

# Neolithic and Bronze Age mixed farming and stock breeding in the traditional Baltic culture-area

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During the past several decades, archaeologists have investigated numerous Neolithic and Bronze Age sites within the traditional culture-area of the Balts - an area delineated not only by historical and archaeological evidence, but by the presence of Baltic hydronyms.<sup>1</sup> The well preserved organic deposits found at many of these traditional Baltic sites are of particular interest to us, because they allow the identification and quantification of faunal osteological remains. Osteological identification, together with the development of palynological profiles and the recovery of agricultural implements, now permit a reliable dating of the beginning of agriculture in the Baltic culture-area.

Some archaeologists have asserted that plant and animal domestication in eastern Europe began at the start of the Neolithic, e.g. in Belarus (Chernjavsky 1979: 68-69), Poland (Kukharenko 1969: 31-60), and the Ukraine (Telegin 1986: 186). In Lithuania, Rimantienė (1984: 246-49) appears to favor the end of the Late Neolithic. Our purpose in this article is to review new data on animal domestication, and to suggest when and how livestock raising and agriculture first appeared in the Baltic culture-area.

## Early Neolithic

The Early Neolithic period in the traditional Baltic culture-area dates to 4800/4600 - 2900/2700 B.C. (based on uncalibrated radiocarbon dates), or approximately the second half of the Atlantic climatic period. Our review of Early Neolithic sites in the region fails to indicate any evidence of agriculture. The only domesticated animal species at the time was the dog (*Canis familiaris*). In east Lithuania, remains of dogs represent 1.5% of the identified total of animal bone remains at the Žemaitiškéš 3B settlement site. Wild animal species exploited at this site included elk (*Alces alces*) (40%), red deer (*Cervus elaphus*) (23%), brown bear (*Ursus arctos*) (7.7%), beaver (*Castor fiber*) (7.7%), wild pig (*Sus scrofa*) (6.2%), roe deer (*Capreolus capreolus*) (1.5%)

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<sup>1</sup> Today, in this area, Baltic-speaking peoples are found primarily in Lithuania and Latvia. Slavic-speaking peoples make up the republic of Belarus, the north-east area of Poland, as well as the Kaliningrad, west Smolensk and south Pskov regions of Russia.

and a few other species (Girininkas 1990a). Settlements in west Lithuania, such as Daktariškės 5 and Šventosios 4, show different frequencies of bones of wild animal species: red deer (35%), wild pig (32%), elk (13%), roe deer (9%), as well as aurochs (*Bos primigenius*) and beaver (Daugnora and Girininkas, in press).

## Middle Neolithic

The Middle Neolithic period in the south-east Baltic is dated to 2900/2700 - 2300/2100 B.C., and constitutes the first half of the Subboreal climatic period. Evidence of mixed farming begins to appear at the following Middle Neolithic Narva ceramic culture sites: Šventosios, west Lithuania (Rimantienė 1979); Kretuonas, east Lithuania (Girininkas 1990a, 1994; Daugnora 1992a; Daugnora and Girininkas 1995); Zvidze, east Latvia (Loze 1988); Usviaty, Russia (Dolukhanov and Mikljajev 1985); Krivina, north Belarus (Chernjavsky 1969). It is clear, however, that throughout the Early and Middle Neolithic the principal mode of subsistence in the southeast Baltic was hunting and gathering.

Preference for different species of game animals appears to correlate to some extent with ecological environment. In general, the red deer is found in high open forest, while the elk prefers a damp, mixed conifer - broad leaf forest (Paaver 1965: 235-80). In the south-east, for example, the primary game species was the red deer, evidenced by osteological remains from such settlements as Žemaitiškės 3B and Kretuonas IB in east Lithuania; and in Russia: Usviaty IV, Naumovo, Serteja I and II, Diazdica, and Dubokraya (Dolukhanov and Mikljajev 1985). To the north, around the Lubāna Lake Depression, eastern Latvia, and the southern Gulf of Finland, the principal game animals were aurochs and elk (Loze 1988). In the western coastal zone, preferred game included seals (*Phocidae*) (50%), wild pig (30%), beaver, elk, aurochs, red deer and other species (Daugnora and Girininkas, in press)

In the eastern and northern areas of the Narva ceramic culture, bone fragments of sheep (*Ovis aries*) and goats (*Capra hircus*) first appear during the Middle Neolithic (Rimantienė 1979: 45-47). At this time, there is also an increase in the number of flint microlith blades that were set into scythes, and used for hay production (Girininkas 1990a,b). The initial development of agriculture in this region therefore appears to be linked to stock breeding.

A different regional trend is evident in the western and south-western areas of the Narva ceramic tradition. Here, the origin of agriculture takes the form of mixed farming, i.e. grain cultivation in conjunction with stock breeding. By the end of the Middle Neolithic, for example, an oak ard is known from Šventosios 6; a small-scale model (perhaps serving a ritual function?) of an ox yoke from Šventosios 4; grains of hemp (*Cannabis sativa*) from Šventosios 2B and 3B; and millet seeds (*Panicum miliceum*) from Šventosios 6 (Rimantienė 1979, 1986). This mixed agricultural complex in the western region appears to be directly influenced by, or borrowed from, the neighboring Funnel Beaker and Globular Amphora ceramic cultures located to the south and south-west.

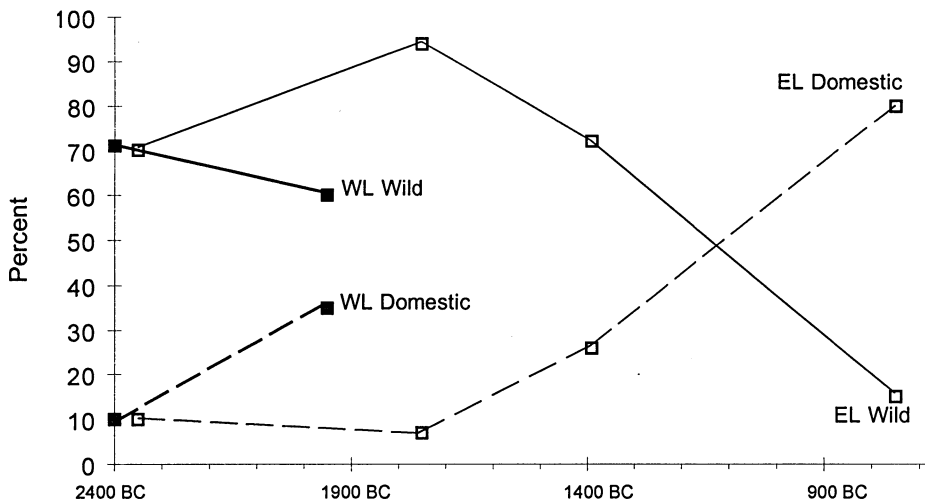
In our opinion, the two regional agricultural traditions – mixed farming in the west-southwest, and stock breeding in the east-northeast – assume their different trajectories almost from the very beginning, i.e. the Middle Neolithic. Regional environmental factors, e.g. arable soils, composition of flora, and differential access to trade networks had a strong influence in the formation of the two traditions.

On the whole, the cultivation of domesticated plants and animals (cattle, sheep, goats) in the traditional Baltic culture-area began quite slowly. In the south-west region, bones of domesticated animals make up only 9.0% of all identified animals bones, and of this number dog remains represent 6.84%. In the north-east region, domesticated animal bones represent 7.56% of all faunal remains at Kretuonas IB; 1.1% at sites in the Usviaty region (Pskov, Russia); and 9.8% at Zvidze, east Latvia (Loze 1988). The presence of spindle whorls during the Middle Neolithic at Kretuonas IB - their earliest appearance in the entire east Baltic area - indicates the first use of domesticated plants at the site (Girininkas 1990a). We believe influence from the neighboring Funnel Beaker ceramic culture stimulated the development of agriculture in this area.

In sum, agriculture appears to have developed more rapidly in the south-western region of the Baltic culture-area, than in its north-eastern and eastern regions. The explanation of this process should be sought in the regional subsistence potential of hunting and fishing activities, climatic conditions and other natural environmental factors (Kabailienė 1990), as well as the influence of neighboring cultures (Girininkas 1989).

## Late Neolithic

The Late Neolithic period in the traditional Baltic culture-area is dated to 2300/2100 - 1800/1600 B.C., and constitutes the middle of the Subboreal climatic period. In the west Baltic culture-region, major advances in agriculture took place during the Late Neolithic. In the north-east Baltic region, however, traditional subsistence activities such as hunting, gathering, and fishing were maintained, and no advances in agriculture are noted. In the opinion of many archaeologists (Loze 1986; Chernjavsky 1979; Mikljajev and Dolukhanov 1986) the influence of the Corded Ware ceramic culture stimulated the development of agriculture in the traditional Baltic culture-area. Our osteological data, however, indicate that this was not the case in the north-east Baltic region. Figure 1 shows that sites in east Lithuania (Žemaitiškės I, Žemaitiškės 2, Žemaitiškės 3A, Kretuonas 1A and 1D) had an average 6.9% of bones of domesticated species within the total faunal collection. Contemporary sites in neighbouring areas indicate similar quantities: in east Latvia (Loze 1979) the corresponding percentage is 3%, while in the southern Pskov district it is 14% (Mikljajev and Dolukhanov 1986). Throughout the Late Neolithic, hunting and fishing continued to be the primary modes of subsistence in the eastern Baltic region. Principal game animals were red deer, elk, wild pig, roe deer, auroch, bear, and beaver. The size of fish bones indicate the



**Fig. 1** Percentage of bone from wild and domestic species in west Lithuania (WL) and east Lithuania (EL) during the Neolithic and Bronze Age. Data from Daugnora and Girininkas (in press).

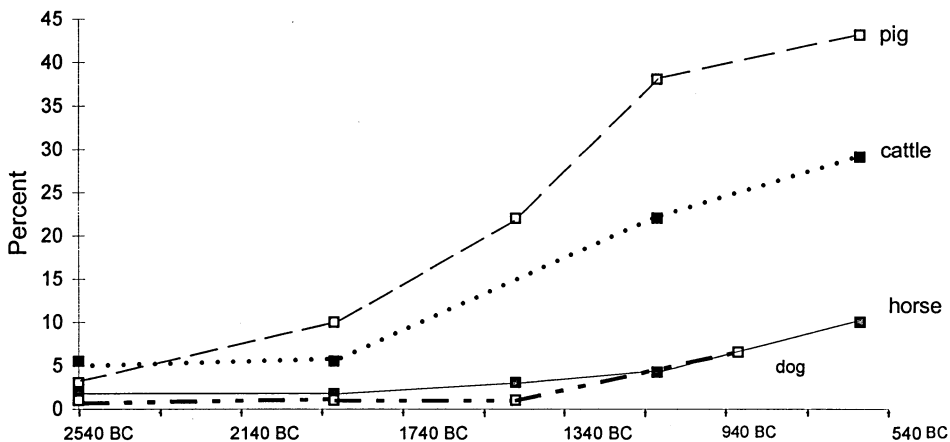
**1 pav.** Vakarų (WL) ir rytų Lietuvos (EL) gyvenvietėse aptiktų laukinių gyvūnų ir naminių gyvulių kaulų santykis (%) neolite ir bronzos amžiuje. Duomenys pagal L. Daugnorą ir A. Girininką (spaudoje).

catch of very large wels (*Silurus glanis*), northern pike (*Esox lucius*), perch (*Perca fluviatilis*), roach (*Rutilus rutilus*) and others.

Figure 1 clearly demonstrates that domesticated animals at Late Neolithic settlements in west Lithuania were more numerous than those in east Lithuania. For example, at the Daktariškės 5 settlement the quantity of domesticated animal bones is 13.7%, and at Šarnelė it reaches 17% (Girininkas 1977).<sup>2</sup> There is other evidence of agriculture at settlements in the Baltic western region. Seeds of hemp and millet plants have been recovered from the Šventosios 1A and 9 sites, as well as at Šarnelė. Pollen profiles show evidence of different types of wheat in this region, and agricultural implements such as hoes and plowing implements have been found in archaeological excavations (Rimantienė 1979: 45-47). Here, the Corded Ware ceramic culture played a more prominent role in the development of farming in the western Baltic region, than it did in other Baltic regions.

The Late Neolithic introduction of long houses - used for human residence, as well as the stabling of farm animals and storage of food and tools - sheds light on the nature of agriculture in the Baltic culture-area. Long houses measured 14-16m in length and some 3-4m in width. Remains of such structures are known from the settlement of Žemaitiškės 2 in east Lithuania (Girininkas 1990a: 89-90, Fig. 112), as well as Abora, Lagaža, and Eini in

<sup>2</sup> An exception is the Šventosios 6 site in west Lithuania, where the major portion of recovered faunal remains is represented by seal and wild pig (66.6% of all identified bones). Remains of bear, elk, red deer and other wild species also exist. In regard to domesticates, we find only the dog (4.4% of all identified bones). In our opinion (cf. Duoba and Daugnora 1994), this site clearly represents a specialized hunting camp, rather than a permanent settlement.



**Fig. 2** Domestic species during the Neolithic and Bronze Age (as a percentage of total bone collection) in east Lithuania. Data from Daugnora and Girininkas (in press).

**2 pav.** Rytų Lietuvos gyvenvietėse aptiktų atskirų naminių gyvulių rūšių kaulių kiekis (%) neolite ir bronzos amžiuje. Duomenys pagal Daugnorą ir Girininką (spaudoje).

Latvia (Loze 1979: 55-60). The Late Neolithic tool inventory (e.g. stone hoes, wooden ards and yokes) also provides evidence of stock breeding and agriculture. At the same time, however, wild animals continued to be exploited: antler of elk and red deer were fashioned into tools used to soften hides, and to manufacture leather belts.

## Bronze Age

Agriculture in the Baltic area changes significantly during the Old Bronze Age (1800/1600 - 1100 B.C.), a period which corresponds to the ending of the Subboreal climatic interval. The first evidence of metallurgy appears, in the form of bronze tools and ornaments, as well as casting moulds and small casting crucibles (Loze 1979; Girininkas 1990a). It is important to note that bronze technology is more widespread in the western Baltic region than in the eastern area. Raw metal for local bronze production was probably brought in from central Europe (although finished tools were also being imported). It is clear that by the end of the Old Bronze Age, agriculture is being practised more extensively than hunting and gathering, as the principal mode of subsistence in the eastern Baltic region. This is observed in Figure 2, which shows that in east Lithuania the percentage of pigs and cattle, in terms of all identified animal bones, steadily increases throughout the Old Bronze Age, from about 18% to 60%.

This trend is supported by data from other eastern Baltic hill-fort settlements in east Latvia (Loze 1979: 55-60) and the southern Pskov district (Dolukhanov and Mikljajev 1985: 55). They indicate that bones of domesticated animals constitute 25%, and more, of all identified animal bone. The increasing importance of animal husbandry is also indicated here by the three-fold

Hill-fort	Domestic animals	Wild animals	Pig <i>Sus suis</i>	Cattle <i>Bos bovis</i>	Sheep-Goat <i>Ovis aries-Capra hircus</i>	Horse <i>Equus caballus</i>	Wild pig <i>Sus scrofa</i>	Elk <i>Alces alces</i>	Red deer <i>Cervus elaphus</i>
<b>Kivutkalns, Vīnakaļns (West Latvia)</b>									
Fragments (n)	2842	377	642	1273	489	427	32	68	37
%	88.29	11.71	19.94	39.55	15.19	13.26	0.99	2.11	1.15
Individuals (n)	129	59	45	37	28	16	11	8	6
%	68.62	31.38	23.94	19.68	14.89	8.51	5.85	4.25	3.19
<b>Narkūnai (East Lithuania)</b>									
Fragments (n)	811	188	378	240	167	26	56	16	4
%	81.18	18.82	37.83	24.02	16.72	2.6	5.6	1.6	0.4
Individuals (n)	33	32	14	9	8	2	10	2	1
%	50.76	49.24	21.54	13.85	12.3	3.07	15.38	3.07	1.53
<b>Demidovka (Smolensk reg., Russia)</b>									
Fragments (n)	1151	564	269	406	280	139	31	121	
%	67.11	32.89	15.68	23.67	16.32	8.1	1.81	7.05	
Individuals (n)	50	86	14	13	11	7	6	9	
%	36.76	63.24	10.29	9.55	8.09	5.14	4.41	6.6	

**Table 1.** Domestic and wild animals from Baltic hill-forts during the New Bronze Age. Not all recovered species are listed. Data are from Luchtanas (1986), Graudonis (1989) and Schmidt (1992).

**Lentelė 1.** Naujojo bronzos amžiaus baltų piliakalniuose aptiktų naminių ir laukinių gyvūnų kaulų duomenys. Į lentelę neįrašyti visų nustatytų gyvūnų rūšių duomenys. Paskelbti duomenys A. Luchtano (1986), J. Graudonio (1989) ir E. Šmidto (1992).

increase in the number of knives and blades used in the cutting of hay. Long houses continue to be used in settlements, suggesting that local patterns of residency have not changed. It seems likely, however, that the appearance of new organisational networks for the procurement of imported metal would have changed traditional tribal relations. By the end of the Old Bronze Age, for example, defensive fortifications are being erected on the summits of hill-forts (Grigalavičienė 1986).

During the New Bronze Age (1100 - 500 B.C.), or by the beginning of the Subatlantic climatic period, patterns of subsistence continued to include stock breeding, agriculture, hunting and fishing. It is likely that advances in bronze technology helped to intensify agricultural activity, as well as many other socio-economic processes. In particular, the importance of stock breeding increases. This is suggested by Figure 2, which shows the quantity of bones of animal domesticates (as a percent of all bones identified) from several sites in east Lithuania, including Nevieriškės, Sokiškiai and Narkūnai. It can be seen that pigs were the most widely kept animals, followed by cattle, horses and dogs.

Table 1 compares the distribution of domestic and wild animal species during the New Bronze Age within three regions of the Baltic culture-area (for site location see Preface, Fig. 1). It is observed that the highest percentage of domesticates is found in west Latvia (Graudonis 1989), based on the number of bone fragments (e.g. 88.29%) as well as individual animals (e.g. 68.62%).

Domesticates are slightly less numerous in east Lithuania (Luchtanas 1986) and substantially fewer in the Smolensk region, Russia (Schmidt 1992) This supports our contention that mixed farming developed at a more intensive pace in the western Baltic area.

In the bottom-most layers of the Narkūnai hill-fort in east Lithuania - dated to the end of the second millennium B.C. and the beginning of the first millennium B.C. - bones of domesticated animals represent from 74.7% to 85.3% of all identified animal bones (Luchtanas 1986). Similarly, in contemporary hill-fort settlements located along the upper and middle Daugava (northern Belarus and southern Pskov district), bones of animal domesticates represent 40% to 80% of the total faunal remains. About a third of the domesticates are pigs, followed by cattle, goats and sheep, and horses (Dolukhanov and Mikljajev 1985). Hunting of wild animals in this region, however, continued to play a supplementary role in subsistence during the New Bronze Age. They represent 14.7% to 25.3% of identified faunal remains in various layers.

Data from east Lithuania indicate that during the Neolithic and Old Bronze Age the bones, horns and antlers of wild animals were used as raw material for the manufacture of utilitarian tools, as well as hunting and fishing equipment. The hunters of the time recognized and optimally exploited the anatomical structural features of the antlers of red deer and elk (the two species represent 33.5% of the identified worked osteological remains), in addition to their *ossa antebrachii*, *metacarpus*, *metatarsus* which represent 23.3% of the identified worked osteological remains (Daugnora 1992a; Daugnora and Girininkas 1994; Daugnora and Girininkas, 1995). This pattern of use continues into the New Bronze Age. With, however, an increase in stock breeding, and a concomitant decrease in hunting, the bones of sheep and goat began to be utilized as raw material for the production of tools and implements. At this time, there is also an increase in the utilized number of bones of horse and roe deer, evidenced by the artefacts recovered from hill-fort sites at Narkūnai, Nevieriškiai, Sokiškiai, Juodonys, all in eastern Lithuania, and Mūkukalns, Latvia (Daugnora and Girininkas, in press).

Osteological material recovered in western Latvia from the bottom stratigraphic layers (Nos. 7-9) of hill-forts at Kivutkalns and Vīnakalns provide useful information about the development of stock breeding and agriculture among the west Balts during the New Bronze Age (Graudonis 1989). At these sites, the quantity of bones from domesticated animals shows an increase of 10%-15% over the previous period, and represents 95%-97% of all identified animal bone. Subsistence based on hunting and fishing has now virtually disappeared, at least in this region.

## Conclusions

The development of stock breeding and agriculture in the traditional Baltic culture-area began during the Middle Neolithic period. Their evolution represents a slow and gradual process, which extended throughout the Late

Neolithic and the Old Bronze Age. By the beginning of the New Bronze Age, stock breeding and agriculture were firmly established in the Baltic culture-area, and at this point there is clear evidence of regional specialization. That is, mixed farming was practised in the western sphere of the Baltic culture-area, while stock breeding predominated in the eastern region. Associated with this regional division are several factors - including distribution of arable soil, local flora, and the technological and economic influence of neighbouring cultures - which have not yet been fully investigated. They represent important areas for future research.

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## Žemdirbystė ir gyvulininkystė istorinėse baltų kultūros teritorijose neolito ir bronzos amžiuje

### L. DAUGNORA ir A. GIRININKAS

#### Santrauka

Baltų žemėse gamybinis ūkis pradėjo formuotis viduriniajame neolite. Šis procesas vyko laipsniškai ir tęsėsi vėlyvajame neolite bei senajame bronzos amžiuje. Galutinai gamybinis ūkis įsitvirtina naujajame bronzos amžiuje. To laikotarpio baltų teritorijose, gamybinis ūkis vystėsi nevienodai. Vakarų baltų gamybinį ūkį sudarė žemdirbystė ir gyvulininkystė, o rytinėse baltų žemėse pagrindine ūkio šaka buvo gyvulininkystė. Šie skirtumai tampriai susiję su dirvožemiu, flora, kaimyninių kultūrų įtaka ir prekyba.