

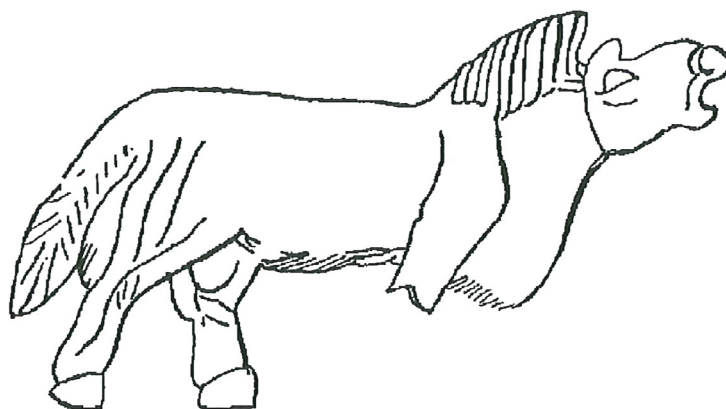


# ARCHAEOZOOLOGY OF THE NEAR EAST IV B

Proceedings of the fourth international symposium on the  
archaeozoology of southwestern Asia and adjacent areas

edited by

**M. Mashkour, A.M. Choyke, H. Buitenhuis and F. Poplin**



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Przewalski from Susa (nacre – mother of pearl)

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# **FAUNAL REMAINS OF AL-BUHAIS 18 AN ACERAMIC NEOLITHIC SITE IN THE EMIRATE OF SHARJAH (SE-ARABIA) - EXCAVATIONS 1995-1998**

Margarethe Uerpmann<sup>1</sup> and Hans-Peter Uerpmann

## **Abstract**

Al-Buhais 18 is the first Neolithic site in the interior of SE-Arabia which has yielded a large enough sample of animal remains to allow well-founded remarks to be made on its animal economy. Contrary to expectations based on the desertic environment and on the many arrowheads found at some roughly contemporary sites, the animal bones from al-Buhais 18 do not reflect a hunter-gatherer way of life. About 90% of the bones are from domestic animals. Apart from sheep and goat, cattle were quite important.

## **Résumé**

Al-Buhais 18 est le premier site néolithique de l'intérieur dans le sud-est de l'Arabie qui ait fourni un échantillon suffisamment important de restes fauniques pour permettre d'avancer des hypothèses solides sur l'économie animale de cette région. Contrairement à ce qu'on pouvait attendre d'après l'environnement désertique et de nombreuses pointes de flèche découvertes sur des sites sensiblement contemporains, les restes animaux d'Al-Buhais 18 ne reflètent un mode de vie chasseur-cueilleur. Environ 90% des os appartiennent à des animaux domestiques. En dehors du mouton et de la chèvre, le bœuf tenait aussi un rôle important.

**Key Words:** Neolithic, Pastoralism, SE-Arabia

**Mots Clés:** Néolithique, Pastoralisme, Sud-Est d'Arabie

## **Introduction**

The site of al-Buhais 18 (BHS18) was found in 1995 by an archaeological team of the Directorate of Antiquities of Sharjah Emirate led by Sabah A. Jasim. Since 1996 it is excavated in yearly seasons by a joint project of the local authorities and the Institute of Pre- and Protohistory of Tübingen University. The project is generously supported by the Ruler of the Emirate, H.H. Dr. Sultan bin Mohammad al-Qasimi. The present report deals with the faunal remains from the excavations 1995 to 1998.

BHS18 is located at about 25° N and 56° E in the interior of the Oman Peninsula some 60 km both from the coast of the Arabian Gulf to the west and the Gulf of Oman to the east. Its main feature is a graveyard. More than 275 individuals have been recovered there. Animal remains were encountered in the fill of the graves and particularly in a stone midden bordering the graveyard towards the plain to the east.

Apart from the firepits there is no evidence for any more durable settlement installations. The site does not seem to have been a permanent settlement. There are radiocarbon dates on ashes from several pits, which cluster around 4700 cal. BC, and span the time between about 5100 and 4200 cal. BC.

The preservation of animal bones at this site is mainly due to the formation of the stone midden. The fire-cracked cobbles, which form the midden, are interpreted as discarded heating and cooking stones. Between them they have preserved the ashes removed from the fire pits containing burnt bone and flint. There are, however, unburnt bones and flints as well scattered around the fires. All the bones are highly fragmented. On the whole, animal bone preservation is bad, but compared to the complete

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Table 1. Taxonomic quantification of the 1996-1998 animal remains from BHS18

	NISP	NISP%	WISP (g)	WISP%
Unidentified, small to medium-sized	2	0.1	2.4	0.1
Unidentified, medium-sized	2148	71.6	2415.6	67.7
Unidentified, medium-sized to large	629	21.0	611.1	17.1
Unidentified, large	160	5.3	494.6	13.9
Unidentified, very large	2	0.1	25.6	0.7
Unidentified	61	2.0	21.4	0.6
Unidentified, total	3002	100.0	3570.7	100.0
Cattle, <i>BOS</i>	227	8.3	1348.6	26.7
Sheep, <i>OVIS</i>	42	1.5	297.0	5.9
Goat, <i>CAPRA</i>	51	1.9	200.1	4.0
Goat or sheep, <i>CAPRA/OVIS</i>	2245	82.5	2739.4	54.3
Domestic animals, total	2565	94.2	4585.1	90.8
Unidentified small ruminants	113	4.2	108.8	2.2
Domestic or wild animals	113	4.2	108.8	2.2
Wild ass, <i>Equus africanus</i>	15	0.6	171.5	3.4
Wild camel, <i>Camelus</i> spec.	5	0.2	79.0	1.6
White oryx, <i>Oryx leucoryx</i>	11	0.4	62.3	1.2
Gazelle, <i>Gazella</i> spec.	10	0.4	35.0	0.7
Wild goat or ibex, <i>Capra</i> spec.	2	0.1	4.6	0.1
Unidentified bird, <i>Aves</i> indet.	1	0.0	1.6	0.0
Wild animals, total	44	1.6	354.0	7.0
Wild and domestic animals, total	2722	100.0	5047.9	100.0
Identified specimens	2722	47.6	5047.9	58.6
Unidentified specimens	3002	52.4	3570.7	41.4
Animal remains, total	5724	100.0	8618.6	100.0

loss of organic finds at most contemporaneous sites they still yield invaluable information about the subsistence activities of the population using the site during the 5<sup>th</sup> millennium BC. A quantitative species list for the animal remains excavated in the years from 1996 to 1998 is given in Table 1. The same species are present in the finds from 1995, but not all bones were collected during the first soundings and therefore the finds of this year are excluded from quantification.

### Wild animals

With the exception of a fragment of a bird bone, which could not be identified any further, all remains of wild animals are from ungulates. All of the specimens are fragmented and most of them burnt. There is no indication that they do not belong to the anthropogenic fauna of the site.

### Wild ass, *Equus africanus*

Most of the wild ass remains are represented by teeth and fragments. According to the enamel pattern of the lower cheek teeth there can be no doubt that the local wild equid was an ass and not a horse, hemione or zebra. Metaconid and metastylid are well rounded and almost symmetrical with regard to the “double knot”. The lingual sulcus between them forms a sharp “V”, and the labial “valley” does not regularly enter the isthmus. These are the typical characters of ass teeth. The occurrence



of *Equus africanus* at a site of the 5<sup>th</sup> millennium BC in the Oman Peninsula confirms earlier observations that Arabia was part of the natural range of this species (Uerpmann 1991).

### **Wild camel, *Camelus spec.***

There are only 5 fragments which can be identified as camel remains with a sufficient degree of certainty. The best specimen is a diastema fragment of a left mandible which cannot be confused with any other species of large ungulate. It is slightly burnt and encrusted with ash. Therefore, there is no doubt that this and the other four camel bones belong to the 5<sup>th</sup> millennium context of the site. Modern camel bones are found dispersed on the surface all along the eastern side of Jebel al-Buhais, but their preservation is different at all taphonomic stages between the death of the animals and the final cracking, crumbling, and disappearance of the skeletons.

The diastema region of the mandible is different between the two species of Old World camelids. In the two-humped camel it is more massive, deeper, and appears flattened medio-laterally. The specimen from BHS18 clearly represents the more rounded form found in the one-humped species. It could therefore be identified as *Camelus dromedarius*, but this Linnean name was based on the domestic dromedary and should therefore not be used for a wild animal. The name *Camelus arabs* seems to be appropriate for the wild ancestor of this most characteristic Arabian animal. However, five small bone fragments are an insufficient base for the description of a “new” species. This has to remain a task for a future revision of the early camel remains from the Arabian Peninsula.

The identification of the camel bones from BHS18 as remains of a *wild* camel is only based on the dating of the finds. There is no convincing evidence for the occurrence of domestic dromedaries before the middle of the 2<sup>nd</sup> millennium BC when the animal starts to appear in the historic records of Mesopotamia (Heimpel 1980). Camel remains from 3<sup>rd</sup> millennium sites in SE-Arabia (such as Umm an-Nar, Hoch 1979) are more likely to represent hunted wild animals, although this remains a matter of belief until good biological or archaeological evidence for their wild or domestic status can be produced. Importance as a meat producer, which is the main argument for a domestic status of the camel at Umm an-Nar, cannot be inferred from the few camel bones found in BHS18. Belonging to a period two millennia earlier than the Umm an-Nar culture, the camel remains from BHS18 most likely represent the wild ancestor of the Arabian dromedary. Its later use as a domesticate in the same area is well attested by archaeozoological finds at Mleha and al-Buhais 12 (Mashkour 1997, Uerpmann 1999, Uerpmann and Uerpmann 1999).

With regard to the almost non-existing evidence for the former occurrence of a wild dromedary, the importance of the finds from BHS18 must be emphasised. The hypothesis that the dromedary is but a domestic variant of the two-humped Central Asian wild camel (Herre and Röhrs 1973) was partly based on the lack of wild dromedaries in Arabia. This hypothesis, which in any case is unlikely because of the marked biological differences between the two kinds of Old World camels, loses even more of its credibility with the finds from BHS18.

### **White oryx, *Oryx leucoryx***

The white or Arabian oryx is a medium-sized antelope which was endemic to the deserts of the Arabian Peninsula. During this century it has disappeared as a wild animal because of over-hunting, but populations still exist in zoos and parks. In prehistoric times the species must have been quite abundant. Its bones are found at most sites in the UAE which have been evaluated for their faunal remains (Uerpmann 1987).

From BHS18 there are bones from all areas of the skeleton, among them fragments of the frontal area with the base of the characteristic round and straight horns. As an animal adapted to the arid desert-steppes of the Peninsula, the white oryx is an indicator of environmental conditions at BHS18 which were not too far different from those prevailing there today.

### **Gazelle, *Gazella spec.***

Although only 10 gazelle bones are listed in table 1, this was the game animal most frequently hunted by the ancient inhabitants of the site. Given the highly fragmented nature of the finds from BHS18, many gazelle remains could not be separated from the sheep and goat bones. A large proportion of the “unidentified small ruminants” may in fact be gazelles. Due to the bad preservation of the bones, it is not possible at present to determine which species of gazelle occurred in area of the site during the 5<sup>th</sup> millennium, although on ecological grounds it seems likely that they represent the eastern form of the mountain gazelle, *Gazella gazella cora*.

### **Wild goat or ibex, *Capra spec.***

Some of the goat remains from BHS18 are clearly above the upper limits of the size range of Neolithic domestic goats, which were found at the site in numbers sufficient for an osteometric approach. Whether the large goat remains represent the wild goat, *Capra aegagrus*, or the Nubian ibex, *Capra nubiana*, cannot be decided yet, because none of the elements with valid characters for the discrimination of the two closely related forms has been found in a good enough state of preservation.

It has been argued that the former presence of wild goat or ibex in the Omani mountain range was unlikely because of the presence of the thar, *Hemitragus jayakari* (Uerpmann 1987). Interspecific competition was seen as causal to the disappearance of the genus *Hemitragus* from its range in the Middle Pleistocene extending at least as far west as southern France and Austria. The fact that the Arabian thar continued to exist in a habitat potentially suitable for members of the genus *Capra* suggested that these might not have reached the Omani mountains. The Wahiba Sands and the adjacent flatlands may have formed a barrier against the spread of the Nubian ibex northward beyond the present limits of its range in the Dhofar mountains. In the north, the Strait of Hormuz, separating the Musandam Peninsula from the mountain ranges of southern Iran, would have barred the wild goat from expanding its range southward. However, this last barrier did not exist at the maximum regression of the sea during the last Pleniglacial some 16,000 to 20,000 years ago when the Arabian Gulf was dry land and when the mouth of the Euphrates was at the eastern entrance to what is now the Strait of Hormuz. According to the evidence available from BHS18, the wild goat actually seems to have entered the Omani mountains at that time. However, at the southernmost extension of its geographical range this species may have been at the limits of its climatic tolerance and does not seem to have been a real threat to the Arabian thar. Obviously it was unable to replace it completely in the Omani mountains. On the other hand, the Nubian ibex coming from the south would most probably have been able to compete successfully with the thar if it had ever had the chance to cross the flatlands north of Dhofar.

Whether the thar was also hunted by the inhabitants of BHS18 cannot be excluded, because its remains may well have gone unrecognised among the sheep and goat bones from the site. According to the few comparative skeletons of this species in the Tübingen collection, the size range of the Arabian thar falls completely within the ranges of the Neolithic sheep and goats. Its morphological characters are also very close to these species, and only well preserved bones – which are lacking from the BHS18 material – would have allowed its secure identification.

### **Domestic animals**

Remains of domestic animals form the bulk of the bone finds from BHS18. Numerically they reach almost 95% of the total and by weight they comprise above 90%. This means that at least nine tenths of the meat consumed at the site came from domestic livestock.



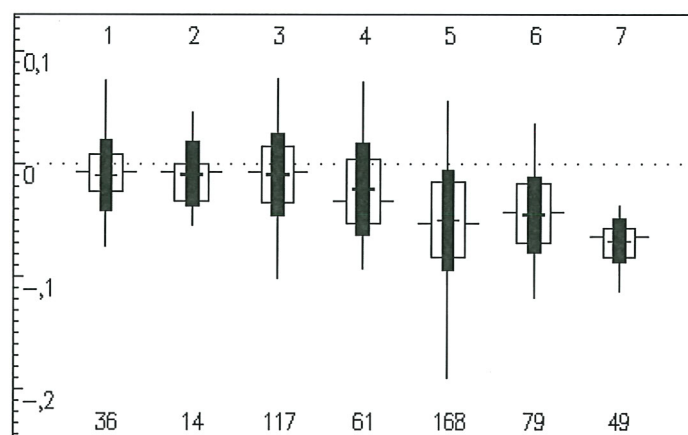


Fig. 1. LSI-distributions of sheep remains from sites in the Arabian Gulf area. 1= Nippur, 2= Uruk IV, 3= Qala'at al Bahrain 520, 4= Qala'at al Bahrain 519 I+II, 5= Saar, 6= Hili 8, 7= Al-Buhais 18

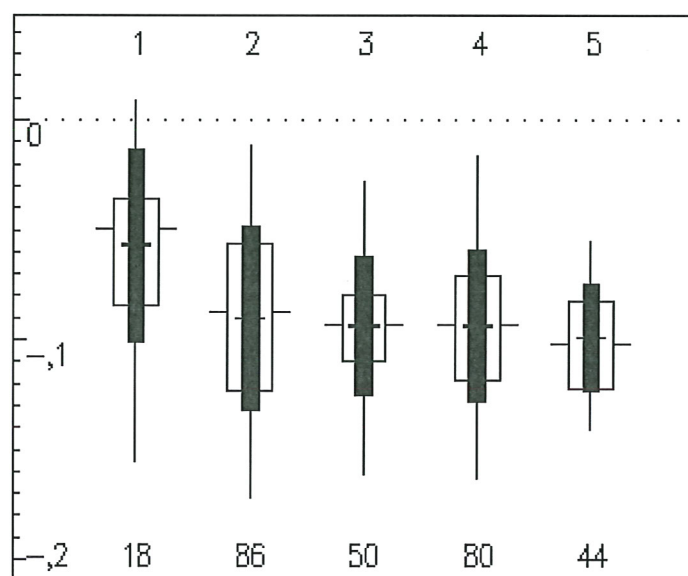


Fig. 2. LSI-distributions of goat remains from sites in the Arabian Gulf area. 1= Uruk IV, 2= Qala'at al Bahrain, 3= Saar, 4= Hili 8, 5= Al-Buhais 18

### Cattle, *BOS*

In numerical terms cattle were not very important, but the weight of the cattle bones from BHS18 indicates that about one quarter of the meat represented by the bone remains was beef (Table 1). Not much can be said about the cattle represented at the site because of the high degree of fragmentation of the bones. The average weight of the fragments is only 6 g. There is a strong bias in the presence of the various skeletal elements, leading to an overrepresentation of teeth and fragments of skulls and mandibles. Another over-represented area is the lower hind leg. In spite of the numerical bias it is obvious, however, that all regions of the skeleton are represented. According to their state of preservation not much osteometric information can be expected from the cattle finds. Only the lower third molars have yielded a small series of measurements. The average length of the M3 is  $37.3 \pm 2.03$  mm ( $n=7$ ), while an astragalus has a lateral length (LL) of 73.4 mm. On the whole the bones represent animals in the medium to upper size range of prehistoric cattle.



### Sheep, *OVIS*, and goat, *CAPRA*

Less than 5% of the sheep and goat bones could be further identified. According to these better preserved finds, sheep bones are slightly less numerous than goat bones. Looking at the element list, however, reveals that the predominance of goats is only due to a number of goat horn cores which have no counterparts on the side of the sheep. Among the other elements sheep bones are a little bit more frequent than goat remains, which may in fact represent a minor numerical predominance of this species over the goats.

According to one find of a sheep frontal and parietal bone among the remains excavated in 1995, this female individual at least was hornless. The lack of identifiable fragments of sheep horn cores is an indication that this may have been the case in most of the sheep at BHS18. Goats on the other hand had horns. Males are not represented among the finds described here. The female horns were quite small and slightly twisted. Their position on the frontal was more upright than in the typical goat breeds of SE-Arabia today, where the horns grow backward towards the neck, not rising above the face-line.

Compared to later prehistoric and early historic sheep and goats from the Gulf area the animals found at BHS18 were quite small. This is obvious from the graphic presentation of the distribution of their size indices (LSI) in Figs. 1 and 2. As far as is known by the authors no comparable measurements of Late Neolithic sheep and goats from Lower Mesopotamia have been published. In Syria (Upper Mesopotamia) small sheep have been found in contexts of the 6<sup>th</sup> to 5<sup>th</sup> millennium (e.g. Uerpmann 1982) which were replaced by larger breeds during the 4<sup>th</sup> and into the 3<sup>rd</sup> millennium (Zeder 1994: Table 9)

The most astounding observation about the small domestic ruminants found at BHS18 concerns their age spectra. The absence of young animal bones was already striking when the faunal remains were first examined during the excavations. It was corroborated by the later counts of open and closed

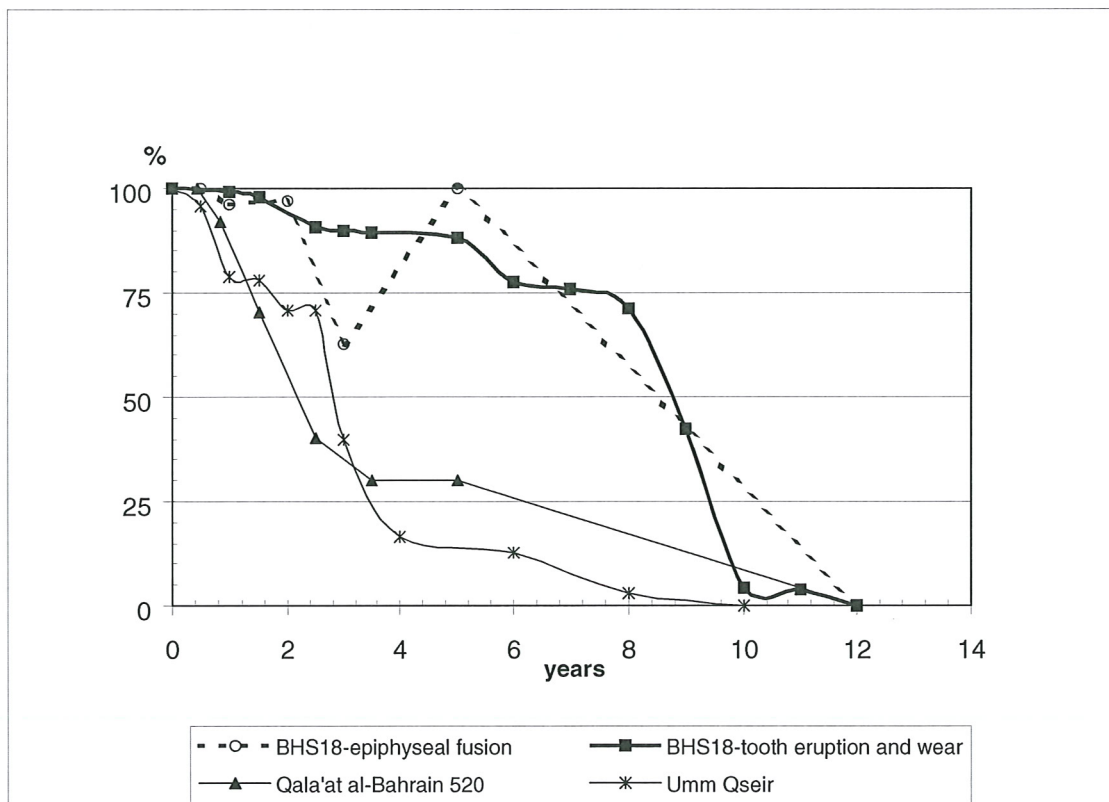


Fig. 3. Survival of sheep and goat at Al-Buhais 18 (in comparison to Qala'at al-Bahrain (Uerpmann and Uerpmann 1994) and Umm Qseir (Zeder 1994))

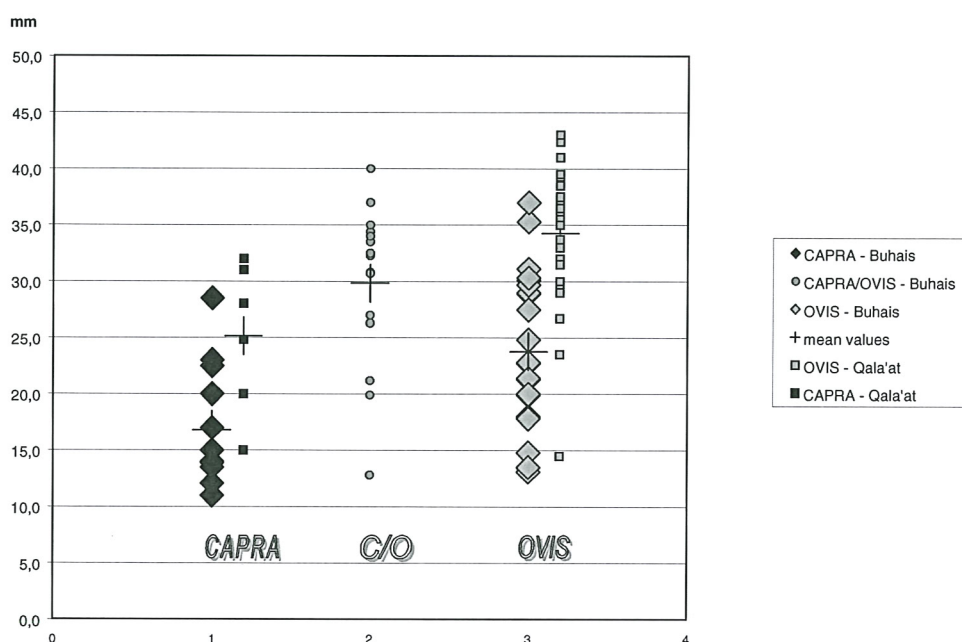


Fig. 4. Crown height of M3 in sheep (*OVIS*) and goat (*CAPRA*) from Al-Buhais 18 (in comparison to Qala'at al-Bahrain (Uerpmann and Uerpmann 1994, 1997)

epiphyses and tooth-eruption and -wear stages. As shown in Fig. 3 more than 75% of the small ruminants of BHS18 became fully adult – if not old – before they were slaughtered. The survival curve of the BHS18 sheep and goats is very unusual. 'Normal' survival curves are similar to those shown for Qala'at al-Bahrain 520 (Uerpmann and Uerpmann 1994) and Umm Qseir (Zeder 1994). These last curves are in the range of what was found by Redding (1981) and comply best with the usual herding strategies found in the Near and Middle East. It is unlikely that the particular age profile of the small ruminants of BHS18 is due to bad preservation of the bone finds. While this may have destroyed more of the postcranial elements from young rather than old individuals, the same differential loss is not to be expected in teeth and tooth-bearing jaws. There are very few milk teeth, and most of the permanent teeth are worn, some of them almost down to the roots.

Using the criteria described for Qala'at al-Bahrain (Uerpmann and Uerpmann 1994), the lower third molars of sheep and goats from BHS18 were separated. Their crown heights were plotted in Fig. 4. Although the teeth of the al-Buhais animals may have been slightly shorter from the beginning (in accordance with their smaller overall size) it is obvious that on average they were also more heavily abraded than the respective teeth from Qala'at al-Bahrain. Apparently, both species were kept to older ages at BHS18. In addition to the more advanced tooth-wear in general, the goat teeth are more abraded than the sheep teeth. Thus, goats became particularly old at al-Buhais. In the case of Qala'at al-Bahrain the advanced age of some goats was interpreted as evidence for milking. The even older age reached by the goats at BHS18, together with the fact that all the better preserved goat horn cores are from females, must lead to the same conclusion: Goats were already used for milking in this area during the first half of the 5<sup>th</sup> millennium BC. However, the lack of very young animals could be seen as contradictory evidence, because efficient milking depends on early slaughtering of the offspring.

The absence of young animal bones in both species of small ruminants and the strong deviation of the survival curve from known examples (Fig. 3) requires more general thought. The normal kill-off patterns in sheep and goat herding are determined by the demand for meat and milk on the one hand and the stable propagation of the herds on the other. Without any kill-off of young animals the herds would grow fast, because females of sheep and goat normally have their first young in the second year of life, and they reproduce every year, not rarely having twins. One female may thus have ten or more



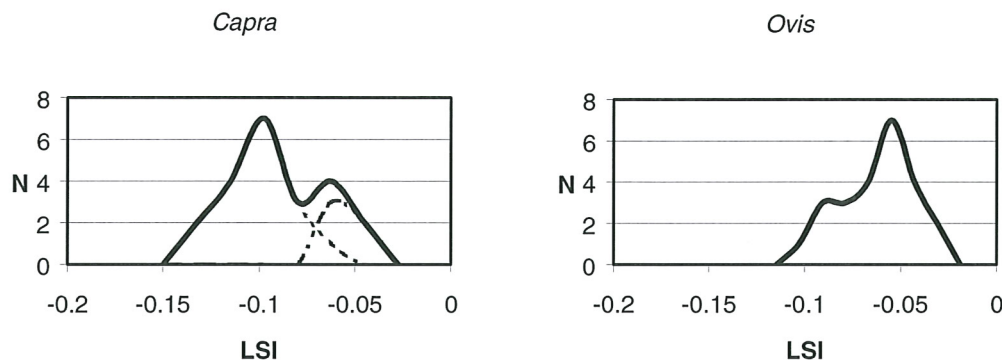


Fig. 5. LSI-distributions of *CAPRA* and *OVIS* at Al-Buhais 18 (1995 – 1998)

surviving lambs or kids, leading to a rapid exponential growth of the herd. At a rate of 1.1 lamb per female per year, a herd of 250 sheep would grow to a population of about 10,000 individuals within 11 (eleven!) years of human presence at BHS18. After 25 years it would have reached almost a million. It is self-evident that such an unlimited growth would have led to rapid overgrazing of the available pastures. Therefore, the survival curve of the small ruminants at BHS18 cannot represent the complete demography of the sheep and goats kept by the inhabitants of the area during the 5<sup>th</sup> millennium. There must have been a culling or population loss which is not represented by bone finds at the site.

The bones found at BHS18 can safely be interpreted as the remains of animals slaughtered and eaten at the site by the population who used the fireplaces. If the bones do not represent the complete potential of the herds, the missing part must have been consumed at other sites or in a way which did not create archaeological remains. Several scenarios can be imagined which might have led to the observed composition of the finds. Natural loss of animals due to starvation, thirst, or diseases – for example – would not have produced archaeological remains at the excavated site. Losses due to carnivore predation would have had the same result. Raiding could be considered as a special form of outside predation, but would probably have been mutual and therefore not visible in long-term accumulations of bone finds. Regular losses of larger parts of the herds due to any of these factors would certainly have prevented the herders from slaughtering more of the offspring than absolutely necessary. In a desert environment this may have been the basic reason for keeping herd animals to an advanced age at which time they had had enough offspring to reproduce themselves and to compensate for potential losses. However, there is evidence that this cannot be the only reason for the observed conditions.

As mentioned already, all the better preserved horn cores of goats are from females. There are no pelvic bones or other remains from which the sex could be determined. However, the distribution of LSI-values (Fig. 5a) for the goat remains indicates the presence of both sexes, although not in a one to one proportion. Males were much less frequent than females, as indicated by the areas marked with thin broken lines under the peaks of the curve in Fig. 5a.

The curve in Fig. 5b represents the same distribution in the sheep remains from BHS18. This curve is less easy to interpret. It is unlikely that only the left 'shoulder' of the sheep curve represents the females, because the ewes also prevail among those few bones which could be identified according to sex. There is a smaller overall size variation in the sheep remains, and it seems possible that bones of adult rams have not yielded any measurements at all. At least in the case of the goats, there is evidence that the two sexes were not equally represented in the population slaughtered at BHS18.

As in most mammals, male and female sheep and goat are born in almost equal proportions. If the number of males is reduced in adult populations this must be due to differential losses or culling. None of the natural causes of animal loss mentioned above is strongly differential with regard to sex. The most likely reason for the observed pattern is deliberate culling of young bucks and rams. How-

ever, if such differential culling was practised, it did not happen at al-Buhais, because the remains of young animals are rare. As a consequence it must be postulated that the culling happened somewhere else.

Pieces of evidence for a nomadic life of the inhabitants of al-Buhais have already been mentioned: The lack of architecture is the most important of it. The occurrence of secondary burials also points in this direction, because it indicates that skeletal remains of people who died elsewhere were brought to the burial ground from afar. Most of the adornments found with the primary burials are made of marine shells including some pearls. Connections to the coast must have been strong and were probably not restricted to the occasional collection of shells for bead-making. Two individuals tested for their carbon isotopes displayed  $\delta^{13}\text{C}$ -values around  $-16\text{‰}$ , which is indicative of a large proportion of marine food in their diet. These people seem to have lived at the coast not very long before they died but for long enough to incorporate measurable amounts of carbon from marine organisms into their bones.

Contemporary sites on the coast are known, but up to now they have yielded very few bone remains from domestic animals (Uerpmann and Uerpmann 1996). If the al-Buhais population spent part of its nomadic life-cycle at these coastal sites, these also do not seem to have been the places where culling of the young males happened. It is plausible, therefore, to postulate at least one further area inhabited during a major portion of the yearly cycle. This may have been the higher elevations of the Hajar Mountains, where pastures would have been available in summer, and where the high temperatures of that season would have been bearable. Culling of surplus of young animals would most probably have happened towards the end of summer and prior to moving on towards the coast, where life would have been best during winter. In spring the piedmont plains – where al-Buhais is located – would have been a most favourable area. Always comparatively lush because of its high water-table, it would then have become even greener after the occasional rains of late winter. At least temporarily it would have provided enough pasture for a larger number of animals during the parts of the life-cycle which require the agglomeration of more than a few families. This could explain why al-Buhais was chosen as some sort of ‘central place’ by a larger nomadic group, indicated by its use as a long-term burial site.

For the herds, this time of the year would have been the calving or lambing season. The strange survival curves of sheep and goats – and to some degree also of cattle – could best be explained as being the result of slaughtering those animals which did not give birth in that particular season. As no herder would normally kill a pregnant or freshly lactating female, those which had remained unfertile would in fact be the only ones available for consumption during this time of the year. The new lambs, kids or calves would not yet have been old enough to be slaughtered, and the culling of young animals from the year before would already have been completed in the late summer or early winter at other places occupied during the seasonal movements of the Buhais population.

## Summary and Conclusions

The animal remains from BHS18 provide insight into the subsistence of a population of nomadic herders for whom the site was a regular stopping place during seasonal movements. Sheep and goat together produced about two thirds and cattle about one quarter of the meat eaten at the site. On the whole, about nine tenths of the animal remains derived from domesticates and only one tenth from hunted mammals. These comprise the wild ass, *Equus africanus*, the Arabian oryx, *Oryx leucoryx*, and a small gazelle, probably *Gazella gazella cora*. In addition to these known members of the wild fauna of SE-Arabia there are some few small bone and tooth fragments of a dromedary, *Camelus dromedarius*, which must have come from hunted animals because there is no evidence for camel domestication at such an early date, and some bones of the wild goat or ibex, *Capra aegagrus* or *C. nubiana*, which have not yet been securely identified in prehistoric contexts in the area. The wild fauna does not indicate that there were major environmental differences between the early fifth millennium and the present time.



The Neolithic cattle were medium-sized and somewhat larger than the Arabian zebu, which were kept in the area before the introduction of European breeds. Sheep and goats were similar in size to the unimproved local breeds of today. According to size and proportions of the bones most of the remains are from females. Their vast majority is from old animals. Goats had even more abraded teeth than sheep, indicating that they were kept as long as possible. In all probability this shows that goats – and possibly sheep as well – were used for milking. Therefore the contribution of these animals to human subsistence may even have been higher than reflected in the quantities of bone.

The lack of immature bones - resulting from the culling of young animals in order to control herd-sizes - indicates that the bones found at al-Buhais are only a seasonal part of the faunal remains left behind by the Neolithic population. It is likely that al-Buhais was visited by these people in spring. During the hot season they may have moved to the higher areas of the Hajar mountains where, however, no sites of this period have yet been discovered. In winter the same population must have been staying at the known coastal sites where the subsistence was mainly based on shellfish. The faunal remains from al-Buhais 18 are among the few examples where animal bone finds give good demographic evidence for nomadic movements of prehistoric populations.

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