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ZOOARCHAEOLOGY AT ACEMHÖYÜK 2013

Benjamin S. Arbuckle*

Keywords: *Bronze Age • Fauna • Zooarchaeology • Horse • Donkey • Wolf*

Abstract: This paper describes the results of zooarchaeological research undertaken at the Bronze Age site of Acemhöyük, Aksaray, central Turkey during the 2013 field season. Analysis of fauna from Early as well as Middle Bronze Age contexts provides the first evidence for diachronic changes in the animal economy at Acemhöyük through the Bronze Age. In addition, preliminary results of the ongoing analysis of *Equid* remains are also discussed. Finally, a rich assemblage of fauna including a wide range of *wild taxa* perhaps associated with elite hunting practices are described from area CB-DB/49-48.

ACEMHÖYÜK 2013 YILI ZOOARKEOLOJİ ÇALIŞMALARI

Anahtar Kelimeler: *Tunç Çağı • Fauna • Zooarkeoloji • At • Maymun • Kurt*

Özet: Bu çalışmada, Aksaray ilinde yer alan Acemhöyük'ün 2013 yılı kazı sezonu boyunca Tunç Çağı yerleşimindeki zooarkeolojik araştırmaların sonuçları incelenmiştir. Eski Tunç Çağı tabakalarının yanı sıra Orta Tunç Çağı kontekstlerindeki fauna analizleri, bu dönemler boyunca Acemhöyük hayvan ekonomisinde, art zamanlı değişimlerin ilk kanıtını oluşturmaktadır. Buna ek olarak, *Equid* kalıntılarına dair devam eden analizlerin ön değerlendirme sonuçları da bu çalışmada tartışılmaktadır. Son olarak, CB-DB/49-48 alanlarındaki, çok sayıda *wild taxa* içeren ve zengin bir faunanın varlığına işaret eden örnekler, elit sınıfın av pratikleriyle ilişkili olarak yorumlanabilir.

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Introduction

With the permission of the Ministry of Culture and Tourism and the General Directorate of Monuments and Museums, analysis of the Acemhöyük archaeozoological collection took place from July 20-25, 2013 at the Acemhöyük excavation house in the village of Yesilova, Aksaray. This represents the fourth season of zooarchaeological research at Acemhöyük. In this short time approximately 10,000 faunal specimens were examined; of these, 1610 represent diagnostic specimens¹ and were the focus of detailed data recording. This brings the total number of diagnostic specimens recorded at Acemhöyük to 11, 287.

The broad goals of zooarchaeological research at Acemhöyük are to reconstruct the nature of the animal economy and its change over time during the tumultuous rise and fall of the settlement as the center of a major Bronze Age polity in central Anatolia. To this end, we have defined some of the primary characteristics of the urban animal economy at the site, especially in the levels III and II (Middle Bronze Age), and undertaken detailed examinations of the production, distribution and consumption of sheep and goats, including analyses of the relationship between the urban center at Acemhöyük and its rural hinterland². Current work has expanded our focus to develop a detailed diachronic perspective that addresses the development of the animal economy in the Early Bronze Age,

especially in regards to the appearance of *Equids*, including both donkeys and horses, and the production of wool and dairy products. We believe that both domestic *Equids* (especially donkeys involved in the caravan trade) and wool production were central components of Bronze Age polities and the rich faunal assemblage from a large center like Acemhöyük provides us with a unique opportunity to define how these systems were structured in the Early and Middle Bronze Age of central Anatolia.

Results of Radiocarbon Dating

Archaeozoological research at Acemhöyük has included a program of radiocarbon dating of faunal specimens (Table 1). Seven results have been obtained for levels IV and XI which place these levels at the end of the third/beginning of the second millennium and the early third millennium BC (calibrated) respectively. Additional samples are currently being analyzed from levels V, IV and II; samples from level II will provide the first radiometric dates for this occupation phase and will have important implications for understanding the occupational history of the site following the destruction of the level III settlement in the Middle Bronze.

Faunal Results

During the 2013 season, a total of 1610 diagnostic specimens were recorded from deposits representing the Early and Middle Bronze Age (levels XI, V, IV, III, and II) as well as the Ottoman period (Table 2). Samples from the Early Bronze Age (level XI) are limited but provide the first evidence for the nature of the animal

¹ Arbuckle 2009, 131; Arbuckle 2006, 250.

² Arbuckle 2012; Arbuckle – Öztan – Gulçur 2009; Öztan – Arbuckle 2011, 223 ; Öztan – Arbuckle 2013, 281.

economy at Acemhöyük in the early third millennium. Here, sheep and goat are the most abundant *taxa* followed by cattle which are also well represented (Table 3). The remains of pigs are very rare, representing only two percent of the EBA assemblage, while a small *Equid* (likely representing domestic donkey), dog (*Canis familiaris*), and red deer (*Cervus elaphus*) are also present. Although eight specimens were identified as red deer, only one of these, a scapula (BG=27.6mm), represents a postcranial element; the remaining seven specimens are fragments of (one?) antler.

The majority of the recorded specimens derive from Middle Bronze Age loci from areas CB-DB/49-50, SA/36, and from a sondaj in room 6 of the Sarıkaya Sarayı. These deposits represent levels V, IV and III and date to the first centuries of the second millennium BC providing valuable evidence for the animal economy throughout the span of the MBA. In all of these MBA loci sheep and goat are the dominant *taxa* followed by cattle. Cattle decline from level V, where they represent 26% of the assemblage, to 14% in level III (area SA/36). As a result of the decline in cattle, sheep and goat increase to their highest levels (67%) in level III (area SA/36). Pigs consistently represent approximately ten percent of the fauna samples in levels V-III (a pattern which continues in to level II as well). Dogs (n=31) and small *Equids* (likely representing domestic donkeys; n=28) are well represented in the MBA deposits. Red deer are represented by two postcranial specimens (a radius-ulna, and

a second phalanx) and an antler fragment.

In level II, dating to the end of the Middle Bronze Age or possibly the Late Bronze Age, we see species frequencies that are very similar to those in level III, although there is some variation in the proportion of *taxa* between areas. In general, though, sheep and goat dominate (c. 60%), followed by cattle (c. 20%) with pigs consistently representing approximately ten percent of the level II fauna.

These preliminary results concerning taxonomic representation provide the first picture of diachronic changes in the organization of the animal economy at Bronze Age Acemhöyük. Although, as previously reported, the animal economies present in level III and level II are remarkably similar, our data suggest that the EBA economy was different. The primary difference is in the very low frequencies of pigs in the samples from level XI, representing the Early Bronze Age. Although it is possible that the near absence of pigs in the EBA loci is a result of sampling bias related to the location of the excavation units near the ancient city wall (DB/50, DB/52, EB/50) where, perhaps, pig remains were not deposited, it is also possible that the early third millennium economy at the site simply did not focus on the management of swine. Further sampling of EBA levels from elsewhere at the site is necessary to resolve this issue.

Finally, a small sample of material deriving from Ottoman period contexts was recorded. In the Ottoman period villagers frequently buried complete don-

keys on the mound and one of these burials was examined and detailed skeletal and dental measurements were taken. In addition, a single specimen (a mandible) representing a camel was identified from Ottoman period deposits in area FB/48-49. This is the first identification of camel at Acemhöyük.

Equids

An ongoing focus of zooarchaeological research at Acemhöyük is on understanding the role of *Equids* including both domestic donkeys (*Equus asinus*) and horses (*Equus caballus*) in Bronze Age Anatolia. Domestic donkeys first appear in Anatolia in the Late Chalcolithic (fourth millennium) and it is likely that their introduction is linked to the expansion of economic influence from the northern Levant in the Uruk period. In the Middle Bronze Age, it is clear that the polity centered at Acemhöyük was a key player in the Assyrian trade network and also played a key role in internal Anatolian trade systems³. It is clear from the texts that this system was based on the use of donkeys as pack animals. It is not a surprise, therefore, that the remains of donkeys are abundant in MBA contexts at Acemhöyük (4% from level III; 13% from level IV; 5% from level V). The abundance of donkey remains in levels IV and V as well as the presence of two specimens in EBA level XI opens the possibility that Acemhöyük's role as a major node in regional trade networks may have extended back into the third millennium BC. In order to test this hypothesis future work will collect and ana-

lyze isotope data, particularly strontium, to identify the region of origin of the donkeys from Bronze Age Acemhöyük. Using this method it may be possible to identify evidence for development of donkey caravan systems throughout the region in the Middle and perhaps even Early Bronze Age.

Because of the difficulty in identifying fragmentary skeletal and dental remains to a specific *Equid* species, most *Equid* remains are preliminarily identified as "large" or "small" *Equid*. A second stage of more detailed morphologic and biometric analysis is then required to confirm the precise taxonomic identification. However, in most cases small *Equids* from Acemhöyük are thought to represent domestic donkeys while large *Equids* are thought to represent horses. Hybrids (including mules and hinnies) could also be present within either group. It is conceivable that hemione (*Equus hemionus*) x donkey (*E. asinus*) hybrids, which have been attested in Bronze Age Mesopotamia, could also be present in Anatolia⁴.

From the sample analyzed in 2013, 35 small *Equids* (likely donkeys) were identified along with four large *Equids* (likely horses). Of the small *Equid* remains, two were recovered in level XI. This indicates that donkeys were present at Acemhöyük in the early third millennium BC. Two specimens representing a large *Equid* (likely horse) were identified in the MBA sample studied in 2013. One of these (AC12312: a fragment of the innominate, LA=62.9mm) derives from area CB-DB/49-50 level V, which based

³ Michel – Veenhof 2010, 228.

⁴ Weber 2008, 501.

on radiocarbon results likely dates to c. 2000 BC (calibrated), while the other is from a level III context in area SA/35 and likely dates to the 18th century BC. The specimen from level V is particularly significant in that it represents one of the earliest examples of (presumably) domestic horse in the Near East⁵.

Although a detailed analysis of morphology and biometry is still needed before more detailed taxonomic identifications of the *Equidae* are offered, one specimen deserves particular notice. Specimen AC12216 comes from area CB-DB/48-49 (level V) and represents a small *Equid* mandibular third molar (Figure 1). The morphology of the enamel folds on the occlusal surface of this tooth are interesting since they do not conform to the usual pattern for a donkey. Instead, the buccal fold (ectoflexid) penetrates all the way to the lingual fold (linguaflexid) in a manner very similar to the typical morphology of *Equus hemionus hydruntinus*, a western Eurasian/European type of wild hemione, or half-ass⁶. This morphology has previous been noted at Acemhöyük in specimen AC175 (SA/37, level II/III)⁷. These two finds indicate either 1) a wide range of variability in donkey dental morphology, or 2) the presence of hydruntines, or hydruntine x donkey hybrids, in Bronze Age central Anatolia. Continued work, and perhaps ancient DNA analysis, will be necessary to clarify the taxonomic identification of the small *Equids* at Acemhöyük.

Canids

Remains of canids, including primarily dogs, are abundant at Acemhöyük and a total of 55 specimens were identified as *Canis* during the 2013 season. With the exception of a few specimens (see below) these remains are thought to represent domestic dogs (*Canis familiaris*). Of the dog remains, 12 specimens exhibit evidence burning, one has evidence for carnivore gnawing and seven bear cutmarks including a calcaneum, atlas, axis, proximal radius, distal tibia, proximal and distal humerus, and proximal ulna. We have previously reported on the prevalence of butchery marks in levels III and II indicating that dog carcasses were regularly dismembered likely for processing skins and perhaps for consumption⁸.

Measureable dental and postcranial remains support the identification of most of the medium sized canids as dogs. For example, six lower carnassial teeth (M/1) yielded length measurements (L = 21.4, 21.9, 21.8, 23.5, 22.3, 21.8; mean = 22.2mm). These measurements are smaller than published samples of modern wolves from Turkey, the Zagros and Portugal and only the two largest specimens overlap the two standard deviation range for modern Israeli wolves⁹. They are also comparable to domestic dogs remains from the nearby sites of Çatalhöyük and Köşk Höyük. Only the largest of these specimens is within the size range of a

⁵ Vila 2006, 102.

⁶ Geigl – Grange 2012, 88.

⁷ Öztan – Arbuckle 2013, 287.

⁸ Arbuckle 2006, 500; Öztan – Arbuckle 2013, 285.

⁹ Davis – Valla 1978, 608; Detry – Cardoso 2010, 2762.

small wolf, but may also represent a large dog.

In addition to this large first molar, two specimens representing postcranial remains are also within the size range of wolves. The first is a fragment of a large humerus (AC12255; Bd=38.1mm) which is within the lower range of large-sized European wolves and is a full 10mm larger than the average humerus breadth measurement from other Acemhöyük dogs¹⁰. This suggests that this outlier is an unusually large dog or, more likely, a wolf. Finally, a complete third metatarsal (AC12688; GL=84, Bd=11.1mm) was identified which is also within the size range of wolves (Figure 2)¹¹. This specimen is also interesting in that it exhibits a serious pathology with the entire shaft, up to the proximal end, is covered in heavy exostosis probably resulting from a trauma and/or major infection of the bone. It is likely that such a condition would have detrimentally affected the gait of the animal making it difficult for a cursorial hunter such as a wolf to survive in the wild. It is thus possible to hypothesize that this large canid, probably a wolf, may have been kept in captivity by the residents at Acemhöyük.

Deer

Red deer (*Cervus elaphus*) was the only species of deer identified during the 2013 season. Although fragments of antler are fairly common at Acemhöyük, postcranial remains were identified from levels XI, V, IV and II including first and second phalanges, scapula, humerus, and radius.

The presence of postcranial remains suggests that red deer were occasionally hunted. Given the importance of red deer in central Anatolian iconography in the Chalcolithic and Bronze Age¹², it is possible that these remains represent elite hunting activities—a topic that will be the focus of future work at Acemhöyük.

Area CB-DB49-48 level V

The largest sample of fauna recorded during the 2013 season came from area CB-DB/49-48, level V. The composition of the fauna in this area is interesting and differs from other areas of the site. In particular, what differentiates this area is the diversity of species represented and particularly the abundance of wild *taxa*.

For example, the *Equid* third molar exhibiting hydruntine-type morphology (described above) was recovered from this area as were the remains of red deer, fox, and hare which are otherwise rare at Acemhöyük. Massive sheep horncores were also recovered from this area (anterior-posterior diameter at base=57, 45, 70mm) suggesting the presence of wild mouflon which today still reside nearby in the Bozdag protected area¹³. A fragment of a very large *Sus* ulna, much larger than the typical remains of domesticates at the site, was also found suggesting that wild boar were also represented in this area. Canids are also relatively abundant in this area and the three largest specimens, which fall into the size range of wolves (and which potentially derive from the same individual), were all found in this excavation area. Finally, two large

¹⁰ Küchelmann 2009, 57.

¹¹ Küchelmann 2009, 57.

¹² Collins 2003, 73.

¹³ Kaya 1991, 135.

scapulae (AC12417 and AC12243) were also identified in this area. Although not yet identified to the species level these specimens represent large carnivores and the morphology of the preserved portion of the glenoid fossa suggests they do not belong to bear. Given the lack of other large carnivores in the region, it is possible, therefore, that these specimens represent large felids including either leopard or lion. These specimens are currently the subject of additional morphological analysis.

The abundance of wild *taxa* uncovered in area CB-DB/49-48 is unusual at Acemhöyük. The concentration of evidence for carnivores including possibly large felids, wolves and fox as well as deer, boar and mouflon potentially represent a signature for elite hunting and display activities which are well attested in texts in later periods. It is therefore necessary to turn to the features, ceramics and small finds recovered in this area in order to further contextualize the use of wild animals at Acemhöyük and explain their concentrated presence in this location.

Conclusion

Although a short season, the 2013 campaign of faunal analysis at Acemhöyük was productive and illuminative. Not only were important discoveries made (e.g., first camel remains at the site, possibly first large felids, first wolves, second potential wild half-ass, and an early domestic horse) but the sample of data collected and recorded add to our ability to describe the patterns of animal use through the Bronze Age at this im-

portant settlement. Future work on the faunal assemblage will continue to target productive areas for more detailed analysis including the complex but important use of *Equids*, the role of wool and dairy production in the economy, and the role of elite hunting in a powerful Bronze Age polity. By addressing these and other specific topics, zooarchaeological research at Acemhöyük will continue to contribute in a positive and fundamental way to our understanding of life in ancient Anatolia.

Acknowledgements

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List of Figures and Table

Figure 1. Mandibular third molar of a small *Equid* (AC12216). The enamel morphology is similar to that of *Equus hydruntinus* rather than a typical domestic donkey.

Figure 2. Top specimen is a pathological third metatarsal of a wolf (AC12255). The bottom specimen is from a dog (nonpathological).

Table 1. Radiocarbon dating results from Acemhöyük. All dates were run on bone collagen except BETA 34026 which is based on a charcoal sample.

Table 2. Count of diagnostic specimens recorded during the 2013 season. Koyun/keçi = Ovis/Capra; sığır = Bos; karaca = Capreolus; alageyik = Dama dama; kızılgeyik = Cervus elaphus; domuz = Sus; deve = Camelus; eşek = donkey; at = horse;

köpek = *Canis familiaris*; tilki = *Vulpes*;
tavşan = *Lepus*; kuş = bird.

Table 3. Frequencies of domesticates identified at Acemhöyük during the 2013 season.
Koyun/keçi = sheep/goat; sığır = *Bos*;
domuz = pig; diğerleri = dog, fox, hare.

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Resim 1 / Figure 1



Resim 2 / Figure 2

Yr/Year	YER/GRID	KAT/LEVEL	BETA#	13C/12C	CONV. AGE	2 SIGMA CALIBRATION
2010	DB48	IV	305370	-19.5 o/oo	3650 +/- 30 BP	Cal BC 2130 to 2080/2060 to 1940
2010	DB48	IV	305369	-19.6 o/oo	3650 +/- 30 BP	Cal BC 2130 to 2080/2060 to 1940
2009	DB48-49	IV	305368	-19.9 o/oo	3580 +/- 30 BP	Cal BC 2020 to 1880
2010	DB48	V/IV	305371		3560 +/- 30 BP	Cal BC 1970-1870
2012	CB50	XI	342028	17.4 o/oo	4220 +/- 30 BP	Cal BC 2900 to 2860/2810 to 2760/2720 to 2700
2012	CB50	XI	342027	-19.1 o/oo	4130 +/- 30 BP	Cal BC 2870 to 2580
2012	CB50	XI	342026	-24.9 o/oo	4030 +/- 30 BP	Cal BC 2620 to 2470

Table 1 / Table 1

Area	DB50	DB52	EB50	CB-DB49-48	RA46	Sar. sond	SA35	SA36	RA46	OA38	AB49	YA49	YA49	ZA49	YA50	CB52	FB48	FB48-49	EB50
level	XI	XI	XI	V	IV	IV	III	III	III	II	II	II	II	II	II	?	?		
period	EBA	EBA	EBA	MBA	MBA	MBA	MBA	MBA	MBA	MBA	MBA	MBA	MBA	MBA	MBA	BA	BA	Ott.	Ott.
Med marn.	2	1	0	15	0	10	1	6	3	0	0	10	4	0	0	0	0	0	0
Large marn.	0	5	0	28	0	12	0	7	2	0	2	2	6	2	0	0	0	0	0
Med artio.	3	1	2	28	2	5	2	3	6	1	2	2	3	5	0	1	0	0	0
Large artio.	0	0	0	13	2	4	0	1	0	1	2	1	0	0	0	0	0	0	0
Koyun/keçi	6	9	13	148	6	76	31	114	14	11	6	44	42	12	0	5	0	0	0
Koyun	5	3	5	60	2	34	15	26	5	3	2	11	11	8	0	2	0	0	0
Keçi	2	0	13	27	0	14	14	11	0	2	2	3	10	1	0	0	0	0	0
Sığır	4	14	3	112	4	41	29	31	8	7	4	26	22	5	0	6	0	0	0
Karaca	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Alageyik	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Kızılgeyik	0	8	0	3	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0
Domuz	0	2	0	43	1	21	10	25	0	3	6	7	11	3	0	2	0	0	0
Deve	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Eşek	0	1	1	21	0	4	1	1	1	0	0	0	2	2	0	1	0	0	20
At	0	0	0	1	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0
Eşek/At	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Köpek	0	1	0	14	0	1	5	11	0	0	3	2	1	0	15	2	0	0	0
Tilki	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
Large cam.	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tarıyan	0	0	0	5	0	0	0	4	1	0	0	3	7	0	0	0	0	0	0
Kuş	0	0	0	0	0	0	0	2	0	0	0	0	3	0	0	0	0	0	0
Tüm	22	45	37	528	17	224	109	243	40	28	31	112	122	39	15	20	1	1	20

Table 2 / Table 2

Area	DB50	DB52	EB50	CB-DB49-48	RA46	Sarıkt Sond	SA35	SA36	RA46	OA38	AB49
level	XI	XI	XI	V	IV	IV	III	III	III	II	II
period	EBA	EBA	EBA	MBA	MBA	MBA	MBA	MBA	MBA	MBA	MBA
Koyun/keçi	76.5	31.6	88.6	53.4	61.5	64.2	56.6	66.8	65.5	61.5	40.0
Siğir	23.5	36.8	8.6	25.5	30.8	21.2	27.4	13.7	27.6	26.9	16.0
Domuz	0.0	5.3	0.0	9.8	7.7	10.9	9.4	11.1	0.0	11.5	24.0
Diğerleri	0.0	26.3	2.9	11.4	0.0	3.6	6.6	8.4	6.9	0.0	20.0
	100	100	100	100	100	100	100	100	100	100	100

Tablo 3 / Table 3