Environment, Colonization, and the Baltic Crusader States
 ENVIRONMENTAL HISTORIES OF THE NORTH ATLANTIC WORLD

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Environment, Colonization, and the Baltic Crusader States

Terra Sacra I

Edited by

Aleksander Pluskowski
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6. Farming, Hunting, and Fishing in Medieval Livonia: The Zooarchaeological Data

Mark Maltby, Aleksander Pluskowski, Eve Rannamäe, and Krish Seetah
With contributions by Sheila Hamilton-Dyer, Katherine French, and Richard Madgwick

Introduction

Before the crusades, the indigenous societies of the eastern Baltic had an established pastoral culture, revolving around the raising of cattle, pigs, sheep, goats, and poultry. Regional and local variations in the representation of these species can be linked to the socio-economic characteristics of individual strongholds and their interdependent settlements (Blomkvist 2009, 444). Little is known about the social organization of animal husbandry, and the relationships between strongholds and settlements within their territories are assumed to mirror the framework of stratified power relations alluded to by other types of archaeological evidence (see Chapter 4; Zemītis 2014, 451–55). In order to support the influx of crusaders, merchants, colonists, and their heavy cavalry, a complex provisioning system was essential from the earliest arrival of crusading armies. The establishment of colonies in Üxküll (Latv. Ikšķile) and Riga enabled fields, pastures, and herds to be rapidly procured and reorganized. These were immediately vulnerable; in the summer of 1203 the Rus’ leader of Yersika, along with the Lithuanians, stole the cattle from Riga’s pasture (pascuis) and captured two priests who were cutting trees, together with crusaders at the ‘Old Hill’ (HCL vii, 8). Riga had been founded a few years earlier within the vicinity of existing Liv settlements, and the incoming colonists would have adopted the existing provisioning system. The pastoral economy at this time would have been highly volatile, with raiding accentuating the impact of environmental factors on herds (Goldschmidt 1979).

The seizure of livestock during raids was common. This supplemented the provisioning requirements of the victors, deprived their enemies of vital resources, and also represented a measure of wealth; referring to the aftermath of the slaughter of Lithuanians and Estonians in 1205, Henry describes the Germans and their Semigallian allies seizing ‘untold loot, both in horses and flocks’ (HCL ix, 4). The crusaders’ resources were also targeted; in the autumn of 1218 an Öselian fleet came up the Daugava, took captives, and stole many flocks (HCL xxii, 8). This continued throughout the thirteenth century, with all the narratives of the Livonian Crusade punctuated by seizures of livestock, particularly horses, and grain. With the onset of the ‘eternal crusade’ against Lithuania, livestock seizure continues to be documented in the southern Livonian frontier. In February 1367, the marshal of the Order attacked northern Lithuania and captured fifty mares from the Grand Duke’s stud farm (equirriam); three years later the commander of Goldingen (Latv. Kuldīga) seized 430 cattle alongside horses during an attack across the Lithuanian border (HWC, 105, 119). When tensions flared up between the Order and its tenants, animals — as valuable property — were taken. Early in 1454 when the Order’s men set fire to some hamlets belonging to the town of Riga near Neumühlen (Latv. Bukulti) and Depena (Latv. Sarkandaugava), they seized the farmers’ cattle and property; conversely, in March 1482 the burghers of Riga broke into the outer bailey of the Order’s castle and took horses, oxen, and food (HHC ii, 743, 778).

The incremental conquest and seizure of tribal lands was accompanied by the annexation of livestock, pasture, and farmland. Although many indigenous power centres were destroyed during the crusades, a significant part of the population remained intact, along with local political and economic structures that were incorporated into the newly established Ordensland (Pluskowski and Valk 2016). At the same time, the provisioning requirements of newly established towns
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6. Farming, Hunting, and Fishing in Medieval Livonia
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6. Farming, Hunting, and Fishing in Medieval Livonia

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and castle communities, the commercial opportunities provided by the Hanse, and the reorganization of land ownership by the theocratic elites (see Chapter 9) would have necessitated degrees of intensification in animal husbandry and fishing. Shifts in the representation of wild mammals and birds are also evident after the crusades and can be variously synchronized with habitat transformation and newly imposed forms of social control. With the merging of the Sword Brothers and the Teutonic Order in 1237, a standardized dietary regime would have been adopted across all the Livonian convents, one that was clarified in 1264 as a means of distancing the Order from its initial model based on the Templars (Sterns 1969, 70–71). This regime allowed the consumption of more meat: three times each week, with two weekly fast days when fish and other aquatic species such as beaver could be eaten (Mänd 2004). Whether a Christian fasting culture was effectively imposed on the indigenous population and enforced is unclear, but it would have been expected in towns, and perhaps also within episcopal territories, where the Livonian Church exerted the most effort in converting its indigenous subjects (Valk 2019).

Few detailed inventories have survived from the Order’s convents in Livonia, in contrast to Prussia. However, one such register from the convent of Goldingen, dated to 28 September 1341, provides a glimpse of the diversity and location of animal resources which amounted to 146 horses, 245 cattle, 300 sheep, and 40 goats (Bauer 1924). The inventory contains separate sections on horses, cattle, sheep, goat, grain reserves, and fish. Horses feature as the most important animal, subdivided by sex, age, and function; seventeen horses are listed as under the charge of the marshal; seven horses were located in the manor of the agricultural curia, an unspecified number in the manor of the gardener, a half-brother; the manor of Alsunga had forty young (juvenes), middle-aged (pariter), and old (senes) riding mares and three stallions, as well as twelve colts of both genders, all one-year-old. Fourteen male colts are listed as at the disposal of the convent’s brethren, and the commander’s stable contains fifty-five riding horses (equos equitales), with the total number of horses and colts equalling 146. Within the convent’s granaries, nine out of the thirty-six last of grain are designated as fodder for the brethren’s horses. The sections on livestock are shorter. In the marstabulo forty oxen and five cows are listed; in the agricultural manor there are forty oxen; in the half-brother Rovke’s manor there are 125 small cattle (capita pecorum) of both genders, and in the manor at Alsunga there are thirty-five small cattle. The location of sheep is not specified, only that three hundred sheep and forty goats are listed on the convent’s lands. In some districts local communities are also listed as renting 205 cows and seventy-five goats from the Order. The convent’s kitchen included a reserve of unspecified meat (carnium), with an additional note on 130 slaughtered sheep and forty live cattle to be fattened for the kitchen’s needs, but its...
fish stocks were more diverse and abundant, dominated by freshwater species, particularly pike and vimba.

In comparison to the detailed written sources, the zooarchaeological record for medieval Livonia is equally fragmented, but its resolution is coarse. It is, however, valuable from a comparative perspective, particularly in the general absence of detailed inventories for the majority of the sites. Moreover, diachronic comparisons provide valuable information on the biological profiles of the Order’s castle communities (Rannamäe and Lõugas 2019). For the purposes of this study, faunal assemblages were made available for recording and analysis from ten sites in Livonia. With the exception of Viljandi (Ger. Fellin) and Karksi (Ger. Karkus), located in Estonia, all sites are situated in Latvia. Wherever possible, secondary data from published and unpublished reports was included. However, it must be noted that much of this comparative material only consisted of basic NISP, MNI, and anatomical element counts. The most detailed and comprehensive comparative study on long-term trends in faunal exploitation which includes the final centuries of the Iron Age has been published by Liina Maldre for Estonia (2012). This has provided a useful context for the data presented in this chapter. All primary and secondary sites are presented in Table 6.1 and Fig. 6.1 (for Karksi and Viljandi phasing, see Rannamäe and Lõugas 2019). Species are presented below in order of importance, and subdivided into domestic and wild species. There is only space to provide comparative summaries, and more detailed site-based studies will be published in due course.

Livestock

Cattle (*Bos taurus*)

Cattle elements were the most commonly identified in most of the assemblages under consideration. Comparing NISP counts of the main domestic mammal species, cattle outnumbered pig and sheep/goat in nineteen of the twenty-three assemblages (Table 6.1). Cattle dominated the small assemblage from the earlier fortified lake settlement at Äraiši (Ger. Arrasch) and were also prominent in the assemblages from: the town and suburbs from Riga, Ventspils (Ger. Windau), and Viljandi; the castles at Riga and Cēsis (Ger. Wenden); and the earliest phase at Viljandi Castle, where their percentages decreased significantly in later levels. The cattle percentage was inflated in the assemblage from Vecdole Castle (Ger. Alt-Dahlen) by the inclusion of 109 bones from the calf skeletons discussed below.

Although NISP counts are usually biased towards cattle because fragmentation and retrieval biases favour their recovery, there is little doubt that beef constituted the major meat source for all the settlements under consideration (Fig. 6.2), even in cases where cattle elements were outnumbered by sheep and goats. The dominance of cattle in most of the urban and castle assemblages reflects both the favourable environment for keeping herds in Livonia (see Chapter 5) and the need to ensure a good supply of meat to these centres. A full-sized cattle carcass can supply around ten times more meat than a sheep or goat and over four times as much as a pig. It is not surprising that cattle feature in reports of raiding and enforced procurement in Livonia.

Mortality evidence for cattle was obtained from mandibular tooth ageing and epiphyseal fusion data (Figs 6.3–6.4). Only fusion data was obtained from the lake settlement at Äraiši, which indicated that although over half the cattle bones belonged to adults, some immature and subadult cattle were also represented. In the late Viking Age assemblage from Pada (Estonia), nearly a quarter of cattle were slaughtered before reaching two years, whilst just over 30% were butchered before reaching four years (Maldre 2007). The Late Iron Age assemblage from Linnaaluste (site 2) also consisted of mainly adults, with five individuals aged over two years (Maldre...
Mark Maltby, Aleksander Pluskowski, Eve Rannamäe, and Krish Seeta

More adults were represented in the final phase of the Curonian hillfort at Beltes (Padure, Latvia), where only one animal was aged to one month when slaughtered, with the others at least seventeen to twenty-four months through to five to six years old (Vasks et al. 2011, 92). In the later assemblage from Riga town, 60% of the mandibles belonged to cattle over three years old. The dominance of adult cattle was also reflected in the fusion data, with over 61% of the latest-fusing epiphyses being fully fused, indicative of animals over three years old. However, at least 30% of the mandibles belonged to cattle slaughtered between 18 and 36 months old, and only 15% fell within the elderly category (over six years old). This indicates a focus on supplying the town with good quality beef. There was limited evidence from Riga Castle, although there was a higher incidence of sub-adult cattle represented in the thirteenth century deposits than in the later assemblage, which produced similar results to the town. Ventspils produced very low percentages of cattle over three years old, perhaps indicating greater intensity of beef production, although this is based on a small sample. Livonian levels at Āraiši Castle produced little ageing evidence, whilst the early post-medieval Polish assemblage from the site was dominated by adult cattle. Ageing data from both the castle and town assemblages from Viljandi indicated that most cattle were over three years old, but the fusion data indicated a substantial kill-off of cattle between three and five years (Rannamäe 2010, 32; Haak et al. 2012, 303), which echo the results from Riga.

Mandibles and bones of neonatal and juvenile calves were rarely encountered in any of the assemblages discussed above. This is also reflected in the low percentages of porous bones recorded. This suggests that intensive dairy production, which would result in the slaughter

![Figure 6.3: Cattle mandibular ageing data from Latvian sites. Figure by M. Maltby and A. Pluskowski.](image)

![Figure 6.4: Cattle epiphyseal fusion data from Latvian sites (percentages of fused specimens). Figure by M. Maltby and A. Pluskowski.](image)
of large numbers of veal calves, was not practised. This contrasts markedly with the assemblage from Vecdole Castle, where bones of young calves were prominent. Most of these were associated with the skeletons of two young calves, at least one of which appears to have been a foundation deposit (see below), although isolated bones of other calves were also found. However, this does not necessarily mean that dairy production was a prominent feature in cattle husbandry at Vecdole. The animals involved could have been from herds kept and bred in the vicinity of the castle and represent either natural mortalities or calves sacrificed for ritual purposes.

Sexing data from metrical analysis of cattle metacarpals from Viljandi’s suburbs indicated that most (c. 75%) of the adult cattle were cows (Rannamäe 2010, 32–35). This would be expected, as surplus males are more likely to have been killed off before adulthood. Metrical data from cattle metacarpals was limited in the Latvian assemblages. In the assemblage from Riga town, nineteen (73%) out of twenty-six complete metacarpals were sufficiently slender to be attributed to cows. At Ventspils, there was a more even distribution, with four of the nine metacarpals having dimensions ascribable to oxen or bulls. Oxen are mentioned specifically in documentary records, and many would have been required for ploughing. It is conceivable that some of these oxen, after they had served their working lives, may have been considered too old to be brought for slaughter to the urban and castle consumer sites, where demand seems to have been for beef from rather younger animals. However, as O’Connor (2011) has pointed out in relation to Anglo-Saxon sites, five-year-old oxen could have been used as plough animals for two or three years prior to slaughter. There were very few instances of pathological conditions commonly associated with the prolonged use of cattle for ploughing (Bartosiewicz et al. 1997), echoed by Maldre’s (2008) findings in Tallinn (Ger. Reval), Pärnu (Ger. Pernau), and Tartu (Ger. Dorpat), where the majority of pathologies were dental and mandibular.

Withers height estimates (following Matolesi 1970) showed that most of the cattle from Livonia were of small stature, with average heights from most of the sites averaging <110 cm (Fig. 6.5). Although analysis was limited by the small number of complete limb bones that could be measured from most sites, there were some variations. Most of the cattle from Ventspils were generally very small, whereas the cattle from Riga were generally larger than those from the other sites. There were no clear chronological trends, and no evidence of any diachronic ‘improvements’. Variations in cattle sizes are implied by the documentary references to ‘small cattle’, and it is possible that there were regional variations in cattle herds. Further discussion of stature can be found in the comparisons with Novgorod (Maltby 2019).

**Pigs** (*Sus scrofa*)

Pig bones have formed a significant percentage of most faunal assemblages from the Livonian sites examined during this project (Table 6.1). This supports evidence from previous studies. In Rositten (Latv. Rēzekne) around a third of the assemblage consisted of pig remains (Muğurêviçs 1985, 69), in Jersika they represented over 50% of domesticates (Vilcāne 2001, 68), and in Asote they comprised 72% of the assemblage (Shnore 1961, 93). At the earlier Āraiši Lake settlement, suid elements ranked second behind cattle, although these include five bones of wild boar. Comparative assemblages from Estonia indicate variability in the representation of pigs at sites, with the species dominating the assemblage from Lõhavere Hillfort, ranking second at Saadjärve Hillfort and third at every other site (Maldre 2012). This prevalence, particularly on Latvian sites, has been interpreted as reflecting the use of surplus animals for socially and politically symbolic feasting (Šnē 2006, 70).
Excluding the bones from the calf skeletons, pigs were the most commonly identified species in the assemblage from Vecdole Castle. In Livonian and Polish period deposits from Āraiši Castle, pig ranked behind both cattle and sheep/goat but still provided around 24%–27% of the elements identified to these species. They outnumbered sheep/goat in the early Livonian assemblage from Riga Castle (24%) but ranked third behind cattle and sheep/goat in the later phase (19%). Both those samples were much smaller than those from Riga town, in which pig provided 25% of the total cattle, sheep/goat, and pig elements. However, at other urban sites in Ventspils and Viljandi, pig elements ranked a distant third (13%–16%) in cattle-dominated assemblages. They were particularly poorly represented (4%) in the earliest castle deposits at Viljandi but increased to levels comparable with the urban deposits from the town in later levels. The opposite trend is seen at Karks Castle, where pig elements (42%) dominated over cattle in the early Livonian phase (see also Valk et al. 2012; Rannamäe and Löugas 2019).

Could this reflect a deliberate emphasis of authority and the appropriation of a local surplus in stock, given the Order’s comparatively new presence at the site? Their percentages declined spectacularly in the late medieval assemblages to 12%–14% of the total cattle, sheep/goat, and pig.

Various reasons could account for the fluctuations in pig percentages, including regional differences in the
amount of woodland available for pig pannage, variations in meat-supply patterns, and biases within the archaeological samples. The assemblage from Vecdole included a higher proportion of jaws and bones of neonatal and juvenile pigs than from any of the other Latvian sites (Figs 6.6–6.8), implying that some pigs (as well as calves) might have been housed within the castle. Apart from Vecdole, Riga town, Viljandi, and Karksi, pig assemblages were too small to allow detailed analysis of ageing and sexing data. In Riga, the tooth ageing evidence indicated that there was an emphasis on the acquisition of sub-adult, or young adult pigs, probably mainly slaughtered in their third year. The fusion evidence gave similar results with over half the pigs surviving into their third year (fused later-fusing epiphyses) but very few survived beyond three to four years (fused latest-fusing epiphyses). The same pattern was apparent at Vecdole, for the pigs that survived neonatal mortality. However, one major difference is that most of the pig jaws at Riga came from males, whereas there was a much more even balance of sows and boars in the Vecdole sample. It suggests that boars were preferentially selected to supply Riga with pork (Fig. 6.9). The epiphyseal fusion evidence from the Estonian sites also showed that nearly all the pigs were slaughtered under four years old, with the majority within the first two years of their life (Rannamäe 2010, 44; Maldre 2012). In Karksi, the largest number of pig bones derived from neonatal animals up to six months of age (45%), followed by animals over one year (30%), and juveniles under or around one year (24%) (Rannamäe and Löugas 2019).

The small size of nearly all the measurable pig bones and teeth confirmed that the vast majority of the suid bones were from domestic animals. For example, the lengths of eight lower third molars from Riga town and all seven specimens from Vecdole Castle fell below 32.7 mm, comfortably within the domestic pig range. There was one larger specimen from Riga measuring 36.2 mm, which could have belonged either to a large domestic pig or a small wild boar. Similarly, withers height estimates of nine bones from the Viljandi suburb ranged between 67 cm and 80 cm, comfortably within the domestic range (Rannamäe 2010, 44). One much larger specimen provided an estimate of 93 cm, which falls within the range of wild boar. Further discussion of pig stature will be considered in comparisons with Novgorod (Maltby 2019).
Sheep (*Ovis aries*) and Goat (*Capra hircus*).

Identifications of sheep and goats were based on distinguishing characteristics of some of the more complete diagnostic bones, mainly horn cores, mandibles, metapodials, radii, ulnae, and humeri. Counts from the Latvian sites are provided in Table 6.1. Overall, the assemblage from Riga town produced fairly equal numbers of identifications of sheep and goats. However, eighteen of the twenty-five goat elements were horn cores compared with only six of sheep. In contrast, sheep provided twenty-one of the twenty-eight other elements identified to species. A similar contrast was observed in the Viljandi suburb assemblage, where ninety-seven goat horn cores were recorded compared with only eleven of sheep. In both cases, there is evidence that the horns of goats, particularly the larger ones of males, were imported for working, and horn cores from cattle were significantly more prevalent on Livonian urban sites, which came to represent major centres of manufacturing (cf. Luik 2015). Two goat horn cores were also identified in the Polish levels at Āraiši Castle, and one was found in the Ventspils assemblage. In most of the assemblages, positive identifications of sheep comfortably outnumbered those of goats (Table 6.1). The thirteenth-century assemblage at Riga Castle (belonging to the pre-castle urban phase) was an exception, where ten goat limb bones were identified compared with only four elements of sheep.

Maldre’s (2012, 119) comparative study of sheep/goat representation from the Viking to Final Iron Age...
suggests regional differences; the rearing of these species decreased slightly in northern Estonia and Saaremaa between the two periods, and increased in southern Estonia, although most of the later assemblages derive from hillforts which may have operated distinct husbandry regimes. Percentages of sheep/goat also varied significantly between different assemblages included within the project (Table 6.1). Comparing cattle, sheep/goat, and pig elements only, those of sheep/goat were the least common in the assemblages from the Āraiši Lake settlement, Riga town, the early (pre-castle) phase at Riga Castle, Vecdole, and the early post-medieval phase at Cēsis Castle. Percentages of sheep/goat from both phases of the recent excavations at Cēsis were both lower than in the large assemblage from earlier excavations, in which sheep/goat were much better represented than pig (Mugurēvičs unpublished). It is possible that the small samples from the recent excavations are unrepresentative or there were significant differences in deposition practices in different parts of the castle. Sheep/goat were much better represented at Āraiši Castle and were the best represented species in the later Livonian and Polish phases. Sheep/goat provided 25%–30% of the cattle, sheep/goat, and pig elements in the medieval phases at Karksi Castle and 50% of the tiny sample from Ropaži. At Viljandi, sheep/goat were consistently better represented in the castle than in the town deposits. Apart from Karksi and Cēsis, sheep/goat were more poorly represented in the earliest phases of multi-period sites, suggesting that they may have become more important in the later Livonian and subsequent periods.

Ageing evidence for sheep/goat must take into account the possibility that sheep and goats may have had different mortality profiles. However, all but one of the twenty ageable mandibles that were identified to species from the various Latvian sites in the project belonged to sheep, so it can be confidently assumed that the remaining mandibles were also mainly sheep. With the possible exception of the earlier phase at Riga Castle, the same applies to the fusion data. Only Riga town and Āraiši Castle produced sufficient numbers of mandibles worthy of analysis (Fig. 6.10). At the former, most of the sheep represented were slaughtered as sub-adults and young adults between the ages of eighteen and forty-eight months. In the Livonian phases at Āraiši, most of the sheep were eighteen to thirty months old, whereas in the Polish phase, sheep mandibles of this age were accompanied by almost equal numbers of sheep aged between six and twelve months, and none of the mandibles belonged to mature adults. A very high percentage of the latest-fusing epiphyses from the Polish phase were unfused (Fig. 6.11). A focus on the slaughter of sheep and goat in their second year was evident in the fusion data from Viljandi (Rannamäe 2010, 39). This suggests that meat production was the main focus of sheep exploitation during the Livonian period, and perhaps became more intensive in the Polish phases at Āraiši. All sheep that survived winters would have provided wool, but the ageing evidence from these sites suggests that wool production was not the main focus of sheep exploitation.

The lack of mandibles and the low percentages of unfused early-fusing epiphyses and porous bones belonging to neonatal and juvenile lambs and kids also suggest that milk production was not of high priority and that sheep and goats were not being kept in large numbers within the Latvian towns and castles (Fig. 6.12). One possible exception is again Vecdole Castle, where 12% of the sheep/goat bones were porous. Withers height estimates based on Teichert’s (1975) and Schramm’s (1967a, 1967b, 1976) conversion factors for sheep and goat metapodials respectively (Fig. 6.13) showed that sheep from Riga were generally slightly larger than those from other
sites, and that goats from Riga were substantially larger than those from Viljandi (Rannamäe 2010, 41–42). Whether this relates to regional or chronological variations cannot be established from these data. Further discussion of stature of animals from Livonian sites can be found in Maltby (2019).

Horses (*Equus sp.*)

The horse came to define crusading armies in both Livonia and Prussia, with the documented introduction of larger breeds designed to carry heavily armoured knights. This clearly made an impression in battle, where ‘the trapings of the horses threw terror into the enemy’ (*HCL* xv, 3). As a result, the warhorse, along with the crossbow, has been seen as pivotal to the military successes of crusading armies in the eastern Baltic (Ekahl 1998). Written sources indicate indigenous military uses of cavalry in the thirteenth century were for travelling to and from battlefields, and that in turn the military training of horses was relatively limited (Nikžentaitis 2009, 404). Professional cavalry would only develop in the eastern Baltic following the crusades, under the management of the new regime. Glimpses of this are evident in obligations of military service to the Order which were maintained into the sixteenth century. In a document issued by the Livonian Master Wolter von Plettenberg to one Draggun on 20 December 1503 (Śwabe 1938, 190–91), the recipient was obliged to accompany the commander of Goldingen to war with one horse, and if required to voluntarily accompany him on his travels, also with one horse. References to vassals keeping warhorses continue into the seventeenth century, as in the Swedish Audit of the Wenden district in 1601. Horse management was also organized at both convents and towns. A document issued by the Livonian Master in 1526 concerning a fief near the Riga road referred to the town of Wenden’s horse pasture called *kuppel* which was situated in Duppen parish (*LGU* 11, 442) (see also Chapter 8).

With respect to this study, horse bones were identified in all but three of the assemblages, albeit usually only forming a small percentage of the mammal elements in most cases (Table 6.1). It should be noted that although it is assumed that all the equid bones belonged to horse, the presence of mules cannot be ruled out. Although there is some evidence that horseflesh was eaten at some of these settlements, its consumption by Christians was discouraged following the decree of Pope Gregory III in AD 732 (Bartosiewicz 2003, 117). The extent to which this decree was subsequently enforced is a matter of debate, as there is variable evidence for horse consumption from certain parts of Christendom, such as the Hungarian Plain. In the case of Livonia, given the animal’s role in...
### Table 6.2: Body part representation of horses from Latvian sites.

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pre-Christian Balt society, it is therefore not surprising that horse bones appear only rarely in assemblages dominated by food refuse, with cut marks (Table 6.2). The highest number of horse bones displaying cut marks came from the Liv quarter in Riga, pointing to the continuation of horse consumption amongst the indigenous population (Fig. 6.14). This will require future verification with comparisons of assemblages from medieval rural settlements.

The only assemblages where horse provided over 3% of the mammal assemblage were from the Viljandi suburb, the latest phase in Viljandi town, Vecdole, Araiši Lake settlement, and, especially Cēsis Castle, where horse provided over 68% of the Livonian period assemblage from the outer bailey. However, in the case of the latter site most of the bones came from a destruction layer and were U-series dated to the final phase of the Order’s rule; c. 1468–1538 (see Chapter 3). At least three horses were represented, one consisting of a fairly complete skeleton. There were several other associated groups of horse bones (particularly vertebrae) along with other horse bones dispersed in this burnt layer. All the bones belonged to adult horses, and the most complete skeleton belonged to a male. Three of the horse bones bore butchery marks, indicating that some of the flesh was removed for human or dog consumption. However, the horses were not heavily processed. Six of their limb bones were sufficiently complete to estimate withers height using the conversion factors of Vitt (1952). These estimates ranged between 135 cm and 147 cm, averaging at 141 cm. Therefore, these were large horses, significantly larger than most recorded from late medieval Prussia (see Chapter 12) and the prehistoric ranges for Latvia and Estonia. The most complete skeleton had pathology on several of the thoracic vertebrae consisting of overriding spinous processes on the dorsal surfaces, as well as spondylotic spurs of newly formed bone on the ventral and lateral surfaces of their lower bodies (Fig. 6.15). These are relatively minor pathologies, which could have developed through stresses instigated by being subjected to various types of traction such as pulling carts or pulling ploughs. These are certainly documented in fourteenth- through to sixteenth-century Livonian sources. However, given the large size of the horses and their association with high status riding tack, it is highly feasible that these pathologies developed because of the stresses of being ridden by heavily armoured knights. Examples of pathological horse thoracic vertebrae have also been found in medieval suburban contexts in Viljandi (Rannamäe 2010,
Appendix 4, 109), and pathological thoracic and lumbar vertebrae have also been observed on horse remains recovered from the outer bailey of the castle in Malbork (Pluskowski et al. 2010).

Some of the horses recovered from the other sites were also of a large size, sometimes over 135 cm in height (Fig. 6.16). Seven complete horse bones from Viljandi produced withers height estimates between 128 cm and 144 cm (Rannamäe 2010, 46). Two horse bones from Riga town, however, were from much smaller animals, with withers heights of only 107 cm and 117 cm. Ekdahl (1998) notes that the warhorses of the Teutonic knights, which were bred on the Order’s estates, were substantially larger than the small indigenous horses which ranged in height from 112–144 cm. The metrical data confirm the presence of both small and large horses in Livonia, suggestive of a dual population of imported animals and indigenous stock comparable to that in Prussia (see Chapter 12).

The discovery of four very worn and shed deciduous teeth at Vecdole Castle indicates that horses were been kept in the castle. Vecdole and the earlier Āraiši Lake settlement were the only sites which produced any unfused horse limb bones including a few very porous bones of young foals, probably indicating that some horses were being kept at these settlements. The limited epiphyseal fusion data from the other sites produced no evidence for the presence of immature horses (Table 6.3). Most horses could expect to have been kept until adulthood because of their value for working and riding. Due to the limited survival of documentation from Livonian commanderies, numbers of horses are difficult to quantify. However, as in the case of Prussia (see Chapter 15), there is evidence these populations fluctuated. In 1341, the convent of Goldigen had fifty-five horses for ploughing (equos unciales) and another three in the half-brother gardener’s (ortulanus) manor simply defined as equos. By 1346, the commandery maintained 146 horses, of which fifty-five were for riding (equos equitales) (Bauer 1924, 182–85). In 1442 this had dropped to horses for thirty-one men and an additional three in the possession of Goddert von Bachem, and by 1451 only the commander and his deputy had listed horses (LUB 11, 160). Indeed, where they were documented the numbers of horses in the Order’s Livonian houses were relatively low in that year, with only two listed in Winda, thirteen in Riga, eleven in Segewold (Lat. Sigulda), twelve in the subservient castle of Rositten, seventeen horses in Wenden, two in Soneburg (Est. Mäasilinn), five in Narva (Est. Narva) and Overpal (Est. Põltsamaa) (LUB x1, 160). A century later, the situation had significantly changed, and by 1555 Wenden’s commandery could field three hundred horses (Hartmann, 2008, 190).

The origins of these horses would have been variable, and not solely from the various farms on the Order’s estates. Horses could be readily moved within the Order’s interregional networks; the Livonian land marshal sent the Grand Master horses in 1463 (LUB xi, 133). In January 1501, the Grand Master wrote to the Livonian Master to inform him that he was going to send the advocate of Brandenburg to Livonia and asked to supply him with carts (fure), horses, and other things that the advocate may need for his trip (LUB xi, 10). Horses could also derive from neighbouring regions; in c. 1450, the Voivode of Polotsk complained to the town council of Riga that he had received back only one of the two horses that he had left in the care of the town’s horse herd (LUB xi, 91). The ongoing conflict between the Livonian episcopates and the Order was also characterized by the seizure of valuable animals, as during the crusading period. In June 1383, the Order’s brethren attacked members of Riga’s cathedral chapter in
Table 6.3: Horse epiphyseal fusion data from Latvian sites.

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P = proximal; D = distal;

Ance and took their eight horses, whilst the Bishop of Courland’s retinue also stole horses (and other livestock) from the chapter at various points in the same year (LUB 111, 1248). Horses were also seized during raids into Lithuania, and in 1492, the Livonian Master forbade peasants within the frontier advocateship of Bauska to sell horses (and weapons) to the Lithuanians, on pain of death (Arbusow 1924–26, 105–08).

**Dogs (Canis familiaris) and Cats (Felis catus)**

Dogs provided only a small proportion of the animal bones recovered in most of the assemblages (Table 6.1). This is unsurprising in deposits that were largely derived from butchery and consumption waste. Although it is known that dogs were sometimes eaten in medieval times, particularly in periods of famine, they did not form a regular dietary supplement. Two of the dog
humeri from the Polish levels at Āraiši Castle did bear butchery marks associated with meat procurement, but there is no evidence that any of the other dog bones from the Latvian sites had been butchered and many survived intact. However, eighteen of the forty-eight dog bones from the Viljandi suburbs bore cut marks, several of which were located on the main meat bones (Rannamäe 2010, 47). The dog assemblage included larger numbers of partial or complete skeletons than for the main food-bearing species, indicating that their carcasses were deposited without being butchered. Three dog skeletons were found in pits on one site in Viljandi town (Rannamäe 2010, 84). Riga town produced several partial skeletons including: twenty-seven bones from a three- to six-month-old puppy; the skull, mandibles, and all seven cervical vertebrae of an adult dog; eighteen ribs of another adult and six vertebrae, possibly from the same animal. Five of the six dog bones from Vecdole consisted of ribs and vertebrae probably from one individual. All nine bones from the early post-medieval levels at Cēsis Castle could have belonged to one adult dog. This individual was quite large, measuring around 54–55 cm at the shoulder (Harcourt 1974). Three dogs from Riga town were of medium size, having shoulder heights of around 33 cm, 39 cm, and 49 cm, but one of the skulls belonged to a smaller round-headed lapdog. In the Viljandi suburbs assemblage, dogs shoulder heights ranged between 35 cm and 60 cm (Rannamäe 2010, 48). A wide range in dog sizes is to be expected, as some would have been bred for specific purposes. The presence of dogs on all the sites is attested by the frequent occurrence of bones damaged by gnawing. One of the Riga skulls also had evidence for a healed depressed fracture above its eye socket. Such fractures are not unusual and may sometimes have been caused by blows inflicted by humans.

Bones of domestic cat were recorded in several of the assemblages but never provided more than 1% of the mammal assemblages (Table 6.1). The skull, mandible, and atlas from an adult cat were found at Vecdole, and a more complete cat skeleton was found amongst the same pits as the dogs in Viljandi (Rannamäe 2010, 84). A complete skeleton of a sub-adult cat was recovered from excavations in the Liv quarter in Riga, most likely discarded on a midden after expiring. It is unlikely that cats would have often provided meat for human consumption, although cut marks were found on a humerus and femur possibly from the same immature cat from Viljandi suburb (Rannamäe 2010, 48). Moreover, none of the sites produced definite evidence for skinning, which is attested in other parts of Northern Europe. Bones of kittens and sub-adult cats were recorded in Riga town, Vecdole, and in the Polish levels at Āraiši. Several bones, mainly of birds, had evidence of puncture marks from cats’ teeth. Cats as well as dogs would have had access to kitchen and butchery waste deposited within the settlements. Although cats occasionally feature on Late Iron Age sites in the eastern Baltic, they are more regularly associated with medieval sites. The process of urbanization, along with the presence of equivalent ecosystems concentrating organic waste in the Order’s convents, would have provided suitable habitats for the proliferation of the species (see also Chapter 12).

Poultry

Bird bones were recovered from all the sites apart from the Āraiši Lake settlement (Table 6.1). By far the most commonly recorded was domestic fowl (Gallus gallus domesticus). Chicken bones never formed less than half of the total bird bones identified and in most cases they provided over 70% of the bird assemblage (Fig. 6.17). Recovery biases using normal excavation techniques are likely to have resulted in their under-representation in relation to the larger domestic mammals. However, relative comparisons of abundance can still be made. Comparing domestic fowl NISP counts with those of pig show interesting variations. Assemblages from castle sites consistently show high percentages of domestic fowl. The most spectacular results have been obtained from the early Livonian phase at Karksi Castle (Valk et al. 2012, 81; Rannamäe and Lõugas 2019), where domestic fowl provided 78% of the total pig and fowl, and indeed provided nearly as many bones as all the mammals combined (Table 6.1). However, domestic fowl were very well represented in all the castle assemblages, regularly providing over 30% of the total pig and fowl counts. At Riga they were found significantly more frequently in the castle deposits than in the assemblages from the associated town. They also increased significantly in the assemblage from Riga Castle after the Order’s convent had been established. They were, however, also well represented in the urban deposits at Ventspils, in the latest phase at Viljandi town and on some of the late prehistoric hilltop sites at Viljandi (see Rannamäe and Lõugas 2019). Domestic fowl were less well represented at Vecdole that in other castle assemblages, although the assemblage from Vecdole is unusual in containing more bones of juvenile animals and may be atypical. The overall impression is that domestic fowl were more common on both high status and urban sites.
The number of domestic fowl bones at Vecdole was inflated by the inclusion of twelve bones from a juvenile chick and six bones from an adult fowl. The presence of the very young chickens probably indicates that they were being bred within the castle, as in the case of Karksi. Other bones of very young chickens were recorded in small numbers at Āraiši Castle and Ventspils. Bones of more developed, but still immature, chickens were common in most Latvian assemblages, outnumbering bones from adults in most cases. The percentages should be regarded as minimum figures, as the recovery and survival of immature bones will be particularly vulnerable to preservation and retrieval biases. Comparisons are difficult to find because ageing data have not been routinely recorded, but on British medieval sites percentages of immature fowl usually range between 20%–40% of the total chicken bones (Serjeantson 2006, 140). The very high percentages of immature chickens on the Livonian sites are likely to represent a focus on the raising, acquisition, and consumption of young chickens for meat. Cut marks were observed on a few bones from several sites. Evidence for the consumption of eggs is less clear. However, eggshells were found in the thirteenth-century midden at Karksi Castle. These have as yet not been
speciated but are likely to have belonged to hens given the predominance of domestic fowl in this assemblage. However, it has not yet been established whether these were eggs of hatched chickens or newly laid eggs that were eaten. The latter is more likely given that the midden contents were substantially food waste. Hens, when they are in lay, form medullary bone in the shafts of some of their bones, and examples of these were recorded from Āraiši Castle, Karksi, and Ropaži (Fig. 6.18). Again, it is not known whether these hens were laying eggs for human consumption or brooding chicks. Several other bones did not have medullary bone, and although some of these may have belonged to cocks or capons, the low frequency of medullary bone plus the high frequency of immature birds suggests that the focus was on meat rather than egg production. The presence or absence of spurs on the tarsometatarsi was recorded, but the samples were too small to determine the relative abundance of male or female fowl. Similarly, there was insufficient metrical data in the assemblages to determine any sexual dimorphism patterns.

Bones of geese were recovered from most of the sites. They were always outnumbered by domestic fowl but formed substantial percentages of the bird bones from Ventspils. Measurable bones were all of a size comparable to grey lag goose (*Anser anser*) and were probably all from domestic birds. In contrast to domestic fowl, nearly all the goose bones belonged to adults, with just single examples from the Polish levels at Āraiši and Ventspils of bones from immature geese. Butchery marks on specimens from Riga town and Livonian levels at Āraiši confirm their flesh was consumed, but they were not exploited as intensively as chickens. Finally, bones of mallard-sized ducks (*Anas platyrhynchos*) were found on four of the Latvian sites in very small numbers. There is no proof that these were domestic birds. The evident role of poultry in medieval Livonian sites contrasts with its general absence in extant inventories, which focus on mammal livestock, fish, and grain. However, clearly some chickens were delivered to castles: the Cathedral Chapter of Riga received three hundred hens from their subjects in Dundagen (Latv. Dundaga) in the 1380s (LUB III, 1248); in the late fifteenth century peasants in Bauska were obliged to deliver two hens to the Order’s advocate each year (Arbusow 1924–26, 105–08), and dues of hens are specified in the late sixteenth centuries audits of Wenden (Ose 2011, 428, 432). A pasture for geese (gozeweyde) is also listed in 1479 in Riga’s revenue book (L.R., 164). In this respect poultry, whilst present and potentially linked to high-status consumption (Rannamäe and Lõugas 2019), do not appear to have been commercially significant within the economic paradigms of Livonian commanderies. They do, however, feature in the ritual praxis of the indigenous population (see below).

**The Religious Significance of Domestic Animals**

The horse is the most important animal in pre-Christian cult praxis in the eastern Baltic (see papers in Bliujienė 2009; also Chapter 12). Deposits of horses feature in cemetery sites across the region, as far north as central Latvia. There is a general regional trend in deposits of whole horses, largely confined to Prussian and Lithuanian territories, with only seven cemetery sites in Latvia containing individual animals and none reported from Estonia, although horses were present in cremations interred within barrows in southern Estonia from the second half of the first millennium AD. Out of 115 investigated burials, twenty-one contained horse bones, with sporadic examples of a range of anatomical elements suggesting that occasionally whole animals were cremated (Allmäe and Maldre 2005; Aun et al. 2008). The inhumed horses in southern Latvia have been interpreted as representing the presence of Selonians or Selonian influence, in turn reflecting Lithuanian cultural trends. More common in Liv sites are deposits of horse body parts (Brūzis and Spirģis 2009, 290), and the inclusion of equestrian equipment, such as harnesses and spurs, in the graves of high-status males within Selonian and Latgalian cemeteries from the mid-tenth century (Vilcāne 2009). The latest dated (and most unusual) horse deposits which can be linked to a cultic context are from the Liv cemetery at Ogresgala Čabas, with graves dating to the twelfth to thirteenth centuries, and fire pits, which include the remains of horses and other species, dated from the eleventh to fourteenth centuries. The nearby settlement appears to have also been inhabited into the fourteenth century. In the cemetery, the deposit of a single horse in a compact, circular pit and covered in dolomite slabs is unique (Fig. 6.19), with a potential parallel in the cemetery next to Daugmale Hillfort (Brūzis and Spirģis 2009, 288–89). Written sources hint at extra-funerary roles for horses in Liv culture, most famously the white stallion used by the Livs of Treiden (Latv. Turaida) as a divine proxy for determining the fate of the Cistercian missionary Theoderic in c. 1190 (HCL I, 10; Zemītis 2009).

The most widely reported category of animal deposits is that of Bauoffern, or foundation deposits. These consist of the bodies or body parts of domestic animals delib-
erately placed under the floors and walls of buildings in both pre-crusade and medieval contexts. Whole animals again are rare, and from the period of active crusading include the deposit of a calf, placed on its back, across the threshold of the main gate of Vecdole Castle (Argāžis 1999, 337). More common is the deliberate placement of skulls or cranial elements within pre-crusade domestic contexts, where there may be evidence for the continuation of depositional practices into the thirteenth century. The decapitated skull of a fifteen-year old stallion along with its lower jaw was found during excavations in Musumāģi (Kissing Hill) within the Viking Age complex in Viljandi, and may have represented a ritual deposit. An inverted cow skull from the twelfth-century in Viljandi, and may have represented a ritual deposit. An inverted cow skull from the twelfth-century (Schmidt 2001; Ermischer 2006).

There is certainly some evidence for animal sacrifice. When the Estonians attacked the Livs allied to the crusaders, they drove their cattle and other livestock back to their base, where they slaughtered them and immolated them as offerings to their gods. Henry notes that ‘the flesh which they cut off fell on the left side, which indicated that their gods were displeased’ (HCL xv, 3). War sacrifices are also documented amongst the Lithuanians; the Samogitians determined to burn armour and horses for their gods if they were victorious in battle against the Teutonic Order (LRC, 4675), and in the fourteenth century horses and officials of the Teutonic Order captured by the Lithuanians were sacrificed by immolation. Widely reported ‘fire pits’ in pre-Christian cemeteries across the eastern Baltic, features containing charcoal, ash, and animal bones, may represent such offerings, more broadly linked to feasting at the graveside. Later episcopal edicts sought to end such practices, consistent with Christian theological opposition to animal sacrifice (Ullumi 2012). However, the inclusion of joints of meat within graves is evident in the fourteenth and fifteenth centuries, and public feasting in cemeteries appears to have continued into the post-medieval period across Livonia, Estonia, and Lithuania (Vaitkevičienė 2011, 108–09; Valk 2001b). At the domestic level, expressions of ritual animal use appear to have continued if the Jesuit accounts of the early seventeenth century are to be believed. One report from 1606 refers to the sacrifice of a piglet, chicken, and bull (all black in colour) to a deity associated with the fields and grain, whilst another from 1618 (concerning Dünaburg (Latv. Daugavpils), Ludzen (Latv. Ludza), and Rositten parishes) refers to spilling the blood of slaughtered animals on a set of sacred stones kept in the kitchen, barn, or store (Laurinškienė 2011, 58–59); one of several examples of animal blood libations documented amongst rural communities in Latvia into the nineteenth century (Vaitkevičienė 2011, 111). Whilst these may be authentic ethnographic observations, their connection with the pre-Christian period remains vague, except that similar customs involving the use of animals were documented in the narratives of the Livonian Crusade.

Hunting and Trapping

With the exception of small mammals whose remains are typically the end result of natural expiration, the bones of wild animals reflect hunting and trapping activities conducted within the territories of settlements. They also usually represent less than 2% of the overall animal
bone assemblage from Livonian sites included within this study and indicate hunting, as in many other medieval European contexts, was practised infrequently and played a relatively insignificant nutritional role. On Late Viking Age and Iron Age sites the representation of wild species is overall comparatively higher, but varies regionally, from very low proportions in north Estonian sites (e.g., less than 1% in Pada; Maldre 2007, 74), whilst at Rõuge Hillfort in the south-east they form a striking 57% of the assemblage, with a similar proportion in the nearby settlement (Paaver 1965; Maldre 2012, 122). The regional differences may reflect relative biodiversity across the region, and further south, in strongholds such as Asote and Beltes, wild species represent larger proportions of assemblages (Mugurevičs 2002; Vasks et al. 2011). These have been interpreted as reflecting the beginnings of systematic exploitation of wild species in the Late Viking Age, linked to the political control exerted by elites residing in strongholds. Woodlands in particular would have been an accessible source of pelts for an international market fully established by the thirteenth century (Asaris 2007, 247–50). It is difficult to gauge the impact of the crusading period in Livonia on the resident wildlife; the few sites with thirteenth-century material and the crusading narratives indicate hunting was occasionally practised. Modern warfare and civil strife can certainly result in environmental degradation. In contrast, periods of warfare in the past which resulted in depopulation are typically associated with the regeneration of wildlife and habitats, following the reduction in human activity (Dudley et al. 2002). The general depopulation of the Livonian-Lithuanian borderlands may have enabled wildlife to regenerate or concentrate in rēfūgīa, but unfortunately no archaeological material was available from such frontier sites for the purposes of this study (for Prussia, the situation is different; see Chapter 12).

The Order’s Rule permitted hunting (except with hounds and hawks), and this would have been primarily used as a means of training its regiments in the use of weapons and tactical formations ‘in the field’. However, in Livonia the local population remained armed, playing an important role in the provision of military service for the Christian theocracy and clearly engaging in hunting and trapping (Klaviņš 2009). There is some evidence for the introduction of seigneurial hunting rights. In 1272, when subdividing annexed Semigallian territory, the Dean of Riga and the Livonian Master agreed that any game being pursued which crossed from the territory of one lord to another would belong to the hunter, but the respective lord would be entitled to receive the animal’s shoulder (armūn); a standard cut taken as a feudal due (LUB 1, 432). Permission to hunt was freely distributed; in 1291, the commander and advocate of Memel (Lith. Klaipėda) when subdividing territory between the Bishop of Courland and the Chapter of Riga designated that the large Forest of Okte (magna sīlva de Octen) remained the shared property of the bishop, chapter, and their subjects for cutting firewood and hunting (LUB 1, 540).

The introduction of a legal separation between German and non-German in Livonia was accompanied by social restrictions in hunting, but it is difficult to determine how effectively this was enforced. Regional regulations surviving from Curonia indicate that ‘free hunting’ was legally recognized, but hunting certain species, particularly cervids, had become the privilege of the landowner by at least the fifteenth century (Mugurevičs 2009, 178). In a reply to the Bishop of Courland in 1465 concerning hunting rights on the territory of the landknecht of Skrunda, the commander of Goldingen clarified that it was possible to hunt red deer, roe deer, and elk only after the owners of the land have hunted first (LUB xii, 293). However, the series of so-called ‘Livonian Peasants’ Rights’, initially functioning as a Landrecht (land law) with documents surviving from the sixteenth and seventeenth centuries, makes no mention of hunting restrictions, and so these almost certainly varied between different regions according to historical precedents and the customs imposed by commanders, advocates, and other officials. By the fifteenth century, the Prussian court of the Grand Master had become increasingly secularized, partly expressed in the trappings of aristocratic hunting culture. The Livonian Masters appear to have participated in this as well; on 10 November 1446, the Grand Master wrote to thank the Livonian Master for sending him falcons (habichte) and wind dogs (wīnde) that he regretted had died (LUB x, 276).

The remains of wild species can be most usefully subdivided by their broad habitat preferences. Assigning habitats to species as ecological proxies often underestimates their behavioural plasticity and adaptability evident in modern biological studies; however, a high level of resolution is not required, particularly given the limited role of wild species in medieval eastern Baltic sites. What is more significant are: long-term trends in relative biodiversity, the presence of species sharing comparable habitat preferences, and shifts in cultural values assigned to these species. Changes in levels of biodiversity at and across sites (calculated using Simpson’s (1949) Diversity Index) indicate a reduction in the measure of diver-
sity between the centres of power in the Late Viking Age and the Middle Ages; at Áraiši this is particularly pronounced with a shift from 2.31 (lake settlement) to 1.84 (castle). Questions concerning the diachronic abundance and integrity of wild populations can only be effectively answered with genetic studies. In some instances, the complete absence of a species from the archaeological record after a certain time may be indicative of its extinction, but the cause and biogeography of that process remains vague. In the case of the eastern Baltic, this concerns only one species: the aurochs (*Bos primigenius*) (see also Chapter 12).

**Woodland Refugee Species**

Aurochs and bison (*Bison bonasus*) are traditionally assumed to have shared similar wooded habitats, but recent isotopic studies have suggested that early Holocene European bison were not confined to dense woodland but preferred more open landscapes. Aurochs overlapped with bison, ranging from woodland through to open habitats, but with contrasting dietary preferences. Postglacial afforestation and increasing hunting pressure pushed both species into denser wooded areas, which were comparatively sub-optimal habitats and only enabled them to survive at lower densities, resulting in further genetic fragmentation (Bocherens et al. 2015; Benecke 2005). As a result, both became refugee species (Kerley et al. 2012), confined by the crusading period to the belts of woodland which came to form the ‘Great Wilderness’. The youngest remains of this species in both Estonia and Latvia are datable to the Iron Age. However, it is possible that bison migrated to Estonia in the Middle Iron Age as their bones have not been found on earlier sites. Tentatively identified fragments of bison bone have been identified at Rõuge (Paaver 1965, 293), Viljandi (where identifiable bones consist of phalanges: Saks and Valk 2002; Rannamäe and Lõugas 2019), and Unipiha (Paaver 1965), but these have been difficult to verify with the exception of Viljandi. A less optimistic survey indicates that bison are generally absent from the pre-crusading period in Estonia and north Livonia. Further south, at the lake settlement in Āraiši, bison or aurochs bones were identified on the basis of their size (the estimated withers height of a complete metatarsal was 133.5 mm, much larger than the domestic cattle, but their preservation was too poor for further analysis).

The most recent survey of aurochs and bison remains indicates a Late Iron Age distribution in southern Livonia (southern Latvia) at sites such as Beltes Hillfort (Vasks et al. 2011), and Paaver (1965) reported the presence of bison at nine medieval sites in Latvia. Aurochs and bison meat is documented in the stores of the Teutonic Order’s frontier convents in eastern Prussia, rather than Livonia, and there is no evidence that the species was accessible in the Livonian-Samogitian borderland (Calkin 1961; Mugurēvičs 2009, 178). The extinction of the northernmost population of Baltic aurochs may therefore already have taken place during the Late Iron Age, coinciding with the intensification of hunting associated with strongholds. Both species, rare and almost certainly confined to wooded refugia, would have only been encountered during the Order’s Reisen into Lithuania. It is entirely plausible that the depopulation of the frontier sustained populations of aurochs for longer than if Iron Age trends in hunting pressure had continued uninterrupted, including in western Lithuania, and as a result the last documented individuals — in captivity within the vicinity of Augustów — survived until the seventeenth century (see also Chapter 12).

**Woodland Fur-Bearing Mammals**

The presence of extensive belts of woodland in Livonia into the modern period would have supported abundant and diverse populations of fur-bearing mammals, particularly the mustelids and squirrels prized by furriers and merchants. However, there is a striking difference between the organization of fur exploitation before and after the crusades. Some Late Iron Age southern Livonian strongholds have a large and diverse proportion of fur-bearers (Mugurēvičs 2009), and the fur-trade was clearly an important economic component from the eleventh century when specialized iron blades for dressing pelts are first evident on Liv sites in the Lower Daugava, including at Daugmale (Vasks 2010). In the equivalent medieval centres of power, the Order’s Livonian castles, the remains of these mammals only occur in minute quantities, with the most valuable furs deriving from mustelids least well represented. Marten (*Martes martes*) bones (fifteen) have only been found at Cēsis Castle within the study area, although there are more references to its pelts in trading records. Fragments of badger were also reported from Valmiera Castle (Ger. Wolmar), although the fur of this species rarely features in trade inventories. Fox remains are more common, although the quantities are typically negligible and derive from a minimum of one or two individuals, as atTuraida (seven), whilst the Order’s phase at Rakvere (Ger. Wesenberg) Castle, in Estonia, is associ-
ated with the highest percentage of fox bones of any site, representing 80% of the wild species assemblage (Paaver 1965, 323). Larger carnivores were hunted, but their furs were of limited commercial interest after the crusading period. Bears (Ursus arctos) documented on a number of pre-crusade sites are rarely encountered in medieval contexts within the study area. The popularity of bear fur in the Viking Age, as suggested by the inclusion of bear pelts into graves in southern Scandinavia and the quantities of ursine bones in eastern Baltic sites, contrasts sharply with the post-crusade period. Six bear elements were found at Viljandi Castle. Fragments of bear bone were found in both the Liv and castle contexts at Turaida, and a metapodial from a juvenile was found in the later medieval contexts at Karksi. They feature in two urban assemblages, Ventspils and Viljandi suburbs (Table 6.1), and in the case of the former, the arthritic phalanx of a bear may potentially represent an animal kept within a confined space and perhaps used for baiting or dancing. Alternatively, this may be a fragment of a pelt, and in fact most bear remains from medieval Livonian contexts derive from paws (Rannamäe and Lõugas 2019). Bear claws continue to feature as centre pieces of jewellery deposited in human graves into the fifteenth century (see below).

Of the other wild species which rarely feature on medieval sites, populations of wolf (Canis l. lupus) and lynx (Lynx lynx) are documented into the twentieth century. The teeth of both species were used as pendants in the Late Iron Age (Jonuks and Rannamäe 2018). However, the lynx, which prefers corridors of unbroken woodland supporting abundant populations of wild ungulates, is arguably the rarest mammal taxa encountered on pre-crusade and medieval sites in Livonia (Muğurêviç 2009, 179). However, its well-documented rapid recolonization of areas of Latvia following intensive periods of hunting in the nineteenth century — a period of no more than three decades — suggests the species was widely distributed in earlier centuries (Ozoliņš et al. 2007). Like other fur-bearers, it was rarely hunted by the households of the Order’s Livonian convents. Wolves, notoriously difficult to identify in fragmentary archaeological assemblages, have been reported in small quantities on a number of sites, including Cēsis Castle (Table 6.1). Given the mobility of wolves, it is difficult to connect these sparse fragments with anything other than opportunistic and infrequent hunting. Wolf fur itself had relatively limited commercial value and rarely features in Hanseatic trade documentation (Delort 1978). Although both lynx and wolf, along with several other wild mammal species, have been identified on pre-historic sites around Viljandi, only a single bone of lynx was recorded at Viljandi Castle (Rannamäe and Lõugas 2019). No further bones of either lynx or wolf were positively identified in assemblages examined during this project. A canid ulna from the later Livonian levels at Āraiši Castle was similar in size to wolf but is more likely to have been from a large hound.

The fur trade was supplied by a network of hunters and trappers largely based in rural settlements. Furs appear to have been removed from carcasses and prepared in these settlements, and then pelts brought to castles which functioned as points of storage and redistribution (along with other agrarian produce). As in the case of Novgorod (see Maltby 2019), the most important centre of the north-east European fur trade in the late medieval period, the storage of pelts has left virtually no archaeological traces. However, inventories of goods brought to Riga for export across the Hanseatic network indicate that tens of thousands of furs were shipped from this town from the fourteenth to sixteenth centuries. In 1406, when English pirates captured three ships from Riga, 394,864 pieces of fur were discovered in their holds, with an estimated 1.5 million pieces of fur exported annually from the eastern Baltic at the time. The majority of these derived from Russian territories, but the source of the trade appears to have shifted at the end of the fifteenth century to Livonia (Delort 1978, 11, 104ff.; Jahnke 2015, 222). Pelts could have been acquired across Livonia and redistributed via the Order’s own network. In this respect the majority of pelts would not have remained long in castle stores, and only a small percentage would have been used by the household. Local use may be represented by occasional finds of bones from fur-bearing mammals, sometimes with skinning marks. This accounts for the composition of the assemblage from Cēsis Castle, the largest from any Livonian site (Table 6.1). Despite evidence for extensive woodland within the castle’s territory, the brethren and extended household clearly did not engage in hunting very often. Furriers were more likely to have been situated in the town, where significant assemblages of animal bone are lacking. Written sources provide a more accurate measure of the quantities of fur being handled through the networks of the theocratic authorities of Livonia. When the Semigallians concluded a treaty with the Archbishop of Riga and the Livonian Master in 1272, in the absence of sufficient quantities of grain for making payments to the new regime, this would be substituted by two marten pelts and eight squirrel pelts (LUB1, 1272). In the later
fourteenth century, the Chapter of Riga received from the properties of its castle in Dundagen (Latv. Dundaga) in Curonia, an annual quantity of two thousand furs of weasel, ermine, and marten, as well as other animals worth twelve Riga marks per thousand (LUB III, 1248). Future excavations of rural settlements may pinpoint, at least on a regional level, the relative importance of fur acquisition within the Order’s individual administrative districts. By way of comparison, in early medieval Masovia, the high representation of fur-bearing species in rural settlements may be interpreted as reflecting the acquisition of fur (and wild meat) for payment as tax or feudal dues (Dulimcz and Iwaszczuk 2008, 165–67), with a similar situation, albeit on a larger scale, visible in the territory of Novgorod (Maltby 2019).

Ungulates within and at the Fringes of Woodland

Two further cervid species represented on Livonian sites are red deer (Cervus elaphus) and roe deer (Capreolus capreolus). However, with the exception of from roe deer at Cēsis Castle, their remains are found in minute quantities (Table 6.1). Their biogeography in the eastern Baltic is also unclear, as red deer may have been completely absent in Estonia in the late Iron Age with antler fragments representing imports derived from southern populations (Rannamäe and Löugas 2019; Haak et al. 2012; Luik 2015, 103–04). Both species favour woodland, with roe deer preferring the more foliage-rich edges of habitats. However, where roe deer appear alongside hare in archaeological assemblages, this presents a compelling argument for the presence of fragmented habitats and agricultural plains (Hewison et al. 2001), with roe deer readily able to colonize these and substitute hedgerows for woodland (Morellet et al. 2011) (see also Chapter 12). This combination is evident in a number of sites: at the castle of Cēsis, Turaida, the Order’s phases of the castles in Riga and Viljandi, as well as the suburbs of the associated town of the latter. Both meat and antler from red and roe deer appear to have been exploited, with antler used as a multi-purpose raw material. Evidence for wild boar (Sus scrofa) is equally scarce, although five large pig specimens from the earlier Āraiši Lake settlement were probably from wild boar. However, only two boar femur fragments were recorded from Riga Castle, and very few suid bones from other sites were sufficiently large to be considered to be wild boar. All three species appear to have been of limited interest to the Livonian branch of the theocracy (Mugurēvičs 2009, 178).

Wetland Mammals

Two wild species which prefer wetland habitats are found on Livonian sites; elk (Alces alces) and beaver (Castor fiber). Both dominate the pre-crusade assemblages of wild species in southern Estonia and north-west Latvia, including the late prehistoric sites around Viljandi (Maldre 2007, 75; 2012, 124; Rannamäe and Löugas 2019), after which they are typically found in small quantities. Elk was exploited within the Lower Daugava Valley, with its remains present in the Order’s phases of Riga Castle, and in the Liv quarter of the town, within the animal bone waste from Vecdole Castle (Table 6.1), and at nearby Mārtiņšala. Further up the Daugava, elk is the second most represented wild species at the hillfort at Jersika (Mugurēvičs unpublished). To the east of Riga, elk was also present in the wetlands of the Lielā Jugla Valley at the site of Ropaži Castle (Table 6.1). Further north, within the Gauja river basin, the species was present, but here there is some evidence for its depletion by the crusading period. On the western side of the valley, a large quantity of elk bones was recovered from excavations in 1980–96 at Turaida, where thirty-eight fragments were identified from the earlier Liv settlement and thirteen from the episcopal castle (Renga 1997), with a further 104 fragments from mixed layers (Renga 1999). Likewise, an abundance of elk bones (forty-two) from the Āraiši Lake settlement contrasted with the complete absence of the species in medieval and post-medieval phases from the nearby castle. Elk is also noticeably absent from Cēsis Castle, whilst it was present in small quantities further up the Gauja at Valmiera Castle (Mugurēvičs unpublished). In north Livonia (southern Estonia), elk is widely distributed in the wetlands today, and its bones have been found in both the castle and town of Viljandi (see also Rannamäe and Löugas 2019). A more detailed analysis of the anatomical element representation does not indicate any site-related preferences for specific joints; whole carcasses were processed at Ropaži and the Liv quarter in Riga. There are also rare examples of the use of elk antler, which features more widely in documentary sources. The largest quantity of elk antler has been found at Viljandi Castle, where the fragments represent working refuse (alongside pieces of red deer antler) that can be related to the production of crossbow parts (Luik 2015).

The distribution of beaver at Livonian sites mirrors that of elk; it is typically found on the same sites, although in smaller quantities, particularly in southern Estonia. At Jersika, the two most abundant wild spe-
species are beaver (seventy-nine) and elk (fifty-one); both are the dominant wild species at Āraiši, and at Turaida beaver occurs in much smaller quantities. However, the exploitation of Castor in medieval Livonia had a more commercially tangible dimension. Its fur was in high demand in European markets in the fourteenth and early fifteenth century, and it is clear the species was already widely exploited in the Viking Age. Its remains have been found in a number of strongholds within the Daugava Valley, and also feature on some Estonian sites (Maldre 2012). Beaver bones from Livonian sites, however, largely represent food waste, with evidence for skinning present on only a few fragments across the region. Given its association with aquatic environments, beaver was an acceptable Lenten food documented in the medieval eastern Baltic (Mänd 2004). Its presence at castles is more readily linked to consumption rather than fur working. This contrasts with the documented quantities of beaver pelts passing through Riga. The specific geographic origin of these pelts is unknown, but it is likely that they were obtained from indigenous communities exploiting local wetlands and handed to the Order’s officials as payments of tenurial dues. For example, in 1466 each merchant entering and leaving Dünaburg (Latv. Daugavpils) was taxed one marten pelt by the Order. It is also likely they were obtained from the traditional fur-producing neighbouring regions (Delort 1978, i, 113; ii, 1198). Given the general lack of excavations of medieval Livonian rural settlements, this aspect of the fur trade is largely invisible. However, the distribution of beaver remains indicates that whole animals were processed in the Liv quarter in Riga — very plausibly for export — as well as the lake settlement at Āraiši (Fig. 6.20); the presence of the species in castles may also reflect the activities of the local population. The absence of elk and beaver from key medieval-period sites within the southern part of Wenden’s commandery (Cēsis and Āraiši), despite the patchwork of wetlands and rivers, may indicate their populations had already been locally depleted by the fourteenth century. The absence of references to beavers in Livonia from the seventeenth century has been used to infer the collapse of the local population (Mugurēvičs 2009, 179), although this cannot be verified by zooarchaeological studies of post-medieval assemblages which are virtually nonexistent.

Wild Birds

Small numbers of a diverse range of wild birds were recovered from Late Iron Age contexts in Viljandi, where fragments from Anseriformes (various species of geese and ducks), Accipitriformes (hawks, falcons, golden eagle, white-tailed eagle), Laridae (gulls and terns), Strigidae (boreal owl), Galliformes (capercaille, quail, grouse), Columbidae (woodpigeon), and Corvidae (magpie, raven) were identified (Ehrlich 2016). Talons from ospreys and white-tailed eagles (and perhaps golden eagles) were used in the late Iron Age as pendants or grave goods (Jonuks and Rannamäe 2018). The representation of wild avian species after the crusades is comparatively limited. Written sources indicate that by the fifteenth century, the earlier prohibition against the use of falcons had long been abandoned. In 1417, the commander of Windau is documented as sending hunting hawks (falken) to the Grand Master of the Teutonic Order following an old custom (nach elder gewonheit) and asking him to pay for the hawks in the new currency (LUB i, 536). However, very few remains
of wild birds have been recovered from the Order’s sites in Livonia investigated in this project (Table 6.1). A few bones of medium-sized and small ducks were recovered from six of the sites. These included two bones closely comparable to a tufted duck (Aythya fuligula) from Ventspils. This is a diving duck which is a summer visitor to this coastal region. One bone of a teal (Anas crecca) was found at Vecdole. A large number of duck bones were found at Viljandi Castle (Rannamäe 2010). These were not further identified and could have included bones from larger domestic ducks and/or wild mallards. Other water birds and waders have been recorded only occasionally. A gull ulna was recorded from Riga town, and possible bones of swan (Cygnus sp.) and crane (Grus grus) were found on the Pik Street site in Viljandi town (Rannamäe 2010, 84; for latest identifications, see Ehrlich 2018). The same town produced seven bones of capercaillie (Tetrao urogallus). The only other evidence for potential gamebirds consisted of thirteen bones of small galliforms from Karksi, along with single fragments of hawk- and eagle-sized Accipitridae, and at Vecdole a coracoid of a woodpigeon (Columba palumbus). The latter may have been derived from a bird nesting nearby, which could also account for the presence of a tibiotarsus of a Tengmalm’s owl (Aegolius funereus) from the same site.

Small Commensals

The establishment of castles and towns would have provided new and abundant sources of concentrated organic waste, creating attractive habitats for diverse communities of small mammals as well as birds. Medieval urban food webs, in particular, have been extensively studied, and those in Livonia would be comparable to other parts of Europe. However, the bones of small mammals have been infrequently recovered from Livonian sites due to a lack of routine sieving during excavations. The presence of black rat (Rattus rattus) is evident in the later medieval and Polish phases of Āraiši Castle. Hedgehogs (Erinaceus europaeus), which can exhibit commensal behaviour, are only represented by a large number of bones from one individual in the late phase of Viljandi Castle, with fragments of voles and moles present on a few sites in negligible quantities and bones of passerines have been recorded on several sites in Viljandi (Table 6.1).

The Religious Significance of Wild Animals in Livonia

The religious significance of wild animals is largely represented by the use of teeth and other bones as pendants (Fig. 6.21). Perforated carnivore teeth derived from foxes, wolves, and bears, are widely reported as grave goods, alongside astragali from beavers and martens used as pendants. Their meaning is unclear, but in the Grand Duchy of Lithuania the use of bear claws within necklaces is represented by 114 examples from
sixteen burials in four cemeteries have also been dated from the mid-fourteenth to mid-fifteenth centuries. Two thirds of these artefacts were found deposited with the bodies of elderly women, and they have been interpreted as a hybridized merging of two symbolic worlds, perhaps mediating the process of religious conversion: the Christian ursine symbol of resurrection combined with a powerful, indigenous animal (Svetikas 2008). The significance of the bear is occasionally alluded to in written sources. A document from 1417 outlining a grant of land to the commandery of Windau from the Livonian Master refers to various landmarks, including a stone on which a bear’s paw (bab- renklawe) is carved (LUB, v, 2168). No such diachronic trends are evident in Livonia, where animal amulets continue to be deposited in indigenous burials, including within Riga itself. Beaver and hare astragali (previously identified as marten) in Estonia have been interpreted as potential markers of social status, specifically of fur traders, rather than having religious significance and in burials they tend to be associated with women, rather than claw pendants typically found with men (Luik 2003).

There is very little mention of wild animals in written sources, whilst place names allude to the importance of certain species. Later folklore suggests that certain animals in specific circumstances were perceived as having supernatural agency, which could be linked to individual deities. However, it is difficult to demonstrate the antiq-
uity of such beliefs. Hunting (and gathering) within sacred groves appears to have been prohibited, although the Curonian 'kings' specifically hunted within such designated woodlands, with roe deer and hare specified as targeted species. This activity appears to itself have had a sacral function, and one that may even have emerged as an indigenous response to the Christian theocracy. Whilst it is tempting to see all these late medieval customs as relics of the Iron Age, it is important to acknowledge that beliefs and practices invariably changed, and may have been heightened or merged with understandings of Christianity during and after the crusading period.

Fishing

Fish clearly played a fundamental role in the alimentation of Late Iron Age and medieval societies in Livonia. However, the lack of routine sieving on archaeological sites has meant that fish bones are typically underrepresented, and in some cases completely absent. Exceptions include the Late Iron Age hilltop sites in Viljandi, where over nine hundred fish bones were identified (Rannamäe and Lõugas 2019). These consisted entirely of freshwater species, mainly perch (*Perca perca*), pike (*Esox lucius*), and cyprinids, indicating exploitation of the local rivers and lakes. However, the complete absence of fish from the archived assemblage of the lake settlement at Āraiši can plausibly be interpreted as a result of archaeological recovery techniques, rather than reflecting a lack of exploitation. Fishing equipment has also been found in a number of sites in Estonia and Latvia, including hooks, which would have been used for catching a range of species (e.g., Rickstu Hillfort; Apala and Apals 2014, 128).

Fishing, like other forms of provisioning, was organized from the onset of the crusading period (see Chapter 8). Henry’s *Chronicle* (*HCL* v, 4) mentions two of Bishop Albert’s fishermen (*piscatores*) caught up in a Lithuanian raid in 1202, and in 1210 fishermen, on both sides of the Daugava, alerted the town of Riga to the approaching Curonian fleet (*HCL* xiv, 5). Fishing rights were subsequently an important feature of the Order’s management. Following the reorganization of territory, lakes, and rivers were reassigned to the Order’s new tenants, but some became incorporated into the provisioning systems of castles. In 1274, the Livonian Master concluded an agreement with Riga’s Cathedral Chapter regarding the building of fish weirs in the Irbe River in northern Curonia (*HWC*, 53; see also Chapter 8). Fishing continued to be practised by indigenous communities, and perhaps fishermen were drawn exclusively from this population. The most striking evidence for this comes from the Liv quarter in Riga, where eggs from fish tapeworm were identified in a mid-fourteenth-century latrine fill, indicative of handling raw fish (Yeh et al. 2014). From the recent excavations in the town, bones of haddock (*Melanogrammus aeglefinus*), gadoids (probably all cod (*Gadus morhua*)), perch, zander (*Sander lucioperca*), salmon (*Salmo sp.*), pike, and sturgeon (*Acipenseridae*) were also found in waste deposits, indicating access to marine and migratory species as well as freshwater species (Table 6.1).

Access to fishing sites in the Daugava was regulated and contested into the sixteenth century. In 1394 there is reference to a piscinam near the Sand Gate (*LR*, 91), and specialized fishing sites include references to an eel weir in the Engure Rivulet in 1535 (Bauer 2003, 184), a lamprey weir (*negenoughe weer*) in the Gauja River in 1435 (*LUB* viii, 1019), and a salmon weir in the Daugava near Ikšķile is mentioned in 1439 (*LUB*, ix, 454). Salmon, in particular, were the focus of disputes in 1469 perhaps because their numbers were being depleted. The Archbishop of Riga demanded the townspeople stopped catching them and demolish the weirs they had built in the Daugava (*LUB* xii, 653; *LGU* 1, 453). Fishing equipment does not appear to have changed following the crusades, and hooks used in the medieval period are identical to those used in the Late Iron Age. However, the documents specify the regulation of types of equipment, from a fishing-rod (*stupent*) and small nets (*setten-etten*), through to large drag nets (*dryffnetten*) of varying lengths. In 1503, the Dean of Riga and the Kumpan of the Order in Kirchholm (Latv. Salaspils) clarified fishing rights for vassals in the Daugava in some detail. Peasants who lived in Memorgen (Latv. Memurga), Kekau (Latv. Ķekava), Koven, and Dole Island could keep forty ells-long drag-nets (*dryffnetten*). Peasants who lived downstream from Dole could keep sixty ells-long drag-nets and fish from both banks of the Daugava. Peasants living on either bank near Dole and Kirchholm could keep forty ells-long nets and fish in the stretch from Rumbula to Jungfernhof (Latv. Jumpravmuiža). Peasants from Uškuiļ (Latv. Ikšķile), Lennewarden (Latv. Lielvārde), Ascheraden (Latv. Aizkraukle), and Jungfernhof who had not had the right to fish from former times could henceforth use a small net (*nette*), a boat, and a fishing-rod. The agreement continued with specifying during which periods fishing could take place, the installation of various weirs, and dates of future inspections (*LUB* ii, 427).

What did change was a gradual increase in the exploitation of local coastal waters. Isotopic provenancing
indicates that stockfish imported from Scandinavian waters during the eleventh and twelfth centuries were supplemented by locally caught cod by the fifteenth century (Orton et al. 2019). All seven gadoid bones recovered from Riga town were precaudal vertebrae, probably all from large cod. These most likely derived from fish preserved by salting and drying that had been transported to the town once their heads had been removed. All five haddock bones were cleithra from quite large fish. These again are likely to have been bones attached to preserved portions of filleted fish imported to the town. The bones from large sturgeon and salmon are also likely to have been from imported fish. The central role of Riga in the Baltic Hanseatic network also meant the town would have been a major recipient of the trade in herring. However, no bones of herring (Clupea harengus) were found in any of the recent excavations in Riga, although this may be because of recovery bias. They have been found in small numbers at Karksi and Viljandi town (Rannamäe and Lõugas 2019). In the earlier thirteenth century deposits at the Order’s castle at Vecdole, there is evidence that the community was already supplementing its locally available cyprinids and pike with possible imports of salmon, catfish, sturgeon, and plaice (Pleuronectes platessa). However, in the late thirteenth century deposits at the inland site at Karksi Castle, the community seems to have continued to rely initially entirely on local cyprinids, perch, and pike for its fish supplies (Valk et al. 2012). It was not until the later medieval period that these supplies were supplemented by imports of cod and possibly zander (Table 6.1). A similar picture can be found in the nearly town of Viljandi, where most of the fish eaten were cyprinids, perch, and pike, occasionally supplemented by imports of cod, salmon, and sturgeon.

The identifiable fish bones recovered from Livonian period levels at Āraiši Castle consisted of a sturgeon fragment, three cod bones, two cyprinids, and a flat fish. During the period of Polish occupation in the early post-medieval period, there was a mix of freshwater (perch, pike, and sturgeon) and marine fish (gadoids and flatfish). Most of the perch and pike remains from here consisted of scales indicating the processing of fish caught locally. The gadoid bones probably mainly consisted of small or medium-sized cod, although whiting (Merlangius merlangus) may also be represented. Most of the gadoid bones came from the head. This could indicate on-site processing of marine fish despite being over 80 km from the coast. It is perhaps more likely that these smaller gadoids were preserved and transported as complete fish. The flatfish were probably all plaice. Less surprisingly, all the fish bones recovered from the coastal town of Ventspils were gadoids and flatfish, all of which could have been caught locally. Most of the gadoids were small cod and consisted mainly of bones from the head, indicative of local processing.

Did the importance of fish change with the introduction of a Christian fasting culture? There was certainly an emphasis on fasting during and after the crusades, but it is difficult to quantify fish consumption in both the Iron Age and medieval period in the eastern Baltic. Earlier studies which tackled this question on a much larger scale hesitated to link the rise of commercial fishing in the eleventh century with the popularization of Lenten fish consumption (Barrett et al. 2011). Given the limitations in introducing even the basic tenets of Christianity amongst the indigenous population, it seems likely that a fasting culture was most prevalent if not confined to castle and town communities. A fasting ideology persisted, at least within the higher ranks of the Order, into the fifteenth century. On 9 April 1450, the Grand Master wrote to the Order’s representative at the papal court instructing him to obtain a permit from the pope for the Livonian Master, who was old and sick and thus, unlike the others, unable to sustain himself on fish during fast days, and to be permitted to eat dairy products and eggs during fasts (LUB XI, 25).

**Conclusion**

To date, trends in faunal exploitation before the crusades in the eastern Baltic are best known from Estonia, where broad regional differences subdivide northern and southern sites in terms of animal husbandry practices (Maldre 2012). In terms of diachronic observations, there were no fundamental changes in the exploitation strategies of cattle (mostly slaughtered as adults) and pigs (slaughtered during the first two years of their life, more prevalent in areas of woodland) between the Viking Age and Final Iron Age. The most evident change is in the husbandry of sheep and goats, with older animals clearly kept for secondary products (milk and wool) being more prevalent in the Final Iron Age. The trends evident on Late Iron Age sites in Latvia broadly correspond to this, although there is evidence for local variation in the relative representation of certain species, as in the case of Estonia (Fig. 6.23a, b) which can be attributed to variability in local environmental and social contexts, as well as sample size, recovery techniques, and chronological resolution. Horse represent-
tation remained low on Estonian sites, which parallels the general absence of the species in the ritual sphere of pre-Christian Estonian society. This contrasts with their distinctive role in the mortuary culture of Prussians and Lithuanians, and to a lesser extent amongst the southern Livs and Semigallians.

This study has contributed new material from a range of Livonian sites, although in quantity it does not match the significantly more abundant dataset from Prussia (Chapter 12). The evidence from medieval Livonian assemblages indicates that the incoming colonists adopted the indigenous livestock husbandry culture, and as a result the absence of any regional diachronic variation is not so surprising. The provisioning of meat to castles and towns was reliant on existing pastoral systems in the countryside, run by indigenous communities, with the only significant change consisting of the reorientation of higher purchasing power communities from strongholds to castles and towns. There were also changes in ownership, with the Order and episcopate in Livonia representing new managers of substantial animal resources. Did numbers of livestock increase? Both zooarchaeological and written datasets are too fragmentary to be sure, but the appearance of urban centres certainly promoted a new demand for beef above all other meat, also a feature of medieval Prussia (Fig. 6.24, see also Chapter 12). The distinctiveness of the Order’s sites is emphasized by access to good-quality meat and the introduction of new meat-processing technology, linked to the use of heavy cleavers, as well as diachronic variation.
shifts in husbandry strategies at individual sites reflecting local adaptations and the purchasing power of individual castle communities (e.g., Viljandi and Karksi; see Rannamäe and Lõugas 2019). The networks created by the Order in Livonia, which mapped onto those of the Hanse, facilitated the movement of raw materials (e.g., antler), meat (whether preserved wild or on the hoof domestic) and fish around the Ordensland, framed by the communication routes linking the Order’s castles with Reval and Riga. At the same time, it can be assumed that the indigenous elites who were incorporated into the new power structures retained the same access to good quality produce, although this can only be tested with future excavations of medieval rural settlement sites in Livonia which take into account socio-topography as a clear research aim.

The exploitation of wild species does appear to have changed, at least in southern Livonia and southern Estonia, where pre-crusade levels of biodiversity are comparatively higher than in the medieval period (Paaver 1965; Maldre 2012). All of the case study micro-regions are within the heartlands of the Livonian Ordensland. However, the wild mammal and bird assemblages from the sites included within this study point to the presence of heterogeneous habitats within Livonian commanderies. Woodlands of varying character, wetlands, and meadows were clearly exploited. Levels of biodiversity appear to have been relatively higher in the Late Iron Age, and there is a marked decline in the relative abundance and diversity of wild species after the crusades. This could either reflect shifts in local biodiversity or be the result of changes in hunting and trapping practices. It could of course reflect both, although the only species which vanish completely from the Livonian landscape by the medieval period are the woodland refugees-aurochs. At the local scale this varied from one commandery to the next, with relatively higher levels of biodiversity present at the eastern Prussian frontier of the ‘Great Wilderness’, as evident from the faunal assemblages of the castles of Klaipėda and Elk (Lýck) dating to the fifteenth and sixteenth centuries (see Chapter 12). In contrast to the impact of the Norman Conquest (Sykes 2007), the control of hunting in the eastern Baltic was not used by the Order in Livonia to assert its authority until the later fourteenth century, and the presence of wild species in the Liv quarter in Riga and the village in Mārtiņšala reinforces this.

Given the documentary evidence for the supply of furs, the most convincing scenario is that following the crusades, the theocratic rulers of Livonia fostered a hunting culture prioritizing the acquisition of fur for the international market. This was paralleled in Prussia; in c. 1400, fur represented 6.3% of the net profits derived from exports managed by the Order’s Großschäffer, in fourth place after amber, rye, and wax (Sarnowsky 1993, 295, tab. 29). The depiction of squirrel hunting in the Livonian Master’s chamber in Cēsis Castle is the only known representation of the exploitation of wild species by the Order and underlines the importance placed on the fur trade over the pageantry of the aristocratic hunt. At the same time, the Order’s lordship in Livonia was partly articulated through the control of wild resources, echoing the better documented evidence from Prussia where this relationship is emphasized in town regulations set out during the period of active crusading in the 1230s (see Chapter 12). This is only evident in association with the Grand Master’s court in Marienburg (Pol. Malbork), which contains the sole-documented (and short-lived) hunting ‘park’ of the Order in the fifteenth century. In late fifteenth- and sixteenth-century Livonia, there are instances where wild animals, including beavers and in one case a stag (possibly an elk rather than a red deer, which would have had to have been imported), along-
side horses, are documented as gifts presented to and from officials of the Order, combining commercial value, symbolism, and exoticism, and emulating common practices in other parts of Europe (Mänd 2016).

Although hunting was carried out by members of the Order both in Prussia and Livonia, and perhaps most of all by their guests participating in the fourteenth-century Reisen, it is generally absent from the iconographic programmes of the Order’s convents. This is in contrast with the glorification of hunting by the secular aristocracy in other parts of Europe in the fourteenth and fifteenth centuries. Indeed, the commander of the Windau convent permitted his leading vassals, the local Curonian ‘kings’, to hunt deer and hare in their sacred forests — an activity that resonates with the contemporary secular emphasis on performance and display. Even a prominent room in the papal palace in Avignon was famously frescoed with hunting scenes, commissioned by Clement VI in 1343 (Anheim 2008). This puts the relationship between the Teutonic Order and hunting, an activity it engaged with relatively infrequently in the eastern Baltic, into perspective. The crusading period is poorly represented in this respect. Henry’s Chronicle suggests hunting was practised intermittently, perhaps as a meat supplement (Mugurēviņš 2009, 180), and the few sites dating to the thirteenth century (e.g., Karksi, Vecdole, Mārtiņšala) indicate it was of relatively minor importance. With the suppression of Baltic tribal resistance, the Order’s efforts and those of its seneschals focused on animal husbandry, agricultural production, and forestry. However, the fragmentation and reduction of habitat associated with this agrarian regime would have had a profound impact on biodiversity. In this respect the Order contributed to the depletion of wild populations that had already been heavily exploited. The study of the Livonian borderlands will be a useful avenue for future understanding of the impact of warfare and depopulation on levels of biodiversity, for this is one region of Europe with a clear reduction in human settlement for a period of several centuries, followed by an increase that continued into the twentieth century. In this respect the period of the ‘Great Wilderness’ in the eastern Baltic, much like the modern reserve in Białowieża Forest or the unintended refugium of the post-Chernobyl landscape, represents a valuable laboratory for investigating the relationship between human activity, the dynamism of trophic cascades, and levels of biodiversity.

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