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Frontispiece: Tony Legge caught this fish in the Euphrates, near Raqqah, in 1983. He was particularly pleased with himself because several local 'experts' had advised him that he would catch nothing in this spot. Tony's eye for water did not let him down, however: he hooked the fish on his first cast. Photo by Peter Rowley-Conwy.

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Edited by

PETER ROWLEY-CONWY, DALE SERJEANTSON AND PAUL HALSTEAD

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Front cover: The “Cairo” deer, see Ch. 33, Ikram and Bertini; Metapodials (photo by Terry O’Connor).
Back cover: Tony Legge teaching bone identification in the field, at Danilo in Croatia in 2005 (photo by A.M.T. Moore).

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Age-at-death in traditional Cypriot sheep and goat husbandry: implications for zooarchaeology

Angelos Hadjikoumis

Prologue

This chapter is dedicated to Tony Legge, who worked in Cyprus and was an advocate of zooarchaeologists gaining a better understanding of animal husbandry and farming practices in the present. He has left an indelible mark in the field through the high quality of his work and the large volume of archaeological knowledge that he produced. Arguably his most valuable contribution was his ability to expose cherished but unjustified assumptions and flaws in methodology. Our discipline needs more of his spirit to avoid mechanical application of methods and uncritical reproduction of knowledge.

Introduction

Ethnography is frequently employed in archaeological interpretations. Naturally, there is a chasm between the ethnographic and archaeological records in terms of resolution and degree of integration between different categories of data. This invites criticism on the use of ethnographic analogy in archaeology. Such criticism usually focusses on assessing the degree of relevance of the ethnographic to the archaeological data on the basis of geography, climate, vegetation, cultural and socioeconomic traits, and so on. Following this logic, the more diverse and robust the ethnographic record, the more fruitful will it be in producing reliable archaeological interpretations. The potential of ethnography can be improved through more research with archaeological application in mind. This ethnozooarchaeological (*sensu* Albarella 2011, 2) study focuses on age-at-death of sheep and goats in traditional and modern husbandry practices in Cyprus and contributes to the enrichment of the interpretative models available to zooarchaeologists. Ethnography may be likened to a colour palette used by archaeologists to paint pictures of the past (i.e. to interpret data). The larger and more diverse it is, the more potential it has to enable archaeologists to paint pictures that resemble a long-gone reality.

Considerable ethnographic research has been carried out in Cyprus, mostly focusing on recent traditional society. The term 'recent' tacitly includes the end of the nineteenth and most of the twentieth centuries, roughly up to the end of the 1970s. Human–animal interactions are addressed in several ethnographic studies as an important component of recent Cypriot society. Perhaps the most animal-focused study is that of Xioutas (2001), which presents a wealth of ethnographic information on all wild and domestic animals with which Cypriots interacted at least during the last century. Despite a linguistic and folkloric focus, Xioutas' work offers insights to pastoral life. The proverbs and folklore presented reveal traditional practices in areas such as seasonality, diet, animal products, practicalities of husbandry and the integration of different components of rural life. Christodoulou's (1959) thorough geographical study produced a wealth of quantitative and qualitative information on land use in Cyprus for the late nineteenth and first half of the twentieth centuries, including sections devoted to animal husbandry and to other topics (e.g. geology, vegetation, water resources, land tenure, crops, etc.) relevant to zooarchaeology or its integration with environmental data. More recently, Rizopoulou-Egoumenidou (2008; 2012) studied several aspects of traditional pastoral life in Cyprus such as its representation in art, herders' clothing and gear, pastoral proverbs, infrastructure, mating, diet, products and consumption. In addition to such studies on different aspects of the human–animal relation in recent years, British colonial (1878–1959) reports (e.g. Bevan 1919; Surridge 1930; Jones *et al*. 1958) and travellers' accounts (Harris 2007,

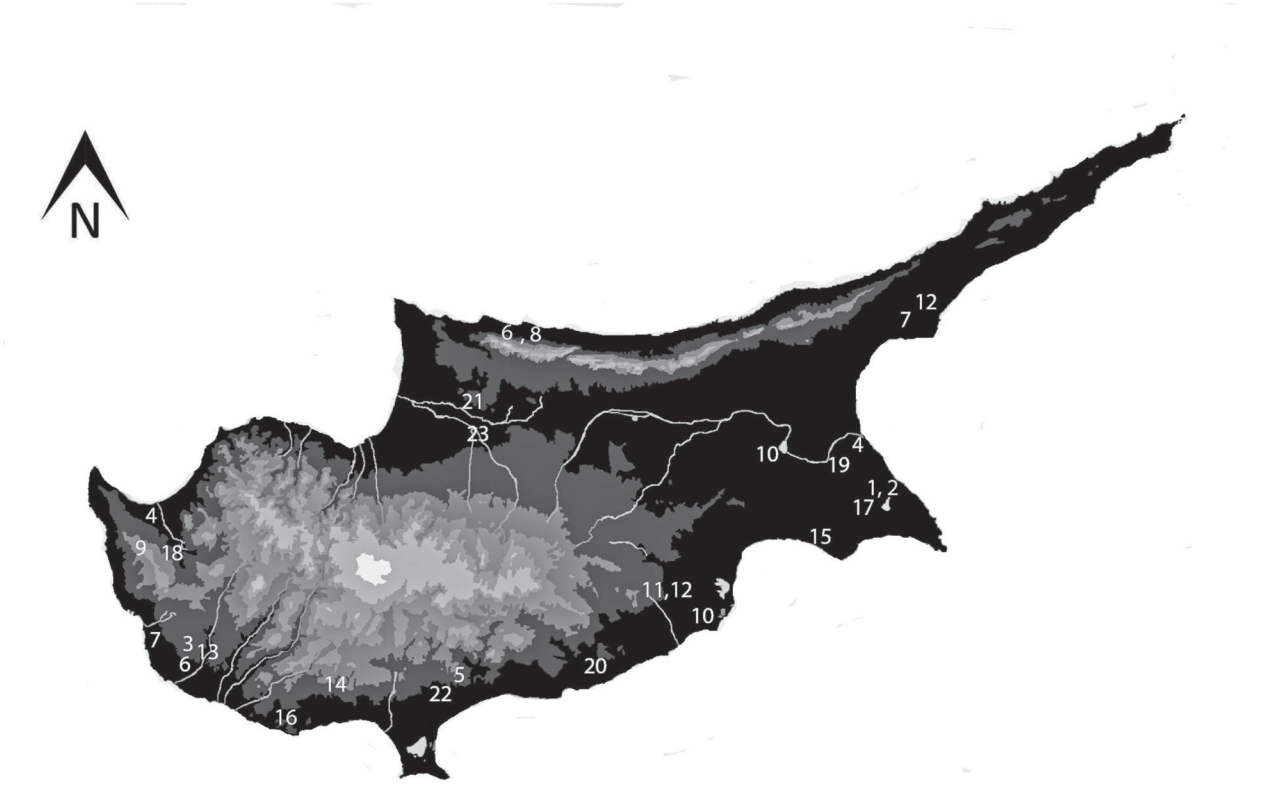
325–442 for a thorough review) often include information useful to the ethnozooarchaeologist.

Nonetheless, ethnozooarchaeological studies in Cyprus are non-existent with the exception of a small study by Tony Legge. While at Agios Epiktitos-Vrysi in 1972, he carried out a small-scale study of the area's farming economy through observations and discussions with farmers (Legge 1982, 14–20). He was planning to expand data collection in subsequent years but the Turkish invasion of 1974 permanently halted both the excavation and his ethnographic work. Since then, no major ethnozooarchaeological study has been published concerning Cyprus. Most ethnographic studies on sheep/goat husbandry have been carried out in continental (e.g. Payne 1973; Digard 1981; Chang 1994; Halstead 1998) rather than insular Mediterranean regions. This dearth of research in insular contexts inevitably results in the use of interpretative frameworks constructed in less relevant environmental conditions. Such use has been fruitful but leaves considerable scope for improvement in terms of relevance, resolution, and integration with other lines of evidence.

This chapter focuses on age-at-death in traditional sheep/goat husbandry in Cyprus, a topic central to Tony Legge's research interests. The chapter aims to increase the diversity and volume of recent age-at-death data, including that related to differences of strategy between individual herders, available to zooarchaeologists for the interpretation of archaeological data.

Methods

Data were collected by the author from April to September 2013 in Cyprus through semi-structured interviews with 23



Herder	Altitude	Herder	Altitude	Herder	Altitude	Herder	Altitude
1	0-100	7	Patriki (N): 0-50 Lemba (SW): 0-100	13	100-400	19	0-100
2	0-100	8	100-1000	14	400-600	20	0-300
3	300-400	9	Farms at 400-600 Foraging at 0-600	15	0-100	21	0-300
4	Enkomi (NE): 0-50 Polis (W): 0-200	10	Lysi (NE): 0-50 Kiti (S): 0-50	16	200	22	50-250
5	300-600	11	50-200	17	0-100	23	100-200
6	Lapithos (N): 0-1000 Agia Varvara (SW): 100-200	12	Vokolida (NE):0-50 Alethriko (S): 50-200	18	200-600		

Altitude in metres above sea level

Fig. 15.1. Map of Cyprus showing the location and altitude of the area(s) in which interviewed herders managed sheep/goat. Key*: numbers 1–23 link the map to the additional information provided for each herder in Table 15.1; for herders displaced in 1974, pre- and post-1974 locations are marked on the map by the same number.*

herders of sheep, goats or both. Care was taken to ensure that interviews were perceived as casual by avoiding a rigid 'question-reply' format in which interviewees tend to provide shorter or idealised answers because they feel that they are expected to perform well. During interviews, specific themes were raised but conversation was allowed to expand in unforeseen directions. Beyond basic information about the herder, the themes addressed in the interviews were: 1) landscape and environmental setting, 2) general characteristics of herd, 3) age and sex composition of herd, 4) mobility, 5) diet, 6) practical aspects of husbandry and 7) consumption of animal products. These themes were selected for their relevance to zooarchaeological issues. This chapter focusses mainly on age-at-death, but other classes of data are inevitably mentioned, where necessary, to provide some context and thus make discussion more meaningful.

Geographical coverage

Interviews covered all of Cyprus except high altitude areas (>800 m asl) of the Troodos range at the centre of the island (Fig. 15.1). The reasons for this geographic void are legal, in the case of goats, and mainly environmental, in the case of sheep. The absence of goat herds from high altitude areas is relatively recent (Given 2000) and attributable to a 1913 colonial law excluding them from government forests and many other areas or villages (e.g. Orr 1918, 141), roughly corresponding to land above the 800 m contour (Christodoulou 1959, 190, map 4). Tethered goats were allowed in areas of goat exclusion and generally ubiquitous (Christodoulou 1959, 191, map 5), but were not a target of this study. The absence of sheep at high altitude was attributed by interviewees to this animal's inability to thrive in steep mountainous terrain and tree/shrub-dominated vegetation

Table 15.1. List of interviewed sheep/goat herders and their basic information

Herder	*Village-district*	*Sex*	*Age (yrs)*	*Active*	*Experience (yrs)*	*Family tradition*
1	Deryneia-Ammochostos	Male	84	No	62	Yes. Father and grandfather
2	Deryneia-Ammochostos	Male	71	No	37	Yes. His father
3	Armou-Paphos	Male	95	No	44	No
4	Pre-'74: Enkomi-Ammochostos 1974–2013: Polis-Paphos	Male	80	Yes	65–70	Yes. At least back to great-grandfather
5	Fasoula-Lemesos	Male	78	No	48	Little. Parents had 1-3 goats
6	Pre-'74: Lapithos-Keryneia Post-'74: Agia Varvara, Paphos	Male	76	No	50–60	Yes. Since 1910.
7	Pre-'74: Patriki-Ammochostos Post-'74: Lemba-Paphos	Male	49	Yes (hobby)	40	Yes. At least back to great-grandfather
8	Lapithos-Keryneia	Male	60	Yes	45–50	Yes. At least back to grandfather
9	Ineia-Paphos (also some information on Peyeia-Paphos)	Male	64	Yes	48	Yes. At least back to great-grandfather
10	Pre-'74: Lysi-Ammochostos Post-'74: Kiti-Larnaca	Male	68–72	Yes	55	Yes. Father
11	Alethriko-Larnaca	Male	75–80	No	20–25	No
12	Pre-'74: Vokolida-Ammochostos Post-'74: Alethriko-Larnaca	Male	50–52	Yes	At least 30	Yes. At least back to grandfather
13	Nata-Paphos	Male	75	Yes	At least 60	Yes. Father and grandfather
14	Pachna-Lemesos	Male	73	Yes	50	Yes. At least back to grandfather
15	Xylofagou-Larnaca	Male	78	No	40	Yes. At least back to grandfather
16	Pissouri-Lemesos	Male	51	Yes	31	Yes. Father and grandfather
17	Deryneia-Ammochostos	Male	85	No	60	Yes. Father
18	Simou-Paphos	Male	63	Yes	40	Yes. Parents
19	Acheritou-Ammochostos	Male	61	Yes	50–55	Yes. At least back to grandfather
20	Maroni-Larnaca	Male	51	Yes	40–45	Yes. At least back to grandfather
21	Philia-Lefkosia	Female	67	No	19	Yes. Father
22	Agia Fyla-Lemesos	Male	67	No	50	Yes. Back to great-grandfather
23	Akaki-Lefkosia	Male	60	Yes	47	Yes. Father

(Christodoulou 1959, 189, map 3). Sheep husbandry in Cyprus during the last century was paired with dry farming, mainly of cereals and carob or olive trees in gentle hilly areas, the coast and the central plain (e.g. Bevan 1919, 2).

The herders

Some of the interviewees became refugees in the 1974 war and so supplied information on both their pre-1974 and post-1974 experiences. The level of detail provided by each herder for each area was rarely balanced but priority was given to pre-1974 information as less affected by modern developments. Basic information on the 23 herders is presented in Table 15.1. Herding free-range (as opposed to stalled or tethered) animals was traditionally a man's profession in Cyprus and the only woman interviewed was herding outdoors with her brother and that only until she was engaged. More than half of the interviewees were above 70 and all except four above 60 years old. In addition, all except two had more than 30 years of experience as well as a long family tradition in herding. It was clear that family tradition and personal experience are sources of pride for herders. Many added that 'it is a difficult profession but once you've loved it during childhood you cannot change'. This shows that a certain way of life, common experiences and interests forge 'a herder's identity' that transcends local boundaries.

Breeds

The sheep/goat breeds owned by the herders are briefly described below. It should be noted that most animals are in reality crosses since breed replacement involves the introduction of male animals and not the substitution of entire herds. This is not intended to be a full account of the history of sheep/goat breeds in the twentieth century but a brief summary of the breeds exploited by the interviewees.

Sheep

1) Cypriot: The traditional fat-tailed breed of sheep, also common all over the Near/Middle East, Turkey and further afield. Based on the interviews this breed goes back to the mid-nineteenth century AD in Cyprus, but was present in the Middle East since at least the late fourth millennium BC (e.g. Ryder 1983, 90) and so was probably introduced to the island during late prehistory. This breed nowadays is almost extinct, at least commercially. Its main characteristics are low productivity in milk and lambs (at least in extensive systems without much additional feed) but high adaptability to local climate and environment.
2) Chios: The first breed extensively to replace the Cypriot. Of similar body size to the Cypriot, its principal differences are a higher lambing rate (two or more, whereas the Cypriot very rarely produced two), production of more milk (albeit usually of lower fat content), easier mating due to absence of a fat-tail, and earlier sexual maturity (although many herders attributed this to improved feeding). On the other hand, like all introduced breeds, it was inferior to the Cypriot in terms of climatic adaptation and vulnerability to disease.
3) 'Israeli': referring to the Awassi breed, as the name suggests probably imported to Cyprus from Israel after it had been improved. Its advantages were similar to those of the Chios breed, but it was of larger body size and better adapted to Cypriot conditions.
4) 'German': refers to the East Friesian breed, the latest arrival of the breeds owned by interviewees. It is even more productive in all aspects except body size (which is similar to the Cypriot, Chios and unimproved Awassi), but is more labour intensive and not well-adapted to Cypriot climate as it needs considerable help during lambing, cannot forage outdoors in hot weather and requires high-quality feed.

Goat

1) Cypriot: a diverse breed of variable size and coat colour, characteristics that define several 'tribes' within Cyprus. Its main common characteristics are erect short ears and short hair, good adaptation to Cypriot climate and abrupt terrain, small litter size (usually 1–2 kids) and ability to thrive as feral.
2) Damascus: less well-adapted but produces more kids per litter and has larger body size than most 'tribes' of Cypriot goat, though not all (e.g. some areas of the Pentadactylos range in the north).
3) Maltese: early arrival in Cyprus to improve milk production but nowadays of restricted use, only mentioned by one herder.
4) Saanen: relatively recent arrival, of restricted use, owned only by one herder. Its main advantage is improved milk production but usually in intensive systems.
5) Alpine: same characteristics as Saanen.
The information provided by herders on the appearance and substitution of the different breeds is not deemed precise enough for more detailed presentation, but some chronological trends in breed replacement should be noted. Most interviewed herders of sheep began their careers in the 1950s and 1960s with the Cypriot breed, which is nowadays not used by any of them as a pure breed. Most herders started replacing the Cypriot breed through crosses in the late 1950s and 1960s with Chios and, slightly later, with Awassi sheep. The East Friesian breed gained importance in the 1980s and 1990s. Since the 1960s, the government's Agricultural Research Institute has supplied herders with improved animals from its experimental farms. Zootechnical research in Cyprus is currently targeting improved lamb and milk production, faster growth, early weaning techniques and, even more importantly, resistance to disease, especially scrapie. The same tendencies in breed improvements are

Table 15.2. Age-at-death data for lambs and kids

Herder	*Age-at-death of lambs*	*Age-at-death of kids*
1	Traditionally 2–2.5 months	–
2	For milk 45 days–2 months. For meat 5–6 months	For meat 5–6 months
3	Traditionally 2–3 months	2–3 months
4	Traditionally 40–60 days, some 6–8 months, nowadays 3 months	–
5	Traditionally 2–3 months, preferred 5 months	Traditionally 3–4 months
6	–	Traditionally 3–5 months
7	Traditionally 2–2.5 months, some 4 months	–
8	–	–
9	–	Traditionally 4 months, nowadays 4–6 months
10	100 days	5–6 months
11	Recently 3–4 months	–
12	Traditionally 3–5 months, nowadays 3–6 months	–
13	Traditionally 3 months	Nowadays 5 months
14	Traditionally 6–7 months, nowadays 4 months	Traditionally 6–7 months, nowadays 4 months
15	Traditionally younger than nowadays	–
16	Recently/nowadays well–fed 2.5 months	Recently/nowadays 3–4 months
17	Traditionally 2–3 months, recently 4–5 (even 6) months	–
18	Nowadays 3 months	Traditionally 8–9 months, nowadays 4–5 months
19	Traditionally 3–4 months	Traditionally 3–4 months
20	Traditionally 3.5–4 months	Traditionally 5–6 months
21	–	Traditionally 4 months, some 2 months
22	4 months	Around 5 months
23	Traditionally 3 months, some at 2 months	–

Key: 'traditionally' refers to pre-1974 practices, 'recently' to 1974–2000 and 'nowadays' to 2000–2013; absence of these terms indicates chronologically imprecise or generic information.

observed in goats. Most herders started with Cypriot goats, but since the late 1960s and 1970s these have been crossed with or replaced by the Damascus breed. Other breeds like the Saanen and Alpine were rarely mentioned and their influence on the genetic make-up of goat populations in Cyprus is small. Unlike the Cypriot sheep, the Cypriot goat is still exploited as a pure breed by some herders, especially in areas with demanding terrain. The majority of goats nowadays, however, are pure Damascus or crosses of Damascus and Cypriot.

Results

Table 15.2 shows age-at-death data for lambs and kids provided by 19 and 14 herders respectively. Lambs were traditionally slaughtered at younger ages (2–3 months) than kids (3–5 months). The age-at-death overlap between lambs and kids is extensive but a trend for younger lambs is clear, also supported by weaning ages (not presented here). Despite seasonal fluctuations in the composition of milk due to differences in nutrition, herders unanimously attributed this to the ewe's richer milk compared to that of the doe. Herder 21, an exception to the general pattern, explained that a few kids were traditionally slaughtered at 2 months if a doe had two or more kids and could not suckle all of them adequately. Rennet for cheese manufacture was also obtained from such kids slaughtered before weaning.

For lambs, there is a trend to older age-at-death in recent/modern compared to traditional practices (Table 15.2). Besides recent market forces favouring older/heavier lambs, many herders attributed this trend to their effort in the past to exploit more of the milk since they could not afford feeding to boost the duration of milk production. Herder 2 mentioned that lambs should be slaughtered around 2 months to optimise milk production, but at 5–6 months for meat production. Such specialised strategies were traditionally difficult to achieve due to the unpredictability of important inter-annual factors such as climate, availability of pasture and fodder, and demand for meat or dairy products.

Table 15.3. Age-at-death data for ewes and rams

Herder	*Age-at-death of adult sheep*	
	♀	♂
1	Traditionally/recently 5–6 years	Same
2	Traditionally 'until dead of old age'	N/A
3	Traditionally more than 5–6 years	Same
4	Traditionally 10+ years, recently/nowadays 5 years	Traditionally 'younger than ewe', recently/nowadays 1–2 years
5	Traditionally 5–7 years	Traditionally 'the older the better'
7	Traditionally, usually 12, up to 15 years	Traditionally 6–7 years or older
9	Traditionally 7 years	Traditionally 10–15 years
10	Traditionally/nowadays 8 years or earlier	Same
11	Recently, usually 4 years	Older
12	Nowadays (Chios/German) 5–6 years	Nowadays (Chios/German) 5–6 years or older
14	Traditionally 5–7, nowadays 6–10 years	Same
15	Traditionally 6 years	Same
16	Recently/nowadays 7–8 years	Same
17	Traditionally/recently 5–6 years	Traditionally/recently good ones 6–7 years
19	Traditionally 7–8 years, some older	Traditionally 8–10 years, some older
20	Traditionally 10 or 'as long as they bred', nowadays (mixed breed) 5–6 years	Traditionally same as ewe, nowadays (mixed breed) 3–4 years
22	Traditionally 8–10+ years, nowadays less than 8 years	If healthy, many years
23	Traditionally 6 years, nowadays younger	Traditionally 6–7 years, nowadays younger

Key: 'traditionally' refers to pre-1974 practices, 'recently' to 1974–2000 and 'nowadays' to 2000–2013; absence of these terms indicates chronologically imprecise or generic information.

In addition to the usual age-at-death range of 2–3 months (also noted by Legge 1982, 18), herder 4 provided two cultural reasons for slaughtering lambs at 6–8 months old. In some villages of the central plain (Mesaoria), many herders every year selected around ten male lambs to be fattened more intensively. Born between January and March, they were destined for slaughter at the Agios Anastasios fair in September. The same herder added that another reason to slaughter sheep older than 6 months was the demand for cooking fat (stored in its fat-tail) by Turkish-speaking Cypriots (Greek-speaking Cypriots raised pigs for this purpose).

To avoid repetition, animals failing selection (because they were injured, sick or barren) and so slaughtered before the end of a normal productive life, are omitted from the tables showing age-at-death results for adults (Tables 15.3 and 15.4). The age-at-death results for sheep are quite diverse with ample overlap between sexes (Table 15.3). Traditionally, healthy ewes were never slaughtered earlier than 5 years and usually older, with many reaching 10 or even 15 years (*cf.* Legge 1982, 18). Further examination of the data, coupled with oral testimonies of herders, suggests that the prime productive period for most ewes was traditionally between 3 and 7 years old. Rams were slaughtered at similar but slightly older ages, with almost all herders asserting that 'the older the ram, the better his seed'. Herders 4 and 20 provided younger ages for rams than for ewes but without explanation. Ewes and rams exhibit a similar trend of change over time, with older age-at-death traditionally than nowadays. Herder 14 was an exception to this pattern, citing in justification improved conditions and nutrition nowadays.

The age-at-death for goats is also diverse (Table 15.4) but with more obvious patterns than sheep. Traditionally, female goats were slaughtered at no younger than 5 and in most cases more than 10 years of age, with some even reaching 16–20 years. Traditionally and nowadays, bucks exhibit almost no overlap with females, being slaughtered at 2–3 years or younger. All herders mentioned that young bucks produce larger kids than old ones. Many even attributed increased stillbirths or deformations to the decreased semen quality of bucks older than 3 years. The well-known saying 'kid from a young buck and lamb from an old ram' perfectly encapsulates their strategy. Herder 16 provided the additional reason that bucks older than 3 years become too heavy for mounting. Only feral bucks exploited by herder 8 reached 7 years or older, because he had little control over these animals. Herder 13 added that the rare occasions when bucks exceeded 2–3 years were because his family

Table 15.4. Age-at-death data for does and bucks

Herder	*Age-at-death of adult goats*	
	♀	♂
2	Recently 4–5 years	N/A
3	Varied according to productivity (usually more than 5–6 years)	Same
6	Traditionally (small scale) around 12 years, recently (medium/large scale) 5–10 years	Traditionally/recently 2 years
8	Traditionally (feral) 15, even 20, nowadays 4–5 years *Not interviewee's case, generally in area* Traditionally (domestic) 'until they could not walk anymore'	Traditionally (feral) 7+ years *Not interviewee, generally in area* Traditionally/nowadays (domestic) 2– years
9	Traditionally/nowadays 7 years	Traditionally/nowadays 3 years
13	Traditionally/nowadays average 8, range 5–12 years	Traditionally 2–5, nowadays 2– years
14	Nowadays 6–7 years	Nowadays 2–3 years
16	Recently/nowadays 7–8 years	Recently/nowadays 2–3 years
18	Traditionally/nowadays 7 years	Traditionally/nowadays 2–3 years
19	Traditionally 7–8 years, some older	Traditionally maximum 3 years
20	Traditionally usually 10+, nowadays 5–6 years	Traditionally 2–3, nowadays 2 years
21	Traditionally 7 years	Traditionally maximum 2 years
22	Usually 8–10 years (record 16 years)	Maximum 2 years

Key: 'traditionally' refers to pre-1974 practices, 'recently' to 1974–2000 and 'nowadays' to 2000–2013; absence of these terms indicates chronologically imprecise or generic information.

could not afford to keep or buy younger males. The effect of modernisation on age-at-death is similar to that observed for sheep, i.e. a trend towards younger age-at-death.

Discussion

To provide the necessary context for discussing these age-at-death results, the traditional sheep/goat husbandry system in Cyprus is briefly outlined here based on interviewees' accounts. Sheep/goat husbandry was of small-medium scale (usually 80–150 animals), extensive or semi-extensive usually within a 5-10 km radius from the village, although there is good evidence for seasonal movements of animals over longer distances (Given 2000). Under the extensive and semi-extensive system, most sheep/goat herders either produced their own dairy products or sold milk to regional dairies. Meat brought seasonally significant income, mostly through the sale of lambs/kids to butchers during the festive seasons of Christmas and Easter. Animals of 1–2 years and older were slaughtered only if they became unproductive (e.g. barren, injured, low milk yield) or to meet cultural demands such as financing a dowry or supplying a wedding feast or village/regional fair. Wool was a welcome, but secondary, source of income and prices declined from the 1960s until exports collapsed in the early 1990s. Sheep wool, fleeces and goat leather were used in the manufacture of clothing, boots and bedding. Manure was mentioned frequently by both sheep and goat herders as either a direct source of income through sale/exchange or a valuable boost to the productivity of the herder's fields, usually sown for animal consumption. Overall, this system was in most lowland areas adapted to articulate with extensive dry farming of cereals, also practised by many herders to improve the availability and quality of feed for their animals.

The main aim of this study is to enhance the potential for interpreting sheep/goat zooarchaeological age-at-death data. The results provide new interpretative options and improve existing ones. It is commonplace in zooarchaeology that precise age-at-death is blurred by many factors (e.g. Marom and Bar-Oz 2009, 1186), several of which are variable in time and space (*cf.* Cribb 1987). Nevertheless, herders expressed a strong preference towards old rams and young bucks for reproduction and clearly, if ancient herders consistently applied a similar strategy, this would affect sheep/goat age-at-death profiles. Thus, breeding males would contribute to mortality between one and three years old in assemblages dominated by goats, but to mortality in the oldest age categories if sheep were predominant, although this difference might be difficult to detect given the usually low proportion of males and the common zooarchaeological practice of pooling sheep with goat and males with females.

The data from Cyprus also contribute to refined interpretation of the age-at-death of lambs and kids. Herders slaughter lambs at a consistently younger age than kids and the main reason is the faster growth rate of lambs fuelled by the richer milk of ewes (Hadjipanayiotou 1995; Hadjipanayiotou

and Koumas 1994). Consequently, proportions of sheep to goat affect the pattern of mortality at 0–6 months. If ancient herders followed the practice of their recent Cypriot counterparts, assemblages with more goats would produce mortality peaks at slightly older ages than assemblages with more sheep. Many Cypriot herders also stressed that lambs/kids kept stalled, while their mothers are out foraging, grow faster because they conserve energy. With the same logic, faunal assemblages representing a more mobile system may exhibit a shift towards older age-at-death amongst lambs/kids. A further consideration is that goats produce more offspring (e.g. Payne 1973, 301), which affects the composition of the 0–6 months cohort by 'drowning' the contribution of lambs.

Rapid modernisation in Cyprus roughly from the 1970s onwards has brought significant changes in many aspects of husbandry practices (Papachristoforou and Markou 2006), among which the differential effect on age-at-death in young and adult sheep/goats is notable. Age-at-death for lambs/kids has increased while that for breeding adults has decreased. Older age-at-death for lambs/kids was explicitly attributed to modern market forces and younger age-at-death for adults to recently acquired knowledge of optimisation strategies and to the more intensive nature and larger scale of modern husbandry. Nevertheless, most herders expressed the view that local breeds of sheep/goat, despite being inferior to introduced ones in terms of productivity, are better-adapted to thrive in conditions specific to Cyprus, less labour-intensive and more resistant to disease (*cf*. Papachristoforou *et al*. 2013). This observation is archaeologically relevant in contexts with evidence for introduction of breeds, especially if accompanied by economic/technological developments and an increase in the scale of husbandry. In such contexts, increased losses of lambs/kids and younger age-at-death for adults could be attributed to disruption of a previously stable husbandry regime and delayed adaptation to new conditions (ongoing for the past several decades in Cyprus).

Beyond the overall age-at-death patterns discussed above, herders revealed finer-tuned decisions likely to affect age-at-death. For example, herder 21 mentioned the traditional strategy of slaughtering one or more kids of a specific doe to allow more milk for the remaining kid and/or for human consumption. If also in the past goats produced more twins than did sheep, then a strategy of slaughtering one kid may have been exercised for the same reasons and to satisfy the need to obtain rennet for dairy products. Herder 2, who also was a butcher, mentioned two strategies for lambs, one focussing on milk with culling at 1.5–2 months (*cf*. Halstead 1998, 8 on sedentary sheep herders in lowland northern Greece) or even 3 weeks in towns where demand for milk was higher (Rizopoulou-Egoumenidou 2008) and another focusing on meat with culling at 5–6 months. Culling at 1.5–2 months or earlier leaves little doubt as to the strategy represented, i.e. milk exploitation according to Payne (1973). However, herder 2 added that intensively fattened lambs (or kids), even if kept alive longer, would not gain much more than 2–3 kg per month for the next few months. By 5–6 months most reached adult weights and were heavier than breeding ewes. Given slower growth rates in the distant past, the equivalents of these intensively fattened 5–6 month old lambs/kids would probably fall in the 6–12 month age interval, in accordance with the 'meat A' mortality model (Helmer and Vigne 2004; Helmer *et al*. 2007, 48, table 1). Accordingly, the traditional Cypriot age-at-death for lambs at 2–3 and kids at 3–5 months can be characterised as a mixed meat and milk strategy with an emphasis on milk, at least in most cases. Another important point stemming from this is related to the style of husbandry. Under intensive/stationary husbandry (e.g. the fattened lambs/kids of herder 2) animals slaughtered for meat are expected to be slaughtered younger than under an extensive/mobile system. In fact, the traditional Cypriot system best matched a mixed strategy resembling Helmer and Vigne's meat model A in some respects and Payne's milk model in others. This point will be further developed elsewhere in the future.

Lastly, herder 8 provided information on a peculiar style of goat exploitation that may have archaeological relevance. He was exploiting feral goats, previously released by his father due to the colonial law, through systematic harvesting of kids and the occasional hunting of adult goats. Such a practice in the past would have distorted age structure due to a disproportionately high input of kids of varying age. In such a situation, confusion between milk and meat models is likely since the presence of kids would imply some degree of milking which did not take place at all. His strategy of capturing or shooting kids and old animals maintained the sustainability of the system. Within the adult category, most goats were killed around 15 years because they started suffering mobility problems and would be captured by thieves or dogs. Before shooting, he aimed at the back of the skull so that animals would either die instantly or survive to be shot another day. He also admitted that in this way he could erase proof of his illegal action by removing the animal's head before selling it to butchers or other households.

Conclusions

This ethnozooarchaeological study of age-at-death has opened a window onto the strategies employed by Cypriot sheep/goat herders, which in turn open up a range of interpretative options to zooarchaeologists. First, it has improved the potential of evaluating the age-at-death in the youngest age intervals (0–6 months) based on the proportions of sheep and goat. Age-at-death of the youngest cohorts should shift upwards by a month or two, if goats are in the majority, and downwards, with a majority of sheep. A complicating factor is the goat's multiparity, which inflates the proportions of kids to lambs but may also promote the culling of some kids before weaning to relieve breeding goats and/or increase milk production.

Secondly, the striking difference in age-at-death between rams (10+ years) and bucks (1–3 years) should be borne in mind in the interpretation of ancient age profiles, even if male animals usually have a minimal effect due to their low numbers. Thirdly, when a traditional system is disrupted by the introduction of new breeds and technological improvements, a change towards overall younger age-at-death for adult animals and higher losses to disease and climatic adversity is likely. Fourthly, the style of husbandry affects the growth rates of animals and thus possibly the age at which an animal acquires the desired weight for slaughter or reaches the end of its prime productive age. Broadly speaking, sheep and goats under intensive/stationary systems achieve production thresholds at an earlier age than under extensive/mobile regimes. This should be taken into account, where feasible, before mechanically applying published models of sheep/goat exploitation to archaeological age profiles. Fifthly, the exploitation of feral populations in parallel to domestic introduces significant biases depending on the modes and aims of each system.

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