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Animal husbandry and hunting in the settlement of the Linear Pottery Culture at Prenzlau 95 (Uckermark, Brandenburg)

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(with 4 figures and 3 tables)

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Abstract

Excavations on the settlement site of the Linear Pottery Culture Prenzlau 95 (Brandenburg district) have revealed 8422 mammal remains. About 68 % of the identifiable specimens belong to domestic animals. Cattle are by far the most frequent species, followed by sheep/goat and pig. Data on age distribution and sex ratio suggest the exploitation of milk in cattle. Morphologically, the cattle represent large sized animals which were typical in Central Europe during the period of the Linear Pottery Culture. Species of game are quite numerous counting for 32 % of the identifiable mammal remains. Beside the frequent species wild boar and red deer, other species like roe deer, elk, aurochs, wild horse, lynx, fox, badger, pine marten and beaver could be identified.

Keywords: Brandenburg, Linear Pottery Culture, Archaeozoology, Animal Husbandry, Hunting.

Zusammenfassung

Bei Ausgrabungen auf der linienbandkeramischen Siedlung Prenzlau 95 in Brandenburg wurden 8422 Überreste von Säugetieren geborgen. Etwa 68 % der bestimmbaren Funde stammen von Haustieren. Das Rind ist die mit Abstand häufigste Art, gefolgt von Schaf und Ziege sowie Schwein. Die Angaben zum Alter und Geschlecht weisen auf die Milchnutzung der Rinder hin. Morphologisch repräsentieren die Rinder einen großwüchsigen Typ, wie er in der Zeit der Linienbandkeramik in Mitteleuropa allgemein verbreitet war. Arten des Jagdwildes sind mit 32 % relativ zahlreich im Fundmaterial vertreten. Neben den häufigsten Arten Wildschwein und Rothirsch konnten noch Reh, Elch, Aurochse, Wildpferd, Luchs, Fuchs, Dachs, Baummarder und Biber nachgewiesen werden.

Schlüsselwörter: Brandenburg, Linienbandkeramik-Kultur, Archäozoologie, Tierhaltung, Jagd.

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Introduction

The Linear Pottery Culture presents the earliest occurrence of human communities with a developed agriculture in Central Europe including the cultivation of plants and animal husbandry. In many regions of this large area, a lot of archaeobiological research has been conducted on sites of this culture in the past decades providing rather detailed information about when and how agriculture became established and how it developed during the centuries of its existence (*e. g.*, Lüning 2000). However, some regions have received comparatively less attention and remain seriously understudied. This applies for example for Northeast Germany, *i. e.*, the region between the rivers Elbe and Oder, where only limited data on the establishment of early agrarian communities is available so far (Cziesla 2008). The present study on the animal remains from the settlement of the Linear Pottery Culture at Prenzlau 95 (Uckermark) aims to improve our knowledge of this early period in the development of agriculture in the Brandenburg region.

Site and Material

The archaeological site which was already discovered in 1935 (Raddatz 1938) is located on the north bank of the lake Unteruckersee, in today's urban area of Prenzlau (Fig. 1). In the summer of 2001, planned construction projects on the site led to rescue excavations on an area of about 6000 m^2 (Lascaris 2002). Because of the slope of the site structures near the surface (*e. g.*, post holes of former long houses) were already completely eroded. The most striking findings of the excavations were large, often elongated pits or complexes of pits. These are probably pits accompanying long houses which were originally used for the removal of clay and later for the disposal of waste. A total of 107 pits could clearly be assigned to the Linear Pottery Culture. Apart from pottery, lithic artefacts, antler and bone tools as well as other equipment, they contained numerous animal remains. Radiocarbon dating was carried out on eight bones from different features (pits) of the site to clarify the chronology of the settlement (Archive of the State Office for Cultural Heritage in Brandenburg and Archaeological Museum). The dates point to a main phase of settlement at Prenzlau 95 in the middle as well as in the second half of the 5th millennium BC. Along with a few radiocarbon dates from other sites they confirm that the Linear Pottery Culture chronologically extended far into the late 5th millennium BC in the area of Brandenburg (Cziesla 2008: tab. 2 and fig. 6). Apart from settlement remains of the Neolithic, the excavations also revealed a few features (mainly pits) dating to the Early Iron Age (Lascaris 2002). The animal remains of this period are not considered here.

The collection of animal remains from Prenzlau 95 dating to the Linear Pottery Culture consists of about 8450 specimens from 72 findings. Bones and teeth of mammals form by far the largest part of the collection. Remains of birds, fish, turtles and mussels are present as well, however, only in very low numbers. Due to the limited time for

Fig. 1. The location of Prenzlau 95 and other sites of the Linear Pottery Culture mentioned in this paper. Underlying map base on https://de.wikipedia.org/wiki/Datei:Relief_Map_of_Germany.svg created by TUBS and released under a CC BY-SA 3.0 license.

excavation sieving and flotation has not been conducted. For this reason birds, fish and turtles seem to be strongly underrepresented in the faunal assemblage. Possibly this also applies to smaller mammals species. In contrast, domestic mammals and large game species which are in the focus of this contribution should be represented in balanced proportions within the collection. Table 1 presents an overview of the mammal species identified in the faunal assemblage from Prenzlau 95. Due to heavy fragmentation, three quarter of the total material remained unidentifiable.

Domestic Animals

Remains of domestic animals form the largest part of the identified bone finds from Prenzlau 95. Numerically, they reach about 68 % of the identified bones (Figure 2). This clearly points to a significant role of animal keeping in the economy of the settlement site, especially for providing food and raw materials. Five species have been identified, *i. e.*, cattle, sheep, goat, pig and dog.

Table 1. List of species: NISP – Number of identified specimens, weight in gram.

Group/Species	NISP	in %	Weight	in %
Domestic Species				
Cattle	1,027	47.8	42,149	61.6
Sheep/Goat	270	12.6	1,382	2.0
(Sheep)	(17)		(128)	
(Goat)	(7)		(78)	
Pig	143	6.7	1,320	1.9
Dog	6	0.3	52	0.1
Domestic or Wild Species				
Cattle or Aurochs	42		4,049	
Pig or Wild boar	114		907	
Wild Species				
Red deer	200	9.3	8,694	12.7
Red deer, antler	33		1,594	
Roe deer	26	1.2	227	0.3
Roe deer, antler	1		15	
Elk, Antler	1		162	
Wild boar	406	18.9	8,647	12.6
Aurochs	40	1.9	4,570	6.7
Wild horse	20	0.9	1,254	1.8
Pine marten	6	0.3	17	<0.1
Lynx	2	0.1	15	<0.1
Red fox	2	0.1	2	<0.1
Badger	1	<0.1	5	<0.1
Beaver	1	<0.1	12	<0.1
Unidentifiable specimens	6,081		10,924	
Sum	8,422		85,997	

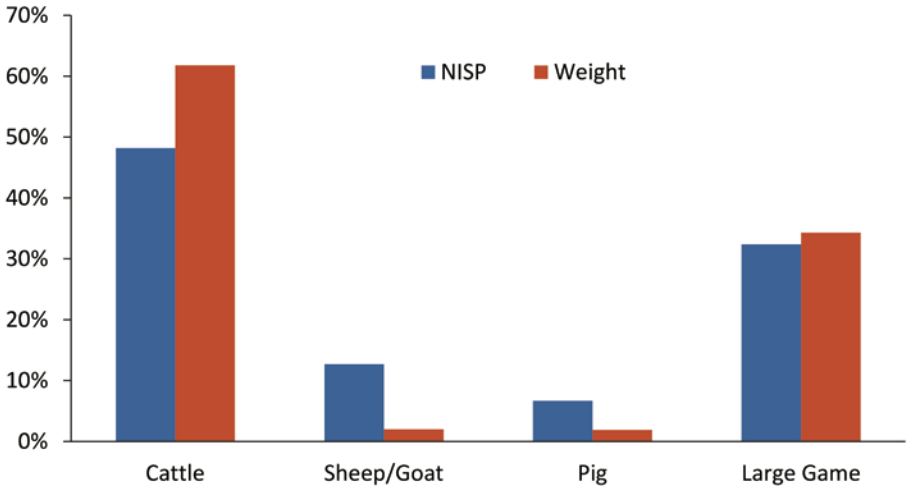

Fig. 2. Percentages of the main domestic mammals and large game at Prenzlau 95, according to NISP and bone weight.

Cattle

The identification of the large bovid remains was encountered with the problem that beside domestic cattle two species of wild cattle could be expected in the faunal assemblage from Prenzlau 95, *i. e.*, aurochs (*Bos primigenius*) and European bison (*Bison bonasus*). As there was no clear proof for the presence of European bison, all remains were assigned to the genus *Bo*s (N=1109). Most of them could be identified as belonging either to cattle or aurochs on the basis of their metrical characters or general size. However, there are 42 specimens where a definite identification was impossible (Table 1).

Numerically, cattle represent the largest group among the animal remains from Prenzlau 95. Altogether 1027 teeth and bone belong to this species. According to NISP they constitute about 71% of the remains of domestic animals. The cattle remains nearly exclusively represent discarded refuse originating from slaughtering animals and preparing food. This is testified by the pattern of fragmentation of the bones as well as by the presence of butchery marks visible on some bone finds. Except for loose teeth, fragments from the skull are scanty. Axial elements (vertebrae and ribs), too, are underrepresented. The best represented elements are those from the forelimb and hindlimb, probably for taphonomic reasons (comparatively high structural density).

According to osteometrical data, the cattle population seems to have been quite uniform in term of body size. On the whole the bones represent animals in the upper range of prehistoric cattle with withers heights varying between 130 and 150 cm. The cattle from Prenzlau 95 largely exhibit the same variation in body size as animals from the other sites of the Linear Pottery Culture in eastern Central Europe (Figure 3).

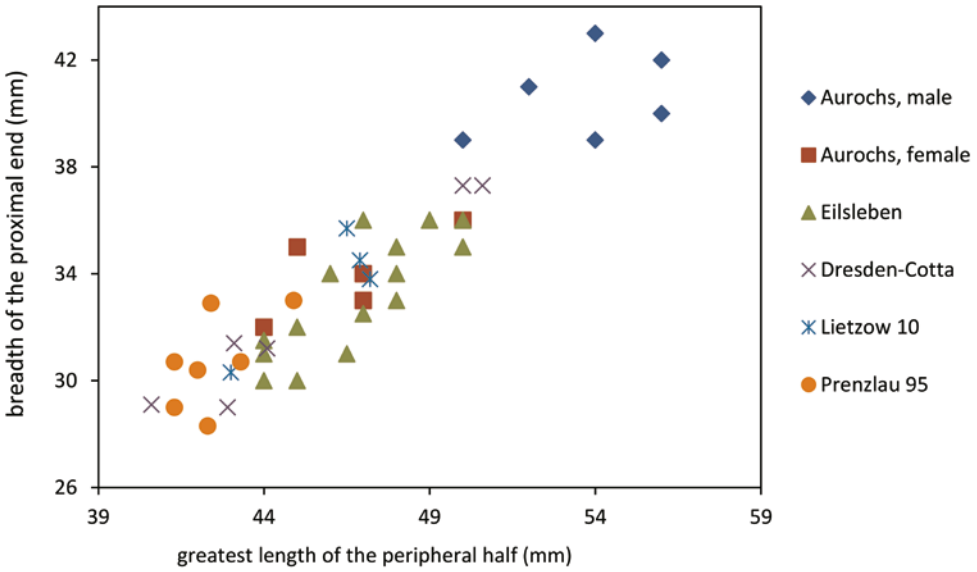

Fig. 3. Comparison of size between cattle from Prenzlau 95 and other sites of the Linear Pottery Culture (Eilsleben – Döhle 1994, Dresden-Cotta – Benecke 1999, Lietzow 10 – Benecke & Hanik in press) as well as aurochs from Denmark (Degerbøl & Fredskild 1970), shown for measurements of the Phalanx 2 posterior.

Due to small sample size there is only limited data available concerning the age structure and sex ratio in cattle. The results of age determination on the mandible finds are compiled in Table 2. They clearly point to a dominance of adult animals among the cattle slaughtered at this site. About two third of the animals were slaughtered at an age of three years and more. Sex determination could be carried out on a few horn cores and

Table 2. Ageing of the mandibles of cattle and sheep/goat (age in months).

Criterium	Cattle		Sheep/Goat	
	Age	N	Age	N
M1 erupting	4–6	1	3–4	–
M1 in wear	7–14	4	5–8	3
M2 erupting	15–18	1	9–11	1
M2 in wear	19–24	2	12–17	3
M3 erupting, Premolars changing	25–34	2	18–24	2
Permanent dentition:				
M3 no wear – slightly worn		20		12
M3 medium worn		2		1
M3 heavily worn		1		–
Sum		33		22

pelvic bones. Sevens specimens were assigned to cows and two to males indicating a predominance of cows among subadult or adult cattle.

Cattle may be raised for a variety of economic purposes such as meat, milk and traction. In a cattle husbandry mainly orientated towards dairying, we would expect to see a high proportion of young calves (primarily males) killed early in the first year of life. Most of the adult cattle will be females, with only a very small number of males kept for breeding purposes. Older females will be slaughtered when their milk production declines or when they fail to produce calves. In a herd mainly raised for beef we would expect a smaller portion of the herd to be killed during the first two years of life. Most animals will be slaughtered in late adolescence or early adulthood (approximately 42–48 months), when they have reached bodily maturity. Only a small number of adults will be kept for breeding purposes. The age structure and sex ratio in the assemblage of Prenzlau 95 point to a cattle husbandry with a pronounced focus on meat production. The preponderance of females among adult animals, however, suggests that cattle may also have been exploited for their milk.

Sheep/Goat

Sheep and goats occupy the second place among the domestic animals in the collection from Prenzlau 95 (Table 1). According to NISP they constitute about 19% of the bone remains of this group. The difficulty in distinguishing bones of sheep and goat in heavily fragmented assemblages from archaeological sites is well known and this problem was also met with in the material studied. Therefore, distinction between sheep and goat could only be made for a limited number of bone finds. As can be seen from the data compiled in Table 1, remains of sheep outnumber those of goats. The low number of metrical data does not allow any conclusions about the body size.

In general, the remains of sheep/goat are highly fragmented with several bones showing traces of butchering. The element distribution analysis revealed that all major elements of the skeleton are present in the assemblages. The missing of some small elements is due to selective bone sampling in the course of the excavation.

The kill-off pattern of sheep and goats was evaluated on the basis of dental eruption and wear. The age data on the mandible finds are summarized in Table 2. They suggest that only a few animals were killed during the first year of life and that approximately 40% of the sheep and goats were killed by two years of age. Another 60% was slaughtered at an older age. Sex determination on isolated horncores, cranial fragments and pelvic bones indicates the presence of both females and males in sheep and goat. Unfortunately, the number of bones which could be determined according to sex is too small for a reliable reconstruction of the sex ratio.

PAYNE (1973) has outlined models for the types of kill-patterns one might expect from meat-, milk-, and wool-producing flocks. As might be expected, the age distribution in sheep/goat for Prenzlau 95 does not match exactly any of Payne's idealized strategies.

With quite a high mortality in the second and third year of life it is most likely comparable to the meat production model. Whether the milk was exploited in both species remains an open question.

Pig

Most of the *Sus* remains (N=663) could be assigned to the domestic form (pig) or wild form (wild boar) on the basis of their metrical characters or general size. However, there are 114 specimens, mainly from young animals, where a definite identification was impossible (Table 1). Numerically, pigs occupy the third place among the domestic animals at Prenzlau 95 (Table 1). According to NISP they constitute about 10% of the bone remains of this group.

The pig bones are generally characterized by a high degree of fragmentation. Cutmarks originating from the dismemberment of the carcasses have mainly been observed on the articulated parts of the limbs. In spite of the numerical bias in the presence of the various skeletal elements resulting from different taphonomic variables it is obvious, however, that all regions of the skeleton are represented in the assemblage. Because of the lack of teeth or bone measurements, no information on the size of the animals is possible.

Age determination on five mandibles and a few postcranial elements shows that pigs were mainly slaughtered at the juvenile/subadult age as is common for meat purpose animals.

Dog

Dog is represented by six bones. Compared to other domestic mammals the percentage of dogs counts for less than one per cent. No butchery marks have been discovered on any dog bone. This seems to indicate that dogs were not exploited for their meat. This is in accordance with observations on other sites of the Linear Pottery Culture in Central Europe (Döhle 1994: p. 79; Benecke 1999: p. 147). All bones belong to animals that had reached bodily maturity before they died. Metrical data point to dogs with shoulder heights between 45 and 55 cm. These medium- to large-sized dogs would have been ideally suited for tasks such as guarding, herding, and possibly hunting.

Wild Mammals

Wild mammals constitute 32% of the total amount of identified mammal remains from Prenzlau 95. This number points to a considerable economic importance of these animals as a resource for food and raw materials. Altogether, 11 species have been identified within the collection representing various species of ungulates and carnivores as well as beaver (Table 2).

Wild boar (*Sus scrofa*) is the most frequent wild mammal. A total of 406 teeth and bones have been assigned to this species. All parts of the body are represented in the

collection and many of the bones had been butchered. Age determination was possible on nine mandibles and on several postcranial bones. All mandibles exhibit a permanent dentition with various stages of tooth wear probably belonging to animals between three and nine years of age. The epiphyseal fusion data show that most of the remains come from wild boar being older than two years of age (Table 3). Sex determination was possible on a few mandibles and loose canines. There are six specimens from males and two from females. Obviously, hunting wild boar was mainly focused on full-grown male animals. Wild boar is an inhabitant of deciduous and mixed forests with oak and beech trees prevailing as well as landscapes with dense vegetation (HERRE 1986: p. 39). The relatively high percentage of this species in the bone collection from Prenzlau 95 is an indication for the presence of vital populations of *Sus scrofa* in the vicinity of the site.

Red deer (*Cervus elaphus*) is the second most frequent wild mammal species. There are 200 bones and teeth as well as 30 antler fragments. Red deer would have been killed for their meat and hides, whilst their antlers were an important resource of raw material. The element distribution analysis revealed that all major elements of the skeleton are present in the assemblage. Age determination was possible on a six mandibles and

Table 3. Epiphyseal fusion data for wild boar and red deer (u – unfused, f – fused or in fusion).

Age of fusion, Epiphysis	Wild boar		Age of fusion, Epiphysis	Red deer	
	u	f		u	f
***c.* 12–24 months**			***c.* 8–10 months**		
Scapula-Coracoid	–	4	Scapula-Coracoid	–	3
Humerus, distal	1	14	Humerus, distal	–	4
Radius, proximal	–	13	Radius, proximal	–	1
Phalanx 2, proximal	–	5			
			***c.* 18–24 months**		
***c.* 24–36 months**			Tibia, distal	–	7
Tibia, distal	2	16	Metapodium, distal	1	5
Calcaneus (Tuber)	3	2	Phalanx 1, proximal	–	1
Metapodium, distal	5	13	Phalanx 2, proximal	–	1
***c.* 36–60 months**			***c.* 30–36 months**		
Humerus, proximal	3	–	Humerus, proximal	–	1
Radius, distal	3	1	Radius, distal	–	1
Ulna, proximal	5	3	Femur, proximal	–	1
Femur, proximal	4	1	Femur, distal	–	1
Femur, distal	5	4	Tibia, proximal	2	6
Tibia, proximal	7	3	Calcaneus (Tuber)	–	5

on several postcranial bones. All mandibles exhibit a permanent dentition with various stages of tooth wear probably belonging to animals between three and ten years of age. The epiphyseal fusion data show that most of the remains come from red deer being older than two years of age (Table 3). According to the sexable bones (cranium, pelvic bone) and the bone measurement male seem to outnumber female animals within the collection. Similar to wild boar, hunting red deer was mainly focused on full-grown male animals. Red deer is an inhabitant of deciduous woodland and woodland-edge, although areas of cultivation may also attract them (Bützler 1986: p. 125).

Roe deer (*Capreolus capreolus*) is represented by 26 teeth and bones as well as one antler fragment in the faunal assemblage from Prenzlau 95. With the exception of a mandible of a juvenile and a calcaneus of a subadult individual, the finds of roe deer come from full grown animals. Two cranium fragments with attached antlers are from bucks. Due to the small sample, reliable information on sex ratio in roe deer is not possible. In contrast to red deer, roe deer is more characteristic of open parkland habitats (von Lehmann & Sägesser 1986: p. 254).

There is evidence of a third cervid species in the bone collection from Prenzlau 95, *i. e.*, elk (*Alces alces*). An antler fragment could be assigned to this species. The presence of *Alces alces* is not surprising because there is much evidence for a wide distribution of elk in Northern Germany during the Early and Mid-Holocene (Benecke 2000: p. 84). Preferred habitats of this species are forests with bogs, marshes and swamps, rivers and lakes (Nygrén 1986: p. 187).

Aurochs (*Bos primigenius*) is represented by a total number of 40 teeth and bones coming from different parts of the skeleton. Most of the bones, *i. e.*, 18 out of 20 ageable specimens, belong to adult animals. Remains of aurochs are regularly encountered in Neolithic bone assemblages from Northern Germany but mostly only in small numbers (Benecke 2000: p. 86). This corresponds with the situation at Prenzlau 95 where aurochs belongs to the occasionally hunted large game species. Aurochs is generally considered to have been an inhabitant of open woodland as well as park-like landscapes and steppes (Requate 1957: p. 325).

The presence of wild horse (*Equus ferus*) is proved by 20 tooth and bone remains of mainly adult animals. In general, wild horse was a rare species in the lowlands of Northern Germany during the Early and Mid-Holocene (Benecke 2000: p. 86). In the area of Brandenburg, remains of wild horse of those periods have already been reported from Potsdam-Schlaatz (Benecke 2002: p. 162) and Friesack 4 (Benecke 2016: p. 133). The occurrence of the extinct wild horse can be expected in biotopes where grasses have provided sufficient feedstuff to sustain a viable population, *e. g.*, in light forests or open areas along rivers and lakes.

Four species of carnivores have been identified in the bone collection from Prenzlau 95. These are pine marten (*Martes martes*), lynx (*Felis lynx*), red fox (*Vulpes vulpes*) and badger (*Meles meles*). They are represented by single bone finds of full-grown animals. Unfortunately, the bones exhibit no marks that can be connected with either fur

exploitation or consumption. All these carnivors have been repeatedly demonstrated on prehistoric sites in the lowlands of Northern Germany (BENECKE 2000: p. 74).

The beaver (*Castor fiber*) is documented by a fragment of a mandible. This large rodent is a common species in the lowlands of Northern Germany during the Early and Mid-Holocene (BENECKE 2000: p. 68). The beaver inhabits slowly flowing and stagnant waters with rich bank vegetation of willow, poplar, alder and aspen (FREYE 1978: p. 191).

Discussion

According to the archaeozoological evidence the settlement's population of Prenzlau 95 relied on animal keeping rather than exploiting wild animal resources. The assemblage mainly consists of remains of domestic mammals with cattle being by far the most frequent species according to NISP, followed by sheep/goat and pig. Within the ovicaprids sheep are much more frequent than goats. From an economic point of view, cattle were the most important domestic animals. A similar situation was observed at two other Early Neolithic sites in the Uckermark region, *i. e.*, Zollchow 20 and Flemsdorf 15 (Figure 4). In contrast, the Linear Pottery Culture site of Lietzow 10, which is located on the so called "Nauener Platte" west of Berlin, points to an animal husbandry with a main focus on keeping sheep and goats.

Data on age distribution and sex ratio suggest that in addition to serving as providers of meat, some of the cattle, sheep and goats may also have been exploited for their milk. But as long as direct evidence (*e. g.,* residues of milk and milk products on sherds) is missing, one has to be careful about the question of early milk exploitation. Whether cattle were also used for traction remains an open question. Beside cattle and sheep/goat, pigs were of some importance for the production of meat at Prenzlau 95. The dog completes the list of domestic species. The bones represent animals of medium to large size which would have been suited for tasks such as guarding and herding.

Morphologically, the cattle, sheep, goats and pigs represent animals which were in a well-advanced stage of domestication, obviously being under human control for a long period. In the area of Brandenburg, cattle and pig might have been domesticated locally. But the reduced mean size in both species compared to aurochs and wild boar at Prenzlau 95 suggests that they were effectively isolated from interbreeding with their larger wild relatives. Archaeogenetic studies should be able to demonstrate whether the earliest cattle and pigs were imported or of local origin. Recent ancient DNA-studies rather suggest that all Early Neolithic cattle and pigs of Central Europe originated from small founder populations imported from areas beyond Europe (*e. g.,* BOLLONGINO 2006; GEÖRG 2013; LARSON & BURGER 2013).

Wild mammals are represented by remains of red deer, roe deer, elk, wild boar, aurochs, wild horse, pine marten, lynx, red fox, badger and beaver. Compared to the domestic species, their number is quite high reaching 32 % of the identified mammal remains. This number points to a considerable economic importance of these animals as a resource

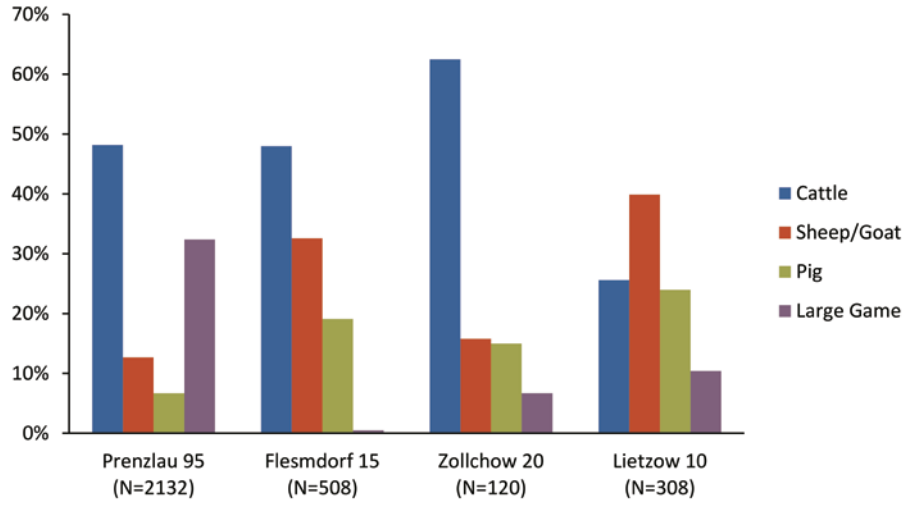

Fig. 4. Percentages of the main domestic mammals and large game according to NISP at Prenzlau 95 and other Early Neolithic sites in Northeast Germany (Flemsdorf 15 – Teichert 1974, Zollchow 20 – Heussner 1989, Lietzow 10 – Benecke & Hanik in press).

for food and raw materials. Other Early Neolithic sites in the Brandenburg region show much lower percentages of game (Figure 4). The wild mammal species fall into two groups, beaver and carnivores that were presumably killed for their furs and perhaps for medical or other reasons apart from food, and large as well as medium-sized ungulates that were hunted for food. The low number of young animals among the ungulates probably results from selective hunting, *i. e.*, the preference of large, fully grown individuals. At Prenzlau 95 hunting may have been performed mainly for traditional and ritual motivations or to protect cultivated fields against herbivores and partly for the acquisition of valuable raw materials (skins of red deer, furs). Most of the wild mammals encountered at the site point to a local natural environment where open woodlands prevailed.

The archaeozoological evidence clearly points to a well-established pastoral economy at Prenzlau 95. As is widely known, pastoralism exists in a myriad of forms ranging from nomadism, with a complete absence of agriculture, through the fully sedentary herding. The data obtained are consistent with two forms of pastoralism which can be described as sedentary animal husbandry or herdsman husbandry (Khazanov 1994: p. 22). In the first case, livestock is kept on pastures adjacent to the settlement (free grazing), whereby the laying-in of fodder and the maintenance of livestock in enclosures or stables is absent or limited. In the case of herdsman husbandry the majority of the population leads a sedentary life and is occupied for the most part with agriculture, while the livestock or, more often, some of it, is maintained all year round on pastures, sometimes quite far from the settlement, and tended by herdsmen especially assigned to this task. For part of the year the livestock is usually kept in enclosures, pens and stalls, which entail the laying-in of fodder. The assumption of a predominantly sedentary, village-based Early

Neolithic economy in the area of Brandenburg is corroborated by the latest archaeobotanical evidence, according to which the subsistence economy also included an agricultural component with several food crops like emmer, wheat, einkorn, pea and flax (JAHNS *et al.* in press).

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