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# Animal exploitation from the Bronze Age to the Early Islamic period in Haftavan Tepe (Western Azerbaijan-Iran).

Azadeh Fatemeh Mohaseb, Marjan Mashkour

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*ASWA 9 delegates at Al Ain Zoo. November 2008*

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*edited by*

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*Front cover: Baynunah Camel site – Abu Dhabi Tourism & Culture Authority (TCA Abu Dhabi) – United Arab Emirates*

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# 11. Animal exploitation from the Bronze Age to the Early Islamic period in Haftavan Tepe (Western Azerbaijan-Iran)

*Fatemeh Azadeh Mohaseb and Marjan Mashkour*

*A rich documentation on the subsistence economy is provided for the long sequence of occupation of Haftavan Tepe in Western Azerbaijan between the Bronze Age to the Islamic period with a set of novel radiocarbon dates for this site. In all periods, Bovines constitute the bulk of the assemblage even if Ovicaprines play an important role for this agropastoral economy where hunting remains a marginal activity. On a regional scale, the pattern observed in Haftavan Tepe seems to express the same global tendency for northern Iran compared to adjacent sites in Turkey where the exploitation of Suids is more characteristic.*

**Keywords** Archaeozoology, Haftavan Tepe, Bronze Age, Radiocarbon dating, Kill-off patterns.

## **Introduction**

Haftavan Tepe is one of the largest sites of Azerbaijan in Iran, excavated during the '70s where the archaeozoological data for the Bronze Age are well represented. Haftavan Tepe has yielded one of the largest faunal assemblages in western Azerbaijan and thus constitutes a reliable source of information for the understanding of the subsistence economy of this part of the Iranian Plateau during more than two millennia.

The aim of this paper is to present the results of the faunal assemblage of Haftavan Tepe recovered during ten years (1968–1978), stored in the basement of the British Council at British Institute of Persian Studies in Tehran and literally rediscovered in the late '90s. Also a small part of the assemblage was housed at the University of Manchester that was transferred to the Natural History Museum of Paris. After 30 years, this large faunal assemblage of Haftavan Tepe could be entirely studied within a PhD programme (Mohaseb 2012).

Haftavan Tepe is located in the middle of the small plain of Salmas, in the northwestern part of Lake Urmia in the province of Western Azerbaijan in Iran. The area of the mound extends over 550m from east to west and up to 400m from north to south, with a maximum height of about 25m above the virgin soil. Haftavan Tepe is one of

the largest prehistoric sites around the lake (Burney 1972). The excavation of the mound of Haftavan took place between 1968 and 1978 under the direction of Charles A. Burney, sponsored by the University of Manchester and the support of the British Academy and the Calouste Gulbenkian Foundation (Burney 1973).

## **Chronology framework**

The large area covered by Haftavan settlement indicates the local importance of the site as the center of a small but well watered and extremely fertile plain (Burney 1970). The archaeological evidences in Haftavan Tepe show clear cultural contacts and influences with both the south, Hasanlu (Danti 2013) and its surroundings, a multi-period site occupied from the Neolithic to the Islamic period and the north, Trans-Caucasian region (Burney 1970; Edwards 1981, 1986; Danti 2013; Summers 1982; 2013) (Fig. 11.1A).

The excavation at Haftavan Tepe was carried out during four seasons. Eight levels of occupation were exposed and yielded architectural remains dated from the Early Trans-Caucasian period through to the Sasanian times. In his third report, Burney stated that several large flattish stones on top of the mound belong perhaps to the very

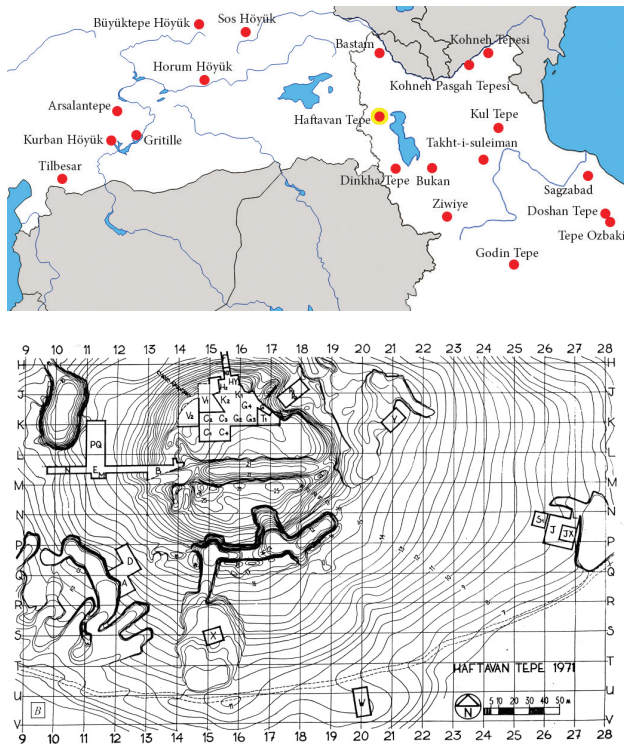


Fig. 11.1. A: Geographical location of Haftavan Tepe in the Urmia basin and the localisation of comparative sites in Northwest of Iran and southeast of Turkey. B: Trenches investigated during ten years of excavation in the mound of Haftavan Tepe (Burney 1973, 154).

early Islamic period (Burney 1973). The results of our dating also demonstrate the presence of remains in the Early Islamic period. The archaeological remains show cultural continuity during the occupation with no major interruptions (Burney 1973). Several trenches (about 33) were investigated during ten years of excavation (Fig. 11.1B).

The only documents available for the chronology of the site were the reports of Burney during the excavation (Burney 1973), which is characterised by eight main cultural periods (Table 11.1). Before the present work, two radiocarbon dates for Haftavan Tepe were known, processed by Dr Mahdavi in Tehran. One of them belongs to the Achaemenid period with a mean radiocarbon date of 492 BC (Burney 1975) and the other one belongs to the Middle Bronze Age context with a mean radiocarbon date of 1772 BC (Edwards 1983).

At the beginning of the study, many problems appeared in relation mainly with contextualising the faunal remains. Because of poor storage conditions of the archaeological material during the last 30 years, many bone bags contained either no archaeological information or with information not reported in the publications. This is surprisingly the case for some of the levels in otherwise known trenches (trench JX level 8, trench X3 level 1, trench TT6D level 1B, trench C2 levels 9, 10, 12, 14, 16, 18, 19, 22, 24, 25,

Table 11.1. The chronology of Haftavan Tepe after Burney (1973)

Haftavan Tepe	Cultural periods	Date
Haftavan I	Sasanian and later	AD 224–651
Haftavan II	Median, Achaemenid and Parthian	728 BC–AD 224
Haftavan III	Urartian	800–600 BC
Haftavan IV	Iron II	1000–800 BC
Haftavan V	Iron I	1200–1000 BC
Haftavan VI	Middle and Late Bronze Age	1800–1200 BC
Haftavan VII	Early Trans-Caucasian III	2300–1800 BC
Haftavan VIII	Trans-Caucasian	3rd quarter 3rd millennium BC

29, 32, 34 and trench C4 level 6) or for the whole trench (C7, ZXR1, TX1, TX2).

Because of all these discrepancies and the important quantity of data that was about to be lost, we decided to develop a direct AMS radiocarbon dating program of mammalian bones on some of these undocumented assemblages. Among the ten trenches quoted above, six trenches with quantitatively important data were selected for radiocarbon dating processed by the Radiocarbon Chrono Centre of the Queen's University at Belfast (Table 11.2A).

According to these results, the sample JX/8/n4 falls into the Early Bronze Age. The samples from X3/1 and BB1/1/8 belong to the Middle and Late Bronze Age. The sample TT6D/1B belongs to the Iron Age, the sample TX2/1/1 to the Sasanian period and the sample TX1/n505 refers clearly to the Early Islamic period. Although the date is clearly Islamic, even if one considers the inferior margin (i.e. AD 661), it is important to remind that Azerbaijan was invaded only 20 years before (Minorsky 1991) and it is most probable that the beliefs and ways of life have not yet changed drastically (Table 11.2B).

In the middle of the 3rd millennium BC (period VIII) Haftavan was a very important urban settlement. During the long and peaceful period of VII, there is a low representation of potteries and archaeological remains and thus we don't have much information about this period (Burney 1972). The period VI is the longest and the most important in the history of Haftavan Tepe. Probably, the settlement of Haftavan VI reached its maximum size because the archaeological remains were discovered from east to west extremities of the mound. There are the remains of a perimeter wall around the city of Haftavan during this period. Haftavan seems to be occupied only partly during the Iron Age I (Burney 1970). During the 10th and 9th centuries BC, the Urartian period, the city regained its urban importance, which continued to the end of this period. At the end of Achaemenid Empire, the settlement was temporarily abandoned. The long occupation of the city of Haftavan came to an end about the end of the Sasanian, or perhaps at the beginning of the Islamic period (Burney 1970; 1973).

Table 11.2. A: New radiocarbon dates from Haftavan Tepe processed by the radiocarbon Chrono Centre of the Queen's University at Belfast; B: new chronological attributions used for the faunal analysis.

A

Sample ID	TX1/n505	TX2/1/1	TT6D/1B	BB1/1/8	X3/1	JX/8/n4
Trench	TX1	TX2	TT6D	BB1	X3	JX
Species	Caprini	Suid	Caprini	Small ruminant	Suid	Caprini
Bone sample	Radius	Radius	Radius	Radius	Mandible	Metacarpus
UBA No	UBA-9987	UBA-9988	UBA-9986	UBA-9985	UBA-9989	UBA-9990
Radiocarbon determination (BP)	1302±22	1490±23	2791±38	3210±35	3296±25	3562±26
Radiocarbon date (2σ)	cal AD 661–725	cal AD 540–631	1027–836 cal BC	1534–1413 cal BC	1630–1504 cal BC	1978–1874 cal BC
Probability (%)	67	100	99.6	98	100	87

B

Haftavan Tepe	Cultural periods	Date
Haftavan EI	Early Islamic period	AD 661–725
Haftavan MAPS	Median, Achaemenid, Parthian & Sasanian	728 BC–651 AD
Haftavan IA	Iron Age I & II	1200–800 BC
Haftavan MLBA	Bronze Age, period VI	1800–1200 BC
Haftavan ETC III	Bronze Age, period VII	2300–1800 BC

The faunal remains of Haftavan Tepe are not distributed evenly for all the cultural periods present at the site. For instance there are no remains from the Urartian (III) and the Transcaucasian (VIII), two important cultural periods for this region. We analyse the faunal remains within five cultural periods according to the amount of remains for each of them. The latest is the Early Islamic period (EI), which produced about 1190 remains. The small size of the remains of Period I led us to pool it together with period II and make the MAPS (Median, Achaemenid, Parthian and Sasanian) periods (N=1440). Similarly we pooled together those of period IV with period V and made the Iron Age (IA), which contained about 230 remains. The most important period in the settlements of Haftavan Tepe and, of course, in the analysis of the faunal remains (N=10,900), is the Middle and Late Bronze Age (MLBA). Finally the earliest period, which contained the faunal remains at this site (N=420), is the Early Bronze Age (EBA). We will see below if any evolution in the subsistence is visible or not.

### Bone preservation

The faunal assemblage of Haftavan Tepe belongs to consumption refuse. Traces of human activity, butchery marks and cooking traces (burning) are visible on many of the bones (Fig. 11.2).

The study of the faunal remains (Barone 1999) showed that the bone preservation in general was satisfactory. This may be due to a selective recovery of the bones; actually we did not track any indication for sieving during the excavation. The percentage of non-identified bones in

means of Number of Fragments (NF) was approximately 17% and in means of weight was 1.5%, indicating that the unidentified bones are mostly composed of very small fragments. As a result, the majority of the bones were well preserved enough to be identified.

For the bones that could not be identified precisely, two artificial groups were introduced, large mammals (LM) and small ruminants (SR). The large mammal category (LM) comprises bones of bovines and equids, which comprise about 20% of the total remains. The small ruminant category (SR) comprises the non-distinguished bones belonging to caprines and gazelle (27%). In order to have a better view of the ratio of each family group in the faunal spectra, we decided to distribute the remains of LM category between bovines and equids and those of SR category between caprines (*Ovis* & *Capra*) and gazelle proportionally. The identified bones in the faunal assemblage of Haftavan Tepe belong mostly to the wild and domestic large and medium size mammals.

### General characteristics of Haftavan Tepe faunal assemblage

Based on NISP, bovines are the most common identified taxa. Bovines are followed in abundance by caprines with sheep outnumbering goats (2:1). Caprines are followed by equids, gazelle, suids, canids and cervids. Birds, amphibians, reptiles and fish are rare or absent in the assemblage. Relative frequencies are also calculated based on the bone weight. This method is used in order to estimate the importance of taxa in contribution of meat



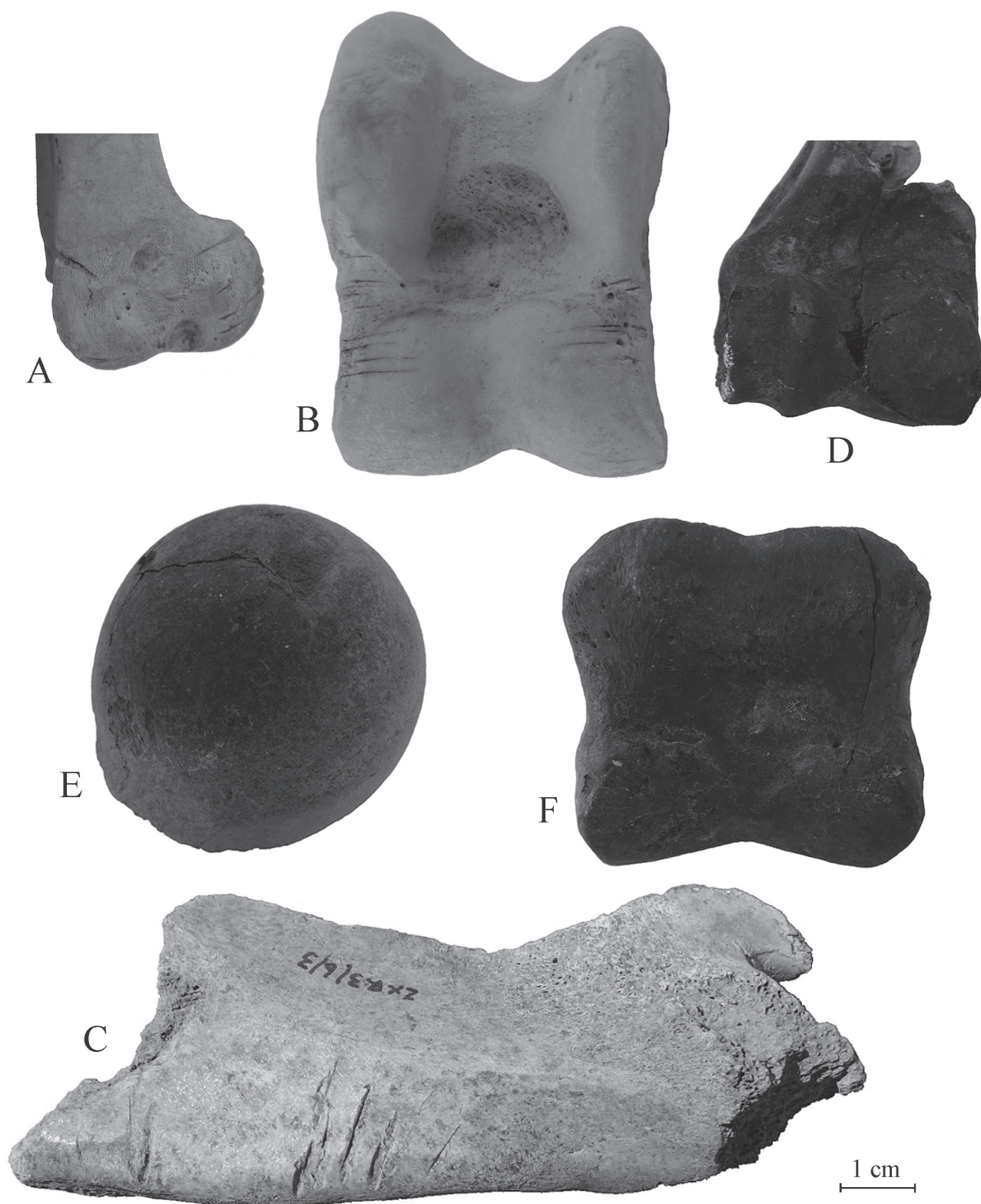


Fig. 11.2. Traces of human activity. Butchery marks A: Left humerus (medial view) of Ovis, B: Left talus (dorsal view) of Bos and C: Left mandible of equid from the Middle/Late Bronze Age levels. Cooking traces or burning D: Right humerus (cranial view) of caprini from the historical levels, E: Femur head (proximal view) of Bos from the Middle/Late Bronze Age levels and F: 2nd phalanx (dorsal view) of equid from the Iron Age levels.

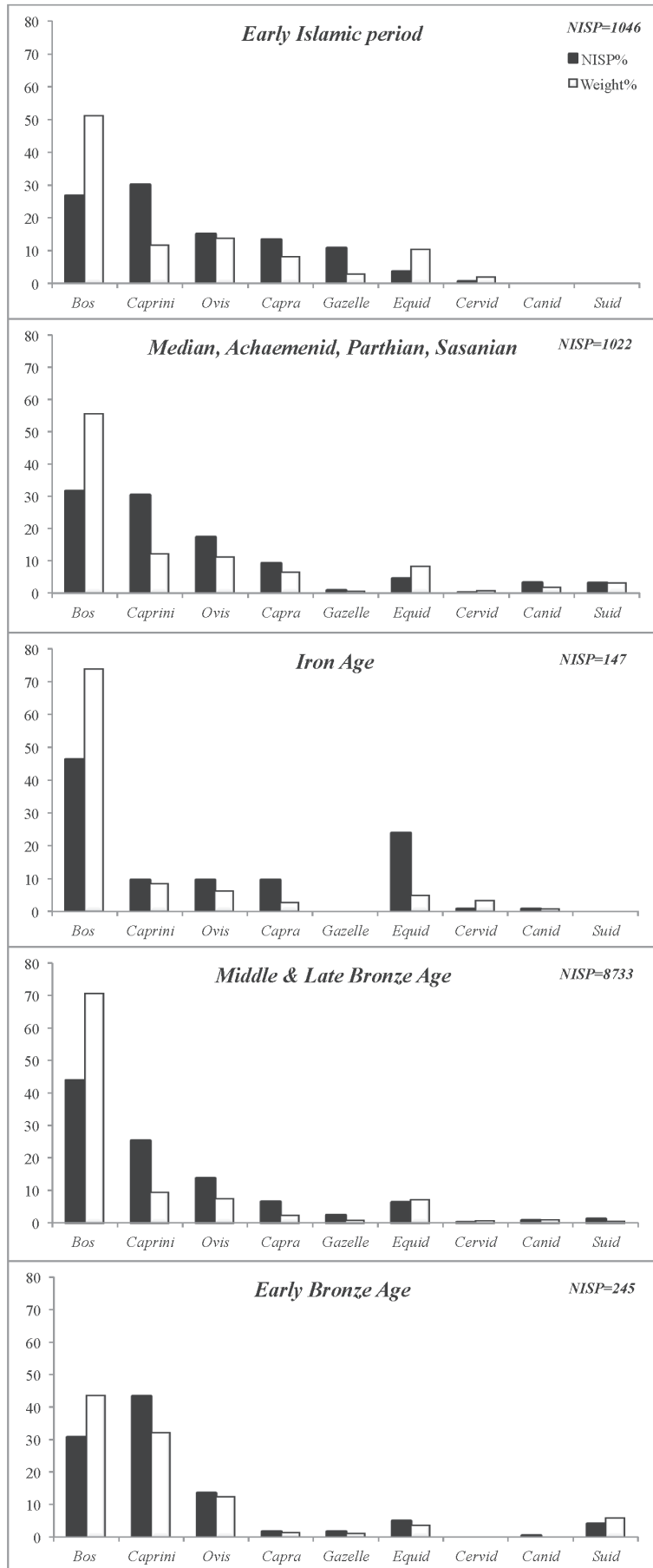


Fig. 11.3. Distribution of the number of identified bones and bone weight in different periods of Haftavan Tepe.

exploitation. The bone weights indicate that cattle make up more than two thirds of the weight of the assemblage, while caprines make up about 21%.

The distribution of different taxa in terms of number of identified specimens (NISP) and bone weight in different periods of Haftavan Tepe is presented in Figure 11.3. Animal bones were identified to the level of species whenever possible which will be discussed in details below.

## Domestic and wild species

### Bovines

At the present time bovinines found in Iran are *Bos taurus*, Eurasian species and *Bos indicus*, Asian/African species. In northern Iran, on the eastern margins of the Caspian Sea, there is also the domestic water buffalo, *Bubalus bubalis* (Uerpmann 1987).

The major group of the mammal bones at Haftavan Tepe refers to bovinines which represents 41% of the specimens identifiable to genus, based on NISP and 68% based on bone weight. The highest representation of bovinines belongs to the IA (46%) and the MLBA (44%). The number of bovinines in the EBA and the MAPS is nearly the same (31% and 32% respectively), and in the EI is the lowest (27%).

The evolution of the NISP of identified species and their weights in five periods of Haftavan Tepe is shown in Figure 11.3. The relation between the NISP and bone weight of ungulates, shows the importance of the species as a meat resource. The bone weight of bovinines in Haftavan Tepe highlights even more the economic importance during all the settlement periods.

### DIACHRONIC SIZE EVOLUTION OF BOVININES IN DIFFERENT PERIODS OF HAFTAVAN TEPE

In order to characterise the size of bovinines at Haftavan Tepe, we analysed the metric data of this species in each archaeological period separately. For this analysis, we used the method of *Log Size Index (LSI)* (Uerpmann & Uerpmann 1994; Meadow 1999) and as the

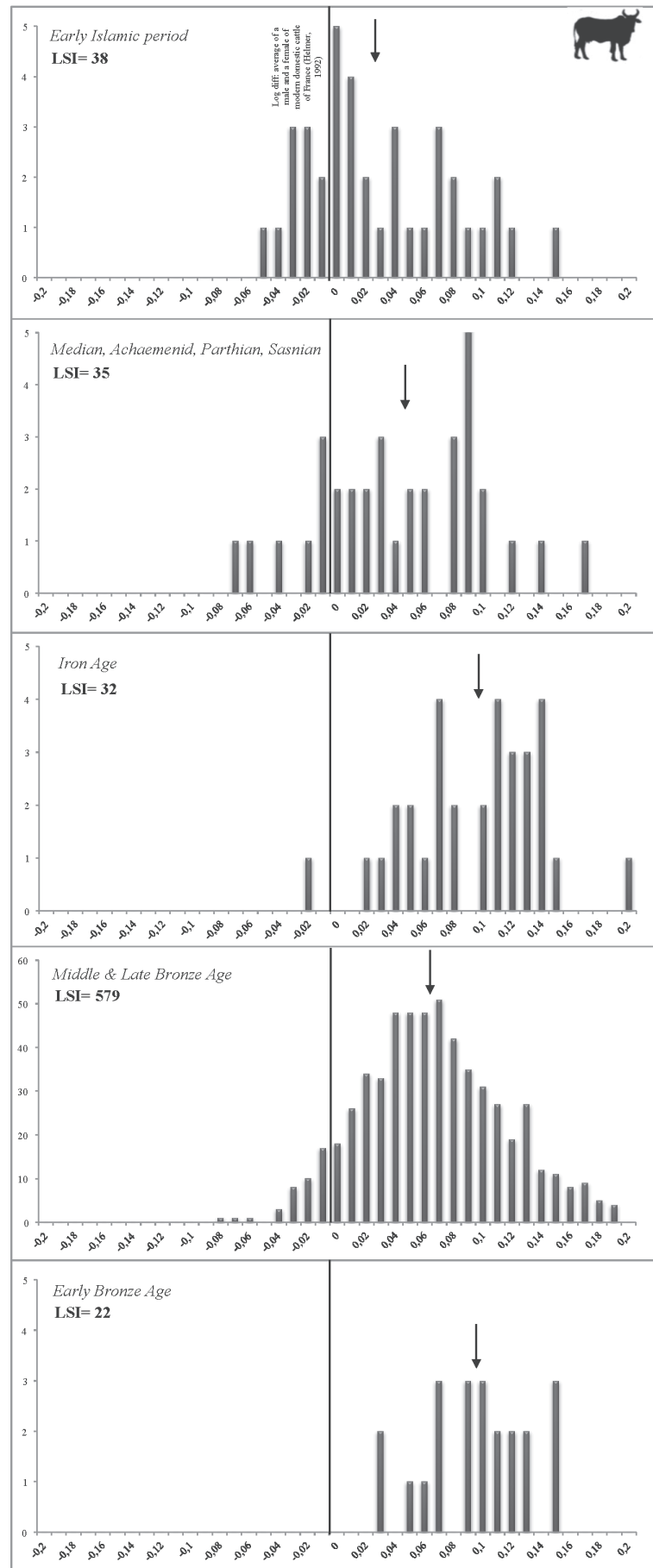
Fig. 11.4. Log Size Index (LSI) representation of bovines at Haftavan Tepe. The measurements used for this analysis are Bd and Ht of humerus; Bp and Bd of radius; Bp and Bd of metacarpus; Bp and Bd of metatarsus; Bp of the 1st, 2nd and 3rd phalanges; Bd of tibia; GLL of talus and GL of calcaneus.

reference (zero line) we used the average of metric data from two modern domestic cattle, male and female from France (Helmer 1992) (Fig. 11.4).

On the basis of a thorough metrical analyses (Mohaseb 2012), the bovines of Haftavan Tepe were allocated to the domestic cattle, *Bos taurus*. Here we would like to examine the evolution of size of the domestic stock during the various periods. These histograms show that the averages of LSI of the bovine population in all periods of Haftavan Tepe are generally higher than the reference.

The bovines of the EBA, the oldest period, are larger than all of other periods (mean=0.092). Based on the t tests, from the EBA (mean=0.092) through the MLBA (mean=0.061), the size of bovines decreases significantly ( $p=0.0008$ ). In the following period a significant increase ( $p=0.0023$ ) in size of bovines is observed from the MLBA (mean=0.061) to the IA (mean=0.089). The LSI of the MAPS is of 0.041 and that of the EI is of 0.024.

From the MAPS to EI and from the EBA to IA, the difference between the averages of the logarithmic size is not significant ( $p=0.1747$  and  $0.8052$  respectively). For all of the others, the chronological size decrease is significant (for IA/EI and EBA/EI  $p<0.0001$ ; for MLBA/EI and EBA/MAPS  $p=0.0001$ ; for IA/MAPS  $p=0.0003$  and for MLBA/MAPS  $p=0.0468$ ). The significant difference between the bovine populations exposed above seems to be related to the exploitation of more or less smaller animals (young males and females). For example this is clearly visible between MLBA and IA. This raises the problem of a different type of exploitation of the animals between these periods. Actually, this hypothesis was verified on the kill off patterns of bovines, where animals of less than one year are not represented at all. According to the kill off pattern analyses it seems thus that the shift of the average size of bovines in the LSI diagrams is mostly due to the absence of young animals rather than females.



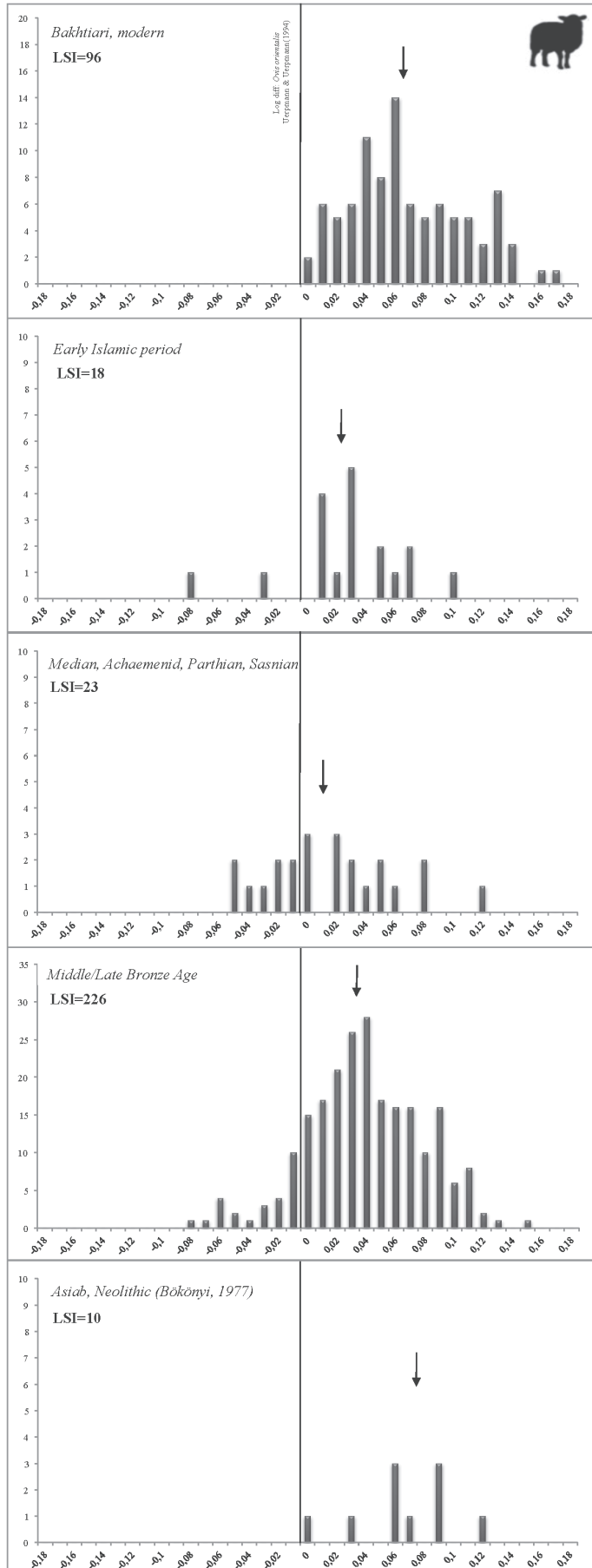


Fig. 11.5. Histogram of the Log Size Index (LSI) for comparison between the size of sheep at Haftavan Tepe and the reference. The measurements used for this analysis are SLC, GLP, LG and BG of scapula; Bd and Ht of humerus; Bp, SD and Bd of radius; Bp, Dp, SD, Bd and Dd of metacarpus and metatarsus; Bp, SD, Bd and Dd of tibia; GL, Bp, SD and Bd of the 1st phalanx; GLL, GLm, Di and Bd of talus and GL of calcaneus.

### Caprini

The other major groups of ungulates are caprines (48%) from which 14% belongs to sheep and 7% belongs to goat and most of them belong to domesticate (Boessneck 1969, Clutton-Brock *et al.* 1990). Also 26% of the remains could not be identified as either sheep or goat and constitutes the category caprines. A little number of wild sheep, *Ovis orientalis* and wild goat, *Capra aegagrus* horn cores could also be identified. The bone weights of caprines (about 21%) in Haftavan Tepe also show the economic importance of this group but it is very much different to the importance of bovine bones in the settlement periods.

In four periods, EI, MAPS, MLBA and EBA, sheep outnumber goat and only in the IA there tends to be equal ratios for these animals. The ratio of goat to sheep in four periods are 1:1.1 in the EI, 1:1.9 in the MAPS, 1:2.1 in the MLBA and 1:8.3 in the EBA. The difference between these two species is the highest in the EBA.

### DIACHRONIC SIZE EVOLUTION OF CAPRINES IN DIFFERENT PERIODS OF HAFTAVAN TEPE

In order to characterize the size of caprines at Haftavan Tepe, we analysed the metric data (Driesch 1976) of these species in each archaeological period by using the method of *Log Size Index (LSI)*.

*Ovis*: In the logarithmic analysis of sheep, we used the measurements of a female wild individual, *Ovis orientalis*, from Iran (Uerpmann & Uerpmann 1994) as the reference or zero line (Fig. 11.5). For having a better idea of the possible range size of a wild population, we chose to compare them with the Asiab wild sheep (Bökönyi 1977, reused by Mashkour 2001; 2002).

The LSI for *Ovis* is between 0.00 and 0.115. In parallel, we know that domestic breeds can have a very large size variation. In this figure, we also represent an Iranian population of domestic sheep, *Ovis aries*, which comprises 10 females and 2 males. This population originates from the herds of Bakhtiari nomads in southwestern Iran collected and prepared by Mashkour in 2001 (Mashkour 2003; Mashkour



Fig. 11.6. Histogram of Log Size Index (LSI) for comparison between the size of goat at Haftavan Tepe and the reference. The measurements used for this analysis are SLC, GLP, LG and BG of scapula; Bd and Ht of humerus; Bp, SD and Bd of radius; Bp, Dp, SD, Bd and Dd of metacarpus and metatarsus; Bp, SD, Bd and Dd of tibia; GL, Bp, SD and Bd of the 1st phalanx; GLL, GLm, Dl and Bd of talus and GL of calcaneus.

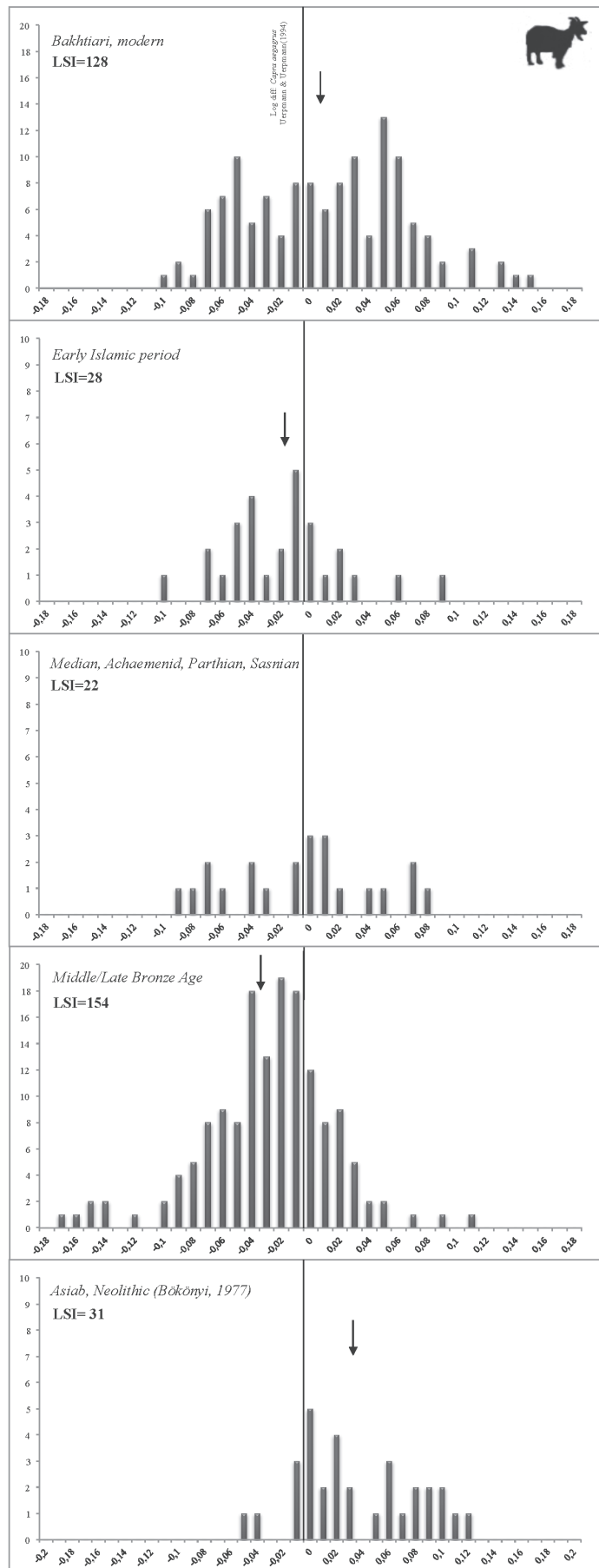
et al. 2005) and measured soon after (Mohaseb & Mashkour unpublished data). The Bakhtiari population, although rustic, is very large in size. The LSIs are between -0.08 and 0.196. This population has even larger animals than Asiab.

The LSI diagrams for sheep are presented in MLBA, MAPS and EI. For other periods, the metric data were under-represented. Between the three periods of Haftavan Tepe, the MLBA has the widest range of variation of LSIs. In MAPS, the frequency of smaller animals (< 0.00) is more than MLBA. It should be stressed that the largest individual (LSI=0.15) and the largest average (0.034) represent in the MLBA. In MAPS, the size of sheep decreases by an average of 0.012. According to *t* test, the increase of size from the MLBA to the MAPS is significant ( $p=0.030$ ). For all the others, the chronological size difference is not significant (for MLBA/EI  $p=0.265$  and for MAPS/EI  $p=0.422$ ).

The question behind these metric analyses is to determine the contribution of the wild specimens. The distribution of LSIs in the Haftavan populations of MAPS and EI show a clear break between 0.07 and 0.08. This break is not visible in the MLBA, obviously because of important number of data, which might hide this effect. According to the reference used above (Asiab and Bakhtiari) and to the distribution of LSIs discussed, we consider that all LSI values above 0.08 belong to the wild. The wild sheep, *Ovis orientalis* is more firmly documented by the presence of horn cores in Haftavan Tepe during the MLBA and MAPS (Mohaseb 2012).

*Capra*: In the logarithmic analysis of goat, we used the average of measurements of two wild individuals, *Capra aegagrus*, one male and one female, from Turkey (Uerpmann & Uerpmann, 1994) as the reference (zero line) (Fig. 11.6). For goat also, we used the measurement of wild population of Asiab to distinguish the wild individuals at Haftavan Tepe and domestic goats of Bakhtiari population, which comprises 8 females, 5 males and 2 castrates.

As for sheep, we could only analyse the metric





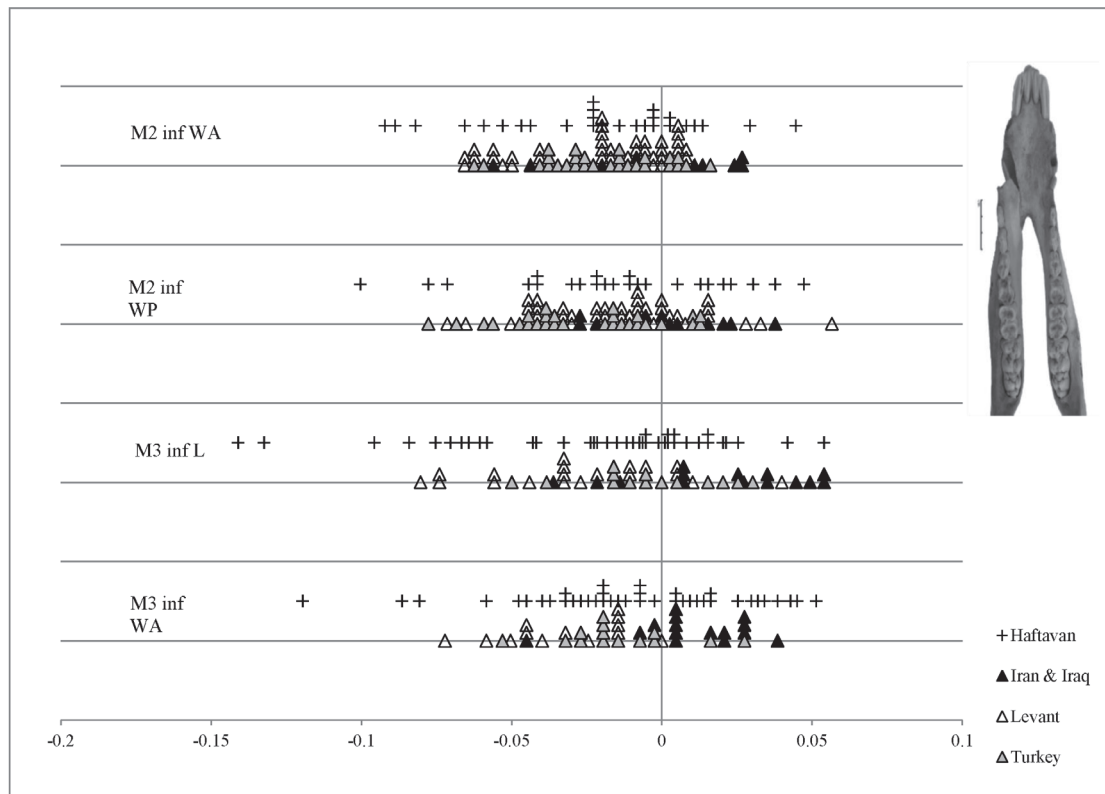


Fig. 11.7. Size of the 2nd and 3rd molars in Suids from Haftavan Tepe in comparison with wild boars from Iran, Iraq, Turkey and Levant (Payne & Bull 1988; Albarella *et al.* 2009) as reference collection. Standard measurement (zero line) is from Kizilcahamam, Turkey (Payne & Bull 1988). Right: Suid mandible recovered from Bronze Age levels in Haftavan Tepe.

data from three periods of EI, MAPS and MLBA. Between these three periods, the MLBA has the widest range of variation of LSIs. Also the largest individual is present in this period (LSI=0.11).

The comparisons between periods (according to *t* test) show that from the MLBA (mean= -0.036) to the MAPS (mean= -0.011), the size of goat increases significantly ( $p=0.0387$ ). The mean value of goats is the largest in the MAPS. From this period to the EI (mean= -0.023) the size of goat decreases but this difference is not significant ( $p=0.382$ ). The population of domestic goat of Bakhtiari is very large like the population of sheep and the LSI of the largest animal is of 0.15, which is larger than that of the MLBA. According to the wild and domestic situation of goats of Haftavan Tepe, we noticed one pair of horn cores from the MLBA, which belongs certainly to a wild individual, *Capra aegagrus*.

According to the average LSI for Asiab and the LSI distribution in Haftavan assemblages, we consider that all values above 0.04 belong to the wild. It should be noted that there is also the probability of presence of castrates between the larger ones (as goats of Bakhtairi in which the castrates are the largest) but we have no enough data to confirm it.

## Suids

The presence of suids (*Sus scrofa scrofa*) has been observed in small quantities mainly in the Early Bronze Age (4%) and the MAPS (3%). The remains of wild boar are absent in the Iron Age and the Early Islamic period. Noteworthy is the large amount of complete suid mandibles (n=80) recovered from the MLBA levels (trenches X2 levels 2B, 3B and X3 level 2) corresponding to about 60 animals. This is a very uncommon pattern and no explanations could be found in the published reports by Burney.

We examined the metrical data from the second and third lower molars in comparison with wild boars from Iran, Iraq, Turkey and Levant (Payne & Bull 1988; Albarella *et al.* 2009). Most of wild boars from Levant are provided by Simon Davis and they include the smallest animals of the region. The Turkish animals are from Kizilcahamam, which were measured by Payne and Bull (1988) and also are used as the standard measurement. These two groups belong to the subspecies *Sus scrofa lybicus* (Groves 1981). The wild boars from Iran and Iraq are the largest group of this region and they belong to the subspecies *Sus scrofa attila* (Groves 1981) (Albarella *et al.* 2009).

In order to compare the reference data of wild boars with the specimens of Haftavan Tepe, we used the ratio diagram method (Fig. 11.7).

In this graph the four measurements from two lower molars, crown length (L) and anterior crown width (WA) of third molar (M3), anterior crown width (WA) and posterior crown width (WP) of second molar (M2) are situated inside the zone of wild boars and even some of them are larger (WA in M2 and M3). Only two or three individuals are smaller than wild boars of the reference collection, which could be allocated to domestic forms. These teeth belong to the MLBA and there is not enough metrical data from other periods to have a more precise distinction of wild and domestic forms of this species in Haftavan Tepe.

The question of the distinction of domestic and wild boars through morphometric geometric analysis and genetics (Evin *et al.* 2013; Ottoni *et al.* 2013) is a topic that has been investigated for some times and published recently. The results of the wild and domestic status of the suids of Haftavan Tepe based on the morphometric geometric analysis (Evin *et al.* 2014) are not always the same as which is distinguished based on metrical analysis. Although the *Sus* population of Haftavan is extremely homogenous by its context and anatomy, there remains a doubt on the identification of the younger specimens of our assemblage that will be under further investigations.

### Equids

The remains of equids are mostly represented in the MLBA. For the analysis of metric data and therefore the specific identification of different species of equids, we used the 'ratio diagram' method (Simpson 1941; Eisenmann 1979; 1986) of first phalanx, the most abundant equid remains in the site (Fig. 11.8).

In these diagrams the standard data (zero line) is the mean of 30 anterior first phalanges of *Equus hemionus onager* (Eisenmann & Mashkour 2000). The archaeological material is compared with the first phalanges of five equid species; horse, *E. caballus* (average of 24 posterior and 31–38 anterior); mule, *E. caballus* ♂ x *E. asinus* ♀ (average of 9 posterior and 5–9 anterior); hemione, *E. h. onager* (average of 29–30 posterior) and donkey, *E. asinus* (average of 10–11 anterior) (Eisenmann official site: [www.vera.eisenmann.com](http://www.vera.eisenmann.com); Eisenmann & Mashkour 2000; Dive & Eisenmann, 1991). We complemented these ratio diagrams with a principal component analysis for a finer identification of Haftavan Tepe equids (Fig. 11.9).

On the basis of the two first logarithmic profiles (Fig. 11.8A & B), horse and mule are very similar and more or less of the same size, therefore it is not easy to distinguish the specimens located in this area. The distinction between these two species is more precise according to the PCA (Fig. 11.9).

In Figure 11.9, the specimens #260, #328, #334, #380 (MLBA) and #397 (MAPS) are posteriors and are situated in the distribution area of horse. The specimens #333 (MLBA), #390 (EBA) and #393 (MAPS) are situated in the distribution area of mule; the two former are posterior and the latter is anterior. There are also four specimens

situated in the overlap zone between horse and mule and could be allocated to either of them: #326, #330, #335 (MLBA) and #430 (IA). Except for the #335, which is a posterior, the others are anterior phalanges.

On the third logarithmic profile (Fig. 11.8C) there are three specimens, which could be allocated to onager. These specimens are situated in the overlap zone between onager and donkey but they are exactly in the distribution area of concentration of onager and furthermore their profile resembles to that of onager. They are #261, #262 and #332, all posteriors and belong to the MLBA. Another possibility is that these specimens are hybrids of hemione and donkey, even if for the moment we do not have any possibility to verify this assumption. It should be reminded that during the Bronze Age in Iraq and Syria, the hybridisation of hemione and donkey was practiced (Zarins 1986). Finally figure 11.8D presents the specimens allocated to donkey. In the PCA, these specimens are also projected in the distribution area of donkey. These are specimens #263, #327, #329 and #331, all the anterior phalanges and belong to the MLBA.

Considering these identifications, it could be deduced that horse is well represented in the MLBA and the MAPS and the hybrids (mule) are present in the EBA, the MLBA and the MAPS. In the MLBA levels either hemione or a hybrid (hemione x donkey) could be observed. Donkey was clearly exploited during the MLBA. In the MLBA and the IA levels we observe the presence of cut marks and burning on a mandible and a second phalanx of equid respectively (see Fig. 11.2). It is not clear if this is related to squaring or to consumption.

### Gazelles

Among the small herbivores, very little remains of gazelle, mostly horn cores (about 3%) could be allocated to *Gazella subguturosa* (Fig. 11.10A). The exploitation of gazelle during the EBA was about 1.6%, about 2.3% in the MLBA, none in IA and about 0.8% in the MAPS, but in the EI hunting of this species suddenly increases (10.8%). The distribution of gazelle in Azerbaijan nowadays is limited to the Eastern parts of the region (Ziaei 1996).

### Cervids

Remains of cervids were also identified in very small quantities and mostly antlers. The highest number of cervids is observed in the IA (0.7%) and the EI (0.6%). The cervids are less than 0.2% in the MLBA, 0.1% in the MAPS and absent in the EBA. Two species are present in Iran, the red deer, *Cervus elaphus* and the Mesopotamian fallow deer, *Dama mesopotamica*, the distinction of which is generally difficult on many bones. On the basis of the morphological criteria described for the antlers the Haftavan remains were securely allocated to red deer (Fig. 11.10B). Nowadays, the main habitat for red deer in Iran is the south margins of Caspian Sea and its distribution is rather limited in Azerbaijan (Ziaei 1996).

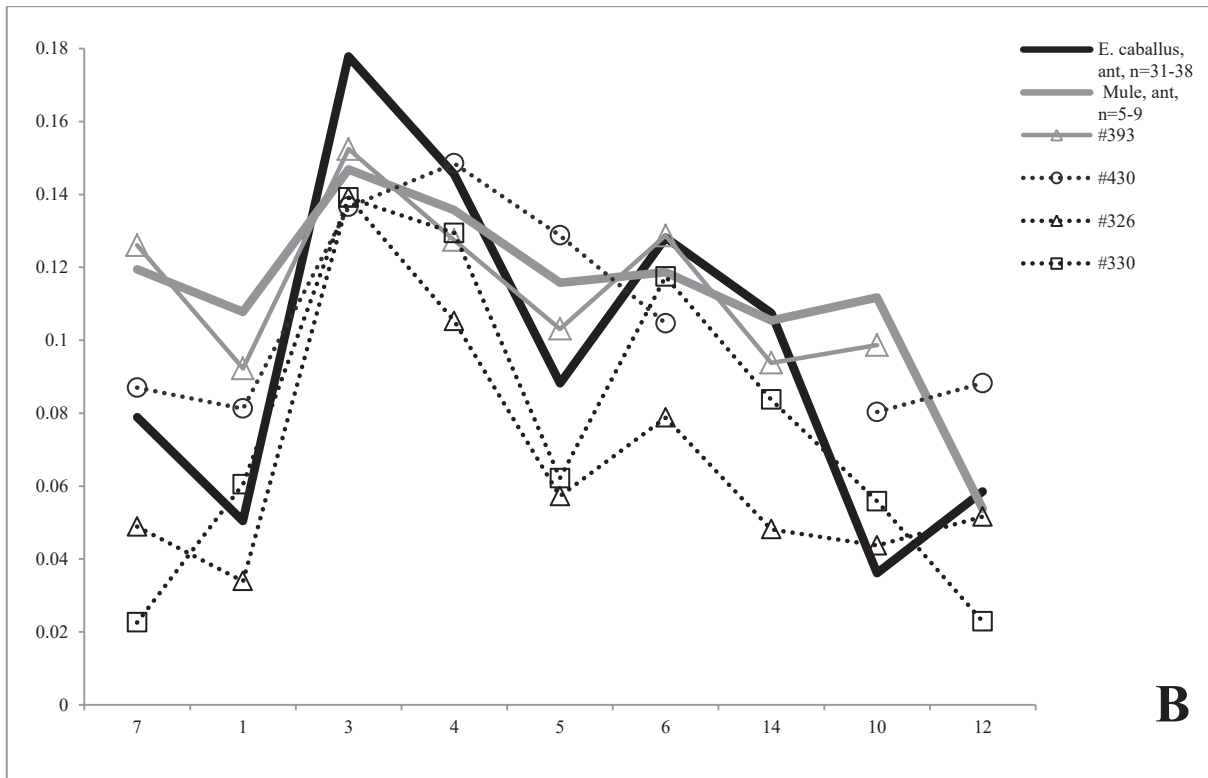
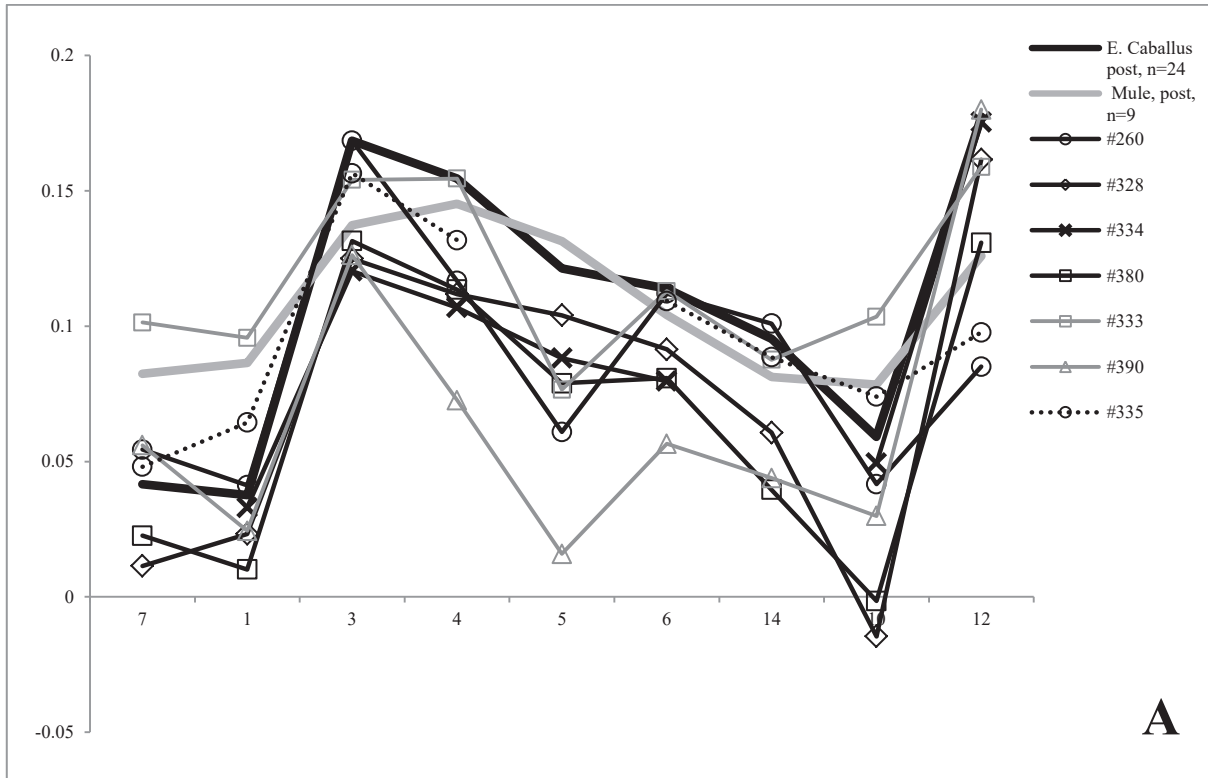


Fig. 11.8. Diagram of Log Size Index to distinguish the different species of equids in Haftavan Tepe in comparison with the reference measurements. A and B: Anterior and posterior phalanx of horse and mule. C: Posterior phalanx of hemione. D: Anterior phalanx of donkey. The codes (e.g. #260) represent the specimens of Haftavan Tepe.

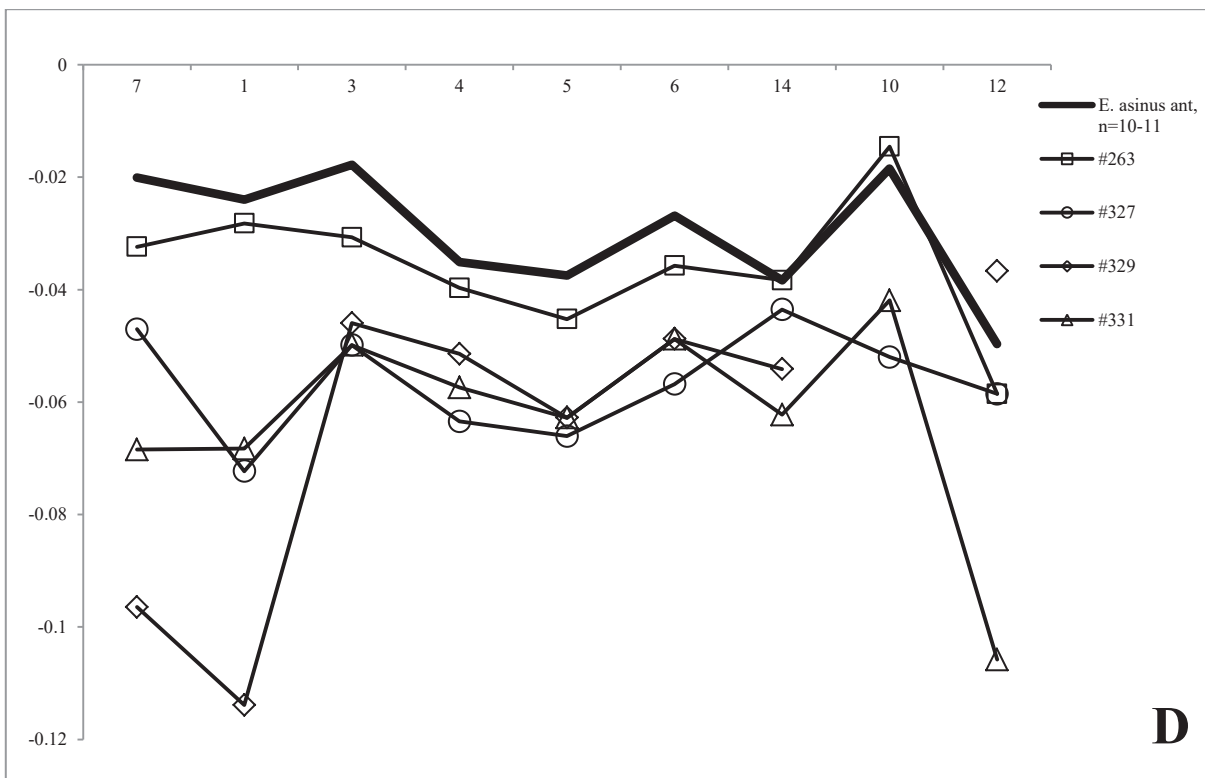
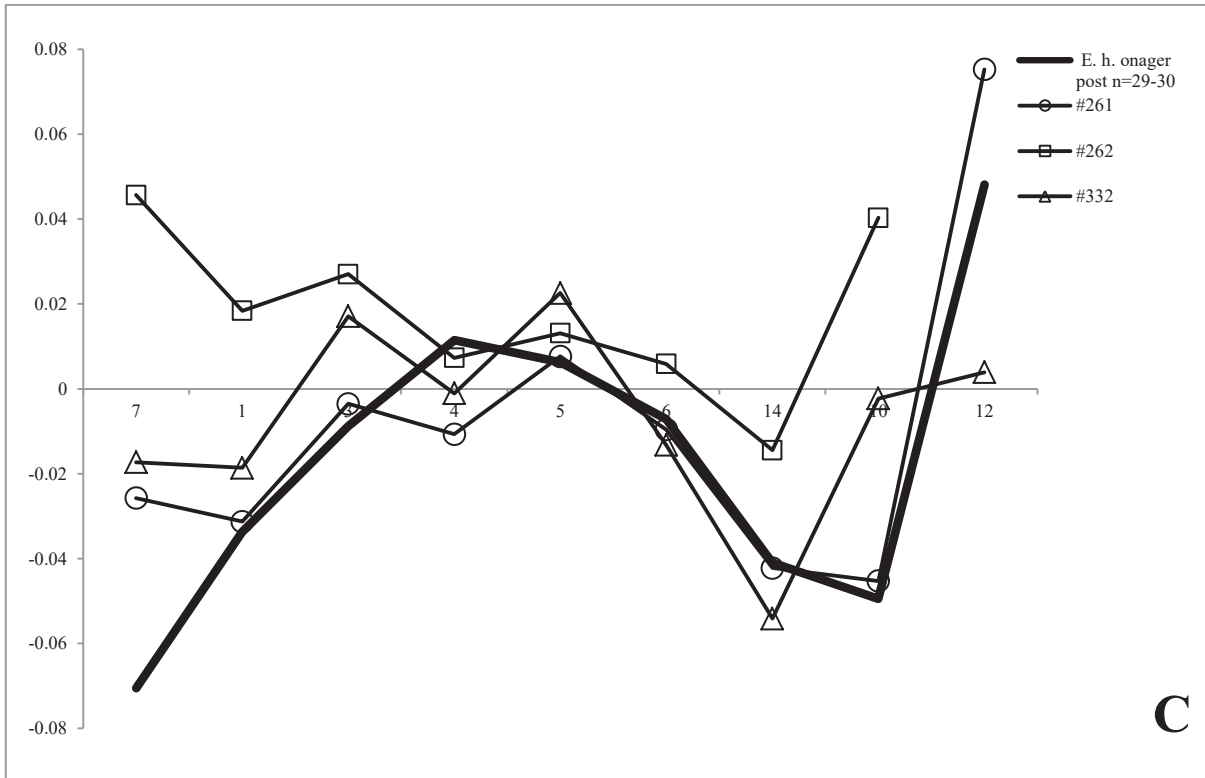


Fig. 11.8. (continued) Diagram of Log Size Index to distinguish the different species of equids in Haftavan Tepe in comparison with the reference measurements. A and B: Anterior and posterior phalanx of horse and mule. C: Posterior phalanx of hemione. D: Anterior phalanx of donkey. The codes (e.g. #260) represent the specimens of Haftavan Tepe.

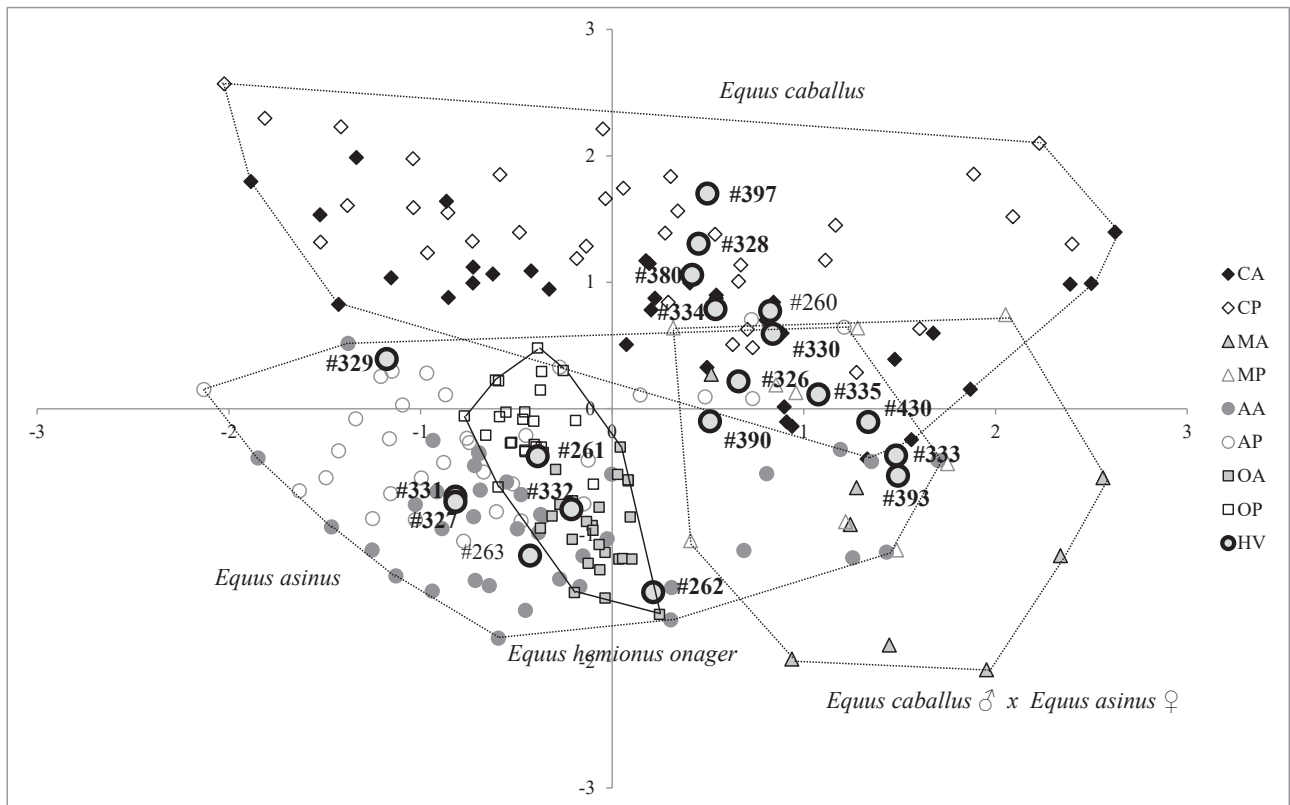


Fig. 11.9. Principal Component Analysis (PCA) of equid first phalanges of Haftavan Tepe in comparison with the reference data: CA and CP = horse, anterior and posterior phalanges; MA and MP = mule, anterior and posterior phalanges; AA = donkey, anterior and posterior phalanges; OA = onager, anterior and posterior phalanges.

### Carnivores

In all periods of Haftavan Tepe, except for the EI, the remains of domestic dog (*Canis familiaris*) are present in small quantities. These remains comprise less than 1% of the total, but in the MAPS it comes to more than 3%. There is no observation of other carnivores in this site. Traces of carnivore gnawing (1–2%) and digestion (<0.1%) are observed on some bones of large mammals and small ruminants.

### Evolution of animal exploitation

Haftavan Tepe is remarkable for the high ratios of bovine bones (Fig. 11.3). This is an uncommon trend on the Iranian Plateau where the most exploited domesticates are caprines (Mashkour 2001; 2002).

Bovines comprise 41% of the total remains and their weight constitutes about 68%, whereas caprines are represented by 48% and their weight constitutes only about 21%. This might be related to the geographical location and environmental setting of the site. Azerbaijan has a favorable climate, which is more suitable for cattle herding.

The practice of hunting in this site was a minor activity (about 2.5%). The hunted species in Haftavan Tepe are *Gazella subgutturosa*, *Cervus elaphus*, *Sus scrofa* and

*Equus hemionus*. No wild carnivores could be identified in the assemblage. These species belong to various ecological settings, going from steppe (gazelle and hemione) to more bushy (*Sus* and *Cervus*) environments. The distribution of mammals in different periods of Haftavan Tepe, identified to the level of genus, is represented in Table 11.3.

As mentioned above, the faunal remains in Haftavan Tepe mostly belong to mammals especially small and large herbivores and are predominately domestic. In this site it was difficult to understand the exploitation of other class of animals, such as fish or birds, as food source, probably due to hand collection and size selection of bones during excavation. Only a few number of bird bones and no fish were found in remains.

### Herding in Haftavan Tepe

Despite the relative frequency of different domesticates, the information about the age at which the animals are slaughtered, gives valuable indications about animal management. This depends on different factors: the characteristics of herded animals, environmental conditions and finally the needs of different products in society (Payne 1973). The methods, by which we determined the age of animals at death, provide information about the exploitation



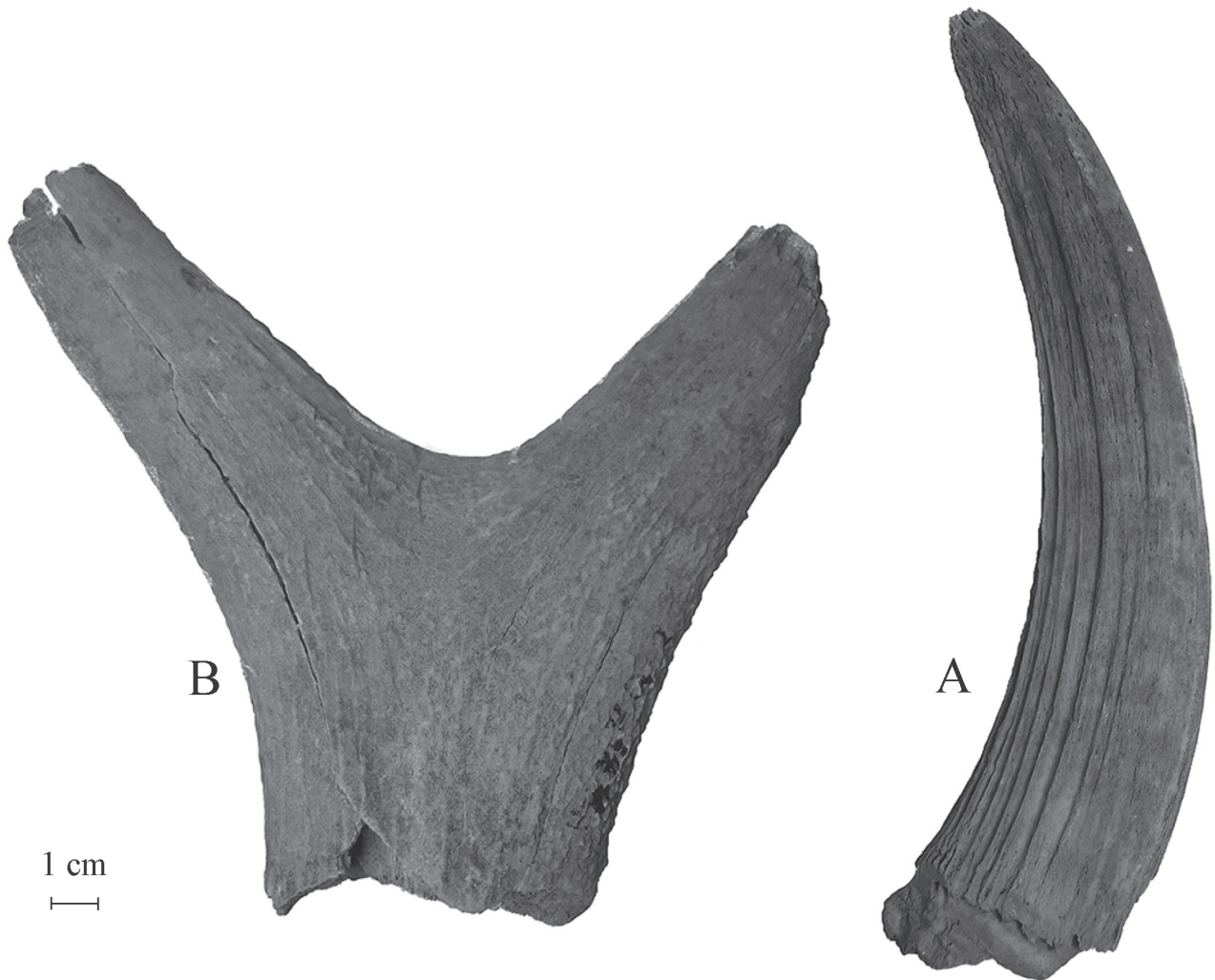


Fig. 11.10. A: *Gazella subgutturosa* horn core recovered from Bronze Age levels; B: *Cervus elaphus* antler recovered from Iron Age levels of Haftavan Tepe.

of different products (meat, milk and dairy products, wool and skin). These methods address the most economically important species: cattle and sheep/goat.

### Cattle

The kill-off pattern for cattle is considered in lower cheek teeth, by the sequence of tooth wear stages, based on the study of Ducos (1968) using indices of crown height to transversal diameter of the tooth, Grant (1982) using the morphology of tooth wear, and the date of eruption given by Silver (1969), Higham (1967) and Grigson (1982a, b). Here, we used the profile of cattle in three periods: the MAPS, the IA and the MLBA. The number of teeth in the EI and the EBA was not enough to analyse kill-off pattern.

The understanding of kill-off patterns in cattle is based on the physiology of animal (Balasse *et al.* 2000). Cows need a stimulus to gain the milk which can be the manipulation of udder or various stimuli such as visual,

hearing, olfactory and smelling (Metge 1990). The high representation of young animals (from birth to 2 years old) shows the exploitation of milk (Tresset 1996; Balasse *et al.* 2000). The presence of these young animals is generally associated with the presence of old females (6.5–9 years old). The exploitation of meat is represented by the slaughtered animals between 2–4 and 4–6.5 years old in which the latter is obviously less tender. The presence of very old animals is the evidence for using cattle for its strength (more than 9 years old).

On the basis of this source of information, the herding strategies in the periods MLBA and IA, which is based on the reconstruction of the kill-off pattern of 20 and 10 individuals respectively, are more or less the same (Fig. 11.11). The peak at the age of 2–4 years (44% for the MLBA and 41% for the IA, most probably the males) demonstrates the exploitation of high quality meat. In the IA, there is a second peak at the age of 6.5–9 years, which is associated with the animals less than 2 years and

Table 11.3. Haftavan Tepe: Relative frequency of taxa identified to genus, calculated using NISP in different periods.

Species	Early Islamic Period		MAPS Periods		Iron Age	
	NISP	NISP%	NISP	NISP%	NISP	NISP%
<i>Bos taurus</i>	278	26.58	323	31.60	68	46.26
<i>Caprini</i>	314	30.02	310	30.33	14	9.52
<i>Ovis aries</i>	156	14.91	173	16.93	14	9.52
<i>Ovis orientalis</i>	1	0.10	3	0.29	0	0.00
<i>Capra hircus</i>	138	13.19	89	8.71	14	9.52
<i>Capra aegagrus</i>	2	0.19	5	0.49	0	0.00
<i>Gazella subguturosa</i>	113	10.80	8	0.78	0	0.00
<i>Equus caballus</i>	0	0.00	1	0.10	0	0.00
<i>E. caballus</i> ♂ x <i>E. asinus</i> ♀	0	0.00	1	0.10	0	0.00
<i>Equus hemionus onager</i>	0	0.00	0	0.00	0	0.00
<i>Equus asinus</i>	0	0.00	0	0.00	0	0.00
<i>Equid</i>	38	3.63	44	4.31	35	23.81
<i>Cervus elaphus</i>	6	0.57	1	0.10	1	0.68
<i>Canis familiaris</i>	0	0.00	33	3.23	1	0.68
<i>Sus scrofa</i>	0	0.00	31	3.03	0	0.00
Total	1046	100	1022	100	147	100.00

Species	Middle & Late Bronze Age		Early Bronze Age		All Periods	
	NISP	NISP%	NISP	NISP%	NISP	NISP%
<i>Bos taurus</i>	3827	43.82	75	30.61	4571	40.84
<i>Caprini</i>	2203	25.23	106	43.27	2947	26.33
<i>Ovis aries</i>	1150	13.17	33	13.47	1526	13.63
<i>Ovis orientalis</i>	44	0.50	0	0.00	48	0.43
<i>Capra hircus</i>	562	6.44	4	1.63	807	7.21
<i>Capra aegagrus</i>	10	0.11	0	0.00	17	0.15
<i>Gazella subguturosa</i>	202	2.31	4	1.63	327	2.92
<i>Equus caballus</i>	4	0.05	0	0.00	5	0.04
<i>E. caballus</i> ♂ x <i>E. asinus</i> ♀	1	0.01	1	0.41	3	0.03
<i>Equus hemionus onager</i>	3	0.03	0	0.00	3	0.03
<i>Equus asinus</i>	4	0.05	0	0.00	4	0.04
<i>Equid</i>	534	6.11	11	4.49	662	5.91
<i>Cervus elaphus</i>	21	0.24	0	0.00	29	0.26
<i>Canis familiaris</i>	63	0.72	1	0.41	98	0.88
<i>Sus scrofa</i>	105	1.20	10	4.08	146	1.30
Total	8733	100	245	100	11193	100.00

demonstrates the exploitation of milk and dairy products. This trend is less important in the MLBA. The use of cattle as draught animal, as confirms the presence of pathological bones (especially lipping), is demonstrated by the animals slaughtered older than 9 years old. This type of exploitation has more or less the same importance in both periods.

During the MAPS represented by 11 individuals, the herders exploited animals in a different way. In these periods the exploitation of milk and dairy products is much more important than butchery exploitation, which is demonstrated by the abundance of animals slaughtered in less than 2 (62%) and 6.5–9 years (17%) and the absence of animals at the age of 2–4 years. The representation of very old animals is less than the two previous periods (13%) but it shows however the use of animal as draught.

The use of cattle as a draught animal is an extremely interesting aspect, which points directly to the development of agricultural practices such as ploughing. This question should be addressed through systematic and integrated archaeological, archaeobotanical and archaeozoological investigations for documenting more precisely the relation

between the exploitation of cattle and the development of cereal farming. Unfortunately, no archaeobotanical studies have ever been performed for Haftavan Tepe. In absence of such source of information, archaeozoology can contribute to some extent to this question since it is generally admitted that cattle is an animal that has been used for its strength. In this regard one can note the progressive and general increase of bovines from the Bronze Age in the faunal spectra of the Iranian Plateau (Mashkour 2001). In Haftavan Tepe, the period with the highest occurrence of old animals is MLBA through IA.

### Caprini

Age profiles for caprines were performed using inferior tooth wear and eruption based on references established by Payne (1973) and Helmer (1995).<sup>1</sup> The distinction of sheep and goat on teeth relies on studies by Payne (1985), Helmer (2000) and Halstead *et al.* (2002) for all teeth and Uerpmann & Uerpmann (1994) and Balasse *et al.* (2005) for the 3rd molar. For the interpretation of the kill-off pattern for sheep and goat we rely on three major

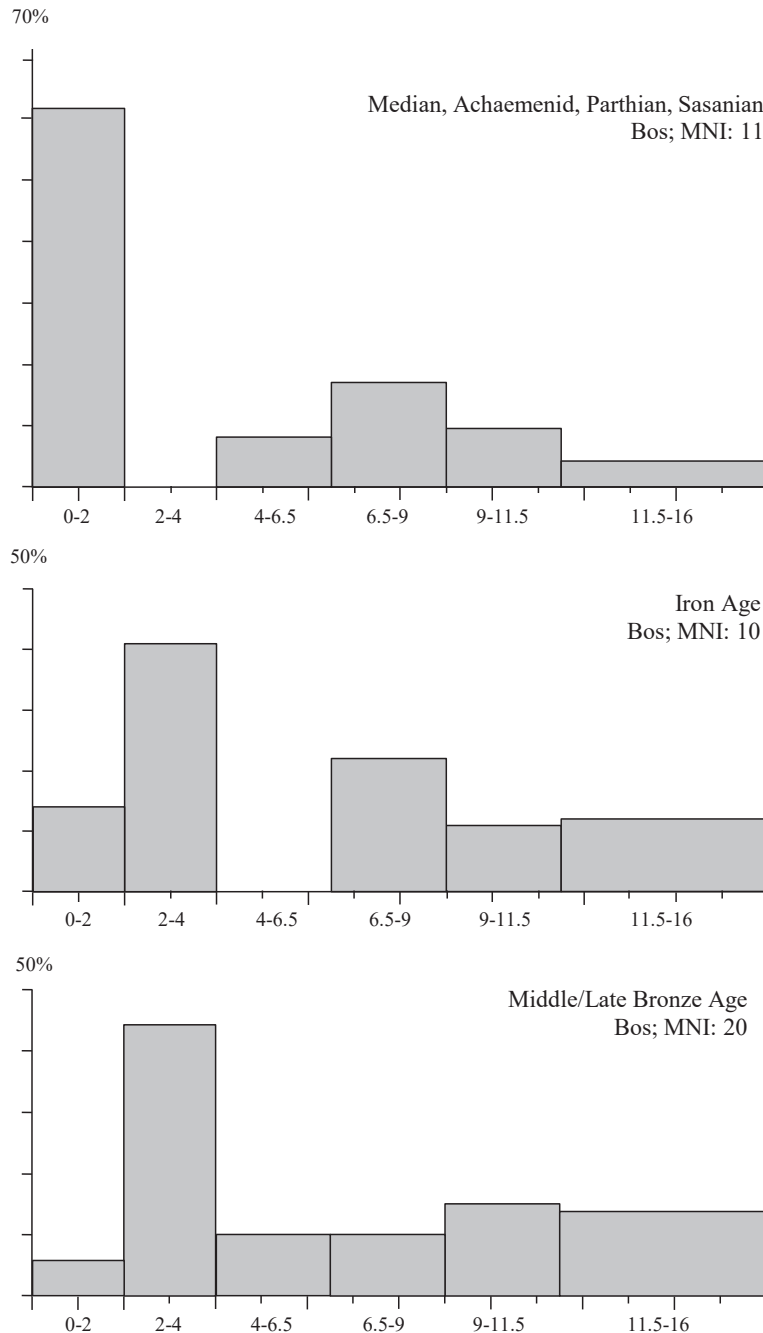


Fig. 11.11. Cattle kill-off pattern in three periods of Haftavan Tepe.

methodological studies performed by S. Payne (1973) and J.-D. Vigne and D. Helmer (Vigne and Helmer 1998; Helmer & Vigne 2004).

Relying on ethnographic data, these authors have provided an economic interpretation of the kill-off patterns based on the production of three categories of products: meat, milk and wool/hair.

For this study, the number of sheep tooth remains was abundant enough to enable the construction of kill-off patterns for all periods whereas this was not the case for goat remains, only possible for MLBA.

Based upon five profiles built with the remains of more

than 150 individuals, we observe a mixed exploitation of sheep for meat, milk and wool (Fig. 11.12).

During the Early Bronze Age, meat exploitation is expressed by a relatively high proportion (52%) of animals slaughtered between 6 months and 2 years old, equally divided between animals of 6–12 months (class C) and 1–2 years (class D) that produce a more tender meat when younger. The milk and dairy products exploitation is expressed by the relatively high percentage of animals, and most probably females, slaughtered at the age of 4–6 years (class G: 24%) plus a lower percentage of animals in the age of 2–4 years (class EF: 16%). Also this high



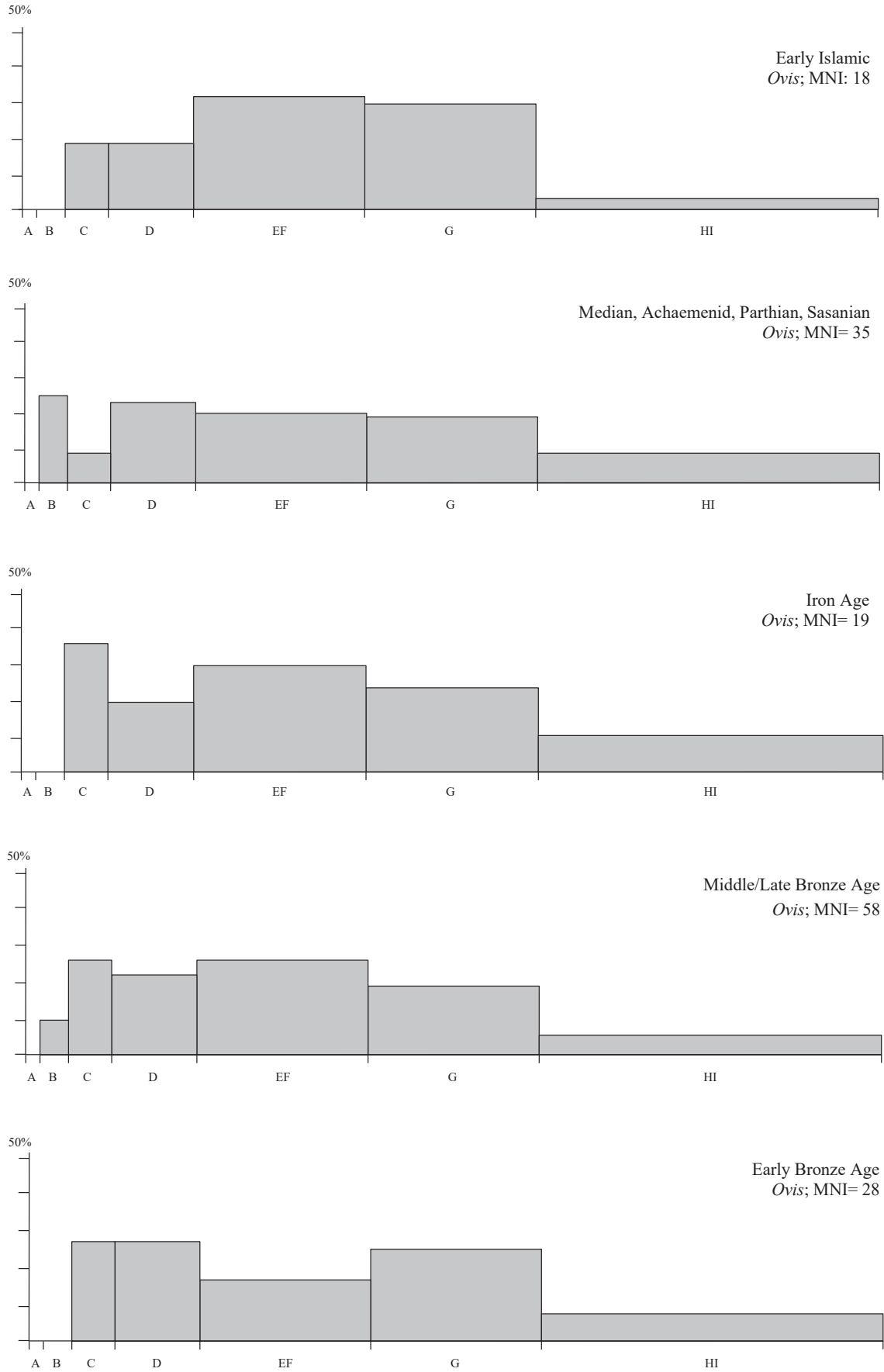


Fig. 11.12. Sheep kill-off pattern in five periods of Haftavan Tepe.

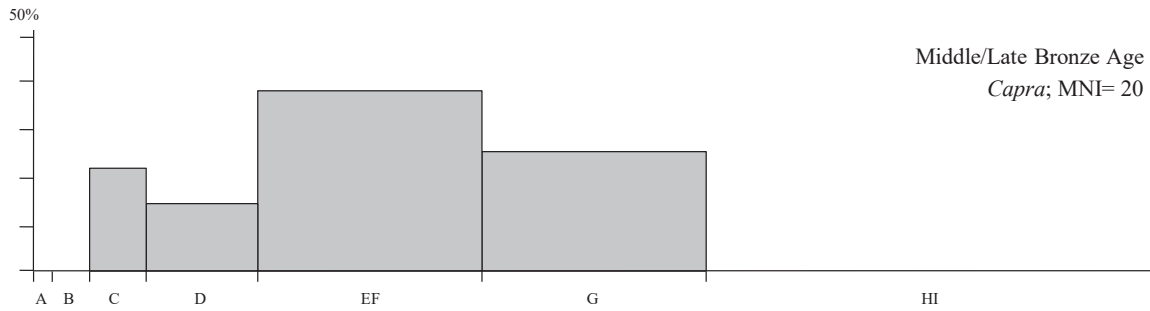


Fig. 11.13. Goat kill-off pattern in the Middle/Late Bronze Age of Haftavan Tepe.

proportion of slaughter in class G and class HI (more than 6 years: 7%) indicates the exploitation of wool more than other periods in the site.

The aim of sheep exploitation during the Middle/Late Bronze Age (MLBA) is based on the reconstruction of the kill-off pattern of 58 individuals, which is statistically very reliable. During this period, milk exploitation seems to be enhanced by a higher percentage of slaughter in Classes EF (25%) and G (14%). The milk exploitation is even more important for goat (represented by 20 individual), with the presence of two peaks in classes EF (37%) and G (26%) (Fig. 11.13). For sheep, it seems that there is a preference for the production of more tender meat (class B=10% and C=35.5%) in comparison to the exploitation of less tender meat class D (21%). Globally the same tendency is visible for goat. In the Middle East this is a very widespread practice in rural or nomadic pastoralist contexts referred to as *parvar bandi* (to fatten) within Persian-speaking communities (Ezatpour 2003). In this system lambs were preserved to reach their maximum weight and that's the reason why they were killed mainly between 6–12 months. This strategy aims principally at meat production, which is generally a response to the dynamic between consumer and producer.

In conclusion, during the MLBA period the sheep and goat are raised more for their milk and dairy products with a slight difference between sheep and goat; sheep being more used for the meat and goat for the milk as is often observed in traditional herding systems. The absence of goats older than 6 years and as it is practically also the case for sheep in this period seems to indicate the little interest to the specialized production of fiber.

The aims of sheep exploitation during the Iron Age (IA) is based on the reconstruction of the kill-off pattern of 19 individuals, shows a similar pattern to that of MLBA.

During the MAPS represented by 35 individuals, milk exploitation seems to be more firmly expressed by a focus on classes EF (19%) and G (18%). In this more sophisticated system, yearlings are separated from ewes as a result of which a higher and more efficient production of milk and meat (class D: 22%). The same pattern seems to continue during the Early Islamic period. Interestingly in this period, wool exploitation seems to have critically declined (class HI =3%).

### Conclusion in herding strategies

The analysis of faunal spectra and the kill off patterns of Haftavan Tepe show in all periods the reliance of the subsistence economy on cattle, sheep and goat. The favorable environment of the site and the presumably presence of agricultural lands in the vicinity of the site would have in principle allowed a sedentary herding. However, this question is currently under study through stable isotope analyses and may add a higher resolution in this interpretation of our current data.

### Characterisation of Haftavan Tepe subsistence economy with adjacent sites in Iran and Turkey

In order to characterise the subsistence economy of Haftavan Tepe during different periods of its occupation within a regional framework, a comparison was made with archaeozoological data from some contemporaneous and adjacent sites in Iran and Turkey. We used the results of 30 faunal assemblages on 18 sites from the Bronze Age, Iron Age and the historical periods including Urartian, Median, Achaemenid, Parthian, Sasanian and Islamic (table in Fig. 11.14).

The considered zone is limited to the north western part of Central Plateau and Central Zagros in Iran and to the southeastern part of Turkey including the sites of Tigris valley and some sites along the Euphrates (Fig. 11.14). The Iranian sites are shown on the left side of the graph and the Turkish sites on the right. In each group, the sites are classified chronologically. The predominance of caprines followed by bovines is the first observation to be made for all periods and for all sites and in both regions. There is however an exception for Haftavan Tepe where the contrary is observed during the Bronze Age and the Iron Age. Also it seems that the exploitation of domestic equids is more important on the Iranian sites in comparison to the Turkish sites (5.6% and 1.4% respectively). As for the suids, they are more exploited in Turkey (9.3%) than in Iran (2.5%). This trend could also be seen in the four sites located in the upper Tigris river valley in Turkey, which are Giricano, Kenan Tepe,

Müslümantepe and Hirbemerdon Tepe all belong to the Bronze Age. The average contribution of domestic suids in these sites is about 20% (Berthon 2011). Finally, game species are more abundant in Iran than in Turkey with an average of 5.6% and 2.6% respectively.

Looking at these raw data through multivariate analysis (Factorial Correspondence Analysis, FCA) allows a better

characterisation of these assemblages and regional trends. In the factorial plans, the variables and the individuals are represented proportionately due to their contribution. The variables used in FCA analysis (Fig. 11.15) are the two groups of domestic and wild animals: bovines (Bos), caprines (Cap), suids (SSd) and equids (Eqd) are the domesticates; the wild group are composed of the wild boar

Site	Country	Region	Location	Period	Author	Year	Code	NR
Takht-i-Suleiman	Iran	North West	Azerbaijan	Late Islamic	Kolb	1972	IT1	2370
Bastam	Iran	North West	Azerbaijan	Islamic	Boessneck & Kokabi	1988	IB1	11670
Haftavan Tepe	Iran	North West	Azerbaijan	Early Islamic	Mohaseb	2012	IH1	330
Takht-i-Suleiman	Iran	North West	Azerbaijan	Parthian/Sassanian	Kolb	1972	IT2	3436
Bastam	Iran	North West	Azerbaijan	Parthian/Sassanian	Boessneck & Kokabi	1988	IB2	423
Haftavan Tepe	Iran	North West	Azerbaijan	Median, Achaemenid, Parthian, Sasanian	Mohaseb	2012	IH2	387
Ziwiye	Iran	Centrale Zagros	Kermanshah	Median	Mohaseb	2012	IZW	323
Tepe Ozbaki	Iran	North of Central Plateau	Savojbolagh Plain	Median	Mashkour & Mohaseb	2011	ITO	149
Doshan Tepe	Iran	North of Central Plateau	Savojbolagh Plain	Median	Mashkour & Mohaseb	2011	ID4	488
Bastam	Iran	North West	Azerbaijan	Uratian	Boessneck & Kokabi/Krauss	1988/1975	IB3	56663
Haftavan Tepe	Iran	North West	Azerbaijan	Iron Age	Mohaseb	2012	IH3	133
Doshan Tepe	Iran	North of Central Plateau	Savojbolagh Plain	Iron Age	Mashkour & Mohaseb	2011	ID3	474
Dinkha Tepe	Iran	North West	Azerbaijan	Iron Age	Gilbert & Steinfield	1977	ID1	253
Sagzabad	Iran	North of Central Plateau	Qazvin Plain	Iron Age	Mashkour/Mashkour et al.	2001/1999	IS1	9601
Bastam	Iran	North West	Azerbaijan	Bronze Age/Iron Age	Krauss	1975	IB4	6586
Sagzabad	Iran	North of Central Plateau	Qazvin Plain	Late Bronze Age	Mashkour/Mashkour et al.	2001/1999	IS2	303
Haftavan Tepe	Iran	North West	Azerbaijan	Bronze Age	Mohaseb	2012	IH4	3877
Kohneh Pasgah Tepesi	Iran	North West	Azerbaijan	Bronze Age	Mohaseb	2012	IKP	299
Dinkha Tepe	Iran	North West	Azerbaijan	Bronze Age	Gilbert & Steinfield	1977	ID2	1321
Godin	Iran	Centrale Zagros	Kangavar, Hamadan	Bronze Age	Gilbert	1979	IGD	15282
Kohneh Tepesi	Iran	North West	Azerbaijan	Early Bronze Age	Sheikhi & Mashkour	in prep.	IKT	6206
Büyüktepe Höyük	Turkey	North East	Bayburt Plain	Iron Age	Howell-Meurs	2001	TBH	923
Sos Höyük	Turkey	South East	Pasinler Valley	Iron Age	Howell-Meurs	2001	TS1	2556
Horum Höyük	Turkey	South East	along the Euphrates	Early Iron Age	Bartosiewicz	2005	TH1	277
Horum Höyük	Turkey	South East	along the Euphrates	Bronze Age	Bartosiewicz	2005	TH2	2003
Tilbeşar	Turkey	South East	North west of Gaziantep	Early/middle Bronze Age	Berthon & Mashkour	2008	TTb	1916
Kurban Höyük	Turkey	South East	Euphrates Valley	Early Bronze Age	Wattenmaker	1987	TKH	1236
Sos Höyük	Turkey	South East	Pasinler Valley	Early Bronze Age	Howell-Meurs	2001	TS2	2762
Arslantepe	Turkey	South East	Malatya	Early Bronze Age	Bartosiewicz	1998	TAT	3836
Gritille	Turkey	South East	Euphrates Valley	Early Bronze Age	Stein	1987	TGR	1178

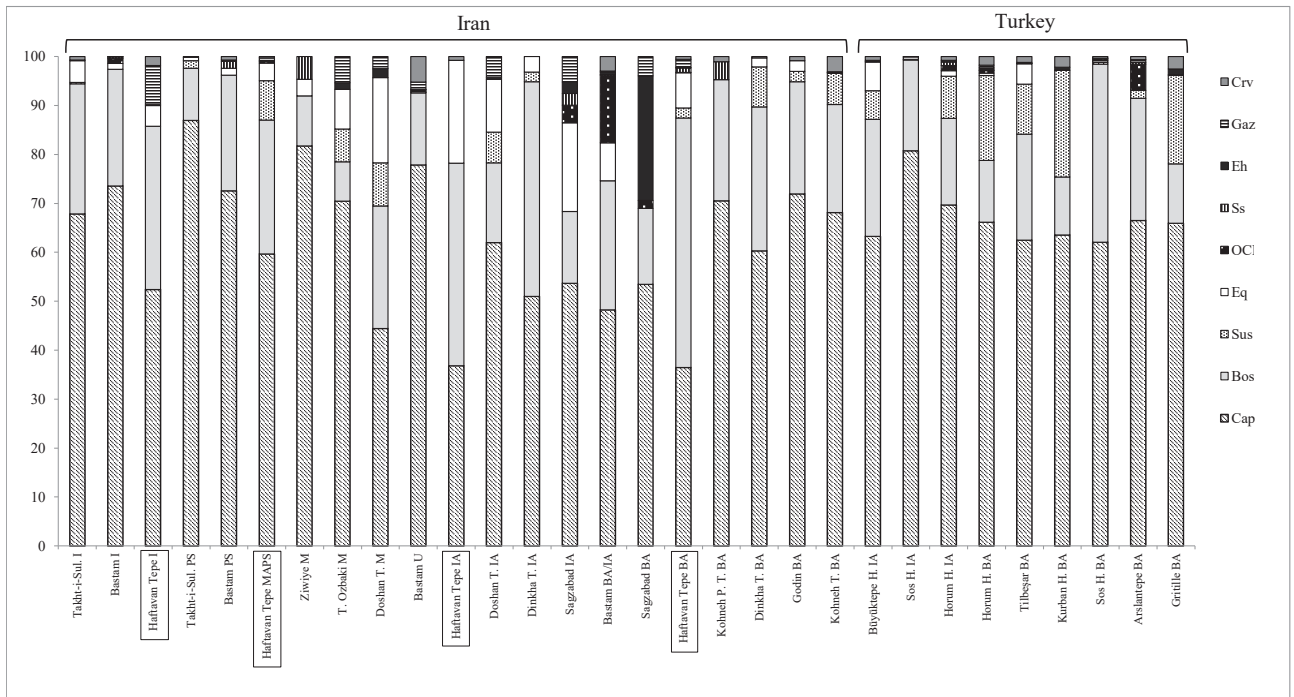


Fig. 11.14. Top: archaeological sites in the northwest of Iran and southeast of Turkey used to compare with Haftavan Tepe. Bottom: distribution of principal species in Iranian and Turkish archaeological sites. BA=Bronze Age, IA=Iron Age, U=Uratian, M=Median, A=Achaemenid, P=Parthian, S=Sassanian and I=Islamic.

(*Sus scrofa*) and cervids (red deer / Dama) (SC) living in humid bushy environments, onager (*Equus hemionus*) and gazelle (EG) living in steppe environments and finally wild caprines (*Ovis orientalis*, *Capra aegagrus*) (OC) living on foot hill and high altitudes.

In order to eliminate the effect of overwhelming contribution of caprines, we decided to consider this group as an illustrative variable. In this analysis, the sites are mainly classified in six different groups.

The two groups of domestic equids and suids seems to be separated highly in the factorial plan, around which appear the sites with the high contribution of these animals: Sagzabad with a high percentage of equids and three Turkish sites of Kurban Höyük, Horum Höyük and Gritille with a high percentage of suids, all belong to the Bronze Age.

The four other groups are classified together because of different characteristics and various reasons. Between the two groups of domestic equids and suids, the three Iranian sites in the north of Central Plateau, Doshan Tepe (Iron Age), Doshan Tepe (Median) and Tepe Ozbaki (Median) are grouped together because of a relatively similar contribution of equids, suids and also bovines.

Haftavan Tepe during the Iron Age has a high percentage of bovines and a relatively high contribution of equids. The more or less same characteristics in the Bronze/Iron Age of Bastam located near Haftavan Tepe and Sagzabad make a single group of these three sites.

The relatively high contribution of bovines followed by suids in the historical period of Haftavan Tepe (MAPS) is the main characteristic which one could observe in the Iranian sites of Takht-i-Suleiman (Parthian/Sasanian), Kohneh Pasgah Tepesi and Dinkha Tepe (Bronze Age) all located in Azerbaijan near Haftavan Tepe and the Turkish sites of Büyüktepe Höyük, Horum Höyük (Iron Age) and Tilbeşar (Bronze Age).

During the Bronze Age of Haftavan Tepe, the percentage of bovines is the highest. During the Early Islamic period of this site also, there is a high contribution of cattle but the position of this site in the factorial plan is affected by the highest percentage of gazelle. The domination of bovines is the main characteristic of all of the sites situated in this group: Kohneh Pasgah Tepesi and Dinkha Tepe (Iron Age), Takht-i-Suleiman (Late Islamic), Ziwiye (Median), Bastam (Uartian, Parthian, Sasanian and Islamic) finally Godin Tepe (Bronze Age). In this group, all of the Iranian sites except for the latter are situated in Azerbaijan. This phenomenon may characterise the domination of bovines in this region. There are also two Turkish sites in this group: Arslantepe and Sos Höyük (Early Bronze and Iron Age).

In this analysis we observe that there is no chronological structure and the grouping of sites is mostly according to ecological, geographical and practical (such as hunting and herding) factors.

In order to have a better understanding of this structure, there is the possibility to have a hierarchical classification directly based on the FCA analysis (Fig. 11.16). The result

is more or less the same as FCA analysis, which means that there appears no chronological structure. It represents firstly the hunting and herding activities and secondly the ecological structure of the sites.

Haftavan Tepe during all of its periods is characterised by the high contribution of bovines. During the historical periods (MAPS), Haftavan is situated a little far from the other periods of this site, which is the affect of the highest contribution of suids in this period. The sites in which the wild species are abundant, Ziwiye, Bastam, Sagzabad and Arslantepe, are located in the hunting area. The two different areas for hunting which are located opposite to each other demonstrate the ecological differences: humid and arid environments. All of the other sites have more important herding strategies in comparison to hunting. The position of the sites in hierarchical classification depends to the abundance and the scarcity of each animal in related region.

Globally, the exploitation of domestic suids seems to characterize the Turkish sites and the high contribution of bovines the Iranian sites, mostly in its northern part.

## Conclusion

Haftavan Tepe faunal remains have shown an important potential for the reconstruction of subsistence economy during the Early Bronze Age through to Islamic period in northwestern Iran.

The analysis of the faunal remains recovered in Haftavan Tepe indicates that the population of the site independently of the period of occupation did not rely on hunting. Cattle is obviously the principal base of the subsistence for all periods. This feature is combined with other archaeological data (extended architectural remains, a very important pottery production, the favorable ecological location of the site and resource availability, etc.). The reliance on domesticates and agriculture, which was highly suggested by the age profiles and bone pathologies are all indicative of an agro-pastoralist sedentary population.

Although the proximity of Lake Urmia to the site can be a food resource, the absence of fish and the scarcity of bird remains are noticeable, even in the absence of sieving during the excavation.

Among the osteological remains, human bones were identified in the Middle and Late Bronze Age levels. This was rather unexpected and might indicate the presence of anonymous graves or mixed materials during the excavation.

Concerning the herding strategies in Haftavan Tepe, based upon the osteoarchaeological data, it is obvious that cattle was exploited mainly for butchery products during Bronze and Iron Age and the use of animals for agricultural activities is apparent. But the exploitation of cattle has changed in the MAPS: the exploitation of milk was the main aim and the use of strength was light. For the caprines and more precisely for sheep, during the Bronze Age, Iron Age and Islamic period, the exploitation

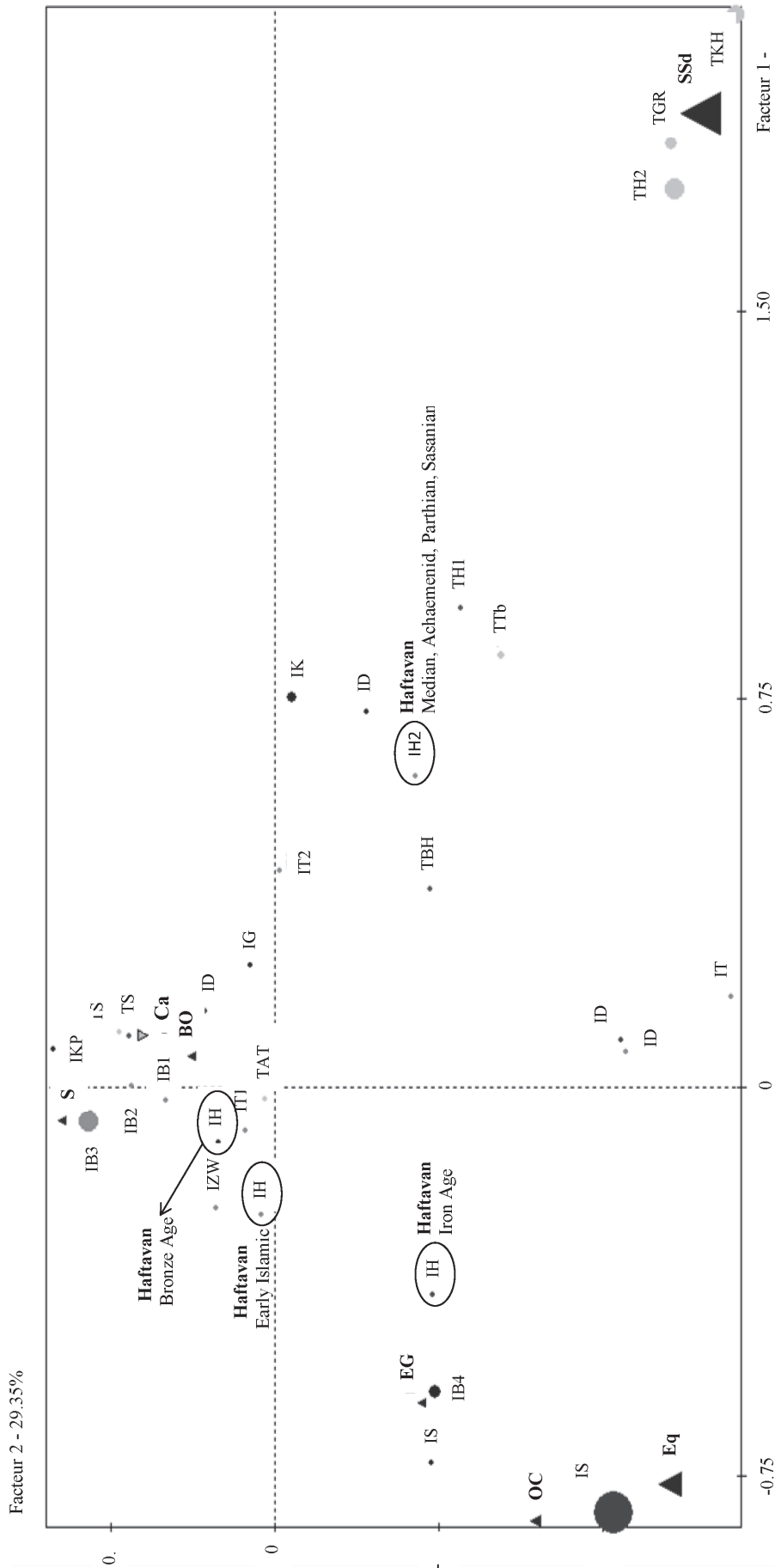


Fig. 11.15. Factorial Correspondence Analysis of examined sites in Iran and Turkey. The variables (triangles) are the animal groups and the individuals (circles) are the sites. The two first factorial axes represent 68.6% ( $F1=39.4\%$  and  $F2=29.4\%$ ) of the total projection of the variation on the factorial plan ( $F1 \times F2$ ). The group of domestic caprines (Cap) is considered as illustrative variable.

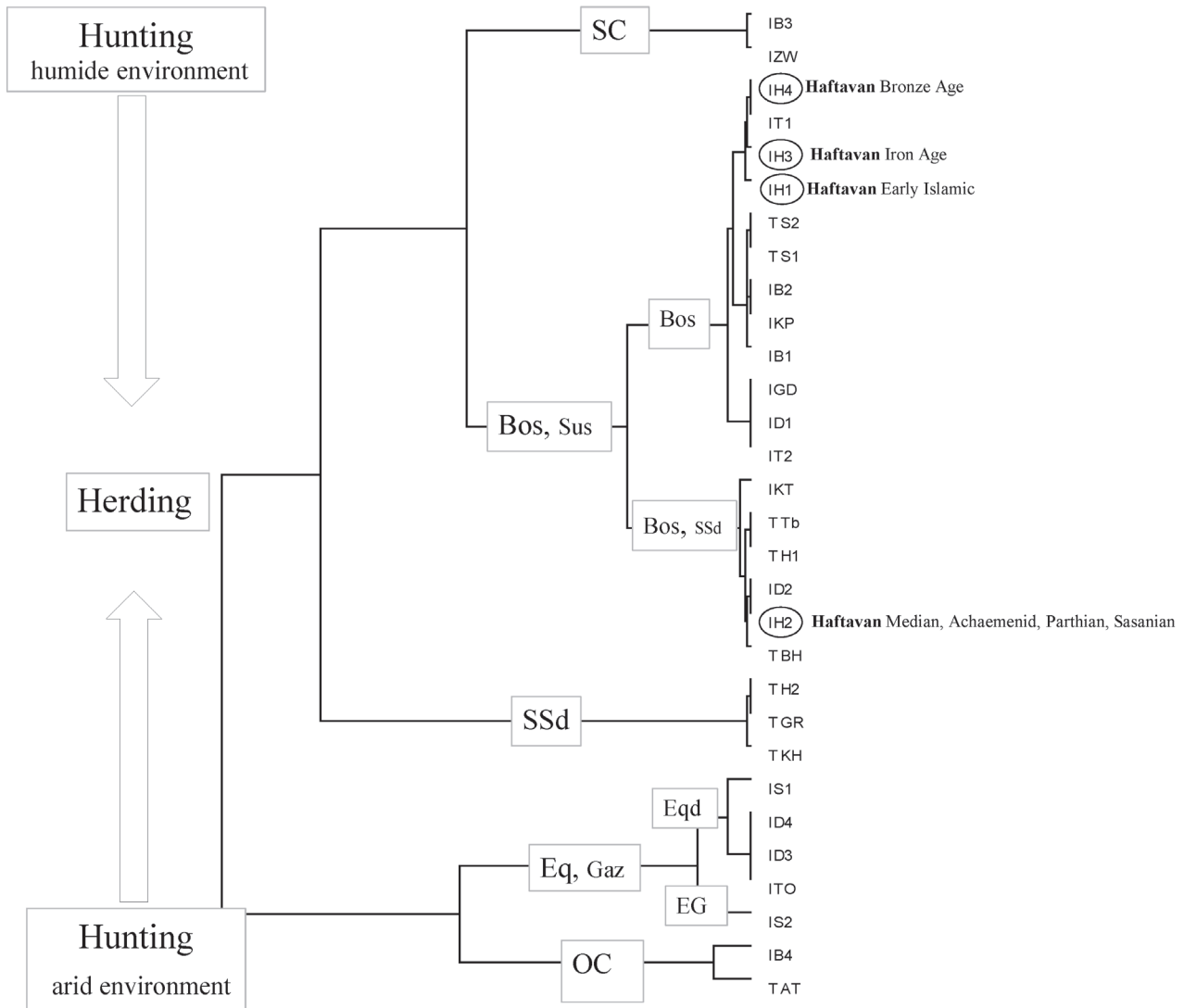


Fig. 11.16. Hierarchical classification of all examined sites of Iran and Turkey based on the FCA analysis (Cap = illustrative).

of animals is concentrated on milk, whereas in the MAPS, the exploitation is mainly based on meat. In Haftavan Tepe, according to the slaughter patterns, which are performed on a very large and significant sample, a mixed exploitation of all products is clearly visible in all periods and no specialisation can be observed. This is typically the case in rural communities or small urban sites.

Also, it should be noted that despite the fact that the Iron Age period in Haftavan Tepe is very well represented archaeologically, it is much less represented in faunal remains. Thus, further archaeological excavations seem necessary to augment the available data mainly to understand the connection between the Bronze Age and the historical periods.

The characterisation of the subsistence economy of Haftavan Tepe and adjacent sites in Iran and Turkey shows a dichotomy in the orientation of the subsistence towards hunting or herding and influence by local environmental

conditions. The situation of Haftavan Tepe shows the low importance of hunting in all periods of its occupation. Domestic cattle is essentially represented in the Bronze Age, Iron Age and Early Islamic period but in the historical periods the cattle and pig contribute to the diet. The high contribution of cattle in Haftavan Tepe, not only shows the exploitation of this animal as the main food source, but also represents the development of agriculture by practicing draught animal. This phenomenon is confirmed by traces of pathology on the extremities. The high representation of cattle in almost all periods of occupation in this site leads us to conclude that Haftavan Tepe was a sedentary occupation during all of its periods.

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### Note

- 1 Age profiles were performed following the protocol initiated by Helmer and Vigne, reproduced in Bréhard (2007).

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