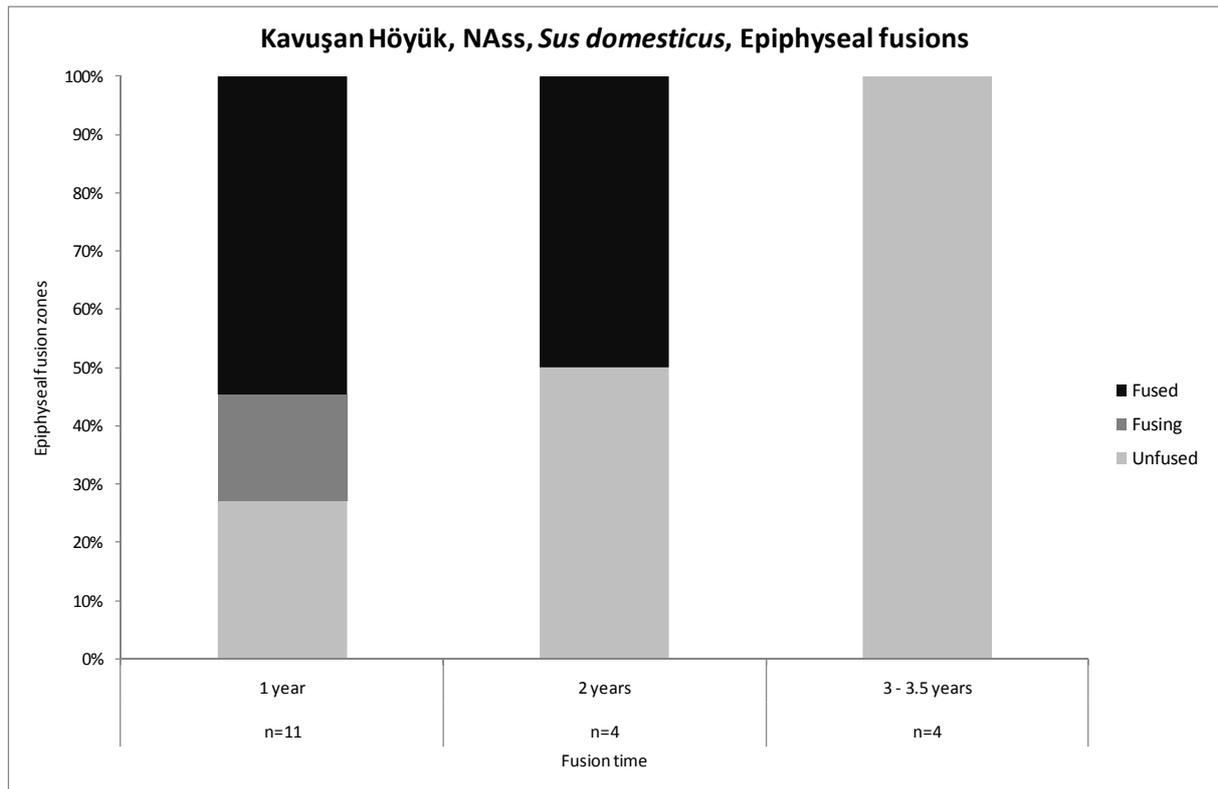


Figure III.16. Relative representation of fused, unfused and fusing domestic pig epiphysis according to the fusion time.

(b) Skeletal representation

Pig skeletal elements are sorted in three groups according to the value of the meat attached to these elements. The definition of the high, medium and low value meat is given by H.-P. Uerpmann (1973). Graphics are difficult to compare to each other at a first glance (Fig. III.17-35). It appears that the representation of different elements within a meat value group is not homogeneous. As a general trend, scapula and cranial (with lower jaw) are usually well represented. Elements from the low value group are poorly represented. It could be a sign that they did not reach the same middens as the other ones but due to their size, phalanges in particular could have been subject to sample bias.

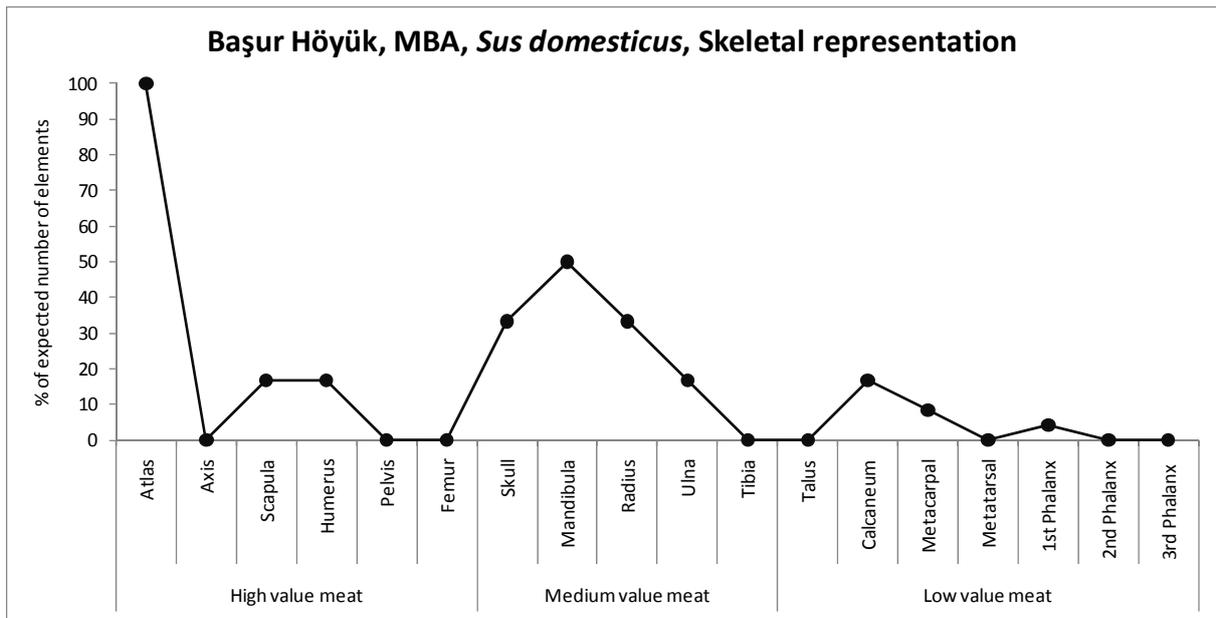


Figure III.17. Skeletal representation for domestic pig in Middle Bronze Age Başur Höyük. (MNI=3, 16 elements).

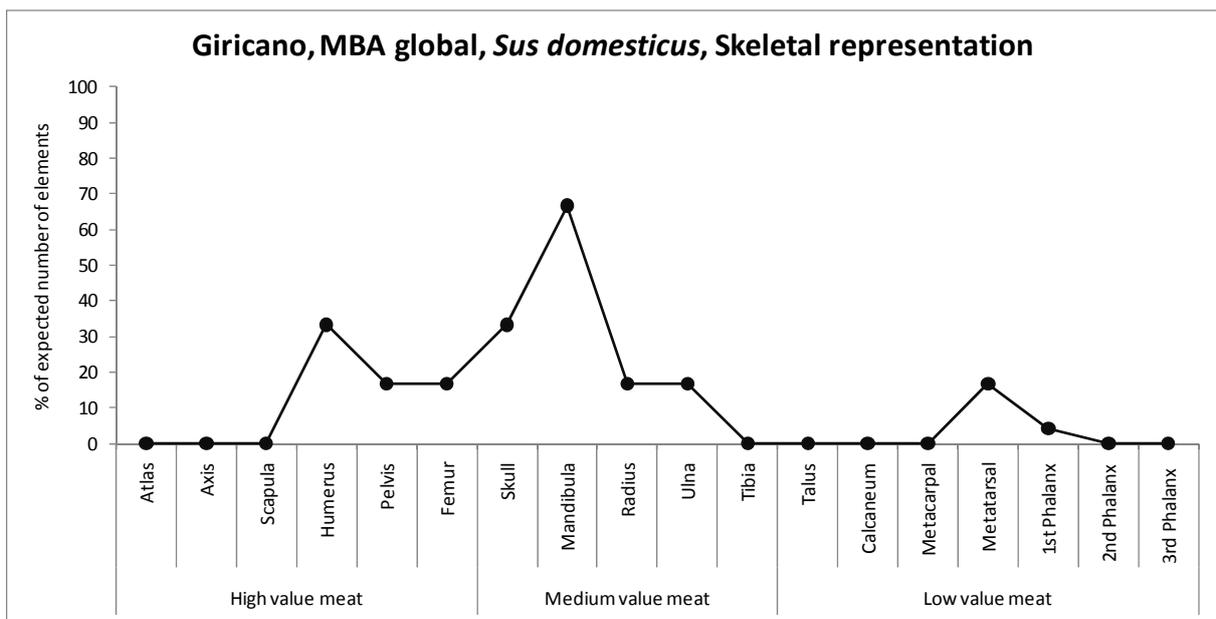


Figure III.18. Skeletal representation for domestic pig in Middle Bronze Age Giricano Tepe. (MNI=3, 15 elements).

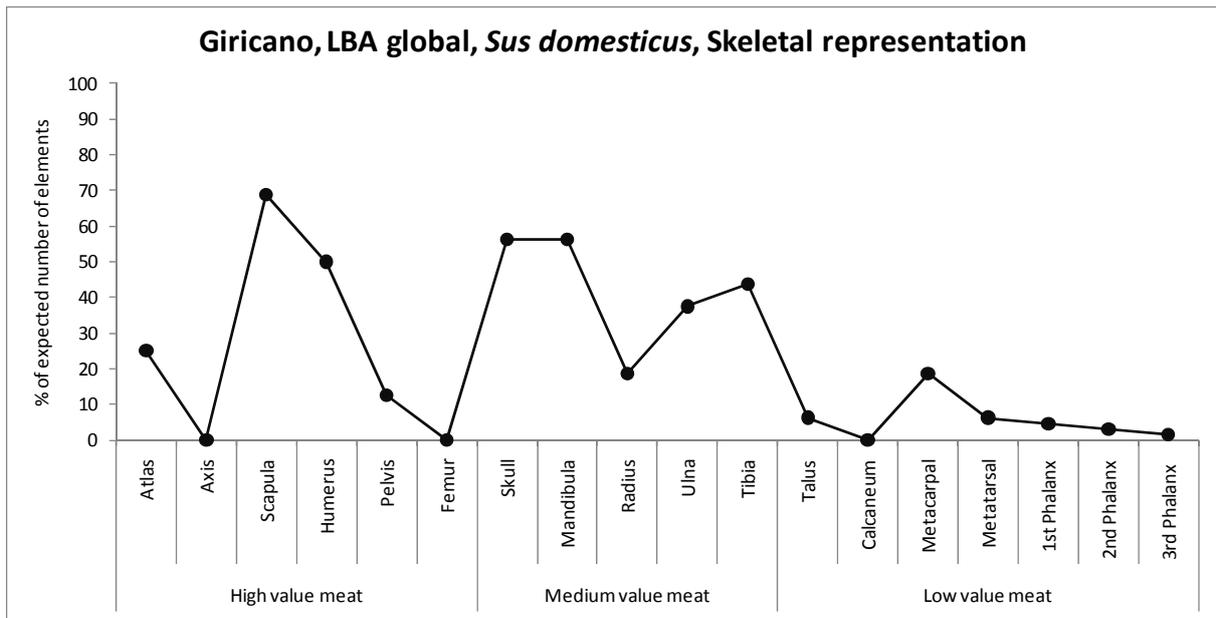


Figure III.19. Skeletal representation for domestic pig in all Late Bronze Age layers at Giricano Tepe. (MNI=8, 72 elements).

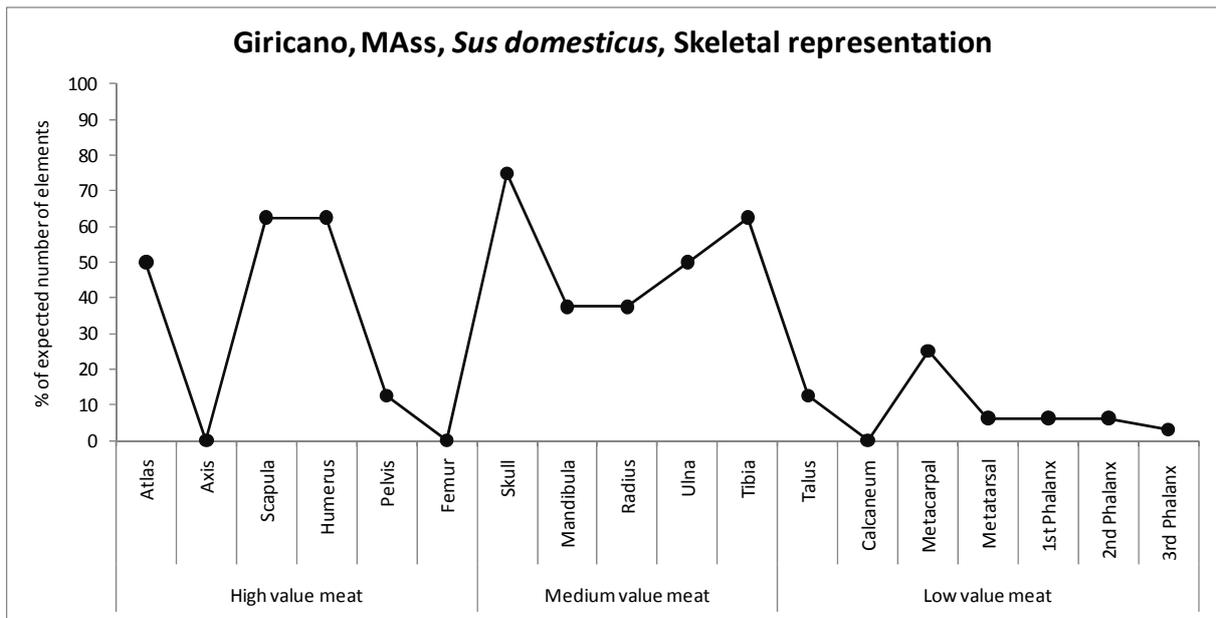


Figure III.20. Skeletal representation for domestic pig in Middle-Assyrian assemblage from Giricano Tepe. (MNI=4, 45 elements).

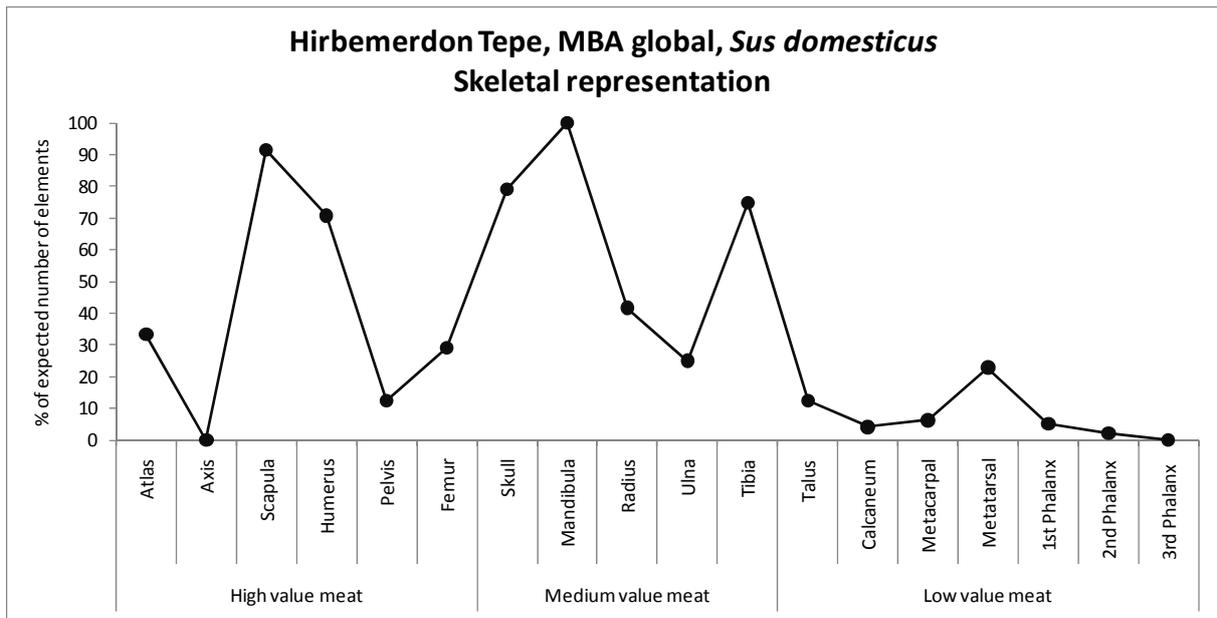


Figure III.21. Skeletal representation for domestic pig in all Middle Bronze Age layers from Hirbemerdon Tepe. (MNI=12, 155 elements).

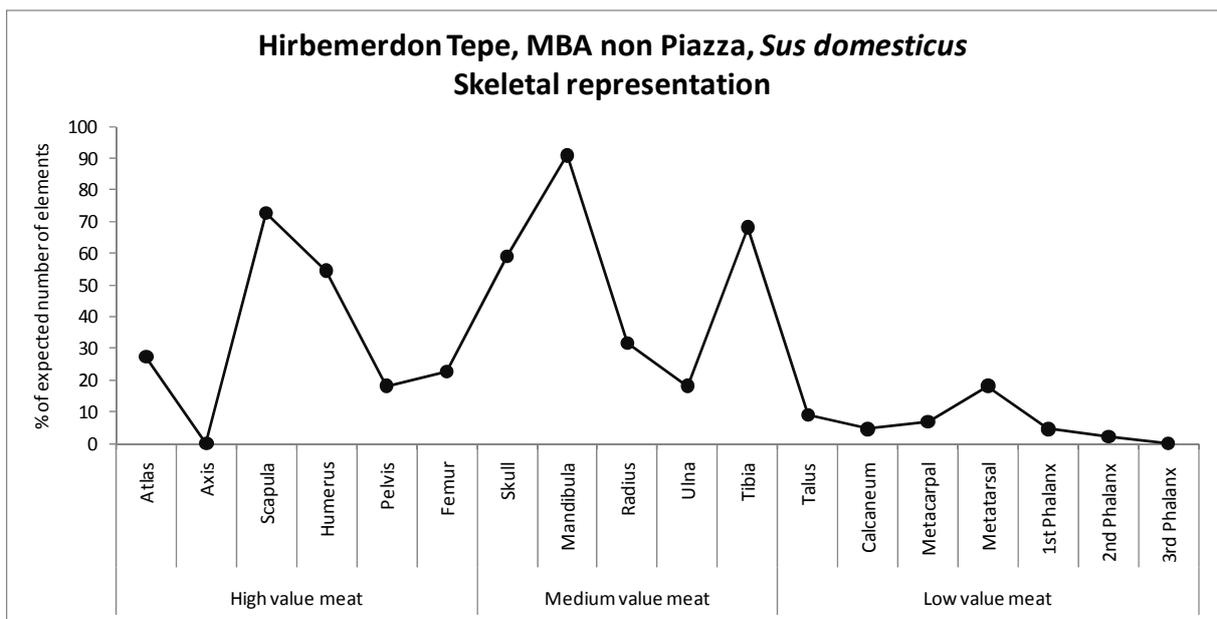


Figure III.22. Skeletal representation for domestic pig in Middle Bronze Age layers except Piazza from Hirbemerdon Tepe. (MNI=11, 119 elements).

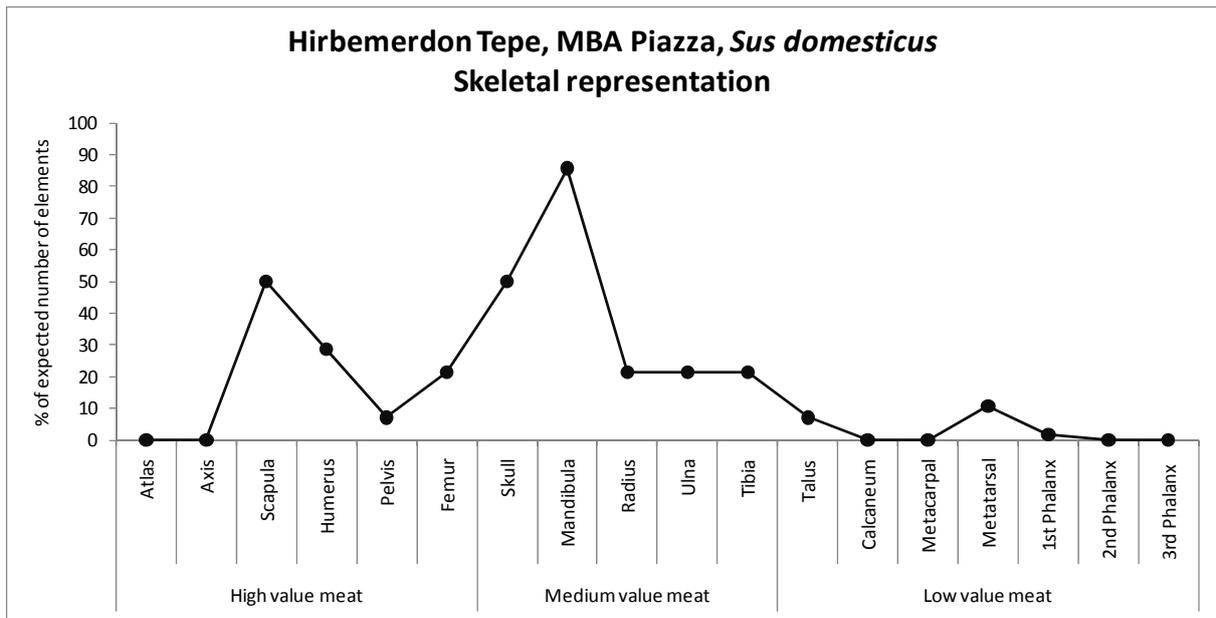


Figure III.23. Skeletal representation for domestic pig in Middle Bronze Age Piazza from Hirbemerdon Tepe. (MNI=7, 48 elements).

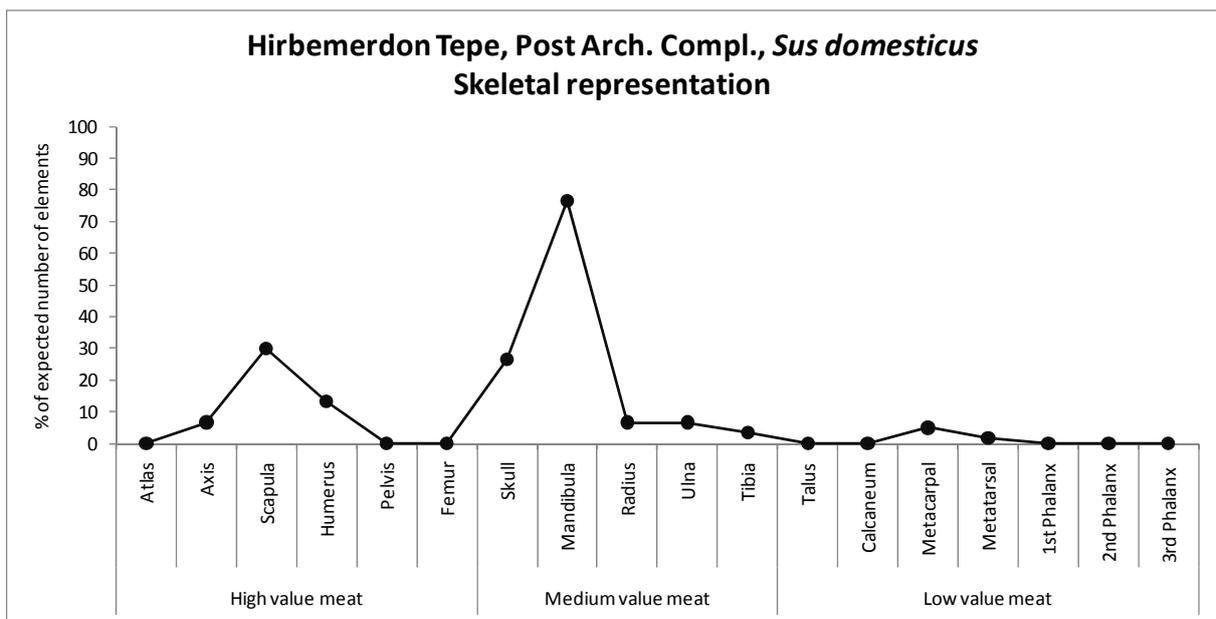


Figure III.24. Skeletal representation for domestic pig in Middle Bronze Age Posterior to the Architectural Complex at Hirbemerdon Tepe. (MNI=15, 54 elements).

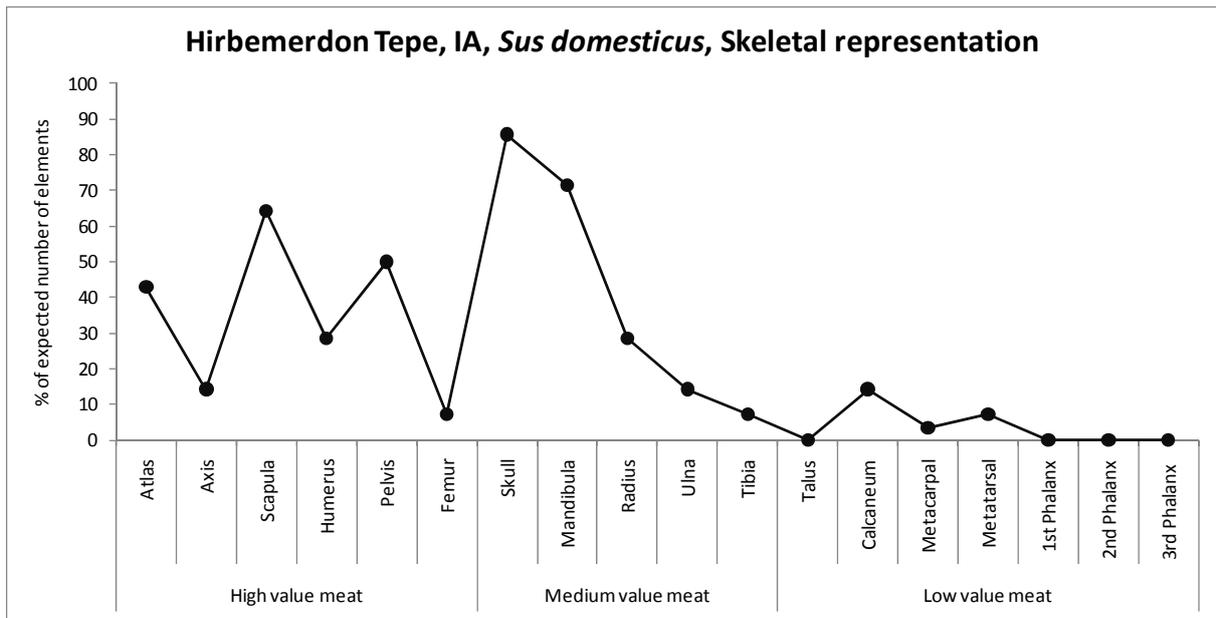


Figure III.25. Skeletal representation for domestic pig in Iron Age assemblage from Hirbemerdon Tepe. (MNI=7, 59 elements).

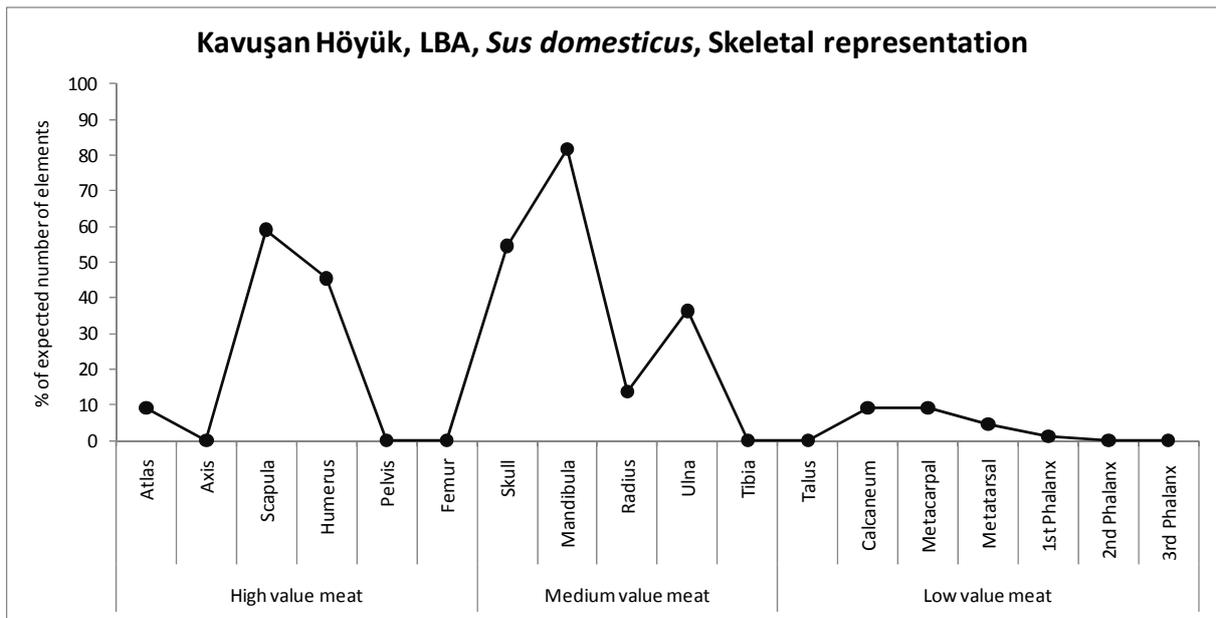


Figure III.26. Skeletal representation for domestic pig in Late Bronze Age assemblage from Kavuşan Tepe. (MNI=11, 74 elements).

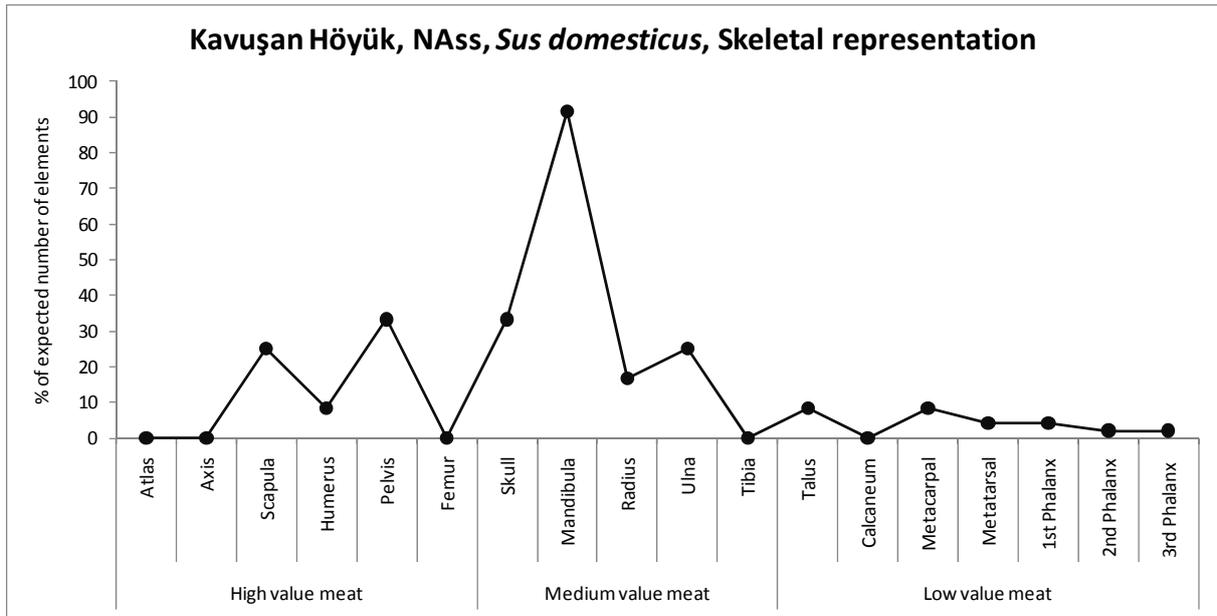


Figure III.27. Skeletal representation for domestic pig in Neo-Assyrian assemblage from Kavuşan Tepe. (MNI=6, 36 elements).

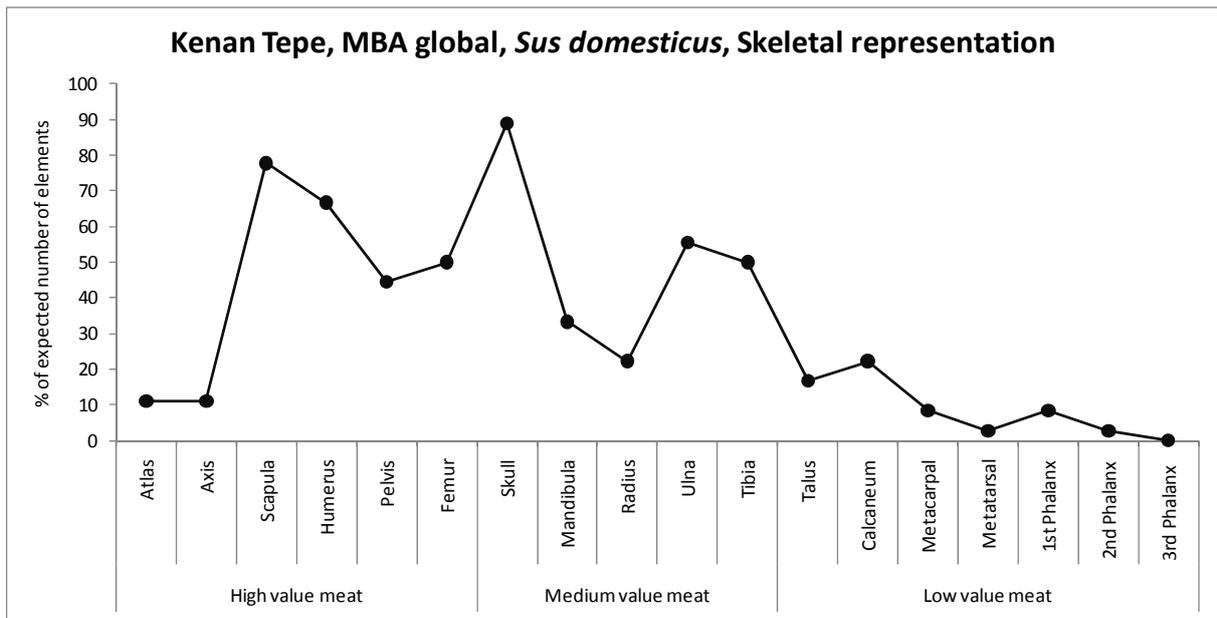


Figure III.28. Skeletal representation for domestic pig in all Middle Bronze Age layers from Kenan Tepe. (MNI=9, 109 elements).

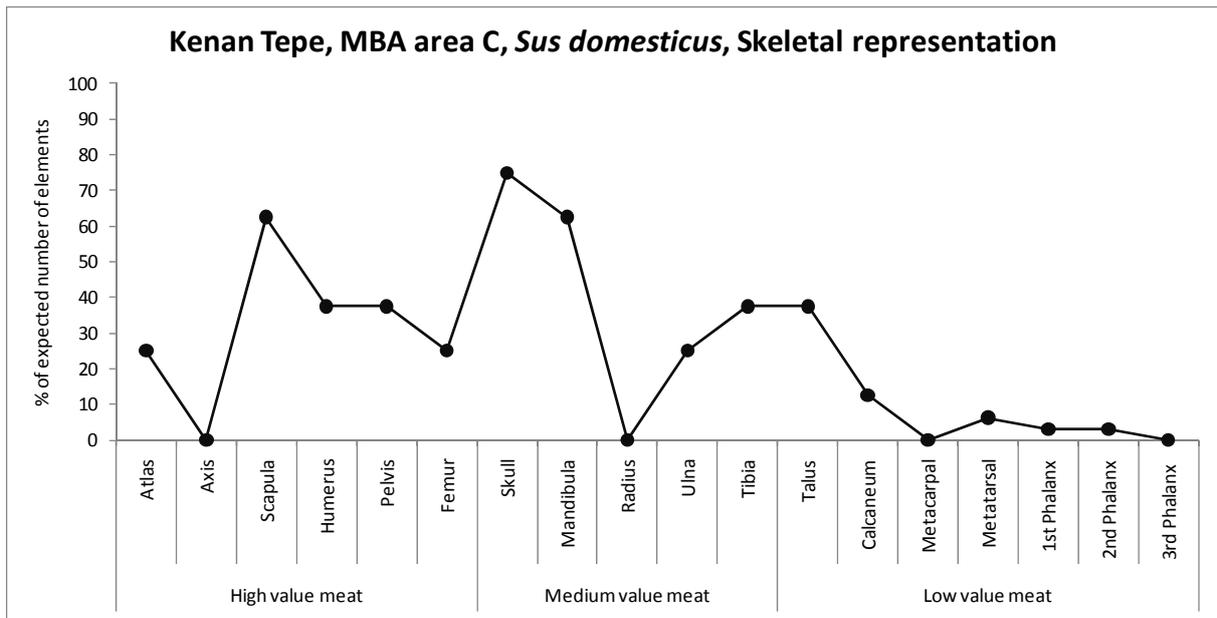


Figure III.29. Skeletal representation for domestic pig in area C at Middle Bronze Age Kenan Tepe. (MNI=4, 37 elements).

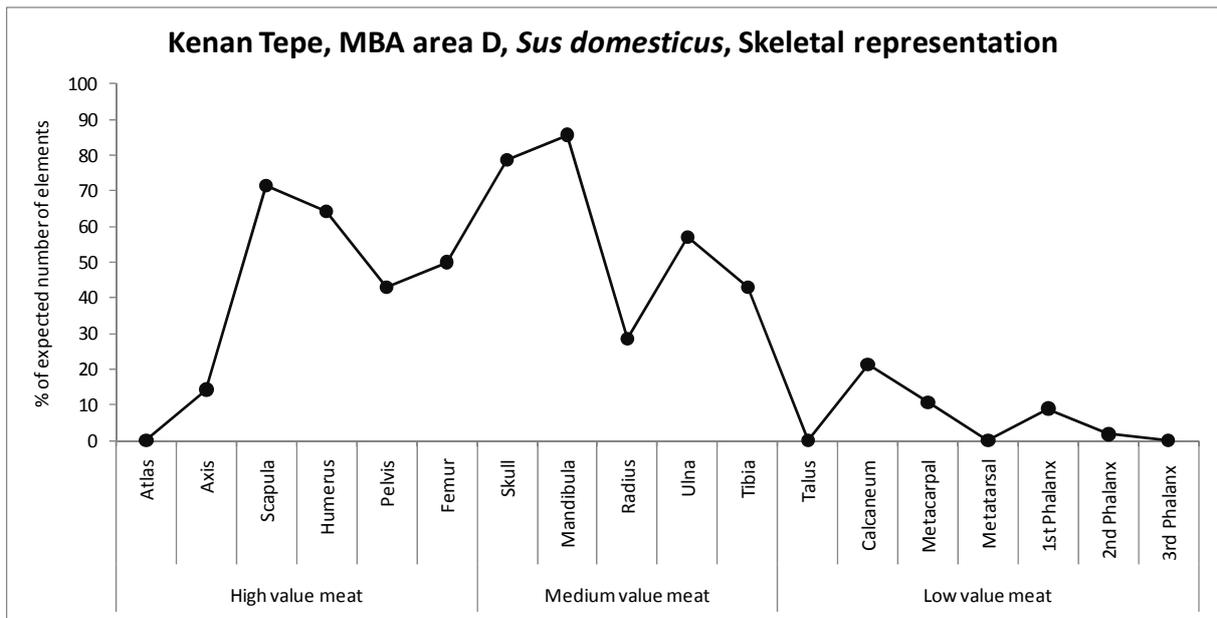


Figure III.30. Skeletal representation for domestic pig in area D at Middle Bronze Age Kenan Tepe. (MNI=7, 86 elements).

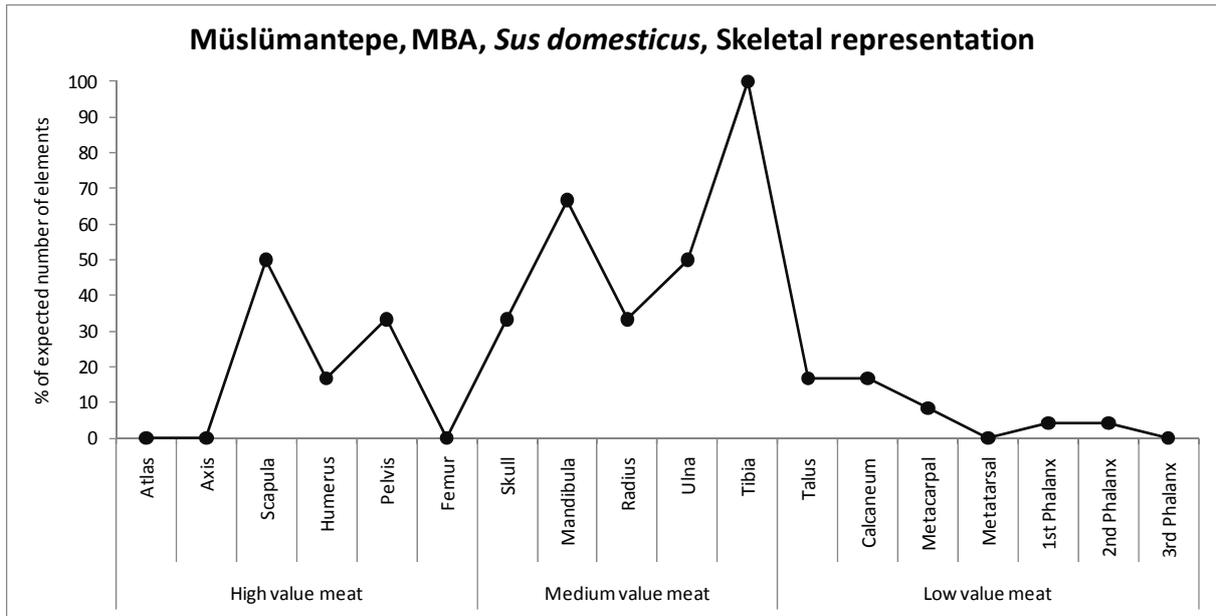


Figure III.31. Skeletal representation for domestic pig in the Middle Bronze Age assemblage from Müslümantepe. (MNI=3, 28 elements).

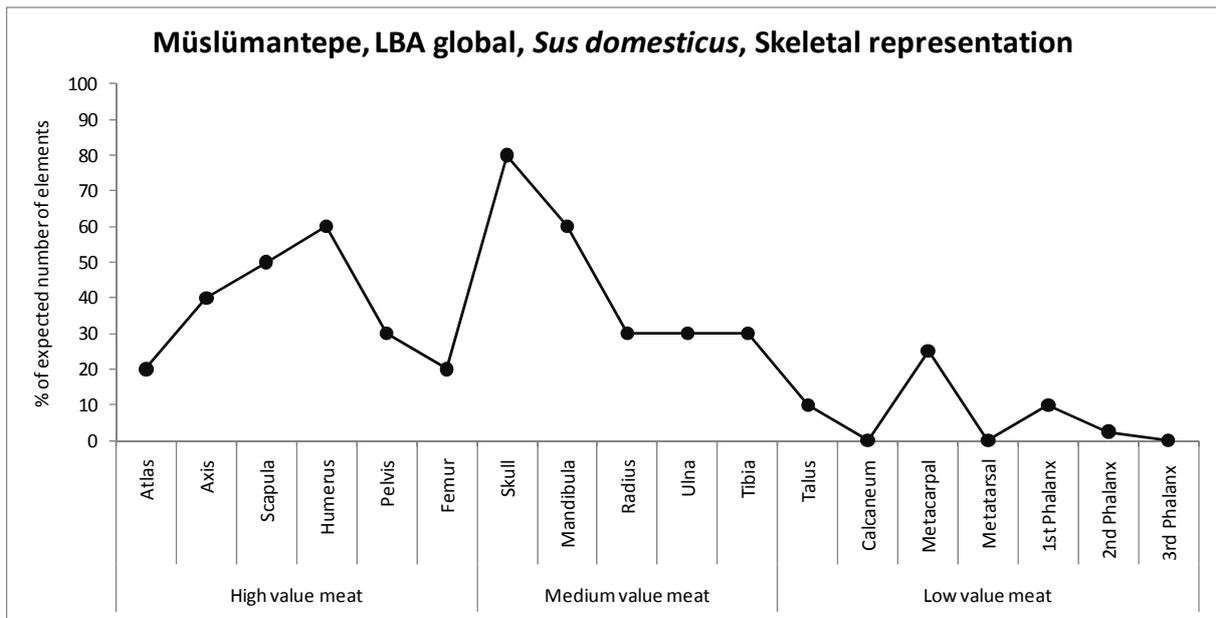


Figure III.32. Skeletal representation for domestic pig in all Late Bronze Age layers from Müslümantepe. (MNI=5, 53 elements).

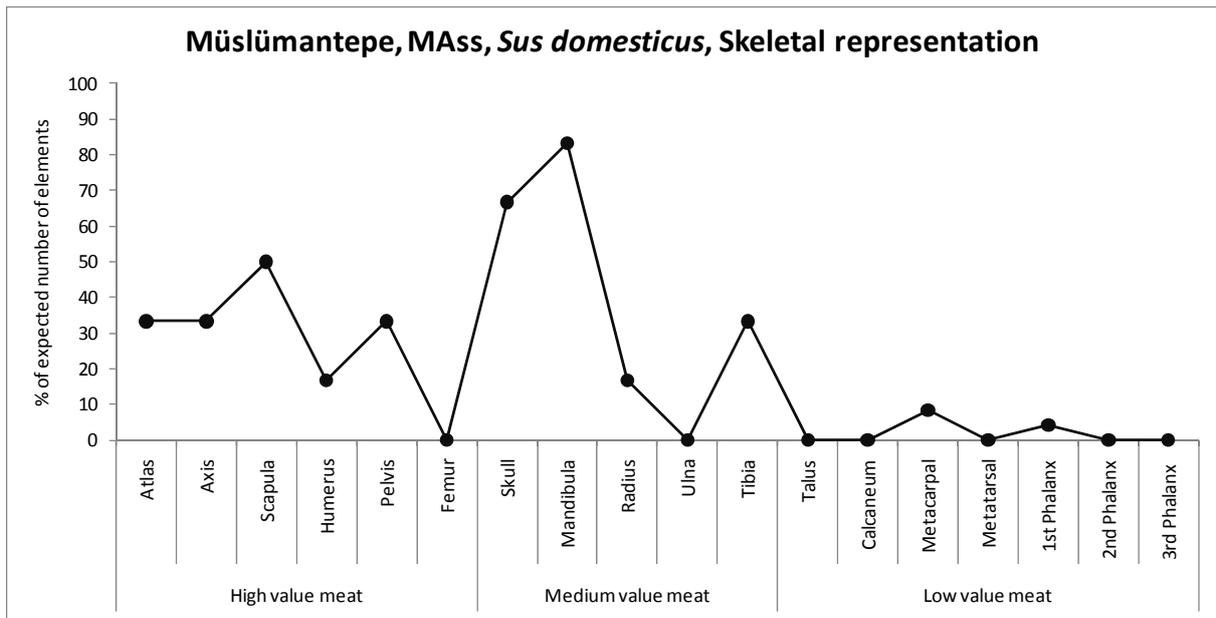


Figure III.33. Skeletal representation for domestic pig in Middle-Assyrian assemblage from Müslümantepe. (MNI=3, 22 elements).

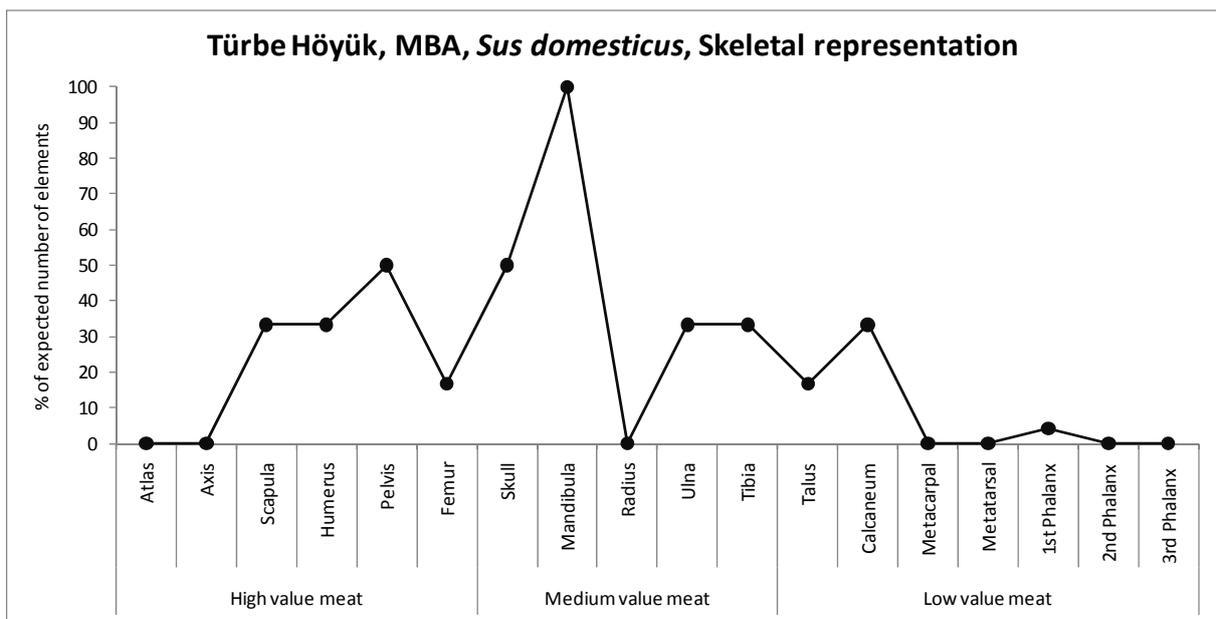


Figure III.34. Skeletal representation for domestic pig in the Middle Bronze Age assemblage from Türbe Höyük. (MNI=3, 25 elements).

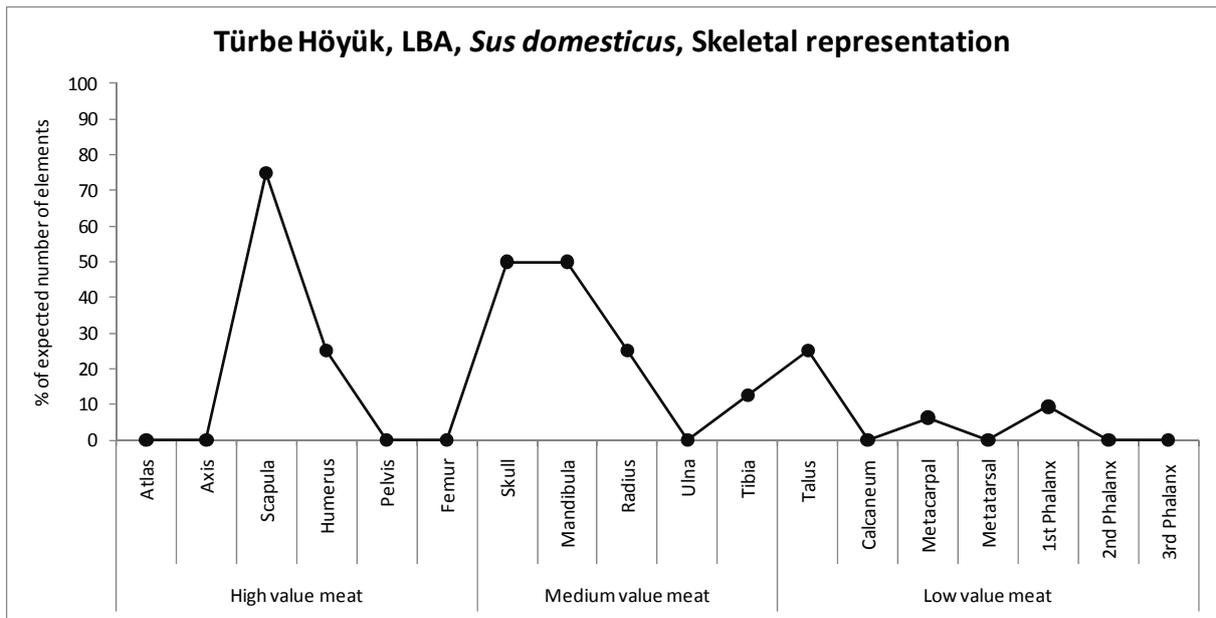


Figure III.35. Skeletal representation for domestic pig in the Late Bronze Age assemblage from Türbe Höyük. (MNI=4, 25 elements).

As it was difficult to extract trends from these graphics, correspondence analyses were performed. The first one concerns the assemblages as objects and the skeletal elements as variables. Plotting only the variables, it appears that the axes do not clearly sort the different meat value groups (Fig. III.36). Atlas and axis cervical vertebrae stand apart from the other elements.

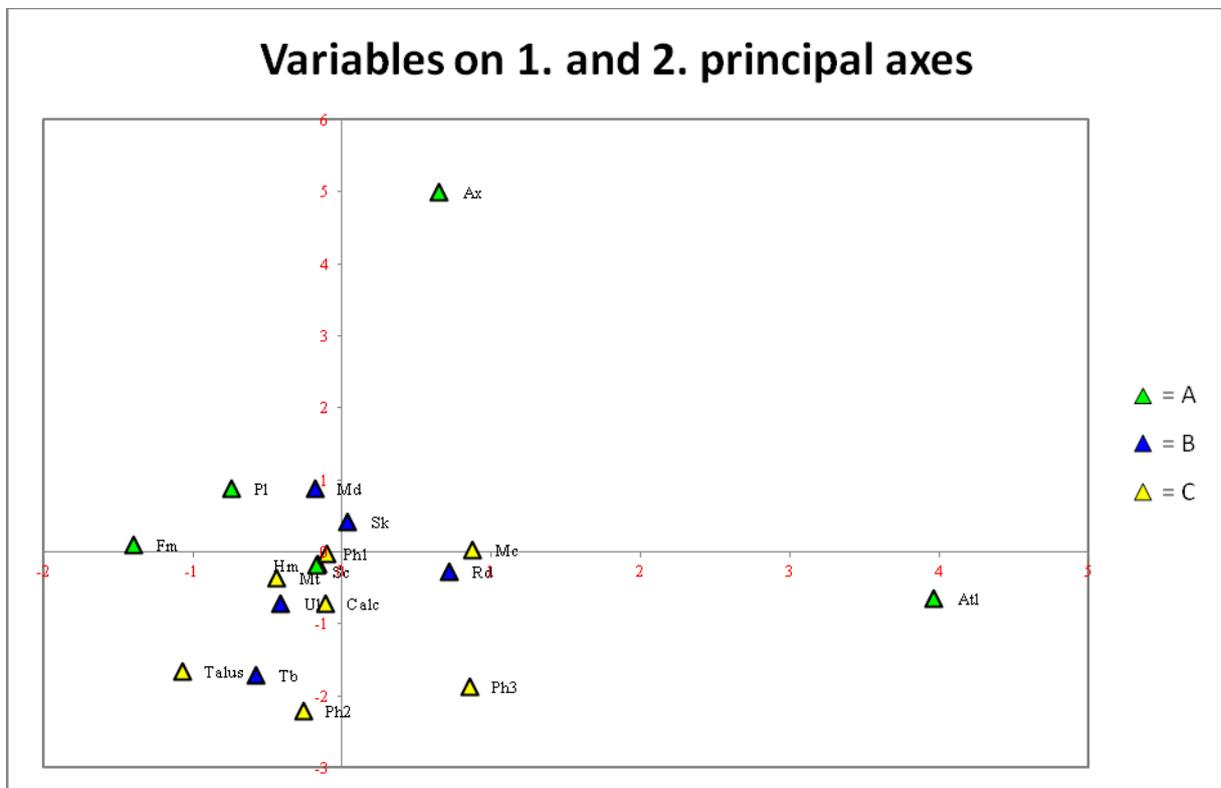


Figure III.36. Correspondence Analysis, using CAPCA software with pig meat value groups as variables (A=high value; B=medium value; C=low value). Axis 1 explains 26.54% and Axis 2 15.67% of the variability.

A second analysis was performed using only the mean value for each group as variable. The first axe separates the assemblages with an important representation of the high value group from the assemblages with an important representation of the medium value group. Most of the assemblages cluster in the middle of the graph and therefore there is no strong trend visible. The second axe seems to correspond to the representation of the low meat value group (Fig. III.37). It doesn't particularly well discriminate the assemblages. It has to be noted that assemblages from sealed context and where some sieving was performed see as the Middle-Assyrian pits at Giricano present also a very low representation of the low value meat group. Therefore it is unlikely that these elements, such as phalanges, were underrepresented due to sample bias linked to their small size.

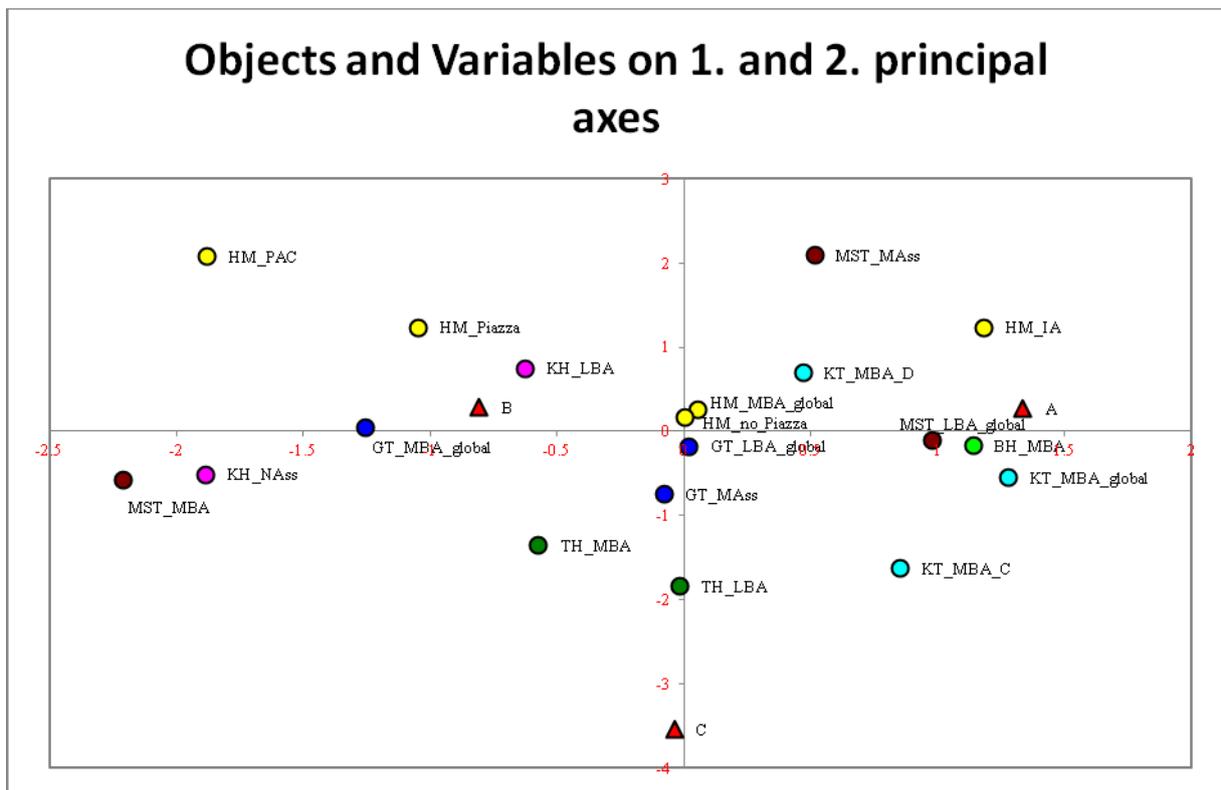


Figure III.37. Correspondence Analysis, using CAPCA software, for pigs with assemblages as objects and mean of the meat value groups as variables (A=high value; B=medium value; C=low value). Axis 1 explains 69.84% and Axis 2 30.16% of the variability.

(c) Butchery

Domestic pig belongs to the main domestic animals for food production (“triad”). There is no doubt about the consumption of pork meat in Upper Tigris River valley during Bronze and Iron Ages. Cut marks are, however, relatively rare (Tab. III.3). In average 4% of the pig remains exhibit cut marks. They are more present in the Middle-Assyrian layer at Giricano, in the Piazza at Hirbemerdon Tepe, in the area A at Middle Bronze Age Kenan Tepe and in the Iron Age level at Hirbemerdon Tepe. Cut marks are mostly visible on the atlas vertebra, forelimb bones and talus.

<i>Sus domesticus</i> number of bones with cut marks	BH MBA	GT LBA MAss	HM MBA Piazza	HM MBA non Piazza	HM MBA PAC	HM IA	KH LBA	KH IA NAss	KT MBA area C	KT MBA area D	MST LBA global	TH LBA
Skull (zygo)										1		
Atlas		2	1			2	1					
Vt			1									
Sc	1		1	1			1					1
Hm		1			1	1			1			
Rd	1		1									
Ul		5								1		
Mc		2								1		
Pl								1		1		
Fm				1								
Fb											1	
Talus			1	1					2			
Mt			1									
Ph1												1
Total bone with cut marks	2	10	6	3	1	3	2	1	3	4	1	2
%pig NISP with cut marks	12.5	8.1	5.5	1.4	0.8	3.3	1.8	1.5	3.8	2.5	0.9	6.5
Total pig NISP	16	123	110	215	132	91	111	68	80	157	109	31

Table III.3. Distribution of domestic pig remains exhibiting cut marks.

(d) *Pathologies*

Among all pig specimens, only two bones exhibit pathological marks. In both cases it concerns an exostosis on the lateral side of the tibia above the distal epiphysis. In one case the epiphysis is fused and in the other case it is not. Both examples come from Middle Bronze Age assemblages: one from Müslümantepe and the other one in a fill outside of the Piazza at Hirbemerdon Tepe.

(2) *Sus scrofa* (wild boar)

A few skeletal elements have been determined as wild boar on the basis of their size (see Methods in Chapter II). Wild boar causes much damage in agricultural fields and could have been hunted for this reason, besides the amount of meat which can be yielded from an adult individual. Nowadays in the Upper Tigris Valley wild boar are considered as pests by local farmers who tend to shoot them down. Due to religious considerations, wild boar is in present time not consumed in the area and dead bodies are left in the fields. As there was obviously no taboo on pig (at least pork) meat in the Bronze and Iron Ages in the area, the low representation of wild boar is probably related to the fact that hunting was not a necessity for the procurement of meat. However, pig meat was consumed. The two talus and the calcaneum present in the whole assemblage (Tab. III.4) exhibit cut marks. There are similarities between cut marks on domestic pig and wild boar talus.

<i>Sus scrofa</i> Skeletal part Number of remains	BH MBA	GT LBA MAss	HM MBA Piazza	HM MBA non Piazza	HM MBA PAC	KH LBA	KT MBA area D	TH MBA
Upper dental remain			1				2	
Lower dental remain	1	1			1	1	1	
Hm					1			2
Rd			1					
Ul								1
Fm				1				
Tibia				2	1			
Talus	1			1				
Cuboid bone			1					
Calcaneum	1							
Metapodial					2			

Table III.4. Distribution of wild boar (*Sus scrofa*). Revoir remain dans tableau car soit remains soit specimen.

b) Camelidae (camelids)

(1) Camelus (camels)

Wild camel populations did not occur in Anatolia during the Holocene but domestic forms were imported often as pack animal. They are the Bactrian camel (*Camelus bactrianus*) and the one-humped camel (*Camelus dromedaries*). The two domestic species arrived not before the 2nd millennia BC in northern Mesopotamia. At Tall Seh Hamad in the Khabur area, some 240km south of the present study area, C. Becker recently published convincing evidence for the presence of the Bactrian camel in the Middle-Assyrian period and the arrival of the one-humped camel in the Neo-Assyrian period (Becker, 2008: 83-6). In the Upper Tigris assemblages, only two camel bones were recovered, both at Kavuşan Höyük. A fragment of fused pelvic acetabulum was found in the Late Bronze Age layers. A metacarpal exhibiting unfused distal epiphyses was drawn from the Neo-Assyrian assemblage. None of them exhibit cut mark. Unfortunately a specific identification of these remains was not possible using morphological or metrical criteria. Two questions arise: why are camel remains so rare and why do they only occur in Kavuşan Höyük? These questions will be addressed in the following chapters. It is, however, possible to put forward two ideas. First, the Upper Tigris River valley could not have been a common road for camel caravans. At the beginning of the 2nd millennium BC Assyrian merchants, were transporting goods from Assur to central Anatolia and back, using a well organized system of donkey caravans (Veenhof, 1972: 1-46). The use of donkey as pack animals might have resisted longer in the area, rather than in steppic landscapes where camel caravans showed their superiority. Second, in the next chapters the question of whether Kavuşan Höyük could have played a particular role in trade or communication networks, due to the importance of equid remains and the rare but significant presence of camel bones, will be addressed.

c) Cervidae (deer)

Deer are represented in the assemblages of the present study by two species, the red deer (*Cervus elaphus*) and the Mesopotamian fallow deer (*Dama mesopotamica*). No roe deer (*Capreolus capreolus*) specimen was identified. This small species is, however, attested at nearby sites of Neo-Assyrian Ziyaret Tepe (at least two remains, Matney et al., 2009), Neolithic Salat Camii Yanı (one specimen, Miyake et al., 2009) and Epipaleolithic Hallan Çemi (seven remains, Starkovich and Stiner, 2009). Although roe deer remains can be difficult to identify with certainty in fragmented assemblages, it seems to be a rare component of faunal assemblages in the Upper Tigris region. For some remains (e.g. antler fragments but also some long bones fragments) it was not possible to sort the red deer from the Mesopotamian fallow deer. For this reason a category Cervidae, including both species, is present in the different tables.

(1) Cervus elaphus (red deer)

Red deer is the largest game available in the area³⁶. The species is encountered in every single assemblage, which is not the case for the other wild mammals. It can therefore be considered as an important component of the landscape in the periods considered and in some assemblages an important component of the exploited fauna. It appears that when the amount of wild mammals' remains represent over 5% of the corrNISP they belong in majority to the red deer (Fig. III.38). It is the game *par excellence*.

³⁶ Apart from lion and aurochs, rare and peculiar taxa.

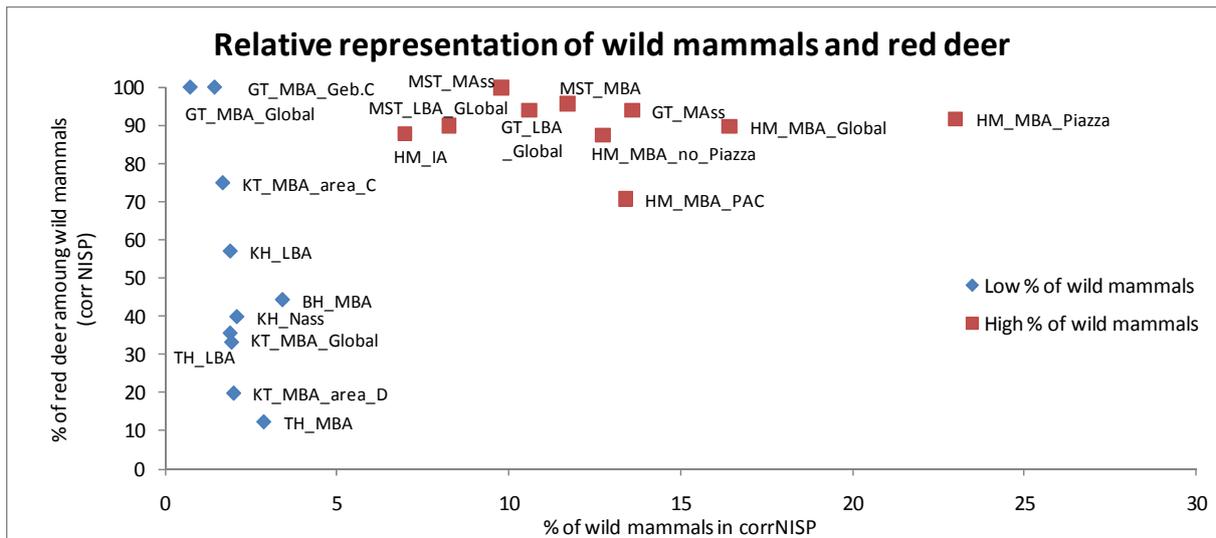


Figure III.38. Percentage of wild mammals and red deer in the assemblages (in corr. NISP).

(a) Kill-off pattern

The question of the age at death is difficult to deal with for red deer in these assemblages. The epiphyseal fusion method suffers here from the difficulty to assign to a species juvenile or sub-adult remains. When a comparative collection was not available, it was not always possible to sort the red deer from the Mesopotamian fallow deer and sometimes from the cattle. Using dental remains is also problematic. Even if red deer is the most common wild mammal, the number of remains is quite low in most of the assemblages and even more if only lower dental remains are considered. Therefore, only numbers of lower dental remains for each broad age group are shown. Interestingly, hunting targeted mostly two age groups: calves and old deer (Tab. III.5). A few remains also belong to adult individuals which are not as old as the main group. Age is approximate because the crown height method (Klein et al., 1981) requires population-specific regression equations (Steele, 2006: 126) which are not yet available for the *Cervus elaphus maral* population of the Middle East. However, remains are well clustered into younger and older groups. Calves were probably not as hunted as it looks like in the Table III.5. Some remains were older than 2 years (i.e. premolar and third molar) but could not be assigned to a precise age group. The important information here is that calves were not spared by the hunters. It has also to be noted that among adult deer the oldest were the most hunted.

<i>Cervus elaphus</i>	GT LBA MAss	HM MBA Piazza	HM MBA non Piazza	HM MBA PAC	HM IA	MST MBA	MST LBA global
approx. age in years	Number of lower dental remains						
<2	2	1	1	1	1		1
4-6				1	1		1
08-12	5	1	2	2	1	1	

Table III.5. Number of red deer lower dental remains of different age groups.

(b) Sex ratio

The hunters' interest for older deer raises the question of the sex ratio. Did hunters mainly target older male individuals for their large antlers? Establishing a sex-ratio for red deer in these

assemblages is also difficult due to small sample sizes. For instance, only one upper canine was found in the assemblages (Late Bronze Age global assemblage from Müslümantepe) and attributed to a female. The frontal bone of the skull also exhibits a clear sexual dimorphism but only a few of them were identified in the assemblages. In assemblages which yielded more than 25 deer remains, only one female frontal bone was found (Middle Bronze Age Piazza at Hirbemerdon Tepe) and 8 male frontal bones with a pedicle (one at Middle Bronze Age Müslümantepe, 2 at Middle Bronze Age Hirbemerdon Tepe outside the Piazza and 5 in the fill Posterior to the Architectural Complex). Some measurements taken on limb bones tend to show a high sexual dimorphism. A test on modern skeletons from the Zoology Institute comparative collection at CAU Kiel allowed the selection of the most sexually dimorphic measurements. These are the distal breadth (Bd) of the humerus, the breadth of the facies articularis distalis (Bfd) of the radius and the proximal breadth (Bp) of both the metacarpal and the metatarsal. Only 22 measurements could be gathered from the assemblages which have the highest number of red deer remains. It appears that they are globally equally spread between male (log ratio over 0) and female, but this is not the case for each assemblage (Fig. III.38). At Hirbemerdon Tepe, in the Middle Bronze Age assemblage (outside the Piazza) there are more male than female (1.7:1). It is exactly the reverse in the assemblage from the fill Posterior to the Architectural Complex.

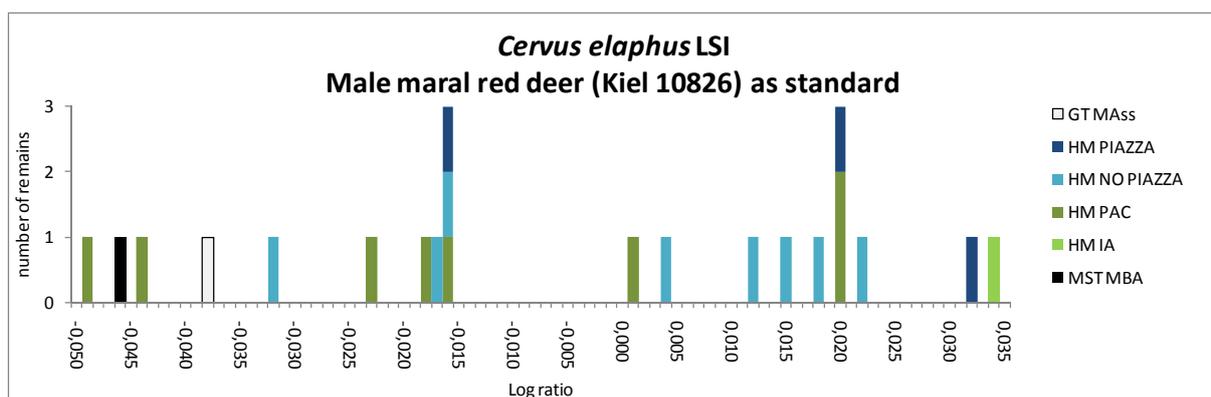


Figure III.38. Log Size Index for red deer remains with a male maral deer as standard.

No clear conclusion can be drawn from the red deer sex ratio, due to the low amount of remains attributed to male or female. Even if hunters of a specific period could have targeted more males or females, there is no evidence for the absence of the other sexual group.

(c) Skeletal representation

In the case of red deer exploitation, two questions are linked to the relative representation of different skeletal parts. Did the hunters bring back to the settlement the entire carcass or did butchery practices and therefore the selection of some parts of the animal already occur in the field? The other question is did they sort the consumption of red deer meat on one side from the use of peculiar products such as antler or pelt? The limited size of the red deer assemblages does not allow a very reliable estimation of the relative representation of a given skeletal part (Fig. III.39-45). A few general assertions can, however, be made. The Middle Assyrian assemblage from Giricano (Fig. III.39) has a very low ratio MNI:MNE. It is also different from the other assemblages, due to the absence of many skeletal elements. Except for the radius, the other skeletal elements belong to the cranial skeleton and to the foot. It is not the kind of skeletal representation which is expected from consumption refusals. It would correspond rather to butchery refusal or to pelts and trophies.

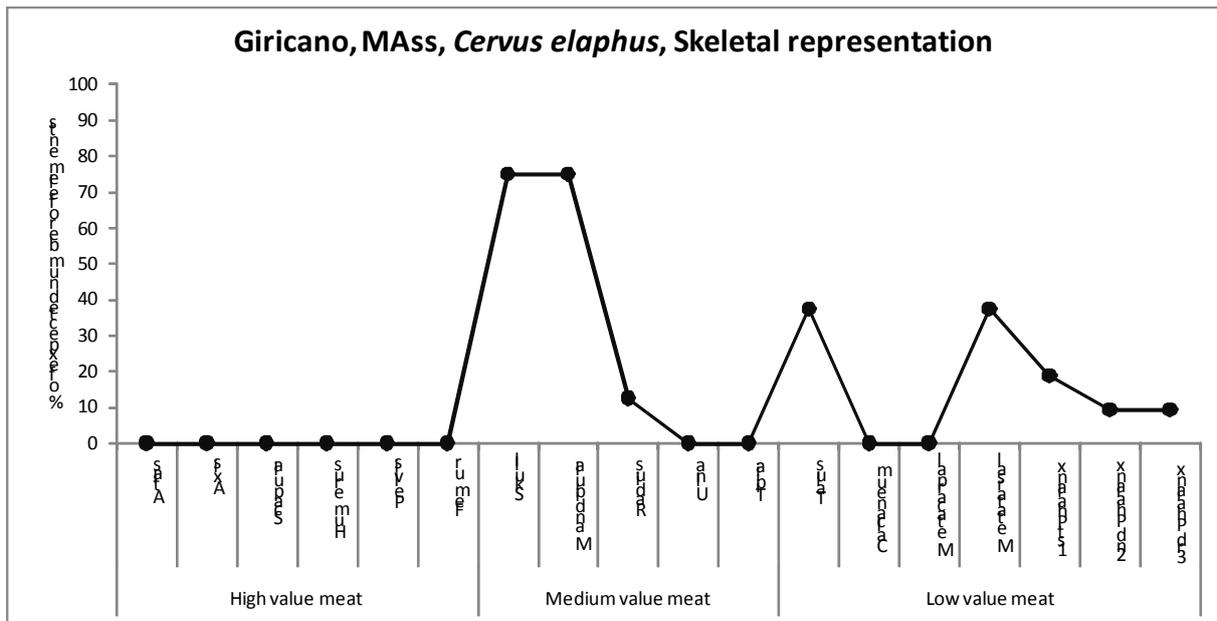


Figure III.39. Skeletal representation for red deer in the Middle-Assyrian assemblage from Giricano (MNI=4, 31 elements).

At Hirbemerdon Tepe and Müslümantepe there are fewer discrepancies between the relative representations of the different skeletal elements. It can be noted that the assemblage with the highest relative representation of high value meat comes from the Piazza at Hirbemerdon Tepe. In Middle Bronze Age Hirbemerdon Tepe (during and after the use of the Architectural Complex) the average number of elements is theoretical quite high-between 16 and 22. On the contrary, as in Giricano, at Müslümantepe assemblages each red deer individual is theoretically represented by less than 10 elements.

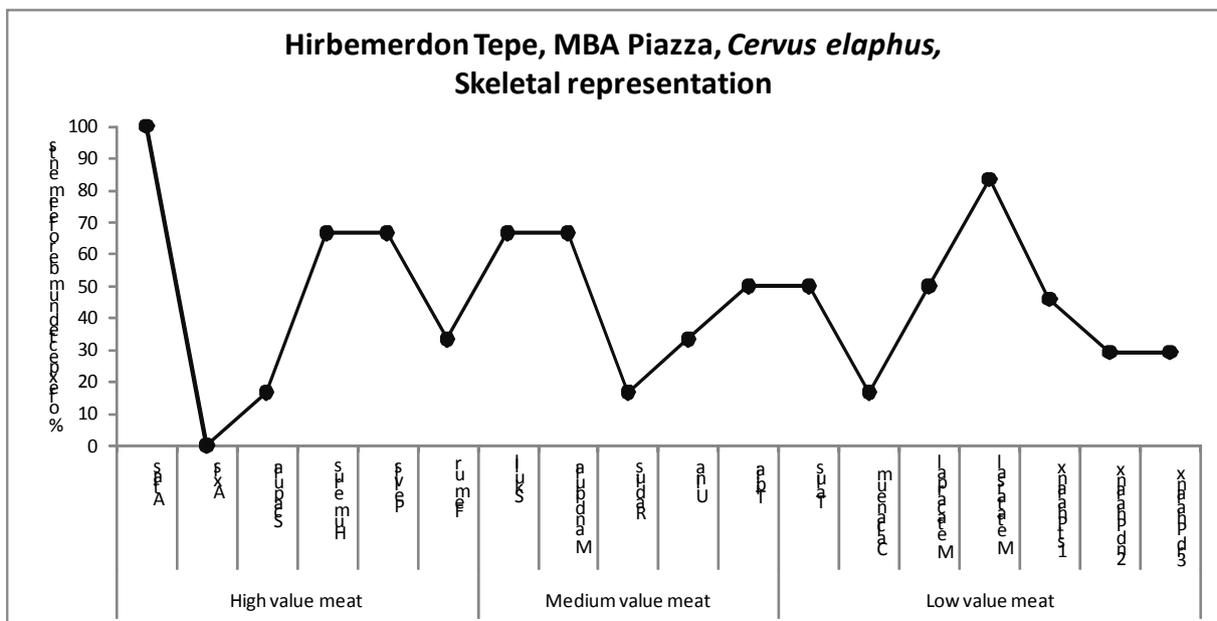


Figure III.40. Skeletal representation for red deer in the Middle Bronze Age Piazza assemblage from Hirbemerdon Tepe (MNI=3, 65 elements).

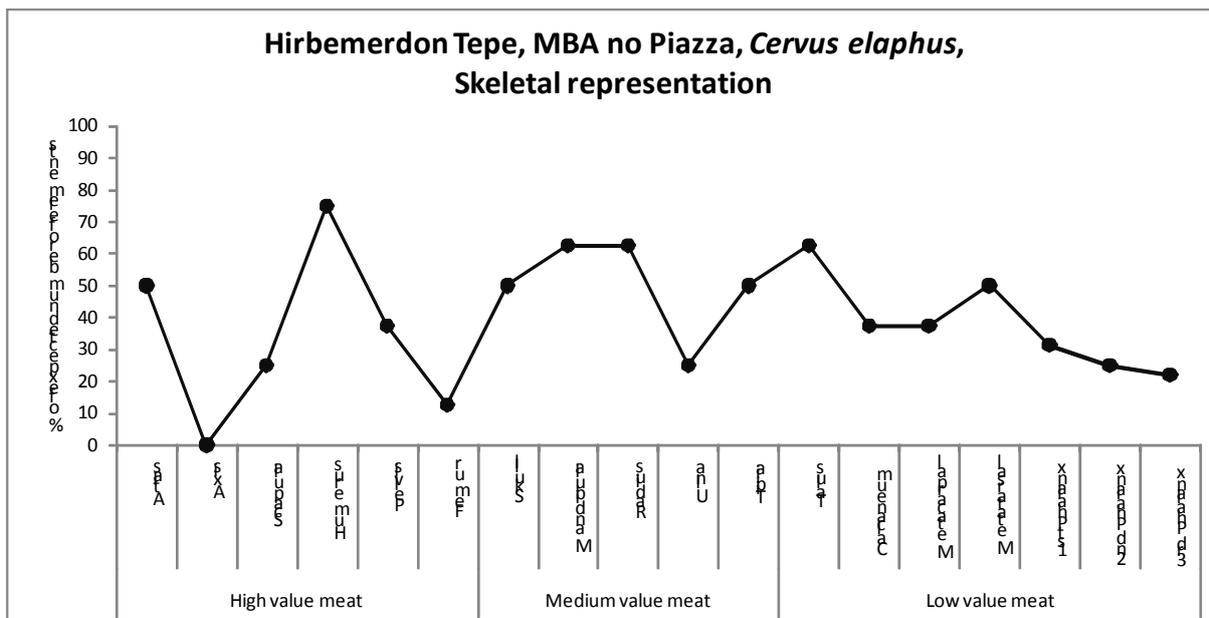


Figure III.41. Skeletal representation for red deer in the Middle Bronze Age assemblage from Hirbemerdon Tepe outside of the Piazza (MNI=4, 74 elements).

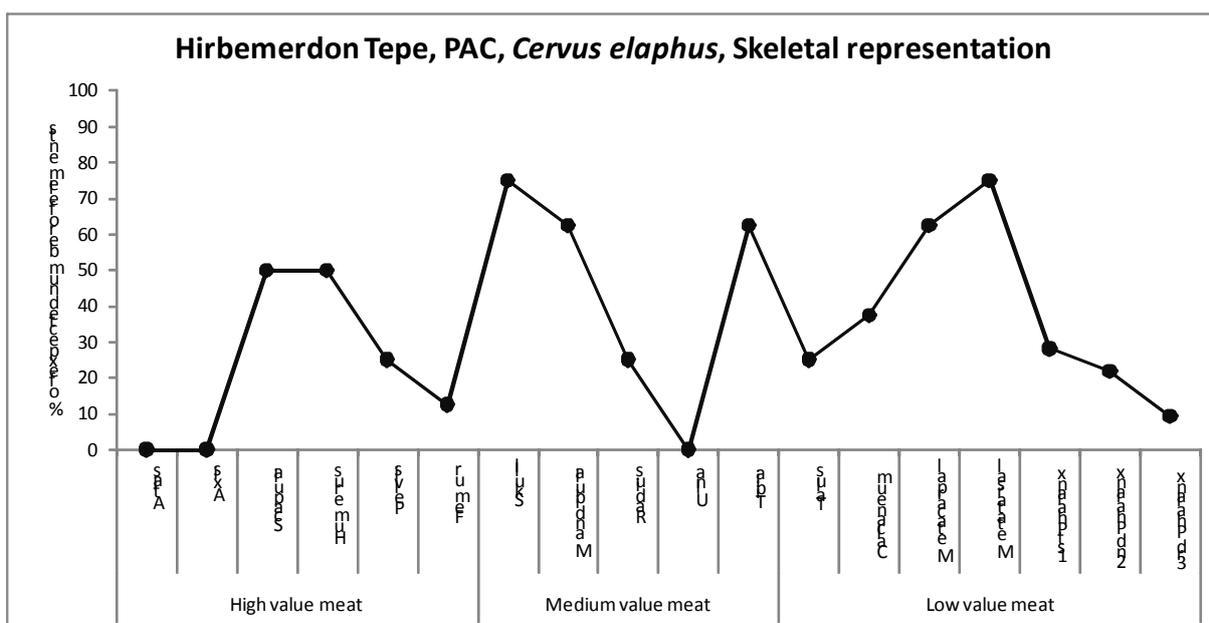


Figure III.42. Skeletal representation for red deer in the Middle Bronze Age assemblage from Hirbemerdon Tepe Posterior to the Architectural Complex (MNI=4, 64 elements).

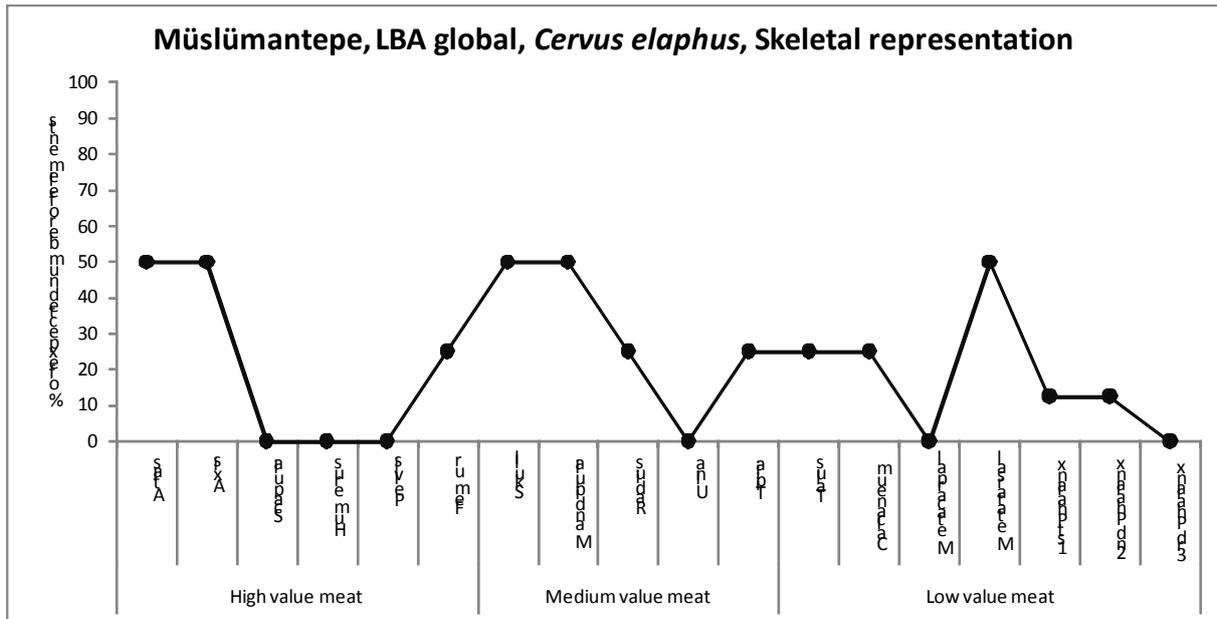


Figure III.45. Skeletal representation for red deer in the Late Bronze Age assemblage from Müslümantepe (MNI=2, 17 elements).

(d) Butchery

Some red deer remains in the assemblages exhibit cut and chop marks (Table III.6). Except for the Middle Bronze Age assemblage from Giricano, they all come from the assemblages which yielded the highest numbers of red deer remains. For the large red deer assemblages, the percentage of remains exhibiting cut or chop marks is around 1. The percentage is higher (around 4) in smaller assemblages. The difference is probably due to the size of the assemblages and not to different butchery practices in the smallest assemblages. The most common bones with cut marks are the talus and phalanges. For the talus it could be the evidence for the removing of the legs which are poor in meat. Skinning is also indicated by cut marks on phalanges.

<i>Cervus elaphus</i> number of bones with cut marks	GT MBA	GT LBA MAss	HM MBA Piazza	HM MBA non Piazza	HM MBA PAC	HM IA	MST MBA	MST LBA global
Mandibula					1			
Atlas			1					
Axis								1
Vt		1						
Hm			1	1			1	
Rd	1	1						
Mc					1			
Vestigial Mc		1						
Patella						1		
Talus		2	2	2				
Calcaneus				1	1			
Mt			1					
Ph1		1		1	2			1
Ph2			1	2	1			1
Total bone with cut marks	1	6	6	7	6	1	1	3
%red deer NISP with cut marks	100	2.1	1.1	1.1	1.3	3.3	4.3	3.7
Total red deer corrNISP	1	48	91	89	77	30	23	27

Table III.6. Distribution of red deer remains exhibiting cut or chop marks.

(e) Pathologies

Three red deer bones exhibit pathological marks. They all come from the Late Bronze Age layers at Müslüman Tepe. One calcaneus, one first phalanx and one proximal metatarsal exhibit exostoses. It might be linked to the selection of older individuals.

(f) Antler as raw material

Antler is a valuable raw material and is found in most of the assemblages (Tab. III.7). It can be noted that shed and unshed antlers are only encountered in assemblages where red deer remains are common (more than 5% of the corrNISP). Unshed antlers prove that male deer carcasses were brought back to the settlement. On the contrary shed antlers do not necessitate actually hunting red deer but are collected in the fields during spring time. The finding of shed antlers suggests that this raw material had a value which made it worth collecting shed antlers when male deer did not bear any antler. Shed antler can also be good for trade. However, considering that shed antlers come from assemblages where wild resources are common, it is unlikely that shed antler was not a local resource.

<i>Cervus elaphus</i> and Cervidae (except <i>Dama mesopotamica</i>)			Shed antler (with burr)	Unshed antler (with pedicle)	Other antler fragments	TOTAL
GT	MBA	Geb. C			2	2
GT	LBA	global	1		9	10
HM	MBA	Piazza			4	4
HM	MBA	non Piazza	2	2	13	17
HM	MBA	PAC	1	5	9	15
HM	IA				4	4
KH	LBA				3	3
KT	MBA	area D			1	1
MST	MBA				5	5
MST	LBA	global		1	2	3
TH	MBA				2	2
TH	LBA				2	2
TOTAL			4	8	56	68

Table III.7. Shed, unshed and other antler remains. Red deer and unidentified large deer (except Mesopotamian fallow deer).

The presence of antler remains raises the question of the use of this raw material. Around 28% of the antler remains were modified by humans (Tab. III.8). Most of them were chopped (Fig. III.46 left) to detach the beam or a tine. A few saw marks also attest workshop activities (Fig. III.46 right). However, artefacts are mostly missing in the assemblage. This is partly due to the practice in Turkey of selecting the artefacts from the archaeological excavations to keep them in a museum. Therefore, objects made from material of animal origin are extracted from the faunal remains and not easily accessible to the zooarchaeologist. Bone and antler projects were in any case not the subject of this study. The only two antler remains considered as artefacts are a little plaque from Late Bronze Age Türbe Höyük and in Middle Bronze Age (outside of the Piazza) Hirbemerdon Tepe, an end of tine polished in a rounded shape.

<i>Cervus elaphus</i>			Chopped	Sawed	Cut	Artefact	TOTAL
antler fragment with saw, chop, cut or work marks							
GT	MBA	Geb. C	1				1
GT	LBA	MAss		2			2
HM	MBA	Piazza	2				2
HM	MBA	non Piazza	1	1		1	3
HM	MBA	PAC	5	1			6
KH	LBA		1		1		2
MST	LBA	global	1				1
TH	MBA		1				1
TH	LBA					1	1
TOTAL			12	4	1	2	19

Table III.8. Chop, saw, cut and work marks on antler in number of remains.



Figure III.46. Red deer antler exhibiting chop (left, HM00682)) and saw (right, HM00680) marks.

(2) *Dama mesopotamica* (Mesopotamian fallow deer)

Mesopotamian fallow deer are much rarer than red deer but, however, not completely absent from the Upper Tigris region. In the sites considered here, Mesopotamian fallow deer remains have been identified only at Hirbemerdon Tepe. In the nearby settlements, one specimen comes from Neo-Assyrian Ziyaret Tepe (Matney et al., 2009). In the Neolithic period, four Mesopotamian fallow deer remains were found at Körtik Tepe (Arbuckle and Özkaya, 2006: tab. 2) and six at Çayönü (Hongo and Meadow 2000: tab. 4a).

At Hirbemerdon Tepe five Mesopotamian fallow deer remains have been identified. In the Piazza assemblage, a proximal metacarpal has been sorted from the red deer remains due to its significantly smaller size. In the assemblage Posterior to the Architectural Complex, one distal tibia has also been identified due to its size. A shed antler, therefore not included in the corr.NISP, was recovered in the same assemblage (Fig. 47). In the Iron Age assemblage, Mesopotamian fallow deer remains are represented by a distal tibia and a talus. The talus presents the morphological criteria described by A. Lister (1996). The talus exhibits cut marks across its medial face.



Figure III.47. Mesopotamian fallow deer shed antler from the layer Posterior to the Architectural Complex at Hirbemerdon Tepe (HM01982).

d) Bovidae (bovids)

(1) *Bos taurus* (cattle)

As part of the domestic “triad”, cattle remains are frequent in every single assemblage. The largest domestic mammal available (as described above camel is not a common domestic mammal) provides meat and milk in large quantities. It can be also used as a draught animal.

(a) Kill-off pattern

Cattle dental remains are very rare in the assemblages and therefore the kill-off patterns were built using 11 dental remains in the best case. Therefore, the analytical value of these kill-off patterns based on dental remains is quite low. Ageing data using epiphyseal fusions are supported in most cases by a higher number of remains and therefore are thought to be more reliable. They will be presented here by assemblage and compared to data yielded from dental remains when necessary.

At Middle Bronze Age Başur Höyük, almost all remains belong to individuals older than three years’ old (Fig. III.48). Because of the very small number of remains in the last fusion group, it is not possible to estimate the slaughtering strategy for cattle older than four years. No lower dental remains (n=4) belong to individuals younger than four years old.

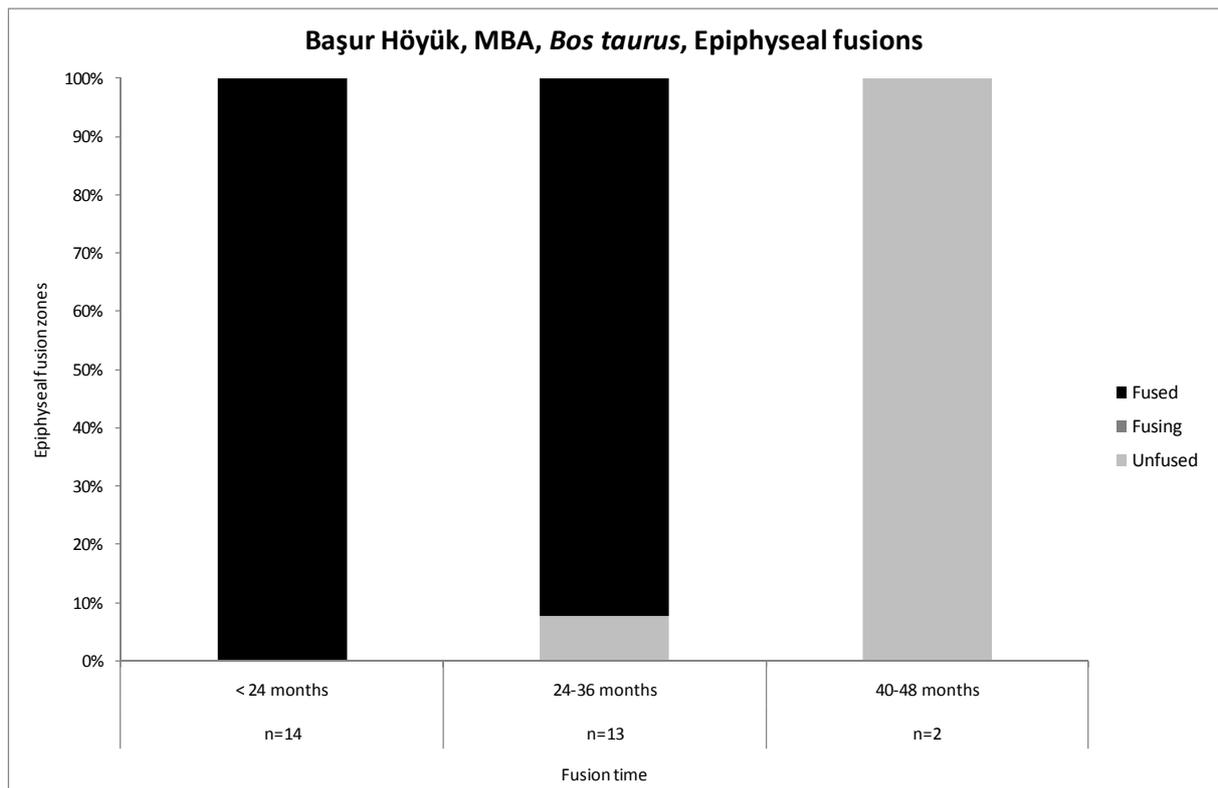


Figure III.48. Relative representation of fused, unfused and fusing cattle epiphysis according to the fusion time. Middle Bronze Age layers at Başur Höyük.

At Giricano only the Middle-Assyrian assemblage yielded some data. One remain belongs to an animal slaughtered before two years old while only 30% of the remains belong to individuals who survived after three years old (Fig. III.49).

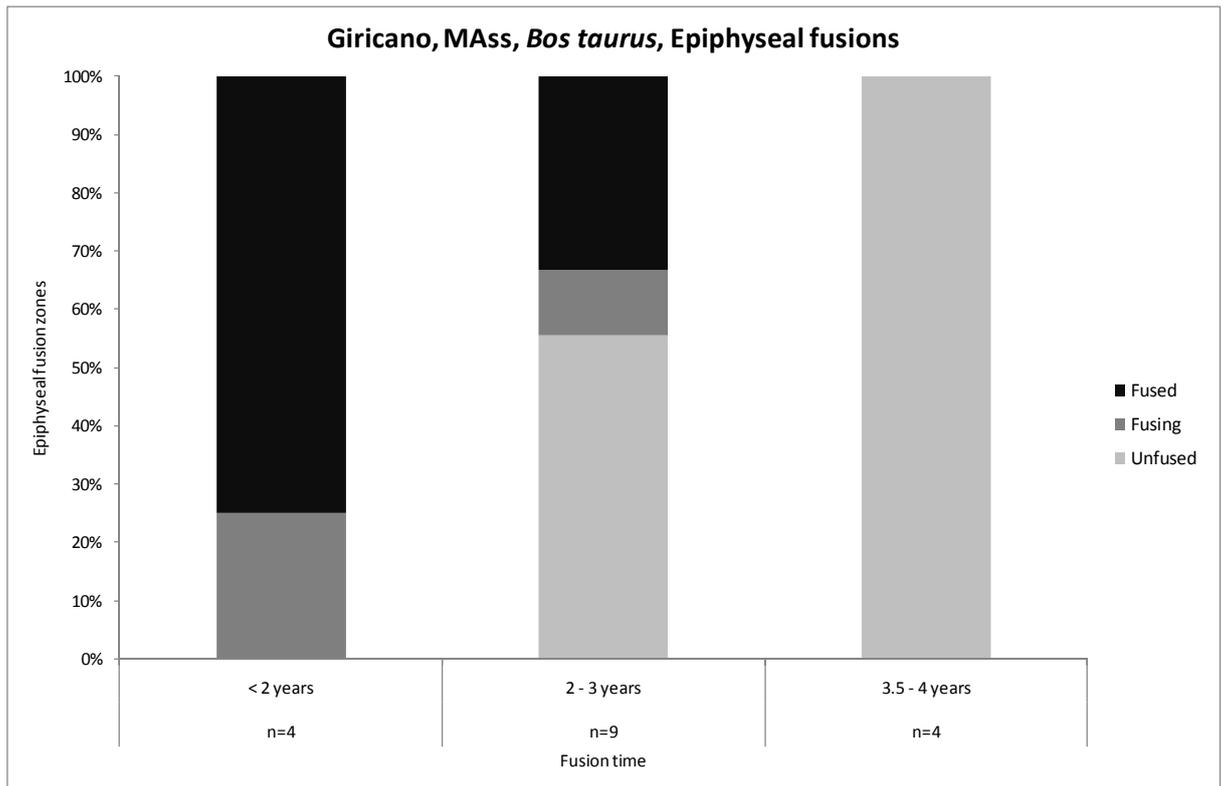


Figure III.49. Relative representation of fused, unfused and fusing cattle epiphysis according to the fusion time. Middle-Assyrian layers at Giricano.

Hirbemerdon Tepe assemblages are among the larger ones. During the Middle Bronze Age, the situation is slightly different in the Piazza and in the other contexts. In the Piazza, only older individuals were selected (Fig. III.50). There is no evidence for cattle younger than 3 years old. Due to the limited number of remains it is not possible to know the selection pattern for cattle older than three years old. In the other Middle Bronze Age contexts there is a slight tendency to slaughter younger animals. It appears that 60% of the remains belong to individuals slaughtered before four years old (Fig. III.51). In the fill Posterior to the use of the Architectural Complex (Fig. III.52), the situation is closer to the one of the Middle Bronze Age layers outside of the Piazza. Fewer remains belong to individuals slaughtered before three years old. However, only 10% of the remains belong to individuals older than four years. The consumption was probably focussed on cattle aged between three and four years old. In the Iron Age (Fig. III.53) the pattern for animals younger than three years old is similar to the one known from the fill Posterior to the use of the Architectural Complex. Only 10% of the remains belong to animals younger than two years old and it appears that there was no consumption of animals between two and three years old. Due to the limited number of remains it is not possible to know the selection pattern for cattle older than three years old, even if all the remains of the last fusion group are unfused.

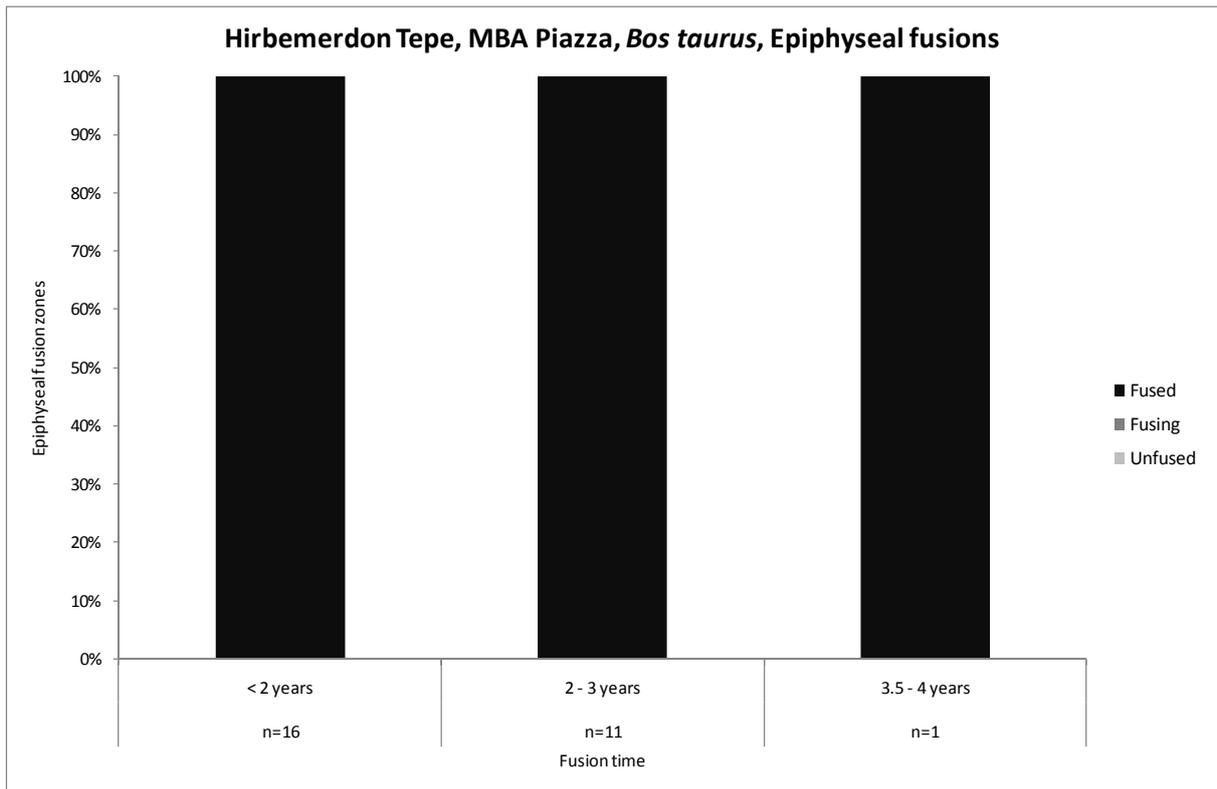


Figure III.50. Relative representation of fused, unfused and fusing cattle epiphysis according to the fusion time. Middle Bronze Age Piazza at Hirbemerdon Tepe.

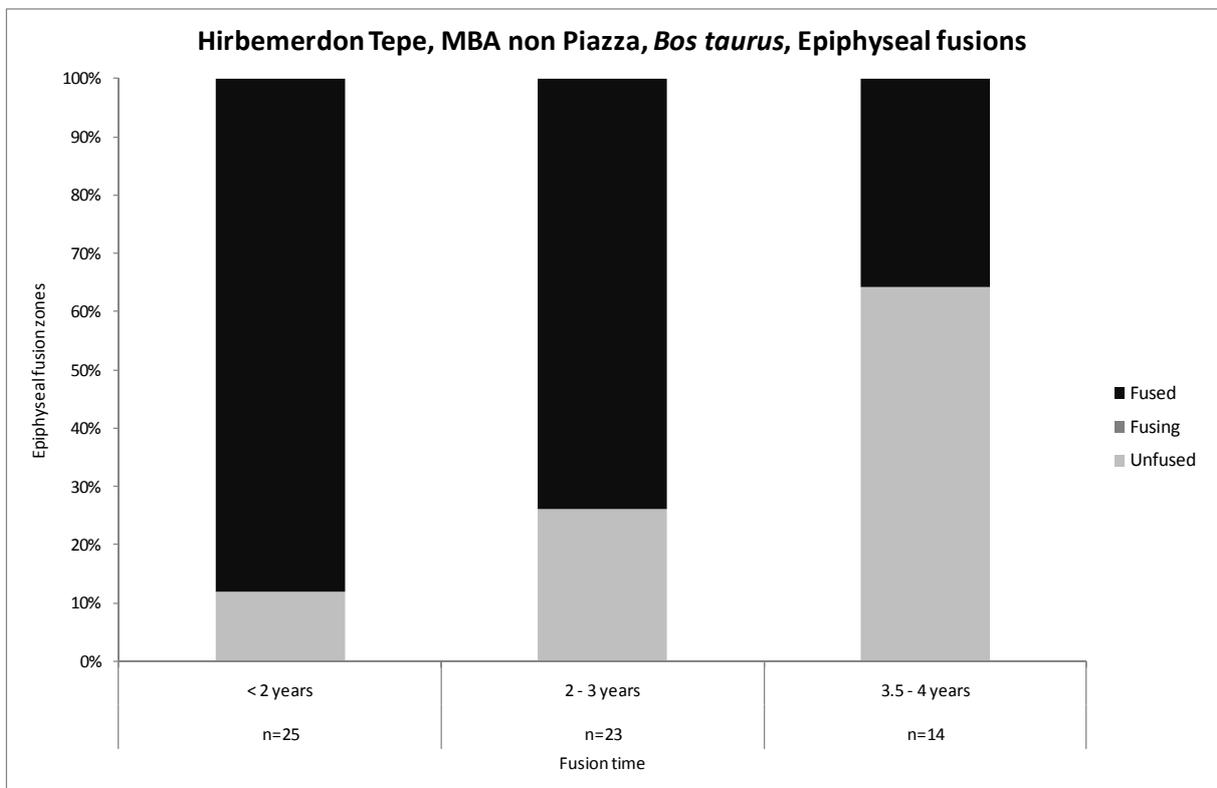


Figure III.51. Relative representation of fused, unfused and fusing cattle epiphysis according to the fusion time. Middle Bronze Age layers outside the Piazza at Hirbemerdon Tepe.

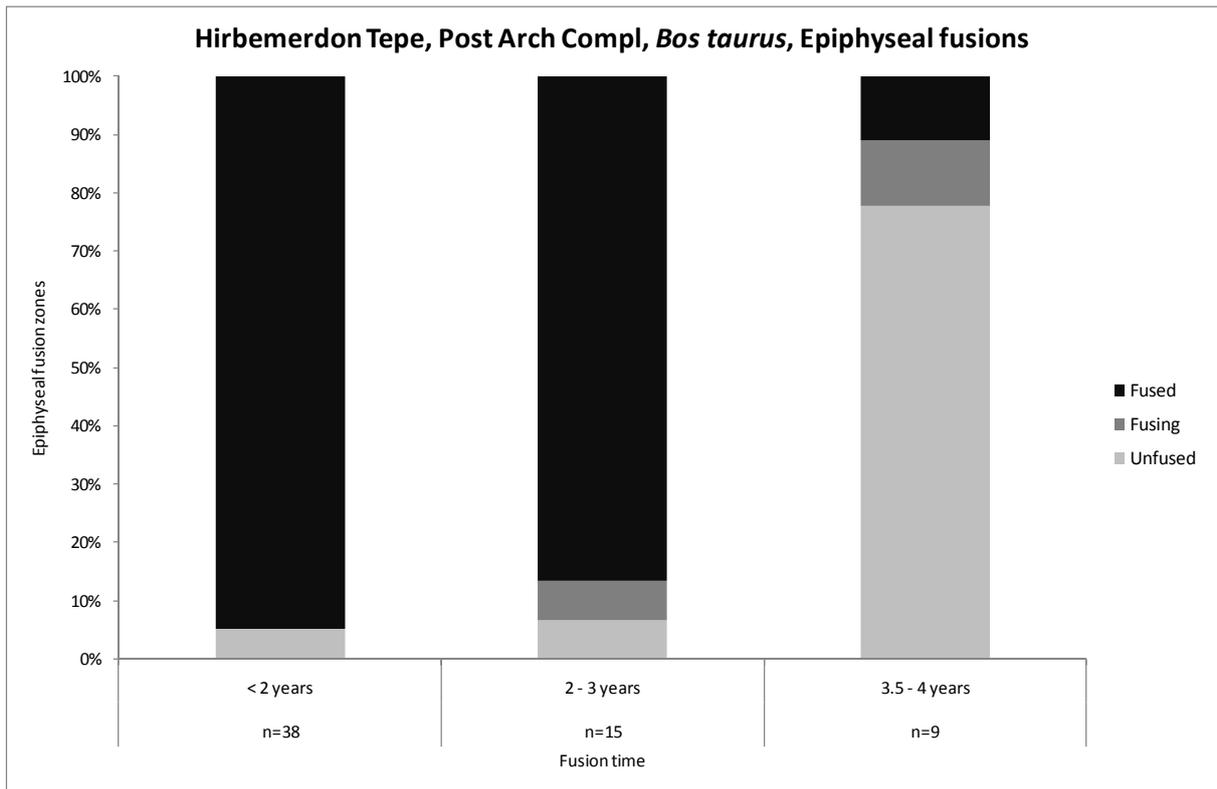


Figure III.52. Relative representation of fused, unfused and fusing cattle epiphysis according to the fusion time. Fill Posterior to the use of the Architectural Complex at Hirbemerdon Tepe.

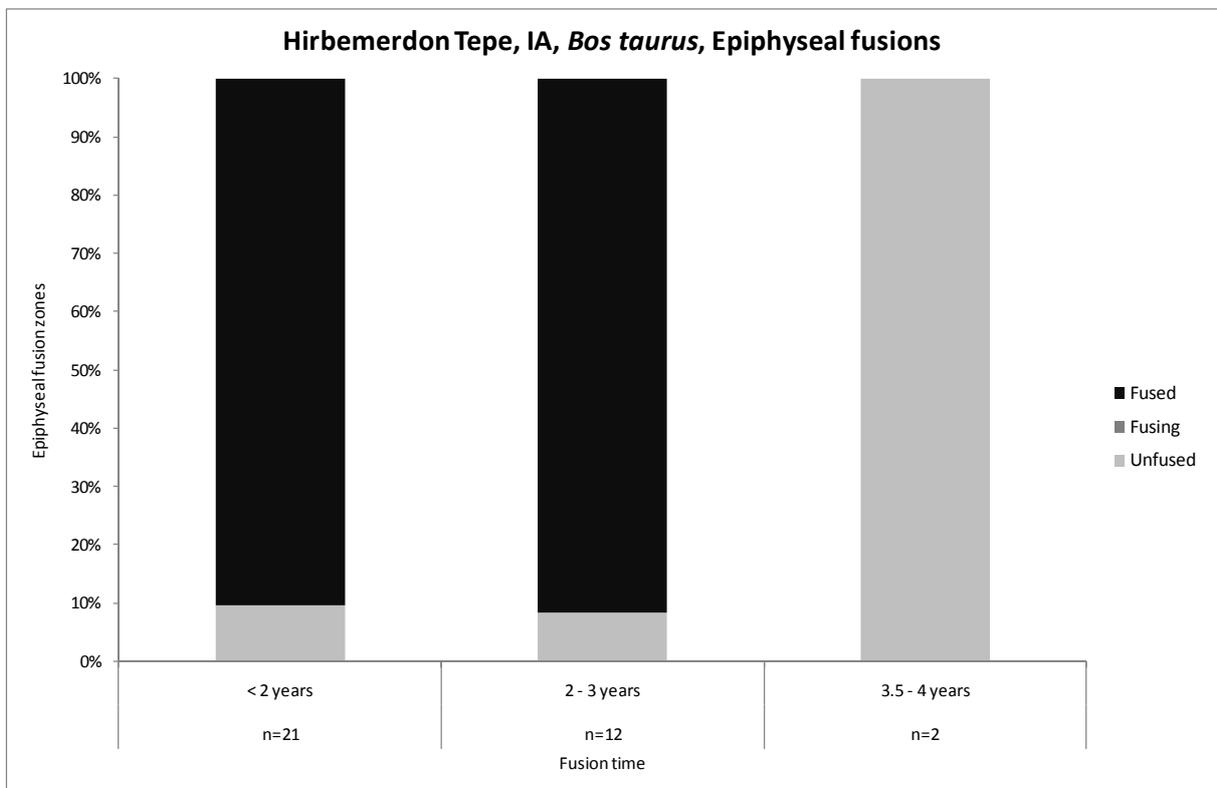


Figure III.53. Relative representation of fused, unfused and fusing cattle epiphysis according to the fusion time. Iron Age assemblage at Hirbemerdon Tepe.

At Kavuşan Höyük, both in the Late Bronze Age and Neo-Assyrian assemblages, there is no evidence of the consumption of cattle younger than three years old. In the Late Bronze Age (Fig. III.54) some 35% of the remains belong to individuals younger than four years old.

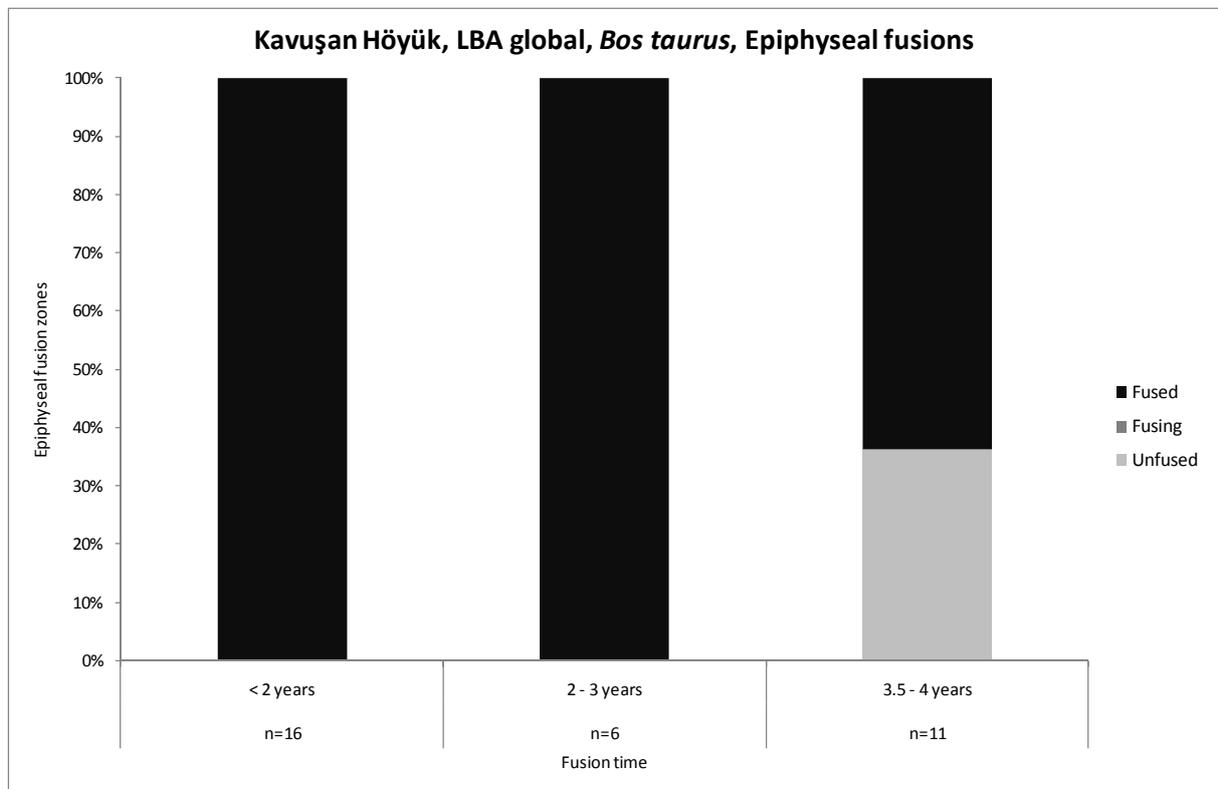


Figure III.54. Relative representation of fused, unfused and fusing cattle epiphysis according to the fusion time. Late Bronze Age assemblage at Kavuşan Höyük.

In the Neo-Assyrian assemblage (Fig. III.55) it seems that cattle were consumed between three and four years old but there are too few remains from the last fusion group to yield reliable information.

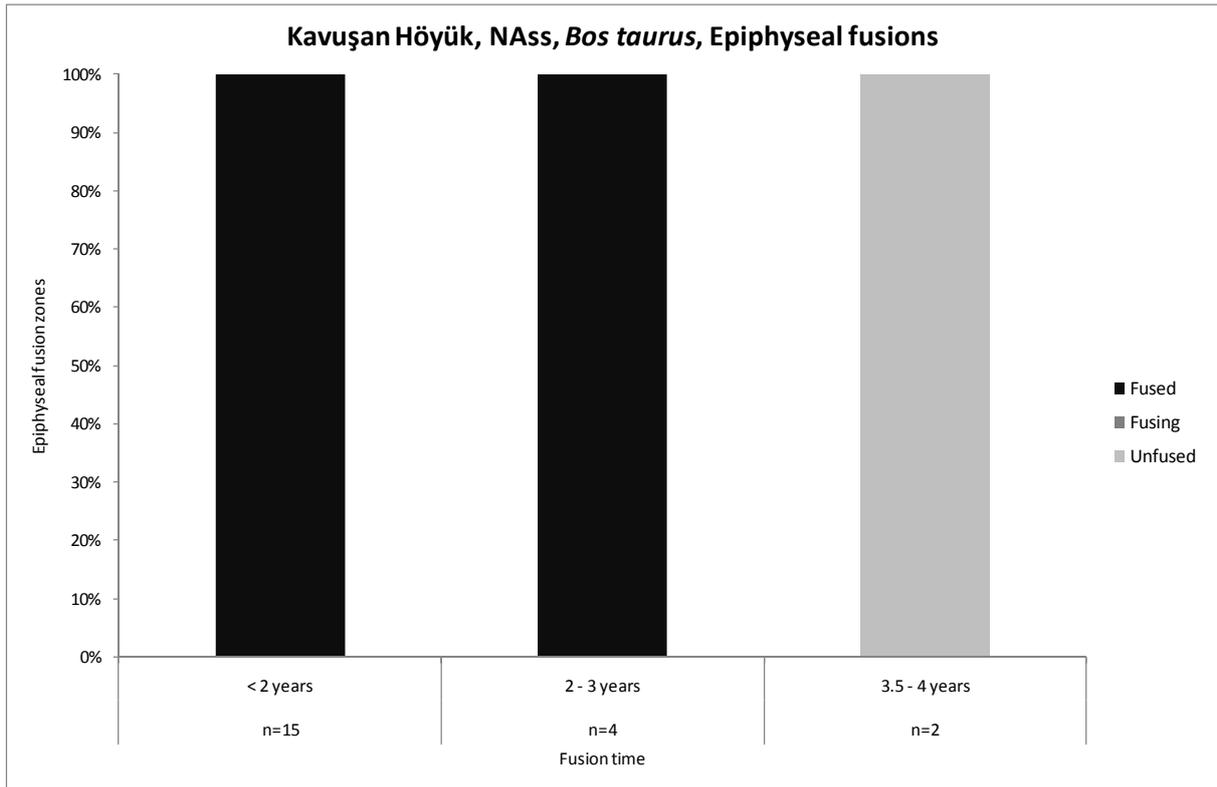


Figure III.55. Relative representation of fused, unfused and fusing cattle epiphysis according to the fusion time. Neo-Assyrian assemblage at Kavuşan Höyük.

At Middle Bronze Age Kenan Tepe, the pattern from the Area D assemblage presents anomalies probably due to a too low number of remains (Fig. III.57). Indeed, the high representation of animals younger than three years old does not appear in the last fusion group. The kill-off pattern built from dental remains shows that more than 75% of the remains from this assemblage belong to individuals younger than 6.5 years old. The slaughtering of older animals from 9 to 11.5 years old can also be noted (Fig. III.56).

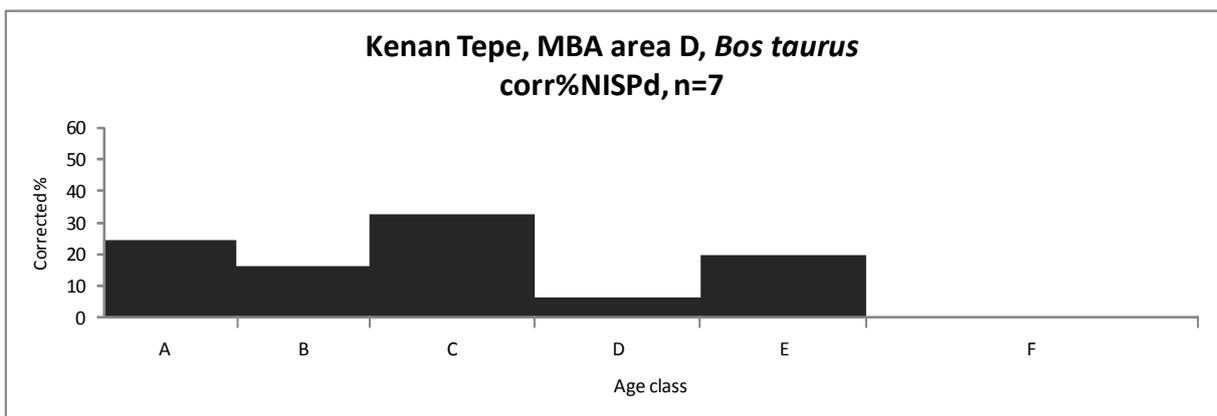


Figure III.56. Cattle kill-off pattern based on lower dental remains from the Area D at Middle Bronze Age Kenan Tepe. Age classes in years; A=0-2, B=2-4, C=4-6.5, D=6.5-9, E=9-11.5, F=11.5-16.5.

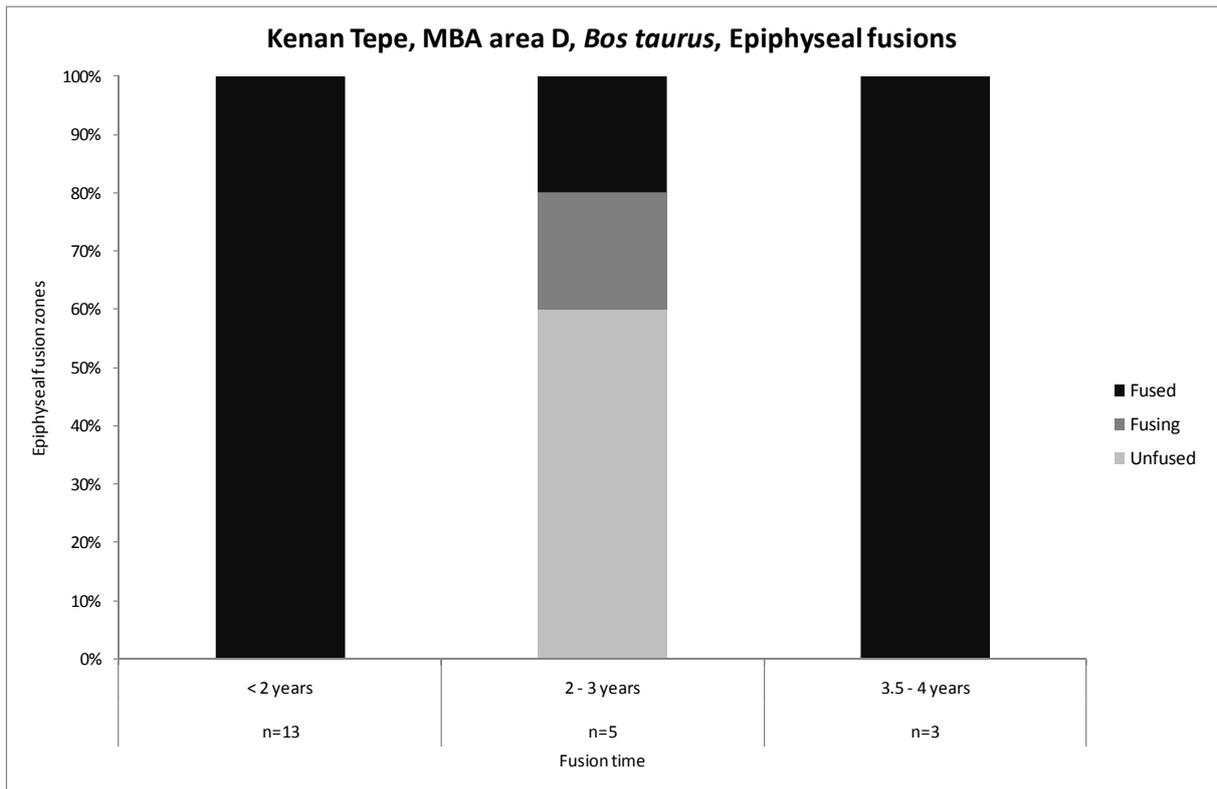


Figure III.57. Relative representation of fused, unfused and fusing cattle epiphysis according to the fusion time. Area D assemblage at Middle Bronze Age Kenan Tepe.

The pattern for the Area C (Fig. III.58) makes more sense. It is almost similar to the pattern done for the Middle Bronze Age (except Piazza) assemblage from Hirbemerdon Tepe (Fig. III.51). The number of remains is, however, limited.

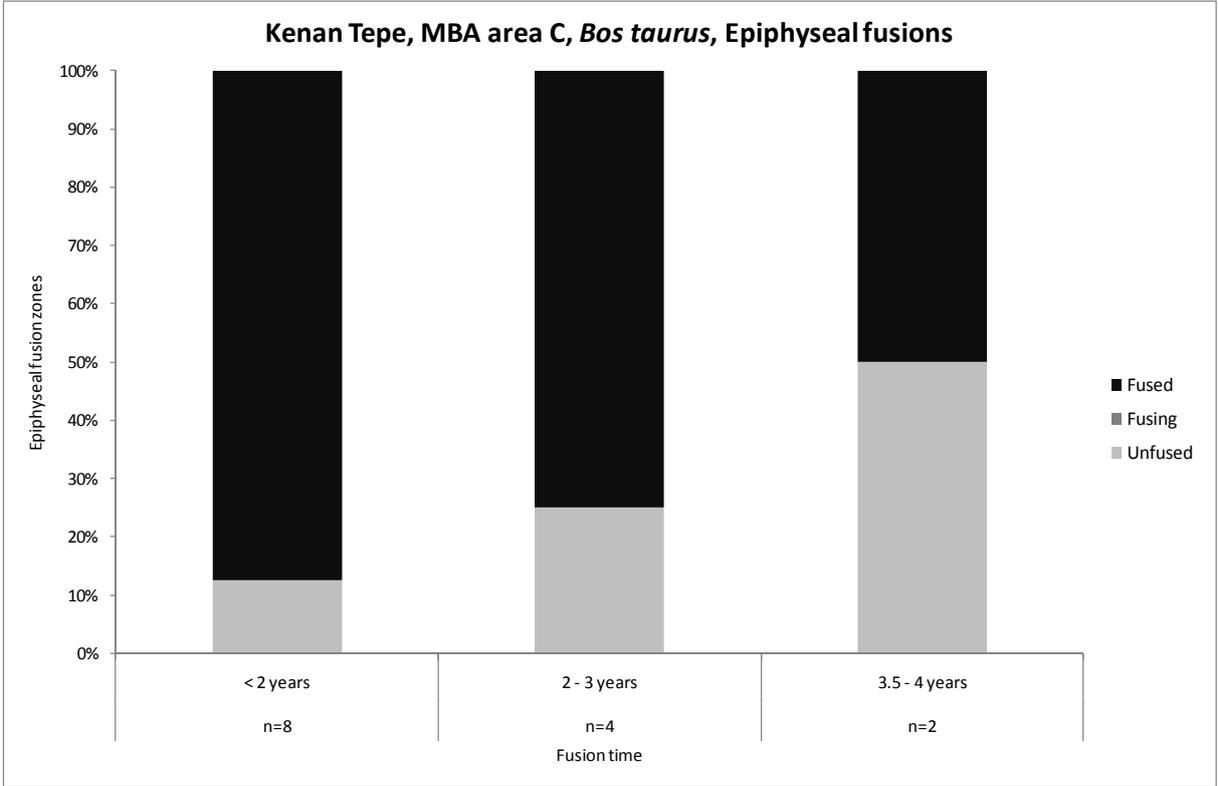


Figure III.58. Relative representation of fused, unfused and fusing cattle epiphysis according to the fusion time. Area C assemblage at Middle Bronze Age Kenan Tepe.

At Middle Bronze Age Müslüman-tepe (Fig. III.59), no specimen belong to cattle younger than two years old and only few cattle were consumed before three years old.

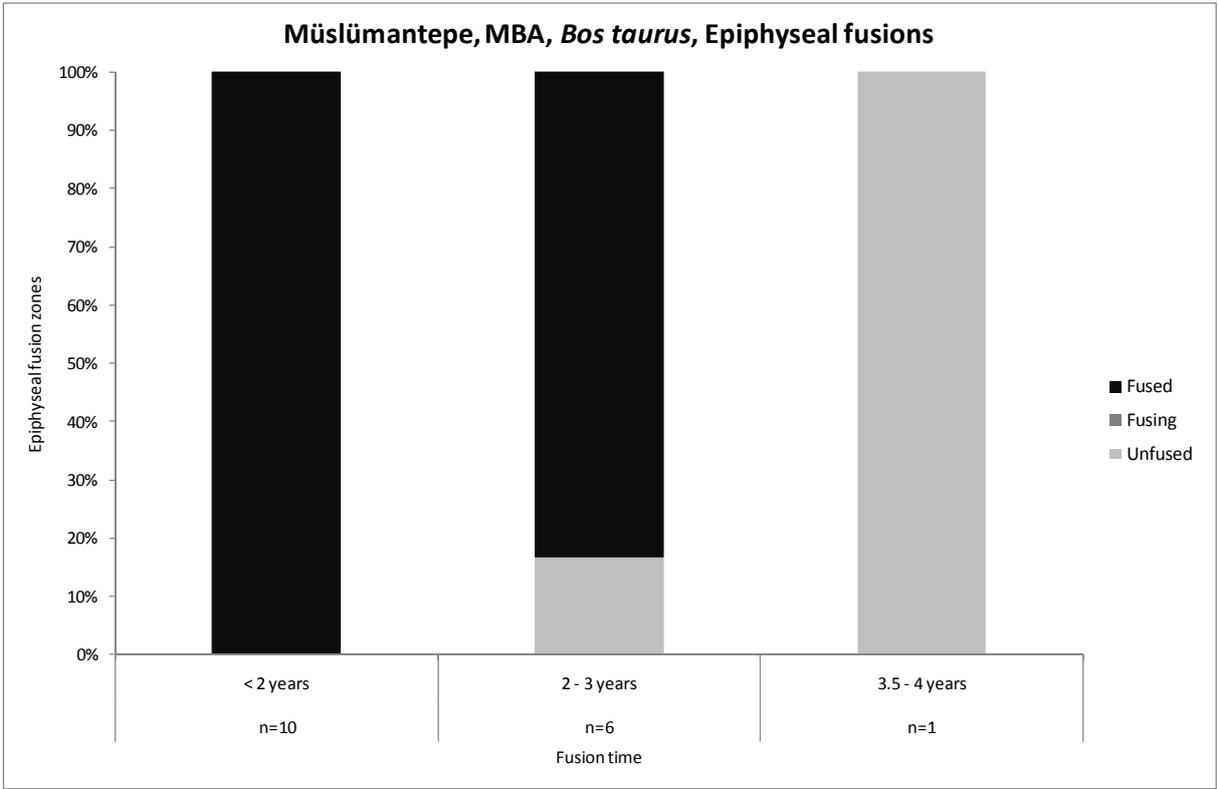


Figure III.59. Relative representation of fused, unfused and fusing cattle epiphysis according to the fusion time. Middle Bronze Age assemblage at Müslüman-tepe.

In the Late Bronze Age (Fig. III.60) more than 40% of the remains belong to animals younger than three years old and some 13% to animals younger than two years old.

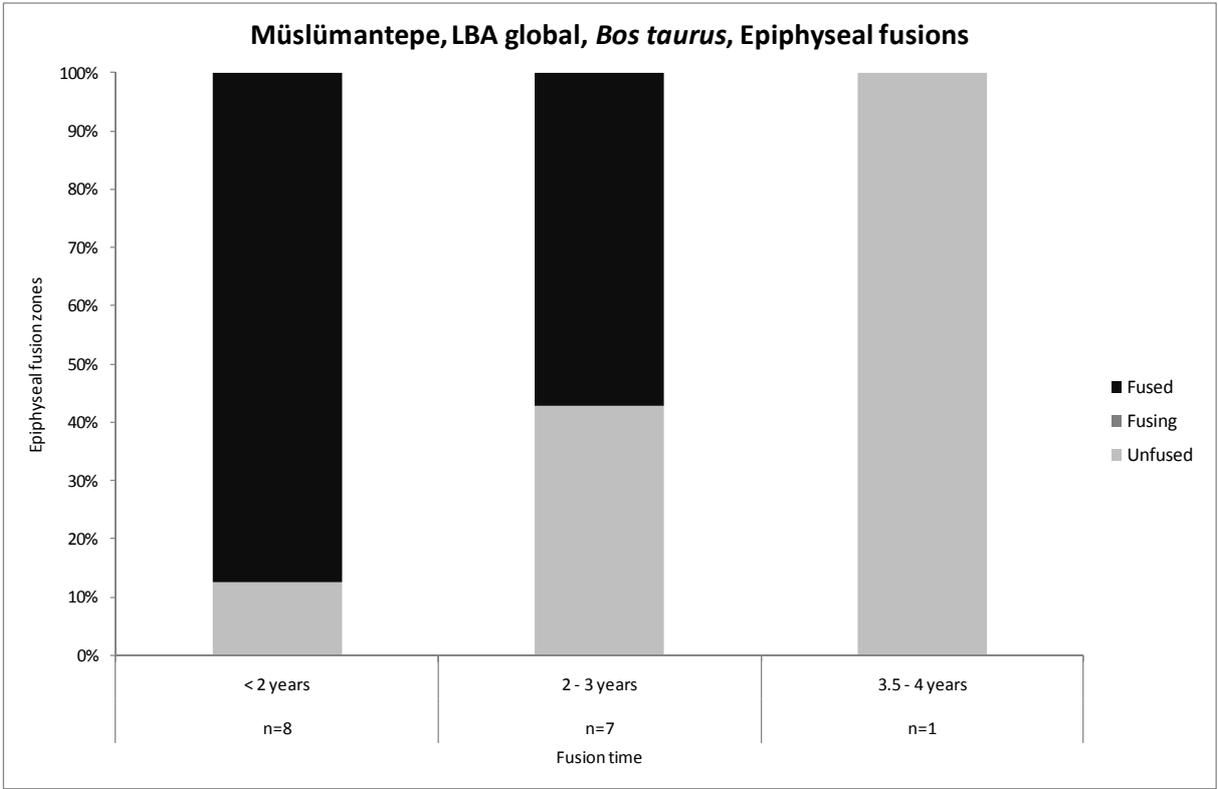


Figure III.60. Relative representation of fused, unfused and fusing cattle epiphysis according to the fusion time. Late Bronze Age assemblage at Müslümanentepe.

At Türbe Höyük, the pattern in the Middle Bronze Age (Fig. III.61) also presents an anomaly such as the assemblage from Area D at Kenan Tepe (Fig. III.57). Information for animals younger than three years old seems, however, reliable. The representation of animals younger than two years old is very limited. 20% of the remains belong to animals younger than three years old.

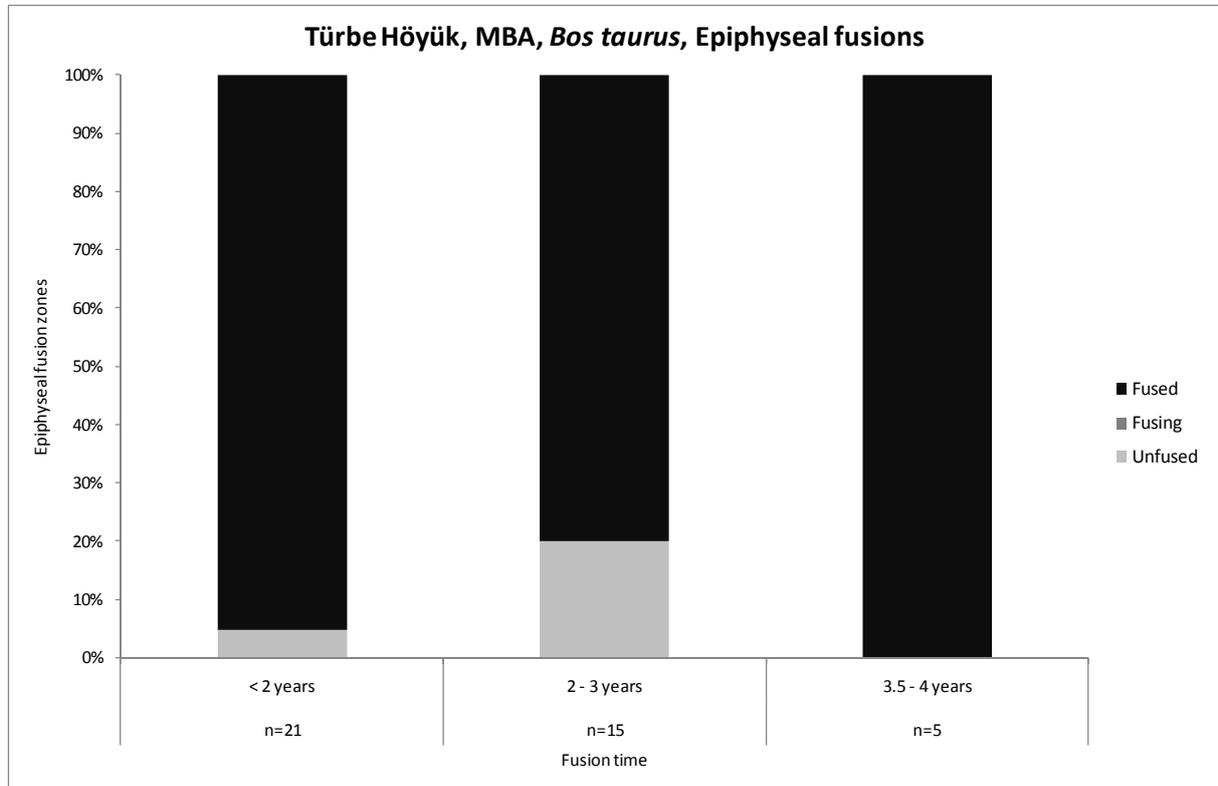


Figure III.61. Relative representation of fused, unfused and fusing cattle epiphysis according to the fusion time. Middle Bronze Age assemblage at Türbe Höyük.

In the Late Bronze Age assemblage, only the first fusion group is represented by enough remains (Fig. III.62). It appears that cattle younger than two years were not consumed.

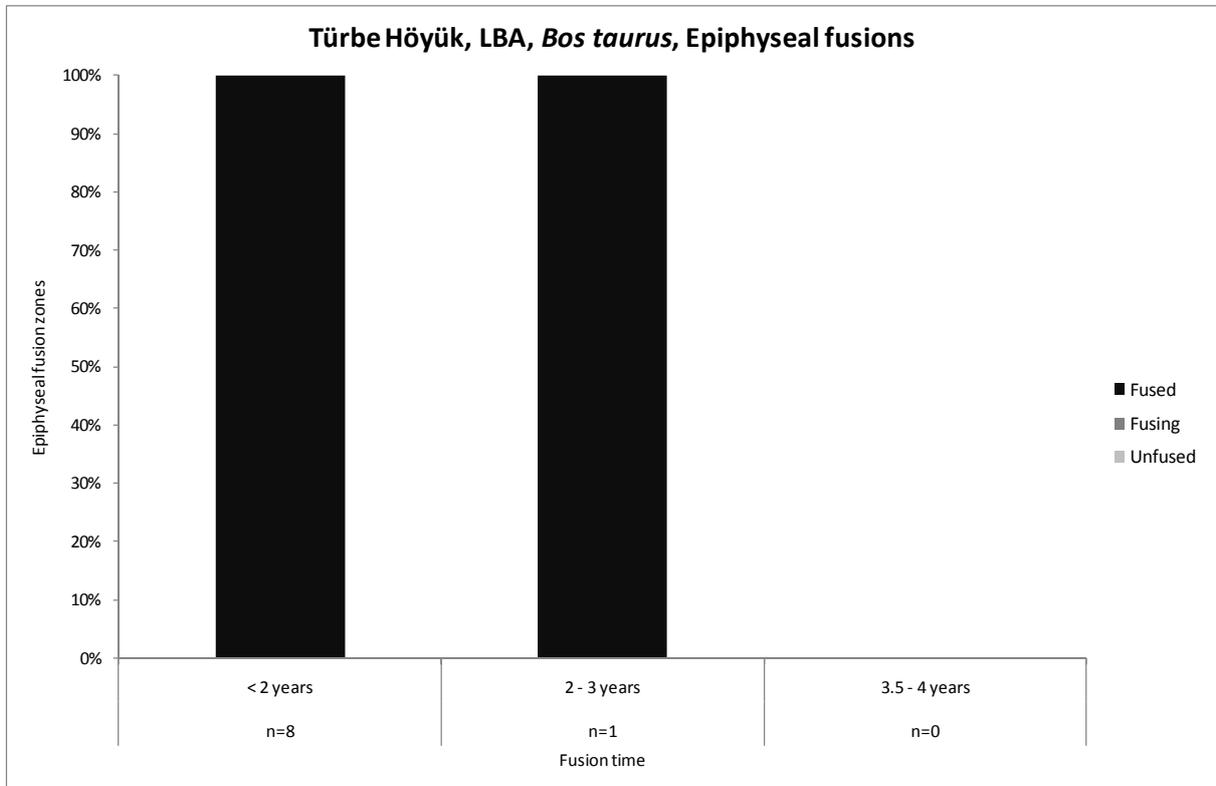


Figure III.62. Relative representation of fused, unfused and fusing cattle epiphysis according to the fusion time. Late Bronze Age assemblage at Türbe Höyük.

To summarize the ageing data, it has first to be noticed that, in most of the assemblages, it is not possible to analyze the kill-off patterns for animals older than three years old, due to the low number of remains in the last fusion group.

Concerning the two years' threshold, it appears that half of the assemblages do not contain remains of cattle younger than two years. In the other assemblages these remains represent from 5% to 12% of epiphyseal zones fusing before two years old. The only exception is the Middle-Assyrian assemblage from Giricano where 25% of the remains belong to individuals slaughtered around two years old.

For the three years threshold, fewer assemblages have a sufficient number of remains in this fusion group. The Piazza assemblage at Hirbemerdon Tepe has no unfused specimen in this group. At Middle Bronze Age Başur Höyük, the fill Posterior to the use of the Architectural Complex at Hirbemerdon Tepe and in the Iron Age assemblage at Hirbemerdon Tepe, remains younger than three years represent less than 10% in the second fusion group. At Middle Bronze Age (except the Piazza) Hirbemerdon Tepe and contemporary assemblage from Türbe Höyük, 20% and 25% of the remains belong to individuals younger than three years. They even reach 55% in the Middle-Assyrian assemblage from Giricano.

Only three assemblages provided enough remains for the last fusion group (around four years old). In the Late Bronze Age Kavuşan Höyük assemblage, 65% of the remains belong to individuals older than four years. On the contrary, in the two other assemblages, most of the remains belong to animals younger than four years. They represent 65% of the remains in the third fusion group in the Middle Bronze Age (except the Piazza) assemblage from Hirbemerdon Tepe, and 80% of the remains in the fill Posterior to the use of the Architectural Complex in the same site.

In most of the assemblages, cattle were not consumed younger than three years. However, in some cases described above, cattle were mainly consumed before they reached four years old. It is a clear selection of younger meat which does not allow using these individuals as draught animals or to produce milk or for reproduction in the case of females. Differences in the cattle kill-off pattern do not seem to be linked to the chronology. However, it is not clear which factor impacts the cattle kill-off pattern variability.

(b) *Skeletal representation*

Cattle skeletal elements are sorted in three groups according to the value of the meat attached to these bones (Fig. III.63-81). Definition of the high, medium and low value meat is given by H.-P. Uerpmann (1973).

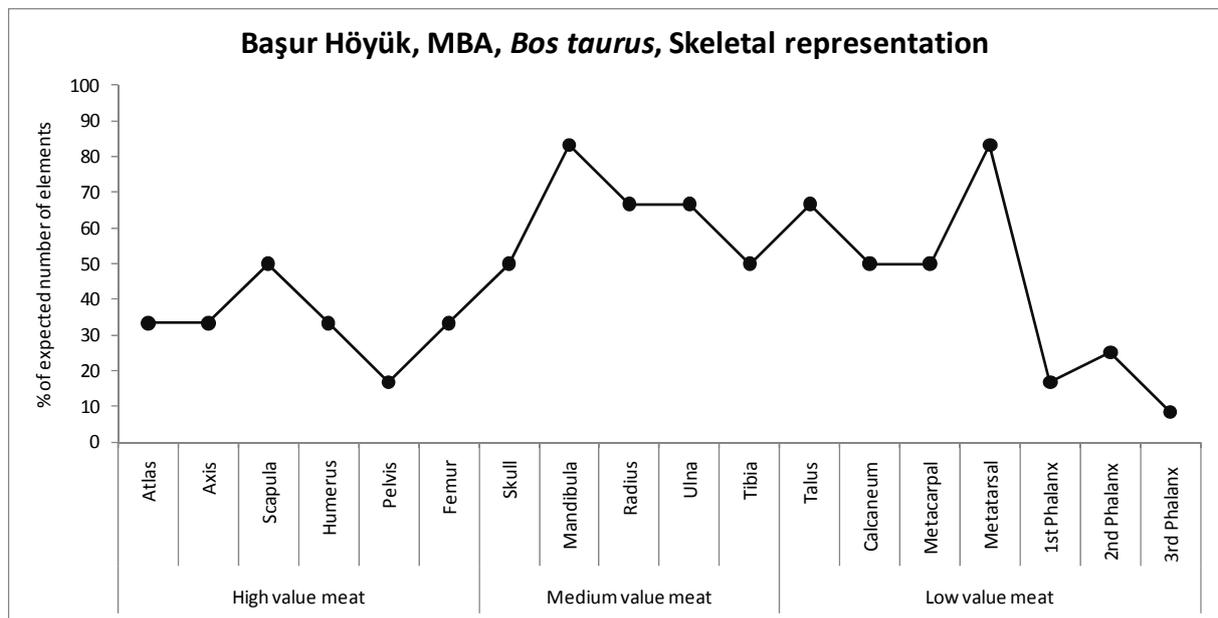


Figure III.63. Skeletal representation for cattle in the Middle Bronze Age assemblage from Başur Höyük (MNI= 3, 56 elements).

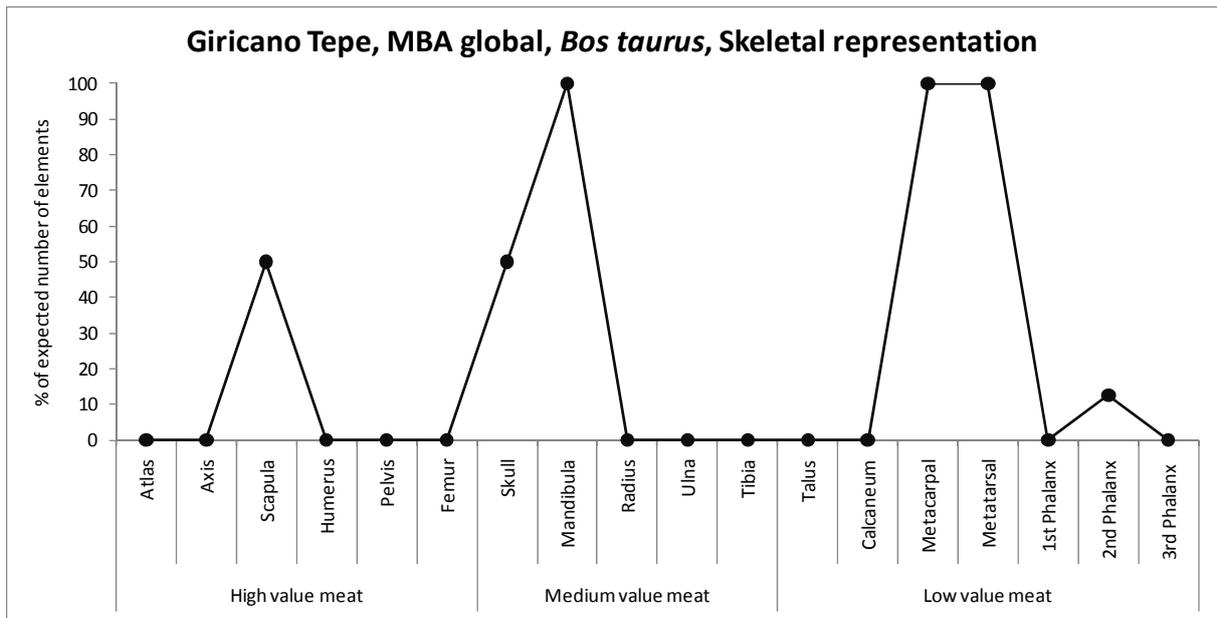


Figure III.64. Skeletal representation for cattle in the Middle Bronze Age assemblage from Giricano (MNI= 1, 9 elements).

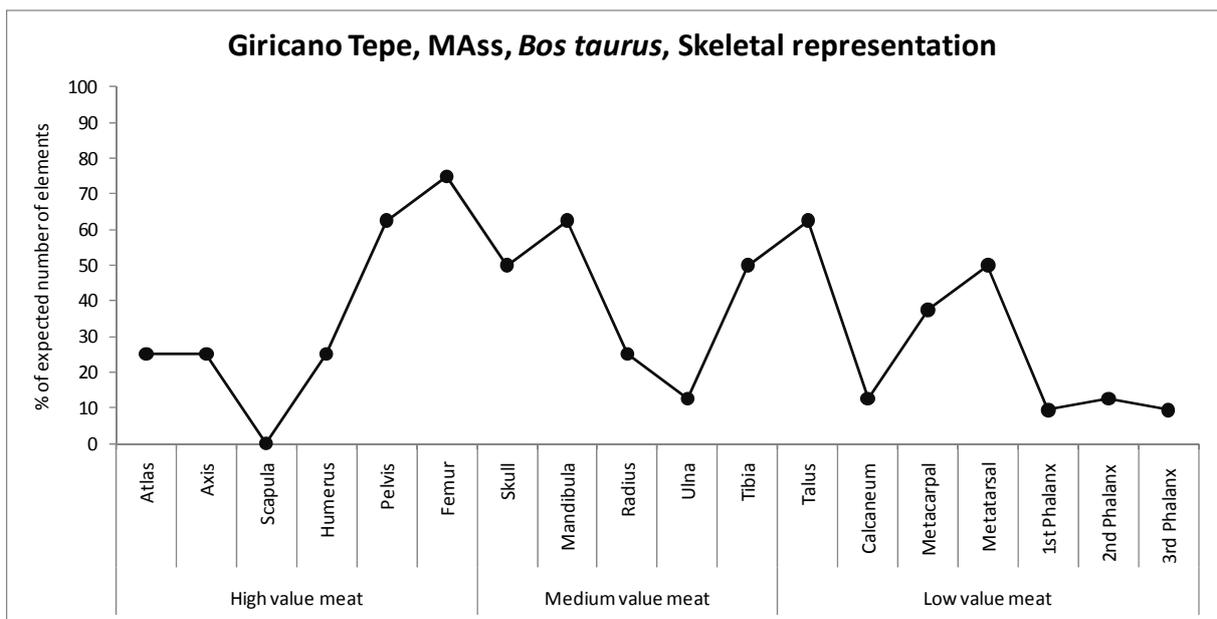


Figure III.65. Skeletal representation for cattle in the Middle Assyrian assemblage from Giricano (MNI= 4, 54 elements).

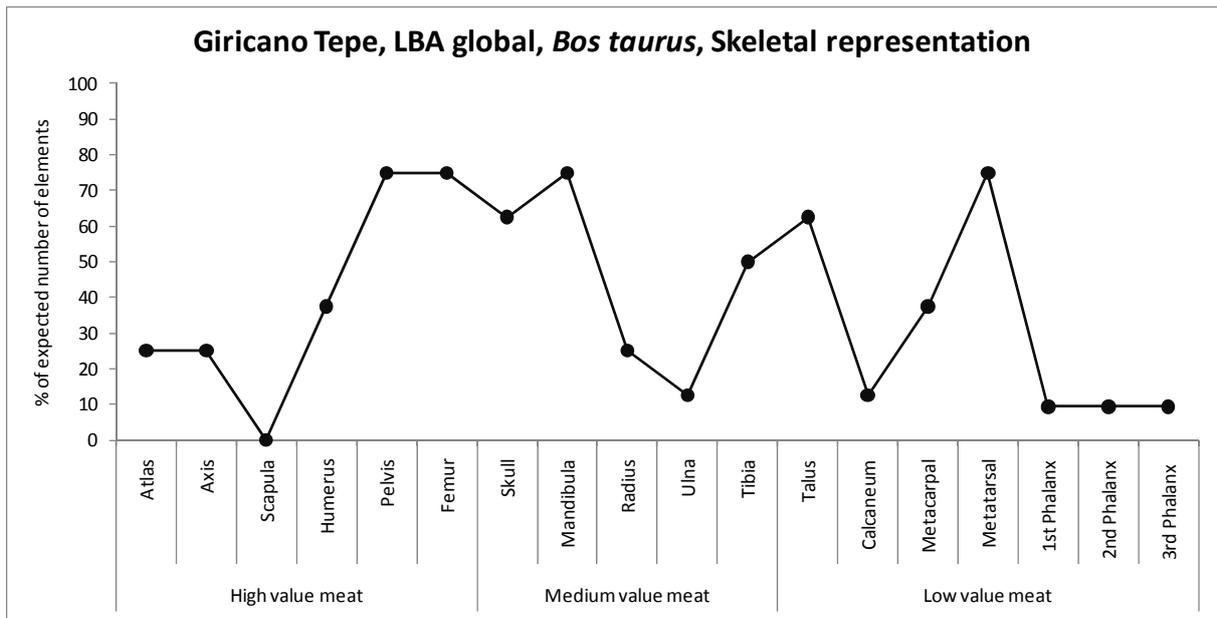


Figure III.66. Skeletal representation for cattle in the global Late Bronze Age assemblage from Giricano (MNI= 4, 59 elements).

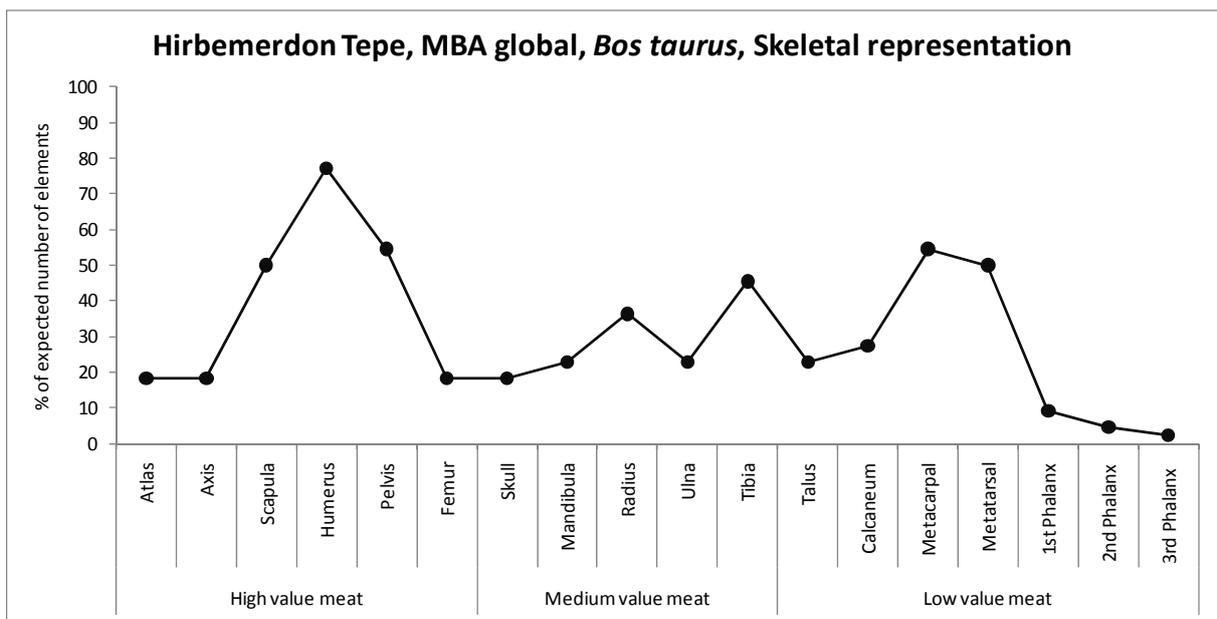


Figure III.67. Skeletal representation for cattle in the global Middle Bronze Age assemblage from Hirbemerdon Tepe (MNI= 11, 128 elements).

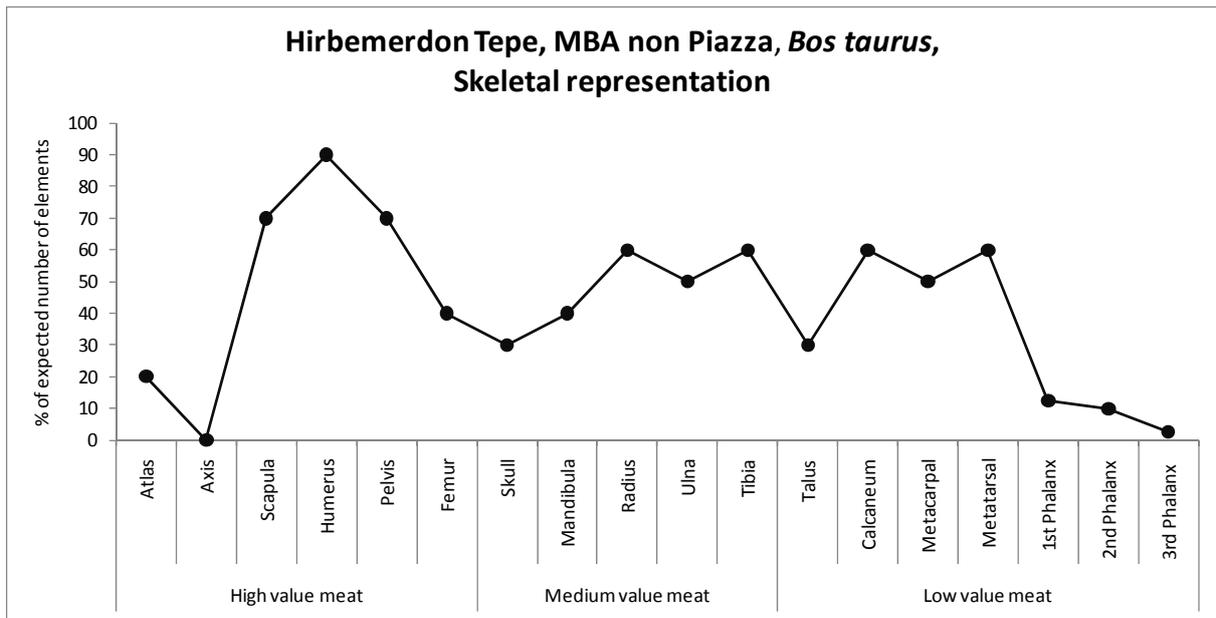


Figure III.68. Skeletal representation for cattle in the Middle Bronze Age outside the Piazza assemblage from Hirbemerdon Tepe (MNI= 5, 82 elements).

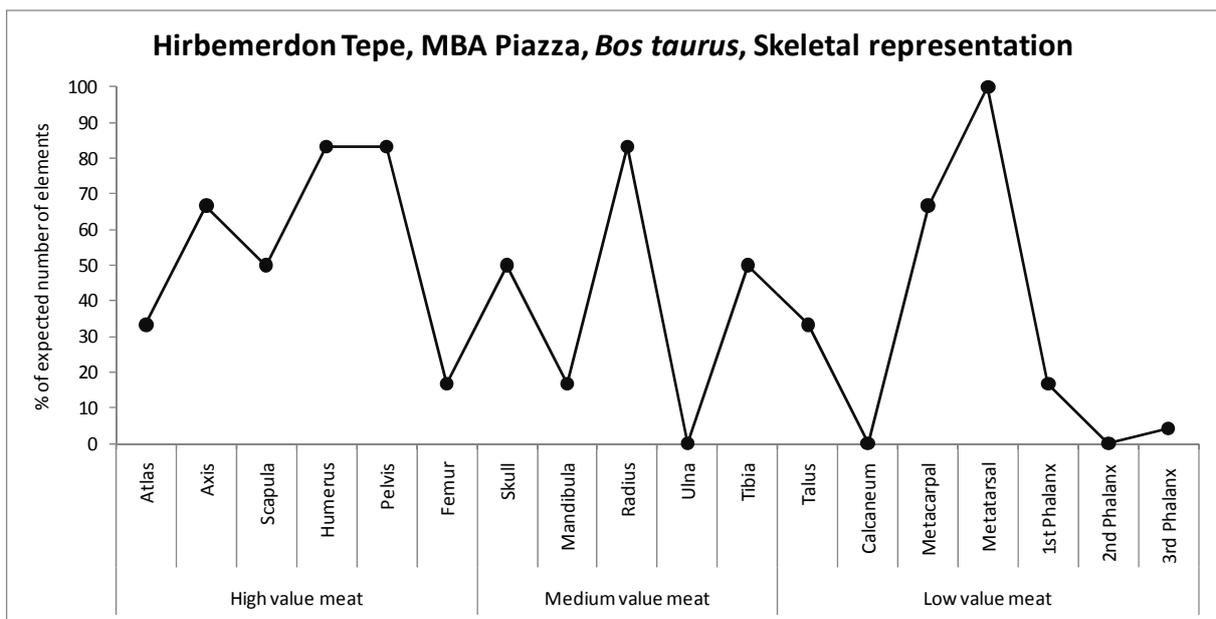


Figure III.69. Skeletal representation for cattle in the Middle Bronze Age Piazza assemblage from Hirbemerdon Tepe (MNI= 3, 46 elements).

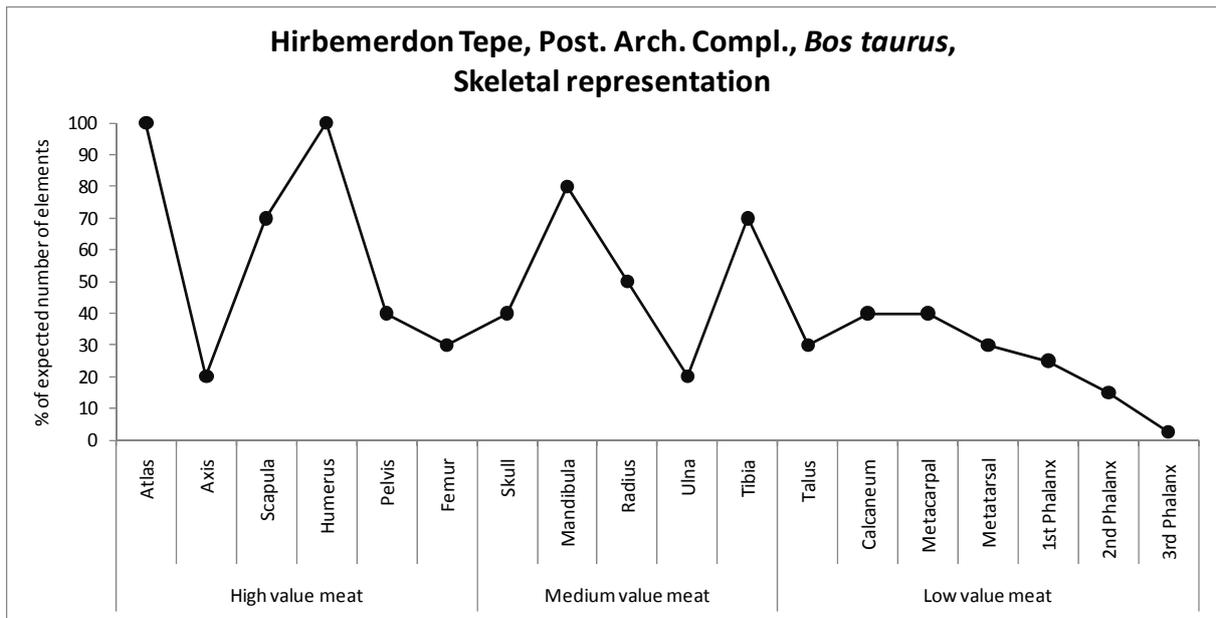


Figure III.70. Skeletal representation for cattle in the fill Posterior to the use of the Architectural Complex at Hirbemerdon Tepe (MNI= 5, 87 elements).

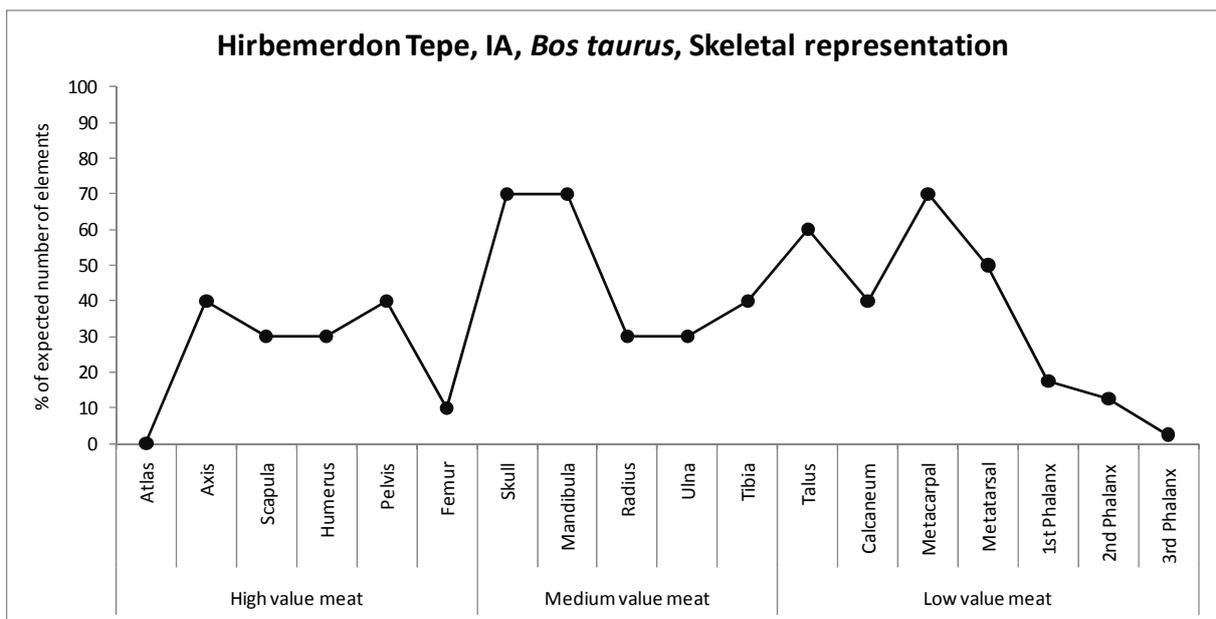


Figure III.71. Skeletal representation for cattle in the Iron Age assemblage from Hirbemerdon Tepe (MNI= 5, 72 elements).

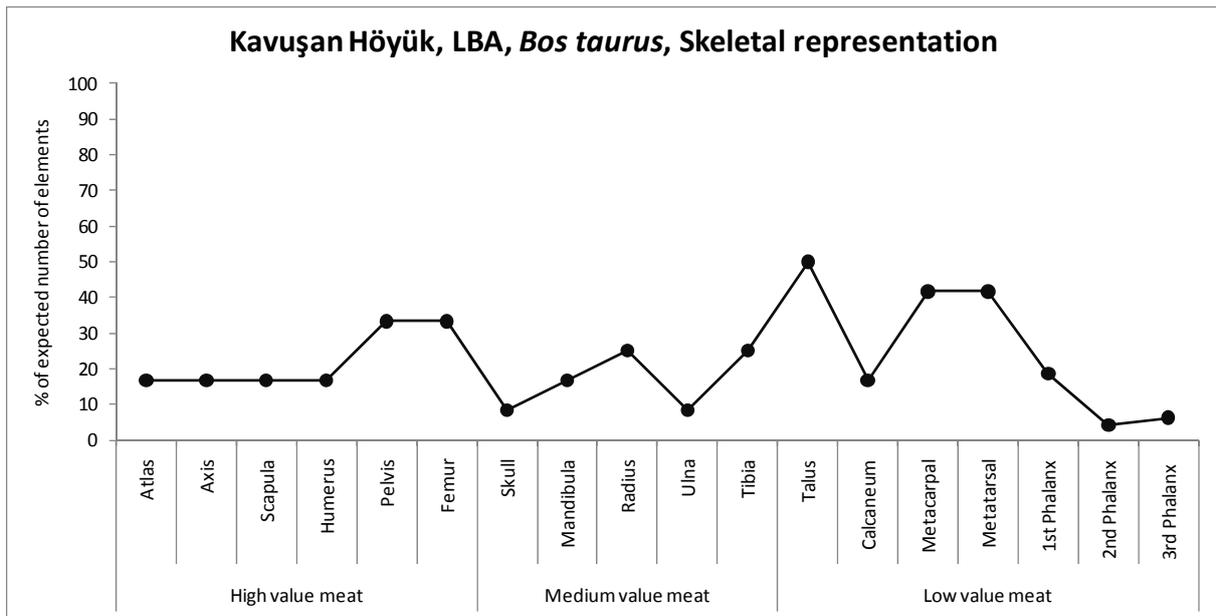


Figure III.72. Skeletal representation for cattle in the Late Bronze Age assemblage from Kavuşan Höyük (MNI= 6, 56 elements).

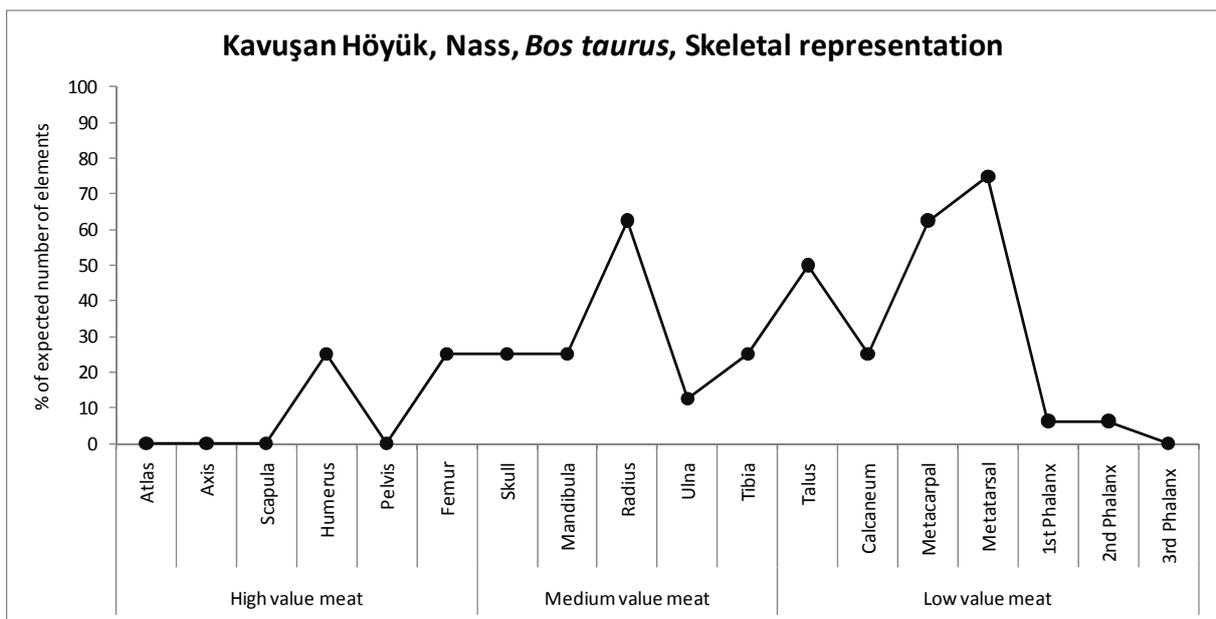


Figure III.73. Skeletal representation for cattle in the Neo-Assyrian assemblage from Kavuşan Höyük (MNI= 4, 37 elements).

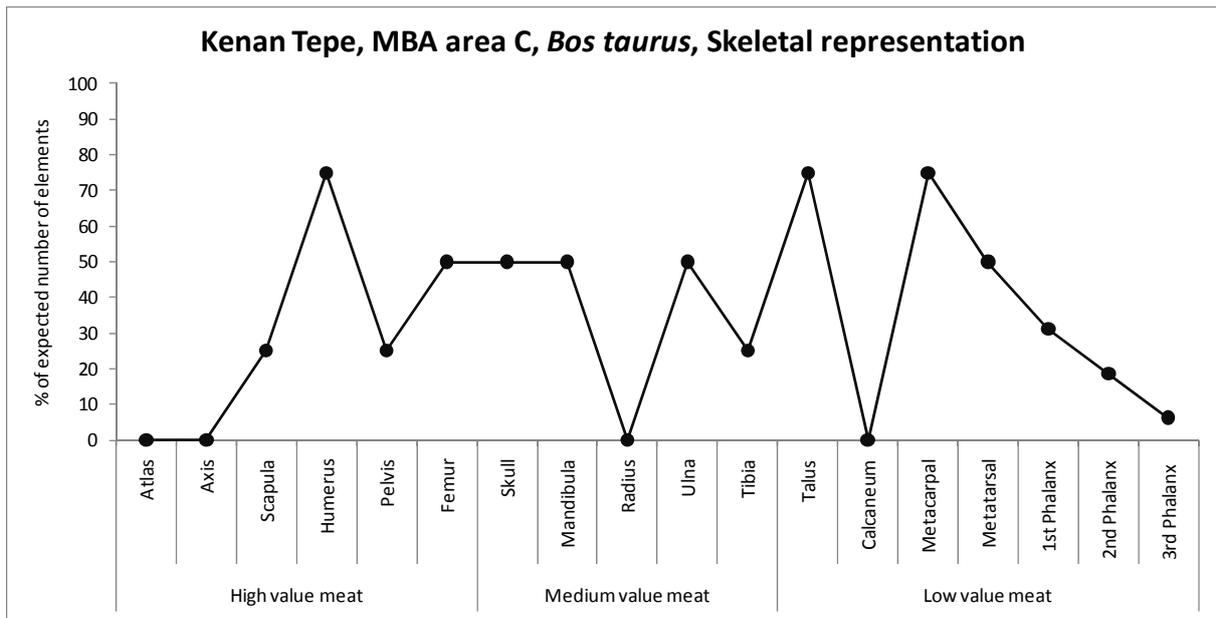


Figure III.74. Skeletal representation for cattle in the Area C assemblage from Middle Bronze Age from Kenan Tepe (MNI= 2, 31 elements).

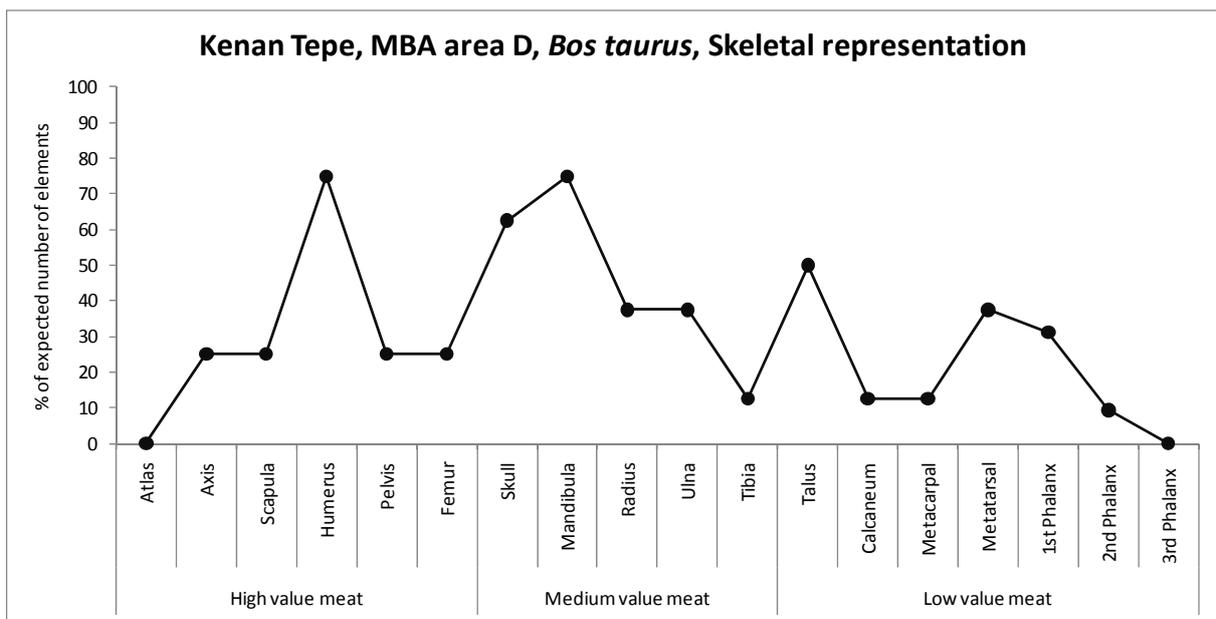


Figure III.75. Skeletal representation for cattle in the Area D assemblage from Middle Bronze Age from Kenan Tepe (MNI= 4, 53 elements).

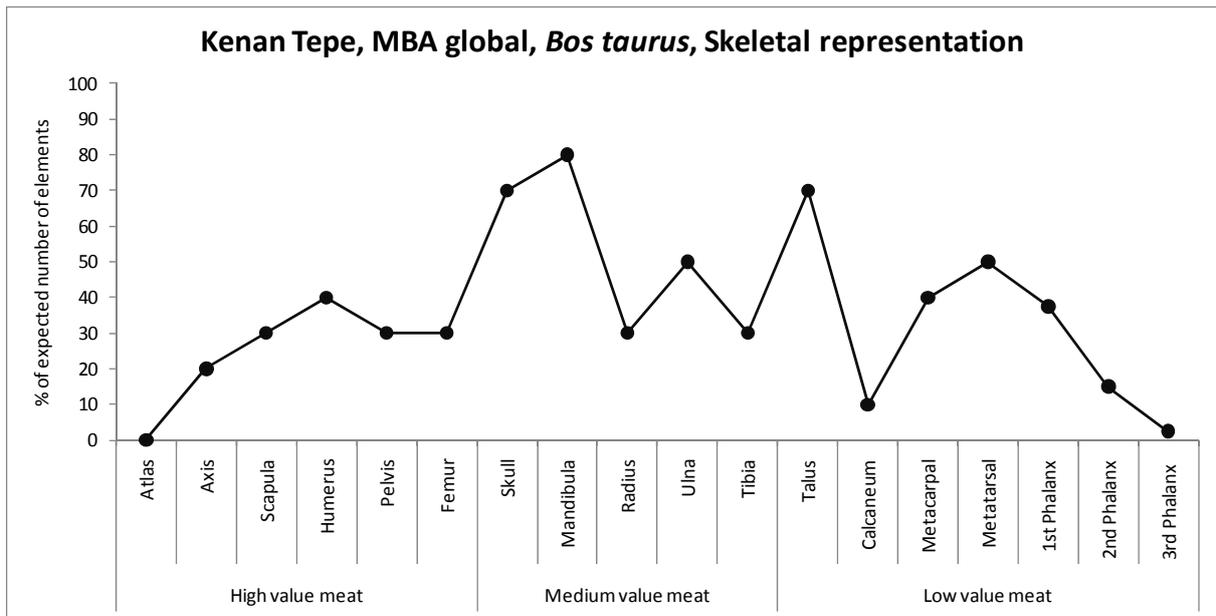


Figure III.76. Skeletal representation for cattle in the global Middle Bronze Age assemblage from Kenan Tepe (MNI= 5, 79 elements).

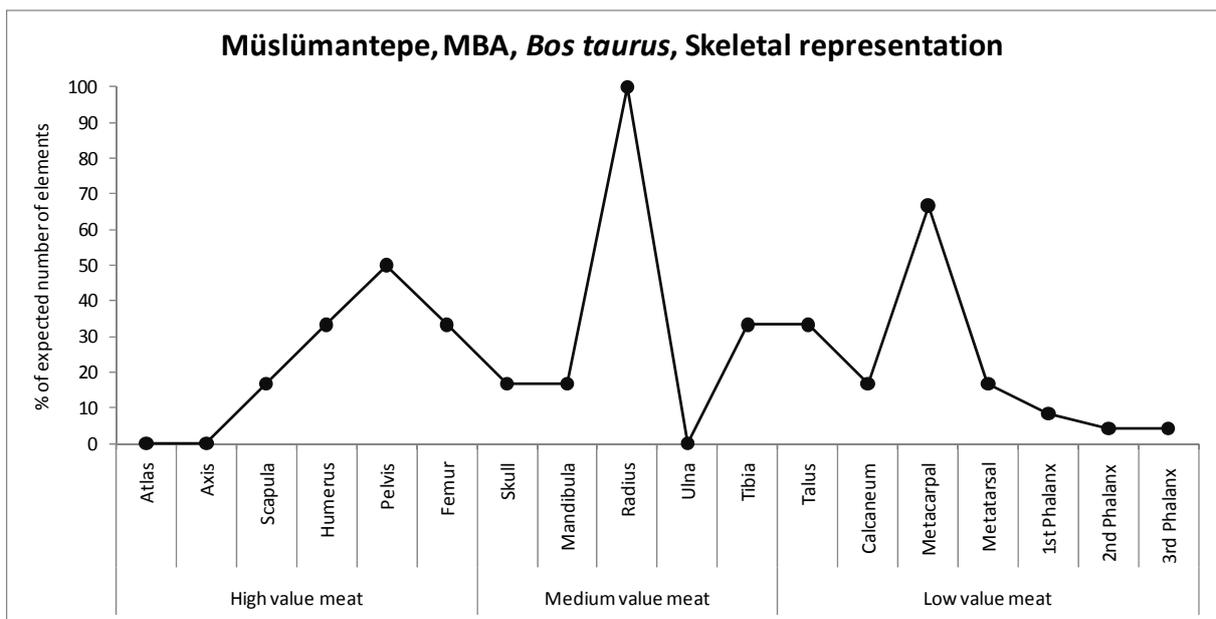


Figure III.77. Skeletal representation for cattle in the Middle Bronze Age assemblage from Müslümantepe (MNI= 3, 30 elements).

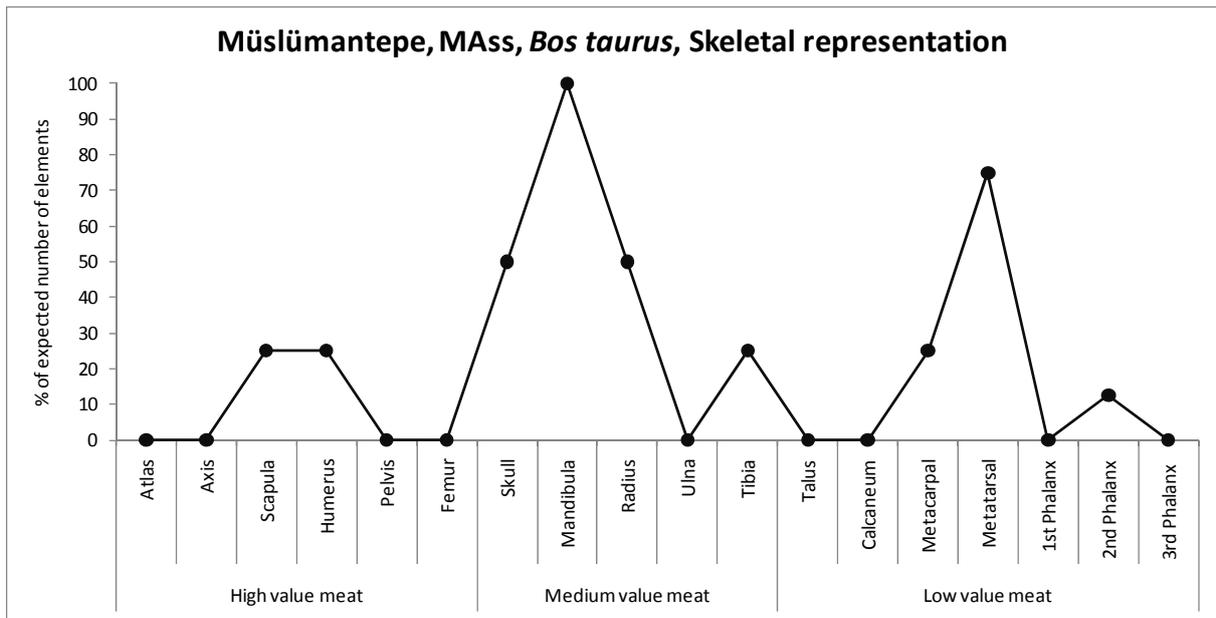


Figure III.78. Skeletal representation for cattle in the Middle Assyrian assemblage from Müslümantepe (MNI= 2, 17 elements).

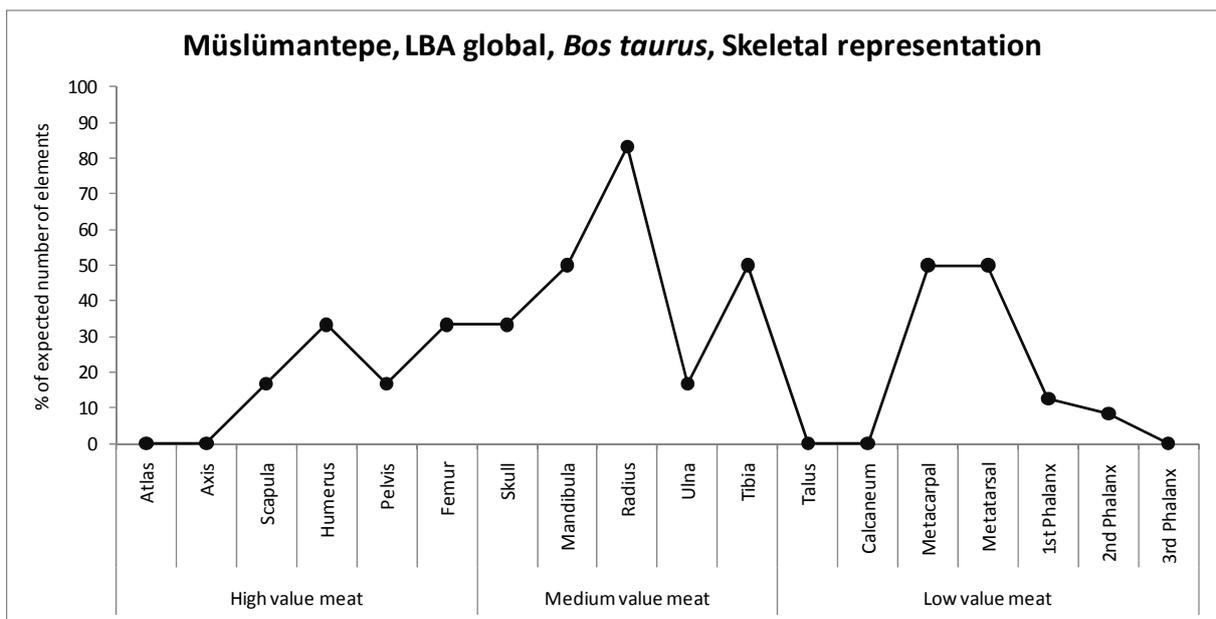


Figure III.79. Skeletal representation for cattle in the global Late Bronze Age assemblage from Müslümantepe (MNI= 3, 31 elements).

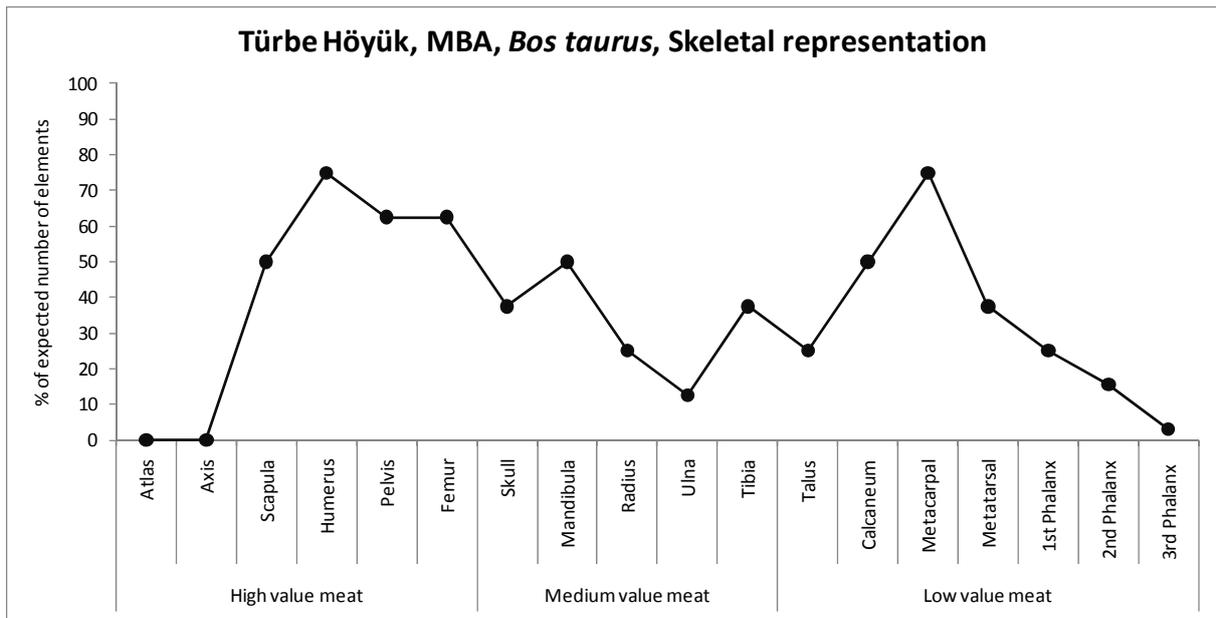


Figure III.80. Skeletal representation for cattle in the Middle Bronze Age assemblage from Türbe Höyük (MNI= 4, 62 elements).

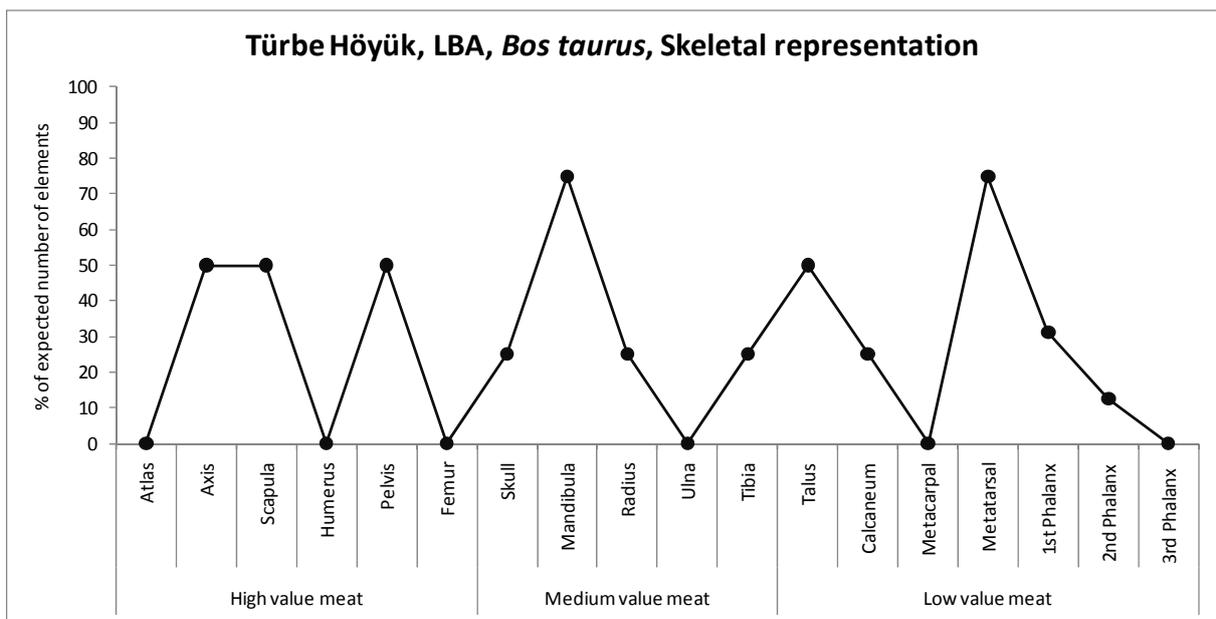


Figure III.81. Skeletal representation for cattle in the Late Bronze Age assemblage from Türbe Höyük (MNI= 2, 24 elements).

Correspondence Analysis was performed in order to investigate the relations between the assemblages and the three meat value groups (Fig. III.82). Axis 1 splits apart high and medium value meat groups while Axis 2 separates these groups from the low value meat group. It is interesting to compare contemporary assemblages yielded from the same settlement. At Kenan Tepe for example, the Area C assemblage is characterized by low value meat in comparison to the Area D assemblage. In Middle Bronze Age Hirbemerdon Tepe, the Piazza assemblage is more related to high value meat than the assemblage yielded from other contemporary contexts.

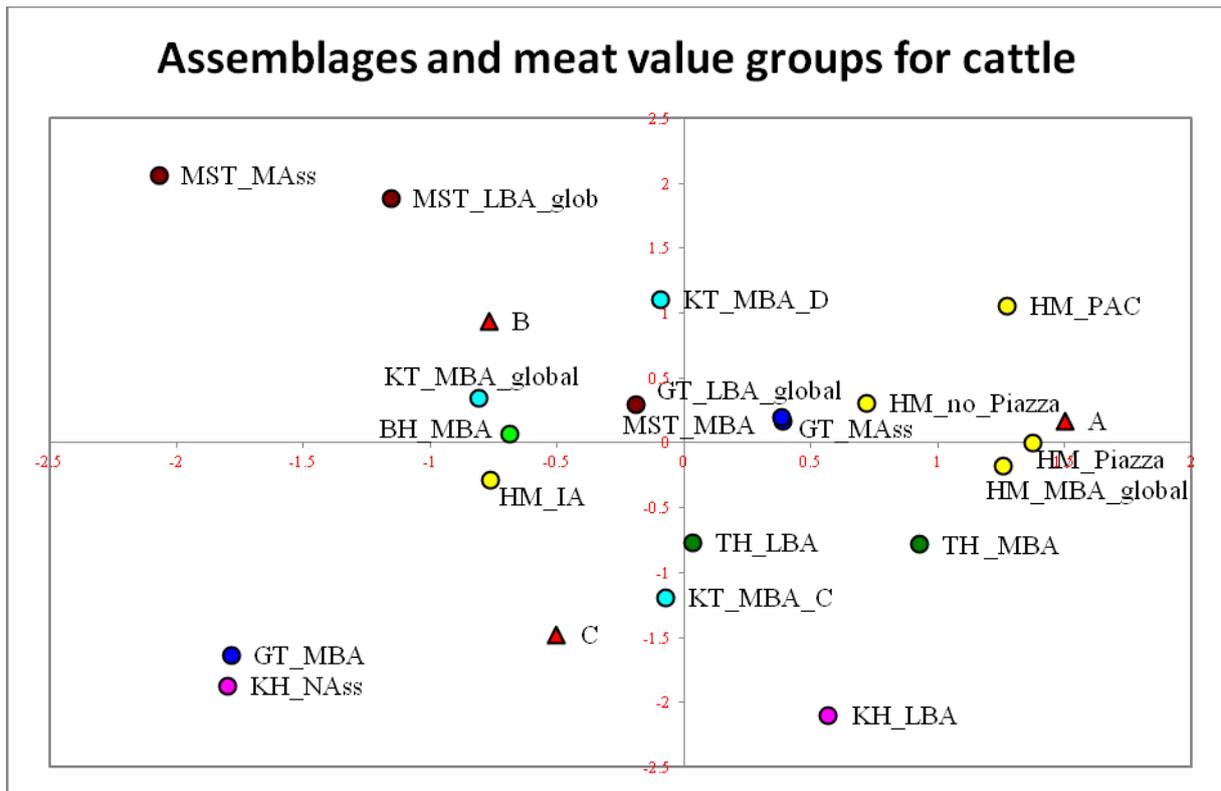


Figure III.82. Correspondence Analysis, using CAPCA software, with meat value groups as variables and assemblages as objects. Axis 1 explains 70.08% and Axis 2 29.92% of the variability.

(c) Butchery

Cattle remains from 12 assemblages exhibit cut or chop marks. They are, however, relatively rare with 10% of the cattle NISP at most (Tab. III.9). Six assemblages present a low proportion of remains with cut or chop marks under 4%. The same amount of assemblages has a higher proportion of cattle remains exhibiting cut or chop marks from 5.8% to 10.3%. It is difficult to link the relative representation of butchered remains with other indicators such as skeletal representation or age classes. However, it can be noticed that in Middle Bronze Age Kenan Tepe, Area C assemblage, which was characterized by a higher proportion of low value meat remains, it has also much more elements with cut or chop marks than the assemblage from Area D. At Hirbemerdon Tepe, the Middle Bronze Age Piazza, considered as a feasting place by the archaeologists (Laneri, 2011) has also a high representation of butchered cattle remains but was characterized by the importance of high value meat elements.

Cut or chop marks are present on a large variety of elements from different meat value groups. The element exhibiting the most frequent marks is the talus as for red deer. The humerus, a meaty element, also exhibits frequent cut marks, especially on the distal part.

<i>Bos taurus</i> number of bones with cut marks	BH MBA	GT LBA global	HM MBA Piazza	HM MBA non Piazza	HM MBA PAC	HM IA	KH LBA	KH IA NAss	KT MBA area C	KT MBA area D	MST LBA global	TH MBA
Skull (auditory bulla)					1							
Skull (jugular process)										1		
Mandibula					2				1			
Atlas				1	2							
Axis	1		1		1							
Vc					1							
Vt	2											
Rb	1											
Sc	1											
Hm		1	1	1	3	1	1				1	
Rd			1								1	
Ul		1										
Os carpi intermedium			1									
Mc									1			1
Pl		1	1		1		2					
Fm	2	1		1								
Fb												
Talus	1	2	1		1	1			2	1		
Calcaneus				1	2							
Mt							1	1		1		
Ph1	1											
Ph2					2			1				
Ph3		1										
Total bone with cut marks	9	7	6	4	16	2	4	2	4	3	2	1
%Cattle NISP with cut marks	9.5	5.8	7.9	3.0	10.3	1.8	5.8	3.4	8.2	2.9	3.9	1.0
Total cattle NISP	95	120	76	135	156	113	69	59	49	103	51	100

Table III.9. Distribution of cattle remains exhibiting cut or chop marks.

(d) *Pathologies*

Pathologies are evidenced by very few cattle remains (less than 1% of the cattle NISP). Most of them are phalanges (Tab. III.10). Anomalies such as lipping and exostosis on phalanges are probably linked to the use of cattle as draught animals. These deformations are, however, quite light (Fig. III.83), not stronger than stage 2 (De Cupere et al., 2000). It is not possible to estimate which percentage of the cattle used as draught were exhibiting pathological anomalies. However, it seems that these animals were not commonly consumed in the studied assemblages. This statement would also corroborate with a relatively young slaughtering age for cattle, disregarding individuals retired from draught work.

<i>Bos taurus</i> number of bones with pathologies	GT LBA MAss	HM MBA Piazza	HM MBA PAC	KH LBA global	KT MBA Area C	MST MBA	TH MBA	TH LBA
Mc (proximal exostosis)						1		
Tb (distal exostosis)							1	
Talus (exostosis)		1						
Ph1 (exostosis)	1		1			1		
Ph1 (lipping)				1	1		2	1
Ph2 (lipping)								1
Total pathological remains	1	1	1	1	1	2	3	2
% pathological cattle NISP	0.8	1.3	0.6	1.7	2.0	3.9	3.0	5.6
Total cattle NISP	120	76	156	59	49	51	100	36

Table III.10. Distribution of pathological cattle bones.



Figure III.83. Light lipping on proximal articulation of cattle proximal phalanges. Left: Late Bronze Age Kavuşan Höyük (KH01228). Right: Middle Bronze Age Kenan Tepe, Area C (KT01136).

(2) *Bos primigenius* (aurochs)

Using methods described here above in Chapter II “Methods”, three bones were identified as aurochs. Wild cattle lived in the Upper Tigris area especially in the Neolithic period, as evidenced at Körtik Tepe (Arbuckle and Özkaya, 2006: tab. 2), but were also present in the Late Bronze Age and up to the Medieval period, according to zooarchaeological studies at Ziyaret Tepe (Matney et al., 2009: fig. 9). One proximal right metacarpal comes from the Middle Bronze Age assemblage from Hirbemerdon Tepe outside of the Piazza. One unfused distal epiphysis of a femur was recovered from the fill Posterior to the use of the Architectural Complex at Hirbemerdon Tepe. The third aurochs specimen is a distal part of a humerus from the Middle Bronze Age layers at Türbe Höyük. This bone was chopped above the distal articulation. The fact that aurochs were available to hunters from Hirbemerdon Tepe or Türbe Höyük is not a surprise according to previously published faunal assemblages. Sorting wild from domestic cattle is quite subjective, due to the limited bone size difference between the two species. Even if some remains belonging to the *Bos* genus could have been misidentified, the low number of aurochs remains raises, however, some questions. Was aurochs hunting limited due to a reduction of the aurochs population? Another possibility would consist of specialized hunts (on red deer) which disregarded the more dangerous aurochs. It can first be noted that except red deer, all other wild mammals are rare in the assemblage. The aurochs remains presented here are parts of the carcasses linked to the meat consumption. More symbolic remains such as horn cores (Vila, 1993) are not present in the assemblages.

(3) *Gazella* (Gazelles)

Gazelles did probably not densely inhabit the Upper Tigris area at any period. Gazelle remains are absent in the Epipaleolithic assemblage from Hallan Çemi (Starkovich and Stiner, 2009). They are rare in Neolithic assemblages from Salat Camii Yanı (n=4, 0.2% NISP, Miyake et al., 2009: tab. 1), Çayönü (n=24, 1.5% NISP, Hongo and Meadow, 2000: tab. 4a) and Körtik Tepe (n=4, 1.9% NISP, Arbuckle and Özkaya, 2006: tab. 3). Gazelle remains are absent from assemblages dated to the Halaf period such as Kenan Tepe (Parker et al., 2008), Girikihacian (McArdle, 1990) and Boztepe (Parker and Creekmore, 2002). In Bronze and Iron Age assemblages from Ziyaret Tepe, no gazelle specimen was identified (Matney et al., 2009, H. Greenfield pers. comm.). In comparison, in the Middle-Assyrian *dunnu* from Tell Sabi Abyad in northern Syria, gazelle represent 8% of the identified specimens (Cavallo, 2002). In the Middle-Assyrian *dunnu* assemblage from Giricano, wild mammals are well represented by red deer but not a single gazelle specimen was identified. It suggests that if

hunting is common in the *dunnu* economic system, the lack of gazelle in the Giricano assemblage would correspond to a lack of or a reduced gazelle population in the Upper Tigris River valley. In the assemblages studied here, two remains were without doubt identified as gazelle. The first one, recovered from a Neo-Assyrian pit at Kavuşan Höyük, is a left talus of which medial and lateral faces were polished (Fig. III.84). Such an artefact is usually interpreted as a knuckle bone or part of a ritual or funerary deposit (Holmgren, 2004, Minniti and Peyronel, 2005). Among the large astragals assemblage recovered from Middle Bronze Age Ebla in northwestern Syria (Minniti and Peyronel, 2005), sheep, goat, cattle and fallow deer were identified, but no gazelle. The shape of small ruminant talus is, however, quite similar and therefore gazelle astragal could have been used in the same way as a sheep or goat astragal.

The second gazelle specimen from the assemblages studied here is a distal part of a humerus. It comes from the Late Bronze Age layers at Türbe Höyük.

The gazelle astragal, being an artefact, might have been subject to trade, exchange or gift and does not give much evidence for the presence of gazelle in the surroundings of the site in the Neo-Assyrian period. The Humerus indeed better evidences the access to gazelle carcass. However, a single specimen cannot without any doubt attest to the presence of a gazelle population in the Botan River valley.

With these two remains, it is difficult to identify the gazelle species they belong to. Most authors agree that goitered gazelle (*Gazella subgutturosa*) lived in southeastern Anatolia in the past as well as in the modern era (Uerpmann, 1987, Harrison and Bates, 1991, Kasperek, 1986). On the contrary, whether Dorcas gazelle (*Gazella dorcas*) and mountain gazelle (*Gazella gazella*) inhabited or not southeastern Anatolia is a matter of debate between the same authors. According to the measurements taken on the distal part of the humerus from Türbe Höyük, this specimen falls into the range of goitered gazelle from Neolithic El Kowm in central Syria (Helmer, 2000b). Goitered gazelle are slightly larger than Dorcas gazelle. Mountain gazelle are in the same size range as goitered gazelle. According to measurements taken from modern mountain gazelle skeletons (Kolska Horwitz et al., 1990), the humerus from Türbe Höyük could only correspond to the smallest female of this species. The gazelle remains from the Upper Tigris assemblage do not provide enough evidence to identify them beyond the generic level. However, goitered gazelle (*Gazella subgutturosa*) are the best candidates since not a single specimen identified without doubt as any of the two other species has been published from southeastern Anatolian archaeological excavations.



Figure III.84. Polished gazelle astragal from a Neo-Assyrian pit at Kavuşan Höyük (KH00223). Up left: posterior side, down left: anterior side, up right: lateral side, down right: medial side.

(4) *Capra hircus* / *Ovis aries* (domestic sheep and goat)

Domestic sheep and goat are a main component of the domestic “triad” with cattle and pig. These remains represent an important part of each single assemblage. They are essential in feeding the human populations with their meat and milk. They also provide wool which is an important matter of trade during, but not only, the Middle Bronze Age (e.g. Veenhof, 2010).

(a) *Domestic sheep and goat*

It is not possible to identify each single domestic caprine specimen to the specific level. For this reason, sheep and goat will have in some cases to be considered together. However, differences between the exploitation of sheep and goat can be expected. Differential patterns of exploitation between sheep and goat will be mostly investigated through kill-off patterns thanks to the possibility of both age and identification of the species on lower dental remains.

On average, almost 30% of the caprine remains were identified to either sheep or goat (Tab. III.11). The amount of identified caprine remains to a specific level ranges however from 17 to 40% of the caprine corr.NISP.

The sheep to goat ratio is a good way to estimate the importance of each species in the consumption patterns. It could also reflect the composition of the flock if one considers that remains from consumption refuse at one site reflect reliably the composition of the live flock owned by the community. In a general view the ratio is quite balanced between sheep and goat (Tab. III.11, Fig. III.85). On average, sheep are slightly more common than goat in the assemblage with one goat for 1.07 sheep. Most of the assemblages are close to the mean with a slight predominance of sheep over

goat. There are, however, some extreme values. In Middle Bronze Age Müslümantepe, there are 3.3 sheep for one goat which is significantly higher than in any other contemporary assemblages. On the contrary, a few assemblages yielded more remains identified to goat rather than to sheep. These assemblages are dated to the Middle Bronze Age but also to the Late Bronze Age. In the assemblage from the Middle Bronze Age “Geb. C” at Giricano, goat represents 75% of the caprine identified to a specific level due to the presence of several goat skeletons in a large pithos as already described in chapter II. The sheep to goat ratio is not linked to the chronological period. Looking at sites where contemporary assemblages are available, there are two possibilities. In Middle Bronze Age Kenan Tepe, the ratio is similar in both areas. On the contrary Middle Bronze Age assemblages from Hirbemerdon Tepe give a good example of context-specific consumption of sheep versus goat. While the assemblage from the Piazza is dominated by goat (two goat for a sheep), the assemblage from the contexts outside the Piazza, like many other assemblages, exhibits slightly more sheep than goat (1.5:1).

Caprinae remains (based on corrNISP)	Total Caprinae	identified goat (<i>Capra hircus</i>)	identified sheep (<i>Ovis aries</i>)	identified sheep and goat	% identified Caprinae	% Goat	% Sheep
BH MBA	138	30	20	50	36.2	60.0	40.0
GT MBA global	89	12	7	19	21.3	63.2	36.8
GT MBA Geb. C	41	6	2	8	19.5	75.0	25.0
GT LBA global	139	17	20	37	26.6	45.9	54.1
GT LBA MAss	87	11	11	22	25.3	50.0	50.0
HM MBA global	397	54	61	115	29.0	47.0	53.0
HM MBA Piazza	127	18	9	27	21.3	66.7	33.3
HM MBA non Piazza	270	36	52	88	32.6	40.9	59.1
HM MBA Post Arch. Compl.	244	45	51	96	39.3	46.9	53.1
HM IA	167	26	34	60	35.9	43.3	56.7
KH LBA	131	19	20	39	29.8	48.7	51.3
KH IA NAss except pit BSG	79	9	14	23	29.1	39.1	60.9
KT MBA global	308	28	39	67	21.8	41.8	58.2
KT MBA area C	96	7	9	16	16.7	43.8	56.3
KT MBA area D	212	21	30	51	24.1	41.2	58.8
MST MBA	87	7	23	30	34.5	23.3	76.7
MST LBA global	157	21	27	48	30.6	43.8	56.3
MST LBA MAss	55	8	11	19	34.5	42.1	57.9
TH MBA	132	20	23	43	32.6	46.5	53.5
TH LBA	83	16	13	29	34.9	55.2	44.8

Table III.11. Distribution of Caprinae, sheep and goat remains.

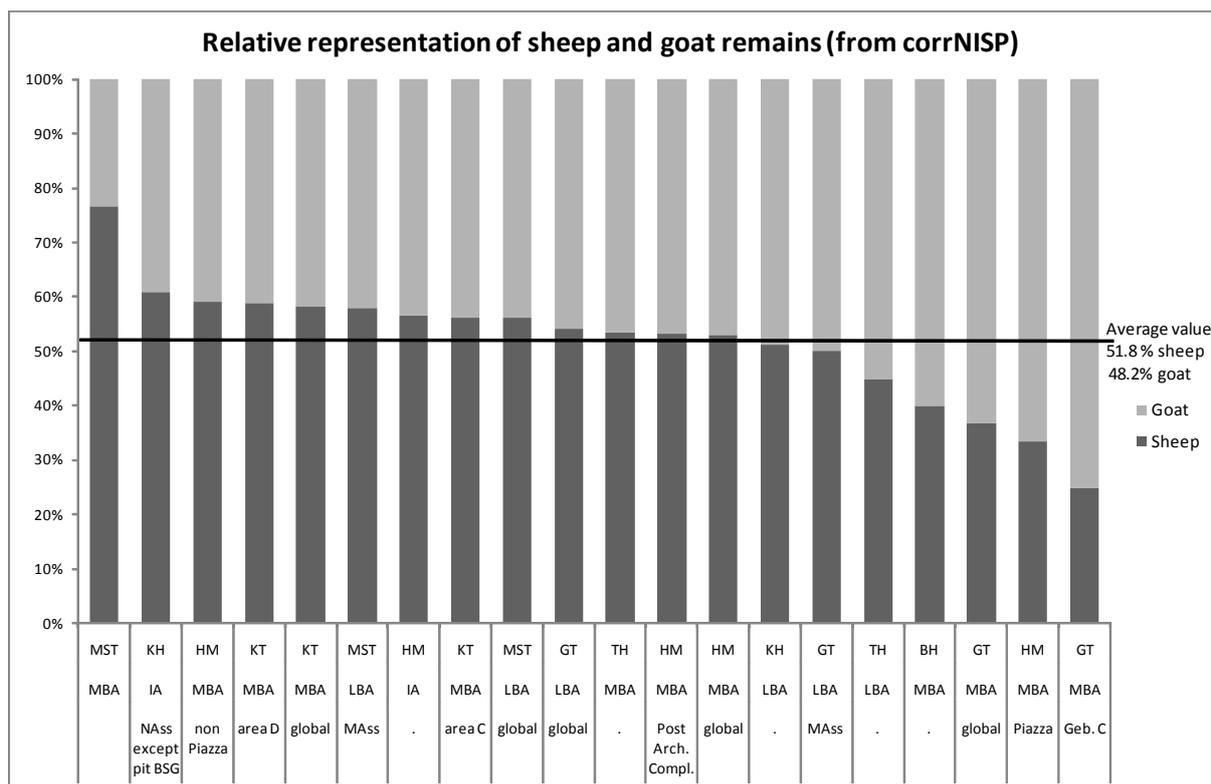


Figure III.85. Relative representation of sheep and goat remains (from corrNISP) sorted from the highest to the lowest representation of sheep remains.

(b) Kill-off patterns

For caprine, kill-off patterns were built using ageing data from lower dental remains. It allows considering sheep and goat together and then to build separate kill-off patterns for sheep or goat. It results an important number of graphics (Figs. III.86-131) which will be briefly presented site by site. They will be then compared and synthesised. The kill-off pattern for sheep and goat together is of course a palimpsest of two exploitations and the graphics tend therefore to be rather flat, the peak of slaughtering for a species being counterbalanced by a peak on another age class for the second species. Therefore, separated kill-off patterns for sheep and goat are shown even when the number of remains is obviously too low to be reliable.

At Middle Bronze Age Başur Höyük, sheep and goat exploitation patterns are different. For goat (Fig. III.87), a first peak is noticeable for individuals aged between six months and one year old. Sheep seem to have been consumed younger-between two and six months old (Fig. III.88). For both species, if individuals older than six years are absent, animals between two and four years old represent an important part of the assemblage.

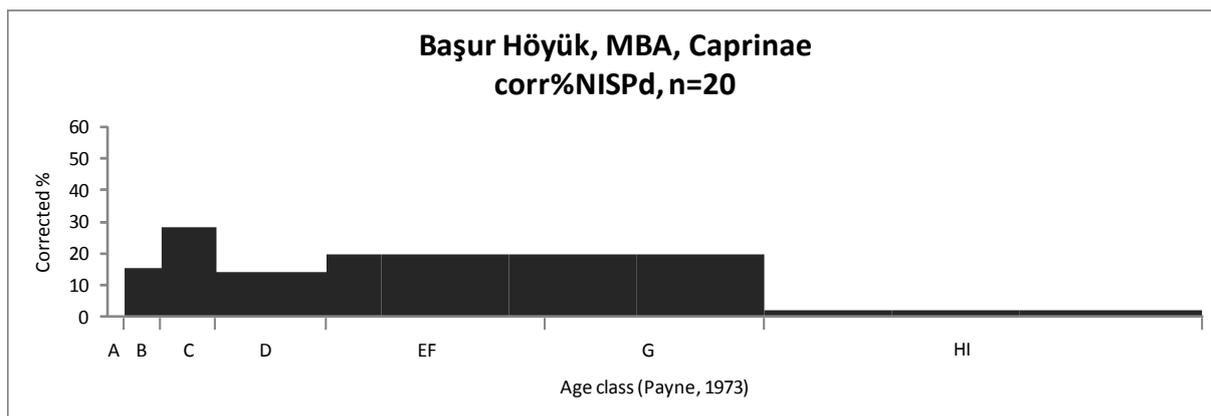


Figure III.86. Sheep and goat kill-off pattern based on lower dental remains from Middle Bronze Age Başur Höyük. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

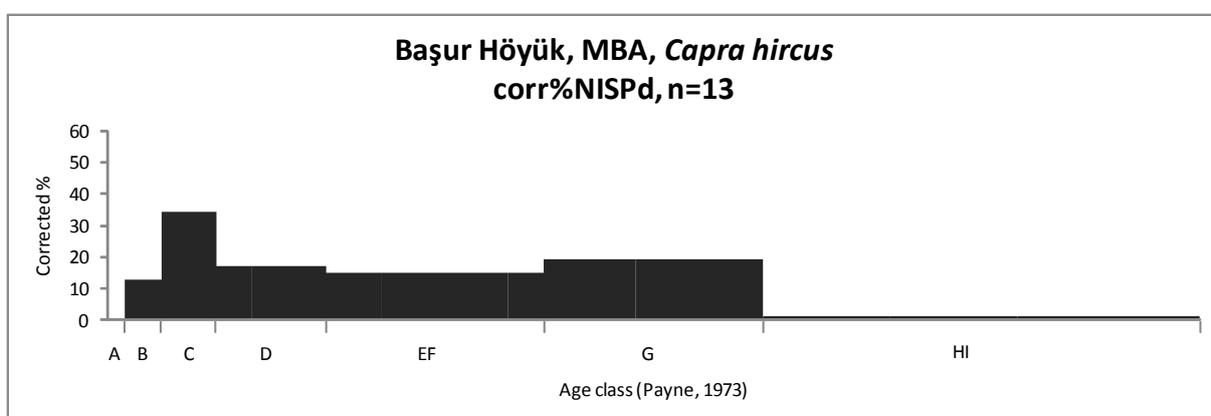


Figure III.87. Goat kill-off pattern based on lower dental remains from Middle Bronze Age Başur Höyük. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

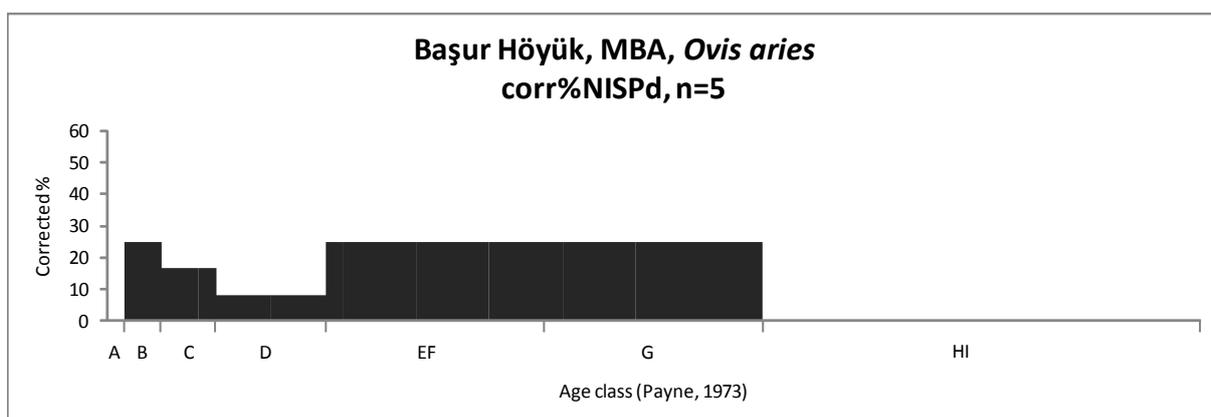


Figure III.88. Sheep kill-off pattern based on lower dental remains from Middle Bronze Age Başur Höyük. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

In Middle Bronze Age Giricano, only the assemblage from the Geb. C is suitable to investigate kill-off patterns. Actually it only concerns the goat found in the large pithos. These goats were mainly kids under two years old with some individuals from the other age classes, except between six months and one year old and over six years. This kill-off pattern is also confirmed when a MNI was calculated from the lower dental remains (Fig. III.90).

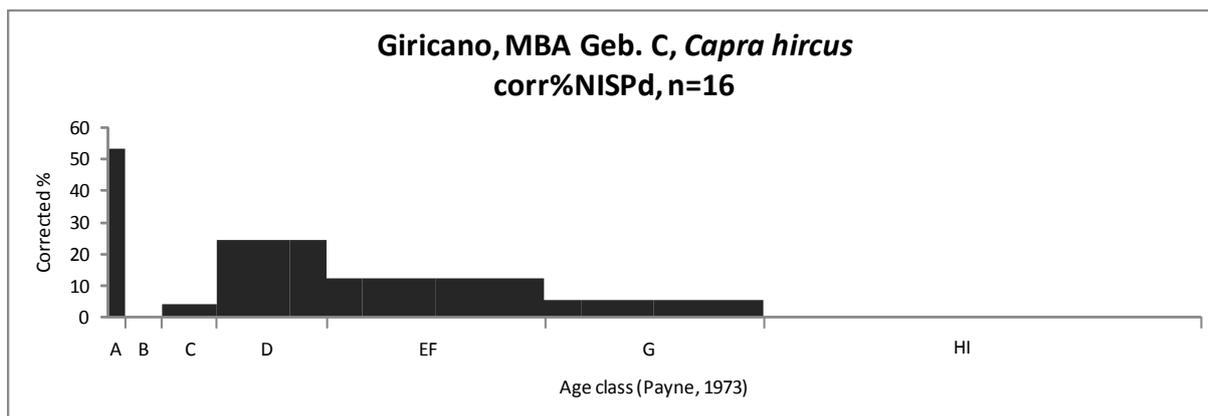


Figure III.89. Goat kill-off pattern based on lower dental remains from Geb. C at Middle Bronze Age Giricano. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

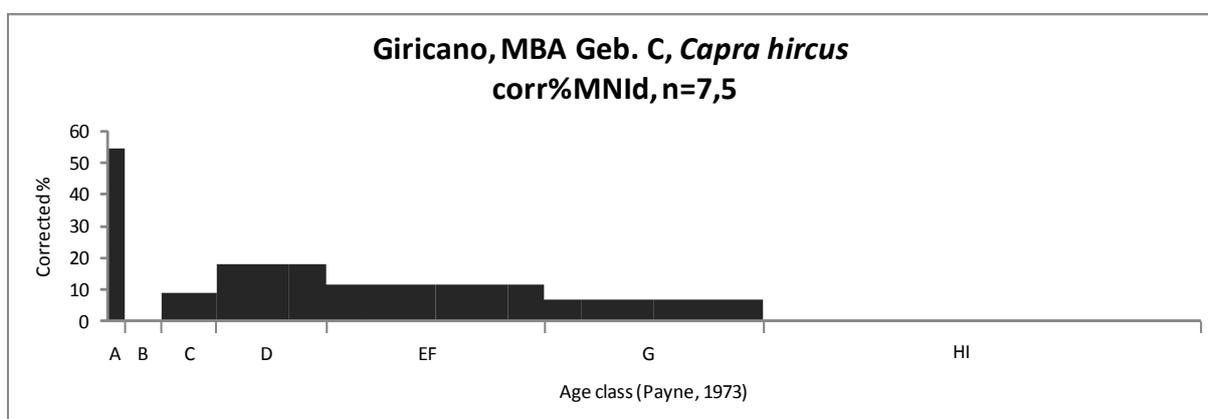


Figure III.90. Goat kill-off pattern based on MNI calculated from lower dental remains from Geb. C at Middle Bronze Age Giricano. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

In the Late Bronze Age of Giricano, the pattern obtained from the Middle-Assyrian contexts is rather similar to the one drawn from the global Late Bronze Age assemblage. Goats were consumed rather old-between four and six years old (Fig. III.92). On the contrary, sheep aged between six months and two years old provided tender meat (Fig. III.93, 96).

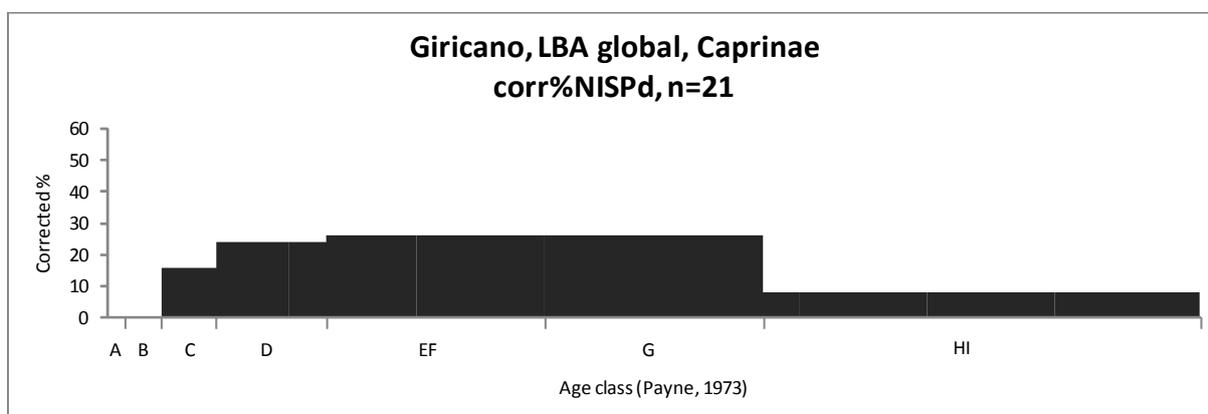


Figure III.91. Sheep and goat kill-off pattern based on lower dental remains from Late Bronze Age Giricano. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

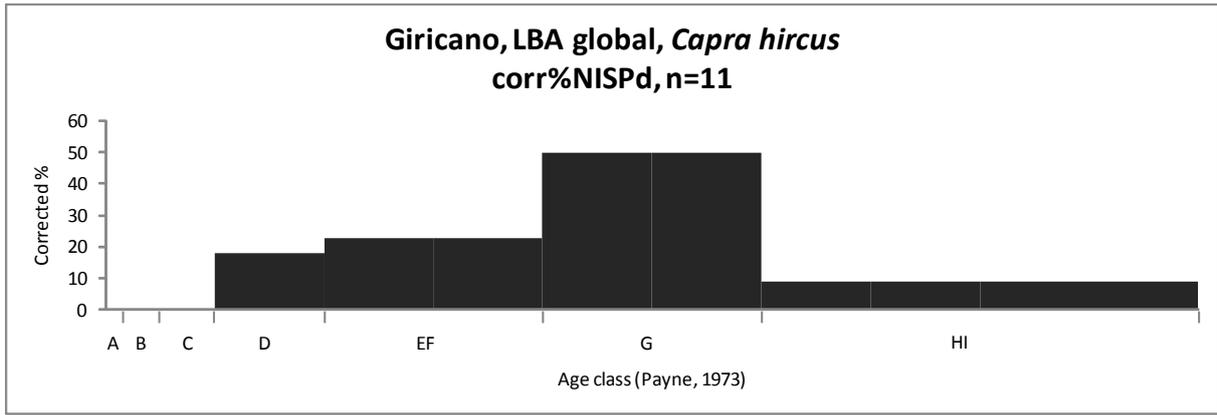


Figure III.92. Goat kill-off pattern based on lower dental remains from Late Bronze Age Giricano. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

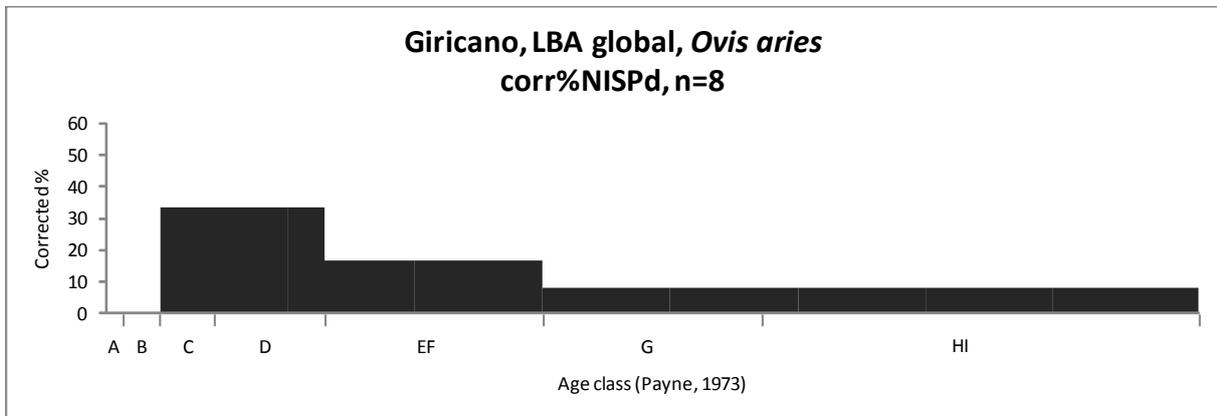


Figure III.93. Sheep kill-off pattern based on lower dental remains from Late Bronze Age Giricano. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

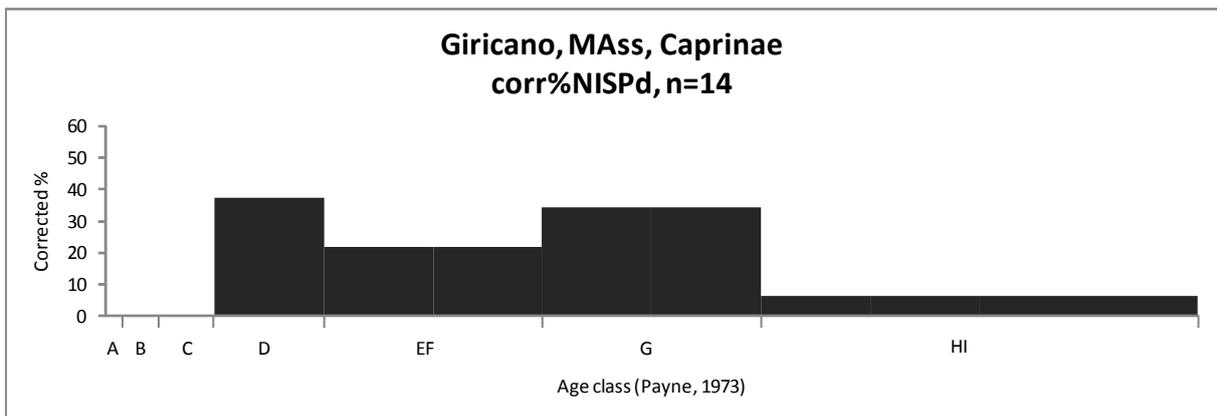


Figure III.94. Sheep and goat kill-off pattern based on lower dental remains from Middle-Assyrian Giricano. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

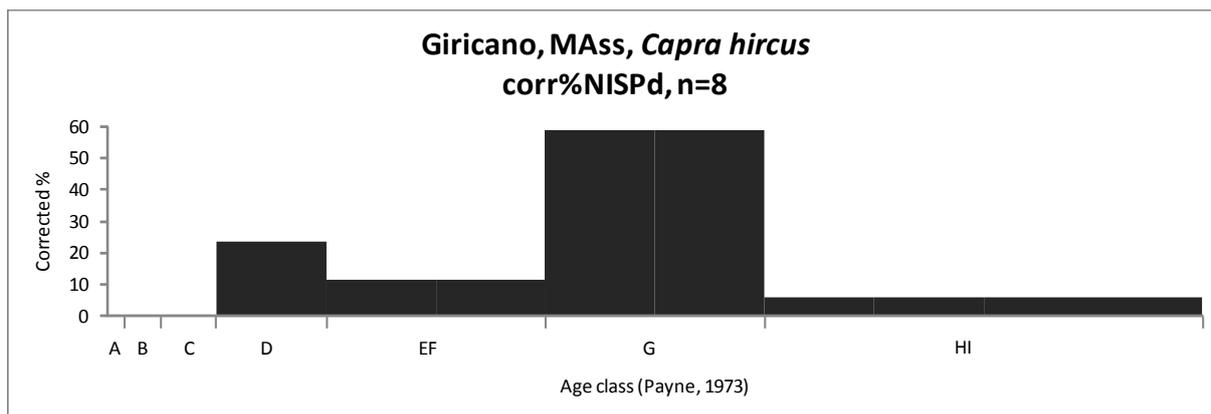


Figure III.95. Goat kill-off pattern based on lower dental remains from Middle-Assyrian Giricano. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

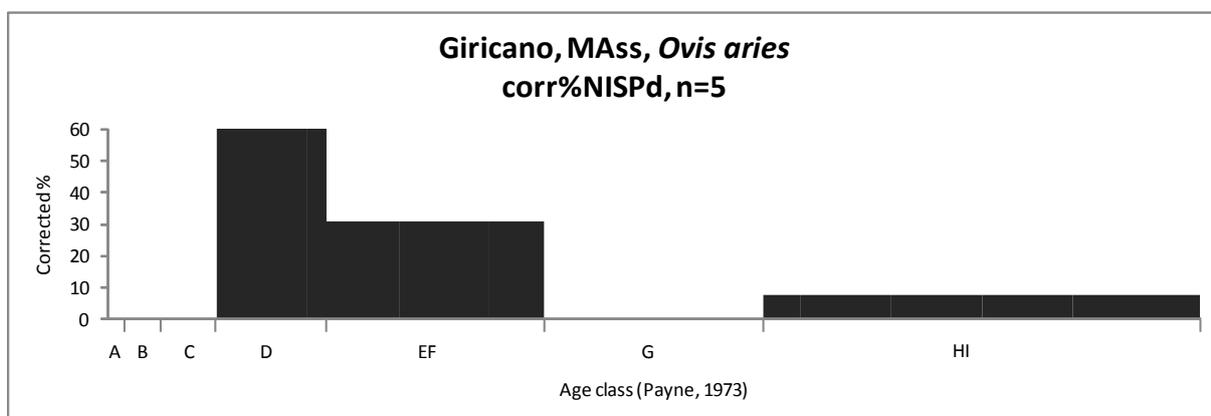


Figure III.96. Sheep kill-off pattern based on lower dental remains from Middle-Assyrian Giricano. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

Hirbemerdon Tepe is a good study case due to the number of remains and the precise definition of the assemblages. The global Middle Bronze Age assemblage (Figs. III.97-99) is not described in detail here because it mixes different patterns encountered in the Piazza and in the other contexts. For the Piazza (Figs. III.100-102) the pattern concerns almost only goats as sheep remains are rare in this assemblage. Mostly young goats, between six months and one year old were consumed there. Older individuals are, however, not completely absent. In the assemblage outside the Piazza (Figs. III.103-105) goat are less numerous than sheep. For goat, young individuals are important as in the Piazza but it has also to be noticed that individuals between four and six years old were also consumed in the settlement but not in the Piazza. Sheep were selected from three different age categories: lambs younger than two months, young individuals between six months and one year providing tender meat and individuals older than two years.

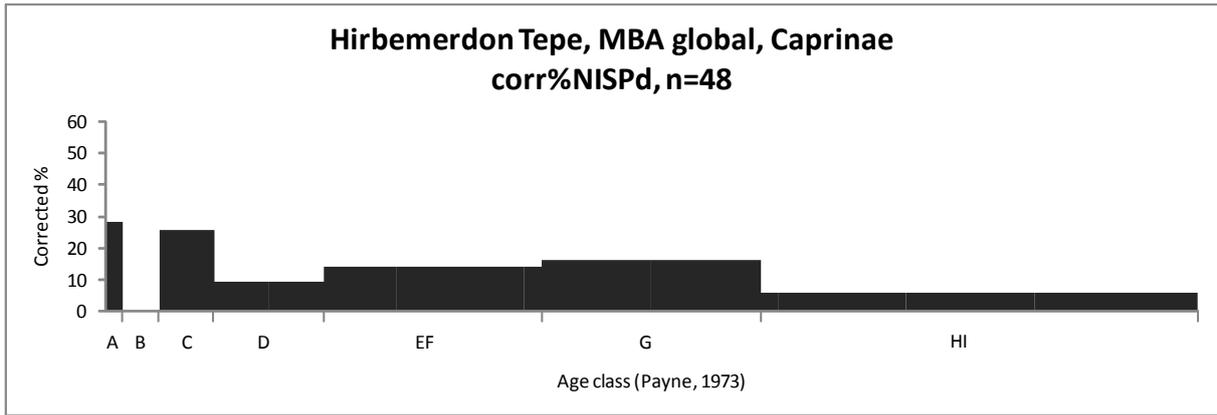


Figure III.97. Sheep and goat kill-off pattern based on lower dental remains from Middle Bronze Age Hirbemerdon Tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

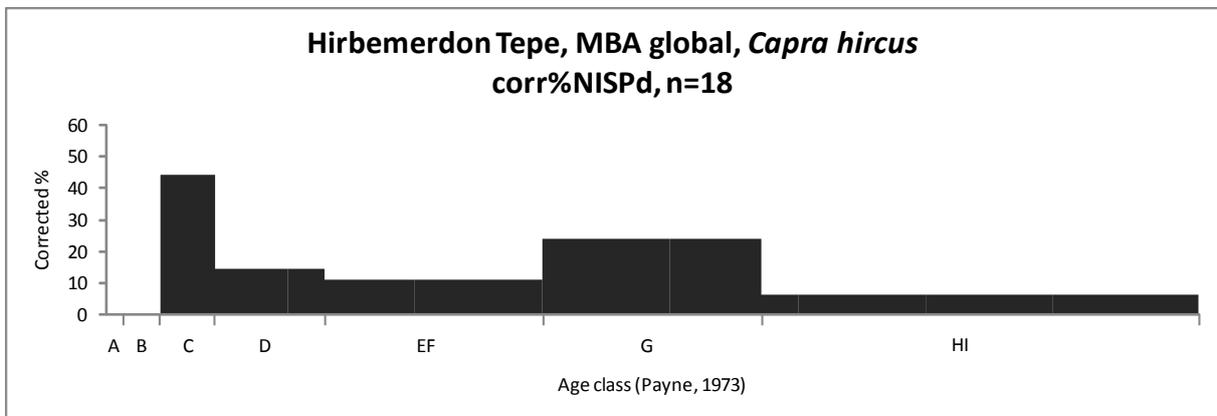


Figure III.98. Goat kill-off pattern based on lower dental remains from Middle Bronze Age Hirbemerdon Tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

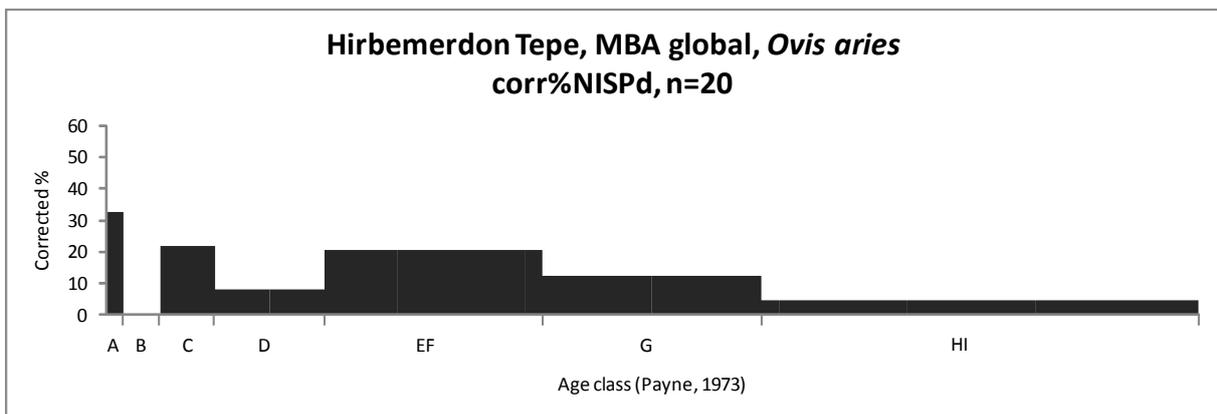


Figure III.99. Sheep kill-off pattern based on lower dental remains from Middle Bronze Age Hirbemerdon Tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

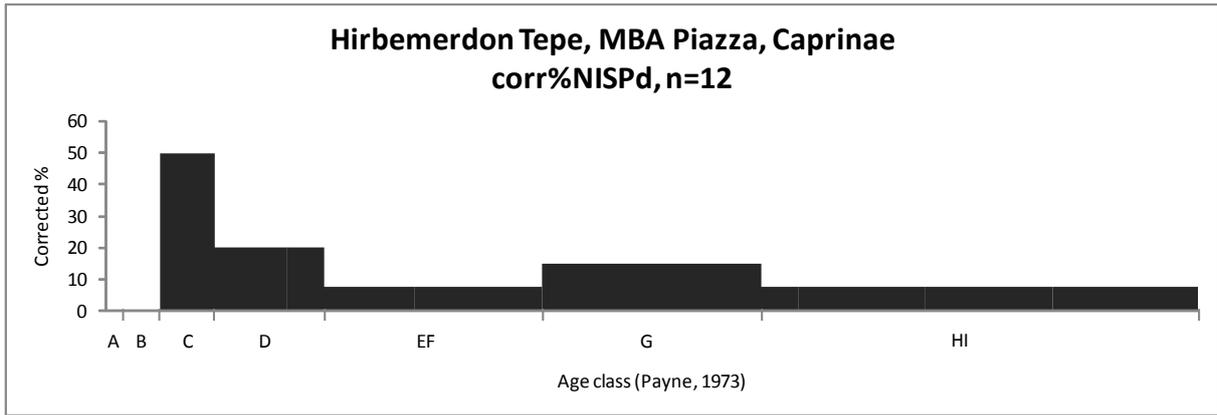


Figure III.100. Sheep and goat kill-off pattern based on lower dental remains from the Piazza at Middle Bronze Age Hirbemerdon Tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

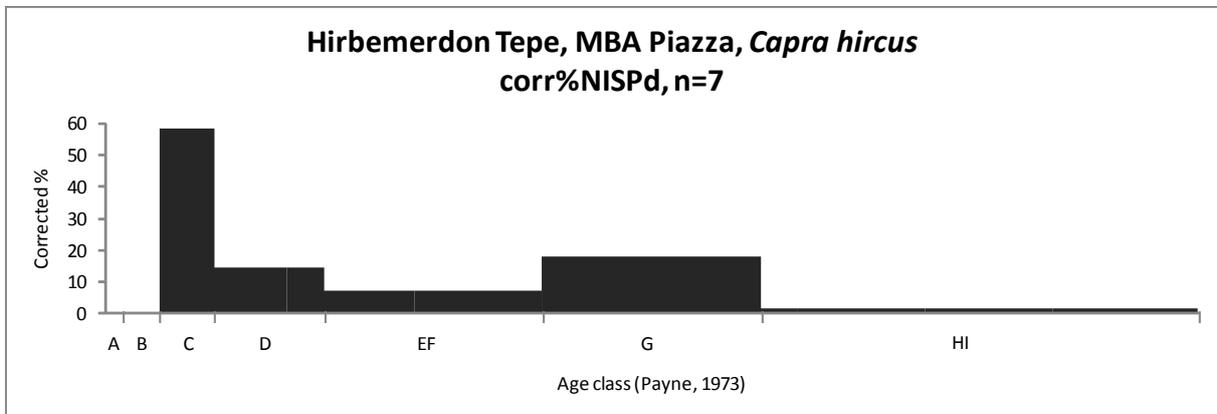


Figure III.101. Goat kill-off pattern based on lower dental remains from the Piazza at Middle Bronze Age Hirbemerdon Tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

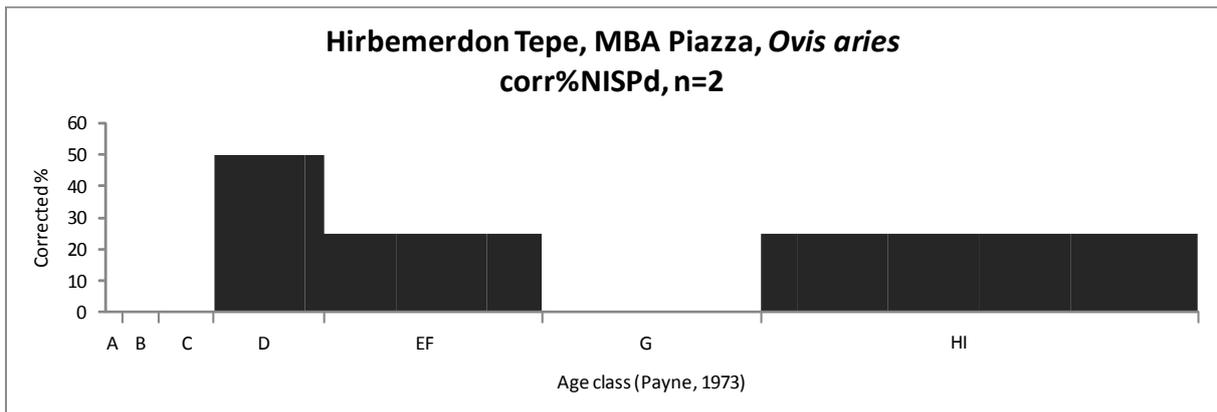


Figure III.102. Sheep kill-off pattern based on lower dental remains from the Piazza at Middle Bronze Age Hirbemerdon Tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

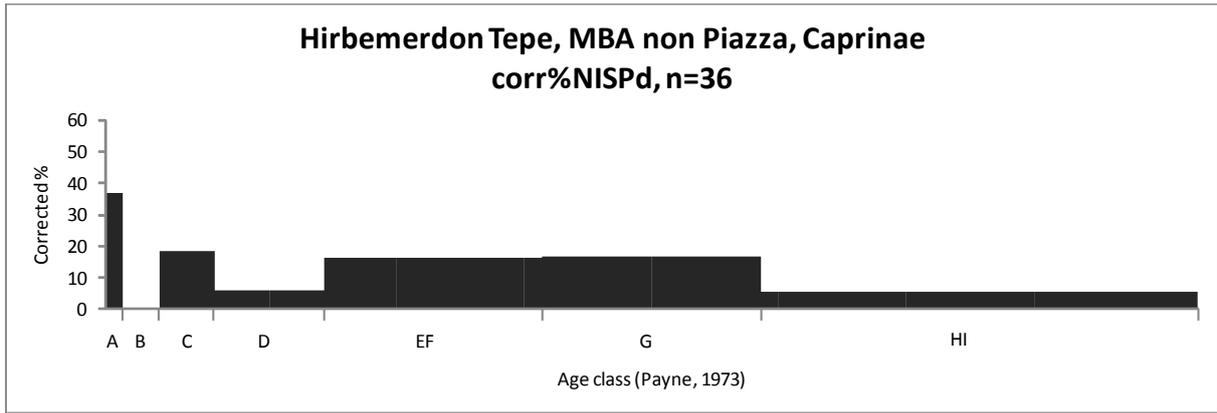


Figure III.103. Sheep and goat kill-off pattern based on lower dental remains from Middle Bronze Age Hirbemerdon Tepe (except Piazza). Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

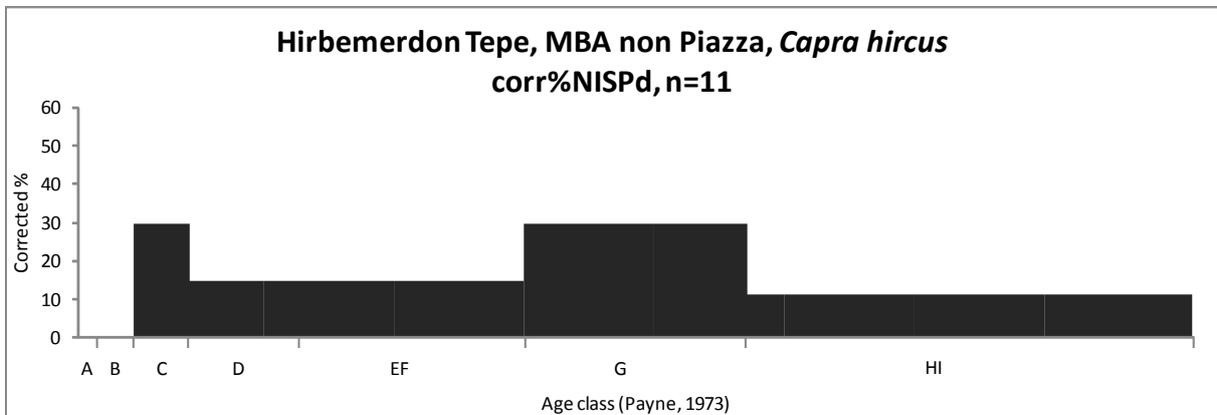


Figure III.104. Goat kill-off pattern based on lower dental remains from Middle Bronze Age Hirbemerdon Tepe (except Piazza). Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

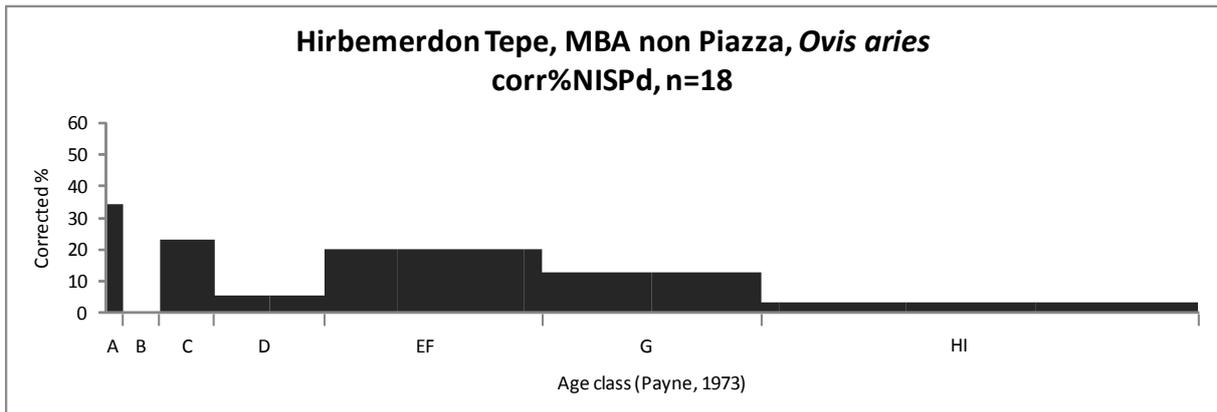


Figure III.105. Sheep kill-off pattern based on lower dental remains from Middle Bronze Age Hirbemerdon Tepe (except Piazza). Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

The assemblage comes from the fill Posterior to the use of the Architectural Complex at Hirbemerdon Tepe is interesting in the sense that sheep and goat are represented by approximately the same number of remains and therefore easily comparable. Surprisingly in this assemblage sheep and goat were selected from the same age classes between one and four years old (Figs. 107-108).

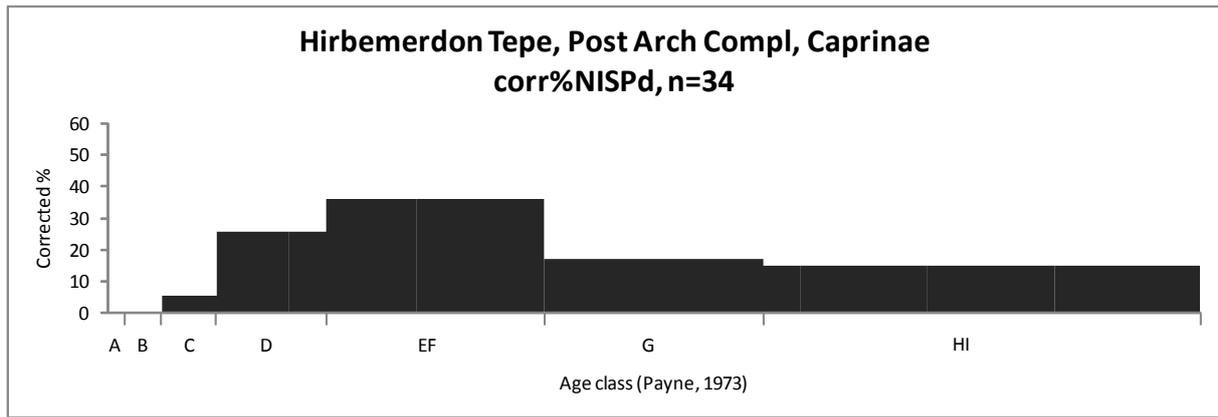


Figure III.106. Sheep and goat kill-off pattern based on lower dental remains from the fill Posterior to the use of the Architectural Complex at Hirbemerdon Tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

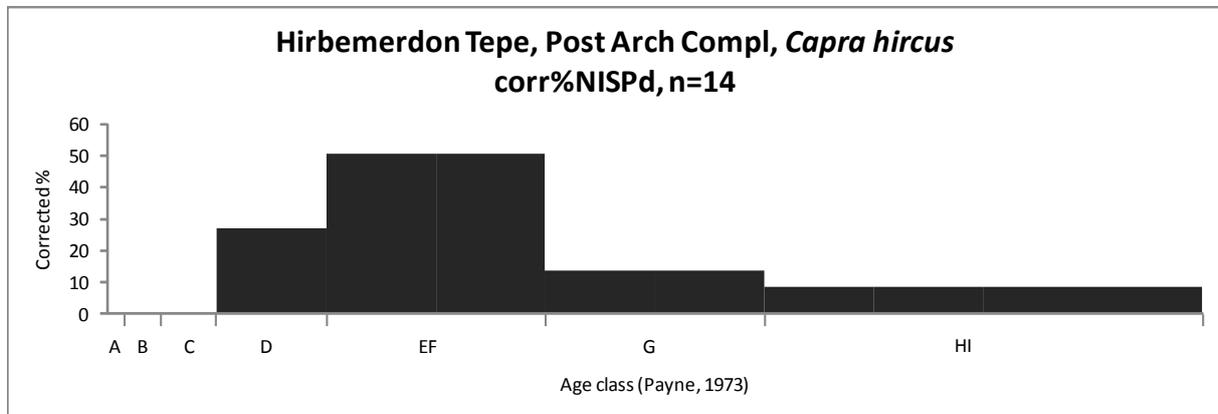


Figure III.107. Goat kill-off pattern based on lower dental remains from the fill Posterior to the use of the Architectural Complex at Hirbemerdon Tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

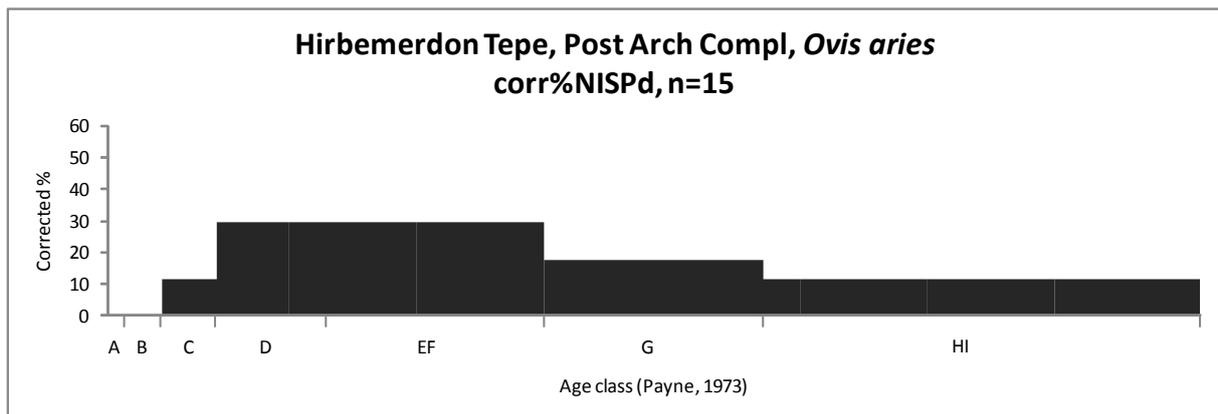


Figure III.108. Sheep kill-off pattern based on lower dental remains from the fill Posterior to the use of the Architectural Complex at Hirbemerdon Tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

On the Iron Age assemblage a second test comparison between kill-of pattern built from the number of lower dental remains (Fig. III.109) and the MNI based on lower dental remains (Fig.

III.110) was performed. Here also the two methods tend to provide similar results. It is therefore decided to keep building the kill-off patterns with the number of lower dental remains as it requests less calculations. The exploitation of sheep and goat in the Iron Age at Hirbemerdon Tepe also seems to have followed the same strategy. For both species animals were selected among individuals aged between six months and one year and then between two and six years old. The only difference between sheep and goat is that, in the latter category, goats were slaughtered slightly younger than sheep (Figs. III.111-112).

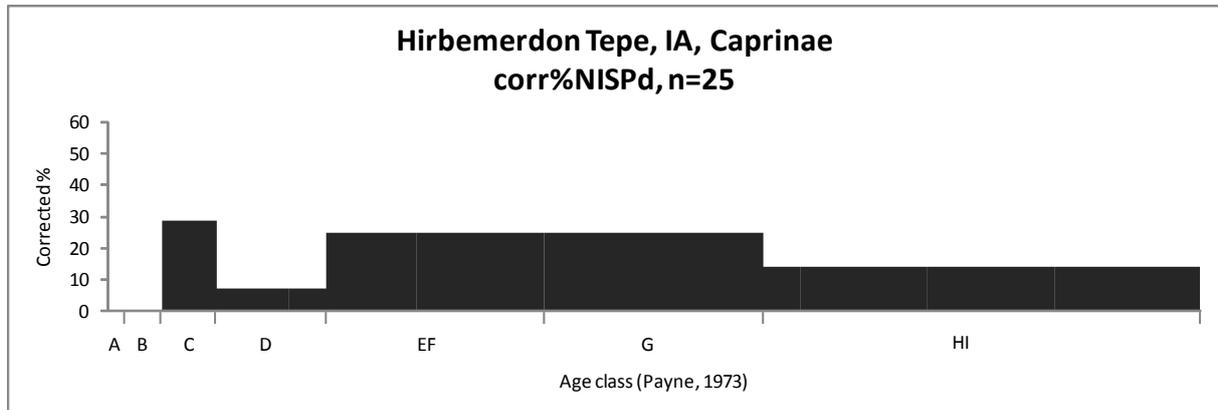


Figure III.109. Sheep and goat kill-off pattern based on lower dental remains from Iron Age Hirbemerdon Tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

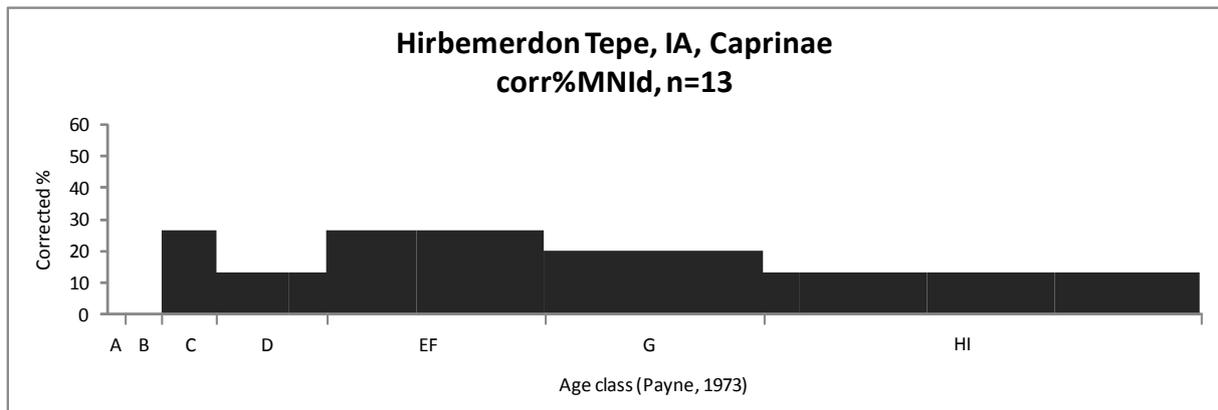


Figure III.110. Sheep and goat kill-off pattern based on MNI calculated from lower dental remains from Iron Age Hirbemerdon Tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

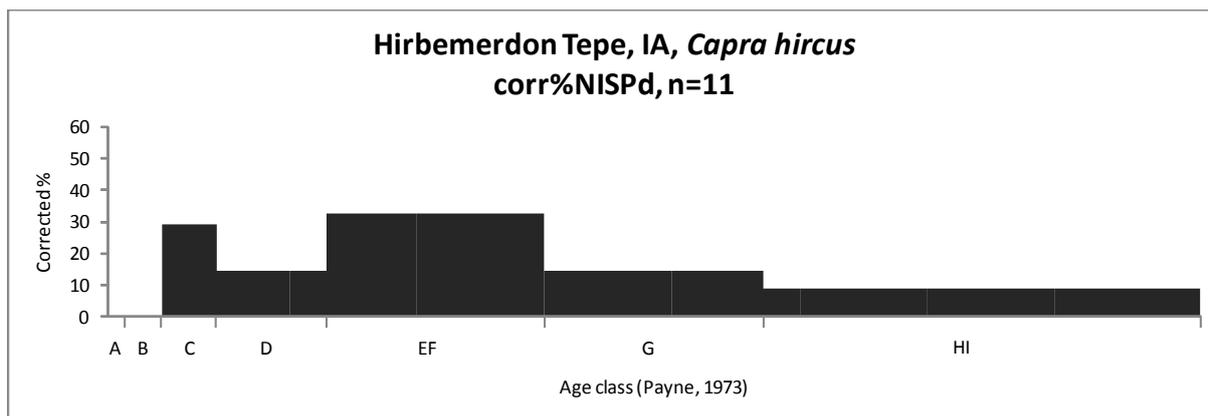


Figure III.111. Goat kill-off pattern based on lower dental remains from Iron Age Hirbemerdon Tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

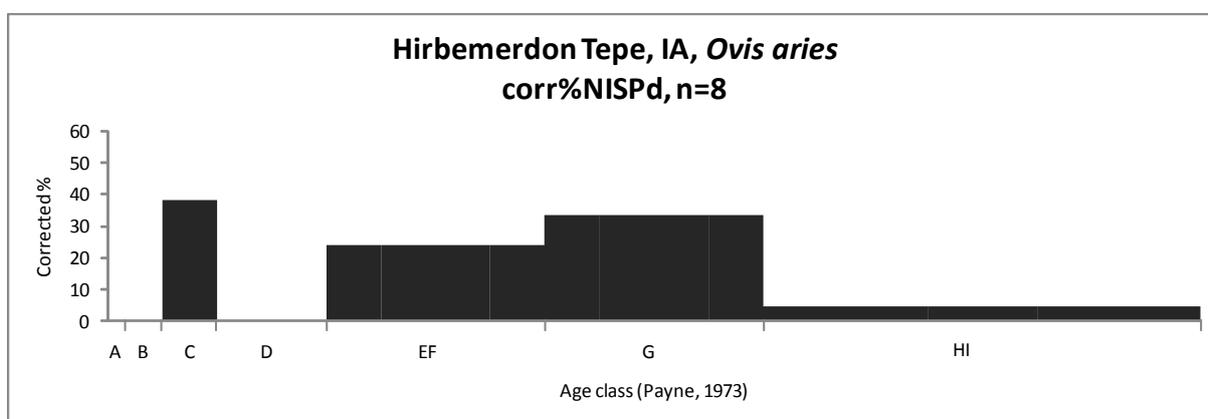


Figure III.112. Sheep kill-off pattern based on lower dental remains from Iron Age Hirbemerdon Tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

For Kavuşan Höyük it was not possible to build separated kill-off patterns for sheep and goat. Even considering the two species together the amount of remains is quite low. Both Late Bronze Age and Neo-Assyrian assemblages are lacking in young individuals and the oldest ones are quite rare. Most of the individuals were slaughtered when they reached at least their optimal meat weight.

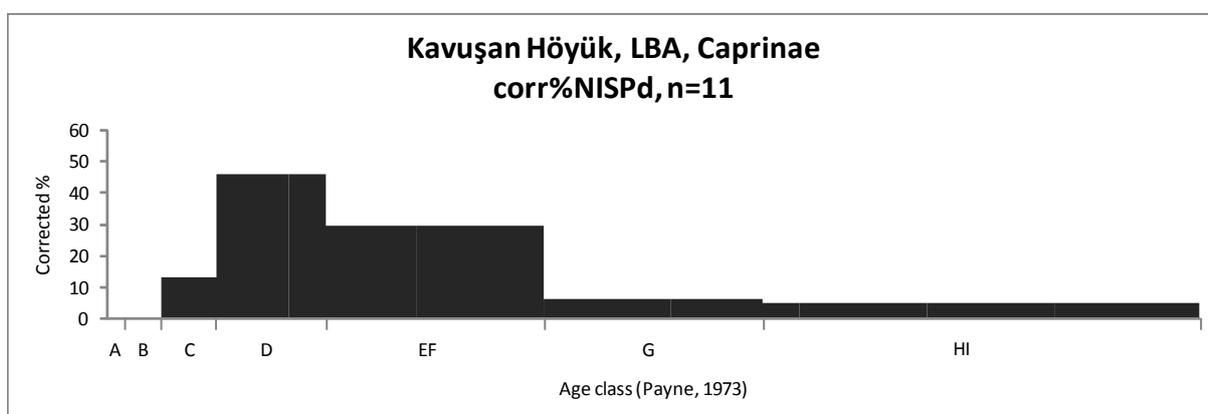


Figure III.113. Sheep and goat kill-off pattern based on lower dental remains from Late Bronze Age Kavuşan Höyük. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

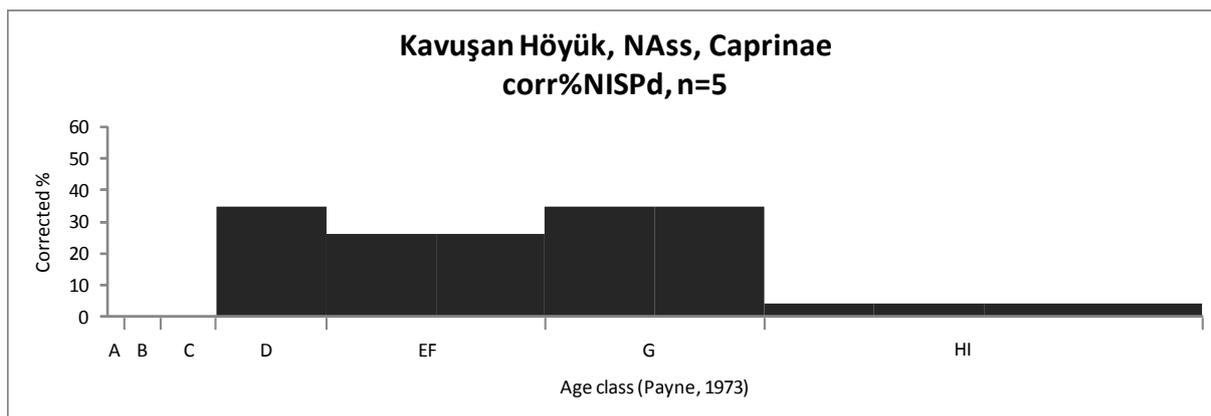


Figure III.114. Sheep and goat kill-off pattern based on lower dental remains from Neo-Assyrian Kavuşan Höyük. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

In Middle Bronze Age Kenan Tepe, caprine were apparently not consumed at the same age in the two areas excavated at the site. Consumption in Area C concerned in majority tender meat from animals slaughtered between six months and one year old but also much older individuals, aged between four and six years (Fig. III.118). In Area D, caprine consumption targeted individuals between one and six years old. Animal between one and two years old were mainly sheep (Fig. III.122), the older ones being goats (Figs. III.121).

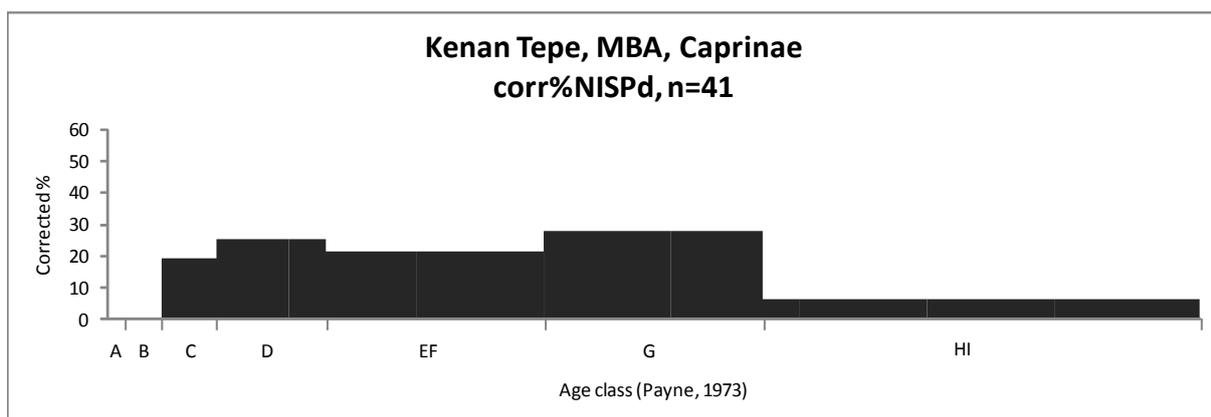


Figure III.115. Sheep and goat kill-off pattern based on lower dental remains from Middle Bronze Age Kenan Tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

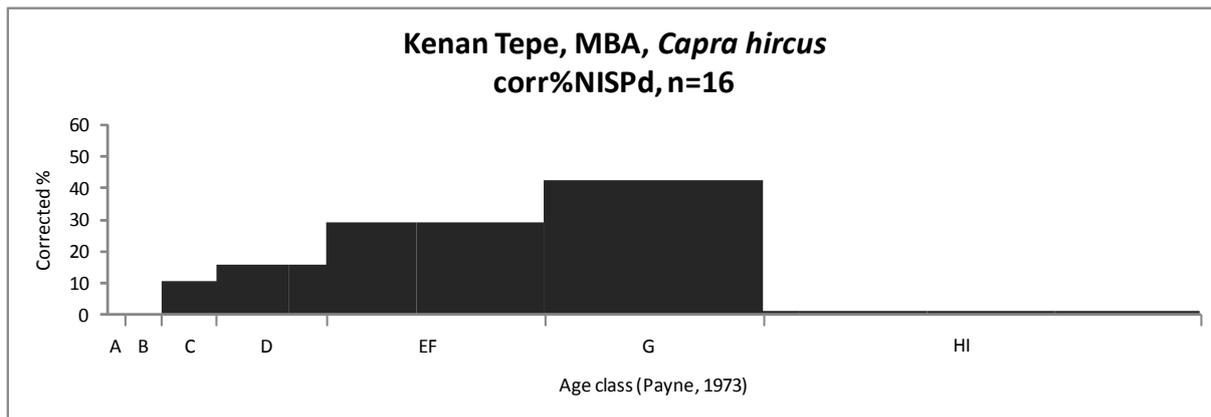


Figure III.116. Goat kill-off pattern based on lower dental remains from Middle Bronze Age Kenan Tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

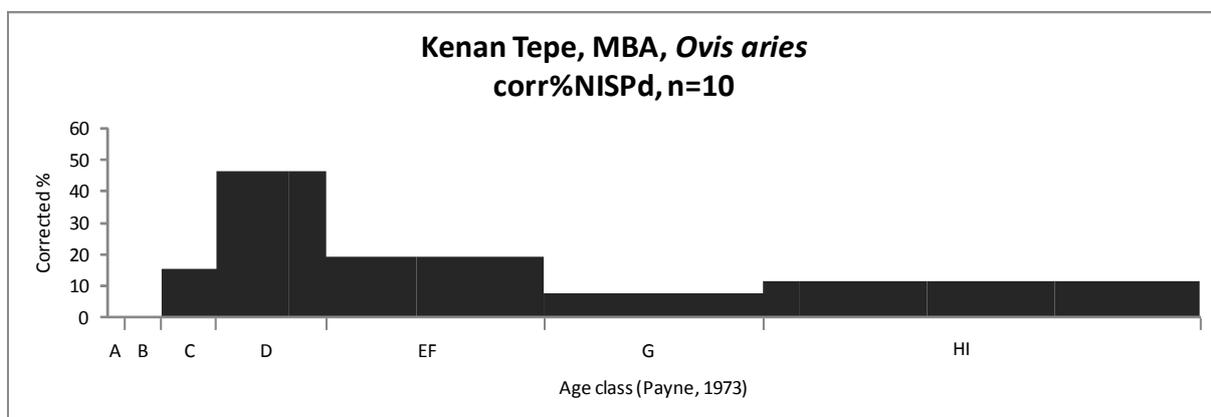


Figure III.117. Sheep kill-off pattern based on lower dental remains from Middle Bronze Age Kenan Tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

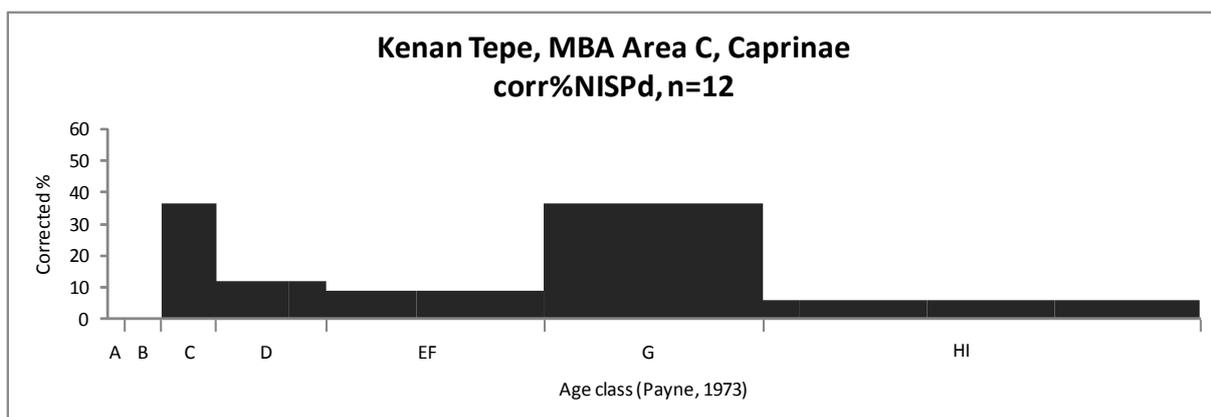


Figure III.118. Sheep and goat kill-off pattern based on lower dental remains from Area C at Middle Bronze Age Kenan Tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

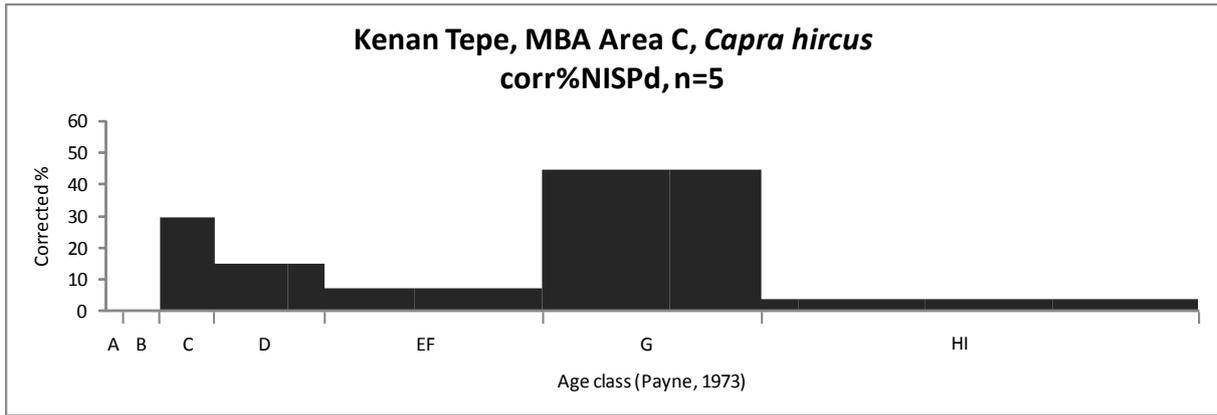


Figure III.119. Goat kill-off pattern based on lower dental remains from Area C at Middle Bronze Age Kenan Tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

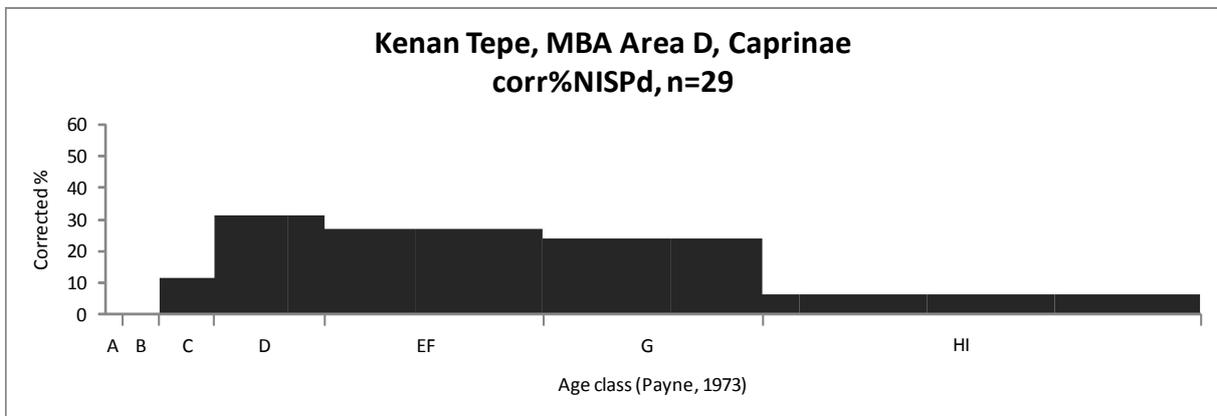


Figure III.120. Sheep and goat kill-off pattern based on lower dental remains from Area D at Middle Bronze Age Kenan Tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

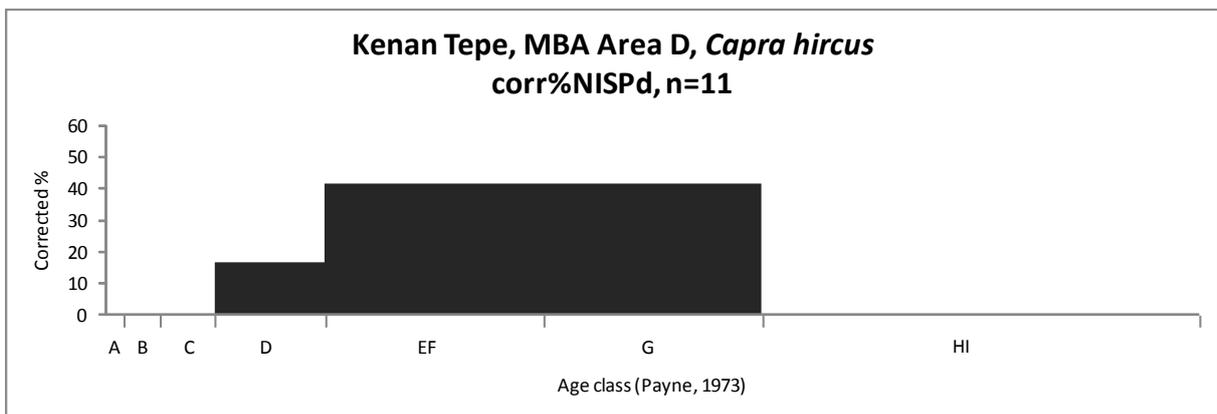


Figure III.121. Goat kill-off pattern based on lower dental remains from Area D at Middle Bronze Age Kenan Tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

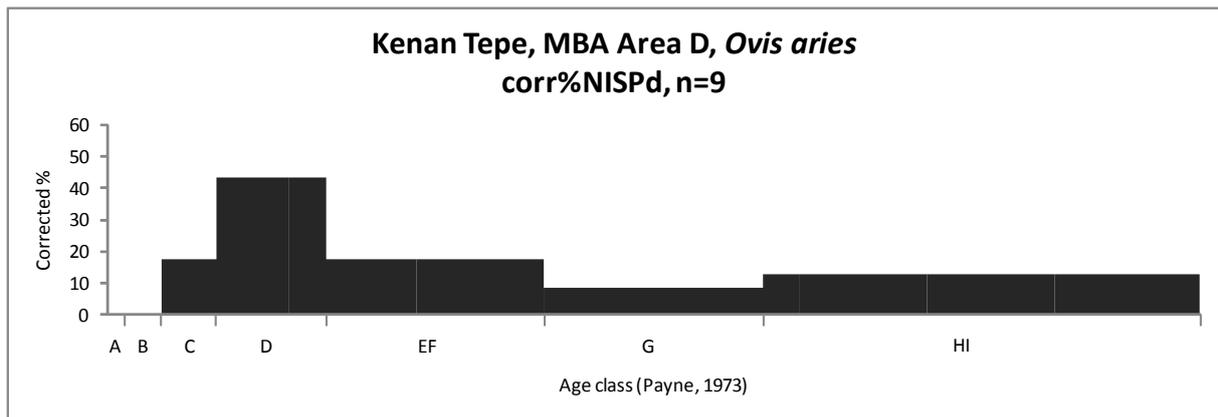


Figure III.122. Sheep kill-off pattern based on lower dental remains from Area D at Middle Bronze Age Kenan Tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

At Müslüman-tepe, the Middle and Late Bronze Age kill-off patterns are rather different. In the Middle Bronze Age, slaughtered animals were in majority from six months to one year old but also older up to four years (Fig. III.123). In the Late Bronze Age, slaughtered sheep and goat were issued from more diverse age classes but animals between six months and one year old are rare (Fig. III.124).

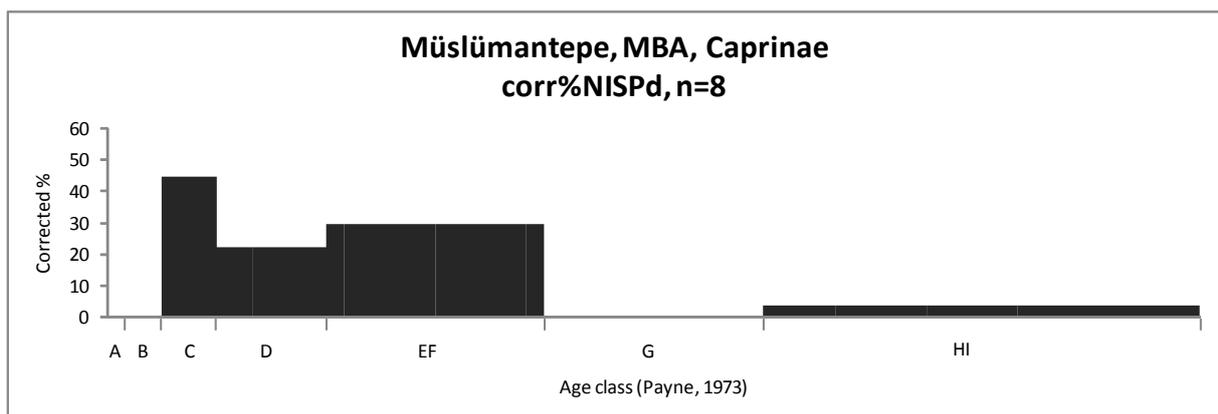


Figure III.123. Sheep and goat kill-off pattern based on lower dental remains from Middle Bronze Age Müslüman-tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

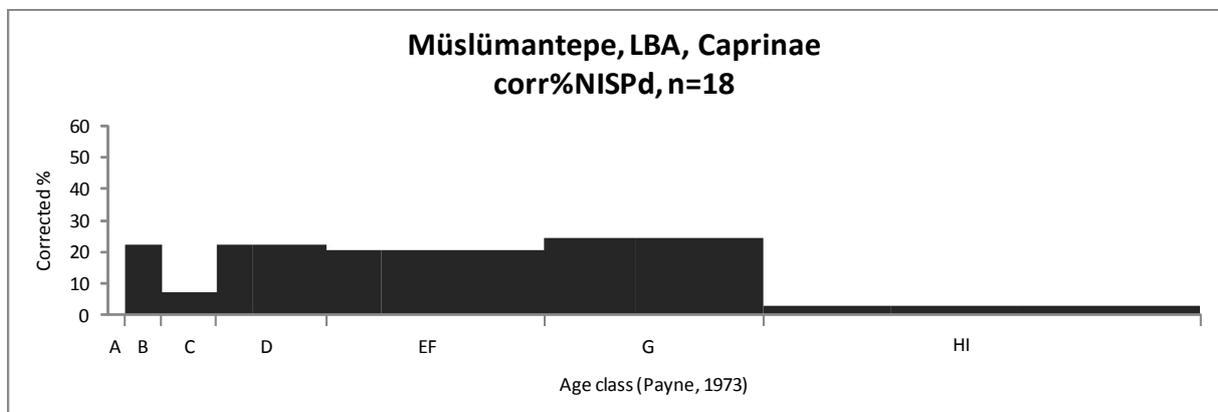


Figure III.124. Sheep and goat kill-off pattern based on lower dental remains from Late Bronze Age Müslüman-tepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

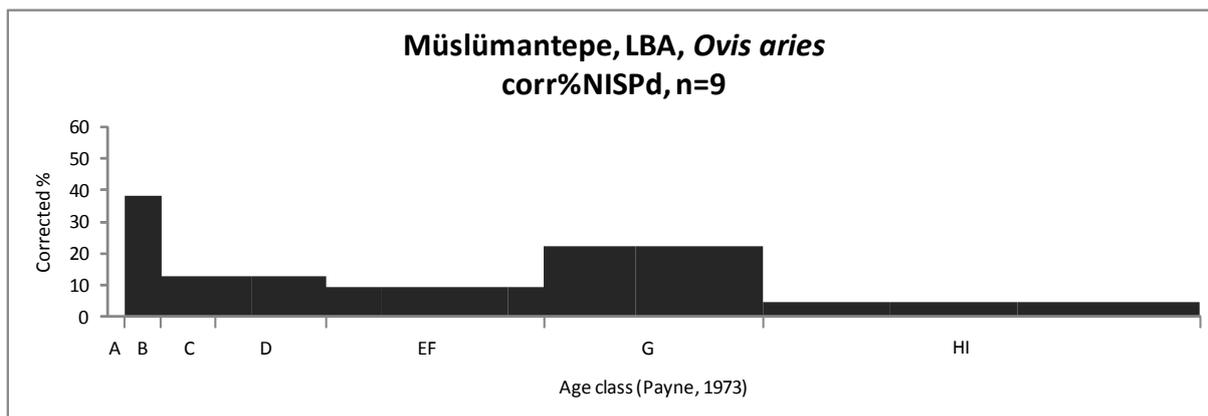


Figure III.125. Sheep kill-off pattern based on lower dental remains from Late Bronze Age Müslümantepe. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

In Türbe Höyük, the rather small Middle Bronze Age assemblage shows a strong focus on adult sheep and goat between one and six years old with a peak between two and four years (Figs. III.126-128). In the Late Bronze Age assemblage, most of the age classes are represented with the exception of young animals under six months old. It can be noticed that sheep seems to be slaughtered older than goat (Figs. III.129-131).

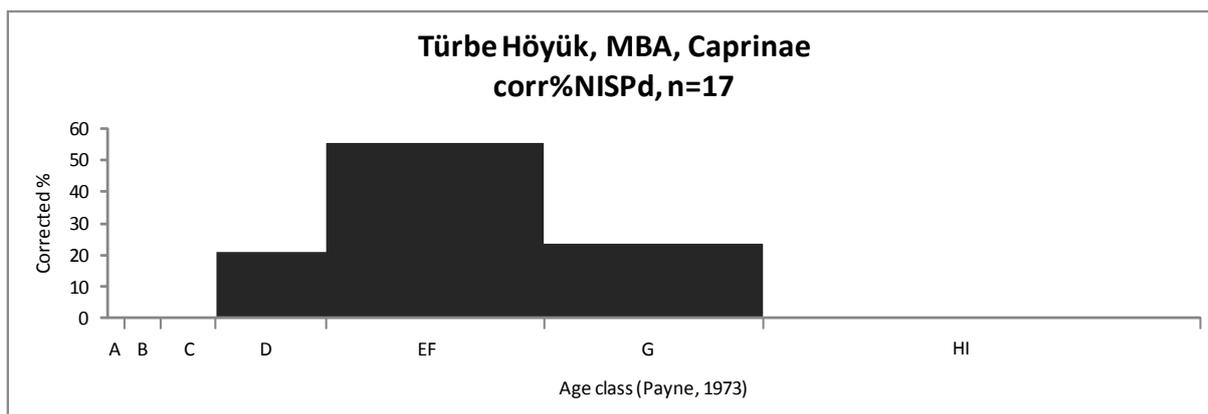


Figure III.126. Sheep and goat kill-off pattern based on lower dental remains from Middle Bronze Age Türbe Höyük. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

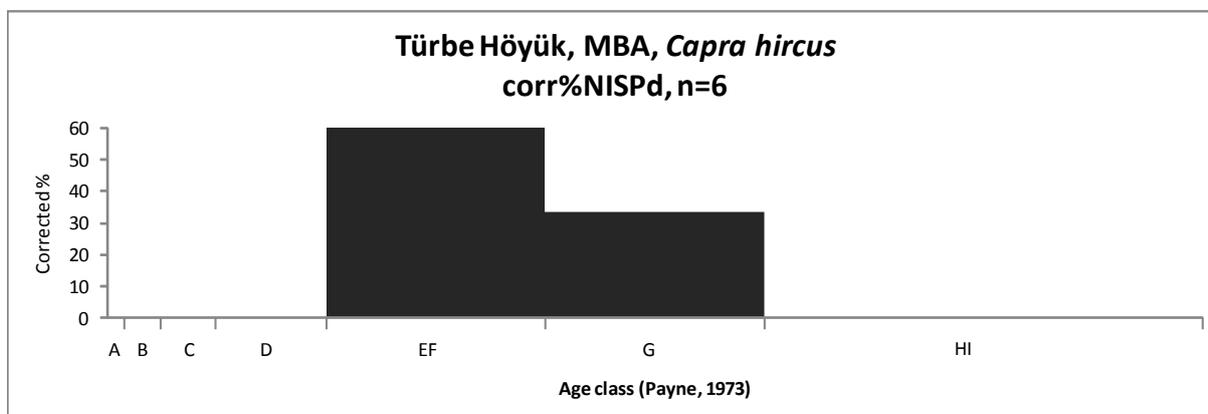


Figure III.127. Goat kill-off pattern based on lower dental remains from Middle Bronze Age Türbe Höyük. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

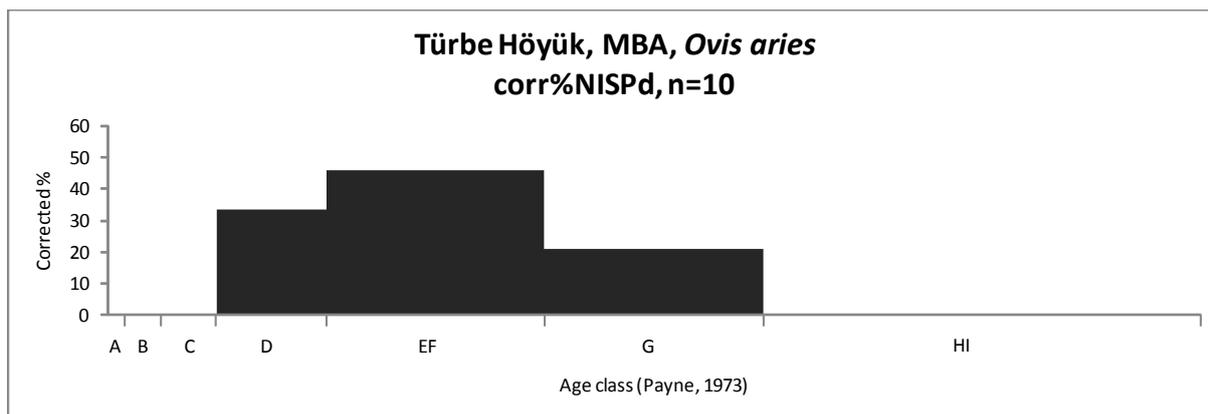


Figure III.128. Sheep kill-off pattern based on lower dental remains from Middle Bronze Age Túrbe Höyük. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

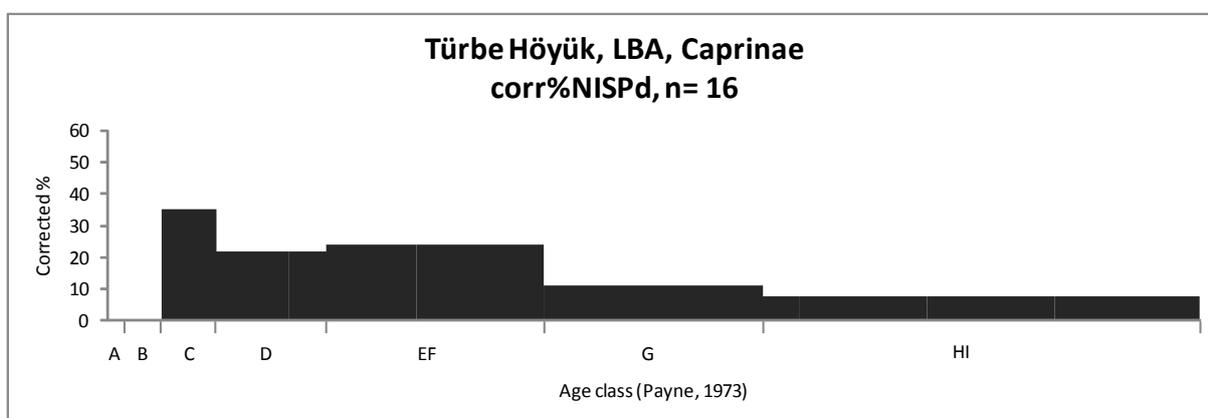


Figure III.129. Sheep and goat kill-off pattern based on lower dental remains from Late Bronze Age Túrbe Höyük. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

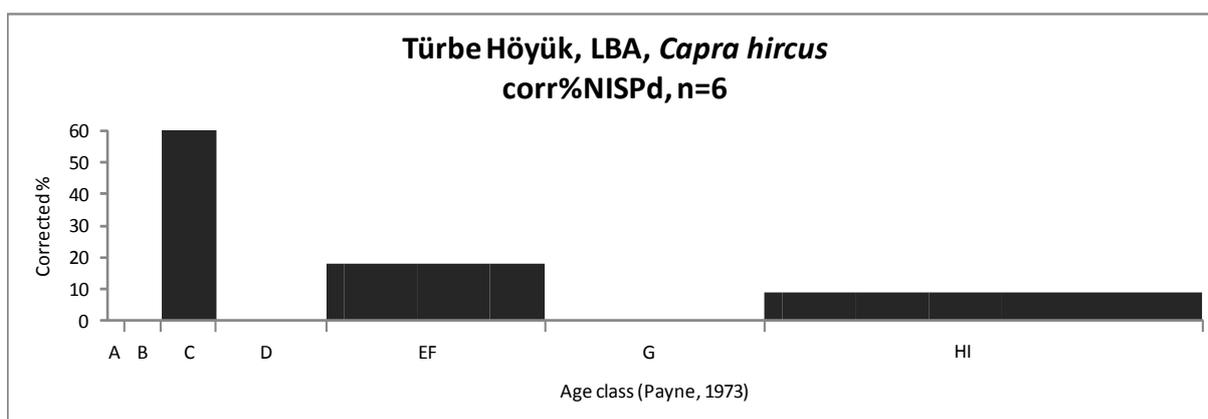


Figure III.130. Goat kill-off pattern based on lower dental remains from Late Bronze Age Túrbe Höyük. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

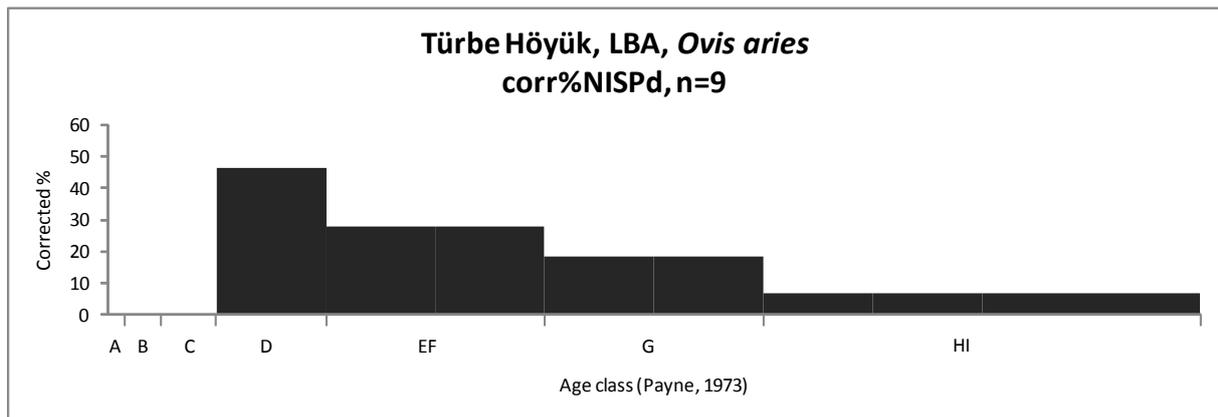


Figure III.131. Sheep kill-off pattern based on lower dental remains from Late Bronze Age Türbe Höyük. Age classes in years; A=0-0.17, B=0.17-0.5, C=0.5-1, D=1-2, EF=2-4, G=4-6, HI=6-10.

It is quite difficult to summarize such an amount of different kill-off patterns, considering also that most of them have a very low number of remains and therefore should be considered with caution. One important piece of information which was expected is the fact that in most of the assemblages sheep and goat were exploited in different manners. However, Correspondence Analysis shows that there is not a particular pattern attributed to sheep and another one to goat (Fig. III.132). Axis 1 mostly separates the class A from the other age classes. Axis 2 splits age classes A, B, and C from the other ones. Due to the small size of the assemblages in general, it is difficult to completely understand the variability of the patterns of exploitation of sheep and goat.

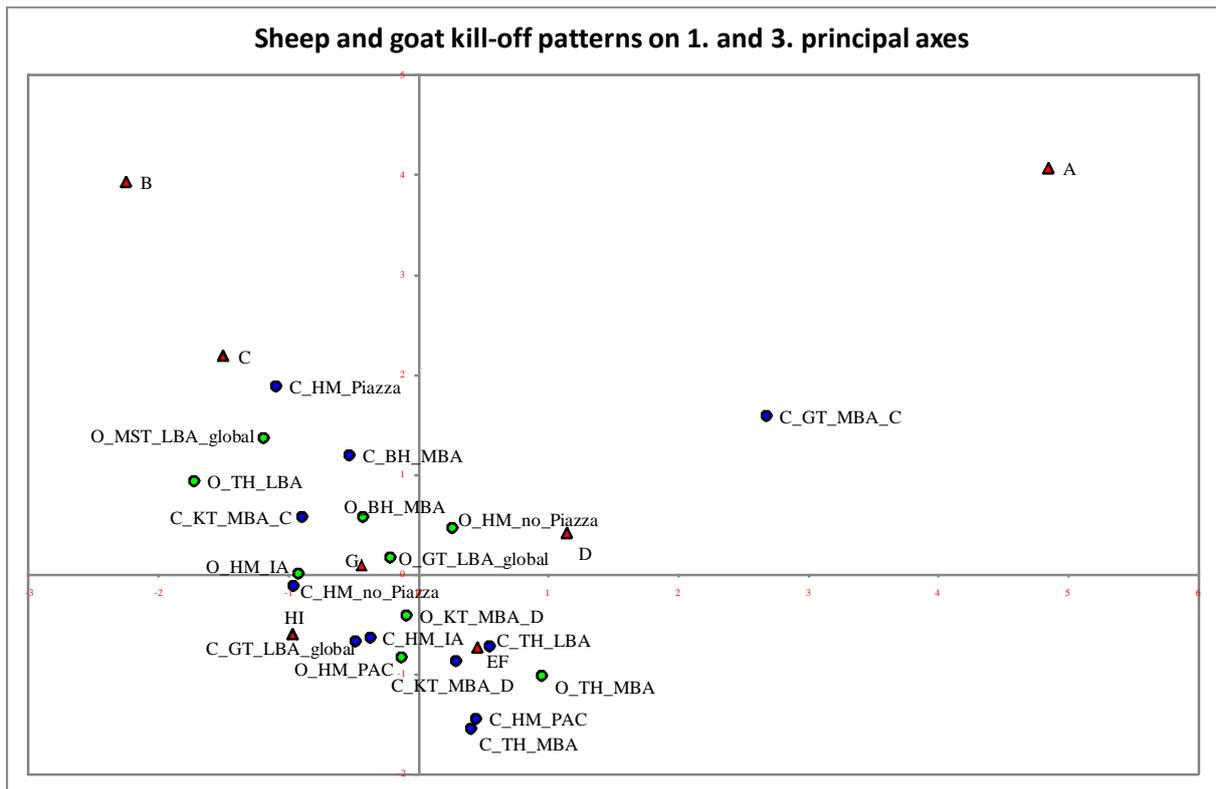


Figure III.132. Correspondence Analysis, using CAPCA software, with sheep (O, green dots) or goat (C, blue dots) kill-off patterns as objects and age classes as variables. Minimum sum for objects is 5. Axis 1 explains 29.70% and Axis 3 17.76% of the variability.

Correspondence Analysis considering kill-off patterns for sheep and goat together is not either easy to read (Fig. III.133). A and B age classes are sorted from the other ones by Axis 1. Axis 3 is useful to separate EF age class. It is confirmed that contemporary assemblages from a single settlement contain animals slaughtered at different ages. This is clear at Middle Bronze Age Kenan Tepe and Hirbemerdon Tepe. The assemblage from Middle Bronze Age Türbe Höyük is characterized by the importance of the EF age class while a number of assemblages seem to be more focussed in the D age class.

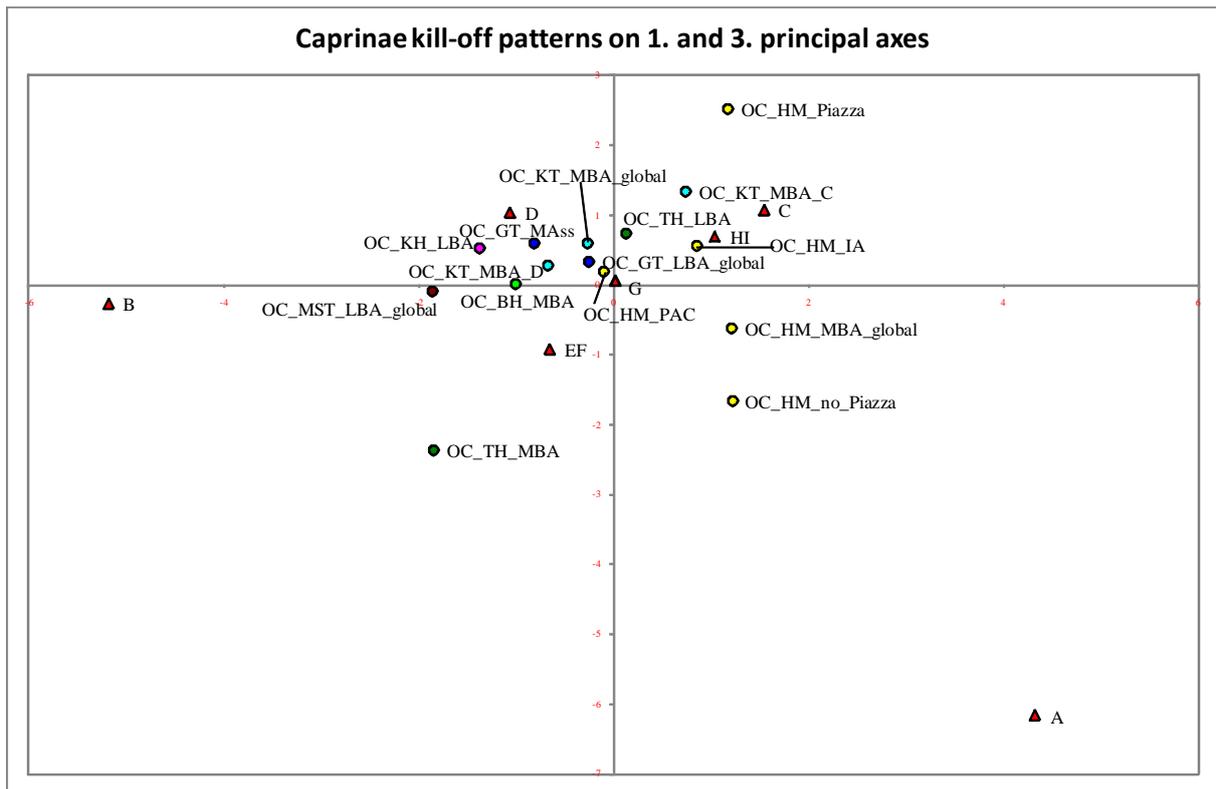


Figure III.133. Correspondence Analysis, using CAPCA software, with Caprinae kill-off patterns as objects and age classes as variables. Minimum sum for objects is 10. Axis 1 explains 35.83% and Axis 3 15.26% of the variability.

(c) *Skeletal representation*

Sheep and goat skeletal elements are sorted in three groups according to the value of the meat attached to these bones (Fig. III.134-154). Definition of the high, medium and low value meat is given by H.-P. Uerpmann (1973). Skeletal representation is investigated for sheep and goat together as there are too many discrepancies in the possibility to identify remains to the specific level, depending on the skeletal element considered.

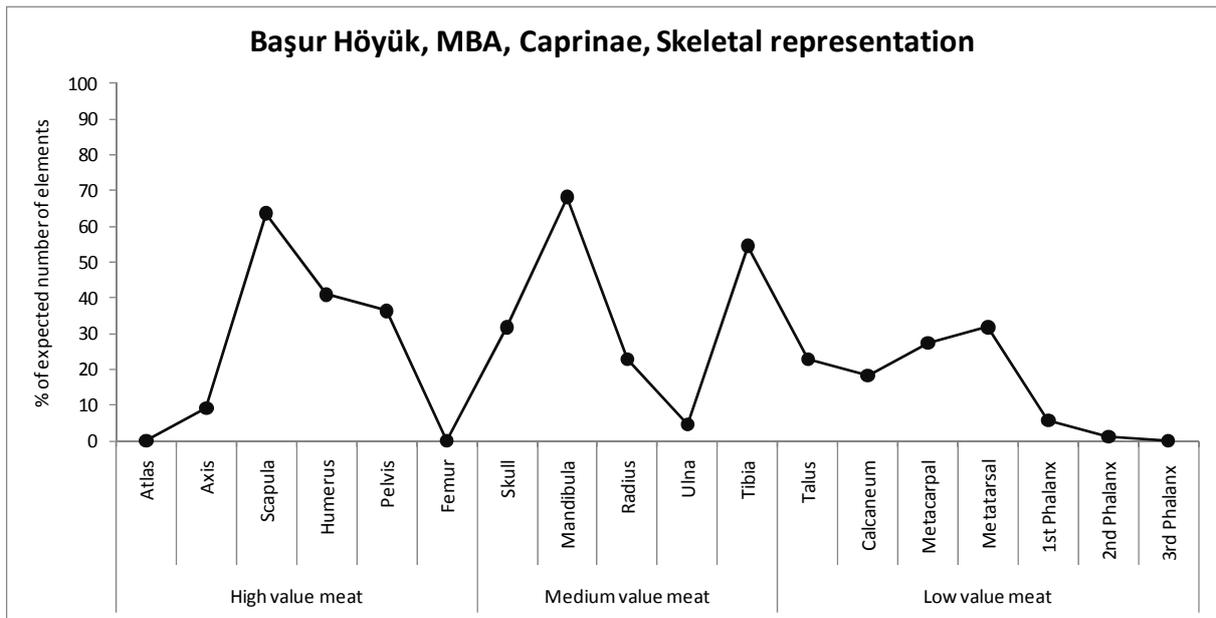


Figure III.134. Skeletal representation for caprine from Middle Bronze Age Başur Höyük (MNI= 11, 100 elements).

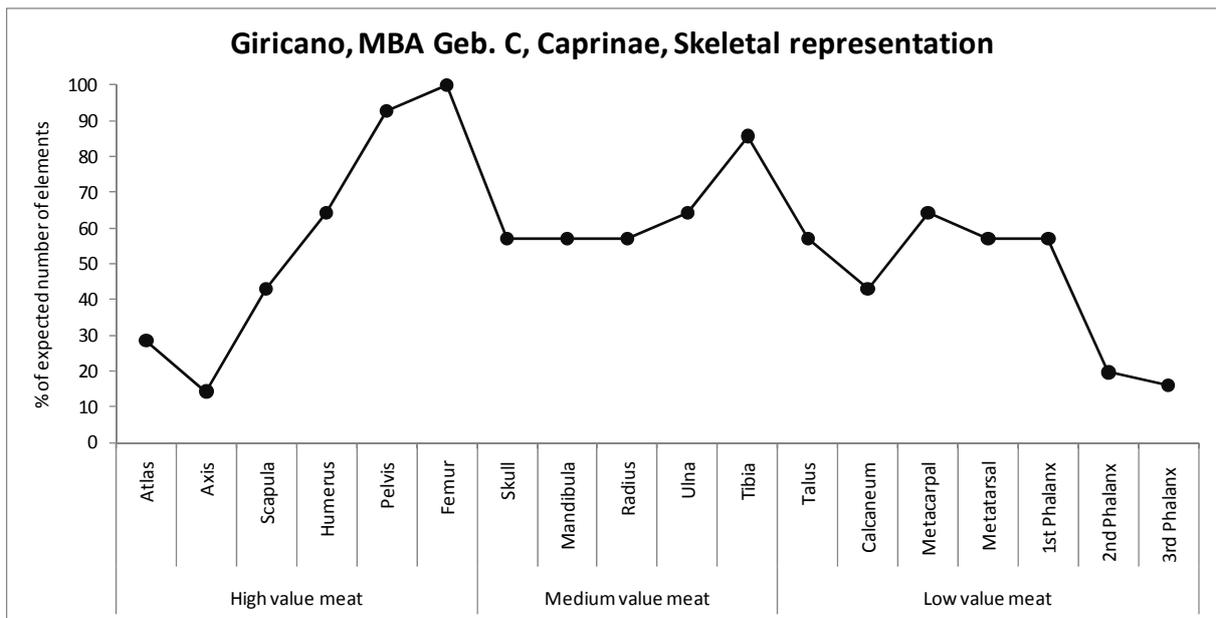


Figure III.135. Skeletal representation for caprine from Geb. C at Middle Bronze Age Giricano (MNI= 7, 173 elements).

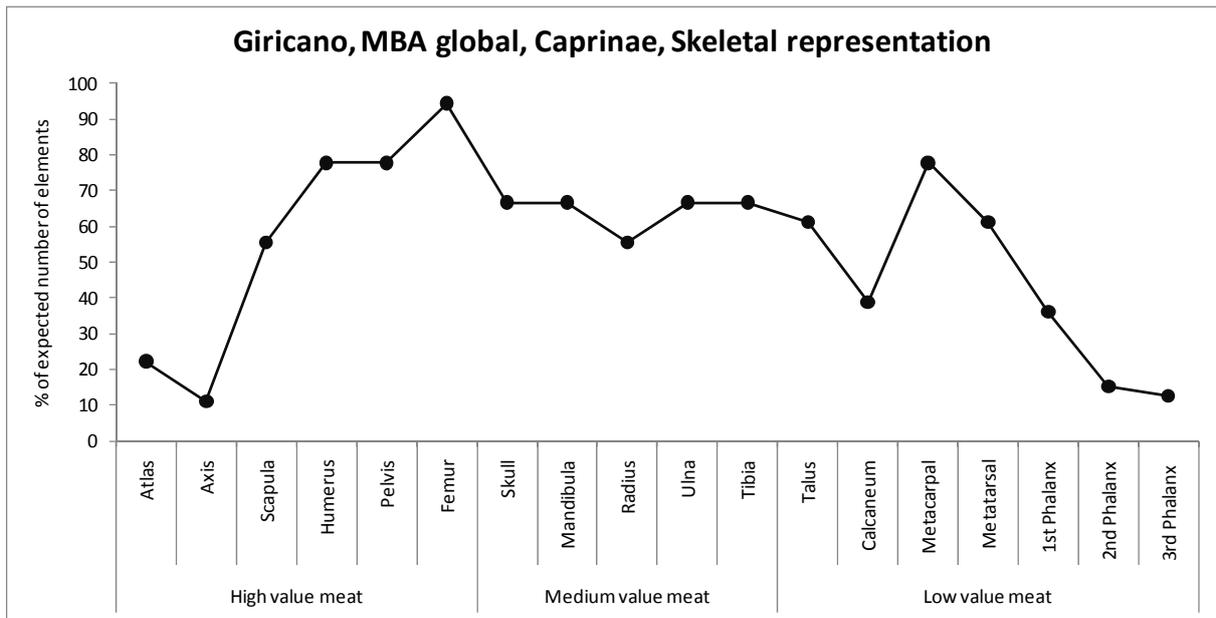


Figure III.136. Skeletal representation for caprine from Middle Bronze Age Giricano (MNI= 9, 205 elements).

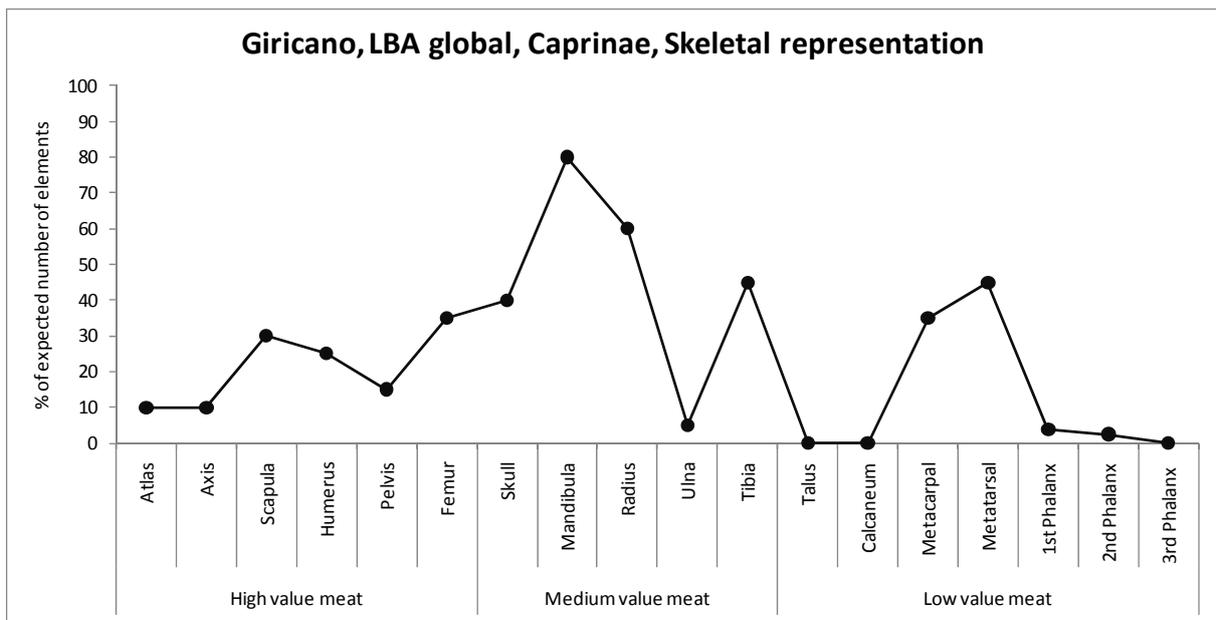


Figure III.137. Skeletal representation for caprine from Late Bronze Age Giricano (MNI= 10, 90 elements).

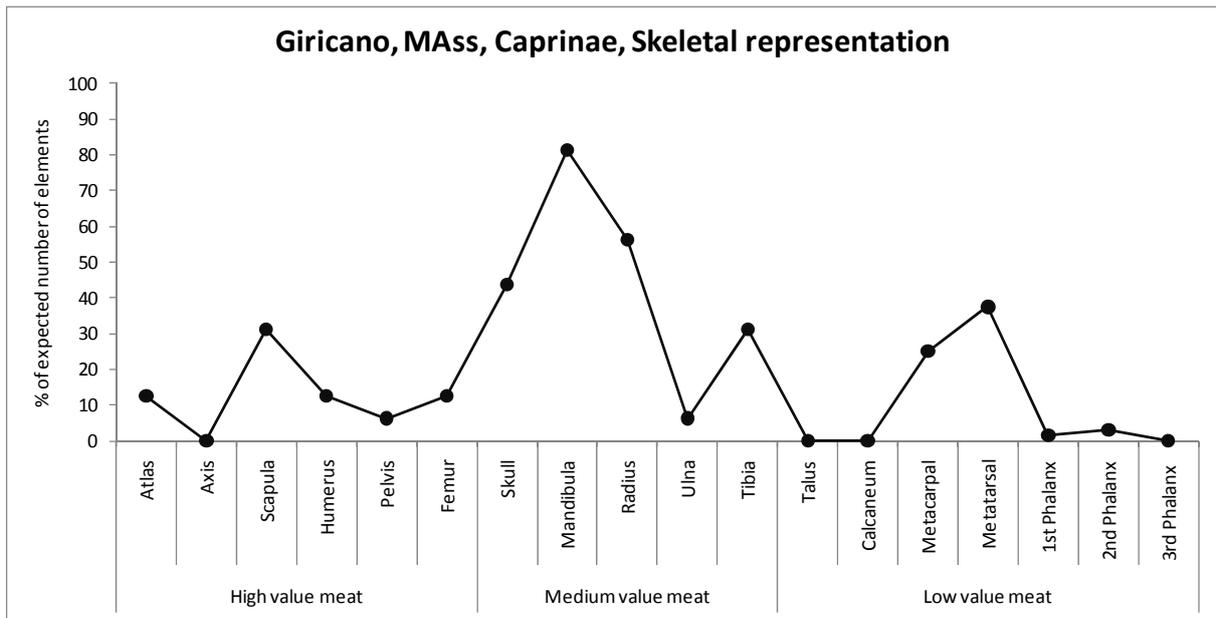


Figure III.138. Skeletal representation for caprine from Middle Assyrian Giricano (MNI= 8, 59 elements).

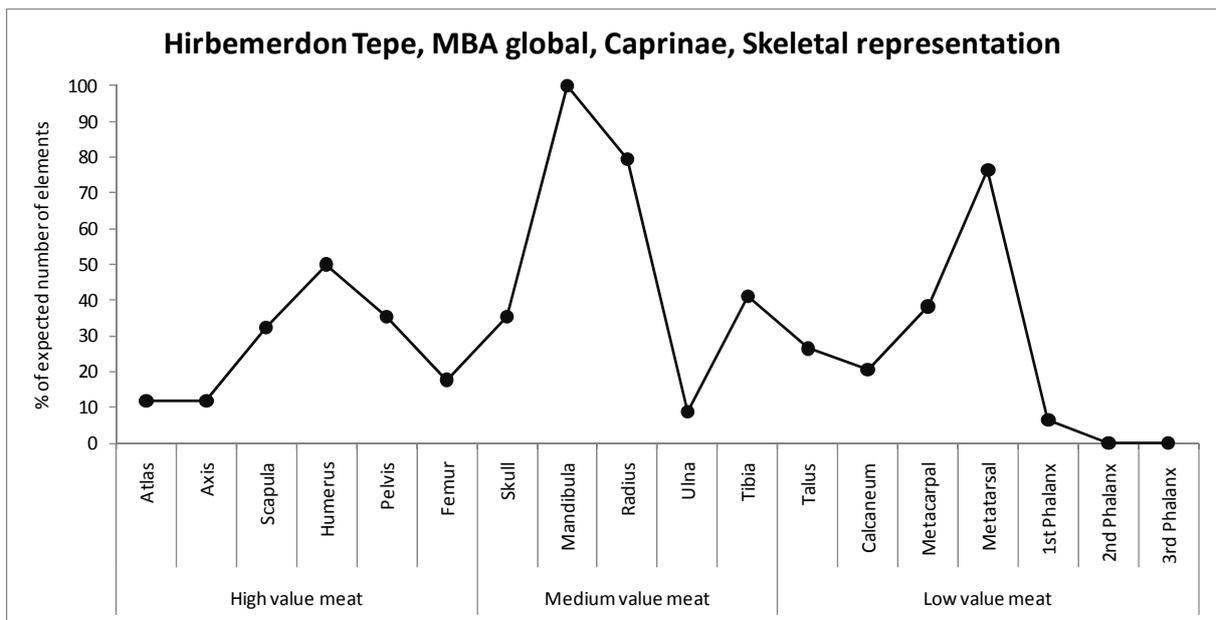


Figure III.139. Skeletal representation for caprine from Middle Bronze Age Hirbemerdon Tepe (MNI= 17, 204 elements).

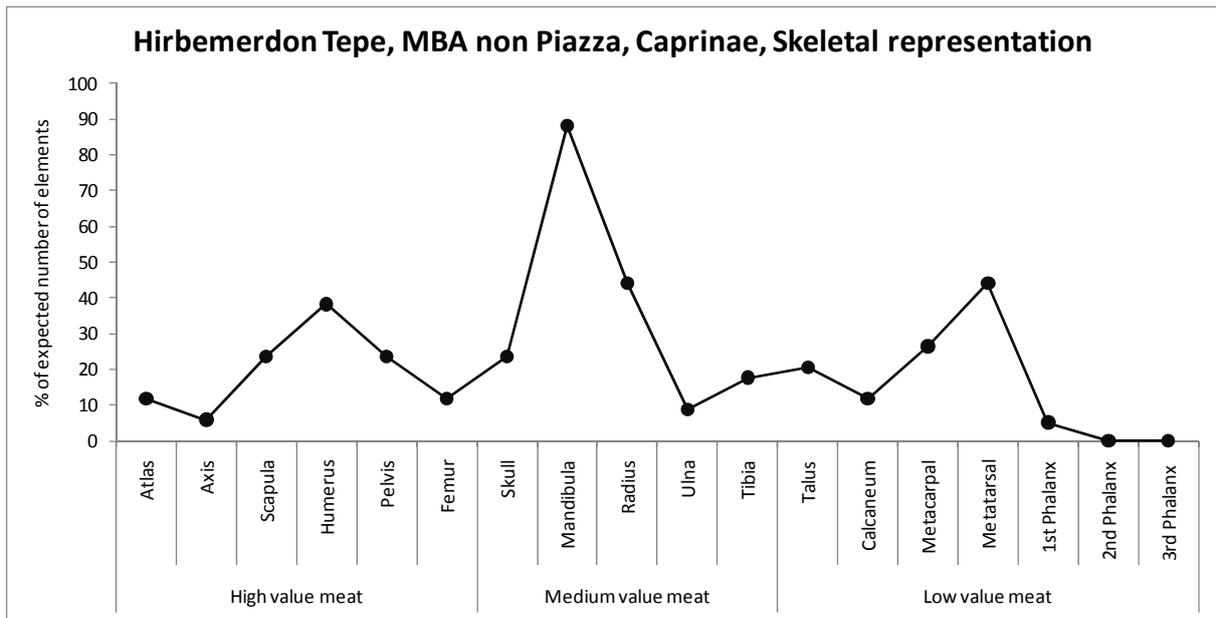


Figure III.140. Skeletal representation for caprine from Middle Bronze Age (except Piazza) Hirbemerdon Tepe (MNI= 17, 140 elements).

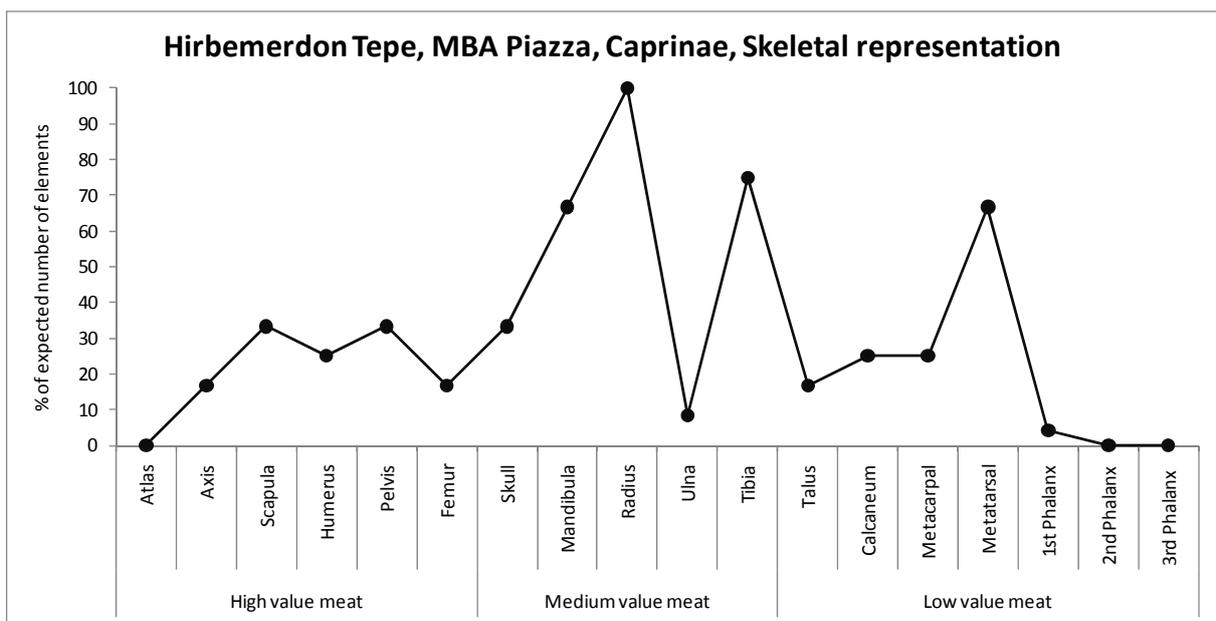


Figure III.141. Skeletal representation for caprine from the Middle Bronze Age Piazza at Hirbemerdon Tepe (MNI= 6, 66 elements).

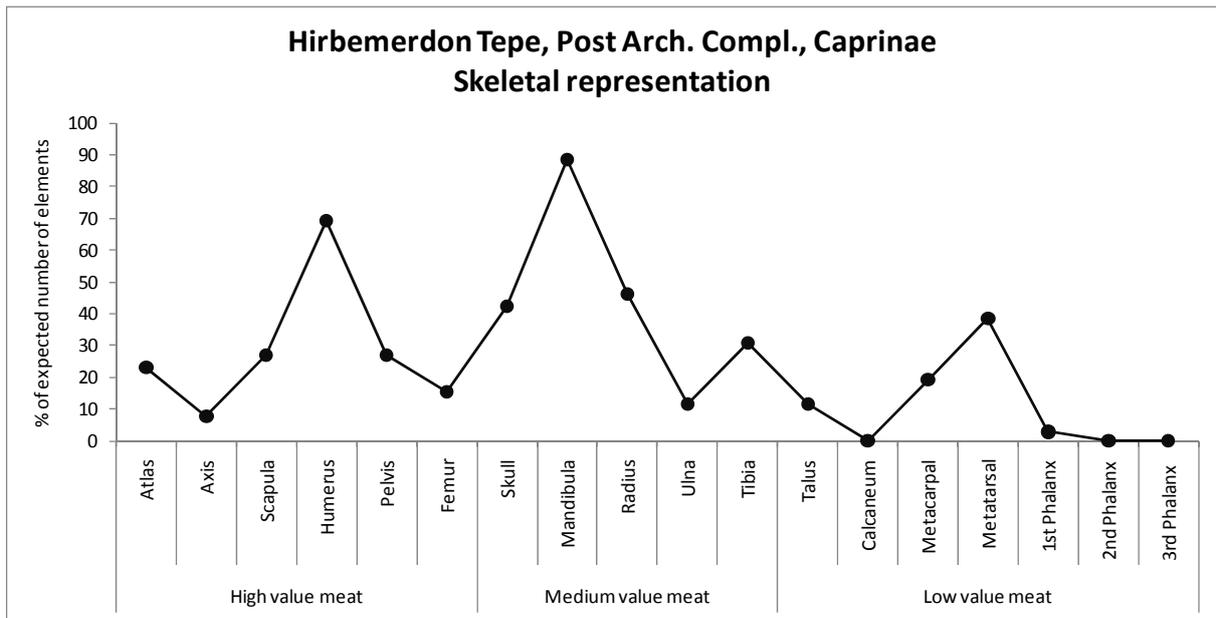


Figure III.142. Skeletal representation for caprine from the fill Posterior to the use of the Architectural Complex at Hirbemerdon Tepe (MNI= 13, 118 elements).

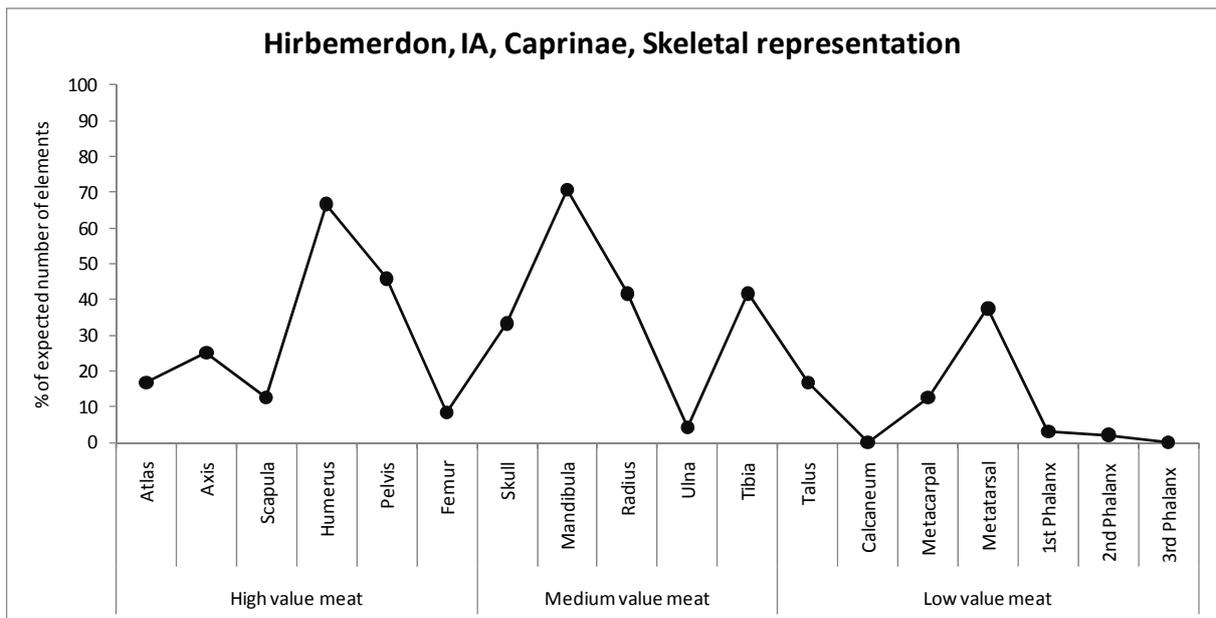


Figure III.143. Skeletal representation for caprine from Iron Age Hirbemerdon Tepe (MNI= 12, 104 elements).

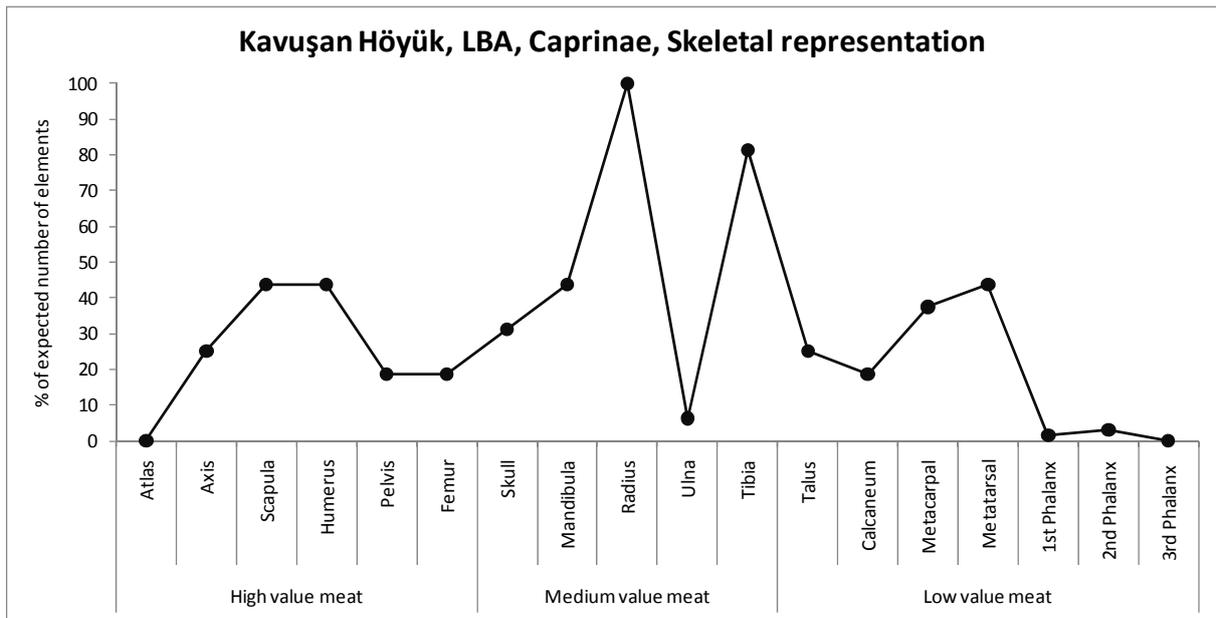


Figure III.144. Skeletal representation for caprine from Late Bronze Age Kavuşan Höyük (MNI= 8, 87 elements).

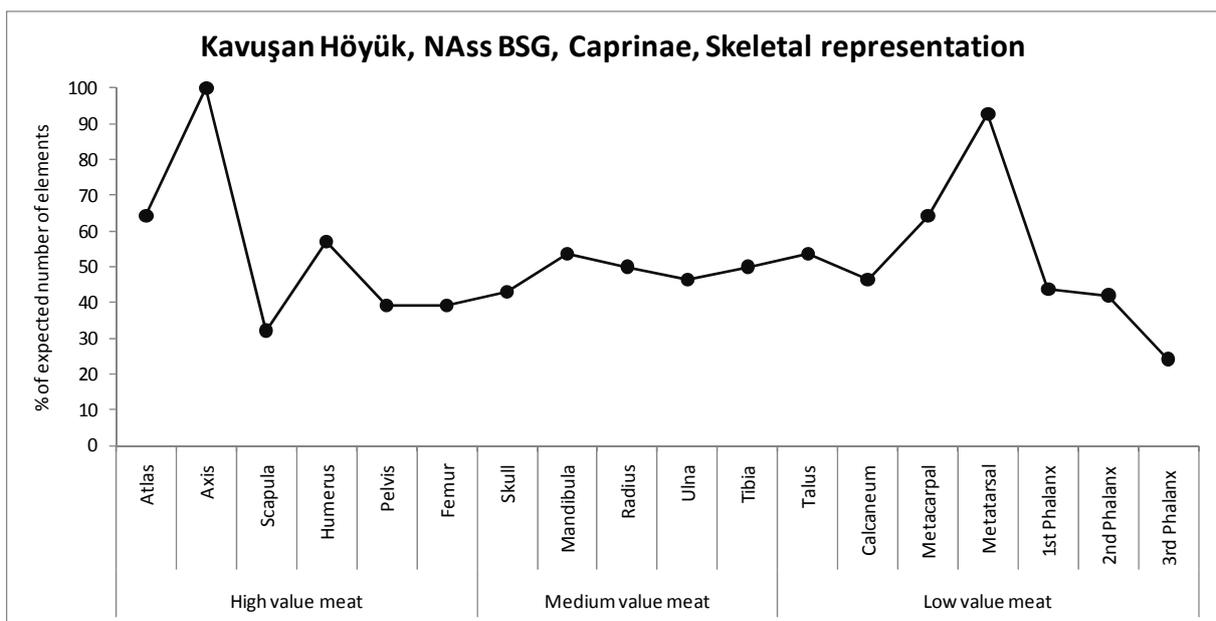


Figure III.145. Skeletal representation for caprine from pit BSG at Neo-Assyrian Kavuşan Höyük (MNI= 14, 333 elements).

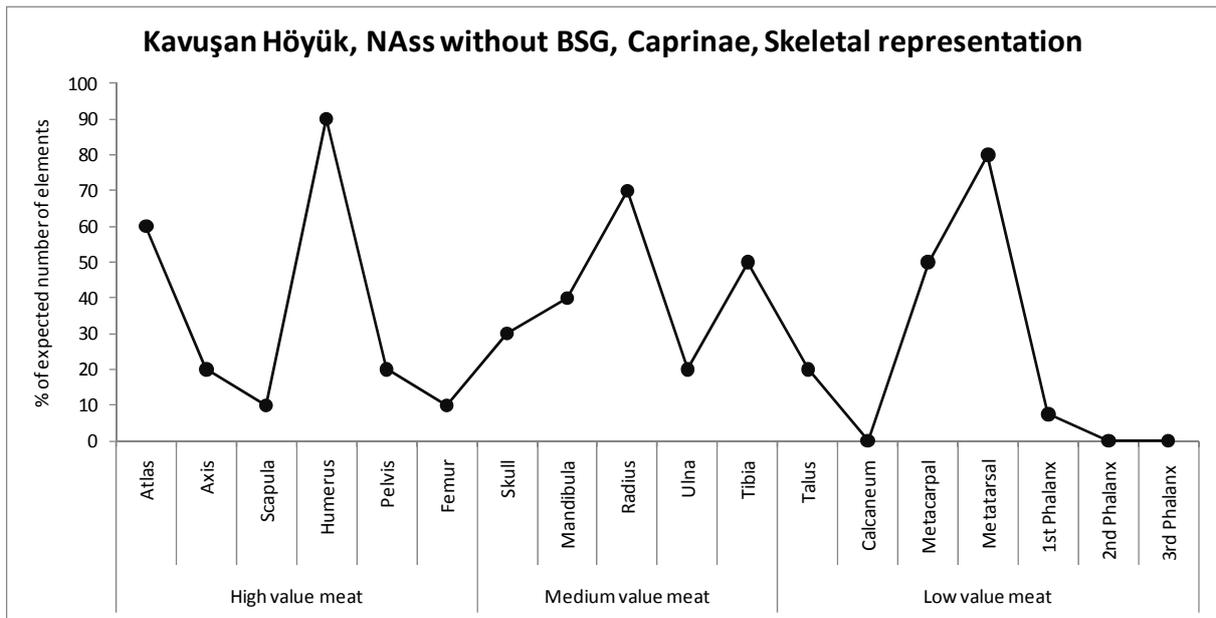


Figure III.146. Skeletal representation for caprine from Neo-Assyrian Kavuşan Höyük (without BSG pit) (MNI= 5, 56 elements).

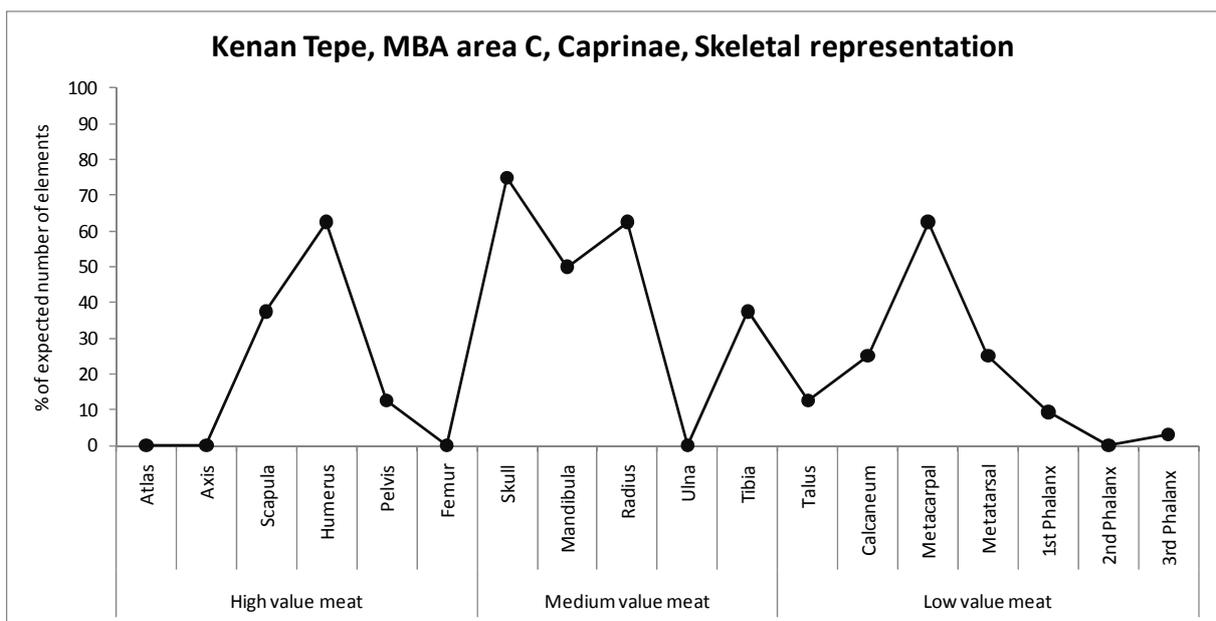


Figure III.147. Skeletal representation for caprine from Area C at Middle Bronze Age Kenan Tepe (MNI= 4, 41 elements).

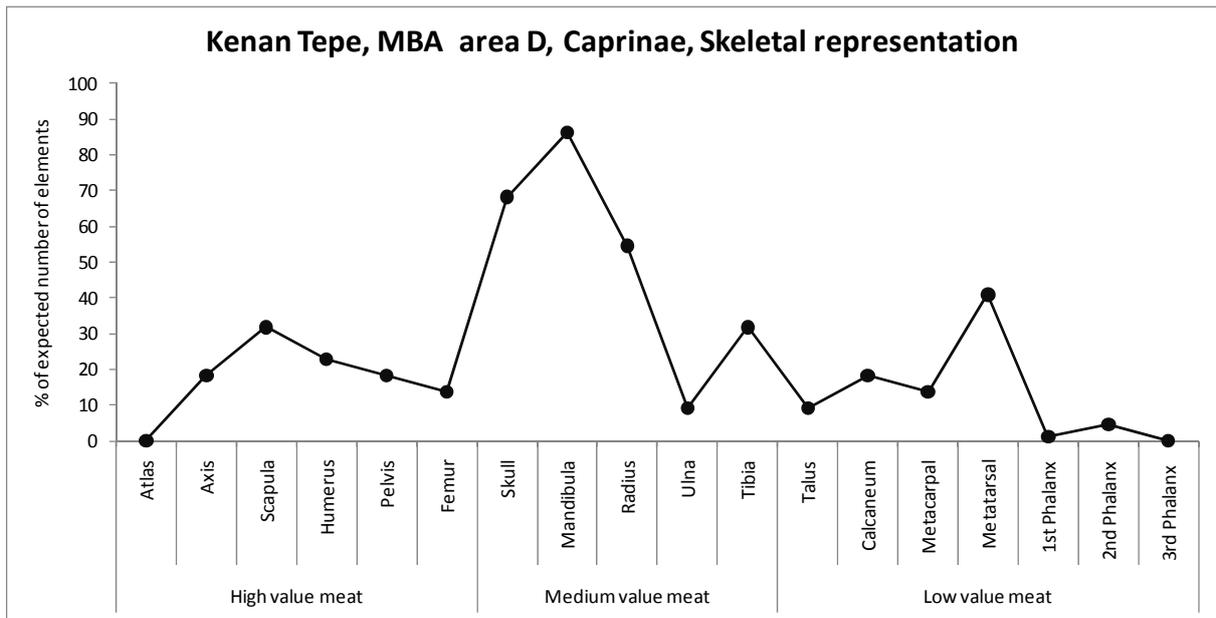


Figure III.148. Skeletal representation for caprine from Area D at Middle Bronze Age Kenan Tepe (MNI= 11, 99 elements).

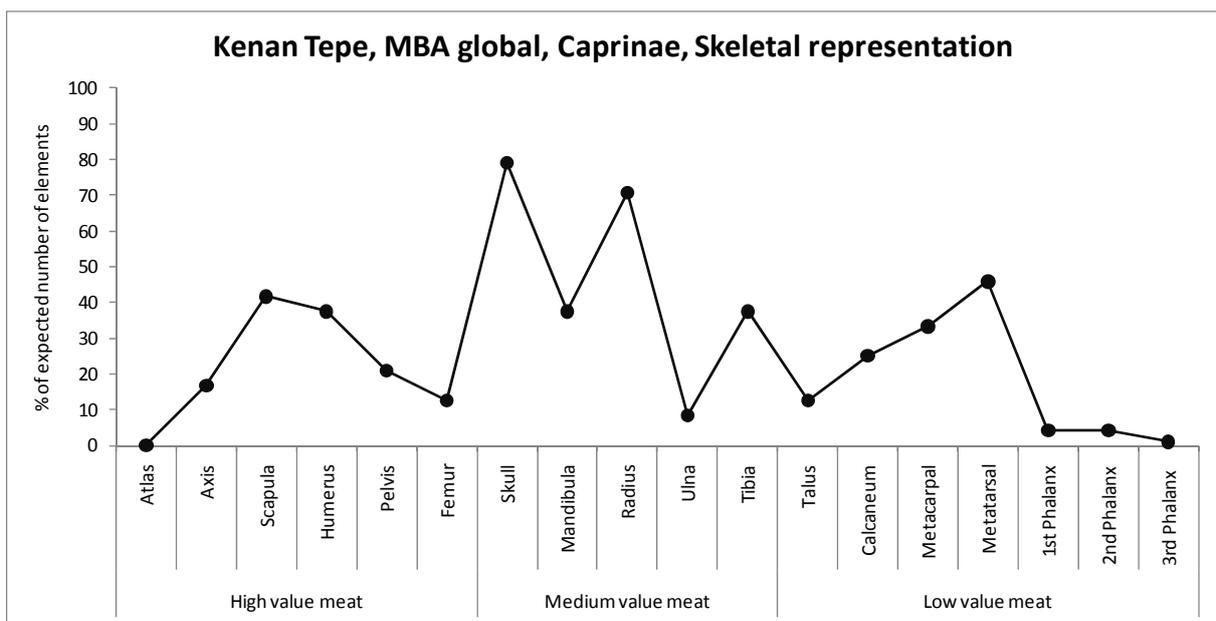


Figure III.149. Skeletal representation for caprine from all Middle Bronze Age areas at Kenan Tepe (MNI= 12, 122 elements).

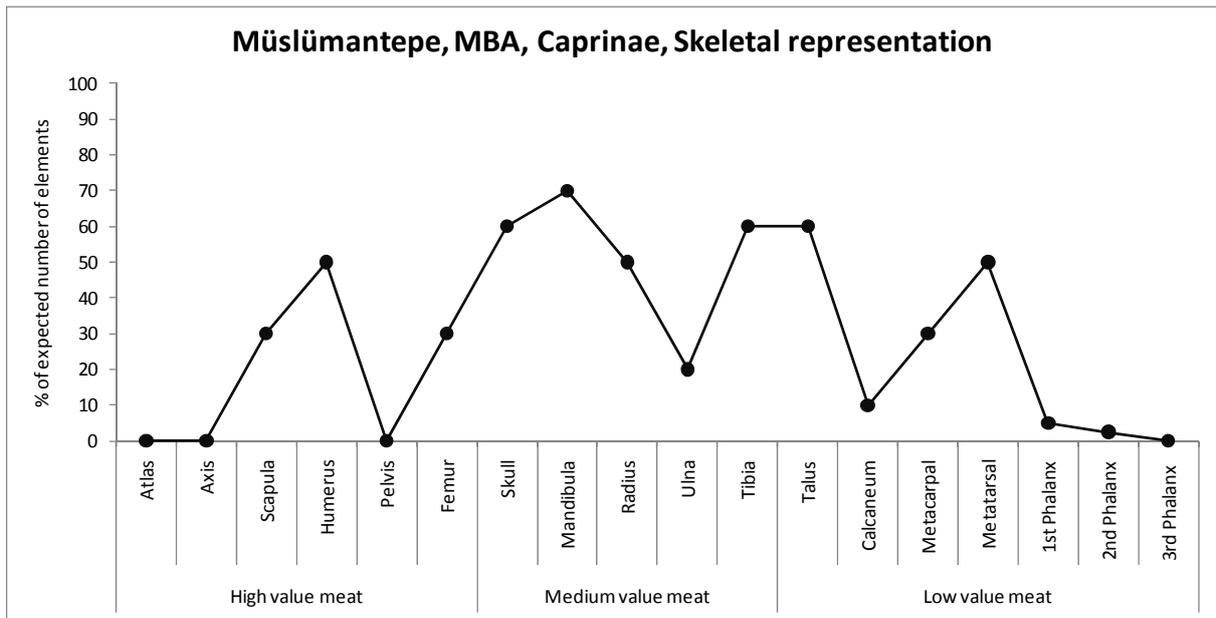


Figure III.150. Skeletal representation for caprine from Middle Bronze Age Müslümanentepe (MNI= 5, 55 elements).

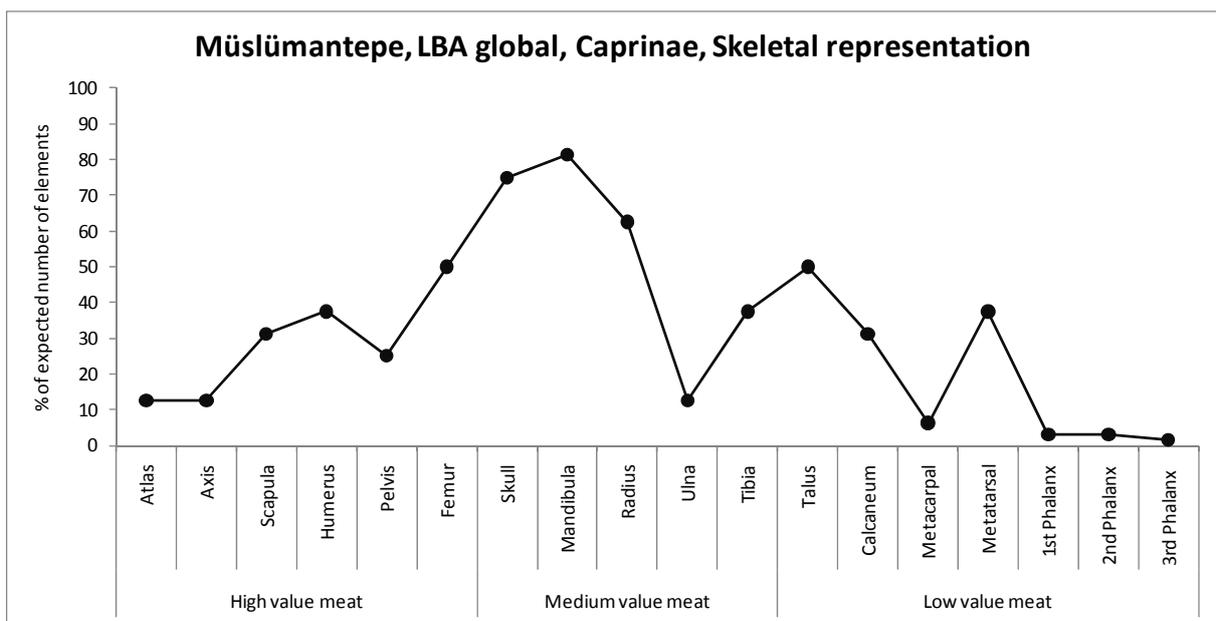


Figure III.151. Skeletal representation for caprine from Late Bronze Age Müslümanentepe (MNI= 8, 93 elements).

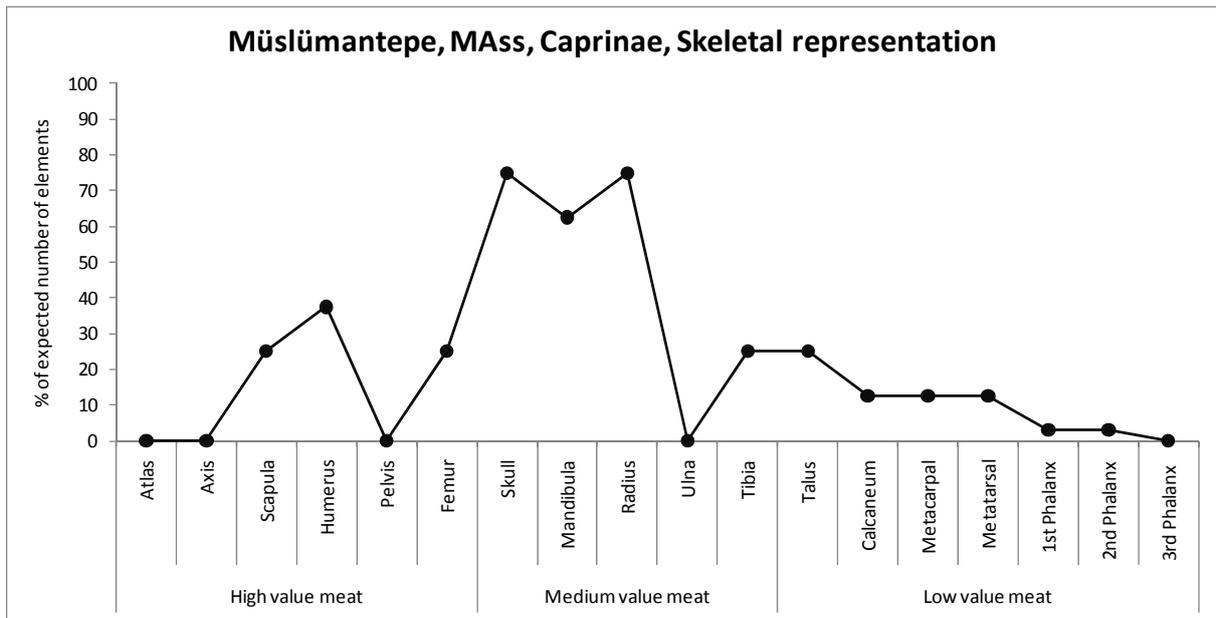


Figure III.152. Skeletal representation for caprine from Middle-Assyrian Müslümantepe (MNI= 4, 33 elements).

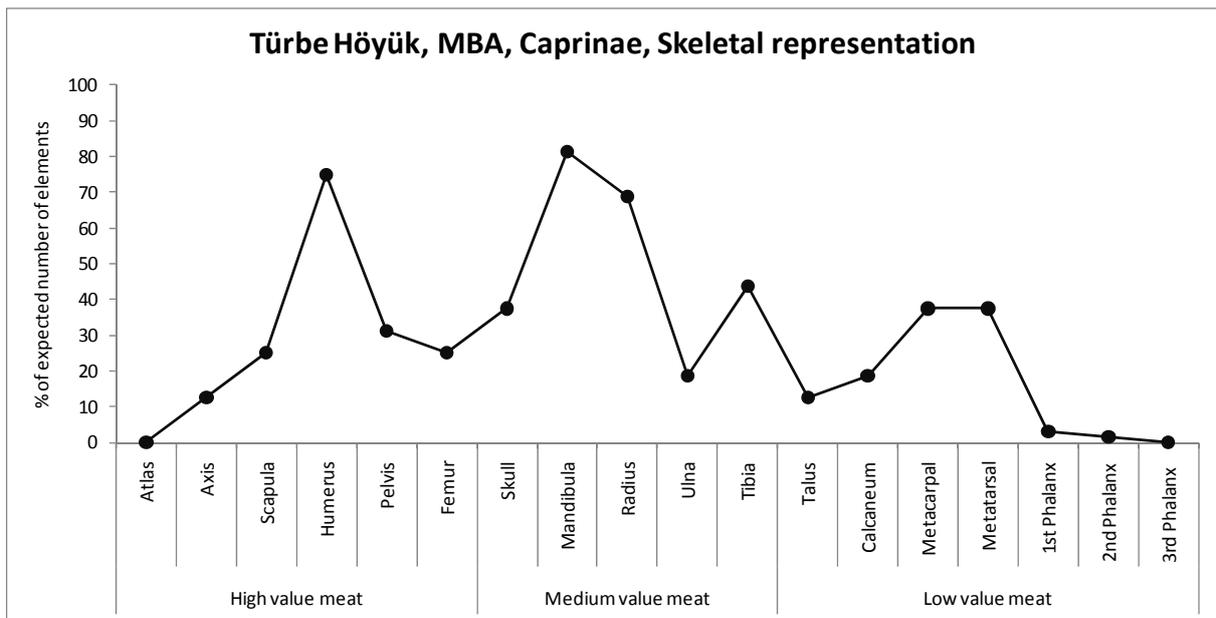


Figure III.153. Skeletal representation for caprine from Middle Bronze Age Türbe Höyük (MNI= 8, 86 elements).

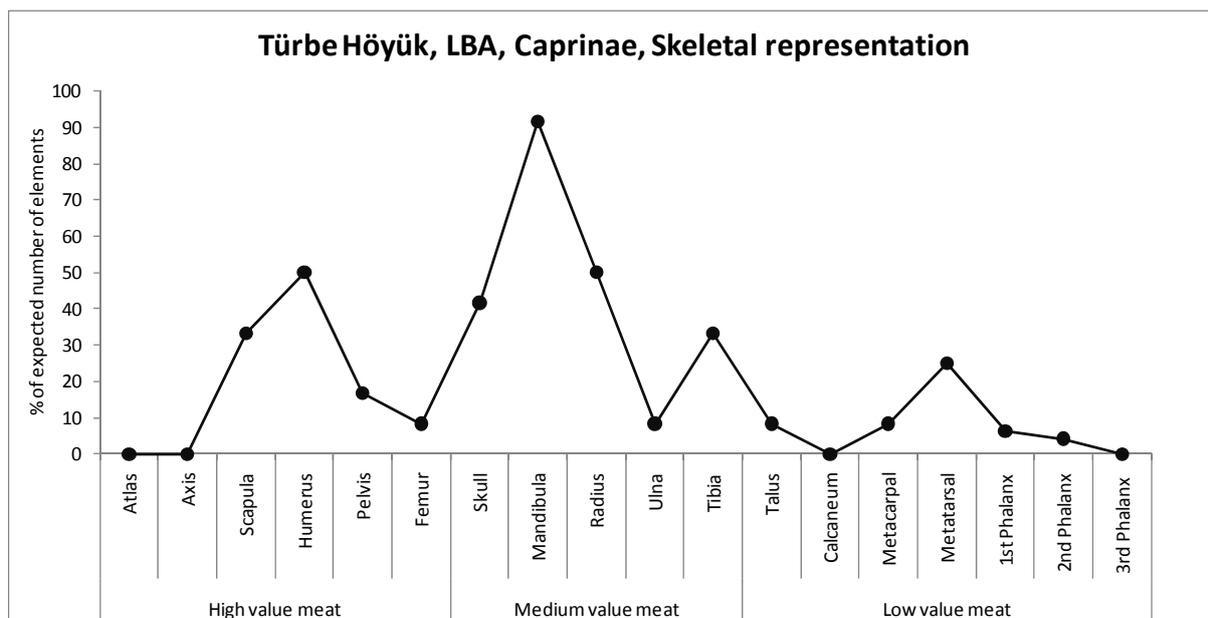


Figure III.154. Skeletal representation for caprine from Late Bronze Age Türbe Höyük (MNI= 6, 50 elements).

Assemblages from Middle Bronze Age Giricano and from the Neo-Assyrian pit BSG at Kavuşan Höyük are not used in the Correspondence Analysis. Their peculiarity is to be composed mainly of almost complete skeletons. Therefore, they would have stood clearly outside from the other assemblages. Axis 1 and 2 explain all the variability with respectively 59.23% and 40.77% (Fig. III.155). The first Axis splits the high and medium value meat groups while both are separated from the low value meat group by the second Axis. As for other Correspondence Analysis in this Chapter, it is very useful to compare contemporary assemblages coming from a single site.

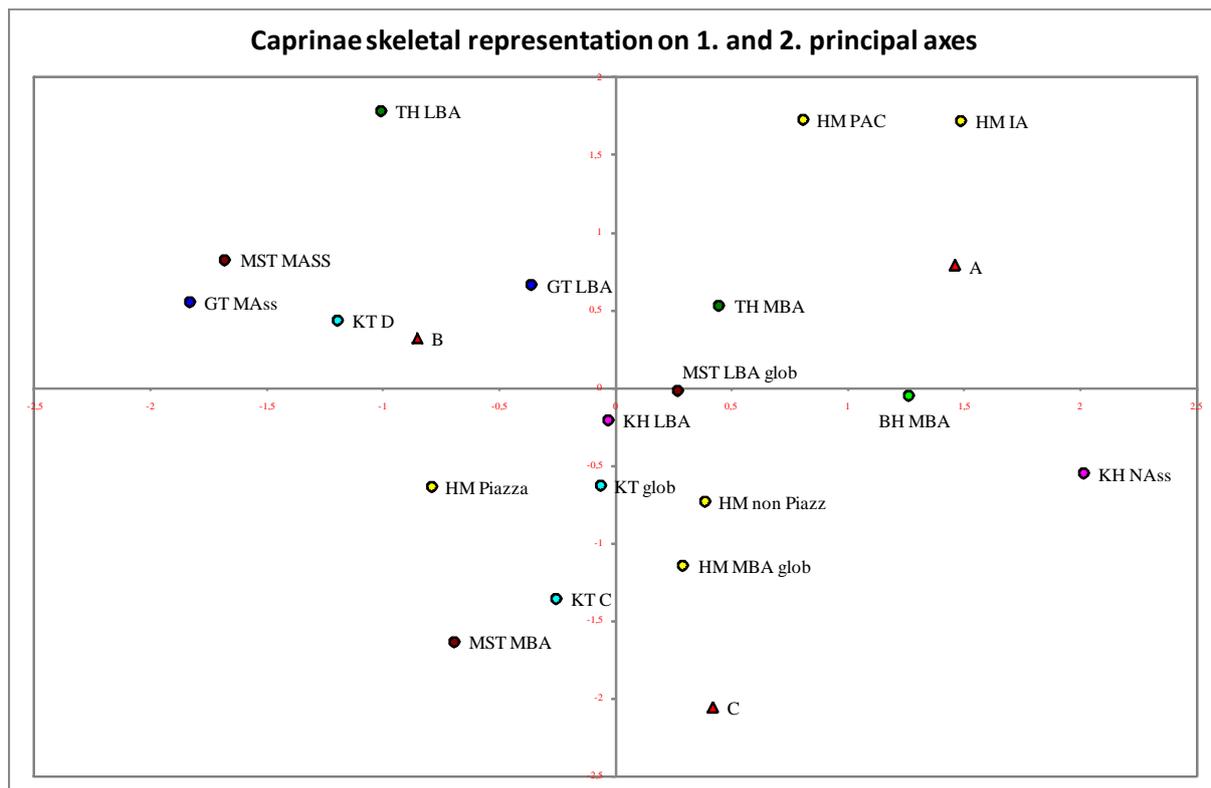


Figure III.155. Correspondence Analysis, using CAPCA software, concerning Caprinae skeletal representation with assemblages as objects and age classes as variables. Each assemblage from the same site is represented by the same colour. Axis 1 explains 59.23% and the Axis 2 40.77% of the variability.

(d) *Butchery*

A majority of assemblages contain sheep or goat remains exhibiting cut or chop marks (Tab. III.12). The relative representation of these remains in the assemblages is more homogeneous than for cattle. In eight assemblages, these remains represent between 3.8 and 5.3% of the caprine NISP. In four assemblages butchered remains represent less than 2% of the caprine NISP. Only two assemblages have a high amount of sheep and goat remains exhibiting cut or chop marks, around 8% of the Caprinae NISP: Late Bronze Age Giricano and Middle Bronze Age Müslümantepe. These two assemblages are smaller than the other ones. The low number of remains can, partly, explain this high percentage. That might in part explain this high percentage. However, it should be noticed that the Middle Bronze Age assemblage from Müslümantepe is also one of those where low value meat remains were more important.

The peculiarity of the Middle Bronze Age assemblage from Giricano has been already described here above. Almost 70% of the butchered remains come from goat skeletons found inside a large pithos (ceramic container). If the relative representation of butchered remains is on the average of the other assemblages, it is probably underestimated due to the high number of small bones (carpal bones, sesamoides, etc...) which were usually not recovered in other contexts. These goats, mostly young were butchered before being stored in the pithos.

Cut or chop marks are present on almost all skeletal parts with the exception of the phalanges. Bones exhibiting most frequently cut marks are humerus (most of all on distal part) and

radius (mainly on proximal part). Therefore, it appears that separating the sheep or goat humerus from the radius was a common butchery practice.

Caprinae number of bones with cut marks	BH MBA	GT MBA	GT LBA	HM MBA	HM MBA non	HM MBA	HM IA	KH LBA	KH IA	KT MBA	KT MBA	MST MBA	MST LBA	TH MBA
			MAss	Piazza	Piazza	PAC			NAss	area C	area D		global	
Skull (basi-occipital)		4												
Skull (horn core)						3								
Maxilla											1			
Mandibula					1	2							1	
Atlas		1							1				1	
Axis						1								
VI										1				
Sacrum								1	1					
Rb		3		1	2						1			
Sc	1			1	1									
Hm	1	3	1		3	4			1	1		3	1	1
Rd	1	2	2	1	2							1	2	
Ul		3		1			1						1	
Mc	2	1	1								1			
Pl	1	2				1	1						1	
Fm		3			2							1		
Tb			1					1						
Talus				1	1					1		2		
Calcaneus								1						
Mt			2	1		1					1			
Total bone with cut marks	6	22	7	6	12	12	2	3	3	4	3	7	7	1
%Caprinae NISP with cut marks	4.3	5.2	8.0	4.7	4.4	4.9	1.2	2.3	3.8	4.2	1.4	8.0	4.5	0.8
Total Caprinae NISP	138	424	87	127	270	244	167	131	79	96	212	87	157	132

Table III.12. Distribution of sheep and goat remains exhibiting cut or chop marks.

(e) Pathologies

Evidence for pathologies could be seen only on a very low number of sheep and goat remains (Table III.13). Only one post-cranial specimen exhibits exostosis. Pathological marks are clearly concentrated on dental remains. These are dental anomalies such as differential wear stage (Fig. III.156). The most frequent pathological mark is the presence of linear enamel hypoplasia (LEC) on the crown of lower and upper teeth (Fig. III.57). LEC results from periodic physiological stress (Niven et al., 2004: 1783). Detailed analysis of these LEC was beyond the scope of this study but it is one of the possible future researches on this material.



Figure III.156. Abnormal dental wear on a lower M3 from Middle Bronze Age Başur Höyük (BH00169).



Figure III.157. Example of Linear Enamel Hypoplasia on an upper M2 from the Middle Bronze age Piazza at Hirbemerdon Tepe (HM00172).

Caprinae number of bones with pathologies	BH MBA	GT MBA	GT LBA global	HM MBA Piazza	HM MBA non Piazza	HM MBA PAC	HM IA	KT MBA Area D	MST LBA global	TH MBA
Skull (exostosis on occipital)					1					
Linear Enamel Hypoplasia (LEH) Upper teeth				2		2	2	1	3	
Lower teeth			1	1		2		3	1	
Mandibula (dental anomalies)	1				2					1
Hm (exostosis on distal part)		1								
Total pathological remains	1	1	1	3	3	4	2	4	4	1
% pathological Caprinae NISP	0.7	0.2	0.7	2.4	1.1	1.6	1.2	1.9	2.5	0.8
Total Caprinae NISP	138	424	139	127	270	244	167	212	157	132

Table III.13. Distribution of pathological sheep and goat bones.

(5) *Capra aegagrus* / *Ovis orientalis* (wild sheep and goat)

The Upper Tigris area is located inside the geographical range of wild sheep and wild goat. It is attested by faunal remains recovered in Epipaleolithic Hallan Çemi (Starkovich and Stiner, 2009)

and Neolithic Körtik Tepe (Arbuckle and Özkaya, 2006). Obviously, these wild populations were still living in the area in the chronological periods on which this study is focused. In all the assemblages only 13 remains were identified as wild Caprinae. Among them, ten were identified to the specific level. In Hallan Hallan Çemi and Körtik Tepe, wild sheep clearly outnumber wild goat (respectively 1:9 and 1:14). It is also the case in the few remains considered here. It might be explained by the location of the considered settlements on the foothills of the Taurus Mountains, a favourable landscape for wild sheep, while wild goat would have lived in more rugged highlands further from the sites (Arbuckle and Özkaya, 2006: 117-9).

The three remains not identified to the specific level are an upper third molar from the Middle Bronze Age area C at Kenan Tepe; an unfused proximal epiphysis of humerus from the Middle Bronze Age Piazza at Hirbemerdon Tepe; and a posterior part of a skull from the fill Posterior to the use of the Architectural Complex in Hirbemerdon Tepe. The skull exhibits cut marks on the basi-occipital bone.

Only two bones are identified as wild goat. The first one is an axis vertebrae, with cut marks on its ventral side, coming from the Middle Bronze Age Area D at Kenan Tepe. The second one is a proximal part of a radius from Middle Bronze Age Türbe Höyük.

A clear evidence for the hunting of wild goat and its possible symbolic importance is the discovery of a large horn core from Early Bronze Age Başur Höyük³⁷ (Fig. III.158). This horn core has a preserved sinus 360mm long and the lower preserved part is 46mm in transverse diameter and 77mm in antero-posterior diameter. This horn core was found inside a building and not in an exterior dumping area.

³⁷ As this assemblage yielded only a handful of remains it is not considered for itself in this study.



Figure III.158. Wild goat horn core from Early Bronze Age Başur Höyük (BH00273). Lateral view. Profile drawings courtesy from Dr. Eda Güngör.

Even if wild sheep remains are four times more numerous than wild goat ones, only eight remains have been identified (Tab. III.14) from six assemblages in total. Only one bone, an axis vertebra, exhibits butchery mark.

<i>Ovis orientalis</i> number of bones	HM MBA Piazza	HM MBA non Piazza	HM MBA PAC	KH IA NAss	TH MBA	TH LBA
Horn core fragment			1			1
Axis vertebrae (chopped transversely)	1					
Tibia (distal part)		1		1		
Metatarsal (proximal part)				1	1	
1st Phalanx		1				

Table III.14. Distribution of wild sheep (*Ovis orientalis*) remains.

Like for the other rare wild mammals, such as aurochs or gazelle, the very few remains do not allow a complete understanding of the place of wild sheep and goat in hunting strategies. Wild goat in particular were not available directly nearby the sites and its hunt would have reflected more symbolic or prestige kind of activities than the need of its physiological products.

B. Other taxa

Taxa other than domestic and wild mammals were not the primary focus of this study. A large part of them are small and therefore tend to be underrepresented or absent due to recovery strategies. For the remains which were not exported outside Turkey, the lack of comparative material made their identification difficult if not impossible under class level.

1. Aves (birds)

A total of 22 bird remains were recognized in the assemblages. Even if a couple of bones belong to large birds such as great bustard (*Otis tarda*) (e.g. in Late Bronze Age Giricano), most of them are small fragments weighing around one gram each.

2. Anura (frogs)

Amphibian remains are known to be very small and fragile. In absence of sieving procedure, their presence in an assemblage tend to be a random occurrence. A complete skeleton from Middle Bronze Age Area D at Kenan Tepe (counted as one specimen) has been identified as a frog genus (*Rana* sp.). Neo-Assyrian Kavuşan Tepe and Middle-Assyrian Giricano assemblages yielded one frog metapodial each.

3. Testudines (turtle and tortoise)

Reptiles are only represented by turtles and tortoises with 51 remains in total. They are present in a majority of assemblages. More than 40% of the remains were identified to a genus. Carapace and plastron plates represent 90% of the remains. Striped-neck terrapin (*Mauremys caspica*) and European pond turtle are present in archaeological assemblages from southern and northeastern Anatolia (Boessneck and Driesch von den, 1975, Siracusano, 2003, Bartosiewicz, 2005, Howell-Meurs, 2001) but were not confidently identified in the assemblages of this study.

a) *Testudo graeca* (spur-tighed tortoise)

Spur-tighed tortoise is the only tortoise species living in Anatolia. Most of the identified remains are plates. Turtle can burrow in winter time and therefore a turtle skeleton could be intrusive in the archaeological layers. However, this hypothesis is not confirmed as intrusive turtle would be recovered with more bones inside the carapace. Only one plastron has been sawn and polished. It was recovered from Late Bronze Age Kavuşan Höyük (Fig. III.159). However, due to the high number of plates and the quasi-absence of other skeletal elements, it is probable that tortoiseshell was used as raw material (Moorey, 1999: 129).

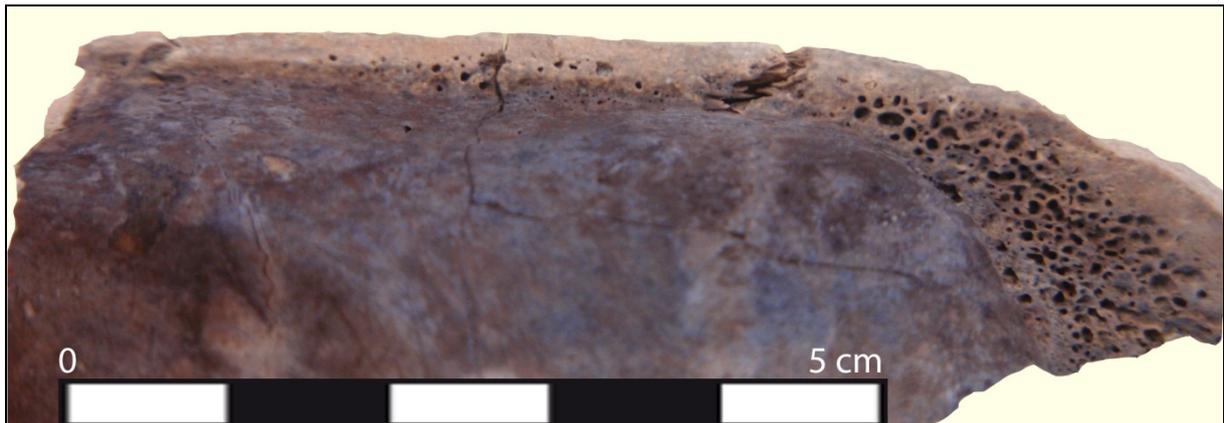


Figure III.159. Spur-tighed tortoise hyoplastron and hypoplastron from Late Bronze Age Kavuşan Höyük (KH01622). Notice the saw and polish marks.

b) *Rafetus euphraticus* (Euphrates soft-shelled turtle)

Euphrates soft-shelled turtle is an aquatic turtle endemic in the Tigris and Euphrates Rivers systems. This species is not very well known and rather rare in archaeological assemblages. A few remains of this species were, however, determined in the faunal assemblages from Hassek Höyük

(Boessneck, 1992) and Lidar Höyük (Kussinger, 1988) in southeastern Anatolia; and (Boessneck and Driesch von den, 1989) Munbaqa, Tell Halawa (Boessneck and Driesch von den, 1986), and Habuba Kabira (Driesch von den, 1993) in northern Mesopotamia. Late Bronze Age and Neo-Assyrian assemblages from Tall Sheh Hamad³⁸ yielded 123 plate fragments and 30 bones. The reasons behind the exploitation of this species could, however, not be clarified (Becker, 2008: 111-2).

Only two carapace plates and one skull fragment of Euphrates soft-shell turtle were found in the assemblages studied here. One plate fragment was found in the Middle Bronze Age assemblage from Area D at Kenan Tepe. The two other remains come from Late Bronze Age Kavuşan Höyük. These three remains do not prove a regular exploitation of this species in the Upper Tigris River valley, unlike at Tell Sheh Hamad. However, an exceptional example of Euphrates soft-shell turtle exploitation has been discovered at Kavuşan Höyük. At least 17 turtles were slaughtered and disposed in a grave dated to the Post-Assyrian period and therefore outside the chronological scope of this study³⁹.

4. Osteichthyes (bony fish)

Fish remains also probably suffered from the lack of sieving operations. This material is therefore not suitable to estimate the importance of fishing in the economies of the settlements. Among the 47 fish remains, half of them were recovered in the Middle-Assyrian and other Late Bronze Age pits at Giricano where sieving was performed. Among the 20 remains discovered in the other assemblages, five vertebrae belong to very large cyprinids (probably barbel, *Barbus esocinus*). These vertebrae which are more than 5cm large in diameter and weigh more than 8g each, probably belong to large barbels measuring almost two meters long⁴⁰.

5. Mollusca (molluscs)

Shells from bivalves and gastropod molluscs were found in all sites but they are not very numerous if we take into account that they are rather resistant to taphonomical processes and not subject to sample bias due to the lack of sieving. Bivalve molluscs were collected in the river but it is not possible to decide whether they were actually consumed or brought on site as part of building material such as mud or sand. The gastropods could also be intrusive but the question of their consumption has not been either investigated.

6. Malacostraca (crustaceans)

Three fragments of claw were identified in Late Bronze Age assemblages from Kavuşan Höyük and Türbe Höyük. They belong to freshwater crab (*Potamon* cf. *potamios*)⁴¹. Freshwater crabs were probably commonly found on the banks of the Tigris and Botan Rivers and are edible. Their consumption was, however, either marginal either done on the bank of the river and not in the settlement.

³⁸ In the Khabur Basin, 240km south of the Upper Tigris River valley.

³⁹ This deposit is under study by R. Berthon, Dr. M. Mashkour, Prof. E. Taşkavak and Prof. G. Kozbe.

⁴⁰ I thank Dr. Valentin Radu for his help with the identification of two of these vertebrae.

⁴¹ The identification is based on a similar specimen from Tilbeşar which was identified with the help of Dr. Pierre Noël (Berthon and Mashkour, 2008: 28).

IV. Synthesis on animal exploitation in the Upper Tigris area between the 3rd and 1st mill. BC.

A. Chronological overview

1. Middle Bronze Age

The Middle Bronze Age Period is represented by 12 assemblages from six different settlements (Tab. IV.1). Some assemblages are sub-assemblages extracted from a bigger one (e.g. in Kenan Tepe). In all assemblages, domestic mammals represent the majority of the remains (without other mentions, it will be referred in this chapter to the Corrected NISP). However, two groups can be seen concerning the representation of wild mammals. In Başur Höyük, Giricano, Kenan Tepe and Türbe Höyük assemblages, wild mammals represent less than 5% of the Corr. NISP. This is not surprising for this period in northern Mesopotamia (Clason and Buitenhuis, 1998). On the contrary, assemblages from Hirbemerdon Tepe and Müslüman Tepe are characterized by a higher percentage of wild mammals above 10% and up to 23% of the Corr. NISP.

	GT	GT	KT	KT	KT	MST	HM	HM	HM	HM	BH	TH
	MBA	MBA	MBA	MBA	MBA	MBA	MBA	MBA	MBA	MBA	MBA	MBA
	global	Geb. C	global	area C	area D		global	Piazza	non Piazza	Post Arch. Compl.		
	%corr. NISP	%corr. NISP	%corr. NISP	%corr. NISP	%corr. NISP	%corr. NISP	%corr. NISP	%corr. NISP	%corr. NISP	%corr. NISP	%corr. NISP	%corr. NISP
<i>Canis familiaris</i>	2.2	2.9	2.2	1.7	2.4	3.9	3.7	3.1	4.1	1.8	0.4	0.7
<i>Equus</i> spp.	0.7	1.4	1.1	1.7	0.8		1.3	0.5	1.7	4.7	1.1	
including <i>Equus caballus</i>							0.1		0.1	2.1	0.4	
including <i>Equus cf. caballus</i>	0.7	1.4					0.2		0.3	0.5		
including <i>Equus asinus</i>							0.3		0.4	0.2		
including <i>Equus cf. asinus</i>			0.3	0.4	0.2		0.4	0.2	0.5	0.9		
<i>Sus domesticus</i>	19.1	21.7	32.2	33.8	31.5	22.9	27.4	25.8	28.3	19.9	6.1	12.6
<i>Bos taurus</i>	11.8	13.0	20.7	20.7	20.7	19.0	17.8	17.8	17.7	23.5	36.3	36.1
Caprinae	65.4	59.4	41.9	40.5	42.6	42.4	33.4	29.8	35.5	36.7	52.7	47.7
including <i>Capra hircus</i>	8.8	8.7	3.8	3.0	4.2	3.4	4.5	4.2	4.7	6.8	11.5	7.2
including <i>Ovis aries</i>	5.1	2.9	5.3	3.8	6.0	11.2	5.1	2.1	6.8	7.7	7.6	8.3
Total domestic mammals	99.3	98.6	98.1	98.3	98.0	88.3	83.6	77.0	87.3	86.6	96.6	97.1
<i>Lepus europaeus</i>						0.5	0.2	0.2	0.1	0.2	0.4	0.4
<i>Panthera leo</i>										0.2		
<i>Canis lupus</i>										0.2		
<i>Vulpes vulpes</i>			0.5		0.8						0.4	
<i>Sus scrofa</i>			0.4		0.6		0.6	0.7	0.5	0.8	1.1	1.1
Cervidae	0.7	1.4	0.7	1.3	0.4	11.2	15.2	21.6	11.7	11.7	1.5	0.4
including <i>Cervus elaphus</i>	0.7	1.4	0.7	1.3	0.4	11.2	14.7	21.1	11.2	9.5	1.5	0.4
including <i>Dama mesopotamica</i>							0.1	0.2		0.2		
<i>Bos primigenius</i>							0.1		0.1	0.2		0.4
<i>C. aegagrus</i> / <i>O. orientalis</i>			0.3	0.4	0.2		0.3	0.5	0.3	0.3		0.7
including <i>Capra aegagrus</i>			0.1		0.2							0.4
including <i>Ovis orientalis</i>							0.3	0.2	0.3	0.2		0.4
Total wild mammals	0.7	1.4	1.9	1.7	2.0	11.7	16.4	23.0	12.7	13.4	3.4	2.9
corr. NISP	136	69	735	237	498	205	1187	426	761	664	262	277
	13 skeletons of Caprinae in pithos represented 348 elements and where counted as 13.											
	1 Caballus skeleton with 40 remains counted as 1.											
	1 Canis skeleton with 61 remains counted as 1.											

Table IV.1. Relative representation of taxa in percentage of corr. NISP (see Chapter II for explanations) in Middle Bronze Age assemblages. Assemblages in grey are included in the assemblage in white before them. See tables II.3-8 for actual numbers.

In the assemblages where wild mammals represent less than 5%, the “triad” (domestic sheep and goat, domestic cattle and domestic pig) represent more than 95% of the Corr. NISP (Fig. IV.1). In the assemblages with a higher representation of wild mammals, this threshold is reached by summing up the “triad” with the deer. It has to be stressed that in these assemblages deer are mainly red deer (*Cervus elaphus*) (Tab. IV.1). In the assemblages where game represent more than 10% of the corr. NISP, wild mammalian remains are constituted of 87.3% to 95.7% of Deer. In this case, it is clear that red deer is the object of specialized hunting which has no impact on the representation of other wild mammals. Deer remains are more common in the Piazza at Hirbemerdon Tepe than in any other Middle Bronze Age assemblage (Fig. IV.2). It is assumed that the importance of the red deer remains in the Piazza is somehow related to the ritual activities which took place there (Laneri, 2011). Although there is no textual evidence for that period in this region, the symbolic value of the red deer can be seen in Hirbemerdon Tepe through a peculiar ceramic pot found in the Piazza among the faunal remains and the paraphernalia. This pot is unique in the region and related to a decorative style unknown among the other ceramic sherds found during the excavations. At least ten deer are depicted in different positions, each of them being separated from each other by a triangle (Fig. IV.3).

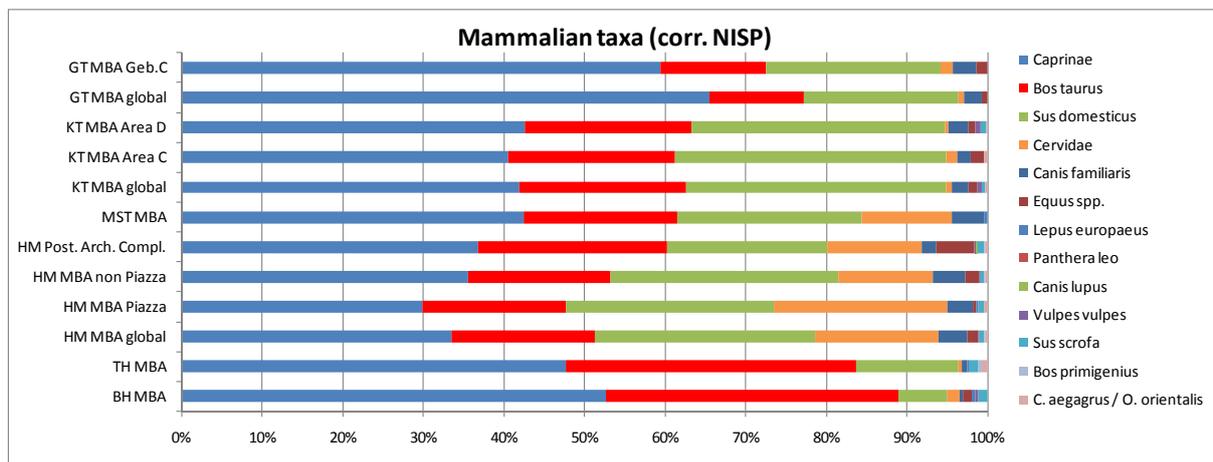


Figure IV.1. Relative representation of mammalian taxa in percentage of corr. NISP.

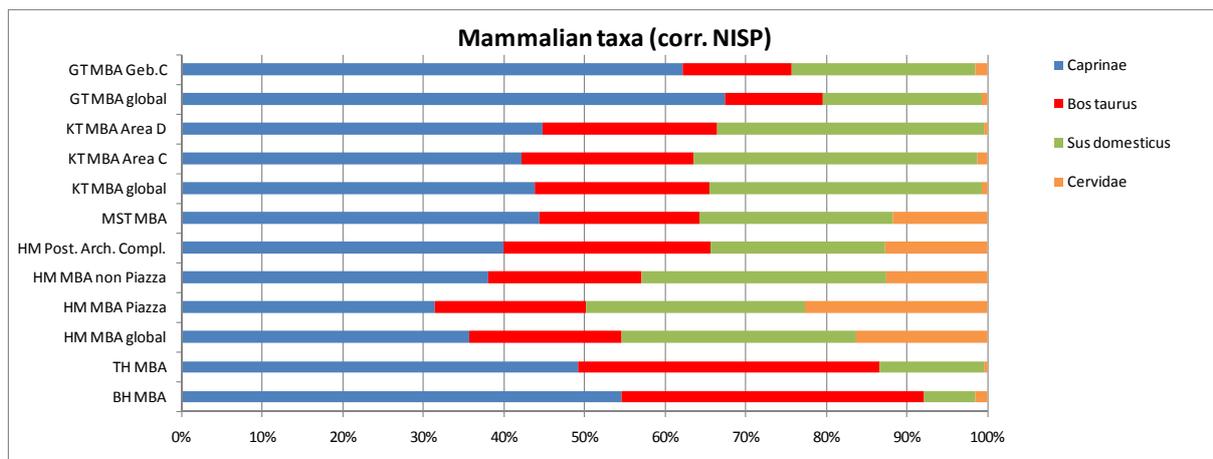


Figure IV.2. Relative representation of the “triad” and deer in percentage of corr. NISP.



Figure IV.3. Picture and drawing of the “dancing deer” pot from the Middle Bronze Age Piazza at Hirbemerdon Tepe (courtesy Dr. Nicola Laneri, Hirbemerdon Tepe Archaeological Project).

Looking only at the relative representation of the “triad” taxa, it appears that the assemblages from Hirbemerdon Tepe are in fact quite similar to the ones from Kenan Tepe (Fig. IV.4). There are, however, differences between the assemblages according to the relative importance of domestic sheep and goats, domestic pigs and domestic cattle. Both assemblages at Giricano are characterized by a high amount of sheep and goats (63.1 and 67.9% corr. NISP) most of them being goats (Tab. III.11), a limited amount of pigs (19.8 and 23.1% corr.NISP) and even less cattle (12.2 and 13.8% corr.NISP). The other assemblages from the Tigris River valley have a more balanced pattern. Sheep and goats are the most frequent but represent only 40 to 50% of the “triad” in corr. NISP. Pigs are in second position (27.2 to 35.6%) except in the fill Posterior to the use of the Architectural Complex at Hirbemerdon Tepe with only 24.8%. Cattle remains represent 21.8 to 22.6% of the “triad” in corr.NISP and up to 29.3% in the fill Posterior to the use of the Architectural Complex at Hirbemerdon Tepe. Başur Höyük and Türbe Höyük in the Botan and Bitlis Rivers valleys show a quite different pattern characterized by the low number of pigs (6.4 and 13.1%). Sheep and goat represent half of the remains (49.4 and 55.4%) while cattle are more important than in any other contemporary assemblage (37.5 and 38.2%). This pattern is not easy to explain. Being located on major roads for mobile pastoralists, more sheep and goat were expected from Başur Höyük and Türbe Höyük. The preference for cattle over pig is also surprising. The valleys provide good pastures for cattle but are quite narrow. It also provides some evidence about the status of these sites. The communities which lived in these small settlements had the luxury of consuming more cattle than pig, the usual cheap and fast-reproducing meat producer. The importance of cattle can also be seen as a more important use of cow milk in this area in comparison with the sites located within the alluvial plain of the Tigris River valley. It is possible that Türbe Höyük and Başur Höyük played a role in trading stations, as evidenced by a tablet from Türbe Höyük (Sağlamtimur and Ozan, 2007). This role as trading station would have not resulted to a higher exploitation of sheep and goat due to more frequent contacts with pastoral nomadic communities. On the contrary these sites had a different social status as it can be seen by a focus on investment demanding cattle and a low amount of pigs which are usually seen as low-cost production of the household.

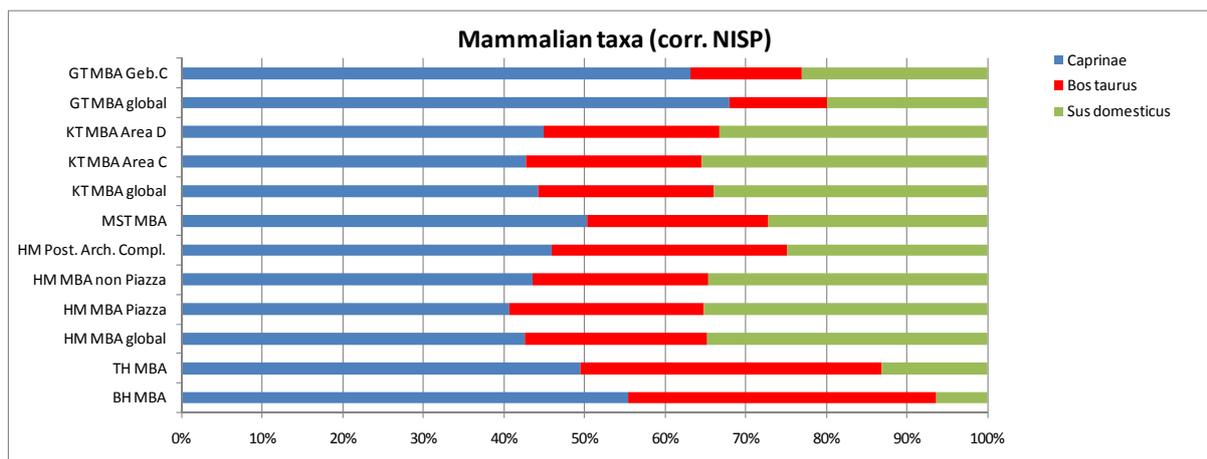


Figure IV.4. Relative representation of the “triad” taxa in percentage of corr. NISP.

The relations between various taxa and the assemblages were investigated using Correspondence Analysis (Fig. IV.5). Axis 1 is clearly linked to the red deer (contribute to 92.47% of the axis) which is opposed to the triad species. Domestic pig is the main contributor to Axis 2 (45.81%) followed by red deer (32.19%) and cattle (19.58%). Assemblages cluster according to their geographical location. The settlements located in the Botan and Bitlis River valleys (BH and TH) stand apart on Axis 2 due their preference for cattle over pigs. However, on Axis 1 assemblages from Türbe Höyük and Başur Höyük are close to the settlements located in the centre of the flood plain (GT, ZT, and KT) due their preference for the “triad” over the red deer. Settlements located on the eastern edge of the flood plain (MST and HM), just before the Tigris Rivers narrows between cliffs, can be sorted from the other assemblages on Axis 1 due to the importance of red deer hunting. It can be seen that the assemblage from the fill Posterior to the Architectural Complex at Hirbemerdon doesn’t completely fit the picture and is characterized by the higher representation of equids and cattle compared to the other layers at this site. It will be argued hereunder that this assemblage from the very end of the MBA is somehow more related to later assemblages.

It is important to notify that the assemblages from sites located on the Tigris River banks are organized on Axis 1 from the most western to the most eastern one. The data from Ziyaret Tepe (provided by H. And T. Greenfield) fits perfectly in this pattern. Not only the assemblages are ordered from the West to the East but moreover the relative distances between the assemblages on the Axis 1 reflect the crow fly distance between the sites. In this case the assemblage which has to be considered for Hirbemerdon Tepe is the one encompassing all MBA contexts. It is obvious that the assemblage from the Piazza emphasizes the general pattern by a focus on red deer remains.

The Correspondence Analysis (Fig. IV.5) clearly evidence a strong relation between the location of a site in the alluvial plain and the importance of red deer hunting in the settlement. Only sites located on the eastern part of the alluvial plain (i.e. Müslümantepe and Hirbemerdon) had a specialized hunting activity on red deer. This has to be explained by the geographical location of these two sites on the edge of the most suitable lands for agricultural activities. Both sites had in their catchment area hilly lands, nowadays eroded, which could have been more suited for hunting in the past.

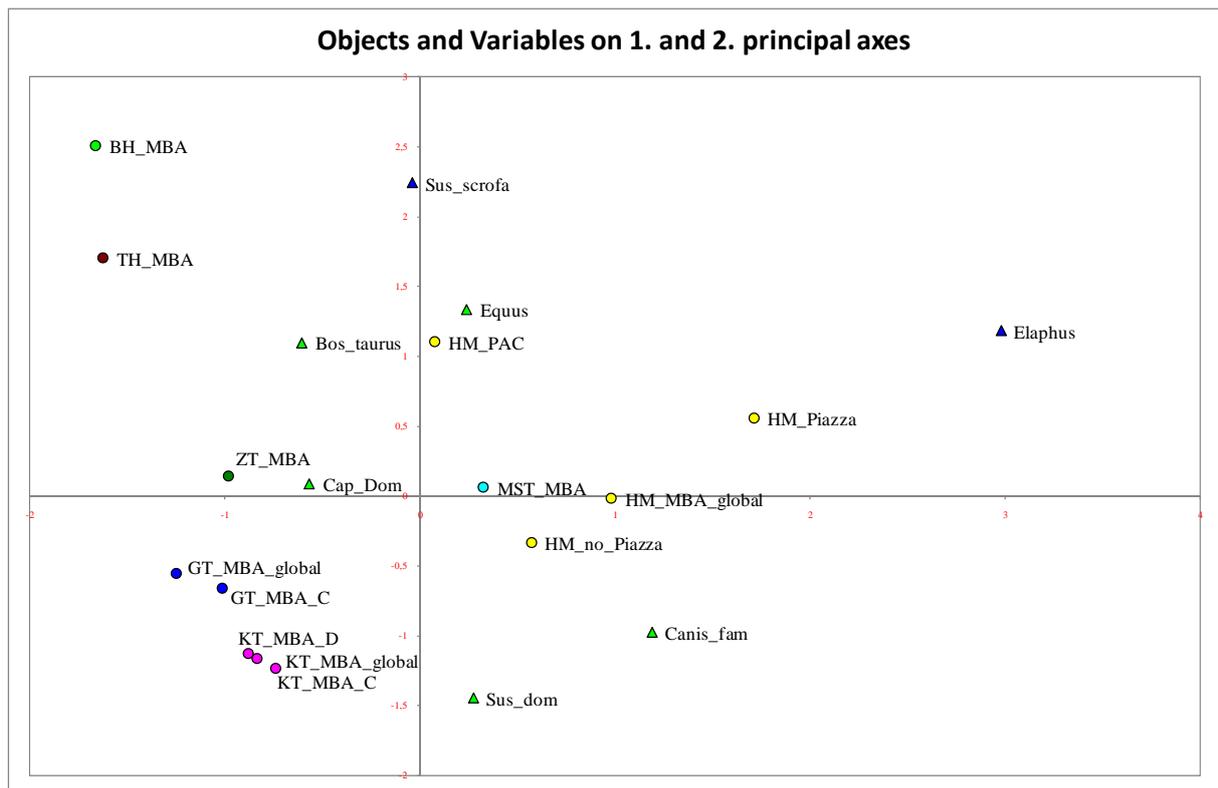


Figure IV.5. Correspondence Analysis, using CAPCA software, with MBA assemblages as objects (circle) and mammalian taxa as variables (triangle). For the circles each colour represents one site. Green triangles are domestic and blue triangles are wild mammals. The minimum sum for variable is 30. Axis 1 explains 60.75% and Axis 2 22.61% of the variability. Ziyaret Tepe data courtesy from Prof. Haskel Greenfield and Tina Greenfield.

The data on the exploitation of the taxa of the “triad”, detailed in Chapter III, are summarized hereunder (Tab. IV.2). Concerning the exploitation of sheep and goat, assemblages exhibit different patterns in term of kill-off pattern. A general trend is the low amount of individuals from the B age group. The A age group is also rare except at Giricano (due to the deposit in the pithos in Geb.C) and in Hirbemerdon Tepe outside of the Piazza. The other important piece of information is the confirmation that sheep and goat were slaughtered at different ages, goat usually older than sheep. It clearly indicates that sheep and goat were raised for different products and that these two species were concerned by differentiated exploitation strategies. Data on age at slaughtering for cattle are not available for all sites but indicate that individuals were not culled before they reached two years old. Then, some assemblages (HM non Piazza, TH) exhibit a significant amount of individuals slaughtered between two and three years old. This indicates that these individuals were selected exclusively for meat consumption.

	GT	GT	KT	KT	KT	MST	HM	HM	HM	HM	BH	TH
	MBA	MBA	MBA	MBA	MBA	MBA	MBA	MBA	MBA	MBA	MBA	MBA
	global	Geb. C	global	area C	area D		global	Piazza	non Piazza	Post Arch. Compl.		
Sheep/Goat (%)	37/63	25/75	58/42	56/44	59/41	77/23	53/47	33/67	59/41	53/47	40/60	53/47
Caprinae Kill-off pattern	--	A ++++ D ++	D G ++ C EF +	C G +++	D ++ EF G ++	C +++ EF ++ D +	A C ++ EF G +	C +++ D + G +	A +++ C EF G +	EF +++ D ++ G HI +	C ++ EF G + B D +	EF ++++ G D +
Difference in sheep and goat kill-off pattern	--	--	sheep = D > EF-C goat = G then EF	--	sheep = D goat = EF-G	--	sheep = A-C-EF goat = C and G	--	sheep = A > C-EF-G goat = C-G-H	sheep and goat quite similar	sheep = peak on B goat = peak on C	sheep = EF > D > G goat = EF then G
Caprinae skeletal representation	--	All elements (complete skeletons)	--	Tend to low meat value	Tend to medium meat value	Tend to medium and low meat value	--	Tend to medium meat value	Tend to high meat value	Tend to high meat value	Tend to high meat value	Tend to high meat value
Cattle kill-off pattern	--	--	--	--	Probably not before 2 years old	Not before 2y but 15% between 2 and 3y	--	Not before 3 years old	25% before 3 years old	Few before 3 years old but peak before 4y	Not before 3 years old	20% before 3 years old
Cattle skeletal representation	Tend to low and medium meat value	--	--	Tend to low meat value	Tend to medium meat value	Quite balanced	Tend to high meat value	Tend to high meat value	Tend to high meat value	Tend to high meat value	Tend to medium meat value	Tend to high meat value
Pig kill-off pattern	--	--	--	--	B ++++ C ++ D +	--	--	B ++++ C ++ D +	B ++++ C ++	B +++ C ++ A +	--	--
Pig skeletal representation	Tend to medium meat value	--	--	Tend to high and low meat value	Tend to high meat value	Tend to medium meat value	Quite balanced	Tend to medium meat value	Quite balanced	Tend to medium meat value	Tend to high meat value	Tend to medium and low meat value

Table IV.2. Summary of different information on the exploitation of domestic mammals in the Middle Bronze Age. Age groups according to the age groups used for each taxa (see Chapter III). ++++ over 50%, +++ 45-35%, ++ 30-25%, + 20-15%.

Pigs were slaughtered mostly between six months and two years old with the exception of the fill Posterior to the Architectural Complex at Hirbemerdon Tepe where few pigs were slaughtered before six months old.

Finally it has to be stressed that in all assemblages where red deer represent more than 10% of the mammalian remains, most of the skeletal elements are present. It is likely that the carcasses were brought complete to the settlement where butchery activities took place.

2. Late Bronze Age

The Late Bronze Age Period is represented by six assemblages from four different settlements (Tab. IV.3). Some assemblages include other ones. In all assemblages, domestic mammals represent the majority of the remains (without other mentions, it will be referred in this chapter to the Corrected NISP). In Kavuşan Höyük and Türbe Höyük assemblages, wild mammals represent less than 3% of the corr. NISP. On the contrary, assemblages from Giricano and Müslümantepe are characterized by a higher percentage of wild mammals between 8.3% and 13.6% of the corr. NISP.

	KH LBA %corr. NISP	GT LBA global %corr. NISP	GT LBA MAss %corr. NISP	MST LBA global %corr. NISP	MST LBA MAss %corr. NISP	TH LBA %corr. NISP
<i>Felis catus</i>	0.3					
<i>Canis familiaris</i>	2.7	0.8	0.5	2.5	2.8	0.6
<i>Equus</i> spp.	10.1	1.7	1.6	1.9	2.1	
including <i>Equus caballus</i>	0.8	0.6	0.5			
including <i>Equus cf. caballus</i>	2.5	0.8	0.8			
including <i>Equus asinus</i>	0.8			0.3		
including <i>Equus cf. asinus</i>	2.5	0.2	0.3	1.1	2.1	
<i>Sus domesticus</i>	30.2	33.1	32.8	30.0	31.5	20.1
<i>Camelus</i> spp.	0.3					
<i>Bos taurus</i>	18.8	24.9	28.3	14.0	15.4	23.4
Caprinae	35.7	28.9	23.2	43.3	38.5	53.9
including <i>Capra hircus</i>	5.2	3.5	2.9	5.8	5.6	10.4
including <i>Ovis aries</i>	5.4	4.2	2.9	7.4	7.7	8.4
Total domestic mammals	98.1	89.4	86.4	91.7	90.2	98.1
<i>Lepus europaeus</i>	0.3			0.6		
<i>Vulpes vulpes</i>		0.4	0.5	0.3		
<i>Equus hemionus</i> ssp.	0.3					
<i>Sus scrofa</i>	0.3	0.2	0.3			
Cervidae	1.1	10.0	12.8	7.4	9.8	0.6
including <i>Cervus elaphus</i>	1.1	10.0	12.8	7.4	9.8	0.6
<i>Gazella</i> spp.						0.6
<i>C. aegagrus</i> / <i>O. orientalis</i>						0.6
including <i>Ovis orientalis</i>						0.6
Total wild mammals	1.9	10.6	13.6	8.3	9.8	1.9
corr. NISP	367	481	375	363	143	154

Table IV.3. Relative representation of taxa in percentage of corr. NISP (see Chapter II for explanations) in Late Bronze Age assemblages. Assemblages in grey are included in the assemblage in white before them. See tables II.3-8 for actual numbers.

In Türbe Höyük, the “triad” (domestic sheep and goat, domestic cattle and domestic pig) represents more than 95% of the corr. NISP (Fig. IV.6). Consumption pattern of the fortress and adjacent domestic areas was completely dependent on domestic herds. At Kavuşan Höyük the “triad” represent only 85% of the corr. NISP. Equids, considered here as domestic animals, represent 10% of the corr. NISP. Wild equids are numerous in contemporary assemblages at Tall Seh Hamad (Becker, 2008) and are thought to be present in the *dunnu* at Tell Sabi Abyad (Cavallo, 2002). However, there is no evidence for the presence of wild equid in Late Bronze Age Kavuşan Höyük (see Methods in Chapter II). Camel is represented by one bone in the same assemblage and therefore, one of the possibilities to explain the high number of equids at Late Bronze Age Kavuşan Höyük is to assume that this settlement was involved in transportation activities using horse, donkey and camel as pack-animals. However it doesn’t indicated whether or not Kavuşan Höyük was a trading station as supposed for Türbe Höyük in the Middle Bronze Age. In the assemblages from Giricano and Müslümantepe with a higher representation of wild mammals, the 95% of corr. NISP threshold is reached by summing up the “triad” with the red deer. In Late Bronze Age assemblages no other deer species was identified.

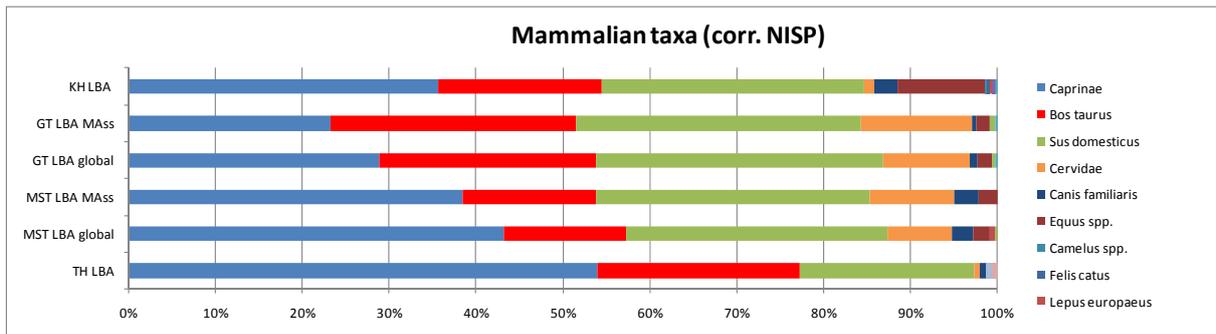


Figure IV.6. Relative representation of mammalian taxa in percentage of corr. NISP.

Assemblages from Müslümantepe and Giricano have a high amount of red deer remains. As in the Middle Bronze Age in assemblages with a strong red deer component, this species represent more than 90% of the wild mammals. The status of the settlement at Müslümantepe during the Late Bronze Age is not known. Giricano in the Middle-Assyrian period was a *dunnu*, a fortified farm (see pp. 15, 19-20 for the definition of a *dunnu*) controlled by a man related to the city of Tushan (Ziyaret Tepe). Texts recovered from a jar in a pit, indicates the use of donkey for transportation and oxen for field activities but no wild mammal is mentioned (Radner, 2004). The lack of reference to wild mammals in texts is, however, not surprising as they were not relevant on an administrative point of view (Wiggermann, 2000). The fact that hunting played a role in a *dunnu* economy is, however, not a surprise since the publication of the faunal material from the *dunnu* at Tell Sabi Abyad (Cavallo, 2002). Gazelle represent there 7.3% of the mammalian remains. Equids are very important with 23.6% of the assemblage. It is assumed by C. Cavallo that part of the equids was wild but she could not provide any quantified estimation (Cavallo, 2002). Hunting is also important at Middle Assyrian Tall Seh Hamad with game representing 11.9% of the mammalian remains. Mesopotamian fallow deer and wild ass represent each a third of the game while gazelle count for a sixth (Becker, 2008).

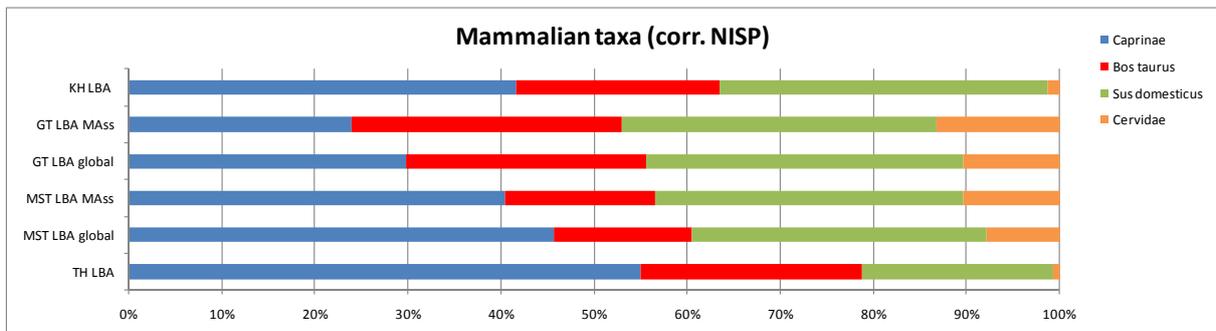


Figure IV.7. Relative representation of the “triad” and deer in percentage of corr. NISP.

As far as the “triad” taxa are concerned (Fig. IV.8), Türbe Höyük is characterized, as in the MBA, by a lower representation of domestic pigs around 20%. In the other assemblages pigs make roughly 35% of the “triad”.

Correspondence Analysis allows shedding light on several aspects of the animal exploitation during the Late Bronze Age (Fig. IV.9). First it has to be noted that when both Middle Assyrian and global Late Bronze Age assemblages are available from the same site, their species composition exhibit similar patterns. Either all Late Bronze Age layers should be attributed to the Middle Assyrian period, even if it cannot be done from the material culture, or patterns of animal exploitation were

similar in the Middle Assyrian period and in anterior Late Bronze Age sub-phases (i.e. Mitannian period). Axis 1 is clearly linked to the red deer (contribute to 87.97% of the axis) which is opposed to Caprinae and equids. Domestic pig is the main contributor to Axis 2 (48.42%) followed by red deer (25.74%) and cattle (22.74%). The position of Kavuşan Höyük and Türbe Höyük on one side of Axis 1 and Müslüman-tepe and Giricano on the other side of the axis is mainly due to the relative proportion of red deer in the assemblages.

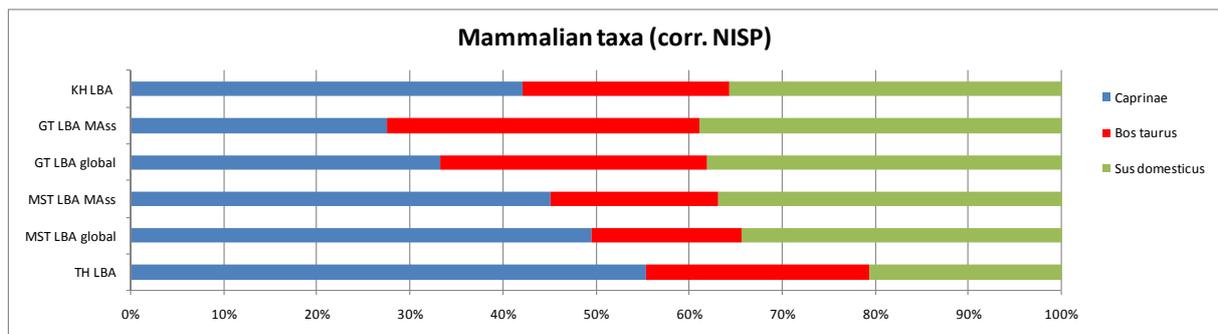


Figure IV.8. Relative representation of the “triad” taxa in percentage of corr. NISP.

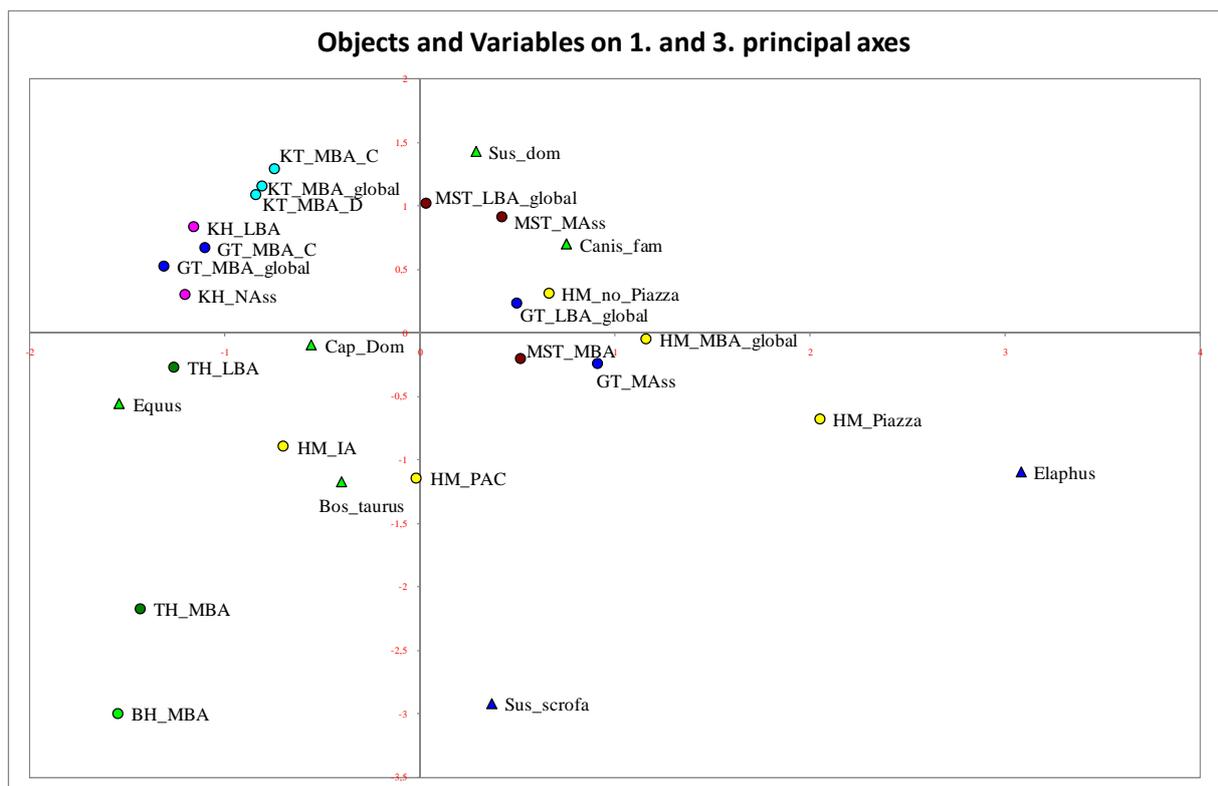


Figure IV.9. Correspondence Analysis, using CAPCA software, with assemblages from all periods as objects (circle) and mammalian taxa as variables (triangle). For the circles, each colour represents one site. Green triangles are domestic and blue triangles are wild mammals. The minimum sum for variable is 30. Axis 1 explains 45.11% and Axis 3 15.92% of the variability.

The data on the exploitation of the taxa of the “triad”, detailed in Chapter III, are summarized hereunder (Tab. IV.2). Concerning the exploitation of sheep and goat, assemblages exhibit different

patterns in term of kill-off pattern. In the Tigris River valley the exploitation is focussed on ages classes D to G (one to six years old) while in Tūrbe Höyük younger animals of the age class C are preferred. As it is the case already in the Middle Bronze Age, sheep and goat were slaughtered at different ages, goat usually older than sheep. Tūrbe Höyük assemblage is also an exception as it seems that most of the young animals (age class C) were goat. Data on age at slaughtering for cattle indicate that an important part was slaughtered after two years old but before the animals reached 4 years. This indicates that these individuals were selected exclusively for meat consumption. They were slaughtered too young to have served as milking cow or draught animal. In Middle Assyrian Giricano in particular, it is known from the texts that cow and oxen were used for ploughing (Radner, 2004). However, only 30% of the cattle remains belong to individuals older than four years. Therefore, it is unlikely that the people from the *dunnu* consumed discharged animals. Pigs were also consumed young mainly between six months and two years old. The proportion of piglets younger than six months increases compared to the Middle Bronze Age. For the “triad”, the skeletal representation suggests that the assemblages are composed of both butchery and consumption refuse. Only at Tūrbe Höyük, a higher proportion of low meat value elements indicates that butchery wastes could have constituted a more important part of the assemblage.

	KH LBA	GT LBA global	GT LBA MAss	MST LBA global	MST LBA MAss	TH LBA
Sheep/Goat (%)	51/49	54/46	50/50	56/44	58/42	45/55
Caprinae Kill-off pattern	D +++ EF ++ C +	D EF G ++ C +	D G +++ EF +	B D EF G ++	--	C +++ D EF ++ G +
Difference in sheep and goat kill-off pattern	--	sheep = C-D>EF goat = peak on G	sheep = D > EF goat = G > D	sheep = peak on B less G	--	sheep = D>EF>G goat = peak on C
Caprinae skeletal representation	Quite balanced	Quite balanced	Tend to medium meat value	Quite balanced	Tend to medium meat value	Tend to medium meat value
Cattle kill-off pattern	35% culled between 3 to 4 years	--	Only 30% survived after 3y	10% culled before 2y 55% after 3y	--	no individual culled before 2y
Cattle skeletal representation	Tend to low and high meat value	Quite balanced	Quite balanced	Tend to medium meat value	Tend to medium meat value	Tend to low meat value
Pig kill-off pattern	B +++ C ++ A 10%	B +++ C ++ A-D +	B +++ C ++ A-D 10%	--	--	--
Pig skeletal representation	Tend to medium meat value	Quite balanced	Quite balanced	Tend to high meat value	Tend to high meat value	Tend to low meat value

Table IV.4. Summary of different information on the exploitation of domestic mammals in the Late Bronze Age. Age groups according to the age groups used for each taxa (see Chapter III). ++++ over 50%, +++ 45-35%, ++ 30-25%, + 20-15%.

Finally, one important remark on the status of Giricano and Müslümantepe can be made considering the red deer remains. In Müslümantepe, the skeletal representation for red deer doesn't dramatically differ from the one calculated from the MBA assemblage (see in Chapter III). It is assumed that, even if in small numbers, carcasses were brought to the settlement and the meat consumed there. On the contrary, in the Middle Assyrian assemblage from Giricano, red deer is almost exclusively represented by cranial remains and extremities (tarsal bones, metapodials and

phalanges). This pattern clearly suggests trophies and pelts. It is attested in texts from other Middle Assyrian sites that pelts of dead animals were cooked and dyed to be then used in the leather industry in connection with the construction of chariots. If red deer is not mentioned in the texts from Tell Sabi Abyad (Wiggermann, 2000: 198) in northern Syria it might be due to the geographical location of the site. Red deer was the most common game in the upper Tigris River valley and therefore, it is possible to think that its skin was used in the leather industry. The data suggest that the presence of red deer remains is due to the use of the skin and possibly for trophies. The carcasses might not have been brought to the settlement and there is no evidence that red deer was hunted in the vicinity of the *dunnu*. On the contrary, red deer was hunted and consumed at Müslümantepe as it is already attested for the Middle Bronze Age. In this case, the assumption made for the Middle Bronze Age that red deer was hunted only on the eastern edge of the flood plain can be maintained for the Late Bronze Age.

3. Iron Age

The Iron Age Period is only represented by three assemblages from two different settlements (Tab. IV.5). First of all, the peculiarity of the assemblage from the pit BSG in Kavuşan Höyük has to be mentioned. The pit was filled with heavily burnt bones. The presence of at least 14 Caprinae skeletons justifies the use of the MNI. All other taxa are only represented by a few bones and have a MNI of one (Fig. IV.10).

The Neo-Assyrian assemblage from Kavuşan Höyük and the (Early) Iron Age assemblage from Hirbemerdon Tepe present several similarities which will be detailed hereunder. Beside the fact that both assemblages are constituted by domestic refuses as indicated by the archaeological context (BSG pit assemblage is not discussed here), these similarities have considerable implications in term of cultural or political differentiations. As stated in the first chapter, Kavuşan Höyük and Hirbemerdon Tepe assemblages belong to two distinct sub-phases of the Iron Age. The archaeologists date the assemblage from Hirbemerdon Tepe to a period predating the arrival of the Neo-Assyrian Empire in the Upper Tigris Area. The “Early” Iron Age period is characterized by a local material culture and a lack of strong political control over the area. On the contrary the assemblage from Kavuşan Höyük dates back to a period when the settlement was under the influence of the Neo-Assyrian Empire. Therefore the similarities between the two assemblages raise some questions concerning the cultural and political interpretation which can be done using the animal exploitation patterns. Similar patterns of animal exploitation can indicate continuity between the two chronological phases. This interpretation would be in contradiction with the fact that the Neo-Assyrian influence is clearly visible in the material culture. It is possible to consider however that due to the small size of Kavuşan Höyük and its rural nature, the influence of the Neo-Assyrian Empire would be less visible in the subsistence strategies than in the material culture. Our analysis suggests that there are some variations, notably in Hirbemerdon Tepe, in term of subsistence strategies in different chronological periods. Therefore differences were expected between the Early Iron Age and the Neo-Assyrian period. Such similar patterns could also indicate that the two settlements considered here could be contemporaneous. New developments in the chronological phasing of various ceramic types could support this hypothesis⁴².

⁴² I thank Dr. Anacleto D’Agostino for personal communications on this subject and Prof. Dr. Kemalettin Köroğlu for similar suggestions.

	HM IA %corr. NISP	KH IA NAss without pit BSG %corr. NISP	KH IA NAss pit BSG %MNI
<i>Canis familiaris</i>	4.2	2.1	5.3
<i>Equus</i> spp.	10.2	8.8	5.3
including <i>Equus caballus</i>	0.2	0.8	
including <i>Equus cf. caballus</i>	1.3	1.3	
including <i>Equus asinus</i>	1.7	2.1	
including <i>Equus cf. asinus</i>	3.4	1.7	
<i>Sus domesticus</i>	19.3	28.6	5.3
<i>Camelus</i> spp.		0.4	
<i>Bos taurus</i>	23.9	24.8	5.3
Caprinae	35.4	33.2	73.7
including <i>Capra hircus</i>	5.5	3.8	
including <i>Ovis aries</i>	7.2	5.9	
Total domestic mammals	93.0	97.9	94.7
<i>Equus hemionus</i> ssp.	0.2		
Cervidae	6.8	0.8	5.3
including <i>Cervus elaphus</i>	6.1	0.8	5.3
including <i>Dama mesopotamica</i>	0.4		
<i>Gazella</i> spp.		0.4	
<i>C. aegagrus</i> / <i>O. orientalis</i>		0.8	
including <i>Ovis orientalis</i>		0.8	
Total wild mammals	7.0	2.1	5.3
corr. NISP	472	238	19
1 skeleton <i>Canis</i> with 24 remains counted as 1. MNI is justified by the presence of at least 14 almost complete Caprinae skeleton.			

Table IV.5. Relative representation of taxa in percentage of corr. NISP and MNI (see Chapter II for explanations) in Iron Age assemblages. See tables II.3-8 for actual numbers.

The Neo-Assyrian assemblage from Kavuşan Höyük and the (Early) Iron Age assemblage from Hirbemerdon Tepe are both characterized by a relatively low representation of the “triad”. It represents no more than 85% of mammalian remains. In these assemblages equids represent almost 10% (Fig. IV.10). These equids are mainly donkeys but it is not clear if they were only used for transportation as attested in the texts (Lanfranchi and Parpola, 1990) or also part of the diet. Red deer still play a role at Hirbemerdon Tepe (Fig. IV.11) but is less abundant than in previous periods.

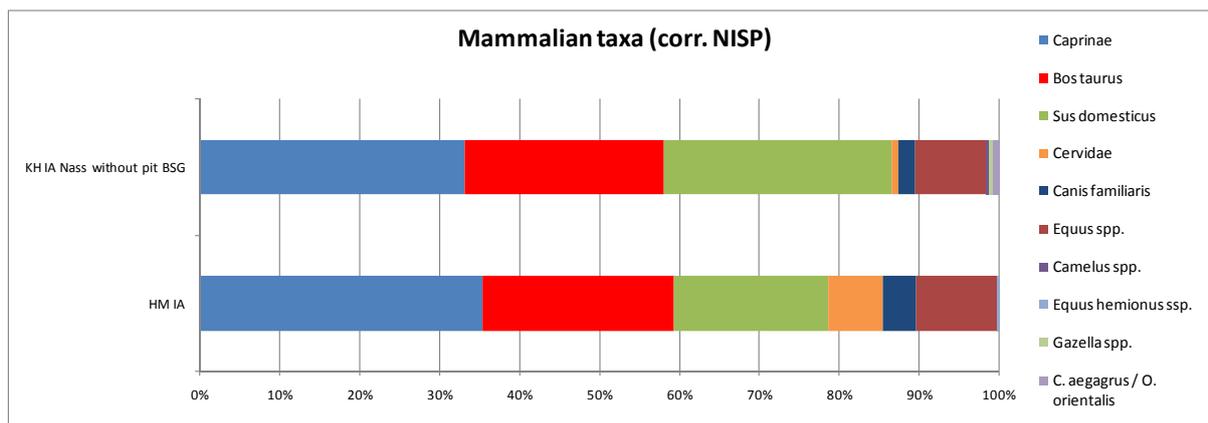


Figure IV.10. Relative representation of mammalian taxa in percentage of corr. NISP.

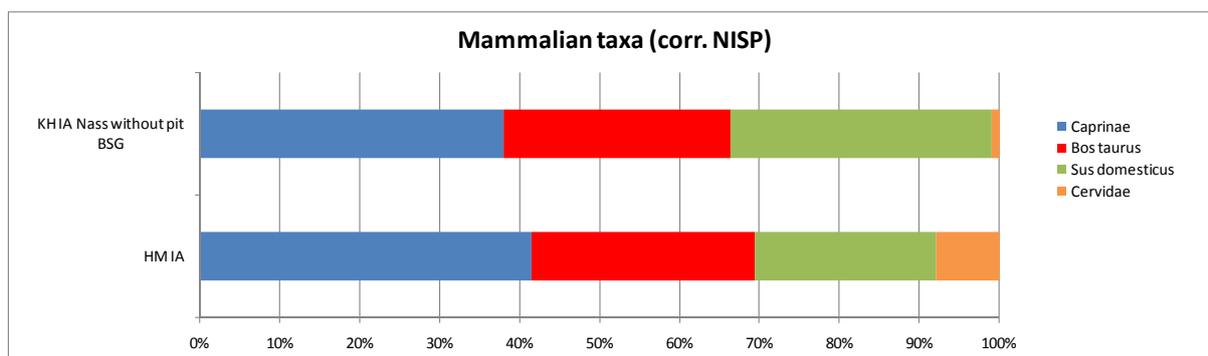


Figure IV.11. Relative representation of the “triad” and deer in percentage of corr. NISP.

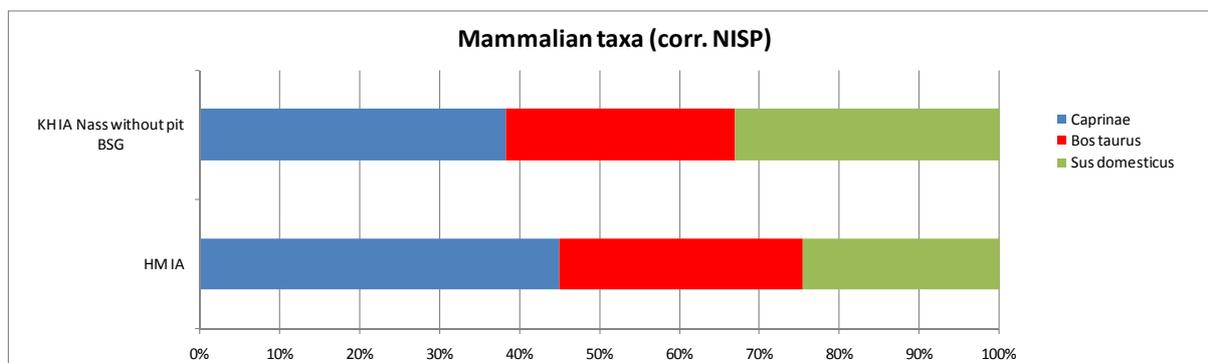


Figure IV.12. Relative representation of the “triad” taxa in percentage of corr. NISP.

Concerning the “triad”, sheep and goat are the most numerous but all taxa are almost equally represented in NISP. It means also that speaking about the pure economic importance of each taxa, cattle was obviously dominant in the subsistence due to the quantity of milk and meat an individual can produce compared to a sheep or a goat. When weight of specimens is considered (Fig. IV.13) cattle dominate the assemblages followed by pig and caprine. The increase in importance of cattle when the weight is considered is valid for all the assemblage of this study. However, it has been decided to keep the corr. NISP as a comparative base because it is the quantitative unit in which possible biases are controlled the best in order to optimize the comparison of assemblages between them.

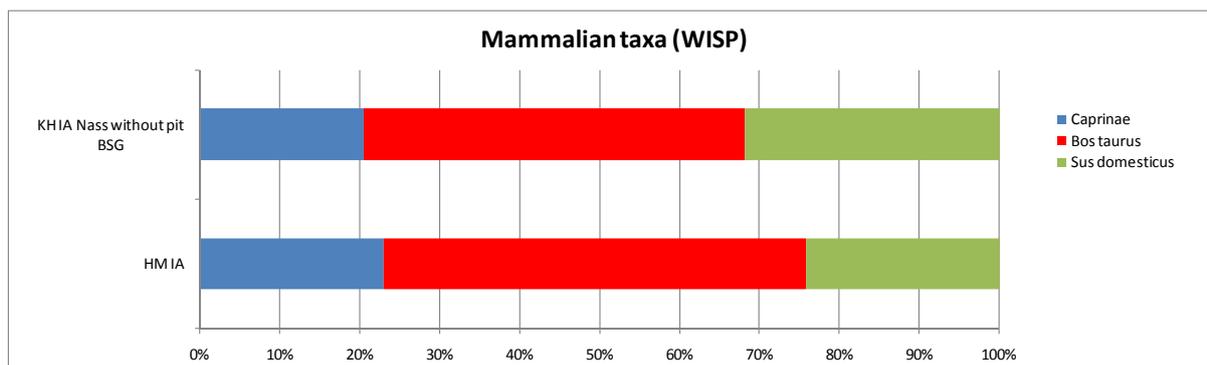


Figure IV.13. Relative representation of the “triad” taxa in percentage of WISP.

On the Correspondence Analysis (Fig. IV.9) both Iron Age assemblages are close to each other on Axis 1 due to the importance of equids. Axis 3 shows a preference in the assemblage from Hirbemerdon Tepe for caprines and cattle over pigs.

	KH IA NAss	HM IA
Sheep/Goat (%)	61/39	57/43
Caprinae Kill-off pattern	D G +++ EF ++	C EF G ++ HI +
Difference in sheep and goat kill-off pattern	--	sheep = C & G +++ / EF ++ goat = C & EF ++ / D & G +
Caprinae skeletal representation	Tend to high meat value	Tend to high meat value
Cattle kill-off pattern	not slaughtered before 2 years old and probably not before 3 years old	10% of animals culled before 2 y all the rest after 3 years old
Cattle skeletal representation	Tend to medium and low meat value	Tend to medium and low meat value
Pig kill-off pattern	C +++ D +	C D ++++ B +
Pig skeletal representation	Tend to medium meat value	Tend to high meat value

Table IV.6. Summary of different information on the exploitation of domestic mammals in the Iron Age. Age groups according to the age groups used for each taxa (see Chapter III). ++++ over 50%, +++ 45-35%, ++ 30-25%, + 20-15%.

Beside the relative representation of mammalian taxa, other data show some similarities between the two assemblages (Tab. IV.6). Young caprine, younger than six months, are lacking in both assemblages. Individuals between two and six years old are well represented in both assemblages; even older animals are also noticeable at Hirbemerdon Tepe. They are likely to belong to animals kept for other aims than meat (milk, wool, reproduction) before slaughtering. At Hirbemerdon Tepe, animals with tender meat (age class C) are well represented for both species. Concerning cattle, there is no evidence for animal slaughtered before three years old at Kavuşan Höyük. At Hirbemerdon Tepe 10% of the animals were slaughtered before two years old. If a small

number of young animals were slaughtered for their tender meat, it seems that the majority of the cattle herd was slaughtered older.

Pig kill-off pattern shows an interesting shift compared to previous periods. In the Bronze Age most of the pigs consumed were from six months to two years old. In the Iron Age the majority of pigs were killed between the ages of one to three years. This change in the exploitation pattern of pig is probably due to a search of productivity where pigs are slaughtered older to increase the amount of meat or fat available from each individual.

Global skeletal representations tend to suggest that the studied material come from a mixture of butchery, kitchen and consumption refuse. Skeletal representation for red deer suggests that carcasses were brought complete to the settlement as it was the case in the previous periods (except for Late Bronze Age Giricano).

B. Variability of animal exploitation patterns.

1. Intra-site variability

a) Spatial variability

Only two sites offer the possibility to compare contemporary areas: Kenan Tepe and Hirbemerdon Tepe in the Middle Bronze Age.

At Kenan Tepe Area C and Area D represent two different zones of the same Middle Bronze Age settlement. Area C is interpreted by the archaeologists as a domestic area (see Chapter I) while in Area D a street and part of a large building were excavated. For both areas the relative representation of the different taxa is very similar as it can be seen from the graphic (Figs. IV.1-2,4) and Correspondence Analysis (Fig. IV.5). The other data on the exploitation of animal products are not very well documented due to the limited sample size (Tab. IV.2). It appears, however, that there is a tendency in Area C assemblage to contain more skeletal elements with a low meat value than in Area D assemblage. Both areas exhibit the pattern of a small urban settlement relying mainly on domestic species. Sheep and goat are the most numerous taxa with ca. 45% of the “triad” NISP followed by pig (ca. 35%) and cattle (ca. 20%). However, it can be deduced that different activities took place in the two areas. In Area C, the domestic context is linked to butchery activities and food preparation as attested by skeletal elements with a low meat value (extremities of limbs). On the contrary, in Area D where the faunal remains were collected in a large building and along a street, the relative low frequency of elements with a low meat value indicates that the faunal assemblage reflects consumption activities. Meals may have taken place in the building and the refuse disposed there and in the street.

At Hirbemerdon Tepe, two contemporary and distinct assemblages come from (i) the Piazza, a large open space related to the Ceremonial Sector of the settlement and (ii) the Working Sector and a long street passing along the buildings (Laneri, 2011). As in Kenan Tepe, the street is interpreted as a place where refuse were disposed (Laneri et al., 2008). Hirbemerdon Tepe is characterized by the importance of a specialized hunting on red deer. The red deer remains are, however, much more numerous in the Piazza where they are in third position after caprine and pig

but before cattle. In the other contexts red deer is in the fourth position with ca. 13% of corr. NISP. As stated above (Chapter IV.A.1) it is assumed by the archaeologist and myself that red deer had a role in the symbolic world at that time and was consumed during ritual meals which took place in the Piazza (Laneri, 2011). When the “triad” taxa are considered, they are represented in the same proportions in the Piazza and in the other contexts. The relative representation of red deer is not the only difference between the Ceremonial and Working Sectors. Sheep are slightly more numerous than goat in the assemblage yielded from outside the Piazza as it is also the case in most of the Middle Bronze Age in the Upper Tigris area (Tab. IV.2). In the Piazza, however, goats are more numerous than sheep. The kill-off pattern is also different. In the Piazza most of the consumed caprines were aged between six months and one year. It is slightly before sheep and goat reach their optimum meat weight. Tender meat could have been selected for the guests attending the ritual activities. Outside the Piazza, tender meat is also represented but in the same proportions as older individuals (G class for goat and EF-G classes for sheep). A high proportion (almost 30%) of sheep is constituted of lambs culled before they reached two months old. Although it might be a delicacy, these lambs were not served in the Piazza. This pattern proves an intensive ewe milk production mixed with some tender meat exploitation (Helmer et al., 2007).

b) Sub-chronological variability

At Middle Bronze Age Giricano, Late Bronze Age Giricano, and Late Bronze Age Müslümantepe, two assemblages from the same chronological phase but not exactly contemporary were available. At Middle Bronze Age Giricano, one assemblage comes from the building “Geb. C”. The other one encompasses the faunal remains from building “Geb. C”, building “Geb. A” and remains not attributed to any of the two buildings. In the Late Bronze Age at the same site, the Middle-Assyrian assemblage was recovered in pits and is included in the global assemblage together with remains from the Mitannian layers and other Late Bronze Age layers. At Late Bronze Age Müslümantepe the Middle-Assyrian assemblage is considered separately and then together with remains from other Late Bronze Age layers. Correspondence Analysis shows that assemblages from the same site have a similar pattern in term of the relative representation of mammalian taxa (Fig. IV.9). Concerning the other data, the amount of additional remains is too limited to provided any clue about discrepancies between the assemblages (Tab. 2-4). It can be argued for the Middle Bronze Age at Giricano that the pattern of animal exploitation did not change significantly during the various sub-phases of this period. For the Late Bronze Age at the same site, it could be that the pattern of animal exploitation is the same in the “Mitannian” Period and in the Middle-Assyrian Period. It could be also that remains from true Mitannian layers were not numerous enough to change the average picture. At Müslümantepe, the remains from other layers than the Middle-Assyrian ones are numerous enough to have impacted the pattern of animal exploitation. As this pattern is similar in both assemblages two conclusions are possible. Either the layers not clearly attributed to the Middle-Assyrian period are actually contemporary⁴³ or the pattern of animal exploitation was unchanged thorough the Late Bronze Age.

2. Inter-site variability

It has been shown that in the Middle Bronze Age, the geographical location of the sites can explain the relative representation of the different mammalian taxa (Chapter IV.A.1). Three groups are clearly visible on the Correspondence Analysis (Fig. IV.5). The “Botan-Bitlis Rivers” group

⁴³ Chronological attribution to a sub-phase in the Late Bronze Age on material culture only is difficult.

constituted of Başur Höyük and Türbe Höyük, is characterized by a lack of red deer on one hand and a preference for cattle over pig on the other hand. The “Tigris River flood plain” group constituted of Giricano and Kenan Tepe has an animal economy based on the “triad”. On the contrary, the two sites on the eastern margin of the flood plain, Müslümantepe and Hirbemerdon Tepe, forming the third group, exhibit a clear specialized hunting on red deer complementary of the “triad” exploitation.

The peculiarity of the Piazza at Hirbemerdon Tepe has been described here above. The fill Posterior to the Architectural Complex at Hirbemerdon Tepe is also questionable as it is in term of chronology at the border between the Middle and Late Bronze Age. It is assumed that all other Middle Bronze Age assemblages can be compared without fearing important biases due to the type of social context. The different groups are, however, not completely homogeneous. For example Caprinae in Giricano are much more numerous (ca. 65% of the “triad” NISP) than in Kenan Tepe (ca. 45% of the “triad” NISP). However, it doesn’t seem to have a strong impact according to the Correspondence Analysis.

In the Late Bronze Age the influence of the geographic location on the pattern of animal exploitation is more difficult to attest. Kavuşan Höyük is characterized by the amount of horse and donkey bones while the archaeological context is said to be of domestic nature (see Chapter I). The importance of equids does not seem to be linked directly to the location of the site but it might be related to the role this settlement could have played in the transportation network. The Neo-Assyrian assemblage from Kavusan Höyük confirms that the site was related to pack and transportation animals such as horse, donkey and camel. Giricano in the Late Bronze Age is characterized by a high amount of red deer remains. It have been argued here above that this was linked to working activities such as the preparation of skins more than with an interested for red deer hunting.

In the Iron Age, although they are attributed to different chronological sub-phases, the assemblages from Kavuşan Höyük and Hirbemerdon Tepe differ only on the amount of red deer remains.

To sum up on inter-site variability, in the Middle and Late Bronze Age, at least three groups of sites can be identified. Three general trends seem to apply to the different settlements whatever the period considered. (i) The sites located on the Botan and Bitlis Rivers banks gave less importance to pig than contemporary settlements. As there is not significant environmental difference between this area and the upper Tigris River valley, this trend is tentatively attributed to local social and cultural choices. (ii) The settlements situated in the eastern edge of the flood plain always exhibit an exploitation of red deer beside the “triad” taxa. It is even confirmed by the fact that at Late Bronze Age Giricano the red deer remains are not due to a local hunting followed by the transportation of the carcasses into the settlement. (iii) The settlement of Kavusan Höyük shows a peculiar interest for the exploitation of domestic equids in both chronological periods represented in the assemblages.

3. Diachronic variability

Due to the inter-site variability within each chronological period, it is difficult to estimate if any changes in the patterns of animal exploitation are due to a chronological trend. As explained here above, it was not possible to identify in the other periods the geographical trend evidenced in the Middle Bronze Age. One possible explanation is that during the Middle Bronze Age, these small settlements were politically and economically more independent. Therefore, the economic and

subsistence choices of each community were more likely to be influenced by environmental considerations such as the vicinity of agriculture fields and hilly areas (e.g. in the upper Tigris River valley) and cultural considerations (e.g. in the Botan and Bitlis River valleys).

In the Late Bronze Age political control is stronger on the area (Mitannian and mainly Middle-Assyrian). A more organized site-hierarchy can be expected from this political control. Some settlements such as the *dunnu* at Giricano or the fortress at Türbe Höyük have a well defined function. The conjunction of a precise economic role and decisions taken by a political power probably had a higher influence on the pattern of animal exploitation than local environmental constraints. It is also in the Late Bronze Age that an important exploitation of equids appeared at Kavuşan Höyük.

The two assemblages representing the Iron Age period are characterized by the exploitation of equids. As stated already it was not possible to quantify the amount of remains belonging to mule. However, donkey seems to dominate among the equids in both assemblages. Another peculiarity of the Iron Age compared to the Bronze Age is a different kill-off pattern for domestic pigs. The age at slaughtering of the animals shifted from six months to two years in the Middle and Late Bronze Age to one to three years in the Iron Age.

The relative representation of the main domestic taxa (cattle, pig, sheep and goat) is not a good chronological marker as no constant change seems to occur from the Middle Bronze Age to the Iron Age. The importance of red deer is not a reliable chronological marker either as specialized hunting is evidenced in all the chronological periods at Hirbemerdon Tepe and Müslümantepe.

4. Concluding remarks

The knowledge on the Upper Tigris River area during the Bronze and Iron Ages was lacking data concerning the exploitation of products from animal origin. The aim of this study was to fill the gap by documenting faunal remains from seven archaeological sites. It was also intended to check if it would be possible to compare assemblages with different collection methods, various chronological and spatial resolutions, and limited in size. This study shows that using a proper quantitative unit, such as a corrected Number of Identified Specimens, it is possible to limit the impact of various biases and to make the comparison of each assemblage with each other easier. In the case of small assemblages coming from nearby and contemporary settlements, the number of assemblages is a key factor to assure the reliability of the patterns observed. Correspondence Analysis is a powerful tool to investigate the variability of the assemblages. However, the best results come from the chronological periods where assemblages are the most numerous. When many assemblages are available, cross-comparisons make possible the investigation of the impact of the local environment, social context or economic choices on the patterns of animal exploitation.

This study showed that subsistence economy in the Upper Tigris River area was, for the animal side, focused on domestic cattle, pig, sheep and goat during the Bronze and Iron Age. Sheep and goat are usually the most numerous but are rarely representing more than 50% of the domestic mammal NISP. This mixed exploitation of the main food-providing mammals was in some settlements complemented by a specialized hunting on red deer or an exploitation of domestic equids. The diversity of wild mammals is quite high with 14 species in total. Except for the red deer, the representation of other wild mammals is extremely low.

Besides mammals other taxa were exploited. Birds, amphibians, turtles and tortoises, fish, mollusks and crustaceans are attested in the assemblages. Their importance in the subsistence economy is, however, difficult to estimate quantitatively due to various preservation and recovery biases.

More detailed information was collected on the exploitation of animal resources such as kill-off patterns, skeletal representation, butchery marks and pathologies. Due to the limited size of the assemblages it was, however, difficult to obtain a sufficient sample size to assure the reliability of these analyzes. These complementary data were, however, essential to demonstrate differences in assemblages which had a similar proportion of different taxa.

This study proved that zooarchaeological research can be undertaken on small assemblages and provide reliable results. Salvage projects often allow for compensation the limited size of the assemblages (due mainly to the limited amount of time available for the excavation of each site) with a higher density of comparable settlements in a given area. It necessitates, however, that the study of each assemblage should be done by the same researcher or at least coordinated by a researcher to assure an optimal comparison of the raw data. It is hoped that this study will be used as an argument in favor of a better integration of zooarchaeology within salvage projects in Turkey and the Near East.

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Appendix 1

Measurements

All measurements are given in mm. Unless mentioned under the measurement's name, all measurement definitions are following von den Driesch 1976.

Sample n°	Species	Bone	Remarks	Chronology	Bp	Dp
MST00562	<i>Lepus europaeus</i>	Radius		LBA	8.9	6

Sample n°	Species	Bone	Remarks	Chronology	Bp	Dp	DC
TH01233	<i>Lepus europaeus</i>	Femur		MBA	27.6		9.9
BH00045	<i>Lepus europaeus</i>	Tibia		MBA	19.5	20.5	

Sample n°	Species	Bone	Remarks	Chronology	GL	Bp	Dp	Bd	Dd	SD	DD
KH00312	<i>Lepus europaeus</i>	Metatarsal		LBA	50.2	5.8	5.7				
MST00761	<i>Lepus europaeus</i>	Metatarsal		LBA		5					
HM03155	<i>Lepus europaeus</i>	Prox phalanx		MBA	20.7	5.5	4.9	3.8	2.8	2.9	3.4

Sample n°	Species	Bone	Remarks	Chronology	M1 B	M1 L	M2 B	M2 L
KT00840	<i>Vulpes vulpes</i>	Mandibula		MBA	5.7	15	4.8	6.7

Sample n°	Species	Bone	Remarks	Chronology	Bd	SD
BH00287	<i>Vulpes vulpes</i>	Humerus		MBA	16.9	7.2

Sample n°	Species	Bone	Remarks	Chronology	GL	Bp	Dp	Bd	Dd	SD	DD
KT00347	<i>Vulpes vulpes</i>	Metacarpal		MBA	40.7	7.4	6.4	7.1	5.8	4.4	3.5
KT00348	<i>Vulpes vulpes</i>	Metacarpal		MBA	47.7	5	6.5	5.5	5.8	3.6	3.2
KT00386	<i>Vulpes vulpes</i>	Metapodial		MBA				5.8	5.8	3.7	3.3

Sample n°	Species	Bone	Remarks	Chronology	GL	Bp	Dp	Bd	Dd	SD	DD
KH00313	<i>Felis catus</i>	Metacarpal		LBA	33.2	4.1	5.9	4.8	4.1	3.1	2.8

Sample n°	Species	Bone	Remarks	Chronology	GL	Bd
HM02693	<i>Panthera leo</i>	Metacarpal		Late MBA	91.1	19

Sample n°	Species	Bone	Remarks	Chronology	DTT	HMT	HT
					Helmer	ernandez	ernandez
TH00053	<i>Gazella</i> spp.	Humerus		LBA	22.8	18.1	15

Sample n°	Species	Bone	Remarks	Chronology	GLI	GLm	DI	Dm
KH00223	<i>Gazella</i> spp.	Tarsal	Talus	IA	24.2	23.1	13	13

Sample n°	Species	Bone	Remarks	Chronology	P4 GB	P4 B	P4 L	M1 B	M1 L	M2 B	M2 L	M3 B	M3 L
KT00880	<i>Canis familiaris</i>	Lower tooth		MBA				8.3	20.8				
KT00151	<i>Canis familiaris</i>	Mandibula		MBA				8.3	20.3				
HM02370	<i>Canis familiaris</i>	Mandibula		MBA				8.9	20.8				
HM02709	<i>Canis familiaris</i>	Mandibula		MBA						6.8	8.9		
HM03266	<i>Canis familiaris</i>	Mandibula		MBA						8	11		
HM01798	<i>Canis familiaris</i>	Mandibula		IA				23	9.3				
HM02615	<i>Canis familiaris</i>	Mandibula		IA				9.4	23.2	7.1	10.6	5.2	6
HM03880	<i>Canis familiaris</i>	Mandibula		IA				8	19.6	5.9	8.2		
HM02241	<i>Canis familiaris</i>	Maxilla		MBA	10.3	8.9	20.8	15	12.2				
HM00936	<i>Canis familiaris</i>	Maxilla		Late MBA	10.6	8.5	19	15.3	12.4	10.1	7.3		
HM01799	<i>Canis familiaris</i>	Maxilla		Late MBA				14	12	6	8.7		
HM02616	<i>Canis familiaris</i>	Maxilla		IA	10.4	8.9	19.1	13.5	15.8				

Sample n°	Species	Bone	Remarks	Chronology	GL	GB	H	BFcr	BFcd	Bpacd	BPtr	LCDe	LAPa	SBV
HM02097	<i>Canis familiaris</i>	Atlas		MBA	34.5		24.1	35.5	25.9					
KH00513	<i>Canis familiaris</i>	Atlas		IA	39.3	76.5	28.4	31.8	42.4				18.8	
KT00367	<i>Canis familiaris</i>	Axis		MBA				27.6	15.9	28.3		45.1		19.5
KH00506	<i>Canis familiaris</i>	Axis		MBA				25.4	16.7		24.8	37.2		18.8
KH00505	<i>Canis familiaris</i>	Axis		LBA			31.7	26.3	15.9		24.7	45	44.2	18.4

Sample n°	Species	Bone	Remarks	Chronology	SLC	GLP	BG	LG
KT00092	<i>Canis familiaris</i>	Scapula		MBA	19.3		15.5	
HM02222	<i>Canis familiaris</i>	Scapula		MBA	25.7	29.3	17.2	
HM02939	<i>Canis familiaris</i>	Scapula		MBA		30.5	18.9	
TH01094	<i>Canis familiaris</i>	Scapula		MBA		30.8	19.3	
MST00017	<i>Canis familiaris</i>	Scapula		MBA	24.2	27	16.6	
HM00792	<i>Canis familiaris</i>	Scapula		Late MBA		28.9	17.6	23.4
KH00472	<i>Canis familiaris</i>	Scapula		LBA		29.7	17.5	

Sample n°	Species	Bone	Remarks	Chronology	BP	Dp	Bd	DTD	DTT	SD
								Helmer	Helmer	
KT00133	<i>Canis familiaris</i>	Humerus		MBA			30.9			
HM02189	<i>Canis familiaris</i>	Humerus		MBA			32.8			11.9
HM02190	<i>Canis familiaris</i>	Humerus		MBA	28.1		33.2			11.7
HM03138	<i>Canis familiaris</i>	Humerus		MBA			27			11.3
HM03799	<i>Canis familiaris</i>	Humerus		MBA	24.9	37.4				
BH00343	<i>Canis familiaris</i>	Humerus		MBA	31.2					
MST01140	<i>Canis familiaris</i>	Humerus		LBA				32.5	25.6	
HM01394	<i>Canis familiaris</i>	Humerus		IA			33		25.2	
HM02415	<i>Canis familiaris</i>	Humerus		IA			34.2			14.5

Sample n°	Species	Bone	Remarks	Chronology	Bp	Dp	Bd	BFd	Dd	SD	DPA	SDO	BPC
KH00422	<i>Canis familiaris</i>	Radius		MBA	17.1	10.9							
HM02182	<i>Canis familiaris</i>	Radius		MBA			22.8						
HM02386	<i>Canis familiaris</i>	Radius		MBA			24.3	20.5	13.1				
HM00757	<i>Canis familiaris</i>	Radius		Late MBA						14.6			
HM02806	<i>Canis familiaris</i>	Radius		IA			25.2		15.5				
KT00557	<i>Canis familiaris</i>	Ulna		MBA									14.9
HM02180	<i>Canis familiaris</i>	Ulna		MBA									14.7
KT00777	<i>Canis familiaris</i>	Ulna		MBA									15.5
HM01285	<i>Canis familiaris</i>	Ulna		Late MBA							19.2	23.5	14.9
KH00414	<i>Canis familiaris</i>	Ulna		LBA									16
HM03867	<i>Canis familiaris</i>	Ulna		IA							27.4	21.8	17.6

Sample n°	Species	Bone	Remarks	Chronology	LA
HM01586	<i>Canis familiaris</i>	Pelvis		IA	27.6

Sample n°	Species	Bone	Remarks	Chronology	GL	GB	Bd
MST00783	<i>Canis familiaris</i>	Tibia		LBA			22.8
HM02593	<i>Canis familiaris</i>	Tarsal	Talus	IA	27.5		
HM02594	<i>Canis familiaris</i>	Tarsal	Calc	IA	44.3	17.2	

Sample n°	Species	Bone	Remarks	Chronology	GL	Bp	Dp	Bd	Dd	SD	DD
HM02983	<i>Canis familiaris</i>	Metacarpal		MBA	65.5	6.8	11.6	8.3	9.6	6.7	
HM02984	<i>Canis familiaris</i>	Metacarpal		MBA	55.1	10.7	10.7	9.6	8.9	8	5.7
KH00310	<i>Canis familiaris</i>	Metacarpal		MBA	77.2			11.1			
HM00166	<i>Canis familiaris</i>	Metacarpal		MBA	61.5	8.5	10.7				
HM02202	<i>Canis familiaris</i>	Metacarpal		MBA	59	5		8.7			
HM02203	<i>Canis familiaris</i>	Metacarpal		MBA		7.2					
HM02204	<i>Canis familiaris</i>	Metacarpal		MBA		8.8					
HM02205	<i>Canis familiaris</i>	Metacarpal		MBA	52	9		8.3			
HM02206	<i>Canis familiaris</i>	Metacarpal		MBA		6.3					
GT02122	<i>Canis familiaris</i>	Metacarpal		LBA	61.3	7.3	10.4	8.2	8.4	6	
MST00780	<i>Canis familiaris</i>	Metacarpal		LBA	62	6.7	10.6	7.3	8.9	6.2	5.9
HM02207	<i>Canis familiaris</i>	Metatarsal		MBA		8.9	13.4				
HM02208	<i>Canis familiaris</i>	Metatarsal		MBA		7.5	11.5				
HM02210	<i>Canis familiaris</i>	Metatarsal		MBA		8.1	11.6				
HM02211	<i>Canis familiaris</i>	Metatarsal		MBA		8.7	13.5				
HM02212	<i>Canis familiaris</i>	Metatarsal		MBA		5.3	12				
HM02822	<i>Canis familiaris</i>	Metatarsal		IA		8.9					
HM02823	<i>Canis familiaris</i>	Metatarsal		IA		9.9					
HM03911	<i>Canis familiaris</i>	Metatarsal		IA	57.1	6.4	10.2	7.7	7.3	5.5	6.1
MST01193	<i>Canis familiaris</i>	Metatarsal		LBA	70.2	9.2		8.5	8.7	6.8	6
HM02192	<i>Canis familiaris</i>	Prox phalanx		MBA	25.1	7.8	7.6	6.8	5.3	4.7	4.6
HM02193	<i>Canis familiaris</i>	Prox phalanx		MBA	22.1	8.5	7.5	7	5.5	5	5.3
HM02194	<i>Canis familiaris</i>	Prox phalanx		MBA	25.2	7.8	7.7	6.6	5.4	4.7	5.1

Sample n°	Species	Bone	Remarks	Chronology	dP4 L	dP4 WP	M1 L	M1 WP	M2 L	M2 WP	M3 L	M3 WA
					Payne 88	Payne 88	Payne 88	Payne 88	Payne 88	Payne 88	Payne 88	
HM01638	<i>Sus domesticus</i>	Lower tooth		MBA								14.7
HM02458	<i>Sus domesticus</i>	Lower tooth		MBA					20	12.6		
HM02996	<i>Sus domesticus</i>	Lower tooth		MBA	18.3	8.6						
HM03232	<i>Sus domesticus</i>	Lower tooth		MBA	18.8	8.2						
HM03812	<i>Sus domesticus</i>	Lower tooth		MBA								15.7
KT00918	<i>Sus domesticus</i>	Lower tooth		MBA			13.6	9.8				
KT00457	<i>Sus domesticus</i>	Lower tooth		MBA		7.7						
KT00604	<i>Sus domesticus</i>	Lower tooth		MBA							35.6	14.6
KT01043	<i>Sus domesticus</i>	Lower tooth		MBA			12.7	10.2				
KT00023	<i>Sus domesticus</i>	Lower tooth		MBA						13		
GT00980	<i>Sus domesticus</i>	Lower tooth		MBA	18	8						
GT00715	<i>Sus domesticus</i>	Lower tooth		MBA			12.4	10				
MST01045	<i>Sus domesticus</i>	Lower tooth		MBA								15.4
KH00605	<i>Sus domesticus</i>	Mandibula		MBA				9.4				
HM00149	<i>Sus domesticus</i>	Mandibula		MBA			13	9.6	18.2	12		
HM00195	<i>Sus domesticus</i>	Mandibula		MBA	16	8	13.6	9.7				
HM00295	<i>Sus domesticus</i>	Mandibula		MBA					19	12.7		
HM00298	<i>Sus domesticus</i>	Mandibula		MBA	17.3	8.1						
HM00302	<i>Sus domesticus</i>	Mandibula		MBA			14.2	9.6				
HM00304	<i>Sus domesticus</i>	Mandibula		MBA	16.1	7.9	12.5		15		26.6	12.8
HM00350	<i>Sus domesticus</i>	Mandibula		MBA			13.9	10	16.9	13.1		
HM00351	<i>Sus domesticus</i>	Mandibula		MBA								15.5
HM00352	<i>Sus domesticus</i>	Mandibula		MBA			11.3	8.8				
HM00353	<i>Sus domesticus</i>	Mandibula		MBA				9.2				
HM00458	<i>Sus domesticus</i>	Mandibula		MBA			11.8	8.5	16.4	11.6		
HM00489	<i>Sus domesticus</i>	Mandibula		MBA			15.7	9.8	19.7	12.4	30.8	14
HM01624	<i>Sus domesticus</i>	Mandibula		MBA	16.8	8.8	14.6	10.3				
HM01625	<i>Sus domesticus</i>	Mandibula		MBA					18.2	13.2		14.4
HM01627	<i>Sus domesticus</i>	Mandibula		MBA			13.8	10.1	17.2	12.2	30.8	13.9
HM01634	<i>Sus domesticus</i>	Mandibula		MBA	16.9	8.6						
HM01637	<i>Sus domesticus</i>	Mandibula		MBA			15.5	10				
HM01640	<i>Sus domesticus</i>	Mandibula		MBA						12.8		
HM01728	<i>Sus domesticus</i>	Mandibula		MBA	16.1	7.9	13.8	10.1				
HM02160	<i>Sus domesticus</i>	Mandibula		MBA			16.2	9.8				
HM02161	<i>Sus domesticus</i>	Mandibula		MBA					16.1	12.3		
HM02271	<i>Sus domesticus</i>	Mandibula		MBA								15
HM02371	<i>Sus domesticus</i>	Mandibula		MBA			14.2	9.3	18.5	11.8		
HM02668	<i>Sus domesticus</i>	Mandibula		MBA			15.2	9.3				
HM02669	<i>Sus domesticus</i>	Mandibula		MBA							33.7	15.7
HM03162	<i>Sus domesticus</i>	Mandibula		MBA					18.3	12.7		
HM03163	<i>Sus domesticus</i>	Mandibula		MBA							32.8	16
HM03809	<i>Sus domesticus</i>	Mandibula		MBA	18.3	8.1	16.4	10.2				
HM03810	<i>Sus domesticus</i>	Mandibula		MBA						13		14.1
BH00206	<i>Sus domesticus</i>	Mandibula		MBA	18.1	8.3	15.2	10.3				
KT00554	<i>Sus domesticus</i>	Mandibula		MBA			12.8	10.2	17.2	12.8	28	14.6
KT00992	<i>Sus domesticus</i>	Mandibula		MBA			13.1	9.9		12.2	29.9	14.7
KT00166	<i>Sus domesticus</i>	Mandibula		MBA	18.7	8.1	16.6	9.2				
KT00959	<i>Sus domesticus</i>	Mandibula		MBA							33.1	15.6
KT00899	<i>Sus domesticus</i>	Mandibula		MBA	15.7	8	15.1	9.8				
KT01027	<i>Sus domesticus</i>	Mandibula		MBA							29.4	14.6
KT00014	<i>Sus domesticus</i>	Mandibula		MBA	16.8	8.2	15	10.1				
KT00015	<i>Sus domesticus</i>	Mandibula		MBA			14	10.2	17.5	13.8		
KT00115	<i>Sus domesticus</i>	Mandibula		MBA	17.3	8.7	13.8	10.5				
KT00152	<i>Sus domesticus</i>	Mandibula		MBA			16.1	10.4				
KT00065	<i>Sus domesticus</i>	Mandibula		MBA			14.2	10.3	17.5	13.1		
KT00098	<i>Sus domesticus</i>	Mandibula		MBA			13.3	9.2	16.8	11.8		
KT00215	<i>Sus domesticus</i>	Mandibula		MBA								14.8
KT00369	<i>Sus domesticus</i>	Mandibula		MBA	15.9	7.9	14	9.5				
KT00490	<i>Sus domesticus</i>	Mandibula		MBA			13.5	8.7	17.9	11.2		
TH01215	<i>Sus domesticus</i>	Mandibula		MBA	17.5	8.8	16.6	10.4	20			
TH01243	<i>Sus domesticus</i>	Mandibula		MBA			16.3	10.1				
TH01403	<i>Sus domesticus</i>	Mandibula		MBA			14.2	10.2	18.8	13.2		
TH01419	<i>Sus domesticus</i>	Mandibula		MBA			15.1	10.9	20.5	14.1		
GT00717	<i>Sus domesticus</i>	Mandibula		MBA	17.6	8.6						
MST00353	<i>Sus domesticus</i>	Mandibula		MBA	17	8.2	15	9.6				
MST00730	<i>Sus domesticus</i>	Mandibula		MBA				10.3			33.9	14.5
MST01030	<i>Sus domesticus</i>	Mandibula		MBA					18.8	12.1		
MST01242	<i>Sus domesticus</i>	Mandibula		MBA	17.9	7.9	16.2	9.9				
BH00373	<i>Sus scrofa</i>	Mandibula		MBA							45.5	19.9
KT00091	<i>Sus scrofa</i>	Mandibula		MBA								16.4
HM00633	<i>Sus domesticus</i>	Lower tooth		Late MBA					18.3			
HM01636	<i>Sus domesticus</i>	Lower tooth		Late MBA							33.4	14.1
HM00242	<i>Sus domesticus</i>	Mandibula		Late MBA			14.3	9.8	18.8	12.3		
HM00243	<i>Sus domesticus</i>	Mandibula		Late MBA	-15.8	8	15.7	10				
HM00282	<i>Sus domesticus</i>	Mandibula		Late MBA	16.3	8.2	13.8	9.2				
HM00286	<i>Sus domesticus</i>	Mandibula		Late MBA	15.9	7.7	14	9.6				
HM00317	<i>Sus domesticus</i>	Mandibula		Late MBA							34.5	16
HM00319	<i>Sus domesticus</i>	Mandibula		Late MBA	15.6	7.2	13.7	9.5				
HM00321	<i>Sus domesticus</i>	Mandibula		Late MBA			13.4	9.9	17.9			13.7
HM00830	<i>Sus domesticus</i>	Mandibula		Late MBA					16.2	11.1	22.2	12.6
HM00831	<i>Sus domesticus</i>	Mandibula		Late MBA					18.2	13.5	34.9	15.1
HM00832	<i>Sus domesticus</i>	Mandibula		Late MBA			14	9.8	17.2	12.3		
HM00835	<i>Sus domesticus</i>	Mandibula		Late MBA	16.5	8.2						
HM00837	<i>Sus domesticus</i>	Mandibula		Late MBA			12.7	9.5	16.3	11	23.4	12.8
HM00838	<i>Sus domesticus</i>	Mandibula		Late MBA			13.9	10.6	18.3	13.4	33.6	15.2
HM00839	<i>Sus domesticus</i>	Mandibula		Late MBA			13.5	9.9	17.1	12.2		

HM00840	<i>Sus domesticus</i>	Mandibula		Late MBA	14.6	7.1	12.6	8.3						
HM01635	<i>Sus domesticus</i>	Mandibula		Late MBA		8.6								
HM01643	<i>Sus domesticus</i>	Mandibula		Late MBA			12.9	9.6	16	11.5				13.9
HM02495	<i>Sus domesticus</i>	Mandibula		Late MBA			13.6	9.5						
HM00316	<i>Sus scrofa</i>	Mandibula		Late MBA										19.5
KH00612	<i>Sus domesticus</i>	Lower tooth		LBA					18.3	13.7				
KH00613	<i>Sus domesticus</i>	Lower tooth		LBA					17.8	11.7				
KH00614	<i>Sus domesticus</i>	Lower tooth		LBA				9.8						
KH01007	<i>Sus domesticus</i>	Lower tooth		LBA	17.5	7.9								
KH01040	<i>Sus domesticus</i>	Lower tooth		LBA	19.4	8.4								
KH00602	<i>Sus domesticus</i>	Mandibula		LBA	17.2	8.3								
KH00588	<i>Sus domesticus</i>	Mandibula		LBA	16.1	7.8	13.2	8.9						
GT00383	<i>Sus domesticus</i>	Mandibula		LBA			14	10.3						
KH00600	<i>Sus domesticus</i>	Mandibula		LBA	15.6	7.6								
KH00593	<i>Sus domesticus</i>	Mandibula		LBA		8.3	13.6	10						
KH00592	<i>Sus domesticus</i>	Mandibula		LBA				16.3	12.2					13.6
KH00576	<i>Sus domesticus</i>	Mandibula		LBA	16.9	8.9	13.6	11.2						
KH00581	<i>Sus domesticus</i>	Mandibula		LBA	17.1	8.4								
KH00580	<i>Sus domesticus</i>	Mandibula		LBA			14.1	10.5						
KH00582	<i>Sus domesticus</i>	Mandibula		LBA	13.9	7.4	13	9.6	16.2					
KH00586	<i>Sus domesticus</i>	Mandibula		LBA	15.7	8.2	14	10.3						
GT01876	<i>Sus domesticus</i>	Mandibula		LBA			14	10						
GT01949	<i>Sus domesticus</i>	Mandibula		LBA	17.3	7.5								
GT01950	<i>Sus domesticus</i>	Mandibula		LBA			14.9	10.7	20	13.3				
GT01951	<i>Sus domesticus</i>	Mandibula		LBA			14.4	10	19.2	12.2				
GT01952	<i>Sus domesticus</i>	Mandibula		LBA					19.4	13.2				15.4
GT01953	<i>Sus domesticus</i>	Mandibula		LBA					18.9	12.7				
GT01956	<i>Sus domesticus</i>	Mandibula		LBA										15.4
GT00413	<i>Sus domesticus</i>	Mandibula		LBA								29.2		15
GT00171	<i>Sus domesticus</i>	Mandibula		LBA				9.9	12.7					13.7
KH01201	<i>Sus domesticus</i>	Mandibula		LBA			14.23	10.4	18.6	12.9				
KH01202	<i>Sus domesticus</i>	Mandibula		LBA		8.7								
KH01271	<i>Sus domesticus</i>	Mandibula		LBA		8.5								
MST00584	<i>Sus domesticus</i>	Mandibula		LBA	16	7.6	13.8	9.3	18	11.9				
MST00966	<i>Sus domesticus</i>	Mandibula		LBA			15.4	9.7						
MST01059	<i>Sus domesticus</i>	Mandibula		LBA								30.2		15
MST01798	<i>Sus domesticus</i>	Mandibula		LBA										14.7
MST00847	<i>Sus domesticus</i>	Mandibula		LBA					19	13				
GT01862	<i>Sus scrofa</i>	Mandibula		LBA			18.5	12.5						
KH00904	<i>Sus scrofa</i>	Mandibula		LBA				11.8						
KH00611	<i>Sus domesticus</i>	Lower tooth		IA										13.5
KH01225	<i>Sus domesticus</i>	Lower tooth		IA					19.5	12.6				
KH01247	<i>Sus domesticus</i>	Lower tooth		IA			13.2	9.4						
KH00595	<i>Sus domesticus</i>	Mandibula		IA								30.3		13.6
KH00578	<i>Sus domesticus</i>	Mandibula		IA			13.9	10.3	16.4	11.9				
KH00574	<i>Sus domesticus</i>	Mandibula		IA			13.2	10	16.5	12.9	30.3			15.2
KH00603	<i>Sus domesticus</i>	Mandibula		IA								27.9		13.3
KH00594	<i>Sus domesticus</i>	Mandibula		IA						13.1				15
KH00577	<i>Sus domesticus</i>	Mandibula		IA			13.9		18.9	12.6				
KH00573	<i>Sus domesticus</i>	Mandibula		IA	14.9	7.8	14.4	9.7						
KH00597	<i>Sus domesticus</i>	Mandibula		IA								33.7		14.7
KH00585	<i>Sus domesticus</i>	Mandibula		IA			14	9.7		12.3				
KH00604	<i>Sus domesticus</i>	Mandibula		IA						12.1				
KH00579	<i>Sus domesticus</i>	Mandibula		IA			12.9	9.6						
KH00599	<i>Sus domesticus</i>	Mandibula		IA			13.2	9.8	15.6	11.9				
KH00584	<i>Sus domesticus</i>	Mandibula		IA	15.4	7.8	12.7	9.1						
KH00583	<i>Sus domesticus</i>	Mandibula		IA								27		14.2
GT01075	<i>Sus domesticus</i>	Mandibula		IA			17	10						
HM01629	<i>Sus domesticus</i>	Mandibula		IA										13.8
HM01631	<i>Sus domesticus</i>	Mandibula		IA						12.3				
HM02413	<i>Sus domesticus</i>	Mandibula		IA				18.4	11.9					
HM02463	<i>Sus domesticus</i>	Mandibula		IA								33		15.3
HM02780	<i>Sus domesticus</i>	Mandibula		IA					18.1	13.5	29.5			14.8
HM02783	<i>Sus domesticus</i>	Mandibula		IA	16.3	7.7	13.5	8.9						
HM03589	<i>Sus domesticus</i>	Mandibula		IA					18.5	11.9				12.6
HM03882	<i>Sus domesticus</i>	Mandibula		IA					11.1	18.6	13.5	33.9		15.3
HM03883	<i>Sus domesticus</i>	Mandibula		IA			14.2	9.6	18.1	12				
HM03853	<i>Sus domesticus</i>	Mandibula		IA	15.8	6.7		8.3						
HM03854	<i>Sus domesticus</i>	Mandibula		IA	17.2	7.6	16	9.6						
KH00871	<i>Sus domesticus</i>	Mandibula		IA					18.2	11.6				
KH00626	<i>Sus domesticus</i>	Maxilla		MBA	11.5	10.4	13	12.6	15.8	14.8				
KH00627	<i>Sus domesticus</i>	Maxilla		MBA	10	10.6	13.3	11.7						
KH00632	<i>Sus domesticus</i>	Maxilla		MBA			12.9	12.5						
HM00094	<i>Sus domesticus</i>	Maxilla		MBA			11.5	10.2	12.6	11.4				
HM00296	<i>Sus domesticus</i>	Maxilla		MBA			14.1	13.4	18.5	16.2				
HM00344	<i>Sus domesticus</i>	Maxilla		MBA					16.8	15.4				16.9
HM00345	<i>Sus domesticus</i>	Maxilla		MBA					17.2	15.1				16.6
HM00346	<i>Sus domesticus</i>	Maxilla		MBA			12.5	13.3	16.3	15.5	25.8			15.1
HM00457	<i>Sus domesticus</i>	Maxilla		MBA							24.4			16.7
HM01649	<i>Sus domesticus</i>	Maxilla		MBA			13.9	12.6	15.9	14.4				
HM01650	<i>Sus domesticus</i>	Maxilla		MBA	11.8	10.8	13.5	13.3						
HM01651	<i>Sus domesticus</i>	Maxilla		MBA	10.5	10.4	12.8	13						
HM01727	<i>Sus domesticus</i>	Maxilla		MBA			13.1	12.9	17.7	16.5				
HM02151	<i>Sus domesticus</i>	Maxilla		MBA					18	14.2	23.5			16.9
HM02152	<i>Sus domesticus</i>	Maxilla		MBA			11.9	12.5	17.7	14.3	28.7			16.7
HM02153	<i>Sus domesticus</i>	Maxilla		MBA			14.1	12.3	19.2	15.4				
HM02459	<i>Sus domesticus</i>	Maxilla		MBA	13.6	10.6	15.1	12.7						

HM02991	<i>Sus domesticus</i>	Maxilla		MBA	13.6	10.9	16.6	12.6				
HM03084	<i>Sus domesticus</i>	Maxilla		MBA			16	12.5				
HM03159	<i>Sus domesticus</i>	Maxilla		MBA			15.6	12.9	18.7	15.7		
HM03270	<i>Sus domesticus</i>	Maxilla		MBA							31.8	18
KT00904	<i>Sus domesticus</i>	Maxilla		MBA	12.9	10.3	15.5	12.5				
KT00556	<i>Sus domesticus</i>	Maxilla		MBA				12.5				
KT00726	<i>Sus domesticus</i>	Maxilla		MBA			11.9	12.5	18.4	15.1		
KT00991	<i>Sus domesticus</i>	Maxilla		MBA			11.5	13	14.7	15.2	27.5	16.1
KT00804	<i>Sus domesticus</i>	Maxilla		MBA				15.1	15.9	28.4	16.3	
KT01093	<i>Sus domesticus</i>	Maxilla		MBA				16.7	16.1			
KT00755	<i>Sus domesticus</i>	Maxilla		MBA				15.2	14.1	23	16.1	
KT00243	<i>Sus domesticus</i>	Maxilla		MBA	10.6	10.4	14.4	12.3				
KT00823	<i>Sus domesticus</i>	Maxilla		MBA				12.8				
KT00779	<i>Sus domesticus</i>	Maxilla		MBA	11.4	10.6	12.6	12.5				
KT00025	<i>Sus domesticus</i>	Maxilla		MBA			14.5	12.6	19.6	15.1		
KT00126	<i>Sus domesticus</i>	Maxilla		MBA			13.7	12.8	17.5	15.1		
KT00154	<i>Sus domesticus</i>	Maxilla		MBA			11.1	12.4			29.2	17
KT00039	<i>Sus domesticus</i>	Maxilla		MBA					16.3	15.3		
KT00064	<i>Sus domesticus</i>	Maxilla		MBA				12.8				
TH01242	<i>Sus domesticus</i>	Maxilla		MBA			12.3	14.9	19.7	17.7	28	18.4
MST00648	<i>Sus domesticus</i>	Maxilla		MBA			15.1	12.4	18.4	14.8		
HM02671	<i>Sus domesticus</i>	Upper tooth		MBA							28.7	14.6
GT00294	<i>Sus domesticus</i>	Upper tooth		MBA					18.5	15.9		
HM00208	<i>Sus domesticus</i>	Upper tooth		MBA								19.1
HM02670	<i>Sus domesticus</i>	Upper tooth		MBA							28.1	16.1
HM02997	<i>Sus domesticus</i>	Upper tooth		MBA				18.7	16.5			
HM03271	<i>Sus domesticus</i>	Upper tooth		MBA							30.7	17.8
KT00616	<i>Sus domesticus</i>	Upper tooth		MBA			14.6	12.6				
KT00026	<i>Sus domesticus</i>	Upper tooth		MBA								15
KT00027	<i>Sus domesticus</i>	Upper tooth		MBA								17.1
KT00958	<i>Sus scrofa</i>	Upper tooth		MBA						18.3		
KT00981	<i>Sus scrofa</i>	Upper tooth		MBA							31.5	20
HM00251	<i>Sus domesticus</i>	Maxilla		Late MBA			12.6	11.5	18.6	14		
HM00318	<i>Sus domesticus</i>	Maxilla		Late MBA							31.4	19
HM00847	<i>Sus domesticus</i>	Maxilla		Late MBA	11	9.7	14.8	12.3				
HM00850	<i>Sus domesticus</i>	Maxilla		Late MBA			12.8	13.3	16.7	15.7		18.7
HM00854	<i>Sus domesticus</i>	Maxilla		Late MBA	12.8	10.3						
HM01655	<i>Sus domesticus</i>	Maxilla		Late MBA			11.8	11	15.1	12.5		
HM01658	<i>Sus domesticus</i>	Maxilla		Late MBA			12.8	13.1	16	15.8		17.7
HM01653	<i>Sus domesticus</i>	Upper tooth		Late MBA							30.2	18.6
KH00631	<i>Sus domesticus</i>	Maxilla		LBA			12.3	12.5	15.8	14.9	26.5	16.5
KH00631	<i>Sus domesticus</i>	Maxilla		LBA			10.9	12.3	15.9	14.1		16.5
KH00624	<i>Sus domesticus</i>	Maxilla		LBA	9.3	9.8	13.6	11.5				
KH00628	<i>Sus domesticus</i>	Maxilla		LBA	10	10.1						
KH00641	<i>Sus domesticus</i>	Maxilla		LBA	12.4	10.4						
KH00640	<i>Sus domesticus</i>	Maxilla		LBA	11.7	9.6						
KH00633	<i>Sus domesticus</i>	Maxilla		LBA			11.2	11.5				
KH00621	<i>Sus domesticus</i>	Maxilla		LBA							28.7	17.4
KH00620	<i>Sus domesticus</i>	Maxilla		LBA			11.8	12.6	15.2	14.7		
TH01297	<i>Sus domesticus</i>	Maxilla		LBA			16.6	12.8	19.1	15.7		
GT01833	<i>Sus domesticus</i>	Maxilla		LBA								16
GT01834	<i>Sus domesticus</i>	Maxilla		LBA								16.6
GT01878	<i>Sus domesticus</i>	Maxilla		LBA	13.8	10	15.4	12.7				
GT01960	<i>Sus domesticus</i>	Maxilla		LBA			12.7	13	20.2	15.3		
GT02072	<i>Sus domesticus</i>	Maxilla		LBA					17.9	15.4		
GT00175	<i>Sus domesticus</i>	Maxilla		LBA	11.4	11	14.2	12.4				
KH01203	<i>Sus domesticus</i>	Maxilla		LBA					18.2	15.2	26.9	16.3
KH01234	<i>Sus domesticus</i>	Maxilla		LBA								16.5
MST00515	<i>Sus domesticus</i>	Maxilla		LBA			11.1	9.3	12.9	11.4		
MST00583	<i>Sus domesticus</i>	Maxilla		LBA			11.9	12.1	16.8		24.6	15.7
MST00589	<i>Sus domesticus</i>	Maxilla		LBA			13.8	11.6	17.3	14.4		
MST00750	<i>Sus domesticus</i>	Maxilla		LBA	12.9	9.9						
GT00301	<i>Sus domesticus</i>	Upper tooth		LBA							25.2	16.4
GT02058	<i>Sus domesticus</i>	Upper tooth		LBA			15.2	12.6				
GT00174	<i>Sus domesticus</i>	Upper tooth		LBA			15.5	13.6				
GT00177	<i>Sus domesticus</i>	Upper tooth		LBA								15.8
KH01204	<i>Sus domesticus</i>	Upper tooth		LBA								17.6
MST01006	<i>Sus domesticus</i>	Upper tooth		LBA					18.1	14		
KH00630	<i>Sus domesticus</i>	Maxilla		IA	10.9	9.7	14.8					
KH00629	<i>Sus domesticus</i>	Maxilla		IA					15.6	15	27.6	16.4
KH00623	<i>Sus domesticus</i>	Maxilla		IA			11	12.6	15.7			
HM01647	<i>Sus domesticus</i>	Maxilla		IA			13.4	13.4		15.5		
HM01648	<i>Sus domesticus</i>	Maxilla		IA			13	12.5	15.4	14.9		15.7
HM01654	<i>Sus domesticus</i>	Maxilla		IA			12	12.5	15.2	15.2		16.2
HM01656	<i>Sus domesticus</i>	Maxilla		IA	10.2	9.5	12.4	11.3				
HM01657	<i>Sus domesticus</i>	Maxilla		IA						14.5		17
HM01659	<i>Sus domesticus</i>	Maxilla		IA			14.1	12.9				
HM02467	<i>Sus domesticus</i>	Maxilla		IA	11.9	10	14.8	12.2				
HM02961	<i>Sus domesticus</i>	Maxilla		IA					20.7	17		
HM03594	<i>Sus domesticus</i>	Maxilla		IA	12.4	9.7	13.1	11.1				
KH01099	<i>Sus domesticus</i>	Maxilla		IA								16.3

Sample n°	Species	Bone	Remarks	Chronology	GL	GB	H	BFcr	BFcd	LAPa	SBV
HM00471	<i>Sus domesticus</i>	Atlas		MBA		70.2	43.3	47.3	55	17.3	
KH00512	<i>Sus domesticus</i>	Atlas		MBA	24.9			27.4	33.6	17	
HM01580	<i>Sus domesticus</i>	Axis		Late MBA				40.1			28.7

Sample n°	Species	Bone	Remarks	Chronology	SLC	GLP	BG	LG
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HM00307	<i>Sus domesticus</i>	Scapula		MBA	21	26.9		
HM00467	<i>Sus domesticus</i>	Scapula		MBA	21			
HM00490	<i>Sus domesticus</i>	Scapula		MBA	16.6	26.5		
KT00535	<i>Sus domesticus</i>	Scapula		MBA	20.1	32	20.7	26.2
KT00731	<i>Sus domesticus</i>	Scapula		MBA	20.1	29.2	18.7	22.6
KT00442	<i>Sus domesticus</i>	Scapula		MBA			19.8	24.6
KT00338	<i>Sus domesticus</i>	Scapula		MBA		31.9		
KT00846	<i>Sus domesticus</i>	Scapula		MBA	19.1	32.5	17.8	
KT00054	<i>Sus domesticus</i>	Scapula		MBA	18.5	31	18	25.4
KT00055	<i>Sus domesticus</i>	Scapula		MBA	23.5			
HM02917	<i>Sus domesticus</i>	Scapula		MBA	21.1			
HM03291	<i>Sus domesticus</i>	Scapula		MBA	22.2			
KT00481	<i>Sus domesticus</i>	Scapula		MBA	21.3	29.7		
MST01197	<i>Sus domesticus</i>	Scapula		MBA	20	33	19.2	
HM00376	<i>Sus domesticus</i>	Scapula		Late MBA	20.6			
HM00788	<i>Sus domesticus</i>	Scapula		Late MBA	18.5	29.7		
HM00787	<i>Sus domesticus</i>	Scapula		Late MBA	21.1	32.8		
HM00784	<i>Sus domesticus</i>	Scapula		Late MBA	21.2	32.4		
TH00082	<i>Sus domesticus</i>	Scapula		LBA			21.2	
TH00649	<i>Sus domesticus</i>	Scapula		LBA	22.1	33.5	21.3	
TH01755	<i>Sus domesticus</i>	Scapula		LBA		37.6	26.7	
GT02002	<i>Sus domesticus</i>	Scapula		LBA		38.5		
KH00970	<i>Sus domesticus</i>	Scapula		LBA		30.8	20.5	
KH00981	<i>Sus domesticus</i>	Scapula		LBA	22.4	32.2		
KH01183	<i>Sus domesticus</i>	Scapula		LBA	21.1	31.5		
HM01355	<i>Sus domesticus</i>	Scapula		IA	18.4	28.9		
HM01352	<i>Sus domesticus</i>	Scapula		IA	21.6	32.8		
HM01351	<i>Sus domesticus</i>	Scapula		IA	16.4			

Sample n°	Species	Bone	Remarks	Chronology	BD	BT	SD	HTC
						Payne 88		Payne 88
HM00306	<i>Sus domesticus</i>	Humerus		MBA	37.6	30.8		19.7
HM02080	<i>Sus domesticus</i>	Humerus		MBA	33	27.1		15.1
BH00091	<i>Sus domesticus</i>	Humerus		MBA		27.8		17.4
KT00468	<i>Sus domesticus</i>	Humerus		MBA	34.9	32.3	14.3	17.8
KT00847	<i>Sus domesticus</i>	Humerus		MBA	32.8	26.6		15.2
KT01053	<i>Sus domesticus</i>	Humerus		MBA	34.7	28.6	14.5	16.4
TH00257	<i>Sus domesticus</i>	Humerus		MBA	31.3	25.7		13.8
TH01435	<i>Sus scrofa</i>	Humerus		MBA		40.5		21.5
HM00234	<i>Sus domesticus</i>	Humerus		Late MBA	32			15.9
HM00754	<i>Sus domesticus</i>	Humerus		Late MBA	35.7	27.5		17.2
HM01387	<i>Sus scrofa</i>	Humerus		Late MBA		40.1		22.6
KH00453	<i>Sus domesticus</i>	Humerus		LBA		26.5		16.1
TH01568	<i>Sus domesticus</i>	Humerus		LBA		26.5		14.7
MST00568	<i>Sus domesticus</i>	Humerus		LBA		26.8		15.7
MST00533	<i>Sus domesticus</i>	Humerus		LBA		28.6		16.7
HM02071	<i>Sus domesticus</i>	Humerus		IA	34.5	30.1		16.1
HM02807	<i>Sus domesticus</i>	Humerus		IA	35.6			16.9
HM03886	<i>Sus domesticus</i>	Humerus		IA		27.9		14.9
KH01205	<i>Sus domesticus</i>	Humerus		IA		24.4		14.3

Sample n°	Species	Bone	Remarks	Chronology	Bp	BpP	Dp	DPA	BPC
						Payne 88			
KH00423	<i>Sus domesticus</i>	Radius		MBA		29.6			
HM02065	<i>Sus domesticus</i>	Radius		MBA		24.4			
HM02067	<i>Sus domesticus</i>	Radius		MBA		25.1			
HM03145	<i>Sus domesticus</i>	Radius		MBA		27.6			
BH00095	<i>Sus domesticus</i>	Radius		MBA		25.6			
BH00176	<i>Sus domesticus</i>	Radius		MBA		26			
KT00877	<i>Sus domesticus</i>	Radius		MBA	24.2	24.2			
KT00831	<i>Sus domesticus</i>	Radius		MBA	26	25.8	17.5		
HM01282	<i>Sus scrofa</i>	Radius		MBA		35.4	24		
TH00235	<i>Sus domesticus</i>	Radius		LBA		29.6			
GT01841	<i>Sus domesticus</i>	Radius		LBA		27.1			
KH01287	<i>Sus domesticus</i>	Radius		LBA		23.5			
MST00559	<i>Sus domesticus</i>	Radius		LBA		28			
HM01284	<i>Sus domesticus</i>	Radius		IA		25.1	17.5		
HM02597	<i>Sus domesticus</i>	Radius		IA		28.7	18.4		
HM00005	<i>Sus domesticus</i>	Ulna		MBA					19.1
HM01289	<i>Sus domesticus</i>	Ulna		MBA					20
KT01029	<i>Sus domesticus</i>	Ulna		MBA				35.5	20.7
KT00175	<i>Sus domesticus</i>	Ulna		MBA					19.9
KT00003	<i>Sus domesticus</i>	Ulna		MBA				31.5	17.8
HM02262	<i>Sus domesticus</i>	Ulna		MBA				33.6	19.4
BH00236	<i>Sus domesticus</i>	Ulna		MBA			30		17.8
KT00870	<i>Sus domesticus</i>	Ulna		MBA				30.5	17.9
KT00915	<i>Sus domesticus</i>	Ulna		MBA				30.7	16.5
TH01188	<i>Sus domesticus</i>	Ulna		MBA					20.5
GT00646	<i>Sus domesticus</i>	Ulna		MBA				31	18.1
MST01122	<i>Sus domesticus</i>	Ulna		MBA				33.4	17.3
MST02358	<i>Sus domesticus</i>	Ulna		MBA				28.5	17.9
KT00831	<i>Sus domesticus</i>	Ulna		MBA				31.4	18.5
TH01074	<i>Sus scrofa</i>	Ulna		MBA					31.4
HM00315	<i>Sus domesticus</i>	Ulna		Late MBA				31.5	20.9
HM01288	<i>Sus domesticus</i>	Ulna		Late MBA					16.8
GT01609	<i>Sus domesticus</i>	Ulna		LBA				32	20.3
KH00412	<i>Sus domesticus</i>	Ulna		LBA					30.4
KH00409	<i>Sus domesticus</i>	Ulna		LBA					31.5

GT01279	<i>Sus domesticus</i>	Metatarsal		MBA	65.2		12		13.5	14		
HM02528	<i>Sus domesticus</i>	Metatarsal		Late MBA	77		9.9	13.6	9.7	9.5	8.2	6.3
HM00360	<i>Sus scrofa</i>	Metatarsal		Late MBA	101.2	95.7	18.31		19.14		15	13.2
KH00304	<i>Sus domesticus</i>	Metatarsal		LBA	73.8	71.3	13.2	16	13.8	14.6	11.2	8.6
HM02404	<i>Sus domesticus</i>	Metatarsal		IA			15.2					
KH00305	<i>Sus domesticus</i>	Metatarsal		IA	77.9	74	14.8	22.6	14.3	16.1	13	10.6
KT00048	<i>Sus domesticus</i>	Metapodial		MBA					18.8			
KT00273	<i>Sus domesticus</i>	Prox phalanx		MBA			14.7	16.5		10	13	10
KT00623	<i>Sus domesticus</i>	Prox phalanx		MBA	26.4		18.7	16.3			15	
HM02364	<i>Sus domesticus</i>	Prox phalanx		MBA	32.8		12.1		11.2	10.4	9.5	9
HM02910	<i>Sus domesticus</i>	Prox phalanx		MBA	33.2		15.6	14.6	14.1	9.2	12.4	
HM03245	<i>Sus domesticus</i>	Prox phalanx		MBA					14	9.2		
HM03917	<i>Sus domesticus</i>	Prox phalanx		MBA	30.2		15.9	14.9	14.1	9.7	12.5	
BH00379	<i>Sus domesticus</i>	Prox phalanx		MBA	39.5		15.5	15.5	15	11.8	13.3	12.3
KT01156	<i>Sus domesticus</i>	Prox phalanx		MBA			14.1	12.5				
KT00743	<i>Sus domesticus</i>	Prox phalanx		MBA	28.8		12.7	13.8	12.6	8.7	11.3	8.4
KT00798	<i>Sus domesticus</i>	Prox phalanx		MBA					13.1	9.5	12.2	
TH01486	<i>Sus domesticus</i>	Prox phalanx		MBA	36.7		13.5	15	13.5	11.3	12.2	11.2
KH01094	<i>Sus domesticus</i>	Prox phalanx		MBA	32		15.5	14.2	14	9.5	12.1	
MST01078	<i>Sus domesticus</i>	Prox phalanx		LBA			23.6	20.8				
TH00932	<i>Sus domesticus</i>	Prox phalanx		LBA	44		22.9	22.7	21	15	17.5	
GT02032	<i>Sus domesticus</i>	Prox phalanx		LBA	29.9		14.3	14.5	13.5	8.7	12.2	11
KT01108	<i>Sus domesticus</i>	Medial phalanx		MBA	19.5		12.9	13.3	11.6	11.1	11.3	8.9
KT00744	<i>Sus domesticus</i>	Medial phalanx		MBA								
KH01095	<i>Sus domesticus</i>	Medial phalanx		MBA	18		11.6	11.2	10.1	8.9	9.8	
MST01155	<i>Sus domesticus</i>	Medial phalanx		LBA	20.4		14.6	13.6	13	11.9	11.7	9.4

Sample n°	Species	Bone	Remarks	Chronology	DLS	Ld	MBS
KH00233	<i>Sus domesticus</i>	Distal phalanx		MBA	22.4	21.5	6.7

Sample n°	Species	Bone	Remarks	Chronology	dp4 d	dp4 h	M1 Dap	M1 Dt	M1 h	M2 Dap	M2 Dt	M2 h	M3 Dap	M3 Dt	M3 h
HM01791	<i>Cervus elaphus</i>	Mandibula		MBA	Payne 85	Payne 85	Ducos	Ducos	Ducos	Ducos	Ducos	Ducos	Ducos	Ducos	Ducos
HM02149	<i>Cervus elaphus</i>	Mandibula		MBA			24.4	13.8	7.3			15.4			13.1
HM02236	<i>Cervus elaphus</i>	Mandibula		MBA			23.1	14.1	14			10			
MST00332	<i>Cervus elaphus</i>	Mandibula		MBA			22.9	14.5	13.3	27.7	16.6	14.8		15.9	14.1
HM00905	<i>Cervus elaphus</i>	Mandibula		Late MBA			20.6	13.9	13.7	22.4	15.4	19.3			
HM01749	<i>Cervus elaphus</i>	Mandibula		Late MBA			19.4	14.2	8.3						
HM02497	<i>Cervus elaphus</i>	Mandibula		Late MBA			19.9	12.5	19.3						
MST00991	<i>Cervus elaphus</i>	Lower tooth		LBA	9.8	6.5									
MST00992	<i>Cervus elaphus</i>	Lower tooth		LBA						28	16.3	19.5			
GT01996	<i>Cervus elaphus</i>	Mandibula		LBA			22.8	15.3	8.8	26.4	15.7	11.3	35.6	16.3	13.5
GT02022	<i>Cervus elaphus</i>	Mandibula		LBA			23.4	14.7	11.5						
GT02050	<i>Cervus elaphus</i>	Mandibula		LBA			22.3		6.7	27.2	15.8	13.3			
GT02089	<i>Cervus elaphus</i>	Mandibula		LBA						29.5	17	15.3			
HM00401	<i>Cervus elaphus</i>	Maxilla		MBA						22.7	20.1	17.6	25.2	23.7	22.2
HM00402	<i>Cervus elaphus</i>	Maxilla		MBA			17.7	19.2	8		21.7	18.9			
HM00403	<i>Cervus elaphus</i>	Maxilla		MBA									24.4	24	21
HM01793	<i>Cervus elaphus</i>	Maxilla		MBA					9.73						
HM03009	<i>Cervus elaphus</i>	Maxilla		MBA			15.7	17.5							
HM01786	<i>Cervus elaphus</i>	Upper tooth		MBA									25.7	24.5	
HM01787	<i>Cervus elaphus</i>	Upper tooth		MBA						22.3	22.5				
HM01790	<i>Cervus elaphus</i>	Upper tooth		MBA			19	20.8							
HM01792	<i>Cervus elaphus</i>	Upper tooth		MBA						23.8	24.7				
HM01788	<i>Cervus elaphus</i>	Upper tooth		Late MBA						21.9	23.5				
HM01789	<i>Cervus elaphus</i>	Upper tooth		Late MBA									24	24.7	
GT02185	<i>Cervus elaphus</i>	Maxilla		LBA			19	22.1	6	23	24.6	8.7			
GT01995	<i>Cervus elaphus</i>	Upper tooth		LBA						22.6	20.8				

Sample n°	Species	Bone	Remarks	Chronology	GL	GB	H	BFcr	BFcd
HM00010	<i>Cervidae</i>	Atlas	Dama ?	MBA	49	62.6	50	55.6	52.6
MST00687	<i>Cervus elaphus</i>	Atlas		LBA					85
MST00688	<i>Cervus elaphus</i>	Axis		LBA				83.4	

Sample n°	Species	Bone	Remarks	Chronology	SLC	GLP	BG	LG
HM00331	<i>Cervus elaphus</i>	Scapula		MBA	38.5	62	42	47.2
HM01366	<i>Cervus elaphus</i>	Scapula		MBA	35.2	55	40.2	
HM03286	<i>Cervus elaphus</i>	Scapula		MBA		65.1	43	47
HM00782	<i>Cervus elaphus</i>	Scapula		Late MBA			41.1	41.5
HM00780	<i>Cervus elaphus</i>	Scapula		Late MBA		60.8	43.2	45.6
HM01364	<i>Cervus elaphus</i>	Scapula		IA		54.2		

Sample n°	Species	Bone	Remarks	Chronology	Bp	DTD	DTT	HMT	HT
HM01395	<i>Cervus elaphus</i>	Humerus		MBA		Helmer	Helmer	Fernandez	Fernandez
HM02280	<i>Cervus elaphus</i>	Humerus		MBA		55.7	50.5	38	29.4
HM02460	<i>Cervus elaphus</i>	Humerus		MBA		71.2	59.6	45.6	35.7
HM03182	<i>Cervus elaphus</i>	Humerus		MBA		70	62.4	45.6	34.8
HM03182	<i>Cervus elaphus</i>	Humerus		MBA		65.2	57.4	42.3	32.2
HM03310	<i>Cervus elaphus</i>	Humerus		MBA			59.8	47.7	33.3
HM03803	<i>Cervus elaphus</i>	Humerus		MBA		65.3	56.4	43.5	33.2
HM03804	<i>Cervus elaphus</i>	Humerus		MBA		70.9	63.2	46.9	36
HM03818	<i>Cervus elaphus</i>	Humerus		MBA			57.1	43.5	32.8
HM03819	<i>Cervus elaphus</i>	Humerus		MBA	88.8				
HM00314	<i>Cervus elaphus</i>	Humerus		Late MBA		64.2	57.6	41.2	32.7
HM00746	<i>Cervus elaphus</i>	Humerus		Late MBA		65.3	61.8	44.3	32.5
HM00745	<i>Cervus elaphus</i>	Humerus		Late MBA		70.9	62.5	46.9	35
KH00447	<i>Cervus elaphus</i>	Humerus		LBA			59.5	42	31.7

Sample n°	Species	Bone	Remarks	Chronology	BFp	Bp	Dp	Bd	BFd	Dd	BPC
HM00199	<i>Cervus elaphus</i>	Radius		MBA				59.5	57		
HM00389	<i>Cervus elaphus</i>	Radius		MBA	56.1	60.5	33.6				
HM02263	<i>Cervus elaphus</i>	Radius		MBA				55.2	54.3	39.6	
HM02974	<i>Cervus elaphus</i>	Radius		MBA				61	58.9	44	
HM03285	<i>Cervus elaphus</i>	Radius		MBA				53.9	52.5	38.9	
HM03288	<i>Cervus elaphus</i>	Radius		MBA	61.3	64.6	35.3				
MST00298	<i>Cervus elaphus</i>	Radius		MBA	60.7	65.6	35.5				
MST00354	<i>Cervus elaphus</i>	Radius		MBA				52.7	50.8	35.9	
HM00765	<i>Cervus elaphus</i>	Radius		Late MBA	51.6	54	31.9				
HM00760	<i>Cervus elaphus</i>	Radius		Late MBA				54.9	54.2	40	
HM00759	<i>Cervus elaphus</i>	Radius		Late MBA				56.5	56.6	41.3	
GT02178	<i>Cervus elaphus</i>	Radius		LBA				53.1		37.3	
MST00975	<i>Cervus elaphus</i>	Radius		LBA	54.6	58.9	31.1				
HM01302	<i>Cervus elaphus</i>	Radius		IA	59.3	63.5	32.9				
HM02952	<i>Cervus elaphus</i>	Radius		IA	59.5	64	33.6				
HM03861	<i>Cervus elaphus</i>	Radius		IA	61.8	64.6	33.5				
HM00338	<i>Cervus elaphus</i>	Ulna		MBA							34.4
HM02185	<i>Cervus elaphus</i>	Ulna		MBA							34.4
HM02265	<i>Cervus elaphus</i>	Ulna		MBA							34.6
HM03828	<i>Cervus elaphus</i>	Ulna		MBA							36.7
MST00299	<i>Cervus elaphus</i>	Ulna		MBA							34.9

Sample n°	Species	Bone	Remarks	Chronology	Bp	GB	Dp
HM00393	<i>Cervus elaphus</i>	Carpal	Cap-Trap	MBA		26	
HM00197	<i>Cervus elaphus</i>	Carpal	Pyr	MBA		31	
HM00197	<i>Cervus elaphus</i>	Carpal	Pyr	MBA		34.5	
HM00196	<i>Cervus elaphus</i>	Carpal	Lunatum	MBA		36.7	
HM00155	<i>Cervus elaphus</i>	Carpal	Cap-Trap	MBA	31		29

Sample n°	Species	Bone	Remarks	Chronology	LA
HM01622	<i>Cervus elaphus</i>	Pelvis		MBA	60.8
HM02653	<i>Cervus elaphus</i>	Pelvis		MBA	57.9
HM00628	<i>Cervus elaphus</i>	Pelvis		Late MBA	61.8

Sample n°	Species	Bone	Remarks	Chronology	GL	GB	Dp	DC
HM00813	<i>Cervus elaphus</i>	Femur		Late MBA				40.8
HM03627	<i>Cervus elaphus</i>	Patella		IA	45.5	38.8	25.8	

Sample n°	Species	Bone	Remarks	Chronology	Bp	Dp	Bd	Dd
HM00390	<i>Cervus elaphus</i>	Tibia		MBA	53.2	40.9		
HM02274	<i>Cervus elaphus</i>	Tibia		MBA			54.8	45.1
HM02649	<i>Cervus elaphus</i>	Tibia		MBA			57.3	44.7
HM03331	<i>Cervus elaphus</i>	Tibia		MBA			49.2	40
HM03922	<i>Cervus elaphus</i>	Tibia		MBA			52.9	40.4
BH00405	<i>Cervus elaphus</i>	Tibia		MBA	91.7			
MST01779	<i>Cervus elaphus</i>	Tibia		MBA			53.2	
HM00267	<i>Cervus elaphus</i>	Tibia		Late MBA			50.6	41.9
HM00268	<i>Cervus elaphus</i>	Tibia		Late MBA			54.9	44.9
HM00808	<i>Cervus elaphus</i>	Tibia		Late MBA			52.5	42.3
HM00810	<i>Cervus elaphus</i>	Tibia		Late MBA	81.6	85.5		
HM01328	<i>Cervus elaphus</i>	Tibia		Late MBA			63.7	43.9
HM00807	<i>Dama mesopotamica</i>	Tibia		Late MBA			41.8	35.9
HM02612	<i>Cervus elaphus</i>	Tibia		IA			55.3	43.1
HM02414	<i>Dama mesopotamica</i>	Tibia		IA			42.7	34

Sample n°	Species	Bone	Remarks	Chronology	GL	Bp	GB	Dp
HM00085	<i>Cervus elaphus</i>	Tarsal	Calc	MBA	105.6		35	
HM00337	<i>Cervus elaphus</i>	Tarsal	Calc	MBA	122.3		42.3	
HM02096	<i>Cervus elaphus</i>	Tarsal	Calc	MBA			39.3	
HM03150	<i>Cervus elaphus</i>	Tarsal	Calc	MBA			38.5	
BH00280	<i>Cervus elaphus</i>	Tarsal	Calc	MBA			42.6	
HM00714	<i>Cervus elaphus</i>	Tarsal	Calc	Late MBA			40.5	
HM00715	<i>Cervus elaphus</i>	Tarsal	Calc	Late MBA			41.9	
MST00797	<i>Cervus elaphus</i>	Tarsal	Calc	LBA	125		41.8	
HM01415	<i>Cervus elaphus</i>	Tarsal	Calc	IA	121		37.9	
HM01441	<i>Cervus elaphus</i>	Tarsal	Cubo-Nav	MBA		49.5		44.9
HM01440	<i>Cervus elaphus</i>	Tarsal	Cubo-Nav	MBA		47.3		40.4
HM02100	<i>Cervus elaphus</i>	Tarsal	Cubo-Nav	MBA		49.8		47.5
HM02355	<i>Cervus elaphus</i>	Tarsal	Cubo-Nav	MBA		51.4		48.4
HM01439	<i>Cervus elaphus</i>	Tarsal	Cubo-Nav	Late MBA		43.9		39.9
GT02094	<i>Cervus elaphus</i>	Tarsal	Cubo-Nav	LBA				49.6
GT02191	<i>Cervus elaphus</i>	Tarsal	Cubo-Nav	LBA				47.8

Sample n°	Species	Bone	Remarks	Chronology	GLI	GLm	DI	Dm	Bd
HM00168	<i>Cervus elaphus</i>	Tarsal	Talus	MBA	59.8	54.4	37.5	33.3	38
HM00332	<i>Cervus elaphus</i>	Tarsal	Talus	MBA	57.7	55.2	31.5	32.6	37.8
HM01425	<i>Cervus elaphus</i>	Tarsal	Talus	MBA		58.7	31.4	34.7	
HM02279	<i>Cervus elaphus</i>	Tarsal	Talus	MBA	61.8	57.5	33.7	34.5	39.8
HM02748	<i>Cervus elaphus</i>	Tarsal	Talus	MBA	60.3	55	33.5		40
HM03135	<i>Cervus elaphus</i>	Tarsal	Talus	MBA	58	53.3	32	32.4	37.1
HM03154	<i>Cervus elaphus</i>	Tarsal	Talus	MBA	59.1	56.8	33	33.9	38.8
KTO0989	<i>Cervus elaphus</i>	Tarsal	Talus	MBA	62	58.3	33.5	35.7	42.6
HM01427	<i>Cervus elaphus</i>	Tarsal	Talus	Late MBA	61.9	57.9	33.1	33.7	40
GT02047	<i>Cervus elaphus</i>	Tarsal	Talus	LBA	61.2	57.3	35		40.8
GT02166	<i>Cervus elaphus</i>	Tarsal	Talus	LBA	61.3	57.2	35.3	36.6	41.4
GT02192	<i>Cervus elaphus</i>	Tarsal	Talus	LBA		60.9		35.7	
KH00211	<i>Cervus elaphus</i>	Tarsal	Talus	LBA	56.3	52.8	31.3	31.5	36.6
MST01309	<i>Cervus elaphus</i>	Tarsal	Talus	LBA					38.6
HM01429	<i>Cervus elaphus</i>	Tarsal	Talus	IA	59.1	56	31.5		
HM01428	<i>Cervus elaphus</i>	Tarsal	Talus	IA	65.1		34.1		
HM01426	<i>Cervus elaphus</i>	Tarsal	Talus	IA	61.5	53.9	33.1	33.7	
HM02809	<i>Cervus elaphus</i>	Tarsal	Talus	IA			24.3		
HM01424	<i>Dama mesopotamica</i>	Tarsal	Talus	IA	45.1	42.9	24.8	25.3	27.5

Sample n°	Species	Bone	Remarks	Chronology	Bp	Dp	Bd	Dd	DTTm	DAPCm	DAPV	DTTI	DAPCpl	DAPVI	DTT	DAPCp	DAPV
HM00291	<i>Cervus elaphus</i>	Metacarpal		MBA			53.3	32.8	Fernandez	Fernandez	Fernandez	Fernandez	Fernandez	Fernandez	Fernandez	Fernandez	Fernandez
HM00080	<i>Cervus elaphus</i>	Metacarpal		MBA	46.4	31.5			24	26.1	32.7	24.6	24	32.6			
HM01537	<i>Cervus elaphus</i>	Metacarpal		MBA					21.6	24.5	31.8	21	23.3	31.6			
HM03297	<i>Cervus elaphus</i>	Metacarpal		MBA											24.5	23.9	31.2
HM03827	<i>Cervus elaphus</i>	Metacarpal		MBA	48.6	35.5											
HM01536	<i>Dama mesopotamica</i>	Metacarpal		MBA	35.5	23.8											
HM00255	<i>Cervus elaphus</i>	Metacarpal		Late MBA			50.3		23.2	24.3	32.5	23.8	23.6	32.5			
HM00260	<i>Cervus elaphus</i>	Metacarpal		Late MBA	47.2	29.5											
HM00724	<i>Cervus elaphus</i>	Metacarpal		Late MBA			51.5	34.6	24.7	25.8	34.8	24.6	24.5	34.7			
HM00725	<i>Cervus elaphus</i>	Metacarpal		Late MBA			49.3	32.5	23.1	25	32.8	22.5	23.5	32.1			
HM00726	<i>Cervus elaphus</i>	Metacarpal		Late MBA			44.4	29	20.6	22.3	29.3	19.9	21.2	29			
HM00727	<i>Cervus elaphus</i>	Metacarpal		Late MBA	40.8	29.2											
HM02526	<i>Cervus elaphus</i>	Metacarpal		Late MBA			46.7	31.1	21.5	24.4	31.1	21.3	23	31.3			
KH00293	<i>Cervus elaphus</i>	Metacarpal		LBA	42.9	28											
HM03909	<i>Cervus elaphus</i>	Metacarpal		IA			51.5		25.5	25.8	34.6	23.3	23.9	33.2			

Sample n°	Species	Bone	Remarks	Chronology	Bp	Dp	Bd	Dd	SD	DD	DTTm	DAPCpm	DAPVm	DTTI	DAPCpl	DAPVI	DTT	DAPCp	DAPV
HM00551	<i>Cervus elaphus</i>	Metatarsal		MBA			49				Fernandez	Fernandez	Fernandez	Fernandez	Fernandez	Fernandez	Fernandez	Fernandez	Fernandez
HM02632	<i>Cervus elaphus</i>	Metatarsal		MBA			49.9	29.5			22.7	24.1	32.5	23.2	21.3	31.4			
HM02636	<i>Cervus elaphus</i>	Metatarsal		MBA			49.6	31.8			22.4	23.1	32.1	21.7	19.5	29.8			
HM03257	<i>Cervus elaphus</i>	Metatarsal		MBA							28.7	25.2	26	34.3	24.3	22.2	32.7		
HM00734	<i>Cervidae</i>	Metatarsal	<i>Dama ?</i>	Late MBA						17.6	16.3								
HM00311	<i>Cervus elaphus</i>	Metatarsal		Late MBA						25.1	24	22.1	22	32.1	21.4	20.7	31.1		
HM00737	<i>Cervus elaphus</i>	Metatarsal		Late MBA													20.3	20.6	29.8
HM00735	<i>Cervus elaphus</i>	Metatarsal		Late MBA			51.7	33.3				23.6	24.6	33.4	24.4	23.2	32.2		
HM00736	<i>Cervus elaphus</i>	Metatarsal		Late MBA	36.7	40.5													
MST00624	<i>Cervus elaphus</i>	Metatarsal		LBA			47.9				22.4	25.2		33.3	21.7	22.2	31.8		
HM01549	<i>Cervus elaphus</i>	Metatarsal		IA			47.9				21.8	23.1	31.1	22.2	19.8	29.4			
HM03603	<i>Cervus elaphus</i>	Metatarsal		IA	44.4	44.1													

Sample n°	Species	Bone	Remarks	Chronology	GL	Bp	Dp	Bd	Dd	SD	DD
HM00014	<i>Cervus elaphus</i>	Prox phalanx		MBA	61.5	22.5	28.7	22	18.6	19.6	
HM00198	<i>Cervus elaphus</i>	Prox phalanx		MBA	57.5	21.2	27.3	21.7	17.7	18.1	22
HM00379	<i>Cervus elaphus</i>	Prox phalanx		MBA	57.6	22.8	28	21.7	18.3	18.6	20.9
HM00394	<i>Cervus elaphus</i>	Prox phalanx		MBA	62	23.9	28.1	23.3	18.5	19.6	21.3
HM00441	<i>Cervus elaphus</i>	Prox phalanx		MBA	65.6	26.1	30.9	25	20.5	22.3	23.5
HM00442	<i>Cervus elaphus</i>	Prox phalanx		MBA		23	31.9				
HM00502	<i>Cervus elaphus</i>	Prox phalanx		MBA	66.1	26.8	33.3	23.9	20	20.5	22.7
HM00604	<i>Cervus elaphus</i>	Prox phalanx		MBA	58	24	29	22	18.7		
HM01485	<i>Cervus elaphus</i>	Prox phalanx		MBA				20	18		
HM01486	<i>Cervus elaphus</i>	Prox phalanx		MBA	58.8	21.7		21.3	18.7	18	19.6
HM01488	<i>Cervus elaphus</i>	Prox phalanx		MBA				21	18.4		
HM01490	<i>Cervus elaphus</i>	Prox phalanx		MBA				21.3	19.1		
HM01491	<i>Cervus elaphus</i>	Prox phalanx		MBA	59.3	23.2	28	21.2	17.7	17.2	21
HM01493	<i>Cervus elaphus</i>	Prox phalanx		MBA	57.5	22.3	25.8	21.5	18.7	17.5	19.8
HM01495	<i>Cervus elaphus</i>	Prox phalanx		MBA	57.4	22.7	26.2	21.2	18.8	16.9	20.4
HM01496	<i>Cervus elaphus</i>	Prox phalanx		MBA	63.1	24.7	30.5	23.1	19.6	19.6	20.6
HM01499	<i>Cervus elaphus</i>	Prox phalanx		MBA	56.1	21	24.3	18.9	15.6	15.9	17.8
HM02628	<i>Cervus elaphus</i>	Prox phalanx		MBA	58.9	22.6	27.5	21.5	18.1	18.5	
HM02750	<i>Cervus elaphus</i>	Prox phalanx		MBA	59.9	23.4	28.6	22.3	18.9	19	
HM02911	<i>Cervus elaphus</i>	Prox phalanx		MBA	58.8	22	27.2		17.7	19.2	
KH01093	<i>Cervus elaphus</i>	Prox phalanx		MBA		20.5		18.4	16	15.1	
MST01780	<i>Cervus elaphus</i>	Prox phalanx		MBA	57.1	23.6	26.6	22.6	20	18.3	
HM00696	<i>Cervus elaphus</i>	Prox phalanx		Late MBA	61.9	25.1	29	23.8	20.5	21.1	
HM00695	<i>Cervus elaphus</i>	Prox phalanx		Late MBA	59.3	21.5	26.7	20.8	17.7	17.7	
HM00694	<i>Cervus elaphus</i>	Prox phalanx		Late MBA	58.7	23.1	28.1	20.9		16.7	
HM00264	<i>Cervus elaphus</i>	Prox phalanx		Late MBA	61.4	22.7	27.6	22.6	18.3	18.5	20.2
HM00265	<i>Cervus elaphus</i>	Prox phalanx		Late MBA	57.2	24.3	28.6	21.3	18.6	19.2	20.2
HM01497	<i>Cervus elaphus</i>	Prox phalanx		Late MBA	64.2	27.3	31.5	24.6	20.6	22.3	22.6
HM01498	<i>Cervus elaphus</i>	Prox phalanx		Late MBA	57.2	22.8	28.4	21.3	18.2	18	19.9
HM01500	<i>Cervus elaphus</i>	Prox phalanx		Late MBA				21.6	17.9		
HM03916	<i>Cervus elaphus</i>	Prox phalanx		Late MBA	55.3	21.5	25.8	20.7	18.7	17	20
GT01985	<i>Cervus elaphus</i>	Prox phalanx		LBA	63.4	23.3	29	22.3	19.1	18.8	21.9
GT01986	<i>Cervus elaphus</i>	Prox phalanx		LBA	56.1	22.9	26.9	21.5	18.1	19.1	19.9
GT02125	<i>Cervus elaphus</i>	Prox phalanx		LBA		24.6	29.2				
GT02129	<i>Cervus elaphus</i>	Prox phalanx		LBA				22.9			
GT02183	<i>Cervus elaphus</i>	Prox phalanx		LBA		21.7	27.2				
MST01158	<i>Cervus elaphus</i>	Prox phalanx		LBA				21.9	18.1	17.9	
HM01489	<i>Cervus elaphus</i>	Prox phalanx		IA		24.3	29.1				
HM01492	<i>Cervus elaphus</i>	Prox phalanx		IA				20.7	18.2		

Sample n°	Species	Bone	Remarks	Chronology	GL	Bp	Dp	Bd	Dd	SD	DD
HM00015	<i>Cervus elaphus</i>	Medial phalanx		MBA	43.7	22.6	28.9	20.1	27.5	16	
HM00438	<i>Cervus elaphus</i>	Medial phalanx		MBA	45.3	25.8	32.6	22.1	27.6	20.9	23.6
HM00439	<i>Cervus elaphus</i>	Medial phalanx		MBA	47.3	25.8	32.3	22.4	30.5	18.9	23.8
HM00440	<i>Cervus elaphus</i>	Medial phalanx		MBA	42.5	22.7	28.6	18.5	23.9	17.8	21.5
HM01460	<i>Cervus elaphus</i>	Medial phalanx		MBA	46.9	24.8	31.8	20.7	27.1	18.6	21.9
HM01461	<i>Cervus elaphus</i>	Medial phalanx		MBA	45	22.1	27.8	18.4	24.9	16.1	19.9
HM01462	<i>Cervus elaphus</i>	Medial phalanx		MBA				19.6	27.4		
HM01464	<i>Cervus elaphus</i>	Medial phalanx		MBA	43.2	22.1	27.1	18.5	24.8	16.6	19.7
HM01465	<i>Cervus elaphus</i>	Medial phalanx		MBA	44.3	21.3	28.6	18.6	24.3	16.1	18.5
HM01466	<i>Cervus elaphus</i>	Medial phalanx		MBA	45.7	25.1	31	20.9	27.8	19.2	21.2
HM02277	<i>Cervus elaphus</i>	Medial phalanx		MBA	43.3	22.6	27.7	18.3	24.5	17.6	20
HM00692	<i>Cervus elaphus</i>	Medial phalanx		Late MBA	44.7	23.8	31	19.5	24.6	17.1	
HM00693	<i>Cervus elaphus</i>	Medial phalanx		Late MBA	42.6	22.6	29.7	19.8	28.2	16.5	
HM00263	<i>Cervus elaphus</i>	Medial phalanx		Late MBA	48.4	25.7		21.4		18.1	
HM00361	<i>Cervus elaphus</i>	Medial phalanx		Late MBA	43.4	22.9	28.9	19.2	25.5	18	20
HM02479	<i>Cervus elaphus</i>	Medial phalanx		Late MBA	42.1	21.9	27.8	19.1	23.8	17.3	19.7
HM02533	<i>Cervus elaphus</i>	Medial phalanx		Late MBA	42.6	23.7	29.4	19.8	25.1	18.4	
GT01987	<i>Cervus elaphus</i>	Medial phalanx		LBA	45.4	22.8	28.7	19.4	26.3	17.8	21
GT02181	<i>Cervus elaphus</i>	Medial phalanx		LBA	43.8	23.4	29.8	20	28.6	16.8	21.8
MST00552	<i>Cervus elaphus</i>	Medial phalanx		LBA	45.7	23.8	30.2	22.7	29.5	17.7	23
MST01156	<i>Cervus elaphus</i>	Medial phalanx		LBA	42.9	22	27.3				
HM01463	<i>Cervus elaphus</i>	Medial phalanx		JA				19.4	24.6		
HM01467	<i>Cervus elaphus</i>	Medial phalanx		JA	43.7	22	27	19.7	27	16.1	19.6

Sample n°	Species	Bone	Remarks	Chronology	H	DLS	Ld	MBS
HM00380	<i>Cervus elaphus</i>	Distal phalanx		MBA	35.7	57	52.7	16.8
HM00395	<i>Cervus elaphus</i>	Distal phalanx		MBA	29.3	54.5	50.6	15.5
HM00396	<i>Cervus elaphus</i>	Distal phalanx		MBA	33.7	55.6	51.7	18.7
HM00397	<i>Cervus elaphus</i>	Distal phalanx		MBA	30.9	55.2	51.3	16.5
HM00437	<i>Cervus elaphus</i>	Distal phalanx		MBA	38.2	63	58.6	18.9
HM00436	<i>Cervus elaphus</i>	Distal phalanx		MBA	34.8	64	59.9	19.4
HM00435	<i>Cervus elaphus</i>	Distal phalanx		MBA				14.1
HM00434	<i>Cervus elaphus</i>	Distal phalanx		MBA	30.9	53	51.2	17.1
HM00433	<i>Cervus elaphus</i>	Distal phalanx		MBA	33.8	58.7	55.9	18.6
HM01452	<i>Cervus elaphus</i>	Distal phalanx		MBA		58.5	55.7	17
HM01453	<i>Cervus elaphus</i>	Distal phalanx		MBA		59	54.2	16
HM01454	<i>Cervus elaphus</i>	Distal phalanx		MBA		51.4	45.4	14.9
HM00686	<i>Cervus elaphus</i>	Distal phalanx		Late MBA		57.7		16.5
HM00262	<i>Cervus elaphus</i>	Distal phalanx		Late MBA	35.5	64.8	56.2	18.6
HM00363	<i>Cervus elaphus</i>	Distal phalanx		Late MBA	29.4	53.73	47.5	13.2
GT01989	<i>Cervus elaphus</i>	Distal phalanx		LBA		48.7	44.7	15
GT02014	<i>Cervus elaphus</i>	Distal phalanx		LBA		48.8	44.7	15.1
GT02182	<i>Cervus elaphus</i>	Distal phalanx		LBA		52.9	46.1	15

Sample n°	Species	Bone	Remarks	Chronology	DT	DAP	cons. H
BH00112	<i>Bos taurus</i>	Horn core		MBA	42.8		130
KTO0822	<i>Bos taurus</i>	Horn core		MBA	34.1	37.5	

Sample n°	Species	Bone	Remarks	Chronology	M1			M2			M3		
					Dap	Dt	h	Dap	Dt	h	Dap	Dt	h
BH00308	<i>Bos taurus</i>	Lower tooth		MBA	21.9	14.3	19.7						
BH00368	<i>Bos taurus</i>	Lower tooth		MBA				24.4	17.8	43			
BH00374	<i>Bos taurus</i>	Lower tooth		MBA							16.7	58.4	
KTO0028	<i>Bos taurus</i>	Lower tooth		MBA				24.6	15	41			
KTO0123	<i>Bos taurus</i>	Lower tooth		MBA							33.14	14.3	55.8
KTO0222	<i>Bos taurus</i>	Lower tooth		MBA				24.3	15.8	27			
TH00266	<i>Bos taurus</i>	Lower tooth		MBA								14.4	49.2
TH01181	<i>Bos taurus</i>	Lower tooth		MBA				23.2	17.6	30.5			
GT00911	<i>Bos taurus</i>	Lower tooth		MBA				24.2	14.8				
HM00516	<i>Bos taurus</i>	Mandibula		MBA	20.2	13.7	31.6	23.7	14.6	45.1		12.2	49.4
BH00367	<i>Bos taurus</i>	Mandibula		MBA								17.4	49.9
KTO0221	<i>Bos taurus</i>	Mandibula		MBA	23.8	14.2	45.9		13.5	50.9			
KTO0684	<i>Bos taurus</i>	Mandibula		MBA								16.6	40
TH01111	<i>Bos taurus</i>	Mandibula		MBA				22.4	16.7	37.8		15.3	44.5
TH01112	<i>Bos taurus</i>	Mandibula		MBA				25.4	17.5	53.9			
TH01258	<i>Bos taurus</i>	Mandibula		MBA				26.3	17.5	22.2			
HM00656	<i>Bos taurus</i>	Lower tooth		Late MBA				23.2	16.1	15.9			
HM00883	<i>Bos taurus</i>	Lower tooth		Late MBA	19.5	14.4	40.4						
HM00891	<i>Bos taurus</i>	Lower tooth		Late MBA				22.7	15.3	50.3			
HM00892	<i>Bos taurus</i>	Lower tooth		Late MBA							36.5	15.6	31.1
HM00882	<i>Bos taurus</i>	Mandibula		Late MBA	21.9	14.5	16.6	23.4	15.2	24	36	15.9	29.5
HM00889	<i>Bos taurus</i>	Mandibula		Late MBA	21.3	15.7	42.2						
HM00890	<i>Bos taurus</i>	Mandibula		Late MBA	22.8	14.8	30.8	24.2	17.1	46.4	36.5	16.3	57.5
HM01746	<i>Bos taurus</i>	Mandibula		Late MBA		15	16.4		17.4	21.4			
TH00056	<i>Bos taurus</i>	Lower tooth		LBA								15.8	60.1
TH00208	<i>Bos taurus</i>	Lower tooth		LBA				26.7	17.4				
GT02044	<i>Bos taurus</i>	Lower tooth		LBA								14.4	43.5
GT02123	<i>Bos taurus</i>	Lower tooth		LBA		14.3	23.5						
GT00352	<i>Bos taurus</i>	Lower tooth		LBA	21.9	14.8	38.5						
KH01270	<i>Bos taurus</i>	Lower tooth		LBA								14.8	53.5
MST01297	<i>Bos taurus</i>	Lower tooth		LBA								15.3	49.3
GT01697	<i>Bos taurus</i>	Mandibula		LBA	19.8	15.1	19.4	25.2	16.1	26.1			
GT01831	<i>Bos taurus</i>	Mandibula		LBA	23.5	14.6	50.3						
MST00582	<i>Bos taurus</i>	Mandibula		LBA	19.7	13.8	22.1	22.7	15	29		15	39.4
HM01747	<i>Bos taurus</i>	Lower tooth		IA	21.8	14.3	31.3						
HM01748	<i>Bos taurus</i>	Lower tooth		IA	19	13.9	28						
HM01751	<i>Bos taurus</i>	Mandibula		IA	21.5	15.4	45						
HM02791	<i>Bos taurus</i>	Mandibula		IA							37.9	16.1	41
HM02792	<i>Bos taurus</i>	Mandibula		IA	19.6	13.5	42.7						
HM02794	<i>Bos taurus</i>	Mandibula		IA	21.7	14.9	14.1						

Sample n°	Species	Bone	Remarks	Chronology	M1			M2			M3		
					Dap	Dt	h	Dap	Dt	h	Dap	Dt	h
KTO1025	<i>Bos taurus</i>	Maxilla		MBA	25.5	23.7	14.3	28.1	23	12.7			
KTO0077	<i>Bos taurus</i>	Maxilla		MBA				23.3	25.4	23.4	27.8		
TH00066	<i>Bos taurus</i>	Maxilla		MBA	20.2	22.8	35.8	24.1	23.8	45.4			
KH01051	<i>Bos taurus</i>	Maxilla		MBA		21.9	15.5						
GT01367	<i>Bos taurus</i>	Maxilla		MBA				23.6	22.4	41.1			
HM01752	<i>Bos taurus</i>	Upper tooth		MBA				25.5	24.8	35.3			
HM01755	<i>Bos taurus</i>	Upper tooth		MBA							31.5	23.2	11
HM01756	<i>Bos taurus</i>	Upper tooth		MBA							32.7	23.5	45.8
HM01764	<i>Bos taurus</i>	Upper tooth		MBA							27.3	22.2	43.2
HM02150	<i>Bos taurus</i>	Upper tooth		MBA	19.5	22.1	36.4						
HM03279	<i>Bos taurus</i>	Upper tooth		MBA							25.9	22.2	45.1
HM03280	<i>Bos taurus</i>	Upper tooth		MBA				27.4	26	24.9			
BH00307	<i>Bos taurus</i>	Upper tooth		MBA								28.6	34.5
BH00362	<i>Bos taurus</i>	Upper tooth		MBA				22.3	22.1	27.6			
BH00363	<i>Bos taurus</i>	Upper tooth		MBA									
KTO0130	<i>Bos taurus</i>	Upper tooth		MBA							24.3	20.6	15.6
TH00850	<i>Bos taurus</i>	Upper tooth		MBA	19.1	21.7	37.7						
TH01235	<i>Bos taurus</i>	Upper tooth		MBA							28.9	24.1	48.5
HM00272	<i>Bos taurus</i>	Maxilla		Late MBA	17.5	18.2	12.8	22.9	21.2	43.8			
HM00895	<i>Bos taurus</i>	Maxilla		Late MBA				22.6	22.8	24.1	28.4	22.9	27.5
HM00896	<i>Bos taurus</i>	Maxilla		Late MBA				22	23.4	24.1	27.2	23.4	32.1
HM00898	<i>Bos taurus</i>	Upper tooth		Late MBA				22.8	22.8	24.2			
HM00899	<i>Bos taurus</i>	Upper tooth		Late MBA	20	22.5	14.9						
HM00900	<i>Bos taurus</i>	Upper tooth		Late MBA				24.6	24.4	26.7			
GT02046	<i>Bos taurus</i>	Maxilla		LBA	20.7	22.4	18.7	22	23.9	31.9		23.6	39.2
MST00580	<i>Bos taurus</i>	Maxilla		LBA				22.9	22.8	26			
GT01902	<i>Bos taurus</i>	Upper tooth		LBA							29	23.4	38.4
GT00390	<i>Bos taurus</i>	Upper tooth		LBA	21.8	20.8	39.8						
GT01306	<i>Bos taurus</i>	Upper tooth		LBA	19.2	23.4	22.6						
HM01765	<i>Bos taurus</i>	Maxilla		IA	21.5	20.9	27.2						
HM02795	<i>Bos taurus</i>	Maxilla		IA	18.3	21.6	26.8		20.7	31.9		22.3	42.9
HM03592	<i>Bos taurus</i>	Maxilla		IA	19.4	22.6	29	24.7	24	41.7			
HM01757	<i>Bos taurus</i>	Upper tooth		IA	19.4	23.5	36.8						
GT01426	<i>Bos taurus</i>	Upper tooth		IA				24.5	21.6	55			
HM01753	<i>Bos taurus</i>	Upper tooth		IA	20.8	21.1	26.3						
HM01758	<i>Bos taurus</i>	Upper tooth		IA				26	23	38			
HM01760	<i>Bos taurus</i>	Upper tooth		IA				25.4	22.9	40			
HM01763	<i>Bos taurus</i>	Upper tooth		IA					22.8	35.8			
KH01048	<i>Bos taurus</i>	Upper tooth		IA							29.3	21.2	39.1

Sample n°	Species	Bone	Remarks	Chronology	PL	BFcr	BFcd	Bpacd	LCDe	SBV
HM00826	<i>Bos taurus</i>	Atlas		Late MBA	83.3	114	102.9			
HM01578	<i>Bos taurus</i>	Axis		MBA		53.2				
KH00511	<i>Bos taurus</i>	Axis		LBA		87.5	41.9	86.5	86.5	53.8
HM01581	<i>Bos taurus</i>	Axis		IA		77.4				48.1

Sample n°	Species	Bone	Remarks	Chronology	SLC	GLP	BG	LG
HM00006	<i>Bos taurus</i>	Scapula		MBA	62.4	44.2	55.4	
HM00309	<i>Bos taurus</i>	Scapula		MBA	58.5	43.8	50.7	
HM01365	<i>Bos taurus</i>	Scapula		MBA		62	56.7	
HM00777	<i>Bos taurus</i>	Scapula		Late MBA		69.3	47.7	
HM00774	<i>Bos taurus</i>	Scapula		Late MBA		65.9	47.6	57
KH00504	<i>Bos taurus</i>	Scapula		LBA	49.7	72.3	48.1	63.1

Sample n°	Species	Bone	Remarks	Chronology	Bd	DTD	DTT	HMT	HT
TH01081	<i>Bos primigenius</i>	Humerus		MBA		Helmer	Helmer	Fernandez	Fernandez
HM00096	<i>Bos taurus</i>	Humerus		MBA		62.6	61.5	33.6	40.9
HM01397	<i>Bos taurus</i>	Humerus		MBA		69	64.3	40.2	29.2
HM02188	<i>Bos taurus</i>	Humerus		MBA		78.8	70.5	40.9	31.8
HM03816	<i>Bos taurus</i>	Humerus		MBA		86.5	74.7	47.7	35.7
HM03817	<i>Bos taurus</i>	Humerus		MBA		81.6	69.2	41.5	31.2
KTO0101	<i>Bos taurus</i>	Humerus		MBA			68.5	38.8	
KTO0158	<i>Bos taurus</i>	Humerus		MBA				39.3	30
TH01078	<i>Bos taurus</i>	Humerus		MBA				51.6	37.8
TH01079	<i>Bos taurus</i>	Humerus		MBA				50.1	
TH01080	<i>Bos taurus</i>	Humerus		MBA			71.6	44.4	32.3

HM00313	<i>Bos taurus</i>	Humerus		Late MBA		80.4	74.3	39.2	30.2				
HM00630	<i>Bos taurus</i>	Humerus		Late MBA	72.5	72.5	69.1	38	28				
HM00740	<i>Bos taurus</i>	Humerus		Late MBA		65.9	64.7	36	28.9				
HM00739	<i>Bos taurus</i>	Humerus		Late MBA				39					
GT00180	<i>Bos taurus</i>	Humerus		LBA			81.6	47.5	35.2				
MST00500	<i>Bos taurus</i>	Humerus		LBA			85	48.8	34.8				
HM01398	<i>Bos taurus</i>	Humerus		IA		64.7	60.6	33	25				
HM02956	<i>Bos taurus</i>	Humerus		IA			61.2	42	32.7				
KH00449	<i>Bos taurus</i>	Humerus		IA			68.7	38.2	30				

Sample n°	Species	Bone	Remarks	Chronology	BFp	Bp	Dp	Bd	BFd	SD	DPA	BPC
HM00098	<i>Bos taurus</i>	Radius		MBA	59.2	68	31			32.8		
HM01301	<i>Bos taurus</i>	Radius		MBA	76.1	83.4	41					
HM02754	<i>Bos taurus</i>	Radius		MBA	70.6	74.9	40					
KTO0854	<i>Bos taurus</i>	Radius		MBA	60.5	64.1	32.3					
TH01073	<i>Bos taurus</i>	Radius		MBA	80	84.6	46.2					
MST01033	<i>Bos taurus</i>	Radius		MBA			44.3					
HM02644	<i>Bos taurus</i>	Radius		MBA	27	29.2	14.8					
HM00766	<i>Bos taurus</i>	Radius		Late MBA						33.3		
HM00764	<i>Bos taurus</i>	Radius		Late MBA	67.1	73.3	37					
HM00763	<i>Bos taurus</i>	Radius		Late MBA	65.5	73.1	38					
HM00762	<i>Bos taurus</i>	Radius		Late MBA	77.4	85.2	41.7					
HM00761	<i>Bos taurus</i>	Radius		Late MBA				61.2	58.6			
KH00400	<i>Bos taurus</i>	Radius		LBA	66.8		37.5					
KH00404	<i>Bos taurus</i>	Radius		LBA				66.4	60			
MST00564	<i>Bos taurus</i>	Radius		LBA	72.6	78.4	40.2					
KH00397	<i>Bos taurus</i>	Radius		IA	66.6	73.6	36.1					
HM00097	<i>Bos taurus</i>	Ulna		MBA								40
HM00206	<i>Bos taurus</i>	Ulna		MBA								35.3
BH00314	<i>Bos taurus</i>	Ulna		MBA								37.8
HM00770	<i>Bos taurus</i>	Ulna		Late MBA								42.5
HM00769	<i>Bos taurus</i>	Ulna		Late MBA						63.3		46.3
KH00973	<i>Bos taurus</i>	Ulna		LBA								44.5
MST00679	<i>Bos taurus</i>	Ulna		LBA								35.6
KH00405	<i>Bos taurus</i>	Ulna		IA							60.5	48.1

Sample n°	Species	Bone	Remarks	Chronology	LAR	LA
TH01249	<i>Bos taurus</i>	Pelvis		MBA		81
HM03833	<i>Bos taurus</i>	Pelvis		MBA	57	
HM01623	<i>Bos taurus</i>	Pelvis		Late MBA		72.8
HM00230	<i>Bos taurus</i>	Pelvis		Late MBA		77.8
KH00388	<i>Bos taurus</i>	Pelvis		LBA	68.7	

Sample n°	Species	Bone	Remarks	Chronology	GL	GB	Bd	DC
HM00019	<i>Bos taurus</i>	Femur	foetus	MBA	72.1			
HM02924	<i>Bos taurus</i>	Femur		MBA				40.4
BH00318	<i>Bos taurus</i>	Femur		MBA				39.3
KTO0230	<i>Bos taurus</i>	Femur		MBA				43.8
TH01496	<i>Bos taurus</i>	Femur		MBA				47.2
MST01044	<i>Bos taurus</i>	Femur		MBA				38.9
HM00822	<i>Bos primigenius</i>	Femur		Late MBA			73.1	
HM01347	<i>Bos taurus</i>	Femur		Late MBA				42.5
HM00076	<i>Bos taurus</i>	Patella		MBA	57.4	43.5		

Sample n°	Species	Bone	Remarks	Chronology	Bp	Bd	Dd
HM01331	<i>Bos taurus</i>	Tibia		MBA		46.2	
HM03139	<i>Bos taurus</i>	Tibia		MBA		63	47.2
HM03332	<i>Bos taurus</i>	Tibia		MBA		53	39.1
HM03333	<i>Bos taurus</i>	Tibia		MBA		62.1	47.8
HM01330	<i>Bos taurus</i>	Tibia		Late MBA			46.8
HM01329	<i>Bos taurus</i>	Tibia		Late MBA		68.1	48.9
HM00806	<i>Bos taurus</i>	Tibia		Late MBA		54.2	44.5
HM00805	<i>Bos taurus</i>	Tibia		Late MBA		65.6	52.1
HM00804	<i>Bos taurus</i>	Tibia		Late MBA		51.2	
HM00803	<i>Bos taurus</i>	Tibia		Late MBA		58.7	45.9
HM01932	<i>Bos taurus</i>	Tibia		Late MBA	61.3		
KH00333	<i>Bos taurus</i>	Tibia		LBA	84.6		
KH00330	<i>Bos taurus</i>	Tibia		LBA		62	46.2
KH00335	<i>Bos taurus</i>	Tibia		LBA	73.4		
MST01796	<i>Bos taurus</i>	Tibia		LBA		60.6	44.6
HM01332	<i>Bos taurus</i>	Tibia		IA		51.1	39.2
HM02957	<i>Bos taurus</i>	Tibia		IA		59	43.9

Sample n°	Species	Bone	Remarks	Chronology	GL	GLI	GLn	GB	DI	Dm	Bd
HM02092	<i>Bos taurus</i>	Tarsal	Calc	MBA	115			39			
HM02093	<i>Bos taurus</i>	Tarsal	Calc	MBA	115.7			35.8			
HM02095	<i>Bos taurus</i>	Tarsal	Calc	MBA				38.5			
TH01098	<i>Bos taurus</i>	Tarsal	Calc	MBA	151						
HM00716	<i>Bos taurus</i>	Tarsal	Calc	Late MBA				47.5			
HM00718	<i>Bos taurus</i>	Tarsal	Calc	Late MBA	125.7			43.2			
KH01177	<i>Bos taurus</i>	Tarsal	Calc	LBA			64.9				47.4
HM01413	<i>Bos taurus</i>	Tarsal	Calc	IA	109.7			36.6			
HM03891	<i>Bos taurus</i>	Tarsal	Calc	IA	122.1			40.3			
HM00468	<i>Bos taurus</i>	Tarsal	Cubo-Nav	MBA				55.7			
HM00012	<i>Bos taurus</i>	Tarsal	Talus	MBA		62.3	60		34.3	38.2	44.8
HM00055	<i>Bos taurus</i>	Tarsal	Talus	MBA		59.6	54.1		34.3	34.2	39.6
HM00207	<i>Bos taurus</i>	Tarsal	Talus	MBA					35	33	
HM02625	<i>Bos taurus</i>	Tarsal	Talus	MBA		57.4	55.5		33.5	33.6	41.9
HM02626	<i>Bos taurus</i>	Tarsal	Talus	MBA		69.8	66.2		39.1	39.3	42.3
BH00281	<i>Bos taurus</i>	Tarsal	Talus	MBA			64.9		32.3	39.7	43.9
BH00309	<i>Bos taurus</i>	Tarsal	Talus	MBA		56.5	52.5		30.3	31.1	35.5
KTO0555	<i>Bos taurus</i>	Tarsal	Talus	MBA		66.2	64.7		37.3	39.1	44.5
KTO0446	<i>Bos taurus</i>	Tarsal	Talus	MBA		63.9	59.5		35.9	35.5	44.4
KTO1055	<i>Bos taurus</i>	Tarsal	Talus	MBA		61.4	58.1		34.7	35.2	39.1
KTO0169	<i>Bos taurus</i>	Tarsal	Talus	MBA		65.2	61.9		37	36.5	39.6
KTO0001	<i>Bos taurus</i>	Tarsal	Talus	MBA		60.1	55.2		33.4	34.7	41.4
KTO0829	<i>Bos taurus</i>	Tarsal	Talus	MBA			59.1		35.3	34.9	42.3
TH01192	<i>Bos taurus</i>	Tarsal	Talus	MBA		75.1	71		41.8	42.7	49
MST00406	<i>Bos taurus</i>	Tarsal	Talus	MBA		66	59.7				42.3
HM00711	<i>Bos taurus</i>	Tarsal	Talus	Late MBA		63.8	58.7		36.5	37.5	41
HM00712	<i>Bos taurus</i>	Tarsal	Talus	Late MBA		71	66.3		38.6	39.7	
HM00713	<i>Bos taurus</i>	Tarsal	Talus	Late MBA		67.5	63.4		38.4	40.5	48.3
TH00931	<i>Bos taurus</i>	Tarsal	Talus	LBA			63.1		36.2	37.5	45
GT01935	<i>Bos taurus</i>	Tarsal	Talus	LBA		58.4	52.8		32.1		
GT01936	<i>Bos taurus</i>	Tarsal	Talus	LBA		62.8	57.8		34.5		40.6
GT02018	<i>Bos taurus</i>	Tarsal	Talus	LBA			57				
GT02167	<i>Bos taurus</i>	Tarsal	Talus	LBA		61.2	58.6		33.9	36	39.7
KH00214	<i>Bos taurus</i>	Tarsal	Talus	LBA		59.5	54.4		32.8	33	38.8
KH00216	<i>Bos taurus</i>	Tarsal	Talus	LBA							38.6
KH00898	<i>Bos taurus</i>	Tarsal	Talus	LBA		63.5	60.2		34.8	37.5	41
KH00977	<i>Bos taurus</i>	Tarsal	Talus	LBA			63		34.2		41

HM01502	<i>Bos taurus</i>	Prox phalanx		Late MBA	56.7		29.4	31.9	28	20.7	26.5	
HM00700	<i>Bos taurus</i>	Prox phalanx		Late MBA	55.4		27.9	32.3	26.4	20.7	24.1	
HM00699	<i>Bos taurus</i>	Prox phalanx		Late MBA	61.6		27.8	32.6	26.6			
HM00698	<i>Bos taurus</i>	Prox phalanx		Late MBA	54.9		27.8	34.2	27	20.7	24	
HM00697	<i>Bos taurus</i>	Prox phalanx		Late MBA	55		28.3	34	27.3	21.1	23.9	
GT02198	<i>Bos taurus</i>	Prox phalanx		LBA	64.1		33.7	37.1				
KH00243	<i>Bos taurus</i>	Prox phalanx		LBA	62.5		37	35	32.7	24.9	30	
KH00242	<i>Bos taurus</i>	Prox phalanx		LBA	54.9		27.7	29.7	26.9	19.9	22.1	
KH00241	<i>Bos taurus</i>	Prox phalanx		LBA			30.5	34.2	29.5	22.7	25.1	
KH00240	<i>Bos taurus</i>	Prox phalanx		LBA	60.5		28.5	33.7	27.3	19.8	24	
KH01228	<i>Bos taurus</i>	Prox phalanx		LBA	57.4		29	32.4	24.7	19.4		
TH00668	<i>Bos taurus</i>	Prox phalanx		LBA	65.9		34.5	39	31.5	24	27.3	
TH00739	<i>Bos taurus</i>	Prox phalanx		LBA	65.3		29.7		30.7	22.8	27.4	
TH01485	<i>Bos taurus</i>	Prox phalanx		LBA	64.2		31.7	35.7	29.8	21.9		
GT02184	<i>Bos taurus</i>	Prox phalanx		LBA	54.2		25.4	29.4	21.7	18.2	20.6	
KH00248	<i>Bos taurus</i>	Prox phalanx		LBA					23.2	17.2		
KH01014	<i>Bos taurus</i>	Prox phalanx		LBA	50.8		25.9	26.9	25.2	19.7	21.2	
MST00896	<i>Bos taurus</i>	Prox phalanx		LBA			24.2	19.5				
HM01501	<i>Bos taurus</i>	Prox phalanx		IA			30.9	36.9	31.3	25	28.2	
HM01504	<i>Bos taurus</i>	Prox phalanx		IA					31.1	22.8	27.7	
HM01503	<i>Bos taurus</i>	Prox phalanx		IA	55.1		28	31.6	25.7	19.9	24.2	
HM01506	<i>Bos taurus</i>	Prox phalanx		IA			24.5		22.5	16.4	21.4	
HM02390	<i>Bos taurus</i>	Prox phalanx		IA	56.5		28.3	31.7	26.9	19.5	21.5	
HM03588	<i>Bos taurus</i>	Prox phalanx		IA	56.2		30.3	35.8		23.1	28.6	
HM03865	<i>Bos taurus</i>	Prox phalanx		IA	54.7		25.5		26.7	18.8		
HM00100	<i>Bos taurus</i>	Medial phalanx		MBA	32.6		24.4		19.8	22.3	19.4	
BH00032	<i>Bos taurus</i>	Medial phalanx		MBA	45		35.3		32.6	34.1	28	
BH00162	<i>Bos taurus</i>	Medial phalanx		MBA	34.9		27.1	29.4	23.9	25.1	22.4	20.4
KT01128	<i>Bos taurus</i>	Medial phalanx		MBA	35.8		26.8	27.6	23.5	27.5	21.5	
KT00599	<i>Bos taurus</i>	Medial phalanx		MBA	35.9		31	32.2	26.2	30	22	
KT01007	<i>Bos taurus</i>	Medial phalanx		MBA	39.6		32.4	33.7	26.6		24.8	
TH01195	<i>Bos taurus</i>	Medial phalanx		MBA	39.8		36.1	36.2	32.8	34.6	28.6	28
HM01472	<i>Bos taurus</i>	Medial phalanx		MBA	35.5		24.8	24.5	20.8	23.3	18.7	18.4
HM02305	<i>Bos taurus</i>	Medial phalanx		MBA	35.1		25.1	26.1	20.5	21.9	19.9	19.6
BH00229	<i>Bos taurus</i>	Medial phalanx		MBA	44.6		33.5	31.1	26.6	31.1	26	
BH00430	<i>Bos taurus</i>	Medial phalanx		MBA	40.7		29.5		24		23.7	
BH00431	<i>Bos taurus</i>	Medial phalanx		MBA	51.4		34.3	40.6	30.2	33.6	29.7	
KT00979	<i>Bos taurus</i>	Medial phalanx		MBA	37.8		28.4	33	25.4	25.7	23.8	22.8
TH00851	<i>Bos taurus</i>	Medial phalanx		MBA	40		29.1	29.5	23.6	27	23.3	
TH01225	<i>Bos taurus</i>	Medial phalanx		MBA	44.1		30.2	32.8	26.7	29	25.5	
GT00714	<i>Bos taurus</i>	Medial phalanx		MBA	41.8		30	30.5	25.5	30.4	24.5	
KT00773	<i>Bos taurus</i>	Medial phalanx		MBA	37		26.2	27.8	21.6	25.1	20.6	
TH01049	<i>Bos taurus</i>	Medial phalanx		MBA	43.5		35.1	39.1	32.6	36	28.7	
TH01097	<i>Bos taurus</i>	Medial phalanx		MBA	36.2		25.2	26	21.8	24.9	20.7	18.9
KH01087	<i>Bos taurus</i>	Medial phalanx		MBA			27.6	32.8				
MST00038	<i>Bos taurus</i>	Medial phalanx		MBA	34		27.6	31.5	22.6	26.7	22.1	
HM00687	<i>Bos taurus</i>	Medial phalanx		Late MBA	37.3		28.2	31.3	24.3	29	22.5	
HM00688	<i>Bos taurus</i>	Medial phalanx		Late MBA	37.3		28.8	31.2	23.8	28.8	22.7	
HM00689	<i>Bos taurus</i>	Medial phalanx		Late MBA	36		27.6	30.5	25.7	28.9	23.1	
HM00691	<i>Bos taurus</i>	Medial phalanx		Late MBA	39.6		26.6	29.8	21.3	28.9	21.1	
HM02532	<i>Bos taurus</i>	Medial phalanx		Late MBA	36.6		25.7	26.1	21.9	24.2	21.1	
KH00235	<i>Bos taurus</i>	Medial phalanx		LBA	41.8		34.2	35.6	32.1	31	29.2	
TH00027	<i>Bos taurus</i>	Medial phalanx		LBA	36.8		27.5	26.5	23.8	26.8	21.9	
TH00669	<i>Bos taurus</i>	Medial phalanx		LBA	45.6		33.7	35.8	29.6	30.9	27.6	
MST00784	<i>Bos taurus</i>	Medial phalanx		LBA	37.5		26.1	27.9	23	25.3	21.2	
GT01934	<i>Bos taurus</i>	Medial phalanx		LBA	40		31.5	32.2	26.5	29.5	25.2	23.2
KH01284	<i>Bos taurus</i>	Medial phalanx		LBA	39.4			33.6	29	32		
MST01106	<i>Bos taurus</i>	Medial phalanx		LBA					27.5	29		
HM01475	<i>Bos taurus</i>	Medial phalanx		IA	41.4		32.4	37	26		26	25.5
HM01473	<i>Bos taurus</i>	Medial phalanx		IA			31.4					
HM02826	<i>Bos taurus</i>	Medial phalanx		IA	34		26.8	28.8	25	25.6	22.5	
HM01476	<i>Bos taurus</i>	Medial phalanx		IA	42.5		29.6	32.5	24.7	28.5	24.2	24
HM01474	<i>Bos taurus</i>	Medial phalanx		IA	37.4		28.7		21.3	24.5	23.3	20.9
KH00234	<i>Bos taurus</i>	Medial phalanx		IA	37.1		24.1	27.4	19.1	23	18.8	
KH00878	<i>Bos taurus</i>	Medial phalanx		IA	40.1		30	32.2	24.9	27.8	24.6	
KH01106	<i>Bos taurus</i>	Medial phalanx		IA	42		29.6	32.6	25.2	27.4	23.8	

Sample n°	Species	Bone	Remarks	Chronology	DLS	LD	MBS
HM02091	<i>Bos taurus</i>	Distal phalanx		MBA			21.3
HM00685	<i>Bos taurus</i>	Distal phalanx		Late MBA	51.5	67.4	24
GT01933	<i>Bos taurus</i>	Distal phalanx		LBA	73.5	61.2	24.2
GT02194	<i>Bos taurus</i>	Distal phalanx		LBA	72.6	58.3	26.1
KH00229	<i>Bos taurus</i>	Distal phalanx		LBA	64.3	43.7	21.2

Sample n°	Species	Bone	Remarks	Chronology	DT	DAP	Sinus depth	Cons. H
KT00311	<i>Capra hircus</i>	Horn core		MBA	17.6	30.6	55.4	90
KT00333	<i>Ovis aries</i>	Horn core		MBA	29.9	51.7		17

Sample n°	Species	Bone	Remarks	Chronology	dp4 d	dp4 h	M1 f	M1 l	M1 Dap	M1 dt	M1 h	M2 Dap	M2 Dt	M2 h	M3 Dap	M3 Dt	M3 h	
					Payne 85	Payne 85	Payne 85	Payne 85	Ducos	Ducos	Ducos	Ducos	Ducos	Ducos	Ducos	Ducos	Ducos	
HM00160	<i>Capra hircus</i>	Lower tooth		MBA													8.8	28.7
HM01693	<i>Capra hircus</i>	Lower tooth		MBA													8.1	36
HM01703	<i>Capra hircus</i>	Lower tooth		MBA					9.8	7	28							
BH00074	<i>Capra hircus</i>	Lower tooth		MBA								12.5	8.8	37.2				
KT00271	<i>Capra hircus</i>	Lower tooth		MBA								12.3	9	29				
KT00527	<i>Capra hircus</i>	Lower tooth		MBA								13	8.7	25				
KT00213	<i>Capra hircus</i>	Lower tooth		MBA								13.4	8.4	40.2				
TH00091	<i>Capra hircus</i>	Lower tooth		MBA													8.1	32.5
GT01538	<i>Capra hircus</i>	Lower tooth		MBA													8.3	16.2
GT00788	<i>Capra hircus</i>	Lower tooth		MBA								11.8	8.8	31				
GT00789	<i>Capra hircus</i>	Lower tooth		MBA								12.5	8.3	32.3				
GT00795	<i>Capra hircus</i>	Lower tooth		MBA								12	8.7	29.5				
GT00796	<i>Capra hircus</i>	Lower tooth		MBA					12.1	8.2	28.1							
GT00797	<i>Capra hircus</i>	Lower tooth		MBA					12.9	8.2	31.7							
GT00798	<i>Capra hircus</i>	Lower tooth		MBA								13.5	8.9					
GT00799	<i>Capra hircus</i>	Lower tooth		MBA								14.5	8.5					
MST00646	<i>Capra hircus</i>	Lower tooth		MBA	7	7.5												
HM00432	<i>Capra hircus</i>	Mandibula		MBA					9.8	7.6	16.3	12.9	8.9	31.8			8.8	42.2
HM00050	<i>Capra hircus</i>	Mandibula		MBA					10.8	7.8	9.6	13.2	8.8	18.7	2.22		8.2	28.2
HM00051	<i>Capra hircus</i>	Mandibula		MBA								13.4	9.15	18.4	23.1		9.14	29
HM01667	<i>Capra hircus</i>	Mandibula		MBA	6.7	6.9	14.6	4.1	9.9	7	32.4							
HM01679	<i>Capra hircus</i>	Mandibula		MBA					9.6	7.7	21.8	12.1	8.4	30.5				
HM01680	<i>Capra hircus</i>	Mandibula		MBA					11.3	8.9	20.8	13.1	9.8	32.8				
HM01704	<i>Capra hircus</i>	Mandibula		MBA					9.8	8.1	15.2	12.1	8.9	29.6				
HM02141	<i>Capra hircus</i>	Mandibula		MBA									8.9	35.6				
HM02142	<i>Capra hircus</i>	Mandibula		MBA													9.8	34.3
HM02232	<i>Capra hircus</i>	Mandibula		MBA	6.5	9.1		3.7	15.9	11	7.4	31						
HM03806	<i>Capra hircus</i>	Mandibula		MBA	6.8	9.4												
BH00072	<i>Capra hircus</i>	Mandibula		MBA					9.9	7.6	18.7	13.1	8.7	29.2			8.2	35.9
BH00073	<i>Capra hircus</i>	Mandibula		MBA					9.1	7.9	31.4							
BH00077	<i>Capra hircus</i>	Mandibula		MBA	7.9	13.7												
BH00380	<i>Capra hircus</i>	Mandibula		MBA								12.2	9.3	34.9				
BH00463	<i>Capra hircus</i>	Mandibula		MBA					10.9	7.2	15.7							33.4
BH00464	<i>Capra hircus</i>	Mandibula		MBA					10.4	7.6	15.1	11.9	8.8	28.3			9	37
KT00655	<i>Capra hircus</i>	Mandibula		MBA					10.8	7.8	16	11.7	8.8	29				
KT00299	<i>Capra hircus</i>	Mandibula		MBA								13	9	30.5				
KT00300	<i>Capra hircus</i>	Mandibula		MBA								11.4	8.4	11.6	11.5	8.7	18.3	
KT00301	<i>Capra hircus</i>	Mandibula		MBA								12.1	8.4	23.5			8.6	28
KT00351	<i>Capra hircus</i>	Mandibula		MBA					10.9	7.9	14.5	13.4	9.4	26.7			9	35.2
KT00353	<i>Capra hircus</i>	Mandibula		MBA								11.2	8.2	30.9			8.3	42.2
KT00800	<i>Capra hircus</i>	Mandibula		MBA								12.6	8.4	34.5			7.9	41.8
KT00388	<i>Capra hircus</i>	Mandibula		MBA					10.6	8.4	30.4	14.2	9.6	38.3				
KT00164	<i>Capra hircus</i>	Mandibula		MBA					10.9	7.4			8.2	27.7			8.4	35.5
KT00214	<i>Capra hircus</i>	Mandibula		MBA													8.6	35.5
TH01237	<i>Capra hircus</i>	Mandibula		MBA								11.9	9.1	29.7			9.4	39.1
TH01239	<i>Capra hircus</i>	Mandibula		MBA					10.7	7.3	24.6	11.5	8	36.8				
TH01259	<i>Capra hircus</i>	Mandibula		MBA					10.2	6.8	17.5	12	7.6	32.3			8.1	36.3
GT00973	<i>Capra hircus</i>	Mandibula		MBA	6.7	5.8												
GT00787	<i>Capra hircus</i>	Mandibula		MBA								14.1	9.2	36.8				
GT01366	<i>Capra hircus</i>	Mandibula		MBA	7.6	8.3												
MST00335	<i>Capra hircus</i>	Mandibula		MBA					12.2	7.7	25.7							
HM00528	Caprinae	Lower tooth		MBA													9.1	25.5
HM02144	Caprinae	Lower tooth		MBA								13.8	9.5	29				
BH00170	Caprinae	Lower tooth		MBA					10.8	8	9.8							
BH00171	Caprinae	Lower tooth		MBA								12.4	8.8	33.3				
KT00502	Caprinae	Lower tooth		MBA													8.6	14.1
KT00613	Caprinae	Lower tooth		MBA					10	8.3	14.7							
KT00496	Caprinae	Lower tooth		MBA					10	7.8	18.3							
KT00403	Caprinae	Lower tooth		MBA			5.8	16.4	12.3	8.5	29.8							
KT00053	Caprinae	Lower tooth		MBA					12.6	8.9	20.4							
KT00431	Caprinae	Lower tooth		MBA						7.8	12.3							
HM00431	Caprinae	Mandibula		MBA													7.7	36.4
HM00447	Caprinae	Mandibula		MBA					10.8	7.8	6							
HM01706	Caprinae	Mandibula		MBA					9.2	7.3	7.1	11.1	8.2	13.7				
HM02374	Caprinae	Mandibula		MBA								12.5	9.3					
HM03807	Caprinae	Mandibula		MBA													8.4	27.8
KT00443	Caprinae	Mandibula		MBA	6.6	9.9	4.7	15.5	10.6	7.2	36.2							
KT00860	Caprinae	Mandibula		MBA					10.5	6.9	21.9	12.5	7.8	31.5				
KT00016	Caprinae	Mandibula		MBA								11.3	8.4	23.1			7.8	27.9
GT00786	Caprinae	Mandibula		MBA					10.9	7.5	13.5							
MST01092	Caprinae	Mandibula		MBA					10.7	7	18.9	12.2	8	33.2				
HM00448	<i>Ovis aries</i>	Lower tooth		MBA													9.5	18
HM01672	<i>Ovis aries</i>	Lower tooth		MBA									8.1	37.9				
HM01702	<i>Ovis aries</i>	Lower tooth		MBA													8.4	23.8
HM02143	<i>Ovis aries</i>	Lower tooth		MBA													8.5	39.8
HM03132	<i>Ovis aries</i>	Lower tooth		MBA													9.3	28.6
BH00070	<i>Ovis aries</i>	Lower tooth		MBA													8.6	30.9
KT01193	<i>Ovis aries</i>	Lower tooth		MBA					12.1	8.5	32.3							
KT00270	<i>Ovis aries</i>	Lower tooth		MBA	7	11.5												
TH00964	<i>Ovis aries</i>	Lower tooth		MBA								15	8.7	30.8				
TH01217	<i>Ovis aries</i>	Lower tooth		MBA								13.3	8.6	44				
MST00334	<i>Ovis aries</i>	Lower tooth		MBA								13	9.1	37.3				
MST00733	<i>Ovis aries</i>	Lower tooth		MBA									7.9	38.2				
MST02393	<i>Ovis aries</i>	Lower tooth		MBA					9.9	7.8	29.3							
HM00446	<i>Ovis aries</i>	Mandibula		MBA					11.9	8.4	7.7	13.6	9.4	17.6			8.9	26.8
HM00159	<i>Ovis aries</i>	Mandibula		MBA					10.2	8.2	12.5	13	9.2	24.5				
HM00445	<i>Ovis aries</i>	Mandibula		MBA					10.9	8.5	10.9	12.1	9.5	22.4			9.2	31.2
HM00449	<i>Ovis aries</i>	Mandibula		MBA	7.3	10.5	4.5	16.4										
HM02138	<i>Ovis aries</i>	Mandibula		MBA					11	8.6	14.8	12.6	9.3	26.8				
HM02139	<i>Ovis aries</i>	Mandibula		MBA													8.7	42.2
HM02140	<i>Ovis aries</i>	Mandibula		MBA													9.2	41.2
HM02373	<i>Ovis aries</i>	Mandibula		MBA								12.8	8.6	44.2				
HM02387	<i>Ovis aries</i>	Mandibula		MBA								12.4	8.5	38.9				
HM02575	<i>Ovis aries</i>	Mandibula		MBA					10.5	7.9	23.7	12.7	8.8	38.5				
HM03268	<i>Ovis aries</i>	Mandibula		MBA								11.8	8.3	33			7.9	43.3
BH00069	<i>Ovis aries</i>	Mandibula		MBA								13.5	8.5	37				
BH00071	<i>Ovis aries</i>	Mandibula		MBA													9.3	39
BH00096	<i>Ovis aries</i>	Mandibula		MBA													9.2	
KT00241	<i>Ovis aries</i>	Mandibula		MBA					10	7.4	6.8	10.4	8	12.8			8.3	

KH00481	Caprinae	Scapula		MBA		37.3	23.1	30.8		
BH00048	Caprinae	Scapula		MBA			24			
HM00530	Ovis aries	Scapula		MBA	23.3	38.8	23.7	29.65	21.4	
BH000301	Ovis aries	Scapula		MBA			24.5		22.2	
BH00047	Ovis aries	Scapula		MBA		35	22.6			
BH00177	Ovis aries	Scapula		MBA			20.4		23.8	
MST01026	Ovis aries	Scapula		MBA	22.2	33.3	22.3	26.1	22.2	
HM00790	Ovis aries	Scapula		Late MBA	20.7	29.7	20.8	24.5	22	
HM01359	Ovis aries	Scapula		Late MBA	19.4	30.1	20.1		19.5	
GT00497	Capra hircus	Scapula		LBA	22.8	40.4	25.5	33.5	26.3	
KH01299	Ovis aries	Scapula		LBA	19.3	32.6	20.6	26.3	21.7	
MST00570	Ovis aries	Scapula		LBA	25.3	38.6	26		21.6	
HM01360	Ovis aries	Scapula		JA		31.8	22.5			
HM01357	Ovis aries	Scapula		JA	19.2	35	21	25	20.2	

Sample n°	Species	Bone	Remarks	Chronology	GL	Helmer		SD	Fernandez	
						DTD	DTT		HMT	HT
HM00011	Capra hircus	Humerus		MBA		32.9	32.7	16.8	21.2	16
HM00499	Capra hircus	Humerus		MBA		28.9	27		16.6	12.7
HM02082	Capra hircus	Humerus		MBA		36.8	34.8		21.1	15.1
HM03152	Capra hircus	Humerus		MBA		31.6	30.8		19.8	14.4
GT00580	Capra hircus	Humerus		MBA			29.8		18.8	14.6
KT00407	Capra hircus	Humerus		MBA		33.3	29.7	12.9	19.6	15.3
TH00517	Capra hircus	Humerus		MBA		32.1	31.5		20.4	15.9
TH00856	Capra hircus	Humerus		MBA		31.3	30.2		18.3	13.9
TH01162	Capra hircus	Humerus		MBA		33.5	32.3		20.5	15.2
GT00833	Capra hircus	Humerus		MBA		28	27.6		17.7	14.3
HM02278	Caprinae	Humerus		MBA		32.3	29.9		20.7	15.4
HM02711	Caprinae	Humerus		MBA		30.2	28.8			14
HM00427	Ovis aries	Humerus		MBA		36.1	35.9		23	17.6
HM00056	Ovis aries	Humerus		MBA		32.7	31.6		19.5	16.1
BH00337	Ovis aries	Humerus		MBA		33.1	31.6		20.2	15.9
GT01821	Ovis aries	Humerus		MBA		31.4	29.9		21.1	15.2
KT00358	Ovis aries	Humerus		MBA			26		16.7	13.6
KT00433	Ovis aries	Humerus		MBA		31.7	31		20.6	15.5
TH01159	Ovis aries	Humerus		MBA		34.2	33.4		21.2	16.1
TH01160	Ovis aries	Humerus		MBA		36.2	34.6		21.5	16.6
TH01400	Ovis aries	Humerus		MBA		38	37		24.1	17.8
HM00358	Capra hircus	Humerus		Late MBA			37.17		22.4	16.5
HM00233	Capra hircus	Humerus		Late MBA		32.3	30.9		19	13.5
HM00357	Ovis aries	Humerus		Late MBA		29.6	28.87		18.84	14.5
HM00752	Ovis aries	Humerus		Late MBA		36.9	35.8		22.5	17.1
HM01371	Ovis aries	Humerus		Late MBA		36.5	35.6		24.8	17.3
HM01368	Ovis aries	Humerus		Late MBA		37	35.5		24	17.3
TH01736	Capra hircus	Humerus		LBA		25.9	25.1		15.7	12.6
TH00245	Ovis aries	Humerus		LBA		31.3	29.5		19.5	14.7
TH01268	Ovis aries	Humerus		LBA		35	32.8		21.2	16.3
GT00499	Ovis aries	Humerus		LBA		32.7	30.5		19.3	15
MST00768	Ovis aries	Humerus		LBA		34.8	33		21.4	16.9
MST01818	Ovis aries	Humerus		LBA		30.3	28.6		19.7	14.8
HM01372	Capra hircus	Humerus		JA		33.8	32.4		21.3	15.7
KH00470	Capra hircus	Humerus		JA		30.5	29.1		17.9	12.7
KH00849	Capra hircus	Humerus		JA			34.2		22	15.7
HM01367	Caprinae	Humerus		JA		33.7	32.1		20.2	15.9
HM01374	Caprinae	Humerus		JA			28.1		17.7	13.3
KH00471	Caprinae	Humerus		JA		34.3	32		21.3	15.9
KH00943	Caprinae	Humerus	fœtus	JA	32.3					
HM01370	Ovis aries	Humerus		JA		33.8	34.2		21.8	17
HM03885	Ovis aries	Humerus		JA		29.8	28.4		18.5	14.5
KH01097	Ovis aries	Humerus		JA		37.8	36.1		22.7	16.3
KH01114	Ovis aries	Humerus		JA		31.5	29.3		19.9	16.4
KH01116	Ovis aries	Humerus		JA		30.5	29.3		18.3	14

Sample n°	Species	Bone	Remarks	Chronology	GL	BFp	Bp	Dp	Bd	Bfd	Dd	SD	DPA	BPC
KT00171	Capra hircus	Radius		MBA		26.1	26.8	14.7						
TH01220	Capra hircus	Radius		MBA					27.3	24.3	18.1			
TH01440	Capra hircus	Radius		MBA		24	25	13.6						
TH01494	Capra hircus	Radius		MBA		26.7	29.5	15						
MST02394	Capra hircus	Radius		MBA		26.5	27.7	15.1						
HM00336	Capra hircus	Radius		MBA			31.5							
HM00473	Capra hircus	Radius		MBA					29	27		19.5		
HM02183	Capra hircus	Radius		MBA	159	30.6	32.3	16.4	30	27.4	19.6	20.7		
HM02574	Capra hircus	Radius		MBA		29.5	31.9					22.9		
HM02739	Capra hircus	Radius		MBA		30	33.7	16.9						
KT00975	Capra hircus	Radius		MBA		27.5	29.5					17.5		
HM03261	Ovis aries	Radius		MBA		31.6	33.9	15.6						
KT00143	Ovis aries	Radius		MBA		27.1	31	16.2				17.7		
TH01071	Ovis aries	Radius		MBA		32.7	34.6	17.8						
TH01075	Ovis aries	Radius		MBA					34.4	28.2	24			
KH00897	Ovis aries	Radius		MBA					30.5	25.7	21			
MST00717	Ovis aries	Radius		MBA		31	25.3							
MST00051	Ovis aries	Radius		MBA		31.7	36	17.31	30.2		19.2			
HM00758	Ovis aries	Radius		Late MBA		31.5	35.8	17.8						
HM01271	Ovis aries	Radius		Late MBA					36.9	31.1				
KH00418	Ovis aries	Radius		LBA		32.7	34.2	18.6				17.1		
KH01035	Ovis aries	Radius		LBA		29.1	20.7	16.3						
MST01132	Ovis aries	Radius		LBA		29.6	32.5	16.8						
HM02598	Capra hircus	Radius		JA		28.8	30.2	16.7						
KH00421	Capra hircus	Radius		JA		30.9	34.4	17.7	30.5	25.8	20.2			
KH01122	Capra hircus	Radius		JA					31.5	26.6				
HM01270	Ovis aries	Radius		JA					33.3	26.2				
HM01272	Ovis aries	Radius		JA										
HM01274	Ovis aries	Radius		JA				15.7				16.5		
HM02418	Ovis aries	Radius		JA		31.7	34.5	17.7						
HM03597	Ovis aries	Radius		JA		28.6	31	15.7						
HM03876	Ovis aries	Radius		JA					34.4	28	23.6			
HM01726	Ovis aries	Radius		JA		31.5	34.3	18.2				18.8		
HM02183	Capra hircus	Ulna		MBA									24.2	22.5
HM00608	Ovis aries	Ulna		MBA										19.4
MST00051	Ovis aries	Ulna		MBA										19
HM00772	Ovis aries	Ulna		Late MBA										18
HM00773	Capra hircus	Ulna		Late MBA										26.6
HM02967	Ovis aries	Ulna		JA										17.8
HM01286	Ovis aries	Ulna		JA									28.2	21.8

Sample n°	Species	Bone	Remarks	Chronology	SB	LAR	LA
KH00835	Capra hircus	Pelvis		MBA		26.8	
HM03350	Caprinae	Pelvis		MBA		31.4	
KT01101	Ovis aries	Pelvis		MBA		23.5	
HM00796	Capra hircus	Pelvis		Late MBA		35.2	
HM00795	Caprinae	Pelvis		Late MBA		30	
HM00626	Ovis aries	Pelvis		Late MBA		36	
HM00794	Ovis aries	Pelvis		Late MBA		30.1	
HM00793	Ovis aries	Pelvis		Late MBA		33.2	
KH00373	Ovis aries	Pelvis		LBA	8.6		
MST00447	Ovis aries	Pelvis		LBA		31.9	
MST00553	Ovis aries	Pelvis		LBA		30.8	
HM02586	Ovis aries	Pelvis		JA		28.9	

HM03892	<i>Ovis aries</i>	Pelvis		IA		32.2	
HM01587	<i>Ovis aries</i>	Pelvis		IA			26.1

Sample n°	Species	Bone	Remarks	Chronology	Bd	Dd	DC
MST00377	<i>Ovis aries</i>	Femur		MBA		40.5	
HM01338	Caprinae	Femur		Late MBA			19.1
HM01339	Caprinae	Femur		IA			22.2
HM01337	Caprinae	Femur		IA	29.6	29.1	
KH00767	Caprinae	Femur		IA			20
KH00766	Caprinae	Femur		IA			17.8
KH00765	Caprinae	Femur		IA			19.5
KH00760	Caprinae	Femur		IA			18
KH00759	Caprinae	Femur		IA			21.1
KH00757	Caprinae	Femur		IA			18.9
KH00758	Caprinae	Femur		IA			18.2
HM01336	<i>Ovis aries</i>	Femur		IA			20.8
KH00761	<i>Ovis aries</i>	Femur		IA			19.5
KH00762	<i>Ovis aries</i>	Femur		IA			20.8

Sample n°	Species	Bone	Remarks	Chronology	Bp	Dp	Bd	Dd	SD
HM02734	<i>Capra hircus</i>	Tibia		MBA			33.1	26.9	
BH00044	<i>Capra hircus</i>	Tibia		MBA			32.3	24.7	
TH01490	<i>Capra hircus</i>	Tibia		MBA	38.4		25.6	20.1	
HM00469	Caprinae	Tibia		MBA			27.3	22	
TH01438	Caprinae	Tibia		MBA			26.1		
MST00040	Caprinae	Tibia		MBA			27.6	20.3	
MST00418	Caprinae	Tibia		MBA			24.5	20.6	
BH00046	<i>Ovis aries</i>	Tibia		MBA	37.8	38.5			
BH00387	<i>Ovis aries</i>	Tibia		MBA			26.6	19.4	13.8
KT00247	<i>Ovis aries</i>	Tibia		MBA			28.8	22	
KT01031	<i>Ovis aries</i>	Tibia		MBA			28.6	22.8	16.7
MST00429	<i>Ovis aries</i>	Tibia		MBA			27.5	20.7	
HM02077	<i>Ovis orientalis</i>	Tibia		MBA			32.1	25.8	
HM00801	<i>Capra hircus</i>	Tibia		Late MBA			24.6	19.3	
HM00802	<i>Ovis aries</i>	Tibia		Late MBA			30.2	22.8	
HM01314	<i>Ovis aries</i>	Tibia		Late MBA			28.1	20.9	
KH00914	<i>Capra hircus</i>	Tibia		LBA			28.2	22.3	
KH00994	<i>Capra hircus</i>	Tibia		LBA			25	17.8	
KH00995	<i>Capra hircus</i>	Tibia		LBA			30.2	25.9	
MST01213	<i>Capra hircus</i>	Tibia		LBA			26.7	19.8	
TH00667	Caprinae	Tibia		LBA			30	23.2	
GT00382	Caprinae	Tibia		LBA		23.6		18.7	14.4
KH01229	Caprinae	Tibia		LBA			26.3	20.5	
KH00322	<i>Ovis aries</i>	Tibia		LBA			26.5	19.7	
KH00319	<i>Ovis aries</i>	Tibia		LBA			30.7	22.5	
TH01269	<i>Ovis aries</i>	Tibia		LBA			24.1	18.9	
HM02848	<i>Capra hircus</i>	Tibia		IA			23.9	19.4	
KH00318	<i>Capra hircus</i>	Tibia		IA			26	20.6	
HM02609	Caprinae	Tibia		IA			26.7		
KH00320	<i>Ovis aries</i>	Tibia		IA			26.1	20.7	
HM01313	<i>Ovis aries</i>	Tibia		IA			29.7	22.8	
HM01312	<i>Ovis aries</i>	Tibia		IA			27	21.8	
HM01311	<i>Ovis aries</i>	Tibia		IA			26.5	20.7	
KH00788	<i>Ovis aries</i>	Tibia		IA			23.9	18.5	
KH00789	<i>Ovis aries</i>	Tibia		IA			27.1		
KH00790	<i>Ovis aries</i>	Tibia		IA			26.7	20.7	
KH00801	<i>Ovis aries</i>	Tibia		IA			26.4	20.8	
KH00802	<i>Ovis aries</i>	Tibia		IA			28.4	21.7	
KH00321	<i>Ovis orientalis</i>	Tibia		IA			33.2	25.3	

Sample n°	Species	Bone	Remarks	Chronology	GL	Bp	GB	Dp	LP	LC
HM00158	<i>Capra hircus</i>	Tarsal	Calc	MBA					Fernandez	Fernandez
HM01405	<i>Capra hircus</i>	Tarsal	Calc	MBA					14	12.35
HM02747	<i>Capra hircus</i>	Tarsal	Calc	MBA		51.5	17.8		11.2	10.6
TH01251	<i>Capra hircus</i>	Tarsal	Calc	MBA					24.2	11.7
GT00738	<i>Capra hircus</i>	Tarsal	Calc	MBA					12	11.2
GT00739	<i>Capra hircus</i>	Tarsal	Calc	MBA					12.9	11.5
GT00739	<i>Capra hircus</i>	Tarsal	Calc	MBA					13.8	12.6
BH00323	Caprinae	Tarsal	Calc	MBA		54.2	18.7		9.7	11
GT00537	Caprinae	Tarsal	Calc	MBA					9.8	10.41
HM01408	<i>Ovis aries</i>	Tarsal	Calc	MBA			24.8			
HM01406	<i>Ovis aries</i>	Tarsal	Calc	MBA		53.2	18.5		10.8	12
HM02351	<i>Ovis aries</i>	Tarsal	Calc	MBA		53.9	18.9			
KT00763	<i>Ovis aries</i>	Tarsal	Calc	MBA		50.5	16.2		10.6	11.9
KT01048	<i>Ovis aries</i>	Tarsal	Calc	MBA		58	21.5		10	11.4
MST00376	<i>Ovis aries</i>	Tarsal	Calc	MBA		60.1	20.8		11.6	13.8
MST00480	<i>Capra hircus</i>	Tarsal	Calc	LBA					11.5	11.5
KH00205	Caprinae	Tarsal	Calc	LBA					10.1	11.7
KH00203	<i>Ovis aries</i>	Tarsal	Calc	LBA		61.9	21		11.3	14.7
KH00204	<i>Ovis aries</i>	Tarsal	Calc	LBA		56.7	15.8		11.3	12
MST00686	<i>Ovis aries</i>	Tarsal	Calc	LBA					10.3	14.1
MST01247	<i>Ovis aries</i>	Tarsal	Calc	LBA		58.7	20.8		10.5	12.7
KH00705	Caprinae	Tarsal	Calc	IA					9.8	10.4
KH00738	Caprinae	Tarsal	Calc	IA					12	12.5
HM01409	<i>Ovis aries</i>	Tarsal	Calc	IA		60.4	21		11.6	14.5
HM01407	<i>Ovis aries</i>	Tarsal	Calc	IA		59.7	20.3		11.4	14
KH00707	<i>Ovis aries</i>	Tarsal	Calc	IA					11.1	13.4
KH00706	<i>Ovis aries</i>	Tarsal	Calc	IA					9.5	12.4
KH00697	<i>Ovis aries</i>	Tarsal	Calc	IA					8.5	11.1
KH00709	<i>Ovis aries</i>	Tarsal	Calc	IA					9.7	11.5
KT00949	<i>Ovis aries</i>	Tarsal	Cubo-Nav	MBA				20.1		
KH00677	<i>Ovis aries</i>	Tarsal	Cubo-Nav	IA				23.6		
KH00676	<i>Ovis aries</i>	Tarsal	Cubo-Nav	IA				19.7		
KH00678	<i>Ovis aries</i>	Tarsal	Cubo-Nav	IA				22.5		
KH00673	<i>Ovis aries</i>	Tarsal	Cubo-Nav	IA				25.4		

Sample n°	Species	Bone	Remarks	Chronology	GLI	GLm	DI	Dm	Bd
HM01423	<i>Capra hircus</i>	Tarsal	Talus	MBA	33.3	31	18.5	19.7	22
HM01422	<i>Capra hircus</i>	Tarsal	Talus	MBA	30.5	28.9	16.1	17	19
HM03211	<i>Capra hircus</i>	Tarsal	Talus	MBA	30	28.5	16.3	17.8	19.6
BH00391	<i>Capra hircus</i>	Tarsal	Talus	MBA	31				
TH00052	<i>Capra hircus</i>	Tarsal	Talus	MBA	28.5	27.1	15.5	16.4	18.5
MST00021	<i>Capra hircus</i>	Tarsal	Talus	MBA	29.3	27.5	16		19.1
MST00369	<i>Capra hircus</i>	Tarsal	Talus	MBA	35.6	33.4	20.1		22.9
HM02313	Caprinae	Tarsal	Talus	MBA	28.6	27.5	15.8	15.7	
BH00143	Caprinae	Tarsal	Talus	MBA					19.7
BH00144	Caprinae	Tarsal	Talus	MBA					18.2
BH00230	Caprinae	Tarsal	Talus	MBA					20.8
HM00507	<i>Ovis aries</i>	Tarsal	Talus	MBA	29.4	28.6	16.1	17.7	18.9
HM00539	<i>Ovis aries</i>	Tarsal	Talus	MBA	30.7	29.2	17.2	18	19.8
HM01421	<i>Ovis aries</i>	Tarsal	Talus	MBA	28.1	26	15.6	16.1	18.2
BH00145	<i>Ovis aries</i>	Tarsal	Talus	MBA		32			21.9
KT00614	<i>Ovis aries</i>	Tarsal	Talus	MBA		29.6	17.5	18	19
KT00168	<i>Ovis aries</i>	Tarsal	Talus	MBA	29.1	27.4	16.8		19.3
KT00993	<i>Ovis aries</i>	Tarsal	Talus	MBA	30	28.6	16.3		19.3
MST00012	<i>Ovis aries</i>	Tarsal	Talus	MBA	35.2	33.5	19.5	20.8	22.9
MST00394	<i>Ovis aries</i>	Tarsal	Talus	MBA	31.6	30.6	18.4		21.8
HM00707	<i>Capra hircus</i>	Tarsal	Talus	Late MBA	29.5	27.5	16	16.6	19.2
TH00188	<i>Capra hircus</i>	Tarsal	Talus	LBA	31.5	30.5	17.6	19	19

KH00221	<i>Capra hircus</i>	Tarsal	Talus	LBA		26.1					15.3									17.8
KH00978	<i>Capra hircus</i>	Tarsal	Talus	LBA	30.5	29.3					16.8									18.6
MST00710	<i>Capra hircus</i>	Tarsal	Talus	LBA			25.5													
MST00670	<i>Capra hircus</i>	Tarsal	Talus	LBA	30.1	28.4					16.9									19.6
MST00680	<i>Capra hircus</i>	Tarsal	Talus	LBA	30.6	30.6					17.5									19.2
MST01067	<i>Capra hircus</i>	Tarsal	Talus	LBA	26.9	24.8					14.1									17.6
MST01215	<i>Capra hircus</i>	Tarsal	Talus	LBA	28.3	26.8					15.6	15.8								18.3
KH00219	<i>Capra spp.</i>	Tarsal	Talus Wild ?	LBA	32	29.5					17.5	17.3								19.6
KH00222	<i>Ovis spp.</i>	Tarsal	Talus Wild ?	LBA	31.6	29.5					18	18.4								20.9
HM02592	<i>Capra hircus</i>	Tarsal	Talus	IA	30.5	28.6					17	18								21.1
HM02969	<i>Capra hircus</i>	Tarsal	Talus	IA	29.2	27.2					16.4	16.7								19.4
KH00220	<i>Capra hircus</i>	Tarsal	Talus	IA	27.5	25.3					14.9	15.6								18.3
KH00667	<i>Capra hircus</i>	Tarsal	Talus	IA	25.5	25.9					14.3	14.5								16.3
KH00668	<i>Capra hircus</i>	Tarsal	Talus	IA	25.5	24.8					14.2	14.1								15
KH00669	<i>Capra hircus</i>	Tarsal	Talus	IA	28						15.6									16.9
KH00670	<i>Capra hircus</i>	Tarsal	Talus	IA							27.8									18.6
KH01115	<i>Capra hircus</i>	Tarsal	Talus	IA	28.4	26.3					15	18.7								
KH00659	Caprinae	Tarsal	Talus	IA	23.6						13.2									15
HM01420	<i>Ovis aries</i>	Tarsal	Talus	IA	29.7	28.4					16.5	16.6								18.7
KH00657	<i>Ovis aries</i>	Tarsal	Talus	IA	25.2	25.3					12.9	13.2								15.6
KH00658	<i>Ovis aries</i>	Tarsal	Talus	IA							28.6	16	16.9							
KH00661	<i>Ovis aries</i>	Tarsal	Talus	IA	26.8	25.5					14.5	14	15.3							
KH00662	<i>Ovis aries</i>	Tarsal	Talus	IA	26.5	25.3					14.6	14.7	16.6							
KH00663	<i>Ovis aries</i>	Tarsal	Talus	IA	24.7	24.1					13	13.5	15.4							
KH00664	<i>Ovis aries</i>	Tarsal	Talus	IA	24.6	26					14.1	14.7	16.3							
KH00665	<i>Ovis aries</i>	Tarsal	Talus	IA	29.8	27.9					15.8	16	18.9							
KH00666	<i>Ovis aries</i>	Tarsal	Talus	IA	28.4	27.2					15.8	15.5	18.2							

Sample n°	Species	Bone	Remarks	Chronology	GL	Bp	Dp	Bd	Dd	SD	DD	DTTm	DAPCpm	DAPVm	DTTI	DAPCpl	DAPVI	DTT	DAPC	DAPV
HM02124	<i>Capra hircus</i>	Metacarpal		MBA		23	16.2						Fernandez	Fernandez	Fernandez	Fernandez	Fernandez	Fernandez	Fernandez	Fernandez
BH00389	<i>Capra hircus</i>	Metacarpal		MBA	102.1	21.5	15.7	26.3		15.1	10.1	11.3	9.7	15.5	11.6	9.5	15.3			
TH01187	<i>Capra hircus</i>	Metacarpal		MBA		24.1	17.8													
GT00883	<i>Capra hircus</i>	Metacarpal		MBA								11.6	9.6	15.7	11.6	9	15.4			
HM00070	Caprinae	Metacarpal	neo-nat	MBA	59.6															
HM00543	<i>Ovis aries</i>	Metacarpal		MBA								11.9	12.3	17.8	11.9	11.2	17.2			
HM03025	<i>Ovis aries</i>	Metacarpal		MBA		20.6	14.2													
KT00577	<i>Ovis aries</i>	Metacarpal		MBA		22.8	16.6													
KT00758	<i>Ovis aries</i>	Metacarpal		MBA		25	16.9			14.7	10									
KT00411	<i>Ovis aries</i>	Metacarpal		MBA		25	17.9			11.7	9.3									
KT00144	<i>Ovis aries</i>	Metacarpal		MBA														11.1	10.7	15.8
KT00047	<i>Ovis aries</i>	Metacarpal		MBA		23.1	17													
TH00409	<i>Ovis aries</i>	Metacarpal		MBA														13	13.1	19.4
TH01223	<i>Ovis aries</i>	Metacarpal		MBA		25.3	18.3													
MST01027	<i>Ovis aries</i>	Metacarpal		MBA		27.8	21.5			18.5	14.8									
HM02480	<i>Capra hircus</i>	Metacarpal		Late MBA	114.8	27.2	18.3	31.7	18.8	21.5	12.2	14	11.3	18.8	13.7	10.7	17.8			
HM00367	<i>Ovis aries</i>	Metacarpal		Late MBA		23.8	17.4			13.6	11.1									
HM00728	<i>Ovis aries</i>	Metacarpal		Late MBA		23.6	17.4													
GT01973	<i>Ovis aries</i>	Metacarpal		LBA								11.1	11.6	15.8	10.8	10.5				
GT01684	<i>Ovis aries</i>	Metacarpal		LBA		23.8	16.6													
GT01685	<i>Ovis aries</i>	Metacarpal		LBA		23.8	16.7													
KH01230	<i>Ovis aries</i>	Metacarpal		LBA		24.7	17.7													
MST00821	<i>Ovis aries</i>	Metacarpal		LBA														11.2	11	15.5
HM01517	<i>Capra hircus</i>	Metacarpal		IA		25.1	17.5													
HM01515	<i>Ovis aries</i>	Metacarpal		IA				26.6	16.2			11.3	10.4	16	12	10.9	16.4			
KH00286	<i>Ovis aries</i>	Metacarpal		IA		24.3	16.8													
KH00287	<i>Ovis aries</i>	Metacarpal		IA		21.7	15.3													
KH01061	<i>Ovis aries</i>	Metacarpal		IA														12.6	12.8	17.2

Sample n°	Species	Bone	Remarks	Chronology	GL	Bp	Dp	Bd	Dd	SD	DD	DTTm	DAPCpm	DAPVm	DTTI	DAPCpl	DAPVI	DTT	DAPC	DAPV
HM00428	<i>Capra hircus</i>	Metatarsal		MBA		21.4	20.2				11.5	11.2								
HM00545	<i>Capra hircus</i>	Metatarsal		MBA		18.2	17.6				12.5	9.7								
HM00606	<i>Capra hircus</i>	Metatarsal		MBA		21.9	23.3													
HM02289	<i>Capra hircus</i>	Metatarsal		MBA								15.4	12.1	20	15.3	13.2	20.5			
HM03127	<i>Capra hircus</i>	Metatarsal		MBA		22.8	22.6				15.3	13.9								
BH00035	<i>Capra hircus</i>	Metatarsal		MBA		21.4	20.4				14.8	13.7								
BH00093	<i>Capra hircus</i>	Metatarsal		MBA		22.9					15.9	12.5								
BH00094	<i>Capra hircus</i>	Metatarsal		MBA		19	16.9													
HM02730	Caprinae	Metatarsal		MBA		20.8	19.4													
KT00964	Caprinae	Metatarsal		MBA		20	19.9				11.3	10.1								
HM00405	<i>Ovis aries</i>	Metatarsal		MBA														12.7	12.2	18.2
HM00544	<i>Ovis aries</i>	Metatarsal		MBA								13.8	12.7	19.4	12.7	12.2	18.3			
HM02220	<i>Ovis aries</i>	Metatarsal		MBA				21.9	14.5	10.9	10.7	10.2	9.9	14.8	9.5	9.1	14.1			
HM02358	<i>Ovis aries</i>	Metatarsal		MBA				22.9	15.3			10.8	10.7	15.5	9.8	10.1	15.3			
HM03148	<i>Ovis aries</i>	Metatarsal		MBA		22.6	21.8													
KT01189	<i>Ovis aries</i>	Metatarsal		MBA								10.5	9.2	15.2	8.9	9.6	14.6			
KT00412	<i>Ovis aries</i>	Metatarsal		MBA		21.4	21													
KT00046	<i>Ovis aries</i>	Metatarsal		MBA	130.5						11.1	9.6					9.9	9.6	15	
TH01072	<i>Ovis aries</i>	Metatarsal		MBA					27.1				13	12.6	18.6	11.8	11.9	17.5		
TH01221	<i>Ovis aries</i>	Metatarsal		MBA					29.9				12.9	13.4	19	14.3	13.7	19.5		
TH01303	<i>Ovis aries</i>	Metatarsal		MBA		20.8	20.1						14	13.3	19.6	12.6	12.3	18.1		
MST00046	<i>Ovis aries</i>	Metatarsal		MBA																
TH01186	<i>Ovis orientalis</i>	Metatarsal		MBA		26.3	26.3													
HM00542	<i>Ovis spp.</i>	Metatarsal	Wild ?	MBA		24.7	24													
HM00733	<i>Capra hircus</i>	Metatarsal		Late MBA		21.4	19.4				14.2	10.8								
HM00256	<i>Ovis aries</i>	Metatarsal		Late MBA	118.5	20.2	18.4	24.3	14.3	13.2	11.3	11	10.5	16.2	11	9.8	15.8			
HM00729	<i>Ovis aries</i>	Metatarsal		Late MBA							19.4									
HM01521	<i>Ovis aries</i>	Metatarsal		Late MBA		20.5						13.6	12	19.5	15	14.8	19.7			
HM01550	<i>Ovis aries</i>	Metatarsal		Late MBA								16.4	16.9	22.1	15.9	16	21.5			
HM02519	<i>Ovis aries</i>	Metatarsal		Late MBA		21.1	21.3													
GT01920	<i>Capra hircus</i>	Metatarsal		LBA		20.8	19.6													
GT02009	<i>Capra hircus</i>	Metatarsal		LBA														12.8	10.4	17.5
GT01918	<i>Ovis aries</i>	Metatarsal		LBA					25.6				11.2	10.3	16.4	10.3	9.7			
GT01970	<i>Ovis aries</i>	Metatarsal		LBA		22.3	22.7													
GT00381	<i>Ovis aries</i>	Metatarsal		LBA				22.3	14.6	10.6	9	9.9	10.9	15.2	9.2	10	14.6			
KH00992	<i>Ovis aries</i>	Metatarsal		LBA																

MST00403	Caprinae	Prox phalanx		MBA	38.1	13	15.5	11.5	9.8	9.9	10.4
BH00184	<i>Ovis aries</i>	Prox phalanx		MBA	45.6	16	19.3	14.8	13.7	13.2	13.2
HM01478	<i>Ovis aries</i>	Prox phalanx		MBA	37.6	12.9	15.5	11.9	11.9	10.7	9.8
BH00161	<i>Ovis aries</i>	Prox phalanx		MBA	41.8	15.7	16.2	14.1	12.8	11.4	10.6
HM00443	<i>Ovis orientalis</i>	Prox phalanx		MBA	51	15.6	18.8	16.3	14.6	12.9	13.5
HM00525	<i>Ovis</i> spp.	Prox phalanx	Wild ?	MBA		16.8	20.3	14.9	13.7	11.4	14.6
HM01481	<i>Capra hircus</i>	Prox phalanx		JA		12.3	12.9			8.9	9.2
HM01480	<i>Capra hircus</i>	Prox phalanx		JA	39.1	12.1	14.7	12.3	12.1	10	10.1
HM01482	<i>Capra hircus</i>	Prox phalanx		JA	38.4	11.9	14.2	12.2	10.9	10.2	10.2
HM02425	Caprinae	Prox phalanx		JA	38.3	15.1	16.9	14.8	11.7	13.4	11.4
HM01483	Caprinae	Prox phalanx		JA	37.9	13.6	16.3	12.5	11.8	11.5	11.8
KH01142	Caprinae	Prox phalanx		JA	39.9			12.4	11.2	9.8	9.8
HM02827	<i>Ovis aries</i>	Prox phalanx		JA	43.6	15.3	17.8	12.9	13.3	13.1	11.3
BH00122	<i>Ovis aries</i>	Prox phalanx		JA	38.7	13.6	15.8	11.8			10.6
HM00706	<i>Ovis aries</i>	Prox phalanx		Late MBA	37	13.1	15.9	12.4	11.2	10.3	10.2
HM01479	<i>Ovis aries</i>	Prox phalanx		Late MBA	48.6	13.7	18.3	13.9	12.1	12	12.5
TH00187	<i>Capra hircus</i>	Prox phalanx		LBA	41.9	13.3	17	12.4	10.8	10.7	10
TH00485	<i>Capra hircus</i>	Prox phalanx		LBA	39.3	11.9	14.9	12.3	10.1	9.5	9.5
TH01573	<i>Capra hircus</i>	Prox phalanx		LBA	39	12.7	15.8	11.2	10.3	10	9.4
MST01161	<i>Capra hircus</i>	Prox phalanx		LBA	34.1	11.7	13.3	10.8	10	9.6	
KH00238	<i>Capra</i> spp.	Prox phalanx	Wild ?	LBA	44.5	14.3	17.2	14.8	13	11.8	
MST00912	<i>Ovis aries</i>	Prox phalanx		LBA	36	12.9	15	12	11.3	10.3	10

Sample n°	Species	Bone	Remarks	Chronology	GL	Bp	Dp	Bd	Dd	SD	DD
KT00437	<i>Capra hircus</i>	Medial phalanx		MBA	23.5	11.9	12.9	9.5		8.5	8.2
KT01191	<i>Ovis aries</i>	Medial phalanx		MBA	23.2	12.5	12.5	9.9	11.6	9.5	
KT00711	<i>Ovis aries</i>	Medial phalanx		MBA	23.8	11.6	12.3	9.4	11.1	8.1	8.4
MST00352	<i>Ovis aries</i>	Medial phalanx		MBA	24.5	12.7	14.4	10.5	11.8	9.4	9.5
TH00486	<i>Capra hircus</i>	Medial phalanx		LBA				9.2	9.8	8.4	
KH00236	<i>Capra hircus</i>	Medial phalanx		LBA	24.4	13	12.6				
MST00685	<i>Capra hircus</i>	Medial phalanx		LBA	25.5		13.2	10.6	11.3	10	
KH00237	<i>Capra</i> spp.	Medial phalanx	Wild ?	LBA	30	14.3	13.9	13.3	14	10.7	
GT02080	Caprinae	Medial phalanx		LBA	23.6	11.9	13.5	8.8	11.2	8	8.6
HM01470	<i>Capra hircus</i>	Medial phalanx		JA	25.3	11.9	11.9	10	11.1	8.6	8.6
HM01471	<i>Ovis aries</i>	Medial phalanx		JA	26.2	12.6	12.5	9.9	10.8	8.9	8.3
HM01469	<i>Ovis aries</i>	Medial phalanx		JA	27.6	12.7	13.3	10.1	11.6	9.7	8.8

Sample n°	Species	Bone	Remarks	Chronology	H	DLS	Ld	MBS
KT00735	<i>Ovis aries</i>	Distal phalanx		MBA		25.1	19.6	4.7
MST00913	<i>Capra hircus</i>	Distal phalanx		LBA		30.2		6
HM01451	<i>Ovis aries</i>	Distal phalanx		JA	16.3	32.8	24.4	7

Appendix 2

Details of the Correspondence Analyses

Fig. III. 14

Correspondence Analysis for pig kill-off pattern

Analysis completed after 64 iterations

Total Inertia of data	Axes		
	1	2	3
Eigen values	0.13	0.10	0.02
Cumulative explanation %	47.85	35.32	8.32

Variables	Coordinates			Absolute contribution		
	1	2	3	1	2	3
A	0.95	-3.95	-0.21	8.09	91.18	0.72
B	0.98	0.49	0.42	46.48	7.47	16.44
C	-0.77	-0.11	-0.14	13.35	0.18	0.83
D	-1.48	0.19	0.36	31.33	0.33	3.42
E	0.72	0.92	-5.36	0.75	0.79	78.49
F	0.36	-1.75	-1.39	0.00	0.05	0.10

Objects	Coordinates			Absolute contribution		
	1	2	3	1	2	3
GT_LBA_global	0.53	-1.64	0.28	1.46	25.13	0.83
GT_MAss	0.51	-0.71	0.23	0.36	1.27	0.16
HM_MBA_global	0.48	0.65	0.12	0.29	0.97	0.04
HM_Piazza	0.30	1.03	-2.58	0.49	10.33	74.56
HM_no_Piazza	0.67	0.55	-0.22	0.76	0.93	0.18
HM_PAC	0.52	-1.94	-0.48	1.86	45.51	3.22
HM_IA	-2.08	0.35	0.44	44.03	2.22	4.16
KH_LBA	0.85	0.46	0.70	1.90	1.01	2.75
KH_NAss	-2.10	-0.61	-0.45	48.73	7.41	4.71
KT_MBA_global	0.22	0.93	0.96	0.10	3.30	4.16
KT_MBA_D	0.09	0.81	1.24	0.01	1.92	5.23

Fig. III. 36

Correspondence Analysis for pig element and meat value groups

Analysis completed after 98 iterations

Total Inertia of data	Axes		
	1	2	3
Eigen values	0.11	0.07	0.06
Cumulative explanation %	26.54	15.67	13.57

Variables	Coordinates			Absolute contribution		
	1	2	3	1	2	3
Atl	3.96	-0.65	-0.47	92.29	4.97	3.10
Ax	0.65	5.00	-3.52	0.40	47.71	27.68
Sc	-0.16	-0.17	0.35	0.07	0.15	0.74
Hm	-0.17	-0.19	0.22	0.04	0.10	0.15
Pl	-0.74	0.88	-1.53	1.09	3.05	10.92
Fm	-1.40	0.10	-1.07	2.64	0.03	3.72
Sk	0.04	0.41	0.01	0.00	0.32	0.00
Md	-0.18	0.88	1.21	0.27	12.49	27.77
Rd	0.72	-0.28	0.56	0.43	0.13	0.63
Ul	-0.41	-0.72	-0.34	0.24	1.53	0.40
Tb	-0.57	-1.72	-0.92	1.33	24.20	8.02
Talus	-1.07	-1.67	-0.21	0.87	4.28	0.08
Calc	-0.11	-0.72	-2.20	0.01	0.70	7.73
Mc	0.87	0.02	-0.26	0.25	0.00	0.05
Mt	-0.44	-0.37	3.22	0.07	0.10	8.91
Ph1	-0.11	-0.03	-0.27	0.00	0.00	0.01
Ph2	-0.26	-2.22	-0.91	0.00	0.18	0.04
Ph3	0.85	-1.87	2.04	0.00	0.04	0.06

Objects	Coordinates			Absolute contribution		
	1	2	3	1	2	3
BH_MBA	4.08	-0.61	-0.05	87.06	4.88	0.04
GT_MBA_global	-0.74	1.04	1.91	0.61	3.05	12.63
GT_LBA_global	0.31	-0.80	0.44	0.08	1.34	0.51
GT_MAss	0.82	-1.35	-0.04	1.66	11.31	0.01
HM_MBA_global	-0.01	-0.71	0.73	0.00	1.97	2.52
HM_Piazza	-0.73	0.19	1.42	0.39	0.07	4.61
HM_no Piazza	-0.06	-0.67	0.60	0.00	1.09	1.09
HM_PAC	-0.20	2.00	2.02	0.03	6.20	7.77
HM_IA	0.79	1.11	-0.41	0.97	4.98	0.83
KH_LBA	0.05	0.38	1.46	0.00	0.37	6.77
KH_NAss	-0.53	1.05	1.31	0.33	3.23	6.19
KT_MBA_global	-0.67	-0.35	-1.35	1.02	0.70	12.78
KT_MBA_C	-0.44	-0.66	-0.47	0.32	1.88	1.19
KT_MBA_D	-0.77	0.37	-0.88	1.23	0.70	5.03
MST_MBA	-0.79	-1.58	-0.82	1.80	18.38	6.14
MST_LBA_global	0.18	1.38	-1.24	0.09	13.43	13.29
MST_MAss	0.83	2.06	-0.94	1.64	25.97	6.70
TH_MBA	-1.05	0.08	-0.76	2.56	0.04	4.15
TH_LBA	-0.38	-0.33	1.29	0.21	0.41	7.76

Fig. III. 37

Correspondence Analysis for pig meat value groups

Analysis completed after 13 iterations

Total Inertia of data	Axes		
	1	2	3
Eigen values	0.02	0.01	0.00
Cumulative explanation %	69.84	30.16	0.00

Variables	Coordinates			Absolute contribution		
	1	2	3	1	2	3
A	1.34	0.27	0.17	72.76	3.94	1.65
B	-0.81	0.29	0.23	27.23	4.78	3.08
C	-0.04	-3.54	3.60	0.01	91.28	95.27

Objects	Coordinates			Absolute contribution		
	1	2	3	1	2	3
BH_MBA	1.14	-0.17	-0.36	1.60	0.06	0.21
GT_MBA_global	-1.26	0.04	0.53	1.39	0.00	0.33
GT_LBA_global	0.02	-0.18	0.15	0.00	0.00	0.00
GT_MAss	-0.08	-0.75	0.70	0.00	0.65	0.47
HM_MBA_global	0.05	0.25	-0.25	0.00	0.01	0.01
HM_Piazza	-1.05	1.23	-0.63	2.38	5.46	1.15
HM_no_Piazza	0.00	0.17	-0.15	0.00	0.00	0.00
HM_PAC	-1.88	2.08	-1.01	7.03	14.25	2.72
HM_IA	1.18	1.23	-1.63	6.10	10.98	15.58
KH_LBA	-0.63	0.75	-0.39	0.30	0.71	0.15
KH_NAss	-1.89	-0.51	1.31	10.30	1.26	6.63
KT_MBA_global	1.28	-0.55	-0.09	10.09	3.06	0.06
KT_MBA_C	0.85	-1.63	1.07	2.95	17.85	6.23
KT_MBA_D	0.47	0.69	-0.83	0.35	1.25	1.45
MST_MBA	-2.21	-0.58	1.52	53.47	6.18	33.73
MST_LBA_global	0.98	-0.10	-0.35	2.45	0.05	0.42
MST_MAss	0.52	2.09	-2.10	0.93	25.37	20.67
TH_MBA	-0.57	-1.35	1.47	0.66	6.09	5.78
TH_LBA	-0.02	-1.83	1.64	0.00	6.78	4.41

Fig. III. 82

Correspondence Analysis for cattle meat value groups

Analysis completed after 12 iterations

Total Inertia of data	Axes		
	1	2	3
Eigen values	0.04	0.02	0.00
Cumulative explanation %	70.08	29.92	0.00

Variables	Coordinates			Absolute contribution		
	1	2	3	1	2	3
A	1.50	0.17	-1.66	79.91	1.61	91.16
B	-0.77	0.94	0.22	15.85	38.13	1.25
C	-0.50	-1.48	0.69	4.24	60.26	7.59

Objects	Coordinates			Absolute contribution		
	1	2	3	1	2	3
BH_MBA	-0.69	0.07	-0.68	0.93	0.01	0.92
GT_MBA	-1.78	-1.64	-1.88	13.88	12.51	15.43
GT_MAss	0.39	0.17	0.40	0.06	0.01	0.06
GT_LBA_global	0.38	0.19	0.40	0.07	0.02	0.07
HM_MBA_global	1.26	-0.18	1.24	4.61	0.10	4.51
HM_no_Piazza	0.72	0.30	0.74	1.02	0.19	1.07
HM_Piazza	1.38	0.00	1.37	12.33	0.00	12.27
HM_PAC	1.27	1.06	1.34	13.79	10.14	15.17
HM_IA	-0.76	-0.29	-0.78	0.91	0.14	0.95
KH_LBA	0.57	-2.10	0.44	0.63	9.15	0.37
KH_NAss	-1.80	-1.87	-1.91	16.24	18.74	18.30
KT_MBA_C	-0.07	-1.20	-0.14	0.01	2.04	0.03
KT_MBA_D	-0.09	1.10	-0.02	0.01	1.35	0.00
KT_MBA_global	-0.81	0.35	-0.79	1.18	0.23	1.11
MST_MBA	-0.19	0.30	-0.17	0.00	0.01	0.00
MST_MAss	-2.07	2.06	-1.94	26.70	28.39	23.39
MST_LBA_glob	-1.15	1.88	-1.03	5.24	14.91	4.21
TH_LBA	0.03	-0.77	-0.02	0.00	0.23	0.00
TH_MBA	0.93	-0.78	0.88	2.39	1.81	2.13

Fig. III. 132

Correspondence Analysis for sheep and goat dental age

Analysis completed after 34 iterations

Total Inertia of data	Axes		
	1	2	3
Eigen values	0.15	0.12	0.09
Cumulative explanation %	29.70	23.77	17.76

Variables	Coordinates			Absolute contribution		
	1	2	3	1	2	3
A	4.84	-0.75	4.07	39.29	0.99	27.81
B	-2.25	3.90	3.93	4.41	13.90	13.52
C	-1.50	-1.11	2.19	18.26	10.60	39.12
D	1.14	-0.59	0.41	15.22	4.32	1.97
EF	0.45	0.17	-0.74	4.48	0.65	11.83
G	-0.43	1.12	0.08	4.40	30.66	0.15
HI	-0.96	-1.57	-0.61	13.94	38.88	5.59

Objects	Coordinates			Absolute contribution		
	1	2	3	1	2	3
O_BH_MBA	-0.43	1.91	0.58	0.10	5.03	0.31
C_BH_MBA	-0.53	0.75	1.19	0.49	2.56	4.38
C_GT_MBA_C	2.68	-0.29	1.59	82.37	2.47	51.33
O_GT_LBA_global	-0.21	-1.44	0.17	0.03	3.78	0.03
C_GT_LBA_global	-0.48	0.75	-0.67	0.32	2.02	1.11
C_HM_Piazza	-1.09	-0.26	1.88	1.60	0.24	8.35
O_HM_no_Piazza	0.26	-0.20	0.47	0.15	0.24	0.86
C_HM_no_Piazza	-0.96	-0.42	-0.12	0.98	0.49	0.03
O_HM_PAC	-0.13	-0.79	-0.84	0.02	2.19	1.66
C_HM_PAC	0.45	-0.33	-1.45	0.37	0.54	6.96
O_HM_IA	-0.92	0.60	0.01	0.54	0.60	0.00
C_HM_IA	-0.37	-0.69	-0.63	0.08	0.72	0.41
C_KT_MBA_C	-0.90	1.04	0.58	0.41	1.44	0.30
O_KT_MBA_D	-0.09	-1.70	-0.41	0.01	11.18	0.44
C_KT_MBA_D	0.29	1.54	-0.87	0.14	10.29	2.26
O_MST_LBA_global	-1.19	1.47	1.37	5.02	19.91	11.85
O_TH_MBA	0.95	0.73	-1.01	1.22	1.87	2.43
C_TH_MBA	0.41	1.40	-1.55	0.14	4.41	3.67
O_TH_LBA	-1.73	-2.42	0.94	5.81	29.79	3.03
C_TH_LBA	0.55	-0.35	-0.72	0.19	0.21	0.60

Fig. III. 133

Correspondence Analysis for caprines dental age

Analysis completed after 23 iterations

Total Inertia of data	Axes		
	1	2	3
Eigen values	0.08	0.05	0.03
Cumulative explanation %	35.83	24.21	15.28

Variables	Coordinates			Absolute contribution		
	1	2	3	1	2	3
A	4.33	1.45	-6.17	23.29	2.52	49.18
B	-5.18	9.28	-0.27	18.06	55.64	0.05
C	1.55	1.33	1.07	16.22	11.36	7.99
D	-1.06	-0.47	1.03	11.33	2.13	11.27
EF	-0.65	-0.58	-0.93	10.56	7.97	22.35
G	0.02	0.76	0.06	0.01	10.05	0.06
HI	1.05	-0.76	0.69	20.53	10.34	9.10

Objects	Coordinates			Absolute contribution		
	1	2	3	1	2	3
OC_BH_MBA	-1.00	2.11	0.01	5.49	24.95	0.00
OC_GT_LBA_global	-0.25	-0.39	0.32	0.03	0.07	0.05
OC_GT_MAss	-0.81	-0.23	0.59	0.94	0.08	0.55
OC_HM_MBA_global	1.22	0.37	-0.62	18.37	1.71	5.11
OC_HM_Piazza	1.18	0.55	2.52	3.20	0.69	15.70
OC_HM_no_Piazza	1.23	0.31	-1.66	16.31	1.05	32.32
OC_HM_PAC	-0.10	-1.53	0.18	0.08	19.80	0.29
OC_HM_IA	0.86	-0.45	0.55	2.96	0.82	1.34
OC_KH_LBA	-1.37	-1.54	0.52	4.04	5.27	0.65
OC_KT_MBA_global	-0.26	0.00	0.59	0.19	0.00	1.09
OC_KT_MBA_C	0.75	1.33	1.33	0.99	3.19	3.42
OC_KT_MBA_D	-0.67	-0.54	0.28	0.98	0.65	0.19
OC_MST_LBA_global	-1.85	2.20	-0.10	24.98	35.90	0.08
OC_TH_MBA	-1.84	-0.90	-2.36	21.43	5.26	38.45
OC_TH_LBA	0.14	-0.66	0.73	0.02	0.57	0.75

Fig. III. 155

Correspondence Analysis for caprines skeletal representation

Analysis completed after 25 iterations

Total Inertia of data	Axes		
	1	2	3
Eigen values	0.02	0.01	0.00
Cumulative explanation %	59.23	40.77	0.00

Variables	Coordinates			Absolute contribution		
	1	2	3	1	2	3
A	1.46	0.79	1.01	66.94	19.28	37.03
B	-0.85	0.31	-1.15	29.82	3.98	62.27
C	0.42	-2.06	-0.18	3.24	76.74	0.70

Objects	Coordinates			Absolute contribution		
	1	2	3	1	2	3
BH MBA	1.26	-0.05	-0.74	3.72	0.01	1.52
GT MAss	-1.83	0.55	1.46	12.76	1.52	9.78
GT LBA	-0.36	0.66	0.75	0.09	0.38	0.44
HM MBA glob	0.29	-1.14	-1.12	0.22	4.53	3.90
HM non Piazz	0.39	-0.73	-0.83	0.10	0.47	0.53
HM Piazza	-0.79	-0.64	-0.10	1.32	1.14	0.02
HM PAC	0.81	1.73	1.00	2.96	18.01	5.45
HM IA	1.49	1.72	0.62	14.02	24.88	2.92
KH LBA	-0.03	-0.21	-0.16	0.00	0.00	0.00
KH NAss	2.02	-0.55	-1.57	42.72	4.28	31.05
KT C	-0.25	-1.36	-0.99	0.15	5.59	2.71
KT D	-1.19	0.43	1.02	3.51	0.61	3.06
KT glob	-0.06	-0.63	-0.49	0.00	0.27	0.15
MST MBA	-0.69	-1.64	-0.99	2.40	17.75	5.82
MST MASS	-1.68	0.82	1.61	11.89	3.75	13.04
MST LBA glob	0.27	-0.02	-0.16	0.01	0.00	0.01
TH LBA	-1.01	1.78	2.04	3.97	16.50	19.56
TH MBA	0.45	0.53	0.19	0.17	0.32	0.04

Fig. IV. 5

Correspondence Analysis for faunal spectrum in the Middle Bronze Age

Analysis completed after 21 iterations

Total Inertia of data	Axes		
	1	2	3
Eigen values	0.07	0.03	0.01
Cumulative explanation %	60.75	22.61	9.29

Variables	Coordinates			Absolute contribution		
	1	2	3	1	2	3
Canis_fam	1.19	-0.98	-0.68	0.38	0.56	0.45
Equus	0.24	1.34	7.23	0.02	1.46	70.63
Sus_dom	0.27	-1.45	0.42	0.75	45.81	6.30
Bos_taurus	-0.60	1.10	0.22	2.68	19.58	1.36
Cap_Dom	-0.57	0.09	-0.53	3.70	0.20	11.70
Sus_scrofa	-0.04	2.24	0.30	0.00	0.20	0.01
Elaphus	2.98	1.18	-0.50	92.47	32.19	9.56

Objects	Coordinates			Absolute contribution		
	1	2	3	1	2	3
BH_MBA	-1.67	2.51	-0.89	16.98	41.34	6.71
GT_MBA_global	-1.25	-0.55	-1.92	2.09	0.44	6.77
GT_MBA_C	-1.01	-0.66	-1.08	0.23	0.11	0.36
HM_MBA_global	0.98	-0.02	-0.26	22.51	0.01	2.22
HM_Piazza	1.71	0.56	-0.95	29.61	3.36	12.44
HM_no_Piazza	0.57	-0.34	0.12	1.31	0.48	0.08
HM_PAC	0.07	1.11	2.16	0.05	11.76	57.90
KT_MBA_global	-0.84	-1.16	0.21	7.96	16.47	0.68
KT_MBA_C	-0.74	-1.23	0.74	0.67	2.01	0.93
KT_MBA_D	-0.88	-1.13	-0.04	4.24	7.42	0.01
MST_MBA	0.32	0.06	-1.58	0.05	0.00	1.51
TH_MBA	-1.62	1.70	-1.15	14.09	16.60	9.71
ZT_MBA	-0.98	0.14	1.47	0.22	0.00	0.69

Fig. IV. 9

Correspondence Analysis for faunal spectrum for all periods

Analysis completed after 23 iterations

Total Inertia of data	Axes		
	1	2	3
Eigen values	0.06	0.04	0.02
Cumulative explanation %	45.11	26.55	15.92

Variables	Coordinates			Absolute contribution		
	1	2	3	1	2	3
Canis_fam	0.75	0.87	0.70	0.20	0.34	0.41
Equus	-1.54	5.65	-0.56	5.37	92.50	1.65
Sus_dom	0.29	0.10	1.43	0.83	0.14	48.42
Bos_taurus	-0.40	-0.09	-1.17	1.13	0.07	22.74
Cap_Dom	-0.56	-0.53	-0.09	4.50	5.32	0.30
Sus_scrofa	0.37	-1.39	-2.92	0.00	0.06	0.51
Elaphus	3.08	0.36	-1.09	87.97	1.57	25.97

Objects	Coordinates			Absolute contribution		
	1	2	3	1	2	3
BH_MBA	-1.55	-1.31	-2.99	9.79	6.74	41.59
GT_MBA_global	-1.32	-1.44	0.53	1.61	1.87	0.30
GT_MBA_C	-1.11	-1.01	0.67	0.19	0.15	0.08
GT_LBA_global	0.50	-0.04	0.24	0.54	0.00	0.15
GT_MAss	0.91	0.12	-0.24	2.48	0.04	0.20
HM_MBA_global	1.16	-0.09	-0.04	23.74	0.14	0.04
HM_Piazza	2.05	-0.15	-0.68	30.04	0.15	3.73
HM_no_Piazza	0.66	-0.06	0.31	1.33	0.01	0.34
HM_PAC	-0.02	0.58	-1.14	0.00	0.87	4.03
HM_IA	-0.70	2.33	-0.89	4.08	43.69	7.61
KH_LBA	-1.16	2.20	0.84	7.33	25.27	4.32
KH_NAss	-1.21	1.86	0.30	2.68	6.12	0.19
KT_MBA_global	-0.81	-0.69	1.16	4.72	3.29	10.92
KT_MBA_C	-0.75	-0.45	1.30	0.39	0.13	1.36
KT_MBA_D	-0.85	-0.81	1.09	2.54	2.24	4.82
MST_MBA	0.52	-0.76	-0.20	0.11	0.22	0.02
MST_LBA_global	0.03	-0.29	1.02	0.00	0.07	1.00
MST_MAss	0.42	-0.04	0.92	0.02	0.00	0.10
TH_MBA	-1.44	-1.49	-2.17	7.33	7.58	19.16
TH_LBA	-1.26	-1.48	-0.26	1.07	1.41	0.05