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Animal keeping and the use of animal products in medieval Emden (Lower Saxony, Germany)

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7 Conclusions & Summary

The conclusions and summary of the zooarchaeological study of the medieval animal bones from Emden are written along the lines of the three levels of research questions as proposed in chapter 1. The majority of the faunal remains derived from three major excavations in the old town centre of Emden, Lower Saxony, Germany. Two excavations, the Rosenstraße and the Schulstraße were conducted in the 1950s by Prof. Dr. W. Haarnagel of the *Niedersächsisches Institut für historische Küstenforschung*. In 2001-03 the *Ostfriesische Landschaft* was able to carry out a large excavation in the Kirchstraße. Together, these excavations provided 19,208 hand collected mammal, bird and fish bones as well as numerous other remains from 28 soil samples taken at the Kirchstraße. This assemblage forms a unique and rich collection of material that sheds light on the use of animals and animal products from the 9th-17th centuries in Emden.

The animals and their products

The medieval people of Emden relied mainly on products derived from cattle, sheep and pig. Although beef was the main type of meat eaten, sheep were the main species kept. Pigs, and thus pork, only played a minor role. After an initial increase in the consumption of lamb and mutton, beef and pork consumption increased from the 12th/early 13th century onwards. It is likely that changes in agricultural practice and population growth invoked this. Cattle husbandry strategy was focussed on maximum meat yield in the 9th-11th centuries and on prime meat animals in the 14th-17th centuries. The increase in size would have meant that cattle matured earlier and thus could be killed at an earlier age. Cattle in the 12th-13th centuries were obtained from mixed farms as stock surplus or retired from the plough team or dairy production. It can thus be seen that consumer preferences (i.e. prime meat) were subordinated to agricultural needs (i.e. traction and manure) in the 9th-11th and 12th-13th centuries. As the majority of the adult cattle consumed in Emden were cows, it is likely that traction was provided by them rather than the sparsely present oxen. A preference for the consumption of tasty veal steak could not be detected in any period.

A preference for the consumption of older lambs was especially strong in the 12th-13th centuries. These animals represent surplus stock from large herds that were managed for their meat, manure, wool and milk. Sexing the adult sheep consumed in Emden showed that these large herds predominately consisted of ewes. The change towards the consumption of older lambs in the 12th-13th centuries can be explained by changing production practices and/or changing consumption practices. Although the analysis of cattle herd structure has shown that agricultural needs took preference over those of the consumers in this period, it seems that in the case of sheep, both interests did not interfere. Large herds primarily managed for wool, produced good tasting meat of older lambs as a by-product. Increasing population density as detected by the excavations from the 11th century onwards would have demanded increased meat production. The older ewes would also have produced some milk. As it is more economical to turn sheep's milk into cheese than cow's milk, sheep cheese consumption should not be underestimated.

Change can also be seen in the pig culling strategy. Pigs are killed at a younger age in the 12th-13th centuries than in the 9th-11th centuries or 14th-17th centuries. A higher demand for meat, due to the increased population density in this part of Emden, would have called for this earlier culling strategy. Sows were in the majority among the adult pigs in Emden and some local breeding could have taken place.

Although horses were probably important for the provision of traction and as a mode of transport, their low numbers in the assemblage indicate that they did not normally end up with the general butchery waste. It is likely that this was the result of a taboo concerning the consumption of horse meat by Christians. This avoidance was not absolute as 17% of the 46 horse remains show butchery

marks. A more practical explanation regarding the lack of evidence for horses in medieval Emden might be that horses were specialised animals. Horses might have been used for ploughing the land after the introduction of the horse collar in the 11th century. However cattle would have been better suited to work the heavy soil of the coastal zone.

Cats and dogs roamed the streets freely. Cat skins were a commodity in Emden and both species were occasionally eaten. The eggs and meat of chickens and geese as well as the meat (and probably the eggs) of wild birds such as ducks and other water fowl provided another source of protein. Fresh and marine fish were caught locally or traded-in from further away as cured fish. The remains of molluscs and water birds indicate that the tidal flats and the marshes were also exploited. It is impossible to estimate the importance of these foodstuffs compared to the products obtained from cattle, sheep and pig. Hunting of wild mammals was unimportant.

Apart from the use of secondary products like milk, wool, manure and traction, archaeological evidence shows that leather production and the working of antler, horn and bone were also practiced in this part of Emden.

Metric analysis has shown that cattle and sheep increased in height during the medieval period. In cattle, this was a continuous increase from the 9th-11th centuries until the 14th-17th centuries. The sheep became taller and more slender from the 9th-11th centuries to the 12th-13th centuries. These size increases were the result of selective breeding and better husbandry and would have resulted in earlier maturing animals, an increase in secondary products as well as an increase in primary products. The database of pig measurements was too small to detect chronological changes. Cattle, pig and horse were quite large compared to animals from other medieval sites. The sheep on the other hand were comparable in height to sheep from other medieval sites. Domestic fowl, dog and cat measurements were comparable to those from medieval Schleswig.

With respect to human-animal relationships it can be said that attitudes towards dogs probably differed from those towards cattle, sheep and pig. Dogs show a higher instance of pathology which might indicate that they were prone to abuse (trauma) and/or a higher level of care (they survived long enough for the pathological changes to develop). Their higher instance of dental anomalies might be due to reduced snout length as a result of advancements in breeding. Active care towards cattle is indicated by the advanced stages of spavin which probably develop when an animal is allowed a period of rest. Veterinary interference might even be proposed in the case of a healed greenstick fracture in the metacarpus. The high instances of dental pathologies and anomalies in sheep/goat and pig might be the result of feeding less suitable food stuffs or the absence of proper food during part of the year.

The disarticulated nature of the medieval animal bone assemblage from Emden as well as the occurrence of butchery marks shows that it mainly consists of food production and consumption waste. Although features like wells, pits and hearths are indicated on the field drawings from the 1950s, animal bone material was not collected respecting these features. It was however possible to show that animal bones were used to improve the road that later became the Schulstraße. Coarse plotting of the animal bone fragments for the Rosenstraße and Schulstraße showed that a well and the areas between the buildings were used for the disposal of waste. Intensive sampling of a pit at the Kirchstraße showed that animal bone was thrown in such features. No cess pits were found on the small excavation areas. Undoubtedly, a lot of the animal bone would have ended up in the waste layers that formed the dwelling mounds.

Emden and its hinterland

Opinions differ widely on how medieval towns were supplied with animal products. Haarnagel's excavations led to the hypothesis that Emden was predominantly inhabited by merchants and participation in agricultural activities were minimal. The animal bone analysis has shown that this

view needs revision. Body part frequency showed that complete animals were processed on or near the site. Meat was thus imported on the hoof and butchered locally. This was most practical as procedures for preserving meat were limited. The presence of foetal material of cattle and sheep as well as stalling facilities indicates that at least some animals were kept locally. Fresh milk could only be obtained in this way. In addition, pigs and poultry were probably commonly kept in back yards or allowed to roam the streets. Regulations regarding the latter are well known from historical sources. On the other hand, the sheer volume of people living within the medieval town of Emden could not be sustained with animal products that were produced solely inside the town. This is most powerfully illustrated by the large volume of older lambs consumed in the 12th-13th centuries. These lambs clearly represent the surplus stock of large herds in the hinterland primarily used for the production of wool. At the same time, agricultural production needs in the hinterland dictated beef supply. The present study has thus shown that a strict division between producer and consumer sites probably did not exist in Emden until at least the 12th-13th centuries. It is likely that part of the agricultural production took place in and closely around the city. Over time, this practice declined but never completely vanished and allotment gardens, chicken keeping and rabbit breeding are still practiced.

It is unlikely that Emden was either a mercantile settlement or a purely agrarian community during any part of the medieval period covered by the analysed assemblages. Stalling facilities were found in chronologically very different layers. Foetal material is also present throughout. Body part frequency did not alter either. Self-production, supply from the immediate hinterland and long distance trade (preserved cod) would all have played a role in the food supply for medieval Emden. Political situation, climate, population dynamics, preferences, opportunities etc. would all have determined which of these three areas of supply would have dominated at any given point in time. Changes might have been quite sudden or short-lived and will therefore be largely smoothed out in the archaeological assemblage.

Analysis of the butchery marks showed that cattle in particular were butchered in a standardised way indicating the presence of a butcher's guild. Sheep and pig were probably butchered by individual families at home. Trade in animal products is indicated by changes in the supply of cattle and sheep into town (see above). The large sheep herds in the vicinity of Emden would have produced wool for a large trade network probably of raw material and finished products. The processing of wool is indicated by spindle whirls and other bone objects as well as finds of textiles made of wool. Wild birds, fish and seafood were probably obtained through a market although the surroundings of Emden would have been favourable for fowling and fishing activities by its inhabitants.

Since social differences were not detected between the animal bone assemblages of the three excavations, zooarchaeology can not support Haarnagel's original theory of peasants living in the Rosenstraße and merchants living in the Schulstraße as the pottery analysis did. However, it should be kept in mind that bone waste found on the sites may have come from elsewhere in the town. A possible example of this is a layer of bone waste in the Schulstraße which was deposited there to improve drainage of the road. It is thus not possible to be certain that all the bone waste found in this part of Emden was also produced here. As animal bone was not collected per feature, possible differences were smoothed out. Furthermore, the absence of a sampling strategy for most of the excavated area would have missed clear social status indicators like certain fish and bird species. Since all three major excavations were situated rather close to each other, it is likely that the people inhabiting this area were of similar social class. In order to detect social stratigraphy it would be best to analyse the finds from a large scale excavation on the former medieval town's fringes or in a former suburb. It is likely that a different social class would be encountered there.

Emden in comparison

Emden was a typical medieval urban coastal site. Many similarities between the assemblage from Emden and those from other medieval sites (Hedeby, Schleswig, Bremen, Dokkum, Groningen, Dorestad and Thetford), regarding species proportions, husbandry strategies, phenotypes, animal welfare and the use of bone, horn and antler as raw materials could be seen. Differences are likely to be due to local preferences and/or differences in environment. All these sites were dependent on products from domesticated animals. Hunting played only a minor role in the diet. In some instances the surrounding countryside had a limiting effect on a particular species. This is especially true of the proportion of pigs that could be supported by woodland. The increase in beef and pork consumption and the decrease of sheep husbandry in the 12th and 13th centuries can be related to economic changes which possibly favoured better quality wool from England and environmental changes due to dike building.

Husbandry strategies differ between sites and change over time. In general, coming from unspecified strategies in which the production of two or more products is balanced, husbandry strategies are increasingly geared towards meat production. Especially the production of meat from older lambs was seen in several contemporary sites. Due to the fact that pigs are solely reared for their meat, husbandry strategies do not really differ between the sites. The small proportions of horse bones, their wide variety in phenotypes and the almost absence of juvenile animals shows that horses used in the urban environment came from a variety of sources in the hinterland.

Compared to other medieval sites, Emden cattle, sheep and pig were large. Cattle and sheep increased in size during the medieval period. This shows that husbandry practices were focussed on a steady increase in production. This was obtained through better feeding practices and selective breeding.

The analysis of pathological changed bones has shown that cattle were used in traction. Soil condition, costs and versatility made cattle the preferred choice over horse during the medieval period in Emden and other urban sites. Occasionally, cattle bones show that veterinary care was provided in medieval urban sites. Sheep were typically plagued by dental problems, whereas pig show very limited pathological changes which undoubtedly relates to the fact that they were commonly slaughtered at a young age. Dogs show more traumata than the other species. It might be that they were subject to more human violence on the one hand and to more human care on the other hand.

Self-production and supply from further afield played a role in the food economy of all these urban medieval sites. Foodstuffs were increasingly obtained and dictated by production in the hinterland as differences between Hedeby and her successor Schleswig show. Written sources inform us that livestock (cattle) was traded over considerable distances in the (later) medieval period. The same holds true for wool and preserved fish. Increasingly, agricultural demands resulting in large changes of the landscape regulated stockbreeding culminating in the disastrous events of the 14th century. The medieval people living in urban centres exploited a wide range of animal foodstuffs coming from self-production, the town's hinterland and long distance trade.

Initiatives for further research

This study of the animal bones of medieval Emden is naturally not complete. The presented results could act as a guideline for either the analysis of further animal bone assemblages yet to be uncovered from Emden or from the rural settlements in the surrounding country side. BENECKE (1994, 292; 2003, 173) remarks, after analysing the zooarchaeological publications of medieval sites in central Europe, that although the number of available publications is quite high, they are not evenly spread in terms of settlement type or period. The early medieval period (6th-10th centuries) is underrepresented, as are assemblages from rural communities. Assemblages dated to the 11th-13th

centuries from castles and early towns are better represented. The latter are regarded as consumer sites, whilst (part of the) production likely took place at the rural sites. In order to study the impact of a developing town like Emden on its hinterland and the rural communities, large-scale excavations of the surrounding rural settlements are necessary in order to yield a substantial amount of animal bones. It is hoped that this study forms a starting point for such a regional study.

The field of zooarchaeology is constantly evolving and new techniques are developed. Some of these more advanced techniques could be used to study part of the assemblage in detail to answer specific research questions:

The study of hypoplasia in pig to see if the fourth premolar was affected in the same way as was seen in Starigard (10th century Slavonic stronghold on the Baltic Sea in present day Germany) where one out of three foetuses experienced some sort of intrauterine stress. The latter might have been related to malnutrition of the mother due to winter food shortages (TEEGEN 2005b, 91). It is unlikely that the small number of pig mandibles (n=193 of which 43 aged below 12 months) discovered would allow for a stand-alone analysis. However, as the feeding habits of the Emden pigs must have been different from those at Starigard as woods were absent, the analysis might be integrated into the regional study of pig teeth from coastal settlements in Northern Germany such as currently being undertaken by Dr. Wolf-Rüdiger Teegen.

The identification of long distance livestock trade can be made visible by the analysis of strontium isotopic ratios (and other isotopic ratios). The isotopic ratios of strontium taken up by plants from the soil and incorporated into the teeth and bone of herbivores can be used to identify the geological region where the animal spent its early years (based on tooth enamel) versus its later years (based on bones) (see for instance BALASSE et al. 2001; SCHWEISSING & GRUPE 2003). This is especially relevant with regard to the changing meat provision of Emden, in order to test the hypothesis that from the 12th-13th centuries onwards meat was increasingly supplied from further away.

The 74 cod fragments from the Emden assemblage could be integrated into the collaborative research project that aims to explore the chronology, causes and implications of the rise of intensive sea fishing in the North Sea, Baltic Sea and North Atlantic from AD 600 to 1600. This project combines traditional zooarchaeological research with isotope analysis to investigate the medieval cod and herring trade (BARRETT et al. 2008).

Planned further research by the author include the revisiting of the Emden assemblage in order to record pathological changes using the new recording protocol by VANN & THOMAS (2006). The results will be compared with a pathological standard which will be obtained from modern reference material. The compilation of such a standard for cattle, sheep and pig will be the aim of future post-doc research by the author.

The present study has only been concerned with the animal bones excavated from Emden. But what about the human consumers? Historical evidence for later medieval England indicates that the diet was mainly based on cereals, especially wheat, with varying amounts of meat and fish depending on social status. People mainly ate beef, followed by pork, mutton and poultry. Milk products and eggs were also consumed. Wild birds were less consumed, but had an important function in the definition of status. Fasting days dictated by the church included every Friday, Saturday and often Wednesday as well as during Lent and Advent, making up nearly half of the year. The poorer people could probably afford lower quality meat every now and then, but relied mainly on milk, cheese and eggs as animal protein sources. Meat became cheaper and thus more widely consumed by the end of the 14th century. Salted herring and mollusc species were also relatively cheap. Although differences in diet between town and country were subtle, the town diet seems to have been more varied as fresh foods were more readily available from the markets (MÜLDNER & RICHARDS 2005, 40-41).

Research on skeleton series from southern Germany and northern Switzerland dating from the Neolithic until the 19th century showed that some of these groups of people suffered from minor stress moments like illnesses or short periods of hunger and with sufficient recovering time afterwards. The idea of chronic starvation of large groups of people is wrong. The situation is probably best described as people who were not always plagued by starvation, but more by the thought of it (HAIDLE 1997, 192). In order to survey the situation of medieval Emden, in collaboration with Katherina Stech from the *Freie Universität* Berlin, the results of her dissertation on the human skeletons from the Große Kirche in Emden will be compared with the results from the present study of the animal bones.

With the analysis of the animal bone material from the older Haarnagel excavations the last piece of a long-due post-excavation jigsaw falls into place. Eating and drinking are a vital part of human existence and evidence for it should therefore be routinely studied. In terms of adding new information to the medieval narrative of Emden, animal husbandry thrived within the city rather than being restricted to the surrounding country side.

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