

Late Chalcolithic Subsistence Strategies on the Basis of Two Examples: The Çukuriçi Höyük in Western Anatolia and the Barcın Höyük in Northwestern Anatolia

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Abstract: A Late Chalcolithic agricultural development based on exploitation of livestock is discussed at two sites: Barcın Höyük is located in the Yenişehir Basin in the eastern part of the Bursa province and Çukuriçi Höyük in the Ephesos region, on the west coast of Anatolia. Both sites revealed similar pattern of cattle- and ovicaprine exploitation but revealed differences in livestock management. Pig was already exploited in the Early Chalcolithic at the Anatolian west coast but keeping pigs did not start earlier than in the Late Chalcolithic in Barcın Höyük and stays absent in the Late Neolithic. Large and small ruminants were mainly kept for meat production and milk to some extent. The archaeozoological remains indicate a form of local husbandry at both settlements but reveal faunal differences between them as well. Cattle and sheep were probably better adapted to the climate of northwest Anatolia while the environment at the western Mediterranean coast was more appropriate for goat. Disparities between both societies are strongly indicated by their cognisance of natural environments and resources. These are not only expressed by varying hunting behaviours but also by the intensity of exploitation in aquatic resources. Freshwater fish and molluscs played a minor role at Barcın Höyük while exploitation of marine resources from the nearby sea shore was probably not only of high nutritive importance for the inhabitants of the Çukuriçi Höyük but may also indicate a component of their daily life and identity.

Keywords: Turkey, western Anatolia, northwestern Anatolia, Barcın Höyük Çukuriçi Höyük, Late Chalcolithic, 4th millennium subsistence, livestock

Late Chalcolithic settlements with reliable stratigraphic sequences and archaeozoological records are scarcely distributed throughout northwest Anatolia.² Subsistence strategies shall be discussed for two sites, 'Barcın Höyük' in the northwestern and 'Çukuriçi Höyük' in the western part of Turkey. Archaeozoological remains from these sites provide an opportunity to shed some light on the breeding strategies of the main domesticates and consumption behaviour. Barcın Höyük is situated in the Yenişehir Basin in the eastern part of the Bursa province.³ The earliest settlement activities started in the Late Neolithic and after a hiatus, over two millennia occupation resumed witnessing Late Chalcolithic activities and continued towards the EBA, the Iron Age, and the Byzantine time.⁴ The surroundings of the site provided wetlands, arable farming land and upland environment in the north. The duration of the Late Chalcolithic occupation is assumed to be rather short at about 3800 calBC,⁵ the missing later phases were probably destroyed by ploughing and soil removal.

Çukuriçi Höyük is located in the region of the classical town of Ephesos, the ancient metropolis Asiae.⁶ The site was originally located rather close to the sea shore, at the delta of the river Küçük Menderes, surrounded by mountainous areas and plains. Similarly to Barcın Höyük, the settling activities started in the Late Neolithic (phase VIII) and proceeded to the EBA probably without continuity in occupation. However, this mound revealed some evidences from the 4th mil-

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² Özbal 2011; Schoop 2005; Schoop 2011.

³ Gerritsen et al. 2010.

⁴ Gerritsen et al. 2010.

⁵ Roodenberg et al. 2008.

⁶ Ladstätter 2012.

lennium as well.⁷ Although both sites yielded only little archaeozoological material dating to the 4th millennium according to Anatolian chronology,⁸ evidence for farming and subsistence appear to be worth discussing. Therefore, argumentation will be improved by evaluations with material from the Late Neolithic from the Barcın Höyük and Early Chalcolithic (Phase VIII) from the Çukuriçi Höyük.

Herding, Exploitation and Subsistence

The earliest settlers at Barcın Höyük exploited domestic breeds. In the Late Neolithic, the weight of cattle remains and bone fragments of animals of similar size predominate the assemblage while less than a quarter represents ovicaprines (Pl. 1A). Subsequently, breeding strategies changed, and the Late Chalcolithic assemblages exhibit the presence of domestic pig and fewer cattle (Pl. 1B). It seems that ovicaprines, especially sheep became more important. At the Çukuriçi Höyük, a phenomenon contrary to the Barcın Höyük becomes visible. In phase VIII domesticates total up to about 75% while the Late Chalcolithic assemblages indicate a probable change in consumption behaviour and a decrease of mammalian finds to approximately 40% (Fig. 1A–1B). Although exploitation of shellfish played a role from the beginning of the occupation, exploitation of domesticates seems to lose importance and harvesting marine food becomes more significant in Çukuriçi Höyük's Late Chalcolithic. Contrary to Barcın Höyük, pig appears even in the earlier chronological units, and the frequency of ovicaprines increases as well. However, goat seems to be of more importance in the Late Chalcolithic (Pl. 1C–D).

For this paper, postcranial elements are used to characterise demographic distributions of slaughtered domesticates by analysing size and form of neonates and infants compared to reference specimens and the stages of epiphyseal fusing (Pls. 2–3).⁹ Unfortunately, the Late Chalcolithic deposits from the Çukuriçi Höyük did not reveal enough postcranial material to produce cattle culling profiles. However, the other profiles from both sites appear rather similar (Pl. 2). Besides some culling of milk calves, infants and juveniles, more cattle survived up to approximately 30 months while older individuals were culled at higher frequencies. The Çukuriçi Höyük reveals a slightly different pattern with a higher representation of individuals older than four years (Pl. 2C). The management of keeping and slaughtering ovicaprines is similar between the two sites as well (Pl. 3). Few kids and lambs were slaughtered at early stages and up to half a year, and the major part of the stock survived the first year. Culling started probably with approximately two years while only a small part of the stock became older than three to four years at Barcın and Çukuriçi Höyük. Although there are some differences in the faunal composition between the sites the culling patterns appear to be somewhat similar and provide several culling ages from newborn/infantile individuals up to adult and sometimes old/senile individuals. Besides the major domesticates, few dog bones cannot be regarded as unusual in the archaeozoological assemblages from both sites. The first evidences of equids did not appear earlier than in the EBA at Barcın Höyük, and these animals remain absent in the Late Chalcolithic at both sites, although equids might be expected as a 'new invention' particularly at this time.

Hunting did not play a substantial role at either site but reveals some importance perhaps beyond nutritive significance. However, when both sites are compared, the Çukuriçi Höyük suggests a higher importance of game. The main species are similar: hare, wild boar and fallow deer. In addition to smaller carnivores like fox, marten, wild cat as well as larger herbivores, like aurochs, roe deer and red deer, are also present. A difference might be expressed by the absence of large carnivores in Barcın Höyük while brown bear and leopard appeared at the Çukuriçi Höyük. The

⁷ Horejs 2010.

⁸ Schoop 2005.

⁹ Habermehl 1975; Zeder 2006.

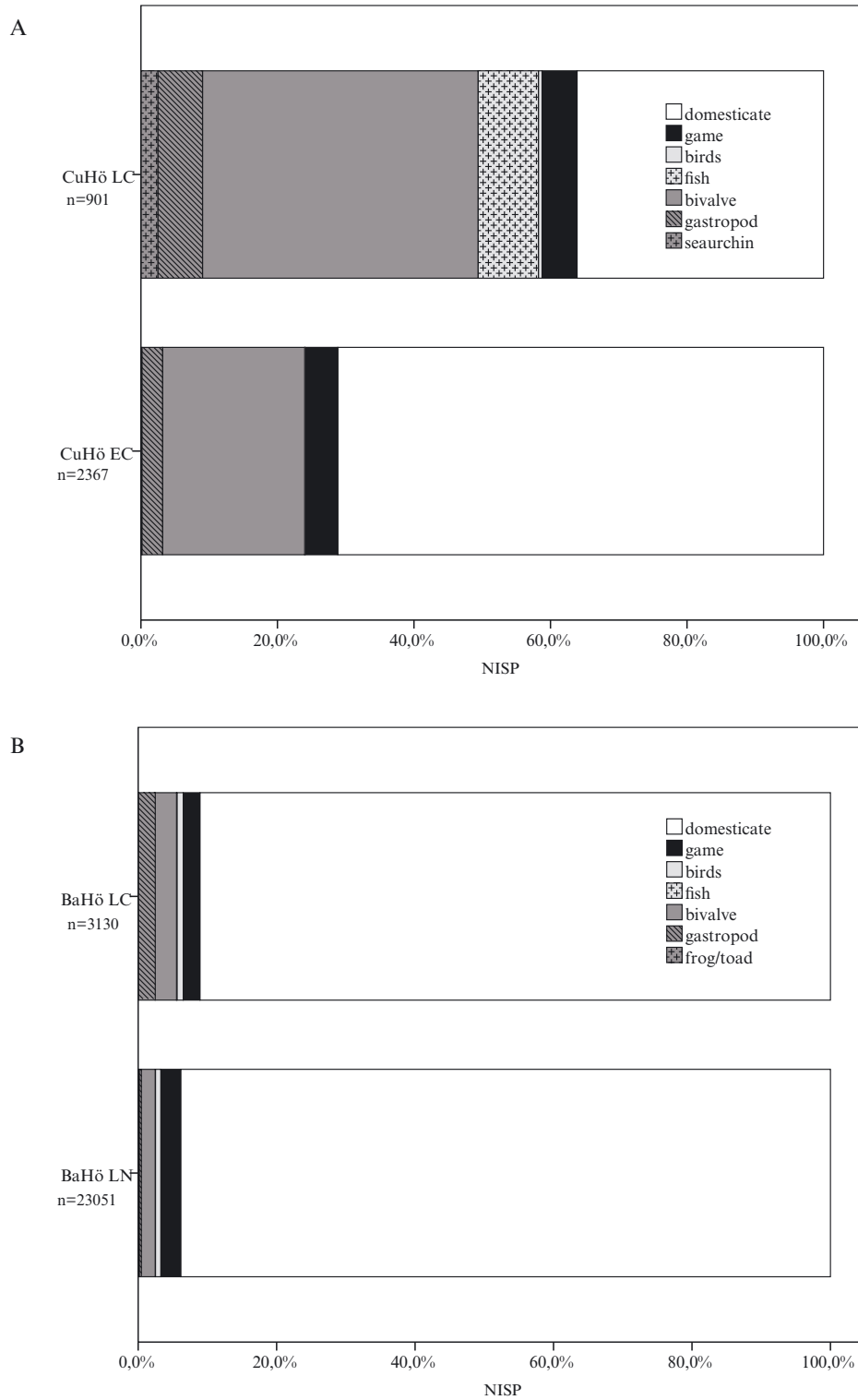
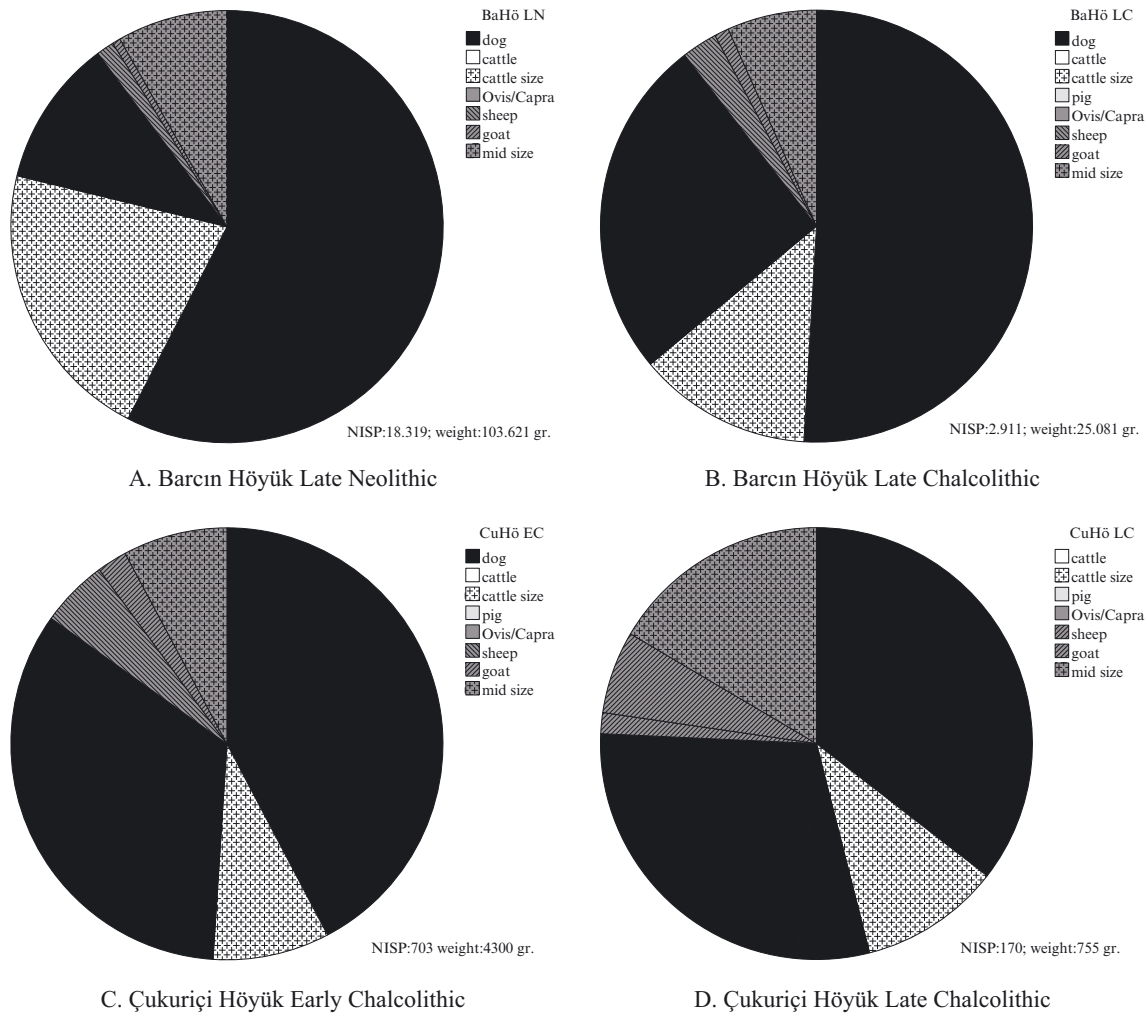


Fig. 1 Distribution of animals. A. Çukuriçi Höyük; B. Barcın Höyük.

latter was discovered in a special context, perhaps ritual (Tab. 4).¹⁰ However, the hunting of birds indicates a different pattern of behaviour between the occupants of both sites. At Barcın Höyük

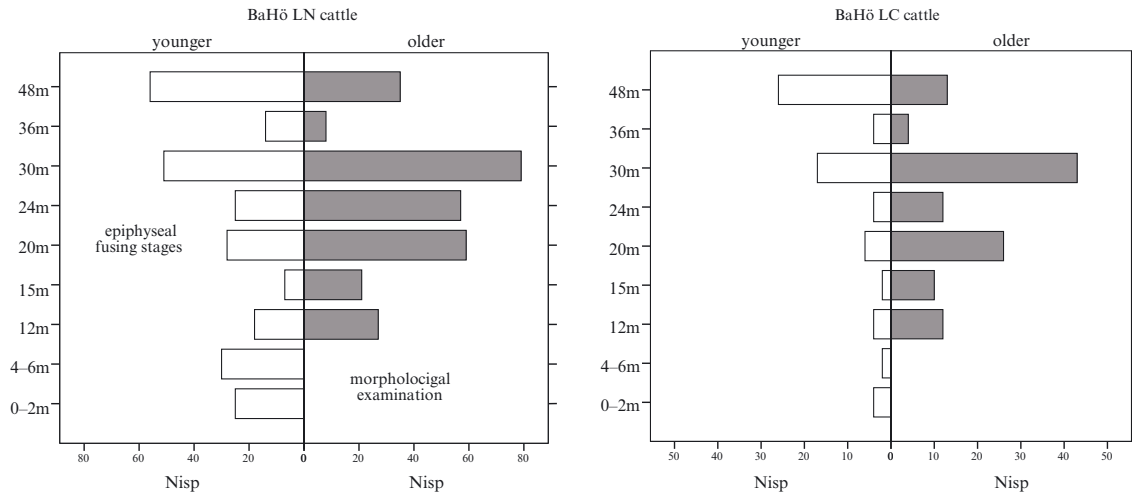
¹⁰ Galik et al. 2013.



Pl. 1 Weight distribution of the most important domesticates

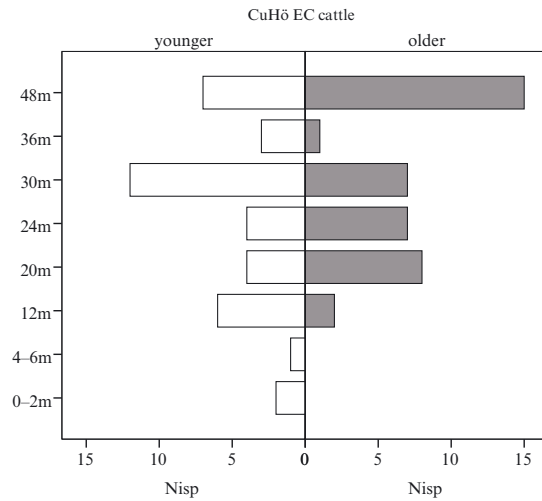
bird hunting was of some importance and the hunters killed raptor birds, open land birds, as well as waterfowl. Although masses of sediment samples were screened at the Çukuriçi Höyük the recovery of a few remains mirrors the irrelevance of birds as a food resource (Tab. 3). A 'dolphin-like' rib fragment relates to the maritime affinity of Çukuriçi Höyük inhabitants.

Besides, herding and hunting the surroundings at both sites encompassed various environments providing additional access to animal protein. For example, the inhabitants of Çukuriçi Höyük obviously used their access to marine resources. Although only a few fish remains were preserved the high diversity of shellfish reflects intense exploitation in the Late Chalcolithic of the Çukuriçi Höyük (Fig. 1A, Tab. 1). In the early phase VIII the assemblage is dominated by species settling on hard substrate, like oyster, sometimes rather large spondylus, blue mussel and mainly Noah's ark shell. The Late Chalcolithic composition of bivalve species completely changed to burrowing species predominantly edible cockle, but also venus shell, carpet shell, noble pen shell and wedge shell dominate over the hard substrate populating species (Tab. 1). At the inland settlement Barcın Höyük, such kinds of nutriment were certainly not without value. The inhabitants exploited freshwater resources as well, but this kind of aliment appeared to be of less significance (Tab. 1). Besides, a few fish remains (Tab. 2) from the Late Neolithic and the Late Chalcolithic shells indicate exploitation of large garden snails (*Helix* sp.), freshwater mussels (*Unio* sp.) and blue mussels (*Mytilus galloprovincialis*). However, the frequency of both bivalves decreases in the Late Chalcolithic while the large garden snail increases. Although, blue mussel populate even in low brackish



A. Late Neolithic Barcın Höyük

B. Late Chalcolithic Barcın Höyük



C. Early Chalcolithic Çukuriçi Höyük

Pl. 2 Demographic distribution of cattle.

waters no habitat can be easily detected in the vicinity of Barcın Höyük today. The mussels were probably collected at the present day freshwater İznik lake north of the mountain ridge to the north of the site. Besides molluscs, other shells like cockle, oyster or a scallop were transported to the settlement as empty and water worn shells probably as raw material for ornaments.

Conclusions

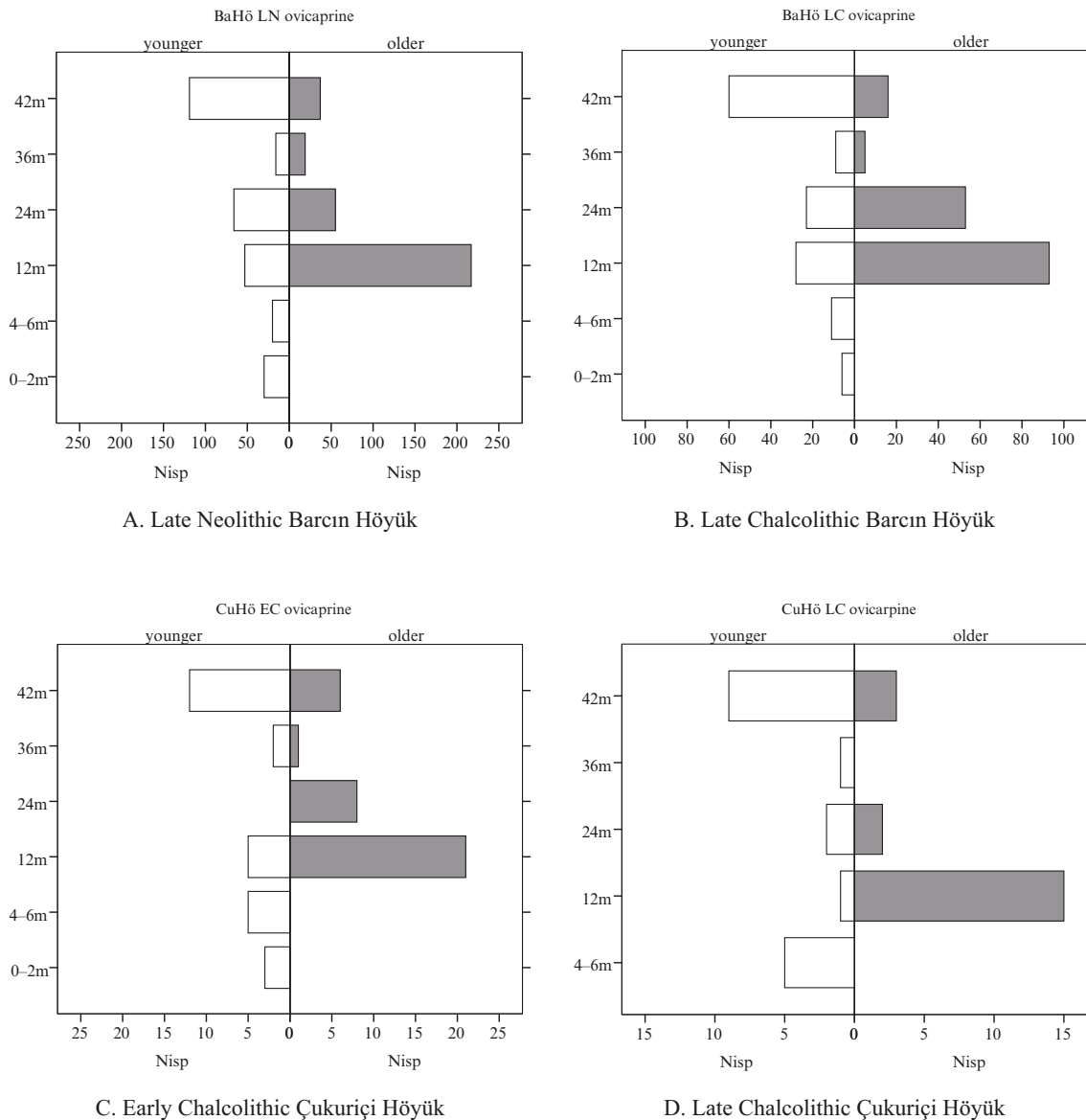
It remains challenging discussing such topics on a wider scale because nearby sites, like Fikirtepe¹¹ and Ilıpınar¹² or Menteşe¹³ in the northwest and Ulucak¹⁴ in the west of Anatolia, were abandoned

¹¹ Boessneck – von den Driesch 1979.

¹² Buitenhuis 2008.

¹³ Gourichon – Helmer 2008.

¹⁴ Çakırlar 2012.



Pl. 3 Demographic distribution of ovicaprines.

before the 4th millennium BC. Concerning cattle and ovicaprines breeding strategies reveal rather similar approaches at both sites, although some changes and differences in keeping and exploitation of livestock became visible. Pig was already utilized in the Late Neolithic and Early Chalcolithic at the west coast of Anatolia,¹⁵ exploitation of ‘house swine’ started in the Late Chalcolithic at Barcın Höyük and domestic pig remained absent in the Late Neolithic of the nearby settlement *Menteşe*¹⁶ and central Turkey as well.¹⁷ The culling profiles presented here do not indicate major changes in exploitation of meat and milk to some extent from the Late Neolithic towards Late Chalcolithic. However, despite the anticipated cultural and economic changes in the Late Chalcolithic such patterns might not indicate major transformations in keeping cattle, sheep and

¹⁵ Horejs – Galik 2011; Cakirlar 2012.

¹⁶ Gourichon – Helmer 2008.

¹⁷ Arbuckle 2013.

goat. They resemble the husbandry economy in rural settlements, rather than large scale and wide distance pastoralism that is usually seen in the context of increasing use of wool or fleece as demonstrated for early Chalcolithic to mid Chalcolithic Köşk, mid Chalcolithic Güvercinkayaşı and Late Chalcolithic Çadır, in combination with vertical transhumance to upland pastures.¹⁸ However, sheep and cattle were probably better adapted to the northwest Anatolian climatic conditions while the western Mediterranean coast perhaps provided suitable conditions for herding goat.

The perception of nature and environmental interaction of the two Late Chalcolithic societies might be enlightened by remains of hunting and gathering activities in their ecosystems. Hunting of large carnivores like brown bear and even leopard is present at the Çukuriçi Höyük, but not at Barcın Höyük, where hunting of diverse bird species was clearly of importance although the surrounding environment at the Çukuriçi Höyük certainly provided habitats for aquatic and other birds as well. The inhabitants of Barcın Höyük probably consisted of a society dependent on farming but supplemented their diet by hunting birds, small and large game. However, they avoided pursuing dangerous and large carnivores. The society living at the Late Chalcolithic Çukuriçi Höyük might be characterised as relying on farming for subsistence as well, but with a large focus, especially, on the exploitation of marine goods like fish and shellfish. Such subsistence practices may express a maritime affinity in their daily life that continues into the Early Bronze Age.¹⁹

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References

Arbuckle 2012

B. S. Arbuckle, Animals and inequality in Chalcolithic central Anatolia, *Journal of Anthropological Archaeology* 31, 2012, 302–313.

Arbuckle 2013

B. S. Arbuckle, The late adoption of cattle and pig husbandry in Neolithic central Turkey, *Journal of Archaeological Science*, 40, 2013, 1805–1815.

Bergner et al. 2009

M. Bergner – B. Horejs – E. Pernicka, Zur Herkunft der Obsidianartefakte vom Çukuriçi Höyük, *Studia Troica*, 18, 2009, 249–271.

Boessneck – von den Driesch 1979

J. Boessneck – A. van den Driesch, Die Tierknochenfunde aus der neolithischen Siedlung auf dem Fikirtepe bei Kadıköy am Marmarameer (München 1979).

Buitenhuis 2008

H. Buitenhuis, Faunal remains from the Late Neolithic and Early Chalcolithic levels, in: J. J. Roodenberg – S. Alpaslan Roodenberg (eds.), *Life and Death in a Prehistoric Settlement in Northwest Anatolia. The Ilıpınar Excavations III* (Leiden 2008) 205–218.

Çakırlar 2012

C. Çakırlar, The evolution of animal husbandry in Neolithic central-west Anatolia. The zooarchaeological record from Ulucak Höyük (c. 7040–5660 cal. BC, Izmir, Turkey), *Anatolian Studies* 62, 2012, 1–33.

¹⁸ Arbuckle 2012.

¹⁹ Bergner et al. 2009.

Galik et al. 2013

A. Galik – B. Horejs – B. Nessel, Der nächtliche Jäger als Beute. Studien zur prähistorischen Leopardenjagd, *Prähistorische Zeitschrift* 87, 2, 2013, 263–207.

Gerritsen et al. 2010

F. Gerritsen – R. Özbal – L. Thissen – H. Özbal – A. Galik, The Late Chalcolithic Settlement of Barcın Höyük, *Anatolica* 36, 2010, 197–225.

Gourichon – Helmer 2008

L. Gourichon – D. Helmer, Etude de la Faune Neolithique de Mentese, in: J. J. Roodenberg – S. Alpaslan Roodenberg (eds.), *Life and Death in a Prehistoric Settlement in Northwest Anatolia. The Ilıpınar Excavations III* (Leiden 2008) 435–446.

Habermehl 1975

K. H. Habermehl, *Die Altersbestimmung bei Haus- und Labortieren* (Berlin 1975).

Horejs 2010

B. Horejs, Çukuriçi Höyük. Neue Ausgrabungen auf einem Tell bei Ephesos, in: S. Aybek – A. Kazım Öz (eds.), *Metropolis Ionia II. The Land of the Crossroads. Essays in Honour of Recep Meriç*, *Metropolis Ionia* 2, 2010, 167–175.

Horejs – Galik 2011

B. Horejs – A. Galik, Çukuriçi Höyük. Various Aspects of its Earliest Settlement Phase, in: R. Krauß (ed.), *Beginnings. New Research in the Appearance of the Neolithic between Northwest Anatolia and the Carpathian Basin* (Rahden 2011) 83–94.

Ladstätter 2012.

S. Ladstätter, *Das Hanghaus 2 in Ephesos. Ein archäologischer Führer* (Istanbul 2012).

Özbal 2011

R. Özbal, The Chalcolithic of Southeast Anatolia, in: S. R. Steadman – G. McMahon (eds.), *The Oxford Handbook of Ancient Anatolia (10,000–323 BCE)* (Oxford 2011) 174–206.

Roodenberg et al. 2008

J. J. Roodenberg – A. van As – S. Alpaslan Roodenberg, Barcın Höyük in the Plain of Yenisehir (2005–2006). A preliminary note on the fieldwork, pottery, human remains of the prehistoric levels, *Anatolica* 34, 2008, 53–60.

Schoop 2005

U.-D. Schoop, Das anatolische Chalkolithikum. Eine chronologische Untersuchung zur vorbronzezeitlichen Kultursequenz im nördlichen Zentralanatolien und den angrenzenden Gebieten, *Urgeschichtliche Studien* 1 (Remshalden 2005).

Schoop 2011

U.-D. Schoop, The Chalcolithic on the plateau, in: S. R. Steadman – G. McMahon (eds.), *The Oxford Handbook of Ancient Anatolia (10,000–323 BCE)* (Oxford 2011) 150–173.

Zeder 2006

M. A. Zeder, 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* (Oxford 2006) 87–118.

	BaHö LN	BaHö LCh	ÇuHö ECh	ÇuHö LCh
Gastropoda	1			1
Helicidae		1		
Helix sp.	25	36		
Viviparus sp.		1		
Patella sp.			6	5
<i>Gourmya vulgata</i>			10	21
<i>Hexaplex trunculus</i>			28	6
<i>Bolinus brandaris</i>			1	
<i>Monodonta turbinata</i>				1
<i>Barleeia rubra</i>				2
Theodoxus sp.				1
Bivalvia	4	26		
Unio sp.	66			
<i>Arca noae</i>			136	10
<i>Barbatia barbatia</i>			1	1
<i>Mytilus galloprovincialis</i>	86	21	17	5
<i>Ostrea edulis</i>		1	34	8
<i>Spondylus gaederopus</i>			38	2
<i>Cerastoderma glaucum</i>	2	1	67	177
<i>Donacilla cornea</i>			3	13
Solen sp.				7
<i>Tapes decussatus</i>			4	4
<i>Venus venerupis</i>			9	
<i>Pecten glaber</i>		3		

Tab. 1 Molluscs from Barcın and Çukuriçi Höyük.

	BaHö LN	BaHö LCh	ÇuHö ECh	ÇuHö LCh
Pisces				44
Cyprinidae	3	1		
Mugilidae				1
Sparidae				4
Serranidae				1

Tab. 2 Fish remains from Barcın and Çukuriçi Höyük.

	BaHö LN	BaHö LCh	ÇuHö ECh	ÇuHö LCh
Aves large size	13	5		
Aves mid size	29	3	1	2
Aves small size	4			
Ciconia ciconia	3			
Anserinae	2			
<i>Anser anser</i>	1			
Anatinae	2	2		
Buteo sp.	2	2		
<i>Fulica atra</i>	1			
<i>Corvus corone</i>	1			
Corvus monedula				1
Grus sp.		2		
<i>Otis tarda</i>	3	1		

Tab. 3 Bird remains from Barcın and Çukuriçi Höyük.

	BaHö LN	BaHö LCh	ÇuHö ECh	ÇuHö LCh
<i>Erinaceus concolor</i>	1			
<i>Lepus europaeus</i>	58	9	4	2
<i>Vulpes vulpes</i>	16	2	4	
<i>Martes foina</i>	1			
<i>Felis silvestris</i>			1	
<i>Ursus arctos</i>				1
<i>Panthera pardus</i>			1	
<i>Sus scrofa</i> (?)	102	10	19	8
<i>Bos primigenius</i>	4		4	
<i>Bos primigenius</i> (?)	7			
<i>Capreolus capreolus</i>		2	1	
Cervidae			1	1
<i>Cervus elaphus</i>			5	
<i>Dama dama</i>	27	17	30	14
Dama_Antler	2		1	2
Delphinidae				1

Tab. 4 Wild animals from Barcın and Çukuriçi Höyük.