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13 The animal bone

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Introduction

The late Saxon to medieval deserted hamlet of West Cotton, Raunds Northamptonshire (SP 976725), lay in the Nene valley on a slightly raised gravel peninsula at the edge of the floodplain. Excavation between 1985 and 1989 revealed the complex sequence of its development. In the mid-tenth century a late Saxon timber building complex, with an associated watermill, was set within a planned settlement of regular plots. This building complex was directly replaced in the early part of the twelfth century by a small manor or manorial holding comprising a two-storey hall, dovecote, detached kitchen/bakehouse and garderobe, but by the end of the century severe alluviation across the valley floor had resulted in the abandonment of the watermill and the creation of protective flood banks. By the mid-thirteenth century there was a new manor to the east and peasant tenements replaced the old manor house. By the end of that century the manor buildings had also been converted to peasant tenements, marking the end of direct farming of the manorial demesne. The tenements were progressively deserted through the fourteenth century, and by mid-fifteenth century the settlement was abandoned and given over to pasture closes.

Material from West Cotton derives from the following periods:

Early-middle Saxon	
Late Saxon settlement	(AD 950–1100)
The medieval manor	(AD 1100–1250)
The medieval manor and hamlet	(AD 1250–1400)
Demolition rubble and robber trenches	(AD 1300–1450)

The early-middle Saxon animal remains have not been dealt with in detail.

Only the medieval assemblages were sufficiently large to allow a full zoo-archaeological study. The chronological overlap between the hamlet and demolition phases arises from the process of progressive tenement desertion, which began in one tenement as early as 1300. Therefore the two periods have generally been grouped together to form a single mid-late medieval period of the manor and hamlet, dated AD 1250–1450. An exception is the calculation of the frequencies of species, where, in order to discern the existence of a possible chronological trend, these periods were kept separate. For most studies quantification is only possible at the basic division into two periods:

The medieval manor	(AD 1100–1250)
The medieval manor and hamlet	(AD 1250–1450)

In addition, there are two small groups of later material:

Early post-medieval ditches and banks	(AD 1450–1550)
Late post-medieval activity	(AD 1550–1800)

Residuality was generally considered to be minimal. According to Chapman (pers comm) studies of the pottery indicate that this was probably never more than about 5%. However, in the boundary ditches in which 80% of the earlier material was found, the amount of residual Saxon bones may be slightly higher.

The nature of the deposit differed with respect to period, and the main differences can be summarised as follows (Chapman pers comm):

Late Saxon and medieval manor: largely boundary ditch fills and some occupation levels.

Medieval manor and hamlet: largely yard deposits and floor levels

Late medieval: demolition rubble and robber trench fills

The scarcity of collections of large animal bones from rural sites makes the West Cotton assemblage particularly important. The main aims of our study were:

- to examine what people were eating at West Cotton
- to try and ascertain what animal products besides meat were being produced
- to understand animal husbandry practises at West Cotton
- to study butchery techniques, methods of food preparation and rubbish disposal on the settlement
- to examine changes with time (mainly early versus late Middle Ages)
- to see how West Cotton differs from other contemporary sites in England and to see whether the West Cotton faunal assemblage reflects countrywide developments in animal husbandry as well as national economic trends

Table 13.1: Number of mammal, bird and amphibian bones (NISP) (not including sieved samples)

Period	**Late Saxon**	**Medieval manor (1100–1250)**		**Medieval manor and hamlet (1250–1400)**		**Medieval desertion (1300–1450)**		**Post–medieval (1450–1550)**		**Post–medieval (1550 –)**
Species	**n**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**
Cattle	46	760	35	290.5	21	116	14	56	11	11
Sheep/Goat	31	531	24	499.5	36	325.5	39	309	58	75
Sheep	*4*	*121*	–	*82*	–	*51*	–	*66*	–	*14*
?Sheep	–	*6*	–	*1*	–	*2*	–	*3*	–	–
Goat	–	–	–	–	–	–	–	–	–	–
?Goat	–	–	–	–	–	–	–	+	–	–
Pig	28	318	15	174	12	56	7	35	7	3
Equid	11.5	176.5	8	159.5	11	101	12	64	12	7
Red deer	–	1	<0.5	+	–	–	–	–	–	–
Fallow deer	–	–	–	–	–	+	–	–	–	–
Roe deer	–	1	<0.5	1	<0.5	–	–	–	–	–
Dog	3	42	2	38	3	16.5	2	10	2	1
Fox	–	–	–	1	<0.5	–	–	–	–	–
Dog/Fox	–	*1*	*<0.5*	–	–	–	–	–	–	–
Cat	1	52	2	17	1	11	1	2	<0.5	–
Polecat/Ferret	–	6	<0.5	3	<0.5	–	–	1	<0.5	–
Weasel	–	+	–	–	–	–	–	–	–	–
Stoat/Weasel	–	2	<0.5	+	–	–	–	–	–	–
Hare	–	3.5	<0.5	7.5	1	14.5	2	1	<0.5	–
Rabbit	–	–	–	–	–	1	<0.5	–	–	–
Beaver	–	–	–	–	–	–	–	–	–	–
Rat	–	5	<0.5	1	<0.5	–	–	1	<0.5	–
Water vole	–	1	<0.5	7	1	11	1	–	–	–
Rat/Water vole	–	*5*	*<0.5*	*2*	*<0.5*	*4*	*<0.5*	*2*	*<0.5*	*1*
Wood/Yellow necked mouse	–	–	–	–	–	–	–	–	–	–
?Bank vole	–	–	–	–		1	<0.5	–	–	–
Hedgehog	–	–	–	1	<0.5	4	<0.5	5	1	1
Mole	1	2	<0.5	14	1	16	2	4	1	1
Domestic fowl	5	68	3	38	3	10	1	4	1	1
Goose	4	40	2	10	1	3	<0.5	–	–	–
Duck	1	21	1	3	<0.5	10	1	6	1	–
Grey/Golden Plover	–	–	–	+	–	–	–	–	–	–
Lapwing	–	+	–	–	–	–	–	–	–	–
Pigeon	2	23	1	41	3	15	2	3	1	1
Cormorant	–	1	<0.5	–	–	–	–	–	–	–
Red Kite	–	3	<0.5	–	–	1	<0.5	–	–	–
Buzzard	–	1	<0.5	–	–	–	–	–	–	–
Sparrowhawk	–	–	–	1	<0.5	–	–	–	–	–
?Kestrel	–	–	–	–	–	–	–	1	<0.5	–
Crow/Rook	2	12	1	5	<0.5	17	2	10	2	–
Turdid	–	–	–	1	<0.5	11	1	2	<0.5	–
Passeriform	–	3	<0.5	1	<0.5	2	<0.5	–	–	–
Bird	–	4	<0.5	3	<0.5	–		–	–	–
Amphibian	7	93	4	79	6	88	11	17	3	9
Frog	–	*7*	–	*4*	–	*4*	–	*2*	–	*1*
Toad	*1*	*8*	–	*3*	–	*1*	–	*1*	–	–
Eel	–	1	<0.5	1	<0.5	1	<0.5	–	–	–
Perch	–	1	<0.5	–	–	–	–	–	–	–
Ling	–	–	–	–	–	1	<0.5	–	–	–
Totals	**142.5**	**2178**	**–**	**1399**	**–**	**825.5**	**–**	**533**	**–**	**112**

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Methodology

Full details of methods used can be found in Albarella and Davis (1994b). [Editors note: This report was originally prepared in the mid-1990s and the full version, including the detailed methodology and all of the tabulated and diagrammatic data, was made available to fellow researchers at the time as an Ancient Monuments Laboratory Report: Albarella, U, and Davis, S J M, 1994 *The Saxon and Medieval animal bones excavated 1985–1989 from West Cotton, Northamptonshire,* HBMC Ancient Monuments Laboratory report, **17/94,** London. As this supplementary data is already available to those who require reference to it, only the principal tabulated data is reproduced here.]

Recovery

Most of the West Cotton animal remains were recovered during hand excavation (Table 13.1). However, a programme of wet and dry sieving was carried out on. Most of the soil samples were of 10 litres and were wet sieved through three sieves respectively 5mm, lmm and 0.5mm mesh (see Campbell in this volume for more details about sampling and recovery methods).

The sieved samples include very small specimens, such as isolated teeth of small mammals (Table 13.2). Unfortunately these samples did not provide useful quantitative information because they were too small and derive from an unknown proportion of the complete deposit. However, three “whole earth” samples (Payne 1992), each of 100 litres, were also sieved. Each is from a different period: late Saxon, the medieval manor and the medieval tenements. Unfortunately, they too produced such a small number of identified animal bones (7, 2 and 5 respectively) that quantitative inferences could not be drawn.

Many small specimens, such as amphibian bones, were collected by hand, which suggests good recovery (Table 13.1). However, a bias against smaller specimens is to be expected. Indeed, an under-representation of smaller parts of the skeleton and smaller species is quite evident.

In order to check whether recovery biases varied in different periods we have calculated the relative frequency of isolated permanent incisors (ie small teeth which are easily overlooked) for the three main taxa in the two main periods. Although a slightly higher degree of recovery in the later period is apparent, the difference between the two periods is probably too slight to seriously affect the characteristics of the different assemblages. However, this difference must be borne in mind when the two samples are compared. The higher frequency of pig incisors (relative to the other species) is due to the larger size of these teeth compared to the molars, whereas the lower frequency of the sheep incisors is almost certainly due to their smaller size relative to the molars.

Although we have been unable to calculate the general loss of smaller specimens, the list of bones from sieving (Table 13.2) shows more taxa than listed in Table 13.1, and the relative frequency of the species would probably have been very different if all bones present in the soil had been recovered.

Identifications

Some closely related taxa were difficult to distinguish. Rather than try to identify all possibly identifiable elements, we decided to record only a selected suite of elements which, we believe, preserves all the quantitative aspects and is more reliable and less time consuming.

We were generally able to identify the following parts of the skeleton as either sheep or goat: dP_3, dP_4, distal humerus, distal metapodials (both fused and unfused epiphyses), distal tibia, astragalus, and calcaneum using the criteria described in Boessneck (1969), Kratochvil (1969) and Payne (1969 and 1985). Since horncores are not necessarily present in both sexes and can be subject to different patterns of preservation, they were distinguished but not used to calculate the sheep:goat ratio.

For the identification criteria of other taxa see Albarella and Davis (1994b).

Quantification

For a full description of the methods used for mammal bones see Davis (1992a). In brief, all mandibular teeth and a restricted suite of ‘parts of the skeleton always recorded’ (ie a predetermined set of articular ends/epiphyses and metaphyses of girdle, limb and foot bones), were recorded and used in counts.

Number of Identified Species (NISP) and Minimum Number of Individuals (MNI) were both calculated for the most common taxa. Since the side of the element was not recorded, the MNI was simply calculated by dividing each element by its number in the body. The MNI was calculated at the ‘higher level of aggregation’ (Grayson 1984), which means that it was calculated considering each period as a single group, rather than calculating the MNI for smaller groups, such as units, and then summing them up in order to get the total for the period.

Table 13.2: Number of mammal, bird and amphibian bones (NISP) from sieved samples

Period	**Late Saxon**	**Medieval manor (1100–1250)**	**Medieval occupation (1250–1400)**	**Medieval desertion (1300–1450)**	**Post–medieval (1550+)**
	n	n	n	n	n
Cattle	–	4	1	–	–
Sheep/goat	1(1)	14	2	2	–
Pig	–	7	2(1)	–	–
Equid	–	2	–	–	–
Dog	–	2	1(1)	–	–
Cat	–	1	–	1	–
Weasel	–	–	+	–	–
Hare	–	–	9	–	–
Rat	–	3	1	–	–
Water vole	–	2	–	–	–
Rat/Water vole	–	–	1	–	–
Small rodent	3	24	22(1)	–	1
Mouse	–	–	1	1	–
Small vole	–	1	5	1	1
House mouse	–	2	–	–	–
Wood/Yellow necked mouse	–	1	–	–	–
Field vole	–	5	4	1	–
Bank vole	–	1	1	–	–
Mole	–	2	1	–	–
Common shrew	1(1)	2	1	–	–
Duck	–	2	–	–	–
?Snipe	–	1	–	–	–
Pigeon	1	1	1	–	–
Crow/Rook	–	2	–	–	–
Turdid	–	1	–	–	–
Passeriform	1	–	2	–	–
Bird	–	1	–	–	–
Amphibian	10(5)	80(2)	36(2)	–	2
Frog	–	*9*	*3*	–	–
Toad	*1*	*4*	–	–	–
Herring	2	26	5	–	–
Eel	1	1	1	–	–
Cyprinid	–	–	1	–	–
Fish	–	3	1	–	–
Totals	**20**	**191**	**99**	**6**	**5**

Ageing and sexing

The wear stage was recorded for all P_4s, dP_4s and molars of cattle, caprines and pig, both isolated and in mandibles. Tooth wear stages follow Grant (1982) for cattle and pig, and Payne (1973 and 1987) for sheep/goat. Mandibles with at least two teeth, with recordable wear stage, in the dp_4/P_4–M_3 row were also assigned to the mandibular wear stages of O'Connor (1988) for cattle and pig, and of Payne (1973) for caprines.

The fusion stage of post-cranial bones was recorded for all species.

Measurements

For a complete list of the measurements taken see Albarella and Davis (1994b). The measurements are generally taken following the criteria suggested by von den Driesch (1976).

Ruminant molar lengths and widths are the maximum measurements of the crown. Measurements taken on equid cheek teeth follow Davis (1987a). All pig measurements follow Payne and Bull (1988). In addition, the width of the central (i.e. second) pillar of M_3 was also measured.

Humerus HTC and Tibia Bd are, for all species, taken following the criteria described by Payne and Bull (1988) for pigs, while humerus BT is, in all other species, taken as in Davis (1992a). Measurements of cattle and caprine metapodials also follow Davis (1992a).

Wmax and Wmin are the largest and smallest diameters of the base of horncores and antlers. L is the dorsal distance between the base and the top of the horncore.

Preservation

Fragmentation

One outstanding characteristic of the West Cotton animal bones is the high incidence of gnawing marks. Almost all these marks were probably caused by carnivores, only two bones both from the mid-late medieval period were gnawed by rodents. The percentage of recorded gnawed post-cranial bones is only about 15%, but this figure is clearly a considerable underestimate of the real frequency of gnawed bones. Indeed some of the bones were not recordable *because* they were gnawed: carnivores had completely removed the ends. For instance, numerous badly chewed pig humerus shafts were observed, but the actual number recorded (ie with the medial part of the distal trochlea preserved) was very low. Furthermore we recorded the presence of gnawing marks only when we felt confident about their identification. It is likely that many other breakages were caused by carnivores.

A very high percentage of gnawed bones was also noticed at the nearby Burystead and Langham Road sites within north Raunds (Davis 1992b and Davis 2009), and we suggest that this may be characteristic of rural sites.

In many instances bone surfaces showing the typical pattern of partial-digestion (as described by Payne and Munson 1985) were also noticed. Most of them (23 out of a total of 34) were from the mid-late medieval period, which corroborates our finding of greater scavenger activity in the later part of the Middle Ages (see below). Only four bones from the medieval manor period were 'part-digested'.

However, a major cause of fragmentation was clearly human activity, many of the bones being chopped or cut, although these signs had often become completely obliterated by the subsequent activities of dogs and erosion in the soil.

Preservation of the surface

While fragmentation was high, the preservation of the bone surface was generally quite good, and occasionally excellent, which suggests that the conditions in the soil had not severely affected the bones. Most of the bones from all periods and areas seemed to be well preserved.

Chronological variation

In order to check whether there were differences in the preservation patterns between the two main periods (medieval manor and medieval manor and hamlet) some factors which should be indicative of the level of fragmentation were compared.

The generally high percentage of teeth, many isolated, is to be noted which almost certainly indicates high fragmentation; teeth are generally harder and relatively unpalatable to dogs. However, the pattern seems to be different in the two periods, the number of teeth versus bones and of loose teeth versus teeth in mandibles being higher in the later period. Therefore it seems that fragmentation is higher in the later medieval assemblage, and this must be taken into account when the results from the two periods are compared.

The difference in the nature of the deposits from which the bones are derived is probably the main cause of the different degree of fragmentation in the two periods. Whereas the earlier period bones are largely derived from boundary ditch fills, the later material is mainly from occupation levels in and around the buildings. Despite the evident recutting of the boundary ditches (Chapman pers comm), the earlier bone assemblage is therefore likely to have suffered less post-depositional disturbance.

Despite the suggested difference in the fragmentation pattern between the two periods, no significant difference in the percentage of gnawed bones has been noticed. This is not surprising because, as stated above, dog activity was probably so intense that many of the post-cranial bones, especially of sheep and pig, would have disappeared from the archaeological record. This is also confirmed by the generally higher percentage of gnawed bones for the larger species; 25–30% of cattle bones as opposed to 13–20% of sheep bones. This is an unrealistic figure because dogs tend to prefer smaller bones which can easily enter their mouth and be chewed until the epiphyses are completely abraded. In the Bronze Age site of La Starza (Southern Italy), where the degree of gnawing was equally high but also shafts were counted, an opposite result was obtained, pig and sheep bones being far more frequently gnawed than cattle bones (Albarella 1995).

It is therefore clear that at West Cotton the percentage of gnawing marks do not represent a direct index of fragmentation and that post-cranial bones of caprines and pigs are almost certainly very under-represented. As the assumed different level of fragmentation suggests, this bias is probably stronger in the later period.

Spatial variation

Given the high degree of dog activity we did not expect to find significant differences in the preservation patterns between different areas. Although in a few contexts articulated bones, which suggest primary deposition, were found, it is probable that most of the bones had been moved around the site by scavengers.

An attempt to compare the degree of fragmentation in the medieval manor period between ditch deposits and building deposits has not shown any consistent variation. The two considered indexes of fragmentation, the percentage of teeth and that of isolated teeth, gave inconsistent results. The comparison is also made problematic by the smallness of the samples of bones derived from buildings and their yards.

Frequency of species in different periods

Cattle, caprines, pig and equids represent more than 75% of the vertebrates and 90% of the mammals in all periods.

The relative frequencies of the main taxa were compared using both estimates of the number of fragments (NISP) and Minimum Number of Individuals (MNI). We have little doubt that the MNI gives a more realistic figure, as the NISP count is seriously affected by recovery and taphonomic factors (see above) so that the smaller species are under-represented.

According to the MNI, caprines are the most common taxon in all periods (Table 13.3). However, this does not mean very much until the patterns of exploitation of each taxon are fully understood, and, of course, mutton was not necessarily the most favoured meat.

The rather high percentage of equid bones in all periods appears to be a character of this site. However, it is not as outstanding as at Burystead/Langham Road where, in the medieval period, equids were the most common taxon (Davis 1992b and Davis 2009). Grant (1988) suggests that, although exceptions exist, a high percentage of equid bones may be related to the presence of light soils where horse-power was more efficient than ox-power. At West Cotton it is probable that both heavy and light soils were exploited (Campbell pers comm), thus the high presence of equids is not entirely inconsistent with this hypothesis.

Table 13.3 Frequencies of the main domestic taxa by percentage and (MNI)

Period of occupation	Cattle	Sheep	Pig	Equid
Medieval manor	26%	48%	22%	5%
(1100–1250)	(37)	(69)	(31)	(7)
Manor and hamlet	20%	62%	12%	7%
(1250–1400)	(20)	(63)	(12)	(7)
Late medieval	13%	66%	12%	9%
demolition (1300–1450)	(7)	(37)	(7)	(5)

The relative frequency of the main species did not remain constant with time. Although the two later medieval periods are not clearly chronologically distinct, an interesting trend can be noticed: caprines and equids gradually *increase,* whereas cattle and pig gradually *decrease.* However, it is important to remember that we are dealing with a 'closed' system – a fall in the frequency of one species will lead automatically to a rise in the others.

A χ^2 test applied to the MNI count shows that there is a substantial difference in the composition of the faunal assemblage between the medieval manor and the manor and hamlet ($\chi^2 = 6.7$, with less than a 1% probability that the difference is due to chance), and that no difference exists between the manor and hamlet and the chronologically overlapping demolition deposits ($\chi^2 = 1.3$, which means that there is a 25% probability that this difference is due to chance). When applied to NISP the test showed in both cases a very substantial difference (with much less than 0.5% probability that it is due to chance). We are inclined to believe that the difference in the frequency of species is real also in the later medieval and that the χ^2 test failed to show any significant difference when applied to MNI due to the reduced sample size.

It is interesting to notice that the increase in caprines seems even more striking in the post-medieval period (Table 1), when they largely dominate the assemblage.

The difference within the Middle Ages should, we suggest, be interpreted in the context of regional as well as local changes. The countrywide phenomena to bear in mind are: a) the increasing importance of wool production in medieval England, and b) the increasing use of horses for traction. The most important local change was the transformation of the site from a manor house to a hamlet, with the consequent probable decline in status.

However, in order to try to explain this change in the faunal composition we will have to examine other questions in detail, such as the kill-off pattern and the size of the West Cotton animals.

Frequency of species in different areas

In order to examine any possible lateral variation, different areas had to be considered in different periods, because of the massive change in the topography of the site between the manor and the manor and hamlet periods.

For the earlier period the frequencies of the main taxa from the system of ditches and plots and from the buildings and their yards were compared. A slightly higher number of larger species was found in the ditch deposits. Whether this is due to differential recovery or differential taphonomic effects or to a real difference in the disposal patterns is uncertain. However, there are two main problems in interpreting these data: one is the probable mixing of bones by scavengers, and the other is the small size of the sample from the buildings, which makes comparison between the two assemblages rather difficult.

For the later period, the assemblages from the different tenements were compared. Apart from minor differences, the four assemblages appear to have a similar composition. It is interesting that the increase in caprines is confirmed for each tenement, which supports our finding of a gradual increase of caprines over the site as a whole.

Major domesticates

Cattle *(Bos taurus)*

Body parts

Differences in the frequency of different elements of the cattle skeleton are probably due to recovery and preservation biases. The smallest elements, such as isolated incisors, and the least dense and most fragile elements, such as distal femur and phalanges (Brain 1967), are, not surprisingly, under-represented.

No major differences can be noticed between the two main periods, apart from a slightly more marked scarcity of post-cranial bones in the manor and hamlet phase, which is consistent with our assumption (see above) of poorer preservation in the later period.

The presence of all parts of the skeleton, including heads and feet, supports the assumption that animals were slaughtered locally.

Age

Age profiles, calculated using mandibular age stages of O'Connor (1988), show that in both periods most of the animals were killed when adult or older, although some younger specimens are also present (Table 13.4).

This kill-off pattern is quite typical of medieval sites (Grant 1988), and it is also consistent with the age of the animals in the nearby sites of Burystead and Langham Road (Davis 1992b). Cattle were used mainly for traction, with their milk and meat being of secondary importance (Grand and Delatouche 1950; Grant 1988). The West Cotton age profile is consistent with this kind of exploitation, with most of the animals kept to maturity, and exploited for power and milk, with a few animals killed when younger for meat.

The use of cow's milk should be associated, not only with elderly animals, but also with the presence of some very juvenile calves. This is not evident in the calculated figures for mandibles, however, the more fragile juvenile mandibles were perhaps more easily fragmented and when loose teeth are also considered a number of deciduous premolars, some relatively unworn, are present.

Grant (1988) suggests that in the later part of the Middle Ages beef became more important, as the increase of more juvenile animals in some sites, such as Exeter (Maltby 1979) and St. Andrew's Priory, York (O'Connor 1993), seems to demonstrate. At Sandal Castle, Yorkshire (Griffith *et al* 1983) and Launceston Castle, Cornwall (Albarella and Davis 1994a), no change was noticed within medieval times, but an increase of calves was quite obvious by the sixteenth century.

The apparently higher number of young cattle at West Cotton in the manor and hamlet period (Table 13.4) is significant when a χ^2 test is applied, although the Kolmogorov-Smirnov test failed to show any significance. This inconsistency is probably due to the small size of the sample, and the result of the Kolmogorov-Smirnov test cannot be taken as a demonstration of continuity in the kill-off pattern between the two periods. When the ratio between deciduous and permanent premolars is taken into account only a very slight change between the two periods becomes apparent. Therefore we can suggest only tentatively at this stage that an increase in beef production occurred in the later period at West Cotton.

The epiphysial fusion data also show that most of the animals were mature, although a number of juvenile cattle (unfused epiphyses) are also present. However, the intensive scavenging by carnivores is without doubt the cause of the under-representation of unfused bones. The absence of any apparent change between the two periods is not of much significance, because of the small size of the sample in the later period and the difference in preservation pattern between the two periods (see above).

Size

A comparison was made of the width of the lower third molar tooth and the distal width of the astragalus between the two periods at West Cotton; with late Saxon specimens from Burystead/Langham Road, Raunds (Davis 1992b and Davis 2009); with middle medieval, late medieval and early post-medieval periods at Launceston Castle, Cornwall (Albarella and Davis, 1994a); with mid-late medieval at Leicester, The Shires (Gidney 1991a and 1991b); and early medieval, Coppergate, York (O'Connor 1986). This comparison gives consistent results as follows:

- No size change occurred at West Cotton during the Middle Ages (confirmed by a statistical test)
- No size difference was noticed between the late Saxon cattle from Burystead/Langham Road and those from West Cotton
- The cattle from the Northamptonshire sites appear to be larger than those from any medieval periods at Launceston Castle. The difference between the West Cotton and the Launceston animals is significant.

Furthermore the astragalus plot shows that:

- There is no size difference between the medieval manor cattle at West Cotton and York
- Leicester cattle are intermediate in size between the West Cotton and the Launceston ones. They are significantly smaller than the West Cotton animals.

Table 13.4: Frequency of cattle mandibles by age stage, percentage and (MNI)

Period of occupation	Juvenile	Immature	Sub-adult	adult	elderly
Medieval manor (1100–1250)	5% (3)	15.5% (10)	8% (4.5)	32% (18.5)	42% (24)
Manor and hamlet (1250–1450)	0% (0)	22% (5)	17% (4)	35% (8)	26% (6)

It also appears that the size of the late Saxon and medieval cattle from Northamptonshire and Yorkshire is more similar to that of the post-medieval than the medieval cattle at Launceston. The evidence then seems to indicate *regional* as well as *chronological* variation in cattle size in medieval England.

It should also be noted that the small size of the Launceston animals is similar to that of the contemporary sites of Exeter, Devon and Prudhoe Castle, Northumberland (Albarella and Davis 1994a). It is thus tempting to suggest that the animals from the heart of the country (ie Northamptonshire) might have been larger (were they 'improved' animals?) than those from more outlying and possibly more marginal areas in the west and north of the country. This hypothesis needs to be tested when more data from different sites and areas become available.

Sex

Since no morphological characters provide a means of distinguishing the sexes of cattle, measurements have to be used in order to investigate the question of sex ratio.

No separate groups were noticed in the plots of different measurements. Furthermore, the coefficient of variation of the supposedly highly dimorphic metacarpal indexes (smallest shaft width/greatest length and distal width/greatest length), are not very high (8.5 and 8.6). This may indicate either that the morphological differences between sexes has been over-emphasized, or that the sample is comprised predominantly of one sex (females, or more probably, females and castrates).

The absence of bulls is quite likely. In some villages the general ratio between females and males was 10/12 : 1 (Grand and Delatouche 1950) while in other villages or manorial systems it was considered too expensive to keep a bull, therefore the herd had to rely upon communal sires (Thornton 1992).

Shape and breed

When the West Cotton metatarsals are compared with those from medieval and post-medieval levels at Launceston Castle, it was noted that not only in terms of their *size,* but also *shape,* the West Cotton cattle appear to be more like the post-medieval than the medieval Launceston cattle.

The evidence for both shape and size therefore show that different kinds of cattle were present at West Cotton and Launceston.

Butchery and bone working

There is little doubt that cattle bones at West Cotton represent butchery and food refuse. Almost 30% of the bones bore clear butchery marks and the fragmentation of many of the others is probably also due to human activity (Tables 13.5 and 13.6).

Cut marks, especially those observed on the astragalus, were almost as frequent as chopping marks. Most are probably connected with the severing of tendons. Two metapodials were smashed and burnt near the mid-shaft, which suggests the extraction of marrow. A tibia from the mid-late medieval period of the manor and hamlet is the only sawn bone found on the site.

Cut marks on phalanges, distal metapodials and in one case also on the skull (frontal bone) almost certainly attest to skinning (Table 13.7). In medieval times, hides were

Table 13.5: Medieval manor (1100–1250): Percentages of butchered and gnawed postcranial bones

Species	Chopping		Cuts		Total Butchery		Gnawing	
	n	%	n	%	n	%	n	%
Cattle	85	16	56	11	137	26	130	25
Sheep	49	19	16	6	59	23	34	13
Pig	8	11	6	8	11	15	18	24
Equid	9	8	9	8	18	15	26	22
Dog	–	0	–	0	–	0	–	0
Total	**151**	**15**	**87**	**9**	**225**	**22**	**208**	**21**

Table 13.6: Medieval manor and hamlet (1250–1450): Percentages of butchered and gnawed postcranial bones

Species	Chopping		Cuts		Total Butchery		Gnawing	
	n	%	n	%	n	%	n	%
Cattle	29	16	25	13	51	27	57	30
Sheep	36	14	11	4	43	17	51	20
Pig	3	7	2	5	5	11	12	27
Equid	25	21	23	15	45	30	48	32
Dog	–	0	–	0	–	0	1	4
Total	**93**	**14**	**61**	**9**	**144**	**22**	**169**	**26**

Table 13.7: Number of cut marks due to skinning on cranial and foot extremities

Species	Late Saxon	Medieval manor	Manor and hamlet	Post-medieval	Total
Cattle	1	23	7	0	*31*
Sheep	0	2	0	0	*2*
Pig	0	1	0	0	*1*
Equid	0	6	20	2	*28*
Dog	0	1	3	0	*4*
Cat	0	4	1	0	*5*

a secondary, but important, product of the cattle carcass (Grand and Delatouche 1950). One chopped horncore indicates that horn working may also have been practised on the site.

We suggest that all slaughter and butchery activities took place on the site, and that all parts of the body were used locally and/or for sale at market.

Caprines *(Ovis/Capra)*

Identification

All the countable bones that we identified to species proved to belong to sheep *(Ovis aries;* Table 13.1). This animal, in terms of numbers of individuals, was the most common of the food species at West Cotton – hardly surprising in view of its great importance. "Shepe…" in the opinion of Fitzherbert (1534) "… is the mooste profytablest cattell that any man can have… ". Only one horncore of goat (*Capra hircus*) was present in the early-middle Saxon period and one proximal radius identified as "possible goat" was found in a post-medieval level.

The scarcity of goat is a general phenomenon in medieval England. At Burystead/Langham Road no trace of goat was found (Davis 1992b and Davis 2009). Historical evidence suggests that flocks of goats were kept mainly in the *hilly* districts of England and Wales (Burke 1834), so the absence of this animal from Northamptonshire sites is not surprising.

Since goat was so rare, or even absent, from medieval West Cotton, in the rest of this report 'caprines' will be simply referred to as 'sheep'.

Body parts

Even more than for cattle, the distribution of parts of the skeleton of sheep is strongly determined by recovery and taphonomic factors. Incisors (generally isolated) and post-cranial bones are hugely under-represented relative to cheek-teeth: incisors being more under-represented in the earlier period and post-cranial bones being more under-represented in the later period. It is probable that, as in cattle, all parts of the skeleton were originally present in equal numbers, and therefore the sheep may have been slaughtered on the site.

Age

The pattern of sheep mortality at West Cotton is of crucial importance to our interpretation of the development of the economy at this site.

Age profiles, as calculated by mandibular age stages (Payne 1973), show that the kill-off pattern of sheep at West Cotton varies between the two medieval periods. A statistical test confirms that in the earlier period a higher proportion of the sheep were killed at a *younger age* than in the mid-late medieval. In the earlier period more sheep were slaughtered in tooth wear stages C and D (6 months–2 years old) whereas, in the mid-late medieval period more were slaughtered in wear stage F (3–4 years old). This result is confirmed by considering loose teeth and teeth in mandibles together (Tables 13.8 and 13.9), where in the earlier period 15% more animals were slaughtered within the second year.

This difference, although not striking, is important, because it suggests a change in the pattern of exploitation of the sheep. In both periods quite a wide range of ages are represented, which suggests a mixed economy, i.e. one in which meat, milk *and* wool were all important. Whereas in the earlier period the major emphasis was upon the production of meat, in the later period wool became more important. This does not mean that the economy shifted to specialized wool production, but merelv that a higher proportion of sheep were shorn of two or more fleeces before being slaughtered. The fact that the killing peak is in the fourth year and not later, indicates perhaps that the production of mutton was still important. Indeed Muffett (1655) suggests that the best mutton is not above four years old.

The increased importance of wool production probably also explains the increasing frequency of sheep with time (see above) and may also be correlated with the possible decrease in cattle age – a non-intensive production of mutton being compensated by an increase of beef from cattle slaughtered at a younger age.

When the age profiles of the West Cotton sheep are compared with those from Launceston and Burystead/ Langham Road, it is interesting that the earlier period at West Cotton (with its emphasis on meat) is similar to late Saxon Burystead, while the later period (with its emphasis on wool) is more similar to the late medieval at Launceston.

Table 13.8: The medieval manor: sheep kill-off pattern from tooth wear (mandibles and loose teeth)

Age ranges	wear stage	% killed within range	Cumulative % killed	Age
0–2 years	–	44%	44%	*c* 2 years
>2 years	–	56%	–	–
2–3 years	2–4	6%	50%	*c* 3 years
3–5 years	5–10	25%	75%	*c* 5 years
6–10 years	11G	24%	99%	*c* 10 years
>10 years	>11G	1%	100%	–

Table 13.9: The medieval manor and hamlet: sheep kill-off pattern from tooth wear (mandibles and loose teeth)

Age ranges	wear stage	% killed within range	Cumulative % killed	Age
0–2 years	–	30%	30%	*c* 2 years
>2 years	–	70%	–	–
2–3 years	2–4	5%	35%	*c* 3 years
3–5 years	5–10	36%	71%	*c* 5 years
6–10 years	11G	28%	99%	*c* 10 years
>10 years	>11G	1%	100%	

It is possible that, unlike size, we are here dealing with a countrywide *chronological development.*

The growing importance of wool production is certainly a regional rather than local phenomenon. The increase in the frequency of sheep has been attested in several other sites such as Exeter (Maltby 1979), Lincoln (O'Connor 1982b) and Barnard Castle (Jones *et al* 1985). There is also historical evidence that from the beginning of the thirteenth century, British wool was considered the finest in Europe and that it was more frequently exported to areas such as Flanders and the Artois (Grand and Delatouche 1950 and Trow-Smith 1957).

Bone fusion data are unfortunately of little help because of the poor preservation. They do not appear to confirm the age shift indicated by the teeth, but their interpretation is complicated by the differential preservation in the two periods and by the probable increase in wool production in the later period which may have entailed a greater proportion of wethers with their later fusing epiphyses (Hatting 1983).

From our finding of an increase in numbers of sheep *and* an increase in the age of their slaughter we may infer that an even greater area of land was used for sheep pasturage in the later thirteenth to mid-fifteenth centuries than sheep numbers alone would indicate. This is because both numbers and age have an 'add-on' effect (we are grateful to Mark Robinson for this observation).

Size

An attempt to metrically distinguish between first and second molars by measuring the maximum width of the crown, failed due to the large amount of overlap between these two teeth sizes, although it was possible to observe that, as with cattle, no size change occurred between the two medieval periods. This result was also confirmed in plotting of the width of the distal tibia.

A comparison of sheep size at different sites gives roughly the same results as for cattle: the West Cotton animals are definitely larger than the medieval sheep at Launceston (the difference being statistically 'very significant'), but are the same size as animals from York (O'Connor 1986). Unlike cattle, the West Cotton sheep are also the same size as animals from Leicester (Gidney 1991 and 1991b). Other sites in the west country, namely Exeter (Maltby 1979) and Okehampton Castle (Maltby 1982), like Launceston, had sheep which were smaller than those from West Cotton. Again, it would appear that since the beginning of the Middle Ages a larger and possibly more 'improved' type was present in the central part of the country. The small size of sheep from south-western sites (Exeter and Taunton) was also noticed by O'Connor (1982a).

Sex

Although no morphological criteria could be used to distinguish the sexes in sheep, a plot of the size of a very sexually dimorphic element, the horncore, was of interest as it comprised two distinct groups: one with four very large horncores and another with a higher number of smaller specimens. Despite the reduced size of horncores in wethers (Hatting 1983) the size difference between females and castrate horn cores is still probably sufficient for measurements to form separate plots. We therefore suggest that the two clusters belong to females and a smaller group of either castrates or entire males.

The possible presence of rams is of some interest. In the manor of Rimpton, Somerset, rams (as well as bulls, see above) were not kept during the first period of occupation of this settlement. Then rams were introduced, in a ratio of one ram to forty ewes, a proportion considered ideal in medieval times (Thornton 1992). In case the large horncores belong to rams, their presence in both periods at West Cotton probably suggests either a high standard of husbandry or that the sheep flock was large enough to justify the keeping of sires. If they are wethers this may be taken as a further indication of wool production.

Butchery and working

As for cattle and pig, approximately 20% of the sheep bones showed signs of butchery, but, unlike cattle, many more chopping than cut marks were noticed (Tables 13.5 and 13.6). Clearly bones of this animal are derived from food refuse.

Only one horncore, a probable ram or wether, from the earlier period, was definitely chopped at the base. No saw marks were noticed. It is possible that the working of sheep horns was not particularly popular, and other materials, such as bone and antler, were preferred.

Pig *(Sus scrofa)*

Body parts

Due mainly to the extensive damage by scavengers, very few post-cranial bones of pig were preserved, and the assemblage is dominated by the much more durable teeth. Pig bones are very porous and generally very greasy, and being mostly juvenile, must have been much preferred by dogs. The huge over-representation of pig teeth in archaeological faunal assemblages is often noted (see for instance Davis 1987b; Davis 1992b and Davis 2009; and Albarella and Davis 1994a).

Skull fragments are also very infrequent, which supports our suggestion that the difference is due to taphonomic factors rather than a preference in antiquity for heads.

Age

Age profiles are calculated by mandibular age stages (O'Connor 1988).

Despite the small sample size, especially in the later period, the ages of pig slaughter appear to have remained the same in both periods at West Cotton, with the age curve dominated by immature and sub-adult animals (Table 13.10), with only a few animals kept to older age, presumably for reproduction. This is a predictable pattern and is widespread. Pig husbandry has only one basic aim: the production of meat and lard.

The surprisingly low ratio of milk to permanent premolars probably reflects the higher fragility of the anterior part of the mandible in juvenile animals, as well as the greater tendency for milk teeth to drop out of the mandibular ramus. (Isolated teeth are more likely to be missed in excavation.) The same phenomenon was noticed at Launceston Castle (Albarella and Davis 1994a).

Size

Tooth measurements have been compared with a 'standard' value calculated from the Neolithic pig sample from Durrington Walls (Albarella and Payne 2005). This method not only allows a comparison of measurements from the two periods, but also the simultaneous consideration of different measurements and different elements, highlighting possible differences in proportions. There is no evidence for any change between the two periods at West Cotton. However, there is an interesting difference in the proportion of the medieval measurements relative to the Neolithic ones: in both periods at West Cotton, relative tooth size decreases towards the back of the jaw. Whether this is due to genetic, allometric or nutritional factors remains an open question. It will be interesting to explore this further.

The coefficient of variation of measurements is generally low and this probably attests the presence of a single domestic population.

Unlike cattle and sheep, no size variation was noticed between the West Cotton and the Launceston pigs. It seems that in medieval England, pig-size was fairly uniform (at least as far as the teeth are concerned).

Sex

When the shape and size of all canines are considered, males appear to have been more common. However, this figure is likely to be biased by recovery, because male canines are larger and therefore less likely to be overlooked. When only canines in mandibles (therefore not affected by recovery bias) are taken into account the ratio is reversed, and females appear to be more frequent (Table 13.11).

Table 13.10: Frequency of pig mandibles by age stage, percentage and (MNI)

Period of occupation	Juvenile	Immature	Sub-adult	adult	elderly
Medieval manor (1100–1250)	8% (3)	32% (13)	45% (18)	15% (6)	0 (0)
Manor and hamlet (1250–1450)	0 (0)	36% (5)	50% (7)	14% (2)	0 (0)

Table 13.11: Pig sex ratio for isolated canines and canines in (mandibles)

Period of occupation	Females	Males
Medieval manor (1100–1250)	14 (2)	24 (1)
Manor and hamlet (1250–1450)	21 (10)	40 (5)
Total	**35 (12)**	**64 (6)**

This predominance of sows is unusual in archaeological sites, especially from 'consumer' sites (see for instance Launceston Castle). However, documentary evidence suggests that only one boar was kept per three sows on manorial sites (Thornton 1992): a proportion which could be consistent with the West Cotton results.

Although caution is necessary because of the small sample, we suspect that the pig sex ratio shows that West Cotton was a 'producer' as well as a 'consumer' site, and that not all pigs were slaughtered for household consumption, but some young males were grown for sale at market.

Butchery and working

Because of the very small size of the post-cranial assemblage very little butchery evidence was available for pigs. However, some butchery marks were recorded (Tables 13.5 and 13.6), which indicate that pig bones too derive from butchery and kitchen waste.

Some pig bones, such as metapodials, seem to have been regularly worked (see Hylton this volume).

*Equids (*Equus *sp)*

Identification

There were 29 specimens of equid (mandibles or loose teeth) which could be securely identified as horse *(Equus caballus)*. Seven come from the medieval manor, 20 from the manor and hamlet and two from post-medieval levels. Despite frequent references to donkeys *(Equus asinus)* in early English books on agriculture, no trace of this animal could be found at West Cotton. It is interesting to quote Loudon (1844, 40) who, in his section on the history of English agriculture from the time of Henry VIII to 1688 states that asses were not "... propagated in England till a subsequent period." All metapodials and third phalanges at West Cotton were more similar to those of the horse rather than donkey.

Although the majority of the West Cotton equids are certainly horses, we still prefer to use the term equid for this taxon, as our sample of identified elements is small and our confidence in being able to identify post-cranial bones only fair (not as high as for sheep and goat).

Body parts

Unlike the other common species, equid post-cranial bones are somewhat better represented than teeth. We think this is mainly due to their larger size, and generally older age. Hence they are less prone to post-mortem destruction. It is also possible that equid carcasses/bones were disposed in a different manner.

Very few equid bones were in articulation, and no trace of burials was found. In terms of their general appearance, degree of damage and scavenging, and scattering around the site, there appears to be little to distinguish between equid bones and bones of sheep, cattle and pig. Therefore, as for cattle, sheep and pig, equid bones probably derive from many different individuals, rather than from a few buried skeletons.

Age

For ascertaining the age-at-death of the equids we have to rely on the ratio of milk to permanent premolar teeth and on the fusion of limb-bone epiphyses. Both methods indicate (tenuously for the few teeth found) an age increase in the later period of occupation.

As far as the fusion of the epiphyses are concerned, it is possible that the poorer preservation in the later period has biased against the unfused bones. It is also possible to argue that the smaller number of milk premolars in the later period is simply due to chance.

Two other explanations are a) that the change is real, and that it reflects improved horse-management (ie fewer deaths of foals), or simply b) instead of breeding horses themselves, the inhabitants of West Cotton in the later period preferred to buy horses elsewhere.

Size

The calculation of withers heights shows that all equids were shorter than 14 hands and 2 inches. This means that they represent ponies rather than horses. However, it must be remembered that we cannot rule out the possible presence of donkey.

There is no apparent change in the heights of the animals between the two periods. The astragalus measurements also show that, apart from two larger late Saxon specimens, the size of the equids from Burystead/Langham Road (Davis 1992b and Davis 2009) and West Cotton were similar.

Butchery

The frequency of chop and cut marks (as well as gnawing marks) on equid bones, although slightly lower in the earlier period, is comparable to that in cattle. However, whereas in cattle most of the cut marks are definite 'butchery' marks in that they can be related to the severing of tendons, in the West Cotton equids most of the cut marks were probably a consequence of skinning (Table 13.7). The skinning of equids seems to have become particularly common in the later period. The use of equid hides is well known from medieval times (Grand and Delatouche 1950; Langdon 1989), but we are not aware of any other medieval site in which such a high number of skinning marks has been found on equid bones.

A high number of butchery marks, chop as well as cut marks, was also found on the West Cotton equid bones (Tables 13.5 and 13.6). Many of the 'non-countable' elements were also butchered. In the earlier period butchery marks are not as common as for cattle, but in the later period equid becomes the taxon with the highest frequency of identified butchery. Chopping marks are particularly common on metapodials, but were also noticed on all other bones in the skeleton (scapula, humerus, radius, pelvis, femur, tibia, calcaneum) and in any period, including late Saxon (only metapodials) and post-medieval.

Butchered equid bones are often found on medieval archaeological sites, and also on some rural sites, such as Gorhambury (Locker 1990) and Langham Road, Raunds (Davis 1992b and Davis 2009, and see Albarella and Davis 1994a for a more comprehensive list). However, in all these sites butchered bones represent only occasional finds, while at West Cotton they seem to be fairly frequent. Wilson and Edwards (1993) have found dense aggregations of butchered horse and dog bones in eighteenth-century levels at Witney Palace, Oxfordshire. They suggest that horse meat was fed to hunting dogs at kennels kept by wealthy landowners.

Despite the high percentage of butchery marks, unlike the other common species, we cannot take for granted that equid bones represent butchery and food refuse. Since the proscription by Pope Gregory III (AD 732) the consumption of horse meat is generally considered to have been widely avoided and the only exploited part of the horse carcass was its hide. Nevertheless the butchery marks on the West Cotton equid bones provide clear evidence that horse flesh, although not necessarily regularly, was exploited. A more difficult question to answer is: by whom? There is some historical evidence that horse meat was used for feeding dogs. Markham (1633) recommends feeding "horse-flesh newly slaine, and warm at the feeding" to hunting hounds on their rest days, this being ".... the strongest and lustiest meat you can give them". The possibility that equid meat was eaten by the numerous dogs which lived on the site must therefore be considered likely, and the high percentage of gnawing marks is to be noted in this respect.

However, the similarity between the butchery pattern for the equids and the other food species is intriguing. The prohibition of hippophagy is undoubtedly a well entrenched aspect of English and even European life (but see Larousse 1873 under *Hippophagie).* As long as horses were scarce and highly prized work animals it is easy to understand why there was such a taboo (see Harris 1985). However, as these animals became more common as work beasts, we wonder whether the severity of the taboo did not decrease and besides being used to feed dogs, horse flesh was occasionally consumed. For example during a sequence of wet seasons, poor harvests, and disease among stock between 1314 and 1321, Stows Annals record the suffering of lords of the manor and their retainers: "horse-flesh was counted great delicates" (Hollis 1946). An equid tibia from the medieval manor period was smashed and burnt near its mid-shaft, probably in order to extract the marrow, and a similar pattern of butchery was also noticed on two cattle metapodials. Was this marrow really used to feed the dogs?

It is interesting in this respect that one of the criteria used by Wilson and Edwards (1993) for suggesting the horses at Witney Palace were not butchered for human consumption is the absence of any evidence of marrow extraction.

Other mammals

Deer

All three European species of deer are present (Table 13.1) but in very small quantity. This is typical of both rural and urban sites (Albarella and Davis 1994a) and is not surprising since deer hunting was a privilege strictly restricted to the aristocracy (Clutton-Brock 1984 and Grant 1988).

A small number of red deer *(Cervus elaphus)* and roe deer *(Capreolus)* bones from both periods are clearly butchery/food refuse, indicating that occasionally the prohibition on deer-hunting was ignored. Fallow deer *(Dama dama)* is only represented in the later period, by a chopped proximal metatarsal.

A few antlers of both red and roe deer were also found. All show signs of working. Some are shed, which suggests that they were collected for craft purposes. One deer bone (probably the shaft of a metatarsal) was also used for making a pipe or flute (Lawson in this volume).

Canids

Dog *(Canis familiaris)* bones are quite common (Table 13.1), although this animal is rather more conspicuous by its destructive influence upon the bones in general. Few measurements could be taken, though most of the dogs seem to have been of ordinary size. Very small and very large specimens are absent. Two almost complete skulls were found, one from late Saxon deposits and another from the medieval manor. They are both from fairly large dogs, and the Saxon one resembles, in shape, an Alsatian.

Cut marks can be seen on the nasal-bone of the medieval skull and there can be little doubt that these were caused by skinning. The same interpretation has been given for some skulls from a Roman well in Eastbourne (Serjeantson 1989). Other evidence for skinning has been found on dog bones: three mandibles from the later medieval period have clear cut marks on their anterior-buccal surfaces.

Dog skins were commonly used in medieval times, for instance for producing gloves (Shepherd 1979, quoted by Serjeantson 1989).

Since most of the dog bones were not butchered (Tables 13.5 and 13.6), dogs were probably not generally eaten. One possible exception is a canid (small dog?) pelvis with cut marks on the acetabulum, possibly the result of dismemberment. Gnawing marks were also uncommon and in general bones were less fragmented than those of food animals.

Only one definite fox *(Vulpes vulpes)* bone, a metatarsal, was found (Table 13.1). This animal was probably occasionally hunted for its fur.

Cat

Cat *(Felis catus)* bones were found in all periods, and are especially common in the earlier period (Table 13.1).

Most of the cats were not only small but also gracile. Dental measurements show that they were definitely smaller than the specimens from Launceston Castle (Albarella and Davis 1994a). Post-cranial bones plot in the very low part of the size range of Irish medieval cats (McCormick 1988).

A fairly large number of bones were unfused, ie from young cats, a pattern also found at Exeter (Maltby 1979) and in a few urban medieval sites in Ireland (McCormick 1988). It must be noted that far fewer unfused bones were found on the early Christian site of Lagore in Ireland. High numbers of juvenile cat bones were also found at Lincoln (O'Connor 1982b) and at King's Lynn (Noddle 1977).

McCormick (1988) interprets the difference in the age pattern between early Christian and medieval sites in Ireland as a consequence of a different use of the animals. He suggests that whereas in pre-medieval times cats were kept mainly as pets, in medieval times they were exploited for their pelts. His idea is also supported by the larger size of the animals in the early Christian period, which, together with the fusion evidence, seems to suggest the presence of a 'well cared-for' cat population. The association between immature bones and skin production has also been suggested by Serjeantson (1989).

Unlike Exeter, King's Lynn, Lincoln, Waterford and Dublin, at West Cotton two kinds of evidence point to the production of cat skins: juvenile age *and* skinning marks (Table 13.7). Two mandibles from the medieval manor, one mandible from the medieval tenements, and two distal humeri from the medieval manor have clear cut marks, presumably caused by skinning.

Despite the common interpretation of cats kept for their pelts, there is little direct evidence from medieval British sites: cut marks on cat bones are not frequently reported. Sadler (1990) mentions the presence of cut marks on a pelvis from the manor house of Faccombe Netherton.

In conclusion, we think that there is clear evidence that at West Cotton cats were used for their pelts, rather than being just pets (however, the two are not incompatible). Their role as rodent predators, well known from historical sources, must also be considered as should the fact that the Middle Ages were unhappy times for cats – they were looked upon as "familiars of the devil, companions of witches and even witches themselves" (Pond and Raleigh 1979). Furthermore, we think that the West Cotton cat bones support McCormick (1988) and Serjeantson's (1989) assumption that juvenile age may be related to skin exploitation.

Mustelids

Several bones, both mandibles and post-cranial bones, of polecats *(Mustela putorius)* were found in medieval and post-medieval contexts (Table 13.1). They come from different parts of the site and therefore probably belonged to different animals.

When compared to modern specimens in the AML reference collection, it is clear that most of the West Cotton polecats were smaller than modern ones and that they are closer in size to ferret (ie domestic polecat) bones.

No cut or chop marks were found on any of the polecat bones. Nevertheless, despite their disagreeable smell, the possibility that we are dealing with wild animals caught for their pelts has to be considered. The interest of the inhabitants of West Cotton in furs, skins and hides seems quite evident.

Their small size may of course indicate that these bones belong to ferrets – an animal known to have lived in Britain at least from the thirteenth century, when it was reared mainly for catching rabbits (Owen 1969). Consequently the scarcity of rabbits at West Cotton (Table 13.1) does not support (though, of course, it does not exclude) this hypothesis.

The polecat-ferret question has, unfortunately, to be left open. If indeed a ferret, then it would represent the first archaeological evidence for this animal in Britain.

Van Damme and Ervynk (1988) identified two partial mustelid skeletons as ferrets from a fourteenth-century pit at the Castle of Laarne in East Flanders. They made their identification on the basis of skull shape and observed that both upper and lower canines had been filed down, a technique known to have been used to prevent ferrets from killing their prey. Rabbit bones were also found on this site.

Weasel *(Mustela nivalis)* bones were found (Tables 13.1 and 13.2) as were bones from a mustelid intermediate in size between the weasels and stoats *(Mustela erminea)* in the AML reference collection. The presence of weasels of normal size at West Cotton suggests that we are more probably dealing with a population of very small stoats rather than large weasels.

Polecats, stoats and weasels are all listed by Veale (1966, quoted by Serjeantson 1989) as being among the animals exploited for fur in the Middle Ages. Baxter (1834) lists polecats, stoats and weasels under "vermin", mentioning that both weasels and polecats steal poultry etc and suggests various ways of getting rid of them. However, he does mention that the weasel "… is beneficial in some respects in destroying rats, mice, and other noxious vermin...".

Lagomorphs

Lagomorph bones are not particularly common, especially in the medieval manor period (Tables 13.1 and 13.2). Rabbit *(Oryctolagus cuniculus)* is very rare, whereas several bones of hare *(Lepus* sp) were found. Two humeri from the medieval manor and one from the medieval tenements are securely identified as 'brown hare' *(Lepus europaeus).*

Although not abundant, hare is the most common wild animal on the site, and it shows that hunting of small animals was undertaken, if on a small scale.

Beaver

A beaver *(Castor fiber)* femur was found in a 'river silt' deposit from the early-mid Saxon period. However, a radiocarbon date has demonstrated that the bone is from the late Bronze Age, 1310–920 cal BC (95% confidence; 2900+/-60BP, OxA-4740).

Historical records suggest that beaver survived in Wales as late as the end of the twelfth century AD (Corbet and Southern 1977). Beaver bones were found in an eighth-century level at Fishergate in York (O'Connor 1991) and in a ninth-century context at St Peter's Street, Northampton (Harman 1979). From historical sources we know that beavers were hunted for their pelts, and especially for their sexual glands, which were supposed to have therapeutic power (Grand and Delatouche 1950).

Other rodents

Several other rodent species were identified (Tables 13.1 and 13.2). They are all obviously under-represented because of their small size.

Water voles *(Arvicola terrestris)* are common and their presence may be associated with the wet environment. It is not impossible that they were exploited, but no cut marks were noticed.

Rats *(Rattus* sp) do not seem to have been particularly numerous, their numbers were perhaps kept in check by the cats and dogs present on the site.

Rats and mice are typical commensal species, and they may be associated with the presence of grain deposits on the site.

Insectivores

Hedgehog *(Erinaceus europaeus)* may have had some value as a source of meat, but shrew *(Sorex araneus)* and mole *(Talpa europaea)* certainly represent animals which died by chance on the site. Most of the mole bones look very white and translucent, and are therefore probably intrusive.

Birds

As at Burystead/Langham Road, Raunds (Davis 1992b and Davis 2009), birds are not very common at West Cotton. It is difficult to compare the frequency of birds relative to mammals, since this is strongly related to the efficiency of recovery. However, it must be noted that at Launceston Castle a decline in status of the site was clearly associated with a dramatic decrease in the number of bird bones (Albarella and Davis 1994a).

Galliforms

Since no clear trace of pheasant *(Phasianus colchicus)* or guinea fowl *(Numida meleagris)* was found and despite the fact that only two bones were definitely identified as domestic fowl *(Gallus gallus),* we assume that all galliform bones belonged to domestic fowl.

Domestic fowl was slightly more common in the earlier period. All parts of the skeleton are more or less represented. In both periods, between 10% and 20% of the bones are juvenile, but this number is probably an underestimate in view of recovery, fragmentation and identification problems. Eleven tarsometatarsi from the earlier period are unspurred (ie from females) and only one has a clear spur (ie it belonged to a male); three of them have spur scars and are probably also from males or capons (West 1985). Only two tarsometatarsi come from the later period and they are both unspurred. Several bones, from both main periods, had chop and especially cut marks.

It is reasonable to suggest that domestic fowl were exploited for meat, eggs and feathers, but they were not among the chief food resources on the site.

*Goose (*Anser *sp)*

This species is almost as common as domestic fowl and also decreases in the later period (Table 13.1). Due to their rather large size they probably belonged to domestic goose. No clear bias was found in the distribution of its body parts, and fewer juvenile bones were found than for domestic fowl, a pattern known also on other sites – see for instance Exeter (Maltby 1979) and Launceston Castle (Albarella and Davis 1994a). Chop and especially cut marks were noticed on several bones.

One specimen from the earlier period and two from the later are slender and quite small, and could therefore belong to one of the wild species.

Geese are common on British medieval sites and are known, from historical sources, to have been valued for their meat. Goose fat and feathers were also exploited. Geese were sometimes kept by mills and malting houses, where they would be fed various by-products (Grand and Delatouche 1950). This is interesting given the presence of a mill and malting activities at West Cotton.

*Duck (*Anas *sp)*

Duck bones are only slightly less common than goose bones, and also tend to decrease in the later period. They probably belonged to domestic duck, again due to their rather large size. They are mostly adult. Cut marks on their bones were also noticed.

One very small duck bone from the earlier period belongs to a garganey *(Anas querquedula)* or, more probably, to a teal *(A. crecca).* A somewhat larger (but still small) bone comes from the later period and may also derive from a wild duck.

Ducks are found much more rarely than geese both in archaeological sites and in historical sources. Their meat was not very valuable and duck were sometimes considered to be dirty and unpleasant animals (Grand and Delatouche 1950). It is therefore possible that they are more closely associated with sites of low status.

*Pigeon/dove (*Columba *sp/*Streptopelia *sp)*

This taxon represents the most common bird in the later medieval period (Table 13.1). It is, however, quite common in the earlier period, and its frequency supports the identification of the circular foundation as a dovecote belonging to the twelfth-century manor. Nine of the 23 pigeon bones from the earlier period come from this building.

Approximately 75% of the later medieval pigeon bones also come from the area around the dovecote, which is thought to have survived into the earliest part of this period (AD 1250–1300; Chapman pers comm).

Almost 30% of the pigeon bones were juvenile and all parts of the skeleton were more or less equally represented. Only one bone, from the earlier period, bears cut marks.

Since the size of the domestic pigeon is very variable we could not use metric criteria to distinguish between the different species. However, the presence of the dovecote could indicate that most of the bones come from domestic animals kept on the site.

The pigeons were perhaps mainly used for their meat, and this is supported by the high number of juvenile animals. Pigeons were supposedly an important standby in medieval times during winter when fresh meat was scarce, and they also provided valuable manure (Drummond and Wilbraham 1939).

Other birds

Among other birds, several species of little economic value were found. Among these corvids are the most common (Table 13.1). Neither small, eg jackdaw *(Corvus monedula)* size, nor large corvids such as raven *(Corvus corax)* size were found, hence we assume all the specimens belong to the rook/crow *(Corvus frugilegus/corone)* group. Very few juvenile bones were found.

Whether or not they constituted part of the traditional English dish containing young rooks cannot be determined.

The presence of several birds of prey (Table 13.1) is interesting. Birds of prey are more commonly associated with castle sites, where they are known to have been used by the aristocracy for hunting. This is clearly not the case for West Cotton, where they might have been killed for amusement. The most common bird of prey is the red kite *(Milvus milvus;* several 'non countable' bones were also found) which is supposed to be a scavenger. Perhaps these birds used to be commensal too, scavenging the village refuse, and hence becoming an easy target. Baxter (1834, 627) lists kite under vermin and considers it "…an insidious thief attacking young poultry, pheasants, partridges, etc" and recommends a method for ensnaring this "…by no means common" bird.

In the late twentieth century the breeding area of the red kite was limited to central Wales (Sharrock 1976), though it was apparently more widespread in former times. [Editors note: and in the early twenty-first century has been successfully re-introduced in England and Scotland]. Red kite bones have also been found on other medieval sites in different regions, such as Fishergate, York (O'Connor 1991) and Launceston Castle, Cornwall (Albarella and Davis 1994a*)* as well as in Northampton (Bramwell 1979).

Other vertebrates

Amphibians

Large numbers of amphibian bones were found both in the hand collected assemblages and the sieved ones (Tables 13.1 and 13.2). T hey probably all belong to the frog/toad *(Anura)* group.

The presence of amphibian bones in such large quantity indicates a wet environment – hardly surprising in view of the nearby location of the river. The presence of large numbers of water voles also probably reflects the closeness of the river.

Fishes

These were kindly identified by Andrew Jones. Fish bones are uncommon in any period, which is strange given the closeness of the river. Only four fish bones were found from the hand collected assemblage and 41 from sieved samples (Tables 13.1 and 13.2). Most belong to relatively small fish, hence their scarcity in the hand collected assemblages. However, compared to the number of amphibian bones of similar small size, they still appear to have been quite uncommon. It really seems that at West Cotton people were not keen on fish and/or fishing.

Most of fish bones come from contexts within buildings. Since they are presumably better preserved in these contexts it is possible that the poor representation of fish bones can be explained, at least in part, by their poor survival in external features.

Both freshwater fishes (eel, perch and cyprinid) and sea fishes (herring and ling) were identified.

The eel *(Anguilla anguilla)* bones all belong to medium-sized individuals, 400–700mm in total length. They were probably fished in the river, following an old and still common British tradition. The early fourteenth-century *Luttrell Psalter* depicts eel traps positioned in the leat of a watermill (Backhouse 1989). This represents a scene from everyday life which could even typify West Cotton in earlier times. However, since large scale netting on the tidal reaches of the main estuaries was already practised in this period, eels may simply have been imported along with the herrings.

A perch *(Perca fluviatilis)* preopercular (from a 300–400mm long fish) and a cyprinid pharyngeal tooth plate (from a fish less than 150mm long) also testify to some interest in riverine resources.

Herrings *(Clupea harengus)* and ling *(Molva molva)* had necessarily to come from the sea, and represent the only direct evidence for a resource which does not derive from the site or its immediate catchment area. Perhaps they were brought in smoked or salted. It is interesting that not only small fish (the herrings were 250–300mm long) but also large fish (a ling cleithrum being from an individual at least one-metre long) were brought from the sea.

The site

Animals were, without doubt, extremely important at West Cotton, and served as sources of all kinds of food, such as meat, fat, milk, cheese and probably eggs. Hides, skins, dung and especially wool were certainly also very important, and no doubt animals and their products in excess of local requirements could have been sold or exchanged at market. In this way West Cotton would have been part of a wider economic system. Power from oxen and horses almost certainly aided in the preparation of the soil for crops, and in their subsequent processing.

Food production was almost entirely derived from the domestic animals. Hunting and fishing were quite clearly subsidiary activities. Despite the presence of the river, some of the fish were imported rather than fished locally.

The animal bones fail to show any real variation between different areas of the site. Most of the bones were probably not in their primary location, having been moved by dogs. However, in view of the presumed importance of dairy products and wool, areas specialising in these tasks must have been present on the site as documentary evidence indicates (Basing 1990).

The mid-thirteenth century change in the site does not seem to be reflected by any substantial change in the nature of the animal economy. Changes of course occurred between the two periods, but they seem to be a consequence of regional economic trends, rather than the transformation of West Cotton from manor to hamlet.

There is little evidence for any possible decline in status of the settlement. Pigs, known to be more common on high status sites (Grant 1988; Albarella and Davis 1994a), are slightly less frequent on the site when it became a hamlet, but this is more probably related to a general countrywide development, perhaps in some way connected with the increasing importance of wool sheep.

Birds, which may signify higher status, appear to have become less common with time at West Cotton. But the change is small and may simply reflect increasingly poor preservation. Furthermore pigeons, whose meat was much valued in the Middle Ages, actually increased in number.

We have no evidence that less meat was consumed. Non edible species, such as dogs and cats, which would have become relatively more common in times of low meat consumption, were more or less equally frequent in the two periods.

Real economic changes which occurred on the site, such as the increased importance of wool production and the possible replacement of some oxen by horses for ploughing, do not seem to bear any relation to the changes which occurred to the status of the site.

In conclusion, the development from manor to hamlet was not paralleled by any dramatic change for better or worse in the economic life of the inhabitants of West Cotton. Time passed, buildings metamorphosed, but the life of the inhabitants remained basically the same.

West Cotton in a more general context

West Cotton and Burystead/Langham Road

The most obvious sites to compare with West Cotton are Burystead and Langham Road, also rural sites, located two miles away in Raunds (Audouy and Chapman 2009). Animal bones from these two sites have been studied as a single assemblage (Davis 1992b and Davis 2009). The comparison is unfortunately somewhat handicapped as at Burystead/Langham Road the largest sample is of late Saxon date, a period for which we only have a small sample of bones at West Cotton. Moreover, no division in the medieval period was feasible at Burystead, so none of the medieval economic changes at West Cotton could be discerned at Burystead/Langham Road.

However, we can observe many similarities between these two sites, such as the extensive destruction of bones by scavengers, the prevalence of sheep in all periods, the importance of equids, and the kill-off patterns of the cattle and sheep suggesting a mixed economy.

It is also interesting that, as mentioned above, the sheep kill-off pattern in the late Saxon at Burystead resembles the earlier rather than the later period at West Cotton. This could indicate a gradual trend towards increasing wool production with time.

The late Saxon cattle from Burystead/Langham Road are comparable in size with the medieval animals from West Cotton. Thus no size change appears to have occurred in the cattle of Northamptonshire during the period late Saxon to late medieval. What is apparent, however, is a contemporary regional variation, with larger cattle in Northamptonshire, Yorkshire (O'Connor 1986) and Leicestershire (Gidney 1991a and 1991b) and smaller cattle in Cornwall (Albarella and Davis 1994a), Devon (Maltby 1979) and Northumberland (Davis 1987b). Unfortunately too few measurements of sheep were taken at Burystead/ Langham Road to enable confirmation of our suggestion derived from the West Cotton data, that sheep showed a pattern similar to that of cattle.

In brief, it seems that the two sites, West Cotton and Burystead/Langham Road, had a very similar animal economy. Minor differences, such as the much longer list of identified taxa at West Cotton, probably simply reflect the larger size of the assemblage from this site.

Villages, towns, castles

Having compared the West Cotton faunal assemblage with another local one, it can be compared with assemblages from other medieval and post-medieval villages, towns and castles countrywide. For the sake of consistency, we have had to use NISP data, which are probably poorer estimates of the actual numbers of livestock, rather than MNI.

With its relatively high percentage of sheep and low percentage of pig, the West Cotton faunal assemblage confirms our predicted village faunal composition, as the West Cotton plot sits well within the distribution of plots of other rural sites. In the medieval manor and hamlet period (1250–1450), West Cotton appears among the sites with the highest frequency of sheep. This could indicate that wool production was particularly important at West Cotton, though we have to admit that it may merely reflect better recovery of smaller (ie sheep) bones and teeth, and perhaps a combination of these two factors is the correct explanation.

The scarcity of wild-animal remains is another factor that seems to characterize rural sites and to differentiate them from castles.

Any further attempt to view West Cotton in a general rural context is handicapped by the general smallness of faunal assemblages from villages.

Medieval and post-medieval sites

The two West Cotton periods also still fit quite well in the chronological pattern, as the change in frequencies of species at West Cotton seems also to represent a countrywide phenomenon, ie the increase of sheep and decrease of pig (see also Grant 1988).

The increasing importance of equids, and a tendency to slaughter sheep at an older age and cattle at a younger age, have also been noticed on other sites, and may reflect general trends.

A new economic system

As we have seen, the transformation from manor to hamlet did not dramatically change the West Cotton economy. Nevertheless, several changes did occur which can reasonably be explained in terms of countrywide rather than local trends.

The absence of any size change of the West Cotton animals reflects the well attested stability of livestock in the Middle Ages (see Armitage 1982). A substantial size increase, apparently gradual in sheep and sudden in cattle, appears to have occurred somewhat later – during the sixteenth to seventeenth centuries (see Kerridge 1967 for the historical evidence and Albarella and Davis 1994a for the archaeological evidence). Nevertheless, we cannot assume that the absence of any size increase necessarily reflects the lack of any improvement in husbandry techniques. Thornton (1992) has demonstrated that at Rimpton manor, Somerset, improvement in livestock productivity in the thirteenth and fourteenth centuries was not manifest as animal-size increase, but as improved fertility and reduced mortality. These are extremely difficult to detect archaeologically.

However, other changes which occurred between the two medieval periods were archaeologically detectable, and we suggest that they could be linked. The increased importance of wool in the later period may to some extent have occurred at the expense of mutton production. At the same time a small decrease of pig numbers occurred, perhaps due to a decline of woodlands.

We suggest the possibility that a reduced pork supply and a non-intensive strategy of mutton production were the causes of the increased extent to which cattle became a source of meat rather than power. If correct, we would be able to understand why we find an increase in the numbers of younger cattle in the later period and we would be able to relate this altered strategy in cattle management with the increasing degree to which horses were used for power. Therefore it appears that the later period saw the introduction of a new economic system, in which wool, beef and horse-power had become more important, and mutton, pork and cattle power less important. This change was not at all revolutionary, but gradual. In general terms, however, a contemporary observer would have seen these changes, but the similarities between the two periods would have seemed greater than the differences.

Summary

Over 5,000 hand-recovered animal bones and teeth were identified and recorded from West Cotton. Like many other medieval sites most of the bones belong to cattle, sheep and pig.

Sheep were the most common taxon and their numbers increased with time, with a shift towards older sheep probably reflecting a countrywide trend towards increased

wool production, but meat and milk were also used.

Cattle were probably used mainly for traction, as well as meat and dairy products. This animal decreased in number, probably as a consequence of the increased importance of sheep, and perhaps also because some of the work oxen were replaced by horses which became slightly more frequent. The study of the kill-off pattern of cattle is handicapped by the small size of the later period sample, although it can be tentatively suggested that a higher number of juveniles were killed in the later period. This may indicate an increase of beef production and decreased use of cattle as work beasts.

Pig numbers also decreased, perhaps also due to the increased number of sheep. However, a general contraction of woodland must also be considered as a possible factor. Pigs were clearly exploited for meat and lard, as indicated by the high number of immature animals.

Equids, probably all horses of pony size, are quite common in all periods and must be added to the list of the most important animals in the economy of the site. They were clearly used for traction and, as the high number of butchered bones shows, also for feeding dogs and probably for human consumption, despite the well known taboo against horse flesh.

Other domestic animals such as dogs and cats were common, while wild mammals, in particular deer, were very rare. Among taxa of great interest is the polecat. Unfortunately we do not know whether it was the domestic form (ie ferret) or the wild animal.

Birds are not abundant, but their scarcity may to some extent be the result of recovery bias. The most common birds are domestic fowl, goose, duck and pigeon, which probably served as a subsidiary source of meat, fat, and dung as well as eggs and feathers. While a few wild geese and ducks were probably present, the pigeons, in view of the presence of a dovecote, were more probably all domestic.

Amphibians were very common, undoubtedly a reflection of the wet environment and the nearby river. However, very few fish have been found. Eels, probably fished from the river, and herring purchased at market were the most common species.

The representation of different parts of the skeleton of all species has largely been influenced by scavenger action, preservation and recovery. No bias caused by human activity can be observed, and it is therefore possible that all animals were reared, slaughtered and butchered on the site.

The bones had been severely fragmented by scavengers, which seems to characterise assemblages of animal bones from rural sites. Cut marks on horse, cat and dog bones as well as on the main food-animal bones probably reflect the importance of animal skins, and the use of cat pelts is supported by the young age at which they were killed.

No size change occurred between the two medieval periods at West Cotton, and both cattle and sheep were comparable in size to contemporary animals from Yorkshire and Leicestershire, but were larger than those animals from Cornwall and Northumberland. It is possible that this regional variation in the size of farm animals may reflect the presence of 'improved' animals in the central counties of England.

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