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PASTORAL ECONOMIES IN EARLY TRANSCAUCASIAN COMMUNITIES FROM THE MID-4th TO 3rd MILLENNIUM BC

Jennifer PIRO[1]

ABSTRACT

This paper presents findings from an ongoing analysis of animal bone remains from the site of Sos Höyük in Turkey dated to between the mid-4th millennium and the end of the 3rd millennium BC. The 1998-2000 field seasons at the site, which is located in the Erzurum region of NE Anatolia, produced archaeological evidence that appears to be transitional to the Early Transcaucasian Culture (ETC) complex that came into prominence in the southern Caucasus and its adjoining highland regions in the 3rd millennium BC. The paper offers initial observations on caprine herding strategies during the Late Chalcolithic-Early Bronze Age transition at Sos Höyük, compares them with previous research on the faunal assemblage from the later Early Bronze Age phase at the site and elsewhere in the region, and explores issues regarding the nature of the pastoral economy, as reflected by the architectural and faunal evidence, during these periods.

Keywords: Sheep, goats, husbandry, pastoralism, Sos Höyük, Late Chalcolithic, Early Bronze Age, Turkey, Armenia, Transcaucasia.

RÉSUMÉ

Cet article présente les résultats de l'analyse en cours des restes osseux d'animaux des niveaux datés du milieu du IV^e^ millénaire à la fin du III^e^ millénaire de Sos Höyük. Le site de Sos Höyük se trouve dans la région d'Erzurum dans le nord-est de l'Anatolie. Les campagnes de fouille 1998-2000 ont fourni des données archéologiques qui semblent relever d'une transition vers le complexe culturel « Early Transcaucasian » (ETC) qui prit de l'importance dans le sud du Caucase et ses régions de hauts plateaux adjacentes au cours du III^e^ millénaire av. J.-C. Dans cet article, des observations préliminaires sur les stratégies de l'élevage des moutons et des chèvres au cours de la transition Chalcolithique final/Bronze ancien à Sos Höyük sont comparées avec les travaux antérieurs faits sur des ensembles fauniques de la phase de l'âge du Bronze Ancien sur ce site ainsi que sur d'autres sites de la région. L'article explore la question de la nature de l'économie pastorale telle qu'elle est reflétée par les données de l'architecture et de la faune à ces périodes.

Mots-clés : *Mouton, chèvre, élevage, pastoralisme, Sos Höyük, Chalcolithique final, âge du Bronze ancien, Turquie, Arménie, Trancaucasie.*

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INTRODUCTION

The Early Transcaucasian Culture (ETC) complex emerged during the mid-fourth millennium BC and later spread throughout the southern Caucasus and its adjacent regions. While much research has focused on the excavated material remains from ETC sites, information regarding the pastoral economies underpinning these communities remains largely unknown. According to archaeological evidence and ethnographic parallels, pastoralism probably played a crucial role in the economic bases of ETC communities. Until recently, more direct evidence for the nature of ETC herding practices has proven elusive due to the lack of detailed faunal reports from ETC sites.

This paper discusses herding strategies at Sos Höyük in northeastern Anatolia from the mid-4th to the end of the 3rd millennium BC. Research findings suggest that the site's inhabitants were primarily settled agro-pastoralists, whose principal goal was minimizing risk and uncertainty in their subsistence economy. To achieve this objective, they engaged in various risk-averse strategies: 1) hunting wild ungulates and small mammals in order to broaden their subsistence base; 2) relying on a mix of domestic livestock, rather than specializing in a single species; and 3) pursuing herding strategies in sheep and goat husbandry that maximized herd security. Available zooarchaeological data from two Early Bronze Age sites in Armenia are also used to compare herding economies across the region.

ENVIRONMENTAL SETTING

Sos Höyük is a multi-period occupation site located near the modern city of Erzurum in the highlands of NE Anatolia—one of the three formative areas of the Early Transcaucasian Culture (Kohl 2007, p. 89) (*fig. 1*). The NE Anatolian uplands were connected both culturally and geographically to the neighboring territory of Transcaucasia, which comprises the modern countries of Georgia, Armenia, and Azerbaijan.

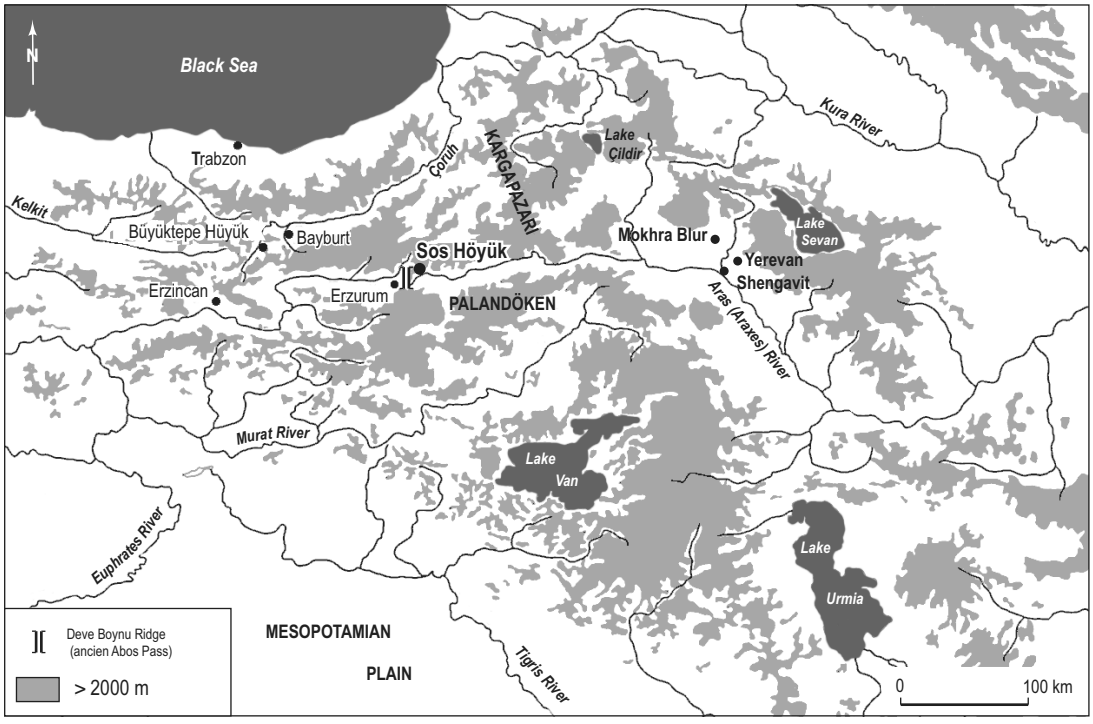

Fig. 1—Map of Transcaucasia and sites mentioned in the text (infography G. Devilder).

The southern boundary of Transcaucasia is composed of a series of continuous highland plateaus extending across NE Turkey, Armenia, and NW Iran. Both the Kura and Araks Rivers originate in the highlands of NE Turkey, while the Araks rises just north and east of the Murad, a tributary of the Upper Euphrates. Major rivers and their tributaries, along with the more easily crossed terrain of the Little Caucasus range, played a key role in facilitating interregional cultural exchange, effectively linking Transcaucasia to the ancient Near East.

SITE BACKGROUND

Excavations at Sos Höyük were directed by Dr Antonio Sagona and Dr Claudia Sagona of the University of Melbourne from 1994 to 2000. The Early Bronze Age phase (3000-2200 cal. BC) at the site presents an architectural sequence comprising several occupation levels, revealing a general progression from free-standing wattle-and-daub dwellings to mud-brick rectilinear structures over time (Sagona *et al.* 1996). These buildings are generally comparable in form, plan, and internal features to those found at other sites of the Early Transcaucasian culture (*ibid.* p. 37). Nevertheless, the absence of internal fixtures within the wattle-and-daub houses in the earlier deposits indicates a level of impermanence, which may suggest that at least some of the site's inhabitants were engaging in a more mobile lifestyle (Sagona 1993).

The underlying Late Chalcolithic level (3500/3300-3000 cal. BC) provides evidence for the earliest period of occupation at the site. In this period, the residents at Sos Höyük constructed a very large curved wall with stone foundations that was destroyed at least twice, most likely by earthquakes, and then rebuilt. Stratigraphically interspersed among the wall's construction and collapse phases are occupation floors covered either by plaster or crushed pottery sherds, which were followed by a rectilinear structure, and later, a circular mud-brick house (Sagona, Sagona 2000). Both the Late Chalcolithic (Sos VA) and Early Bronze Age periods (Sos VB-VD) at the site yielded large quantities of artifacts that strongly resemble the Early Transcaucasian culture complex, including red-black-burnished pottery, portable andirons, and tools manufactured from bone or obsidian.

SOS HÖYÜK FAUNAL ASSEMBLAGE

At present, a total of 10,234 faunal specimens, approximately 75% of the entire assemblage, has been analyzed from Late Chalcolithic and Early Bronze contexts at Sos Höyük (*table 1-3*).[2] Analysis of the fauna, thus far, shows that domesticated species largely predominate over wild species in the assemblage. Among the domesticated species, caprines are the most numerous in each phase followed by cattle. Pigs, dogs, and equids are found in much smaller quantity (1% or less of the sample in each period). In terms of wild animals, red deer and hare are among those most represented, but overall constitute less than 5% of the sample in each period.

Due to the significant quantity of caprine remains in the assemblage thus far, the following discussion will focus only on these specimens.

2. This study includes 5,264 previously analyzed fragments from later Early Bronze Age loci at Sos (Howell-Meurs 2001).

Species	Common name	NISP	NISP(%) Identified Taxa	MNI
Domesticates				
Bos taurus	cow	233	22.23	12
Ovis/Capra	sheep/goat	772	73.66	43
including:				
Ovis aries	sheep	206		11
Capra hircus	goat	50		9
Sus scrofa domesticus	pig	5	0.48	2
Equus sp.	horse; ass/hemione	1	0.1	1
Canis familiaris	dog	3	0.29	1
Subtotal		1014	96.76%	59
Wild Species				
Cervus elaphus	red deer	1	0.1	1
Lepus europaeus	hare	6	0.57	2
Meles meles	Eurasian badger	5	0.48	2
Rodentia sp.	rodents	9	0.86	x
Aves sp.	birds	5	0.48	x
	shell	8	0.76	
Subtotal		34	3.24%	5
Total Identified		1048	100%	64
Total Unidentified		2316		
Total # of Fragments		3364		

Table 1—Late Chalcolithic Sos bone list.

Species	Common name	NISP	NISP(%) Identified Taxa	MNI
Domesticates				
Bos taurus	cow	198	25.13	8
Ovis/Capra	sheep/goat	545	69.16	42
including:				
Ovis aries	sheep	142		9
Capra hircus	goat	35		4
Sus scrofa domesticus	pig	2	0.25	1
Equus sp.	horse; ass/hemione	2	0.25	1
Canis familiaris	dog	8	1.02	2
Subtotal		755	95.81%	54
Wild Species				
Cervus elaphus	red deer	13	1.65	1
Lepus europaeus	hare	5	0.63	1
Rodent sp.	rodents	2	0.25	x
Avis sp.	birds	2	0.25	x
	amphibian	1	0.13	
	shell	5	0.63	x
	other	5	0.63	x
Subtotal		33	4.19%	2
Total Identified		788	100%	56
Total Unidentified		285		
Total # of Fragments		1073		

Table 2—EBI Sos bone list.

Species	Common name	NISP	NISP(%) Identified Taxa	MNI
Domesticates				
Bos taurus	cow	1112	37.8	31
Ovis/Capra	sheep/goat	1681	57.14	117
including:				
Ovis aries	sheep	330		47
Capra hircus	goat	130		19
Sus scrofa domesticus	pig	10	0.34	3
Equus sp.	horse; ass/hemione	11	0.37	4
Canis familiaris	dog	32	1.09	4
Subtotal		2846	96.74	159
Wild Species				
Cervus elaphus	red deer	15	0.51	4
Lepus europaeus	hare	15	0.51	3
	other	66	2.24	36
Subtotal		96	3.26	43
Total Identified		2942	100	202
Total Unidentified		2855		
Total # of Fragments		5797		

Table 3—EBII-III Sos bone list (includes data from Howell-Meurs 2001, p. 117).

OVIS/CAPRA

Thus far, 772 caprine specimens, representing a MNI of 43, have been identified from Late Chalcolithic levels at the site.[3] Of these, 206 were distinguished as *Ovis* and 50 as *Capra*, representing a MNI of 11 and 9 respectively. Based on the total number of specimens that could be assigned to genus, the ratio of sheep to goat is approximately 4 to 1. From the EBI phase at the site, 545 caprine remains, representing an MNI of 42 were recovered. Of these 142 were identified as *Ovis* and 35 as *Capra*, with an MNI of 9 and 4 respectively. The ratio of sheep to goat remained at 4 to 1, showing continuity with the Late Chalcolithic period. During the EBII-III phases, 1681 caprine remains, representing an MNI of 117, were recovered. Of these, 330 were assigned to *Ovis* and 130 to *Capra*, with an MNI of 47 and 19 respectively. Unlike the preceding periods, the sheep to goat ratio dropped to 2.5 to 1 in the later Early Bronze.

Species ratios of the main domesticates during the Late Chalcolithic and Early Bronze Age are summarized in this chart (*fig. 2*). The relative abundance of cattle, caprines, and pigs remains constant throughout the Late Chalcolithic and Early Bronze I periods. By the later Early Bronze Age, however, there is a substantially greater proportion of cattle with a corresponding decline in caprines by almost 17%. This change in species ratios also occurs between the Late Chalcolithic and the Early Bronze as a whole. The substantial increase in the percentage of cattle at the expense of caprines in the later Early Bronze may point to a deliberate shift in subsistence strategies, with the aim of intensifying agricultural resources (R. Redding, personal communication). To corroborate this hypothesis, further analysis of traction pathologies in the cattle sample, along with archaeobotanical evidence from each period, is necessary.

Caprine mortality profiles were constructed from mandibular tooth eruption and wear in order to gain insight into herding strategies over time (*table 4*). Due to the limited number of mandibles available for this study, the dental data from each period were investigated in a combined *Ovis/Capra* sample. The following line graph summarizes the mortality data from the Late Chalcolithic to EBII-III (*fig. 3*).

3. The MNI is based on the Late Chalcolithic caprine assemblage as a whole and calculated as “minimum” MNI.

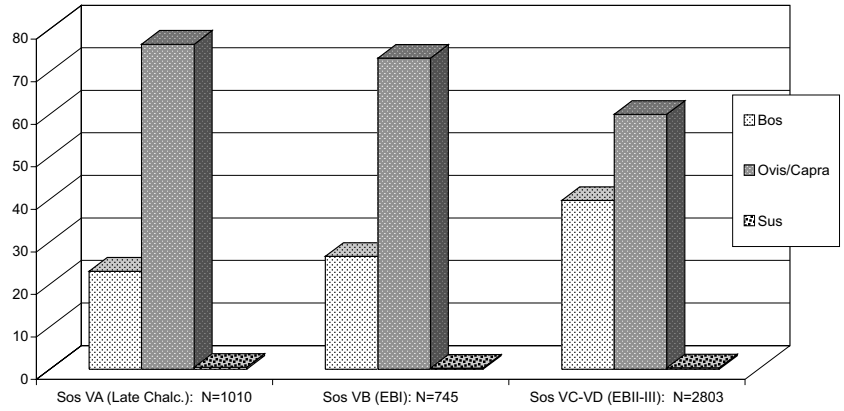

Fig. 2—Relative abundance of the main domesticates from Sos Höyük (% NISP).

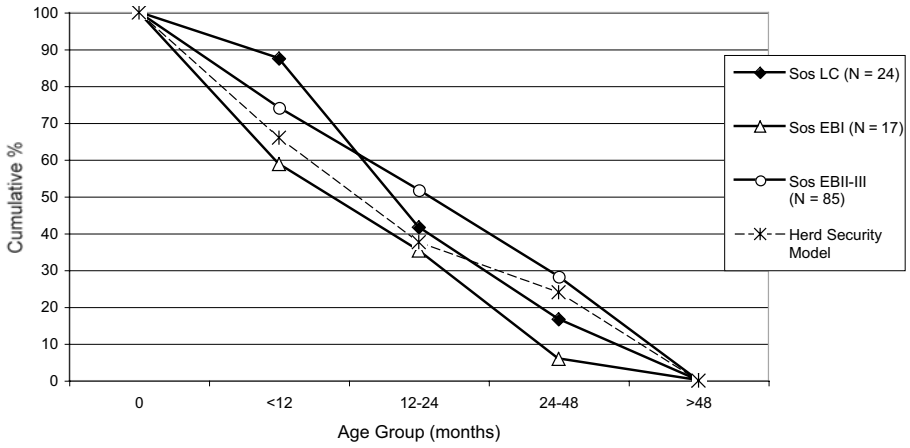

Fig. 3—Survivorship curves of caprines at Sos Höyük from mandibular data.

Zeder Group	Payne Group	Age	Age Group	Sos LC	%	Sos EBI	%	Sos EBII-III	%
I	A	0-2 m							
II	B	2-6 m	< 12 m	3	12.5	7	41.18	22	25.88
III	C	6-12 m							
IV	D	12-18 m	12-24 m	11	45.83	4	23.53	19	22.35
V	D	18-24 m							
VI	E	2-3 y	24-48 m	6	25	5	29.41	20	23.53
VII	F	3-4 y							
VIII	G	4-5 y							
IX	G	5-6 y							
X	H	6-8 y	> 48 m	4	16.67	1	5.88	24	28.24
XI	I	8-10 y							
XII	I	10+							

Table 4—Caprines dental data from Sos Höyük (includes Sos EBII-III data from Howell-Meurs 2001, p. 171), age groups from Payne (1973) and Zeder (2006).

Before beginning analysis of pastoral production strategies, the survivorship curves from each period at Sos were statistically evaluated in order to determine whether significant differences existed between samples. Findings based on the Kolmogorov-Smirnov two-sample test indicate that differences between culling patterns at each period were not significant at the 5% level ($p > 5\%$). These results demonstrate that caprine survivorship patterns remained essentially constant over the course of the Late Chalcolithic and Early Bronze Age. In addition, sheep and goat mortality data for the Early Bronze Age as a whole were analyzed separately to see if there were differences in husbandry strategies within the caprine sample (*fig. 4*). Once again, the Kolmogorov-Smirnov test indicated no significant difference at the 5% level ($p > 5\%$) between the way sheep and goats were raised over the course of the Early Bronze Age. Low significance at the 5% level (Kolmogorov-Smirnov test, $p > 5\%$) is also demonstrated when comparing separate sheep and goat survivorship patterns between the Late Chalcolithic and the Early Bronze Age as a whole.

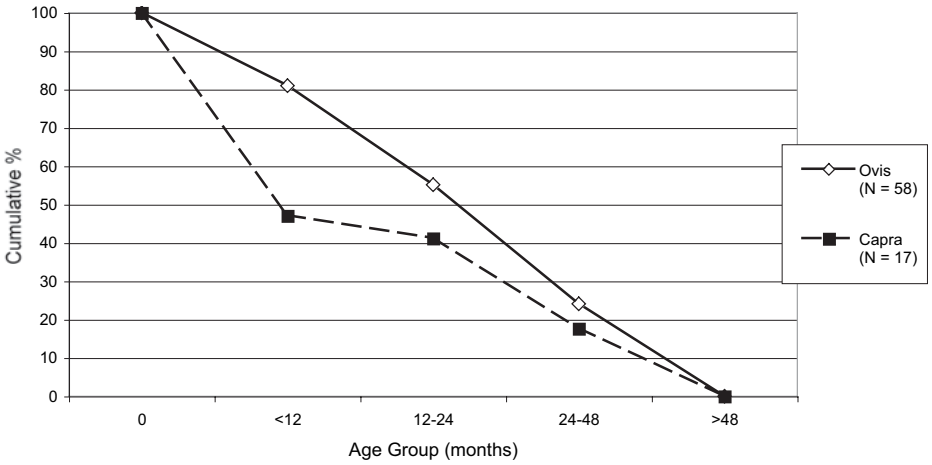

Fig. 4—Caprine survivorship curves (sheep vs *goat) at Sos Höyük from mandibular data.*

The combined caprine sample was then compared with expected culling patterns for both specialized pastoral production (*i.e.* dairy production, wool production, and the intersite exchange of animals) and generalized, subsistence-oriented herding (*i.e.* meat production for local consumption and herd security). The Sos sheep and goat survivorship data best fit Redding's herd security model (Redding 1981), which emphasizes conservative pastoral strategies that minimize subsistence risk and uncertainty (*fig. 3*). The Kolmogorov-Smirnov two-sample test indicates no significance difference at the 5% level ($p > 5\%$) between caprine survivorship from each period and the herd security model, suggesting that sheep and goat herding strategies were designed to maximize herd security. Moreover, the representation of all age categories in the mortality profiles, as well as the presence of neonatal bones in the assemblage, suggest that caprines were primarily raised and consumed at the site, rather than for trade with other settlements.

Culling patterns were also constructed from epiphyseal fusion data for each period (*table 5*, *fig. 5*), but interpreting these profiles is more complicated due to the lack of mortality data beyond 48 months. Based on fusion stage, caprine mortality appears relatively constant for each period, with the widest deviations among the curves occurring in the 12-18 and 18-30 month categories. Chi-square analysis indicates that differences in the proportions of fused and unfused elements from the Late Chalcolithic and EBII-III in the 12-18 month category are highly significant (*Chi-square* = 4.1045, $0.05 > p > 0.02$, 1 degree of freedom), while those in the 18-30 month category are very highly significant (*Chi-square* = 11.2368, $0.001 > p$, 1 degree of freedom). Similar results are obtained when comparing the Late Chalcolithic mortality data to the Early Bronze Age as a whole. It appears that a significantly larger proportion of the Late Chalcolithic herd was killed before 18 months and before 30 months compared to those in the later Early Bronze Age or

in the Early Bronze Age as a whole. However, since there are no significant differences in the proportions of fused elements below 12 months and between 30-48 months, the caprine mortality profile generally corroborate those outlined by the mandibles, in which the majority of animals were killed in their second or third year.

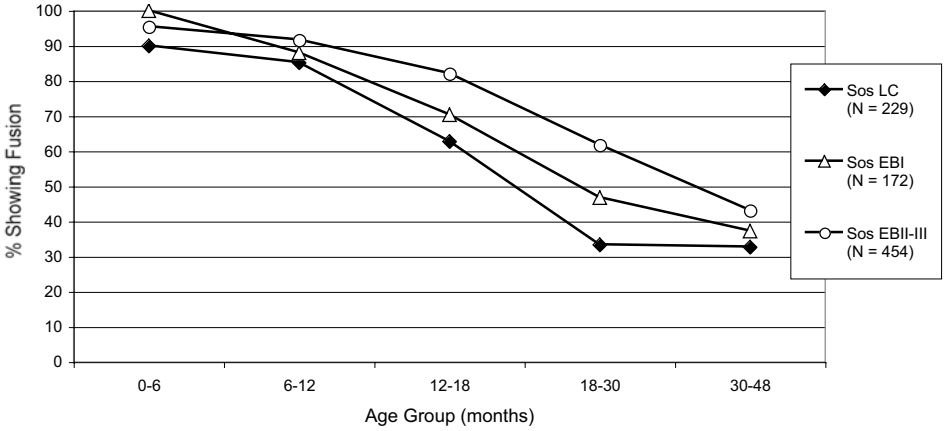

Fig. 5—Survivorship curves of caprines at Sos Höyük from epiphyseal fusion data.

Late Chalcolithic *Ovis/Capra*					
Zeder Group	Estimated Age (mo.)	Fused	%	Unfused	%
A	0-6	27	90	3	10
B	6-12	46	85.19	8	14.81
C	12-18	27	62.79	16	37.21
D	18-30	16	33.33	32	66.67
E	30-48	17	32.69	35	67.31
F/G	48+	0	0	2	100
Total		133		96	
Early Bronze I *Ovis/Capra*					
Zeder Group	Estimated Age (mo.)	Fused	%	Unfused	%
A	0-6	14	100	0	0
B	6-12	22	88	3	12
C	12-18	19	70.37	8	29.63
D	18-30	22	46.81	25	53.19
E	30-48	19	37.25	32	62.75
F/G	48+	3	37.5	5	62.5
Total		99		73	
Early Bronze II-III *Ovis/Capra*					
Zeder Group	Estimated Age (mo.)	Fused	%	Unfused	%
A	0-6	42	95.45	2	4.55
B	6-12	110	91.67	10	8.33
C	12-18	55	82.09	12	17.91
D	18-30	76	61.79	47	38.21
E	30-48	41	43.16	54	56.84
F/G	48+	0	0	5	100
Total		324		130	

Table 5—Fusion stages for caprines at Sos Höyük (includes Sos EBII-III data from Howell-Meurs 2001, p. 173), age groups from Zeder 2006.

In addition to caprine herd security, additional evidence from the Sos faunal assemblage points to risk-averse subsistence strategies. First, although cervids, aurochs, wild caprines, boar, and small mammals constituted less than 5% of the entire assemblage in each period, their presence suggests that hunting continued to take place as a secondary subsistence activity in addition to the herding of domestic animals. The site's inhabitants diversified their food supply through herding, hunting, and farming as part of an overall strategy of risk avoidance. Second, the site's inhabitants relied on a mix of domestic cattle, caprines, and pigs in their herding economy, rather than focusing on a single species. This diversification in livestock production also helped minimize subsistence risk.

REGIONAL COMPARISON OF THE MAIN DOMESTICATES

Bone remains of the main domestic ungulates from Late Chalcolithic and later Early Bronze Sos Höyük were compared to those from contemporaneous levels elsewhere in Transcaucasia in order to provide insight into the nature of herding economies on a broader regional scale (*fig. 1*). Both sites are large Early Bronze Age settlements located on the Ararat plain in NW Armenia. These sites were chosen as comparanda because the excavated animal bone remains were available for analysis.

The graph illustrates relative proportions of the main domesticates at Early Bronze Sos Höyük, Shengavit, and Mokhra Blur (*fig. 6*). A comparison of species ratios from Sos EBI-III and Shengavit reveals that caprines herding was predominant at both sites. In contrast, the species ratio from Early Bronze Sos from Mokhra Blur shows roughly equal proportions of cattle and caprines.

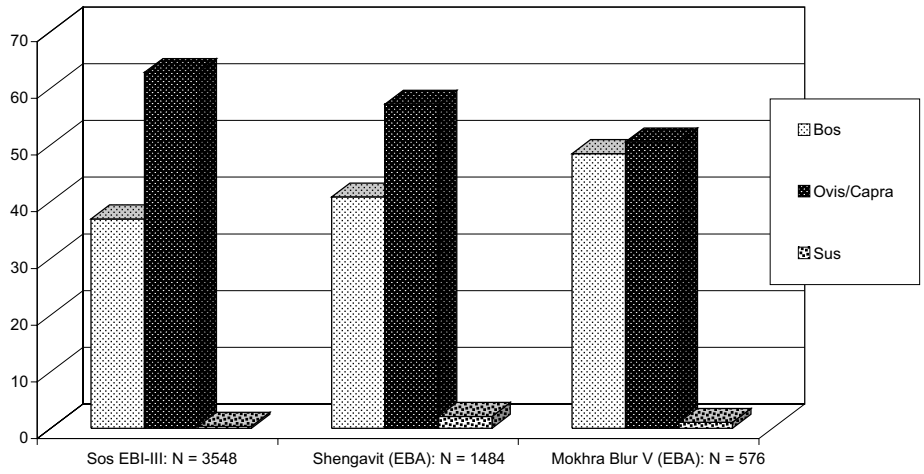

Fig. 6—Regional comparison of the main domesticates (% NISP).

A comparison of the mortality profiles based on tooth eruption and wear revealed no significant difference in survivorship patterns among the three sites (Kolmogorov-Smirnov, $p > 5\%$) (*table 6*, *fig. 7*). Similar to Early Bronze Sos Höyük, both Shengavit and Mokhra Blur demonstrate evidence for resource diversification, in the form of small-scale hunting of aurochs, wild caprines, red deer, and other small mammals. Another risk-aversion strategy is visible in the broad-based exploitation of domestic livestock, instead of specialized, surplus-oriented forms of pastoralism. Finally, the mortality data from Shengavit and Mokhra Blur conform to expected culling patterns for meat production for local consumption, with a 50%

reduction in the herd between the ages of 2 and 3 years when males reach their maximum meat weight. Moreover, the presence of all age groups at both sites indicates that caprines were raised and consumed locally as part of a generalized, subsistence-oriented herding economy.

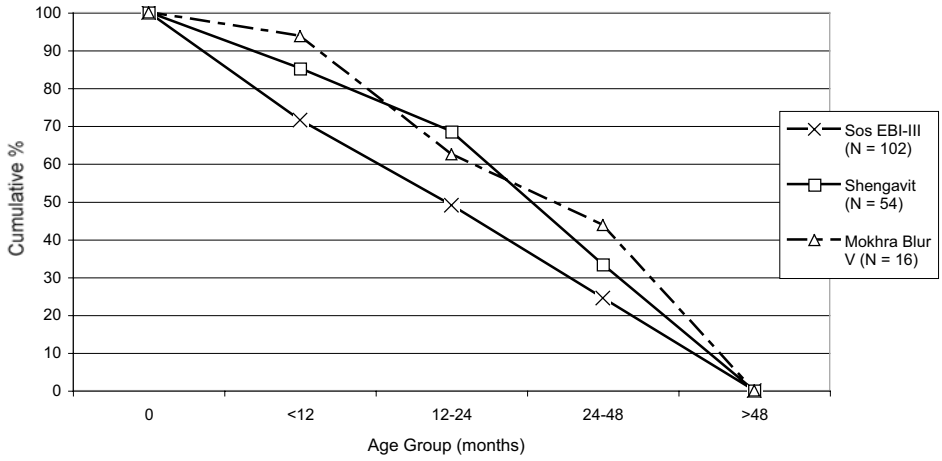

Fig. 7—Survivorship curves of caprines from comparative sites.

Zeder Group	Payne Group	Age	Age Group	Sos EBI-III	%	Shengavit	%	Mokhra Blur	%
I	A	0-2 m							
II	B	2-6 m	< 12 m	29	28.43	8	14.81	1	6.25
III	C	6-12 m							
IV	D	12-18 m	12-24 m	23	22.55	9	16.67	5	31.25
V	D	18-24 m							
VI	E	2-3 y	24-48 m	25	24.51	19	35.19	3	18.75
VII	F	3-4 y							
VIII	G	4-5 y							
IX	G	5-6 y							
X	H	6-8 y	> 48 m	25	24.51	18	33.33	7	43.75
XI	I	8-10 y							
XII	I	10+							
No. of specimens				102		54		16	

Table 6—Age distribution across Early Bronze Age Transcaucasian sites (includes Sos EBII-III data from Howell-Meurs 2001, p. 171), age groups from Payne (1973) and Zeder (2006).

THE NATURE OF PASTORALISM IN TRANSCAUCASIA DURING THE 4TH-3RD MILLENNIUM BC

Further insight into the nature of herding practices in Late Chalcolithic and Early Bronze Age Transcaucasia has proven elusive—complicated by the region's marked ecological diversity and hampered by a lack of detailed animal bone studies to derive socio-economic inferences from the archaeological

record. Various forms of pastoralism, involving different degrees of mobility, are believed to have served a fundamental role in the subsistence economy. A number of researchers have suggested that transhumant pastoralism, in particular, formed a significant component of the economic base of ETC communities (*i.e.* Burney, Lang 1971, p. 75-76; Kushnareva 1997, p. 192ff). Nevertheless, the diversity characterizing ETC settlement types, from those suggesting seasonal or short-term occupation to those demonstrating greater architectural investment, indicates that the issue of mobility is more complex than previously recognized (Cribb 1991, p. 220-224; Sagona 1993).

Thus far, analysis of the faunal evidence from Early Bronze levels at Sos Höyük, Shengavit, and Mokhra Blur strongly suggests that these were predominantly settled agro-pastoral communities, in which the inhabitants engaged in similar strategies of subsistence diversification within an overall system of risk avoidance. The animal bone remains from these three sites highlight the role of conservative management strategies and a broad-based exploitation of resources as ways to reduce risk in the subsistence economy of Early Bronze Age Transcaucasia.

In the case of Sos Höyük, the faunal evidence from the Late Chalcolithic and Early Bronze Age questions previous interpretations based on material culture and architecture that suggested a more mobile lifestyle for the site inhabitants. Seasonality studies of both wild and domestic taxa in the later Early Bronze Age point to year-round occupation, while patterns of dental eruption, species diversity, and the presence of foetal and neonatal domestic animals within the faunal assemblage in each period indicate that a portion of the herds, and, likewise, a portion of the population, may have permanently remained at the site (Howell-Meurs 2001, p. 97-100).

If the findings from the animal bone remains are correct, they conform thus far with our understanding of the emergence of the ETC culture complex and its subsequent spread across neighboring regions in the Near East. Sos Höyük, Shengavit, and Mokhra Blur are located within the original core areas of the appearance of the ETC phenomenon (*fig. 8*), and each of these sites fits the expectation of an overall stable village community with a distinctive cultural tradition that persisted for over a millennium. Future research must focus on faunal assemblages from sites outside the ETC homeland, across the Anatolian plateau and along the Zagros in northwestern Iran, where ETC groups began to penetrate, perhaps at first as pastoral nomads, and then later settled permanently as small groups of farmers or transhumant pastoralists, either assimilating with the local population or re-inhabiting abandoned sites (Batiuk, Rothman 2007). Analysis of animal bone remains from these sites will enable us to uncover the full range of pastoral activities that underpinned the economic base of ETC communities and help us gain insight into processes behind the spread of the ETC phenomenon across the Near East.

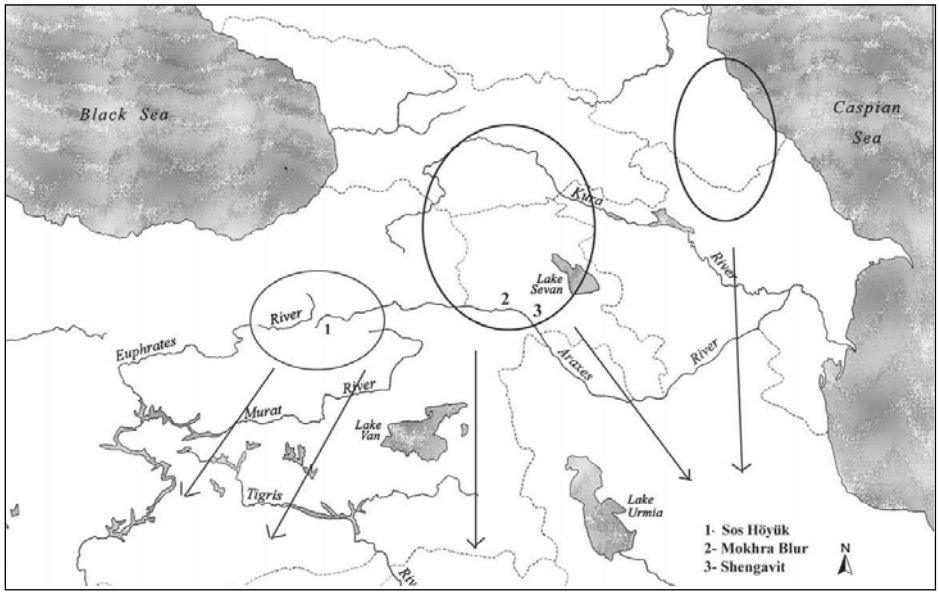

Fig. 8—Map of original core areas of the Early Transcaucasian Culture.

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BIBLIOGRAPHY

BATIUK A., ROTHMAN M.S. 2007, "Early Transcaucasian cultures and their neighbors: unraveling migration, trade and assimilation", *Expedition* 49 (1), p. 7-17.

BURNEY C.A., LANG D.M. 1971, *The Peoples of the Hills: Ancient Ararat and Caucasus,* Weidenfeld and Nicholson, London.

CRIBB R. 1991, *Nomads in Archaeology*, Cambridge University Press, New York.

HOWELL-MEURS S. 2001*, Early Bronze and Iron Age Animal Exploitation in Northeastern Anatolia: the Faunal Remains from Sos Höyük and Büyüktepe Höyük*, Oxford University Press, Oxford.

KOHL P.L. 2007, *The Making of Bronze Age Eurasia*, Cambridge World Archaeology, New York.

KUSHNAREVA K.K. 1997, *The Southern Caucasus in Prehistory: Stages of Cultural and Socioeconomic Development from the 8th to the 2nd millennium BC*, University Museum, University of Pennsylvania, Philadelphia.

PAYNE S. 1973, "Kill-off patterns in sheep and goats: the mandibles from Aşvan Kale", *Anatolian Studies* 23, p. 281-303.

REDDING R. 1981, *Decision Making in Subsistence Herding of Sheep and Goats in the Middle East*, Ph.D., University of Michigan.

SAGONA A.G. 1993, "Settlement and society in Late Prehistoric Trans-Caucasus", *in* M. Frangipane (ed.), *Between the Rivers and Over the Mountains*, University of Rome « La Sapienza », Rome, p. 453-474.

SAGONA A.G., ERKMEN M., SAGONA C., THOMAS I 1996, "Excavations at Sos Höyük, 1995: 2nd preliminary report", *Anatolian Studies* 46, p. 27-52.

SAGONA A.G., SAGONA C. 2000, "Excavations at Sos Höyük 1998-2000: 5th preliminary report", *Ancient Near Eastern Studies* 37, p. 56-127.

ZEDER M.A. 2006, "Reconciling rates of long bone fusion and tooth eruption and wear in sheep (*Ovis*) and goat (*Capra*)", *in* D. Ruscillo (ed.), *Recent Advances in Ageing and Sexing Animal Bones*, 9th ICAZ Conference, Durham 2002, Oxbow Books, Oxford, p. 87-118.