Household specialisation in horse breeding: the role of returning veterans in the Batavian river area

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This paper investigates differences in agrarian specialisation between households in two rural settlements in the Roman Dutch River Area, and offers an explanation for these differences. It also discusses methodological problems that are inherent to studies at household level, especially when they involve small samples.

The analysis at household level shows a recurring pattern: some households specialised in sheep rearing while others specialised in horse breeding. A suspicion that returned veterans from the Roman army were responsible for initiating the breeding of horses as a surplus is confirmed by studies of material culture and house construction.

The far-reaching role of veterans from the Roman army in social and economic change in the Dutch River Area is becoming increasingly clear. So far, this topic has been studied through material culture and changes in house construction. This paper demonstrates that the analysis of animal bones is another way to study the impact of veterans.

Keywords: specialisation, animal husbandry, surplus production, Roman, the Netherlands, household, veterans, horse breeding

Introduction and historical background

The role of individual people in past economies is fascinating, but difficult to study. The study of archaeology through animal bones is not the most obvious route to gain insight into the lives and livelihoods of individual people. In focusing on the size of samples (large enough to be statistically meaningful), animal remains from archaeological sites are often grouped together. Chronology is usually respected, but spatial differentiation within sites less so. Changes in the agrarian economy are usually studied for an entire settlement. An unfortunate consequence of this focus on entire settlements and large samples is that we lose sight of individual people’s contribution to the agrarian economy. Any differences in animal husbandry between households also remain invisible. This leads us to the aim of the research presented in this paper. By analysing animal bone assemblages for households instead of settlements, I wish to discover whether there were differences between how households practised animal husbandry. If differences can be determined, it may also be possible to link households, and thus individual people, to developments in agriculture.

This paper will address differences in animal husbandry and relative specialisation between households in two rural settlements in the Roman Dutch River Area, and will offer possible explanations for these differences. While it offers insights into how individual people shaped the agrarian economy, it is also a methodological exploration.

One of the most important facts for the Dutch River Area in the Roman period is the presence of a number of army camps along the River Rhine (Fig. 1). Towns were rare in this area. The large presence of the Roman army and its demand for food must have had consequences for the agricultural production in rural settlements in the area adjacent to the frontier that supplied animals and/or cereals. It encouraged local inhabitants to start producing an agrarian surplus. This surplus probably consisted primarily of animal products. Although the local landscape provided ample grazing for livestock, the area suitable for arable farming was limited (Kooistra 1996; Groot et al. 2009). The reward of producing a surplus for the Roman market is obvious – it resulted in the ability to acquire goods. The evidence of imported goods such as pottery, glass and metal is widespread in rural settlements in the area. Finds of coins indicate that local inhabitants participated in a monetary economy. In the Roman period, the Dutch River Area was very much a complex society in which people of very different backgrounds interacted and traded.

A vital factor in the development of this region was the system of ethnic recruitment by the Roman army. Exempt from taxation, the Batavian tribe that inhabited the Dutch River Area was obliged to supply soldiers for the army (Tacitus, Germania 29; Historiae 4.12, 5.25). The extent of recruitment was
such that every community, and perhaps even every family, had a member who was serving in the army (Willems 1984, 235). After a period of 25 years, soldiers were released from the army, and were free to return to their families and homes. While not every soldier returned to the civitas Batavorum – some may have married and preferred to settle down elsewhere, while others failed to survive army service – enough did so to have a large effect on Batavian communities.

Both the production for a market and the innovative veterans can be related to the changes that occurred in animal husbandry in the Early Roman period: changes in species’ proportions, age distribution and withers height. Apart from changes in agrarian practice, differences between settlements are determined. The question is what caused these changes and created the differences. Were changes in agriculture initiated by local people as a response to market demand or were they forced on them from above, either by the Roman army or civilian authorities? Before presenting the results from the zoolo-

chaeological analysis at household level, I will provide a summary of the evidence for surplus production of animal products.

**Sites and material**

In the Dutch River Area, small rural settlements were the main habitation sites. The settlements were basically agrarian settlements, with crafts and industry not exceeding local importance. Habitation consisted mostly of traditional byre houses. In these houses, people and cattle lived under one roof. A typical settlement in this region and time period consisted of a cluster of farmhouses.

This study focuses on two rural settlements in the civitas of the Batavi, for which I have analysed the animal bone assemblages: Tiel-Passewaaij and Geldermalsen-Hondsgemet (Fig. 1). Tiel-Passewaaij actually consists of two separate settlements: Passewaaijse Hogeweg and Oude Tielseweg. Although the main focus in this paper will be on the animal
bone assemblage from Passewaaijse Hogeweg, it will also include one household from Oude Tielseweg for the Early Roman period. The sites were excavated by the Archaeological Centre of VU University Amsterdam (Heeren 2006; Heeren 2009; Van Renswoude/Van Kerckhove 2009). Excavations took place on a large scale: the settlements were almost completely uncovered. Both are typical settlements for the region, with several byre houses existing simultaneously (Figs. 2 and 3). They were inhabited throughout the entire Roman period. This gives us the opportunity to determine changes in animal husbandry. Both sites are excellently preserved, and animal bone assemblages of more than 10,000 fragments were collected and analysed (Groot 2008; Groot 2009). The number of fragments totals nearly 14,000 for Geldermalsen-Hondsgemert (3,666 assigned to species) and nearly 17,000 for Tiel-Passewaaijse Hogeweg (6,354 assigned to species). All animal bones from datable features were included in the analysis.

Methods

The term ‘household’ in this study has two meanings: a spatially defined and archaeologically visible unit consisting of a farmhouse, outbuildings and enclosure ditches; and a socio-economic agrarian unit consisting of an (extended) family that lived and worked together.

Eleven households are included in this study: six for Geldermalsen-Hondsgemert and five for Tiel-Passewaaij. These are all the households from the Early to the Late Roman period to which more than a handful of animal bones could be assigned. The Late Roman period is not included in the study for several reasons. These include a possible change in ethnicity of the people inhabiting the settlements and uncertainty about the extent of market production in this period. Two households per phase were examined for three successive phases in Geldermalsen-Hondsgemert. For Tiel-Passewaaij, three households were studied for the Early Roman period, and two for the period between 130 and 220 AD.

The analysis of animal bone assemblages per household will be limited to the proportions between the total numbers of fragments for the main domestic animals. This is purely a pragmatic choice: for eight out of the 11 households, the samples contain fewer than 100 fragments that could be assigned to species. This means that it was not possible to study aspects such as age distribution, butchery marks and skeletal elements. Comparing the species pro-
portions per household with that for the entire phase to which the household belonged should reveal whether a household conforms to the general picture for that phase, or whether it deviates from it.

To analyse the proportions of domestic animal species, a simple uncorrected Number of Identified Fragments was used. One reason for this decision is that I am mainly concerned with changes and differences in proportions, and less with actual numbers and percentages. Other methods are less suitable. Proportions in weight, for instance, are revealing when studying animals as a source of food, but I am interested in the production of living animals as well as meat. Since we are dealing with small samples, calculating Minimum Numbers of Individuals would not be helpful; the numbers would simply be too small to be meaningful.

**Surplus production in the Dutch River Area**

While the concept of surplus production is essential to this paper, it is not its primary focus. More information and a full discussion on surplus production in rural settlements can be found elsewhere (GROOT ET AL. 2009; VOSSEN / GROOT 2009; GROOT 2008a; GROOT 2008b). Here, I will provide a summary of the evidence of surplus production in the Dutch River Area, and discussions related to that evidence.

Since the main evidence for surplus production is the surplus food itself, it is obvious that this involves a number of methodological problems. After all, the surplus products, and thus most of our evidence, are moved away from production sites. A second complication is that although rural communities may have produced a surplus, this occurred next to production for their own needs. Thus, our data consists of evidence of both subsistence production and surplus production. One way to overcome these problems is to combine results from archaeobotanical and zooarchaeological studies with other types of evidence (GROOT ET AL. 2009).

I will concentrate on two other types of changes in animal husbandry: in species composition and mortality profiles. These changes will be interpreted as a response to the demand from a market, in this case the Roman army. Changes in species composition reflect changes in the relative importance of animals. Changes in mortality profiles reflect a change in the exploitation of animals, with an emphasis on a different product (e.g. meat vs. milk).

**Geldermalsen-Hondsgemet**

In Geldermalsen-Hondsgemet, the main changes in species composition during the Roman period are an increase in horses, starting in the Early Roman period (phase 2, 50 BC - AD 50), and peaking at 31% in phase 4 (AD 150-270). The proportion of sheep steadily decreases from the Early Roman period onwards. The proportion of cattle is relatively stable, fluctuating between 51 and 62% during the Roman period. The exploitation of cattle shows a development from an emphasis on meat during the Late Iron Age to an increased emphasis on manure and labour during the Roman period.

Since habitation in Geldermalsen-Hondsgemet was continuous between the Late Iron Age and early Roman period, this settlement allows us to note any changes that date to the period when the Romans first arrived in the region: phase 2. Apart from an increase in sheep, we can also see that the percentage of horse bones already starts to increase in the Early Roman period.

**Tiel-Passewaaij**

In Tiel-Passewaaijse Hogeweg, the same broad trends are found as in Geldermalsen-Hondsgemet: a decrease in sheep and an increase in horses, taking place mainly during the 2nd century AD (phases 4 and 5-6) but starting in the late 1st century (phase 3). Sheep seem to have been more important here than in Geldermalsen-Hondsgemet, and cattle slightly less important. Although the proportion of cattle varies only slightly during the Roman period, the exploitation also shows an increased emphasis on manure and labour. In the earliest part of the Roman period, the first half of the 1st century AD (phase 2), no drastic changes seemed to have occurred compared to the Late Iron Age. However, there is a gap of more than one hundred years between phases 1 and 2.

**Surplus production of cattle**

Cattle are the most common species in military sites. Considering their size, they also provided the majority of meat consumed by soldiers (VAN WINGAARDEN-BAKKER 1970, 274; VERHAGEN 1988, 109; ESSER ET AL. 2004, 6). These cattle were probably acquired locally. Studying mortality profiles from complementary sites – production and consumption sites – can provide insights into how surplus animals were produced. Earlier research demonstrated...
that there were no significant differences in mortality profiles from military sites, towns and rural settlements (GROOT 2008a, 89-90; GROOT 2008b, 73-76). This suggests that no specialised production of beef cattle took place. If rural settlements were producing beef cattle specifically for the Roman market, we would expect them to sell young animals, which would be the most efficient strategy of production. Instead, the animals whose remains are found in military sites reflect the population structure in the rural settlements. Surplus animals were taken from existing herds, which were exploited for secondary products such as traction and manure in the first place, and meat in the second place.

**Surplus production of wool**

In the 1st century, the proportion of sheep peaked in rural settlements in the Dutch River Area. The mortality profiles for phases 2 and 3 in Tiel-Passewaaijse Hogeweg show a change in exploitation of sheep, from a slaughter peak between six and 12 months to a slaughter peak of adult animals. This suggests a shift from milk and meat to wool and meat. The increase in the proportion of sheep bones and the change in age distribution suggest that the production of wool gained in importance in the second half of the 1st century AD. If we assume that enough wool was already produced to satisfy local demands in the previous phase, this increased emphasis on wool suggests that surplus wool was produced specifically for a market. Since the proportions of sheep declined after around 100 AD, we must assume that the demand for wool had declined by this time. In Geldermalsen-Hondsgemiet, no such clear evidence for wool production was found. This serves to highlight the existence of differences between rural settlements.

**Surplus production of horses**

At the beginning of the 2nd century, the proportion of horses increased rapidly in both Tiel-Passewaaijse Hogeweg and Geldermalsen-Hondsgemiet. This is a continuation of a trend that already started in the second half of the 1st century. High proportions of horses are found in several other settlements in the area in the Middle Roman period. It has long been assumed that these high proportions reflect a specialisation in horse breeding, connected with the presence of the army. Horses were not just used by the cavalry, but also by other army units and for transporting people and goods. Since there is no evidence of a central supply of horses, it seems likely that many of the horses required were acquired locally (DAVES 1969, 434-435; JOHNSTONE 2008).

**Differential specialisation between settlements**

The trends in species composition found in Tiel-Passewaaijse Hogeweg and Geldermalsen-Hondsgemiet are reflected in many other settlements. In the Dutch River Area, local communities played an important role in supplying the Roman army. Rural settlements were limited in their response to the demand for products from the Roman army by their existing livestock, their expertise, the local landscape and local exchange networks.

Relative specialisation in certain products was not stable, but changed during the Roman period in many of the settlements from specialised wool production in the 1st century AD to horse breeding in the 2nd century AD. Although many settlements show a high proportion of sheep in the 1st century AD and later a high proportion of horse, the actual percentages vary. The extent of specialisation clearly differed between settlements.

The two settlements in Tiel-Passewaaij demonstrate that even adjacent and probably closely related settlements differed in their animal husbandry. Oude Tielseweg shows a lesser degree of specialisation in animal husbandry than Passewaaijse Hogeweg: both the percentages of sheep and horse bones never reach the levels found at Passewaaijse Hogeweg. How livestock was managed seems to have differed as well. While young lambs were absent in Passewaaijse Hogeweg, suggesting that sheep were kept outside the settlement all year round, bones of juvenile sheep were found in Oude Tielseweg (GROOT / KOOISTRA 2009). The relation between the two settlements is difficult to grasp. Could it be that Oude Tielseweg was subservient to its larger neighbour?

Another settlement that illustrates differential development and specialisation is Wijk bij Duurstede-De Horden. Here, the increase in the percentage of horse bones seen elsewhere occurs much earlier (LAARMAN 1996, 379, Table 61). While the breeding of horses already gained importance during the Early Roman period, sheep and wool production never played a significant role in this settlement. The closer proximity of Wijk bij Duurstede to the Roman limes could have resulted in earlier, more intensive contacts between the army and local inhabitants. The army formed a ready market for any surplus...
horses that could be produced, and the inhabitants of this settlement may simply have been quicker to respond to this demand.

At the moment, it is very difficult to establish whether differences in animal husbandry between settlements are a deliberate choice, or whether they are due to the limited possibilities of the existing livestock and expertise. It could, of course, also be that authorities dictated what rural communities had to produce (ROYMANS 1996, 86). Now that we have established that differential specialisation between rural communities existed, it is time to proceed to differences in animal husbandry between households.

**Differential specialisation between households**

**Geldermalsen-Hondsgemet**

For the early Roman period (phase 2), there are only minor differences between the two analysed households (Figs. 4 and 5). The only real difference is that
house 16 has a higher percentage of horse fragments than house 19. However, the difference in the actual number of fragments is very small. This is precisely what we would expect to find. In this early phase, the effect of the presence of the Roman army is negligible, and any differences in animal husbandry between households are small.

For phase 3, the second half of the 1st century and the first half of the 2nd century, the differences between two households are more noticeable (Figs. 6 and 7). House 2 has a very high percentage of sheep bones (58%), whereas house 20 shows high percentages of horses (26%) and cattle, but a low percentage of sheep (14%). The dates of these two houses overlap, but the period when house 2 was in use starts and ends about 20 years earlier than house 20. This could partially explain the differences: since sheep decline in this phase and horses increase, it is not surprising that the earlier house shows a higher percentage of sheep and a lower percentage of horses compared to the later house. However, the differences seem too large for them to be merely a result of slightly differing dates.
The two households of phase 4 show the same differences that were found for phase 3: house 10 has a high percentage of sheep bones (44%) and a low percentage of horse bones (8%), whereas house 5 has a high percentage of horse bones (34%) and a low percentage of sheep (7%) (Figs. 8 and 9).

**Tiel-Passewaaijse Hogeweg**

For phase 2, the Early Roman period, three households could be analysed: house 2 in Oude Tielseweg and houses 23 and X in Passewaaijse Hogeweg. Although the exact dates of these houses differ, they can all be dated between 20 BC and AD 20. Phase 2 has a broader date of 50 BC to AD 70. Two households show a similar species composition to each other and to the phase as a whole (Figs. 10 and 11). House 23 differs by a higher percentage of cattle compared to sheep, and a slightly higher percentage of horses.

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1 House X was not numbered because no actual house plan was found. It is uncertain whether this farmyard ever had a farmhouse.
Fig. 10 Map of Tiel-Passewaaij during phase 2. Illustration Stijn Heeren.
Unfortunately, it was not possible to analyse households for phase 3 in Tiel-Passewaaij. The numbers of animal bones assigned to houses were too small to draw any conclusions.

For phase 4, two contemporary households in Passewaaijse Hogeweg yielded sufficient material: house 3 and house 25. This means we can study the largest and the smallest house for this phase. House 3 shows a species composition similar to that of the entire phase: a high percentage of horses (22%), and a relatively low percentage of sheep (26%), at least compared to earlier phases (Figs. 12 and 13). House 25 has a low percentage of horses (8%), and a high percentage of sheep (48%).

**Discussion: possible explanations for differences between households**

So far, I have treated the differences in species composition between households as if they reflect actual differences in the number of animals owned by a household, and thus in animal husbandry. Unfortunately, things are not that simple. Several factors influence the analysis of animal bones at household level. These factors, and their possible effect on my results, will be discussed in this section.

**Bias of small samples**

As mentioned earlier, the numbers of animal bones per household are very small. This means that the differences could be accidental. Furthermore, the size of the samples per household varies strongly in some cases. However, the data do show a recurring pattern, and no unexpected results, such as for instance, a high percentage of pig, or an absence of cattle. Furthermore, the species composition of some of the households fit that of the phase they belong to.

**Differences in dating**

Slight differences in dating could have an effect on our data. Farmhouses and farmyards are rarely dated to the exact same time period. Although the houses compared above are all dated to the same phase, their exact dates differ slightly. In some cases, differences in species proportions could be related to such small differences. For instance, in phase 3 in Geldermalsen-Hondsgemiet, the house with the higher percentage of horse bones is dated about 20 years later than the other house. Since this is the phase in which the proportion of horses increases, a slightly later date could explain the difference between the two households. A further complication is that the time span to which houses are dated normally extends beyond a human lifespan. It is...
generally assumed that houses in this region survived for roughly one generation, or ca. 20 years, before requiring repairs or rebuilding (Gerritsen 2003, 39). This means that the actual time period a house was in use falls somewhere within the date given. It is not possible to further divide and date material from within the lifespan of a house. Short-term changes that take place within one generation are therefore not visible.

Random selection of households

The choice of households for this analysis is not based on sound arguments, but is determined by the availability and numbers of animal bones. Ideally, all households should be analysed separately, but some yielded few or no material at all. For instance, for phase 2 in Tiel-Passewaaij, the largest farmhouses could not be included in this study. In one case, I compared two households from separate but adjacent settlements (phase 2 in Tiel-Passewaaij). I consider this to be legitimate since the proportions for phase 2 for the two settlements are very similar.
Reworking of earlier deposits

Some of the later houses were built in areas that had been occupied intensively in previous phases. Digging ditches and pits may have unearthed earlier animal bones, which would then be mixed with the later material. This could explain a high percentage of sheep, characteristic of the Early Roman period. However, since the percentages of sheep for house 2 in phase 3 and house 10 in phase 4 in Geldermalsen-Hondsgemet are much higher than in any of the earlier phases, I do not believe this explains the differences. Furthermore, house 2 in phase 3 is located in an area of the settlement that was not used before. Although the effect of the reworking of earlier material cannot be excluded, it is not a satisfying explanation for the differences between households.

Feature type and taphonomy

The feature type in which animal bones are found can affect the proportions between species (DeReumaux et al. 2008, 65; Maltby 1985, 41-42). Generally, pits are filled more quickly than ditches, providing better preservation conditions for smaller and more fragile fragments. The effect of feature type on species composition was studied for Geldermalsen-Hondsgemet. In phase 2, most of the animal bones from house 19 were found in ditches, whereas most of the material from house 16 was found in pits. Nevertheless, the species composition for the two households is very similar. The effect of feature type is hard to assess for phases 3 and 4. For houses 10 and 20, for example, 70–90% of the animal bones derive from ‘wet’ contexts, which could explain a high percentage of sheep. But although a high percentage of sheep is found for house 10, this is not the case for house 20.

The number of features contributing animal bones could also have an effect. An assemblage originating from a larger number of features is probably more representative than that from only a handful of features. The material for house 2 in Geldermalsen-Hondsgemet, for example, derives from only two features. The probability that this material represents just one single moment in animal husbandry or household activities is high.

Interpretation of animal bone finds

A further kind of problem is that archaeologists have difficulty understanding what animal bones actually mean. They do not reflect the proportion of living animals, but rather the proportion of animals killed and processed in a certain location. For example, sheep may always have been butchered in a certain zone within the settlement or by a certain person. Even then, butchery and the disposal of waste are two entirely different processes. The concept of waste is problematic, as this is a cultural construct. How waste was disposed of and how it could spread through a settlement is little understood. For the purpose of this study, I have assumed that the distance between the source and the final deposition is not significant, i.e. that animal bones found near a farmhouse derive from animals killed and butchered at or near this location.

Animal bones could also reflect consumption patterns, with one household consuming more sheep, and another more horse meat. Since the consumption of horse meat seems to be associated with ritual activities, this could mean more than just a difference in taste (Cool 2006, 92). A more detailed study of skeletal elements and butchery marks, and any differences in these between households, could tell us more. However, the numbers of fragments from Geldermalsen-Hondsgemet and Tiel-Passewaaij are simply too small for such an investigation. One argument against interpreting animal bones as solely consumption waste is the presence of dog bones, which are found in most farmyards.

Militaria and the veteran model

Since the past is usually more complicated than we think, there may well be various reasons behind the differences in species composition. At the moment, there seem to be more complications and problems than results. However, there are several reasons for concluding that the differences observed between households do indeed reflect differences in animal husbandry strategies.

First, the differences are not random, but fit in with our knowledge of animal husbandry in the region. For example, a high percentage of pig bones is never found, and cattle fragments are always present. Second, the data show a recurring pattern, both between phases and between settlements. A distinction can be made between households with high percentages of sheep and households with high percentages of horses. Some factors, such as the reworking of earlier material, and the effect of feature type, can be excluded, at least for some phases. The effect of these factors can be accurately assessed by high-quality fieldwork and by using the expertise of the site archaeologist.
There is one further reason for taking the differences between households seriously. When other archaeological data are taken into account, an interesting pattern is revealed. House 20 in phase 3 in Geldermalsen-Hondsgemet is not only the most prominent house in this phase – both in size and considering the enclosure ditches – the large number of metal finds with a military character also suggest that the owner of this house had served in the Roman army (Fig. 14). The contemporary house 2 only yielded one military piece. The family in house 2 seems to have continued the local animal husbandry tradition, with a strong focus on sheep, while the owner of house 20 introduced a new development: a specialisation in the breeding of horses. House 5 of phase 4 in Geldermalsen-Hondsgemet was not a large house, but it did have its own enclosure. A piece of a scabbard was found in this farmyard. In the adjacent enclosure, a concentration of metal horse gear was found. Again, this phase seems to show the existence of a household that clung to a traditional way of agrarian practice, and one that concentrated on the breeding of horses. House 3 of phase 4 in Tiel-Passewaaijse Hogeweg is also remarkable for its large size, adjacent enclosed area and larger number of military metal finds and horse gear. The enclosure may have been used for training horses.

Of course, absolute numbers of metal finds may reflect the density of finds rather than anything else. Finds density is connected to the number and type of features in a farmyard. In Tiel-Passewaaijse Hogeweg, for instance, house 3 is surrounded by several ditches, which are missing in house 20. It would be better if we could use the ratio of metal finds with a military character to that of other metal finds. At the moment, such data is not available. Phase 2 in Tiel-Passewaaij is a reminder that the interpretation of metal finds, and their relation to animal bone assemblages, is not straightforward. House X, which was unremarkable as far as species composition was concerned, yielded a high number of metal finds with a military character, whereas house 23, the house with a higher percentage of horse fragments, had the lowest number of military finds.

Nevertheless, it is hard to believe that the recurrent association between a high percentage of horse bones and a relatively high number of military metal finds and horse gear could be a coincidence. The presence of military finds in rural settlements can be explained by the fact that many Batavian men served in the Roman army and returned to their home villages after they had been discharged, bringing some of their equipment with them (NICOLAY 2007). It looks as if they were the ones who initiated a new development in animal husbandry: breeding horses as a surplus (Fig. 15).

For Tiel-Passewaaijse Hogeweg, the construction of farmhouses and outbuildings provides further relevant information. A development in outbuildings which has been linked to horse breeding is the appearance of separate stables from the later 1st century onwards (GROOT 2008, 83-84; HEEREN 2009, 172-173; GROOT ET AL. 2009, 250). Since these stables are found next to farmhouses with traditional byre sections, and coincide with the increase in the proportion of horses, it seems logical to conclude that the stables housed horses. In fact, house 3, a house where a high percentage of horse bones was found, has one of these stables in its farmyard. It has been identified independently in another study as a house inhabited by a veteran (HEEREN 2009, 159), on the basis of certain elements in the construction and material culture such as militaria, seal-boxes and keys. What is interesting is that at this site, the farmyards with stables are also the ones with large granaries, which have been associated with the production of a surplus of cereals (GROOT ET AL. 2009, 248-249). Even more interestingly, the farmhouses with stables and/or large granaries are of a type now referred to as the ‘veteran farmhouse’. This type of farmhouse has a surrounding portico inspired by military barracks (VOS 2009, 243-247; HEEREN 2009, 157-160). When this information is combined with the distribution of...
"military" metal finds, there is only one conclusion: these farmhouses were inhabited by veterans (and their families), and it was they who were responsible for the surplus of horses and cereals.

This conclusion fits into recent research into the role of veterans from the Roman army in developments in rural settlements. Veterans are now thought to be responsible for the introduction and spread of literacy in the Dutch River Area (DERKS / ROYMANS 2002, 100-102). As we have seen, they also introduced new developments in house construction in rural settlements, using their knowledge of Roman military building styles (VOS 2009, 243-247; HEEREN 2009, 157-160). Veterans clearly played an important role in social and economic developments. The move to breeding and selling horses is one further achievement that can be attributed to veterans. It is not surprising to discover a link between veterans and horse breeding (with the army as the main market). After all, they are the ones who had contacts in the army, and knew what the army required. They may also have had the financial means to instigate change.

Further research

This study started out as a first attempt to discover differential specialisation in animal husbandry in rural settlements in the Dutch River Area. The relation discovered between surplus production and veterans was an unexpected result.

Analysis at household level is most promising in large, well-excavated and well-analysed settlements. Moreover, good contacts between the site archaeologist and the animal bone specialist, and the exchange of information and ideas, is essential. Obviously, such research can only be carried out after the animal bone assemblage from the entire site has been analysed, allowing the results for households to be compared to the overall results for the relevant phase. Thorough zooarchaeological studies of large samples remain of the utmost importance. A rather humbling conclusion from this study is that even for large-scale excavations with large animal bone assemblages, the samples per households are still too small to allow anything more than a comparison of the proportions between species.

Excavations of the calibre of Geldermalsen-Hondsgemert and Tiel-Passewaaij are rare, but even smaller
sites and excavations of sections of large sites can be suitable for household analysis. The important factor is to collect and analyse finds in such a way that the results can easily be related to individual households. However, it is essential that research at household level becomes part of our research agenda.

This study has touched on a number of aspects that require further research. First, the association between a high percentage of horse bones and other indicators such as military metal finds, seal-boxes, “veteran houses”, etc. needs to be explored further by systematic studies. Second, taphonomy, including the reworking of earlier material and the effect of feature type, should always be taken into account. This is really a research area in its own right, where a lot of work remains to be done. Next, we need a better understanding of the disposal of waste in rural settlements in this region. Studies focusing on (variations in) weathering, fragmentation and refitting of both material and organic finds could shed some light on disposal practices. Finally, we need to consider what the results mean for social and economic organisation in the area. If indeed veterans introduced the concept of the surplus production of horses for a market to the Dutch River Area, what happened next? Did they control horse breeding, or was this pursuit open to their neighbours as well? This study has demonstrated that not every household was involved in horse breeding, so it is conceivable that veterans not only initiated horse breeding, but that this specialisation continued to be dominated by military families.

Although an analysis at household level must overcome many problems and take into account several factors, and would benefit from more research in other areas, it offers enormous potential. It moves away from looking at animal husbandry as something practised by an entire community to seeing it as a livelihood pursued by a single family. It also offers a tempting glance at the choices people made and the developments they instigated.

**Conclusion**

While certain trends in animal husbandry are found in rural settlements in the Dutch River Area, there is variation, both at settlement and household level. Whether or not this variation is a result of choice is impossible to tell at present. Variation between settlements is found in the extent of relative specialisation, and the moment when specialisation occurred. Variation at household level is found in the animal species specialisation was focused on: either sheep or horse. The households with a high percentage of sheep reflect a local animal husbandry tradition, whereas the households with a high percentage of horses reflect a new development.

The households with a high percentage of horse fragments have also yielded a high number of military metal finds and horse gear. This suggests a link between horse breeding and returned veterans. Horse breeding may have been initiated and controlled by veterans. It is not surprising that the breeding of horses, destined for the Roman army, was controlled by people with connections in the army.

The suspicion that veterans played a role in horse breeding in the Dutch River Area is not a new one, but this is the first time that we can support it with archaeological evidence. This demonstrates once again that the study of animal bones can do much more than merely provide information on animal husbandry; it can give an insight into social change as well.

An analysis at household level not only offers new answers, but also leads us to new research questions. We need to consider what the results of this study mean for social and economic organisation in the area. If indeed veterans introduced the concept of surplus production of horses for a market to the Dutch River Area, what happened next? Did they control horse breeding, or was this pursuit open to their neighbours as well? This study has demonstrated that not every household was involved in horse breeding, so it is conceivable that veterans not only initiated horse breeding, but that this specialisation continued to be dominated by military families. Cereal production was another important part of the agricultural economy. The location of large granaries near veteran farmhouses suggests that this, too, was a business undertaken by veterans and their families. But were they the only ones producing a surplus, or did they collect the surplus produced by their neighbours? Finally, what is the meaning of veterans and veteran farmhouses if it is true that every family in the *civitas Batavorum* had its own veteran?

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