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CENTRE FOR ARCHAEOLOGY

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Summary

Over 5,000 hand-recovered animal bones and teeth were identified and recorded from West Cotton. The majority derive from four periods: early mediæval (1100 - 1250), mid-mediæval (1255 - 1400), late mediæval (1300 - 1450) and post-mediæval (1450 - 1800) and belonged to cattle, sheep, pig and horse, as well as a small number of other species. Some bones were also recovered by wet sieving. They and the hand-recovered bones include numerous remains of amphibia and some water voles which testify to the wetness of the environment.

Sheep were the most common taxon and their numbers increased with time at West Cotton. This increase and a shift towards older sheep culled in the mid-late mediæval probably reflect a countrywide trend towards increased wool production. Dog and cat were fairly common but wild animals such as deer were rare.

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. Several butchered horse bones testify to the consumption of horse flesh.

Both cattle and sheep were similar in size to contemporary animals from some other sites in central England but larger than these taxa from outlying regions such as Cornwall and Northumberland. This regional variation in the size of farm animals may reflect the presence of "improved" animals in the centre of the country. There is no evidence for size-change of sheep and cattle between Saxon and late mediæval times in the West Cotton area.

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INTRODUCTION

The Saxon-mediæval deserted village of West Cotton (Northamptonshire, SP 976725; fig. 1) was excavated between 1985 and 1989 by the Northamptonshire Archaeology Unit directed by Dave Windell as part of the Raunds Area project. The site is located in the Nene valley, on a slightly raised gravel peninsula at the edge of the floodplain - at 35m OD (Windell et al., 1990). It was intermittently occupied from Neolithic to post-mediæval (18th century) times.

Excavation revealed a late Saxon complex of timber buildings with an associated watermill. This complex was directly replaced in the earlier 12th century by a manor or manorial holding comprising a two-storey hall, a dovecote, a detached kitchen/bakehouse and a garderobe. Finds such as a chess piece and a silver ring indicate educated and wealthy residents. By the mid 13th century the original manorial ranges had been demolished and may have been replaced by a new manor further towards the coast. By the end of that century the entire area was given over to a series of tenements forming a hamlet with the mediæval buildings grouped around a central space. The remains of water channels, which served to fix the boundaries of the settlement, were also found. These tenements were deserted by the mid 15th century and thereafter the site was utilized as pasture closes.

Material from West Cotton derives from the following periods:

Late post-mediæval	(c. 1550-1800 AD)
Early post-mediæval	(c. 1450-1550 AD)
Late mediæval	(c. 1300-1450 AD)
Middle mediæval	(c. 1250-1400 AD)
Early mediæval	(c. 1100-1250 AD)
Late Saxon	(c. 950-1100 AD)
Early-middle Saxon	
Romano-British	

The Romano-British and Early-middle Saxon animal remains from West Cotton have not been dealt with here in detail. Their numbers are merely noted in table 1*. Only the mediæval assemblages were sufficiently large to allow a full zoo-archaeological study. As it is possible to see above, there is a substantial chronological overlap between middle and late mediæval. This arises from the process of progressive tenement desertion;

* A small number of prehistoric bones was also studied and will be dealt with elsewhere.

the middle mediæval contexts being defined as those derived from occupation, continuing in some tenements to 1400 or later, while late mediæval contexts where those related to desertion, beginning in one tenement as early as 1300. Therefore the two periods have generally been grouped together in our study as "mid-late mediæval" dated c. 1250-1450 AD. An exception is our calculation of the frequencies of species, where, in order to discern the existence of a possible chronological trend, middle and late mediæval periods are kept separate.

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

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

Late mediæval: demolition rubble and robber trench fills
Middle mediæval: occupation levels, largely yard and floor levels
Early mediæval: largely boundary ditch fills and some occupation levels.

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

- to examine what people were eating at West Cotton
- to try and ascertain what animal products besides meat were being produced, i.e., to deduce the nature of the economy and how this developed with time
- 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 and economic trends

The West Cotton animal bones will be stored at the County Archive of the Northampton Museum.

METHODS

Recovery. Most of the West Cotton animal remains were recovered by hand (table 1). However, a programme of wet and dry sieving was carried out on the site. Most of the soil samples were of 10 litres and were wet sieved through three sieves respectively 5mm, 1mm and 0.5mm mesh. The sieved samples include very small specimens, such as isolated teeth of small mammals (table 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, each of 100 litres, were also sieved. Each is from a different period: late Saxon, early mediæval and middle mediæval. Unfortunately they too produced such a small number of animal bones (7, 2 and 5 respectively) that quantitative analysis is not possible.

As table 1 shows, many small specimens, such as amphibian bones, were collected by hand, which suggests good recovery. However a bias against smaller specimens is to be expected. Indeed an under-representation of smaller anatomical elements and smaller species is quite evident.

In order to check whether recovery biasses were different in different periods we have calculated the relative frequency of isolated permanent incisors (i.e., small teeth which are easily overlooked) for the three main taxa in the two main periods (fig. 2). Although a slighter 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. 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 2) shows that more taxa than listed in table 1 were present on the site and that 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), 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.

The shape of the enamel folds (Eisenmann, 1981) was used for identifying equid teeth to species. Only molar rows and isolated teeth whose position within the jaw could be securely located were considered. All post-cranial bones were identified simply as "equid", although we noticed whether the shape of the metapodials and of the third phalanges was more "horse-like" or "ass-like".

The shape of the distal humerus was used to distinguish between brown hare and mountain hare. All other bones were merely recorded as "hare".

Small rodent (i.e., mouse size) post-cranial bones and incisors were recorded but identified as "small rodent". Any molar was used to distinguish mice from voles, whereas complete molar rows and isolated M_1s were used to distinguish house mouse from wood/yellow necked mouse and field vole from bank vole.

The closely related galliforms - domestic fowl, guinea fowl and pheasant - are difficult to distinguish. The presence of a spur on tarso-metatarsi was considered a diagnostic character of male domestic fowl/pheasant (being absent from guinea-fowl), whereas the lack of a continuous posterior keel was considered a diagnostic character for distinguishing between pheasant and domestic fowl/guinea fowl. Therefore a spurred tarso-metatarsus lacking the posterior continuous keel was securely identified as "domestic fowl". The presence or absence of an air-sac foramen on the proximal end of the femur was used to distinguish between pheasant and domestic fowl/guinea fowl. MacDonald's (1992) criteria for the scapula and carpo-metacarpus were used to distinguish domestic fowl/pheasant from guinea fowl.

All amphibian bones were identified to class level; differences in the shape of the pelvis were used to distinguish frog from toad.

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" (i.e., a predetermined set of articular ends/epiphyses and metaphyses of girdle, limb and foot bones) were recorded and used in counts. These are: scapula (glenoid articulation), distal humerus, distal radius, carpal 2-3, distal metacarpal, ischial part of the acetabulum (pelvic girdle), distal femur, distal tibia, calcaneum, astragalus, distal metatarsal, proximal end of the first phalanx, and third phalanx. In order to avoid multiple counting of very fragmented bones, at least 50% of a given part had to be present for it to be counted. Broken, and therefore single, metapodial condyles of cattle, caprines and cervids were counted as halves, as were each of the two central pig metapodials. Metapodials of carnivores and lagomorphs were counted as quarters. One skull element (the zygomatic arch) was added to the list of countable elements in Davis (1992a). The radiale was ignored.

Horncores and antlers with a complete transverse section and "non countable" elements of particular interest (e.g., belonging to rarer species, anomalous size, interesting butchery marks or abnormalities), were recorded, but not included in the counts.

For birds the following elements were always recorded: articular end of scapula, proximal coracoid, distal humerus, proximal carpometacarpus, distal femur, distal tibiotarsus, distal tarsometatarsus.

For amphibia, the following were always recorded: humerus, radius, pelvis, femur, tibia, astragalus and calcaneum. Long bones were recorded when at least one half was present, whereas pelvis was recorded when the acetabulum was present.

Because of their scarcity on the site a "diagnostic zone" system (see Watson, 1979) was not adopted for fishes, but all fragments were recorded, in order to attest at least the presence of this aquatic resource.

Total number of fragments (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.

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, whose wear stage was recordable, 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. An epiphysis was described as "fusing" once spicules of bone have formed across the epiphysial plate joining metaphysis to epiphysis and while some open areas were still visible between epiphysis and metaphysis. An epiphysis was described as "fused" when this line of fusion was closed.

Bird bones with "spongy" (i.e., incompletely ossified or growing) ends were recorded as "juvenile".

Only for pig and domestic fowl was it possible to separate sexes using morphological characters. The size and shape of pig canines (and their alveoli) were used to distinguish boars from sows, whereas the presence or absence of a spur on the tarsometatarsus was the criterion used to distinguish cocks (and capons) from hens. (We are aware that exceptions may occur, so this method may not separate all male from female domestic fowl.) As far as other species are concerned any attempt to detect the sexual composition of the population had to rely on metrical analysis.

Measurements. Measurements taken are listed in appendix 2. These in general follow von den Driesch (1976).

Cattle M_3 length and width (M_3L and M_3W) are the maximum length and width of the crown. In order to take the maximum measurement some mandibles had to be carefully prised apart in order to extract the tooth. This was done in a way that as little destruction as possible was caused, enabling subsequent gluing together of the two pieces of mandible rami. The widths of caprine teeth are also the maximum widths of the crown and, in order to take these measurements, it was also sometimes necessary to prise apart the mandibles. 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 on cattle and caprine metapodials also follow Davis (1992a).

W_{max} and W_{min} are the largest and smallest diameters at the base of horncores and antlers. L is the dorsal distance between the base and the top of the horn-core.

Gnawing and butchery. For all "countable" post-cranial bones gnawing and butchery marks were recorded. They were also recorded when present on mandibles, but not used for quantitative purposes.

Gnawing marks made by carnivores and rodents were differentiated. Signs of partial digestion (see Payne and Munson, 1985) were also recorded.

Butchery marks were described crudely as "chop", "cut" and "saw" marks. Their position was recorded only if considered particularly meaningful (e.g., cuts on the proximal or distal part of the metapodials), and not used for quantitative purposes.

PRESERVATION

Fragmentation. One outstanding characteristic of the West Cotton animal bones is the high incidence of gnawing marks. Almost all these marks were caused by carnivores, only two bones (both from the mid-late mediæval period) were gnawed by rodents. The percentage of recorded gnawed post-cranial bones is only about 15% (fig. 3), but this figure is clearly a considerable underestimate of the real frequency of gnawed bones. Indeed some of the bones were unrecordable *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 (i.e., 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 we suggest that this is 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 mediæval period, which corroborates our finding of greater scavenger activity in the later part of the Middle Ages. Only four bones from the early mediæval period were "digested".

However, a major cause of fragmentation was clearly human activity, many of the bones being chopped or cut (table 3), although these signs were often obliterated subsequently by dogs and taphonomic factors.

Preservation of the surface. While fragmentation was high, the preservation of the bone surface was generally quite good, although only very 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 in this good state.

Time variation. In order to check whether there were differences in the preservation patterns between the two main periods (early mediæval and mid-late mediæval) some factors which should be indicative of the level of fragmentation were compared (fig. 3).

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 the fragmentation is higher in the mid-late mediæval 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 early mediæval bones are largely derived from boundary ditche fills, the mid-late mediæval bones are mainly from occupation levels. 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 (fig. 3). 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, became archaeologically invisible. This is also confirmed by the generally higher percentage of gnawed bones for the larger species (table 3). This is an unrealistic figure because dogs tend to prefer smaller bones which can easily enter into 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, forthcoming).

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 mid-late mediæval 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 early mediæval 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 small sample of bones coming from the buildings and their yards.

FREQUENCY OF SPECIES

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

The relative frequencies of the main taxa were compared using both estimates of NISP and MNI (tables 4 and 5; figs. 4 and 5). We have little doubt that the MNI gives a more realistic figure. 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 represent the most common taxon in all periods, although 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 common 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 mediæval period, equids were the most common taxon (Davis, 1992b). Grant (1988) suggests that, although exceptions exist, a high percentage of equid bones may be related to the presence of light soils where the 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.

The relative frequency of the main species did not remain constant with time (tables 4 and 5; figs. 4 and 5). Although the two later mediæval 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 early mediæval and middle mediæval times (χ^2=6.7, with less than a 1% probability that the difference is due to chance), and that no difference exists between middle and late mediæval times (χ^2=1.3, which means that there is a c. 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 mid to late mediæval. The χ^2 test failed to show any significant difference when applied to MNI, probably a consequence of the reduced sample size.

It is interesting to notice that the increase in caprines seems even more striking in the post-mediæval assemblage (table 4), when, despite its small size, the assemblage is largely dominated by this taxon.

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 mediæval England, and b) the increasing use of horses for traction. The most important local change between early and mid-late mediæval times 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.

In different areas. In order to check possible lateral variation, different areas had to be considered in different periods, because of the massive change in the topography of the site between early and mid-late mediæval times.

For the early mediæval period the frequency of the main taxa from the system of ditches and enclosures and from the buildings and their yards were compared (table 6). 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, the other is the small size of the sample from the buildings, which makes comparison between the two assemblages rather difficult.

For the mid-late mediæval period, the assemblages deriving from the different tenements were compared (table 7). Apart from minor differences, the four assemblages appear to have a similar composition. What is interesting is that the increase in caprines is confirmed for each single tenement, which supports our finding of a gradual increase of caprines over the site as a whole.

CATTLE

Body parts. The distribution of different parts of the skeleton of cattle in the two main periods is shown in table 8. Differences in the frequency of different elements are probably due to recovery and preservation biasses. 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 periods, apart from a slightly more marked scarcity of post-cranial bones in mid-late mediæval times, 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. The wear stages of individual teeth are given in table 9, while the age profiles, calculated using mandibular age stages of O'Connor (1988), are shown in table 10 and fig. 6. The complete list of mandibles which could be assigned to age stage is in appendix 1.

In both periods most of the animals were killed when adult or older, although some younger specimens are also present (figs. 6 and 7).

This kill-off pattern is quite typical of mediæval 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, while milk and meat were generally only secondary products (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, for ploughing and probably for milk, and 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 fig 6. However, it is possible that the most fragile juvenile mandibles were more easily fragmented, and some of the isolated teeth consequently overlooked. When loose teeth are also considered (table 9 and fig. 7), we can see that a number of deciduous premolars, some relatively unworn, were 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 (O'Connor, 1993), seems to demonstrate. At Sandal Castle (Griffith et al., 1983) and Launceston Castle (Albarella and Davis, forthcoming), no change was noticed within mediæval times, but an increase of calves was quite obvious by the 16th century.

The apparently higher number of juvenile cattle at West Cotton in the mid-late mediæval period (table 10 and fig. 6) is significant when a χ^2 is applied, although the Kolmogorov-Smirnov test failed to show any significance (table 11). The inconsistency between the two tests is probably due to the small size of the later mediæval sample. 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 (fig. 7) only a very slight change between the two periods becomes apparent. Therefore we suggest tentatively at this stage that an increase in beef production occurred in the later period at West Cotton.

The fusion data are given in table 12. These 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 any significance, both because of the small size of the sample in the later period and because of the difference in preservation pattern between the two periods (see above).

Size. Individual measurements of cattle teeth and bones are listed in appendix 2, while a summary of the variability of the most common measurements is given in table 13.

In figures 8 and 9 the width of the lower third molar tooth and the width of the distal astragalus are compared between the two periods at West Cotton and between this site and cattle measurements from Burystead/Langham Road (Northamptonshire, Late Saxon; Davis, 1992b), Launceston Castle (Cornwall, middle mediæval, Late mediæval and Early Post mediæval; Albarella and Davis, forthcoming), Leicester The Shires (Mid-Late Mediæval; Gidney, 1991a and 1991b), York Coppergate (Early Mediæval; O'Connor 1986). The two plots give consistent results as follows:

- No size change occurred at West Cotton during the Middle Ages (confirmed by a statistics test; table 14)
- 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 mediæval periods at Launceston Castle. The difference between the West Cotton and the Launceston animals is highly significant (table 14).

Furthermore the astragalus plot shows that:

- There is no size difference between the Early Mediæval 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 14).

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

It must also be noted that the small size of the Launceston animals is similar to that of the contemporary sites of Exeter in Devon and Prudhoe Castle in Northumberland (Albarella and Davis, forthcoming). It is thus tempting to suggest that the animals from the heart of the country (i.e., 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 the sex ratio.

A traditional method is to consider the relative measurements of metacarpals, which tend to be short and slender in cows, short and wide in bulls and long and slender in oxen (see for instance Higham, 1968). In fig. 10 we have plotted the ratio of minimum shaft width to length against the ratio of maximum distal width to length, in order to produce a diagram which is *shape* dependent and *size* independent. No separation of groups can be observed. Note also (table 13) that despite their presumed high sexual dimorphism the coefficients of variation of these indexes are not particularly 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 (cows, or more probably, cows 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).

Table 13 gives the coefficient of variation for the different measurements. It is interesting to notice that tooth and length measurements, which are probably less sex dependent, show smaller variability. The relatively high coefficient of variation of most of the other measurements suggests that other sexes besides females were probably present.

Shape and breed. Figure 10 shows that there is a fairly good correlation between the two metacarpal indexes. This is consistent with the possible presence of more sexes, though it may also indicate the presence of a single cattle type at West Cotton (see Albarella and Davis, forthcoming).

When the shape of the metatarsals is taken into account other interesting results can be detected. The West Cotton metatarsals are compared with those from mediæval and post-mediæval levels at Launceston Castle in figure 11. Note that not only in terms of their size, but also in their shape characteristics, the West Cotton cattle appear to be more like the post-mediæval than the mediæval Launceston cattle.

The evidence for shape as well as size, seems therefore to show that a different and perhaps more "improved" cattle type was present at West Cotton.

Abnormalities. The West Cotton cattle seemed to be in reasonable health: pathological conditions were uncommon.

The absence or reduction of the third pillar (hypoconulid) on the M_3 may be an inherited character. The frequency of this anomaly was calculated for the cattle third molars at West Cotton. 5 out of 58 in the early mediæval (i.e., 9%) and 2 out of 40 in the mid-late mediæval (i.e., 5%) of the M_3s had a reduced or absent hypoconulids.

Asymmetry of the distal metatarsals, a condition characterized by the excessive medial growth of the medial condyle relative to the lateral one, has been noticed only in very few cases.

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 (table 3) and the fragmentation of many of the others is probably also due to human activity.

Cut marks, especially those observed on the astragalus, were almost as frequent as chopping marks (tables 3 and 15). Most are probably connected with the severing of tendons. Two metapodials were smashed and burnt near the mid-shaft, which suggests extraction of marrow. A tibia from the mid-late mediæval period 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; table 16) almost certainly attest to skinning. In mediæval times, hides were a secondary, but important, product of the cattle carcass (Grand and Delatouche, 1950). One chopped horn-core 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 - whether locally or for sale at market is, unfortunately unknown.

CAPRINES

Identification. All the countable bones that we identified to species level proved to belong to sheep (table 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 horn-core of goat was present in the early-mid Saxon period and one proximal radius identified as "possible goat" was found in a post-mediæval level.

The scarcity of goat is a general phenomenon in mediæval England. At Burystead/Langham Road no trace of goat was found (Davis, 1992b). 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 these Northamptonshire sites is not surprising.

Since goat was so rare, or even absent, from mediæval West Cotton, in 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. The former is true especially in the earlier period and the latter is true especially in the later period (table 17).

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.

The wear stages of individual teeth are given in table 18, while the age profile, as calculated by mandibular age stages (Payne, 1973), is shown in table 10 and fig. 12. The complete list of mandibles which could be assigned age stages is in appendix 1.

As can be seen in figs. 12 and 7 and table 10, the kill-off pattern of sheep at West Cotton varies between the two mediæval 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 mediæval (table 11). In the early mediæval period more sheep were slaughtered in wear stages C and D (c. 6 months - 2 years old) whereas, in the mid-late mediæval period more were slaughtered in wear stage F (c. 3-4 years old). This result is confirmed by considering loose teeth and teeth in mandibles together (table 19): in the early mediæval 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 was 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 somewhat more important. This does not mean that the economy shifted to specialized wool production, but merely that in late mediæval times a high 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 Muffet (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 decreased production of mutton being compensated by an increase of beef from cattle slaughtered at a younger age.

In fig. 12 the age profiles of the West Cotton sheep are compared with those from Launceston and Burystead/Langham Road. It is interesting that the early mediæval West Cotton (with its emphasis on meat) is similar to the late Saxon at Burystead, while the late mediæval West Cotton (with its emphasis on wool) is more similar to the late mediæval at Launceston. 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, 1982) and Barnard Castle (Jones et al., 1985). There is also historical evidence that, from the beginning of the 13th 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; Trow-Smith, 1957).

The bone fusion data (table 20) 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 an even greater area of land was used for sheep pasturage in the mid-late mediæval 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. Individual measurements of caprine teeth and bones are listed in appendix 2, while a summary of the variability of the most common measurements is given in table 21.

An attempt to metrically distinguish between first and second molars was undertaken by measuring the maximum width of the crown. This failed due to the large amount of overlap between these two teeth sizes as the absence of any bimodality in the curve of the $M_{1/2}$ widths clearly shows (fig. 13).

In the same diagram it is possible to observe that, as with cattle, no size change occurred between the two mediæval periods. This result is confirmed by the plot of the width of the distal tibia (fig.14; and see table 14 for the statistical test).

Comparison of the sheep size at different sites gives roughly the same results as for cattle: the West Cotton animals are definitely larger than the mediæval 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, 1991a and 1991b; fig. 14 and table 14). Other sites in the west country, namely Exeter (Maltby, 1979) and Okehampton Castle (Maltby, 1982), like Launceston, had sheep smaller than 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 (1982).

Sex. Although no morphological criteria could be used to distinguish the sexes in sheep, the plot of size of a very sexually dimorphic element, such as the horn-core, was of interest in this respect (fig. 15). It is important to remember that this diagram does not indicate the sex ratio due to the different degree of preservation of male versus female horn cores. Ram horncores are especially robust while those of ewes are gracile. Moreover, ewes are often hornless: one polled skull from the post-mediæval level was found (Plate 1a). Therefore an under-representation of ewes is to be expected.

Two groups can be seen in fig. 15, 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 in figure 15 belong to females and 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 for forty ewes, a proportion considered ideal in mediæval times (Thornton, 1992). In case the large hornocores 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.

Abnormalities. Apart for some traumatic injuries, very few pathologies were observed on the sheep remains from West Cotton. One horn-core from the early mediæval period and another from the post-mediæval (both of small size) carried depressions similar to "thumb prints", a condition which is considered to be due to environmental/metabolic stress (Albarella, in prep.).

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 (table 3). Clearly bones of this animal are derived from food refuse.

Only one horn-core, a probable ram or wether from the early mediæval period, was definitely chopped at the base (Plate 1b). 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

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 (table 22). 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 Albarella and Davis, forthcoming).

Skull fragments are also very infrequent (table 22), which supports our suggestion that the difference is due to taphonomic factors rather than a preference in antiquity for heads.

Age. The wear stages of individual teeth are given in table 23, while the age profiles, calculated by mandibular age stages (O'Connor, 1988), are shown in table 10 and figure 16. The complete list of mandibles which could be assigned to age stages is in appendix 1.

Despite the small sample size, especially in the later period, the ages of pig slaughter appear to have remained the same in both early and mid-late mediæval periods at West Cotton. In both periods the age curve is dominated by immature and sub-adult animals (fig. 16), 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 (fig. 7) is probably a consequence of 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, forthcoming).

Size. Individual measurements of pig teeth and bones are listed in appendix 2, while a summary of the variability of the most common tooth measurements is given in table 24.

Plots of the widths of the first and second molar (fig. 17) show that no size change occurred at West Cotton between the early and mid-late Middle Ages. Note also the absence of any overlap between the measurements of the two teeth. On this basis isolated molars initially identified as $M_{1/2}$ could be confidently identified as first or second molar.

The clear metrical distinction between the two teeth can be taken as indirect evidence for low variability of the West Cotton pigs. This is also confirmed by the generally rather low coefficient of variation of the

measurements (table 24) and probably attests to the presence of a single domestic population.

In figure 18 more tooth measurements are compared with a "standard" value calculated from the Neolithic pig sample from Durrington Walls (Albarella and Payne, forthcoming). 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. The absence of any change between the two periods at West Cotton is confirmed and an interesting difference in the proportion of the mediæval measurements, relative to the neolithic ones, can be noticed: in both periods at West Cotton, relative tooth size decreases towards the back of the jaw. Whether this is due to genetic or nutritional factors remains an open question. It will be interesting to explore this further.

Unlike cattle and sheep, no size variation was noticed between the West Cotton and the Launceston pigs (table 14). It seems that in mediæval England, pig-size was fairly uniform (at least as far as the teeth are concerned).

Sex. In table 25 the number of females and males, as identified from canine shape and size, is shown.

When 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.

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.

Abnormalities. No abnormalities or pathologies which could be of archaeological interest were noticed in the pig population.

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 (table 3), which indicate that pig bones too represent butchery and kitchen waste.

Some pig bones, such as metapodials, seem to have been regularly worked (see Hylton and Chapman, forthcoming).

EQUIDS

Identification. 29 specimens of equid (mandibles or loose teeth) were definitely identified as horse. Seven come from early mediæval, 20 from mid-late mediæval and 2 from post-mediæval levels. Despite frequent references to donkeys in early English books on agriculture, no trace of this animal could be found at West Cotton. It is interesting to quote Loudon (1844) who, in his section on the history of English agriculture from the time of Henry VIII to 1688 states (p. 40) 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 "equids" 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 slightly better represented than teeth (table 26). We think that 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 a different mode of disposal was adopted for equid carcasses/bones.

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 (fig. 7) and on the fusion of limb-bone epiphyses (table 27). Both methods indicate (tenuously for the few teeth found) an age increase in the later mediæval period.

As far as the fusion of the epiphyses are concerned it is possible that the poorer preservation in the later period has biassed 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 (i.e., fewer deaths of foals), or simply b) instead of breeding horses themselves, the inhabitants of West Cotton, in the later mediæval period, preferred to buy horses elsewhere.

Size. Individual measurements of equid teeth and bones are listed in appendix 2, while a summary of the variability of the most common measurements is given in table 28.

Withers heights (fig. 19) were calculated using the factors in Vitt (1952). Converting the measurements to hands, all equids (including a few Saxon and post-mediæval specimens) derived from ponies, rather than horses (i.e., shorter than 14 hands 2 inches). However it must be remembered that we cannot rule out the possible presence of donkey.

Figure 19 shows that there is no apparent change in the heights of the animals between the two periods. The astragalus measurements (fig. 20) also show that, apart from two larger late Saxon specimens, the size of the equids from Burystead/Langham Road (Davis, 1992b) and West Cotton were similar. A plot (fig. 21) of measurements of the first phalanx shows a possible decrease in size between the two mediæval periods occurred. However, there are too few phalanges to be able to come to a definite conclusion (table 14).

Butchery. Table 3 shows that 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 truly "butchery" marks as they can be related to the severing of tendons, in equids most of the cut marks are probably a consequence of skinning (table 15; Plate 1c). The skinning of equid hides seems to have become particularly common in the mid-late mediæval period. The use of equid hides is well known from mediæval times (Grand and Delatouche, 1950; Langdon, 1989), but we are not aware of any other mediæval site in which such a high number of skinning marks has been found.

A high number of butchery marks, chop as well as cut marks, was also found on the West Cotton equid bones (table 3; Plates 1d and 2a). Many of the "non-countable" elements were also butchered. In the early mediæval 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-mediæval.

Butchered equid bones are often found on mediæval archaeological sites, and also on some rural sites, such as Gorhambury (Locker, 1990) and Langham Road (Davis, 1992b) (see Albarella and Davis, forthcoming 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.

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 indeed 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 the 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 early mediæval equid tibia was smashed and burnt near its mid-shaft, probably in order to extract the marrow (Plate 2b; A similar pattern of butchery was also noticed on two cattle metapodials; Plate 2c). Was this marrow really used to feed the dogs?

An equid metatarsal with some anomalous cut marks was found in a late Mediæval layer (Plate 2d).

Abnormalities. Two equid metatarsals (one from early mediæval and another from mid-late mediæval) had strong exostoses near their proximal ends, and another three (two from mid-late mediæval and one from post-mediæval) were affected by "spavin", a condition characterized by the fusion of tarsal bones to the proximal end of the metatarsal. Several causes of this condition have been suggested, including hereditary factors and working stress (Baker and Brothwell, 1980). It seems that this condition does not seriously impede the animal's ability to work, (Baker and Brothwell, 1980).

OTHER MAMMALS

Deer. All three European species of deer are present (table 1), but in very small quantity. This is typical of both rural and urban sites (Albarella and Davis, forthcoming) and is not surprising since deer hunting was a privilege strictly restricted to the aristocracy (Clutton-Brock, 1984; Grant, 1988).

A small number of red deer and roe deer bones from both early and mid-late mediæval times are clearly butchery/food refuse, indicating that occasionally the prohibition on deer-hunting was ignored. A red deer chopped metatarsal from the

Saxon period should be added to this list, but it comes from the "river silts" and may therefore represent a residual specimen from prehistoric times (see table 1). Fallow deer is only represented, in late mediæval times, 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 (Plate 3a). One deer bone (probably the shaft of a metatarsal) was also used for making a pipe or flute (Lawson, in prep.).

Canids. Dog bones are quite common (table 1), although this animal is rather more conspicuous by its destructive influence upon the bones in general. Few measurements could be taken (appendix 2), though most of the dogs seem to have been of ordinary size, and very small and very large specimens are missing. Two almost complete skulls were found, one from late Saxon and another from early mediæval times (Plate 3b). 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 mediæval skull (Plate 3c). There can be little doubt that these are a consequence of 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 mid-late mediæval period have clear cut marks on the anterior-buccal side (Plate 3d).

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

Since most of the dog bones were not butchered (table 3), 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 (Plate 4a). Gnawing marks were also uncommon (table 3) and in general bones were less fragmented than those of food animals.

Only one definite fox bone (a metatarsal) was found (table 1). This animal was probably occasionally hunted for its fur.

Cat. Cat bones were found in all periods, and are especially common in the early Middle Ages (table 1).

Most of the cats were not only small but also gracile (see measurements in appendix 2). A plot of the M_1 measurements (fig. 22) shows that they were definitely smaller than the specimens from Launceston Castle (Albarella and Davis, forthcoming). Post-cranial bones plot in the very low part of the size range of Irish mediæval cats (McCormick, 1988).

A fairly large number of bones were unfused, i.e., from young cats, a pattern also found at Exeter (Maltby, 1979) and in a few urban mediæval 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 (table 29 and fig. 23). High numbers of juvenile cat bones were also found at Lincoln (O'Connor, 1982) and at King's Lynn (Noddle, 1977).

McCormick (1988) interprets the difference in the age pattern between early Christian and mediæval sites in Ireland as a consequence of a different use of the animals. He suggests that whereas in pre-mediæval times cats were kept mainly as pets, in mediæval 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 16). Two mandibles from early mediæval, one mandible from mid-late mediæval (Plate 4b) and two distal humeri from early mediæval have clear cut marks, presumably caused by skinning.

Despite the common interpretation of cats kept for their pelts, there is little direct evidence from mediæval 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 (Plate 4c) and post-cranial bones, of polecats were found in early, middle, and post-mediæval contexts (table 1). They come from different part 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 (i.e., domestic polecat) bones.

No cut or chop marks were found on any of the polecat bones. Nevertheless the possibility that we are dealing with wild animals caught for their pelts has to be considered a possibility. (This despite their disagreeable smell). 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. This animal is known to have lived in Britain at least from the 13th century, when it was reared mainly for catching rabbits (Owen, 1969). Consequently the scarcity of rabbits at West Cotton (table 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 14th century pit at the Castle of Laarne in East Flanders. They made their identification on the basis of skull shape. They also 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 bones were found (table 1 and 2) as were bones from a mustelid intermediate in size between the weasels and stoats 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 (p. 626) 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 early mediæval period (table 1 and 2). Rabbit is very rare, whereas several bones of hare were found. Two humeri from early mediæval and one from mid-late mediæval are securely identified as "brown hare".

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 femur was found in a "river silt" deposit supposedly from the early-mid Saxon period. However, a radiocarbon date has demonstrated that the bone is from the late Bronze Age (2900 $\pm$ 60 uncalibrated radiocarbon years BP; Oxford Radiocarbon Accelerator no. 4740).

It must be mentioned here that an aurochs mandible was found in a redeposited "river silt" context. There is little doubt that this specimen too derives from prehistoric levels.

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 8th century level at Fishergate in York (O'Connor, 1991) and in a ninth century context at St Peter's Street in 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 (table 1 and 2). They are all obviously under-represented because of their small size.

Water voles 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 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 may have had some value as a source of meat, but shrew and mole 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 (Davis, 1992b) 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 the 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, forthcoming).

Galliforms. Since no clear trace of pheasant or guinea fowl was found and despite the fact that only two bones were definitely identified as domestic fowl, we assume that all galliform bones belonged to domestic fowl.

Domestic fowl was slightly more common in the early mediæval period. All anatomical elements 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. 11 tarsometatarsi from the early mediæval period are unspurred (i.e., females) and only one has a clear spur (i.e., it is a male); three of them have spur scars and are probably also from males or capons (West, 1985). Only two tarsometatarsi come from the mid-late mediæval 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. This species is almost as common as domestic fowl and also decreases in the later period (table 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, forthcoming). Chop and especially cut marks were noticed on several bones.

One specimen from early mediæval and two from mid-late mediæval are slender and quite small, and could therefore belong to one of the wild species.

Geese are common on British mediæval sites and are known, from historical sources, to have been valued for their meat. Goose fat and feathers were also exploited. In view of the presence of a mill and malting activities (Windell et al., 1990) at West Cotton, it is interesting that geese were sometimes kept by mills and malting houses, where by-products were fed to the geese (Grand and Delatouche, 1950).

Duck. 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 an early mediæval context belongs to a garganey or, more probably, to a teal. A somewhat larger (but still small) bone comes from the mid-late mediæval 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 considered very valuable and duck were sometimes considered 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. This species represents the most common bird in the mid-late mediæval period (table 1). It is, however, quite common also in the previous period, and its frequency supports the identification of the "circular foundation," part of the 12th century manor, as really a dovecote (see Windell et al., 1990). Nine of the 23 pigeon bones from the early mediæval come from this building.

Approximately 75% of the mid-late mediæval pigeon bones also come from the area around the dovecote, which is thought to have survived into the earliest part of this period (1250-1300 AD; 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 early-mid mediæval 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, (and in spite of the circularity of our suggestion) the presence of the dovecote, could indicate 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 an important standby in mediæval 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 1). Neither small (e.g., jackdaw size) nor large corvids (raven size) were found, hence we assume all remaining specimens belong to the rook/crow group.

The traditional English dish containing young rooks notwithstanding, we are unsure whether the West Cotton rooks were eaten; very few juvenile bones were found.

The presence of several birds of prey (table 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 (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.

Today in Britain, the breeding area of the red kite is limited to the central part of Wales (Sharrock, 1976), though it was apparently more widespread in former times. Red kite bones have also been found on other mediæval sites in different regions, such as Fishergate in York (O'Connor, 1991) and Launceston Castle in Cornwall (Albarella and Davis, forthcoming) 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 1 and 2). They probably all belong to the frog/toad group (i.e., *Anura*) and that tailed amphibians (i.e., *Urodela*), such as newts, are missing. However these newts are very small and could well have been overlooked.

Identification to genus level, undertaken on the pelvis alone, indicates that both frogs and toads were present in roughly equal numbers (table 1). Although toads tend to be less aquatic than frogs, a large overlap occurs between the habitats of the two taxa, especially during the reproduction season (Barry Clarke, pers. comm.).

The presence of amphibian bones in such large quantity indicates a wet environment, which is hardly surprising in view of the nearby location of the river. The presence of large numbers of water voles may well also be associated with the closeness of the river.

Fishes (identification by Andrew Jones). Fish bones are uncommon in any period, strange in view of the closeness of the river. Only four fish bones were found from the hand collected assemblage and 41 from sieved samples (tables 1 and 2). Most of them 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 for the 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 bones all belong to medium sized individuals, 40-70 cm in total length. They were probably fished in the river, following an old and still common British tradition. The early 14th 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 (Chapman, pers. comm.).

A perch preopercular (from a 30-40 cm long fish) and a cyprinid pharyngeal tooth plate (from a fish less than 15 cm long) also testify to some interest in riverine resources.

Herrings and ling had necessarily to come from the sea, and represent the only direct evidence of 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 fishes (herrings were 25-30 cm long) but also large fishes (a ling cleithrum being from an individual at least 1 metre long) were brought from the sea.

THE SITE

Animals were, no 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/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 change 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 specialised in these tasks must have been present on the site as documentary evidence indicates (Basing, 1990).

The mid-13th 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 from manor to hamlet.

There is little evidence of any possible decline in status of the settlement. Pigs, known to be more common on high status sites (Grant, 1988; Albarella and Davis, forthcoming), are slightly less frequent on the site when it became a hamlet, but this is more probably related to a much more general countrywide development (see Grant, 1988; Albarella and Davis, forthcoming), 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 peasants 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. Animal bones from these two sites have been studied as a single assemblage (Davis, 1992b). 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 mediæval period was feasible at Burystead, so none of the mediæval 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 age patterns of cattle and sheep suggesting a mixed economy.

It is also interesting that, as mentioned above (fig. 12), the sheep kill-off pattern in the late Saxon at Burystead resembles the early rather than the late mediæval 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 mediæval animals from West Cotton (fig. 13 and 14). Thus no size change has occurred in the cattle of Northamptonshire during the period late Saxon - late mediæval. 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, forthcoming), 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, figure 24 compares it with assemblages from other mediæval and post-mediæval villages, towns and castles countrywide. For the sake of consistency, we have had to use NISP data, probably a poorer estimate of the actual numbers of livestock, rather than MNI. (For a complete list of these sites see table 30).

With its relatively high percentage of sheep and low percentage of pig, the West Cotton faunal assemblage confirms our predicted village faunal composition - the West Cotton plot sits well within the distribution of plots of other rural sites. It must be noticed that, in mid-late mediæval times, West Cotton is among the sites with the highest frequency of sheep. This could indicate that at West Cotton the wool production was particularly important, though we have to admit that it may merely reflect better recovery of smaller (i.e., sheep) bones and teeth. (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.

Early, mid, late and post-mediæval sites. Fig 25 separates sites by "period" rather than "type". The two West Cotton periods still fit quite well in the relative chronological period patterns. Although there are several exceptions. The frequencies of species at West Cotton seems also to represent a countrywide phenomenon: i.e., the increase of sheep and decrease of pig (see also Grant, 1988).

The increasing importance of equids, a tendency to slaughter sheep at an older age and cattle at a younger age have also been noticed on other sites, and may also 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 16th-17th centuries (see Kerridge, 1967 for the historical evidence and Albarella and Davis, forthcoming for the archaeological evidence). Nevertheless we cannot assume that the absence of 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 13th and 14th century was not manifest as animal-size increase, but as improved fertility and reduced mortality. These are factors which would be extremely difficult to detect archaeologically.

However, other changes which occurred between the early and the late mediæval periods were archaeologically detectable, and we suggest that they could be linked. The increased importance of wool in the mid-late mediæval 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 mutton and pork supply was a cause 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 mid-late mediæval 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 mid-late mediæval periods 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 rather very 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.

Archaeological and historical evidence suggest that changes in the rural economy were probably countrywide. We therefore suspect that the changed aspect of the site played only a minor role.

CONCLUSIONS AND SUMMARY

Like many other mediæval sites most of the bones found at West Cotton belong to cattle, sheep and pig. Equids, although slightly less frequent, must be added to the list of the most important animals in the economy of the site.

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 (i.e., 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, while very few fish have been found. Eels fished from the river and herring purchased at market were both present.

The bones were severely fragmented as a result of the action of scavengers. The level of destruction seems to have been worse in the mid-late mediæval period.

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.

Whereas goat seems completely absent from the mediæval periods, sheep represents the most common taxon, and its frequency even increased in the mid-late mediæval period. Sheep were probably kept mainly for the production of wool, but meat and milk were also used. The increased number of adult animals in the later period can be related to the increasing importance of the wool production, which may also explain the increased number of sheep relative to other species.

Cattle were probably used mainly for traction, as well as meat and dairy products. This animal decreased in number in the course of the Middle Ages, probably as a consequence of the increased importance of sheep, and perhaps also because some of the work oxen were replaced by horses. This animal became slightly more frequent in the mid-late mediæval period. Our study of the kill-off pattern of cattle is handicapped by the small size of the mid-late mediæval sample, however we can tentatively suggest that a higher number of juveniles were killed in the late period. This may indicate an increase of beef production and decreased use of cattle as work beasts.

Pig numbers also decreased in the mid-late mediæval period - perhaps also a consequence of 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 - are quite common in all periods. They were clearly used for traction and, as the high number of butchered bones show, also for feeding dogs. Perhaps occasionally horse meat was eaten by people too - despite the well known taboo against horse flesh.

Clear cut marks on cattle, equid, dog and cat bones almost certainly reflect considerable interest on the part of the inhabitants of West Cotton in the use of these animals for their skins. The use of cat pelts is also supported by the young age at which they were killed.

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. No size change occurred between the two mediæval periods at West Cotton. As far as cattle is concerned their size was similar to cattle from the nearby Northamptonshire site of Burystead/Langham Road. It is possible that large, and therefore perhaps "improved" cattle and sheep were kept in mediæval Northamptonshire.

The changes in the patterns of exploitation of animal resources which occurred between the two main mediæval periods, namely the increased importance of wool and horse power, are more probably related to countrywide trends which have been documented in both historical and archaeological sources, although the transformation of the site from manor to hamlet may also have played a role.

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PERIOD	Roman	Bronze Age/ Saxon[1]	Late Saxon	Early Mediæval		Mid Mediæval		Late Mediæval		Early Post Mediæval		Late Post Mediæval
	n	n	n	n	%	n	%	n	%	n	%	n
Cattle	5	21	46	760	**35**	290.5	**21**	116	**14**	56	**11**	11
Sheep/Goat	-	9	31	531	**24**	499.5	**36**	325.5	**39**	309	**58**	75
(Sheep	-	5	4	121		82		51		66		14)
(?Sheep	-	-	-	6		1		2		3		-)
(Goat	-	+	-	-		-		-		-		-)
(?Goat	-	-	-	-		-		-		+		-)
Pig	-	4	28	318	**15**	174	**12**	56	**7**	35	**7**	3
Equid	-	5	11.5	176.5	**8**	159.5	**11**	101	**12**	64	**12**	7
Red deer	-	1	-	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	1	52	**2**	17	**1**	11	**1**	2	**<0.5**	-
Polecat/Ferret	-	-	-	6	**<0.5**	3	**<0.5**	-	-	1	**<0.5**	1
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	-	1	-	-	-	-	-	-	-	-	-	-
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	-	1	-	-	-	-	-	-	-	-	-	-
?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	-	1	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	-	2	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**	-		-		-
Perch	-	-	-	1	**<0.5**	-		-		-		-
Ling	-	-	-	-		-		1	**<0.5**	-		-
Total	5	46	142.5	2178		1399		835.5		533		112

Table 1

Numbers of mammal, bird and amphibian bones (NISP) in all levels at West Cotton (sieved samples are not included). Sheep/Goat also includes the specimens identified to species and Amphibian also includes specimens identified to genus. Cases where only "non-countable" bones were present are denoted by a "+". Percentages are given only for periods with larger samples. Pig metapodials and ruminant half distal metapodials have been divided by two, while carnivore and lagomorph metapodials have been divided by four. Due to the difficulty in distinguishing between upper and lower incisors, all equid incisors have been recorded and then divided by two.

[1] Approximately 50% of the bones in this level, including goat, red deer and beaver, come from the "river silts". This deposit was supposed to be Saxon, but has not been directly dated, due to the absence of pottery. Since it is contiguous with the prehistoric level, some residual prehistoric material was expected. A radiocarbon date carried out on the beaver bone has indeed given a late prehistoric date of 2900 ± 60 uncalibrated radiocarbon years BP.

PERIOD	Late Saxon	Early Mediæval	Mid Mediæval	Late Mediæval	Late Post Mediæval
	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	-	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	-	-
Total	20	191	99	6	5

Table 2

Number of mammal, bird and amphibian bones (NISP) from **sieved samples** at West Cotton (water sieving, 0.5mm mesh). Amphibian also includes the specimens identified to genus. Cases where only "non-countable" bones were present are denoted by a "+". Most of the bones are from 10 litre samples; bones from "whole earth" samples (100 litres) are specified in brackets.

	EARLY MEDIÆVAL								MID-LATE MEDIÆVAL							
	Chopping		Cuts		Total butchery		Gnawing		Chopping		Cuts		Total butchery		Gnawing	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Cattle	85	**16**	56	**11**	137	**26**	130	**25**	29	**16**	25	**13**	51	**27**	57	**30**
Sheep	49	**19**	16	**6**	59	**23**	34	**13**	36	**14**	11	**4**	43	**17**	51	**20**
Pig	8	**11**	6	**8**	11	**15**	18	**24**	3	**7**	2	**5**	5	**11**	12	**27**
Equid	9	**8**	9	**8**	18	**15**	26	**22**	25	**21**	23	**15**	45	**30**	48	**32**
Dog	-	**0**	-	**0**	-	**0**	-	**0**	-	**0**	-	**0**	-	**0**	1	**4**
Total	151	**15**	87	**9**	225	**22**	208	**21**	93	**14**	61	**9**	144	**22**	169	**26**

Table 3

Percentages of **butchered and gnawed postcranial bones** at West Cotton. Total butchery includes chop and cut marks (its value is higher than the total of chopping and cuts because some bones were chopped *and* cut). Gnawing includes digested bones and bones gnawed by carnivores or rodents. The percentage is calculated from the total number of postcranial bones in that period.

PERIOD	Early Mediæval		Mid Mediæval		Late Mediæval		Early Post Mediæval	
	n	%	n	%	n	%	n	%
Cattle	760	**43**	290.5	**26**	116	**19**	56	**12**
Sheep/Goat	531	**30**	499.5	**44**	325.5	**54**	309	**67**
Pig	318	**18**	174	**15**	56	**9**	35	**8**
Equid	176.5	**10**	159.5	**14**	101	**17**	64	**14**
Total	1785.5		1123.5		598.5		464	

Table 4

Relative frequencies of the four main species (NISP) in the main levels at West Cotton (unsieved collection).

PERIOD	Early Mediæval		Mid Mediæval		Late Mediæval	
	MNI	%	MNI	%	MNI	%
Cattle	37 ($M_{1/2}$)	**26**	20 ($M_{1/2}$)	**20**	7 (M_3)	**13**
Sheep/Goat	69 ($M_{1/2}$)	**48**	63 ($M_{1/2}$)	**62**	37 ($M_{1/2}$)	**66**
Pig	31 (CAN)	**22**	12 (CAN)	**12**	7 (CAN)	**13**
Equid	7 (PE,TI)	**5**	7 (TI)	**7**	5 (MT)	**9**
Total	144		102		56	

Table 5

Minimum numbers of individuals (MNI) of the four main species in the main levels at West Cotton (unsieved collection). Those parts of the skeleton which indicated the highest MNI are given in parentheses.
CAN=canine, PE=pelvis, TI=tibia, MT=metatarsal.

	Ditches & Enclosures								Buildings & their yards	
	Southern holding		Northern holding		Eastern enclosures		Total			
	n	%	n	%	n	%	n	%	n	%
Cattle	47	45	212	48	39	40	298	**46**	73	**41**
Sheep	41	39	91	21	23	23	155	**24**	51	**29**
Pig	9	9	85	19	14	14	108	**17**	48	**27**
Equid	7	7	52	12	22	22	81	**13**	5	**3**
Total	104		440		98		642		177	

Table 6

West Cotton. **Early Mediæval. Lateral variation** in the frequency of the main species (NISP).

	Tenement A						Tenement B						Tenement C/D						Tenement E					
	M.Med.		L.Med.		Tot.		M.Med.		L.Med.		Tot.		M.Med.		L.Med.		Tot.		M.Med.		L.Med.		Tot.	
	n	%	n	%	n	**%**	n	%	n	%	n	%	n	%	n	%	n	**%**	n	%	n	%	n	**%**
Cattle	42	26	26	18	68	**22**	70	26	29	21	99	**24**	10	12	11	19	21	**15**	97	26	37	20	134	**24**
Sheep	81	50	89	61	170	**55**	124	45	67	48	191	**46**	36	42	31	53	67	**47**	161	44	92	49	253	**46**
Pig	18	11	9	6	27	**9**	47	17	14	10	61	**15**	18	21	7	12	25	**17**	62	17	23	12	85	**15**
Equid	20	12	22	15	42	**14**	32	12	31	22	63	**15**	22	26	9	16	31	**22**	48	33	36	19	84	**15**
Total	161		146		307		273		141		414		86		58		144		368		188		556	

Table 7

West Cotton. **Lateral variation in the mid-late mediæval period**. Frequencies of the main taxa (NISP) in the different tenements (which include the buildings and their yards)

	Early Mediæval			Mid-Late Mediæval		
	NISP	MNI	%	NISP	MNI	%
INCISORS	47	6	**16**	44	6	**24**
DECIDUOUS + PERMANENT PREMOLARS	160	27	**73**	108	18	**72**
$M_{1/2}$	147	37	**100**	100	25	**100**
M_3	58	29	**78**	40	20	**80**
CRANIUM	15	8	**22**	5	3	**12**
SCAPULA	37	19	**51**	18	9	**36**
HUMERUS	25	13	**35**	3	2	**8**
RADIUS	35	18	**49**	6	3	**12**
METACARPAL	36.5	20	**54**	17.5	10	**40**
PELVIS	59	30	**81**	12	6	**24**
FEMUR	14	7	**19**	1	1	**4**
TIBIA	54	27	**73**	12	6	**24**
ASTRAGALUS	45	23	**62**	36	18	**72**
CALCANEUM	51	26	**70**	25	13	**52**
METATARSAL	32.5	18	**49**	8	5	**20**
PHALANX 1	72	9	**24**	28	4	**16**
PHALANX 3	15	2	**5**	5	1	**4**
TOTAL	903			468.5		

Table 8

West Cotton. **Parts of the cattle skeleton** by number of fragments (NISP) and minimum number of individuals (MNI). Unfused epiphyses are not counted.
Each individual tooth within mandibles has been counted, hence the total is greater than the total NISP (table 1).
The MNI has been calculated as follows:
Incisors and phalanges have been divided by 8, deciduous + permanent premolars by 6, $M_{1/2}$ by 4, all other elements, except metapodials, by 2.
Metacarpal = (MC1 + MC2/2 + MP1/2 + MP2/4) / 2.
Metatarsal = (MT1 + MT2/2 + MP1/2 + MP2/4) / 2.
Where:

MC1 = complete distal metacarpal.
MC2 = half distal metacarpal.
MT1 = complete distal metatarsal.
MT2 = half distal metatarsal.
MP1 = complete distal metapodial.
MP2 = half distal metapodial.

% = frequency of an element expressed in relation to the most common one (by MNI).

		C	V	E	H	a	b	c	d	e	f	g	h	j	k	l	m	n	o	p
dP_4	Mid-Late Mediæval									2	2	1	1	9	2	1	1			
	Early Mediæval	1								2	4	1	1	11	4	1	1	1		
P_4	Mid-Late Mediæval						1	1		1	4	6				1				
	Early Mediæval					4	2	1	1	3	11	10		2						
M_1	Mid-Late Mediæval							2	1		4	3		2	4	2	3			
	Early Mediæval		1		1	1	3	1		2	2	6		3	8	15	7			
M_2	Mid-Late Mediæval		1	1			3	1			1		1	2	4	3	1			
	Early Mediæval	1	2	1	2		2					9	1	4	20	6				
$M_{1/2}$	Mid-Late Mediæval					3	5	1	1	2	1	9	1	3	22	8	4			
	Early Mediæval					8	1	1			3	5	2	5	17	4	2			
M_3	Mid-Late Mediæval	1				1	2	1	2		1	6		10	4	2	3			1
	Early Mediæval			2		1	3	5	2	1	2	17		10	9	4				

Table 9

West Cotton. **Cattle wear stages of individual teeth** (following Grant 1982). Both teeth in mandibles and isolated teeth are included. Grant's stage "U" is considered equivalent to stage "a". Unworn isolated teeth which could have been in one of the eruption stages (C,V,E,H) are coded as "a".

Cattle	Mandibular wear stage										
	J		I		S		A		E		Tot
	n	%	n	%	n	%	n	%	n	%	n
Mid-Late Mediæval	-	**0**	5	**22**	4	**17**	8	**35**	6	**26**	23
Early Mediæval	3	**5**	10	**17**	4.5	**8**	18.5	**31**	24	**40**	60

Sheep1	Mandibular wear stage																		
	A		B		C		D		E		F		G		H		I		Tot
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n
Mid-Late Mediæval	-	**0**	1	**1**	7.5	**8**	11.5	**12**	13.3	**13**	37.8	**38**	19.2	**19**	6.8	**7**	1.8	**2**	99
Early Mediæval	-	**0**	1	**1**	13.5	**14**	23.5	**24**	12.5	**13**	17.5	**18**	19	**19**	10.5	**11**	1.5	**2**	99

Sheep2	Mandibular wear stage																		
	A		B		C		D		E		F		G		H		I		Tot
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n
Mid-Late Mediæval	-	**0**	1	**1**	7.5	**9**	9.5	**12**	11.3	**14**	33.3	**42**	11.7	**15**	3.8	**5**	1.8	**2**	80
Early Mediæval	-	**0**	1	**1**	13.5	**17**	19.5	**25**	11.5	**15**	13	**16**	11.5	**15**	7.5	**9**	1.5	**2**	79

Pig	Mandibular wear stage										
	J		I		S		A		E		Tot
	n	%	n	%	n	%	n	%	n	%	n
Mid-Late Mediæval	-	**0**	5	**36**	7	**50**	2	**14**	-	**0**	14
Early Mediæval	3	**8**	13	**33**	18	**45**	6	**15**	-	**0**	40

Table 10

Mandibular wear stages for cattle, sheep and pig. See appendix 1 for complete list of individual mandibles and for definition of the stages. For cattle, sheep1 and pig only mandibles with two or more teeth (with recordable wear stage) in the dP_4/P_4 - M_3 row are considered; for sheep2 only mandibles with two or more teeth (with recordable wear stage) in the dP_4/P_4 - M_3 row, one of the which had to be dP_4/P_4, were considered. Mandibular wear stages for cattle and pig follow O'Connor (1988), and for sheep follow Payne (1973).
Cattle & Pig: J=juvenile I=immature S=subadult A=adult E=elderly.
Sheep: A=0-2m B=2-6m C=6-12m D=1-2y E=2-3y F=3-4y G=4-6y H=6-8y I=8-10y. m=months y=years.

Taxon	Periods compared	Test	Value	Probability (x)
Cattle	Mid-Late Med. - Early Med.	KS	1.30	50% < x < 75%
Cattle	Mid-Late Med. - Early Med.	χ^2	7.43	0.5% < x < 1% **
Sheep	Mid-Late Med. - Early Med.	KS	6.53	2.5% < x < 5% *
Sheep	Mid-Late Med. - Early Med.	χ^2	10.74	< 0.5% **

Table 11

West Cotton. **Significance of the differences between sheep and cattle kill-off patterns in different periods**. The Kolmogorov-Smirnov test (Siegel 1956) and χ^2 test (Spiegel 1961) compare the age profiles as calculated by the mandibular wear stage distribution (fig. 12).

Probability = probability that the difference between the two groups is due to chance

** = the difference is highly significant (with less than a 1% probability that it is due to chance)

* = the difference is significant (less than 5% probability that the difference is due to chance)

no asterisk = no significant difference (more than a 5% probability that it is due to chance)

	Early Mediæval				Mid-Late Mediæval			
	Fused		Unfused		Fused		Unfused	
Element	n	%	n	%	n	%	n	%
Scapula d	18	**100**	-	**0**	8		1	
Humerus d	25	**100**	-	**0**	3		-	
Radius d	21	**60**	14	**40**	3		3	
Metacarpal d	32	**86**	5	**14**	16	**84**	3	**16**
Pelvis a	35	**100**	-	**0**	9		-	
Femur d	7	**50**	7	**50**	-		1	
Tibia d	42	**78**	12	**22**	10	**83**	2	**17**
Calcaneum	4	**31**	9	**69**	-		5	
Metatarsal d	24	**71**	10	**29**	5		3	
Phalanx 1 p	68	**96**	3	**4**	23	**85**	4	**15**

Table 12

West Cotton. **Cattle, fusion data**. Fused and fusing epiphyses are amalgamated. Only unfused diaphyses, not epiphyses, are counted. Percentages calculated only for samples with a minimum of 10 specimens. a=acetabulum, p=proximal, d=distal.

MID-LATE MEDIÆVAL

Measurement	Mean	V	Min.	Max.	N
M_3 L	356	5.8	315	390	25
M_3 WA	153	8.8	131	168	33
Metacarpal BatF	512	8.2	450	573	11
Metacarpal Bd	560	7.3	476	606	10
Metacarpal a	276	9.2	226	318	10
Astragalus GLl	612	5.3	537	684	29
Astragalus Bd	390	6.8	332	442	28
Astragalus Dl	335	6.4	294	382	27

EARLY MEDIÆVAL

Measurement	Mean	V	Min.	Max.	N
M_3 L	356	5.9	309	385	17
M_3 WA	155	6.4	138	175	22
Scapula SLC	458	19.6	313	675	15
Humerus BT	628	7.2	566	730	12
Humerus HTC	291	9.6	247	364	23
Metacarpal GL	1829	5.0	1605	1938	24
Metacarpal SD	293	10.3	221	339	27
Metacarpal Bd	555	10.5	448	663	26
Metacarpal BatF	503	9.2	394	595	23
Metacarpal Dd	295	7.9	247	343	18
Metacarpal a	273	9.9	227	324	22
Metacarpal b	265	9.9	223	310	22
Metacarpal 1	227	9.8	193	267	27
Metacarpal 4	212	10.7	179	248	25
Pelvi LA	604	6.1	505	658	22
Tibia Bd	563	8.2	465	655	35
Astragalus GLl	599	4.8	530	654	34
Astragalus Bd	380	6.6	335	443	30
Astragalus Dl	329	4.9	297	362	30
Metatarsal GL	2079	3.8	1930	2218	15
Metatarsal SD	227	6.5	201	261	17
Metatarsal Bd	495	7.5	426	567	16
Metatarsal BatF	452	8.4	381	522	16
Metatarsal Dd	286	5.3	260	315	14
Metatarsal a	237	8.4	204	279	15
Metatarsal b	225	7.3	198	256	15
Metatarsal 1	212	7.2	191	248	17
Metatarsal 4	200	6.8	176	233	18

Table 13

West Cotton: means, coefficients of variation (V), ranges and sample sizes for the **cattle measurements**. Fusing bones are included, unfused ones are not. A few measurements are approximated. All the measurements are in tenths of millimetres. Only samples of at least 10 measurements are given.

Taxon	Measurement	Groups compared	Probability
Cattle	Astragalus Bd	LAU Late Med. - WC MidLate Med.	0.000 **
Cattle	Astragalus Bd	WC MidLate Med. - LEI MidLate Med.	0.009 **
Cattle	Astragalus Bd	WC MidLate Med. - LAU Mid Med.	0.000 **
Cattle	Astragalus Bd	WC MidLate Med. - WC Early Med.	0.166
Cattle	Astragalus Bd	LAU Mid Med. - WC Early Med.	0.000 **
Cattle	Astragalus Bd	WC Early Med. - YORK Early Med.	0.069
Sheep	Tibia Bd	LAU Late Med. - WC MidLate Med.	0.000 **
Sheep	Tibia Bd	WC MidLate Med. - LEI MidLate Med.	0.395
Sheep	Tibia Bd	WC MidLate Med. - LAU Mid Med.	0.000 **
Sheep	Tibia Bd	WC MidLate Med. - WC Early Med.	0.979
Sheep	Tibia Bd	LAU Mid Med. - WC Early Med.	0.000 **
Sheep	Tibia Bd	WC Early Med. - YORK Early Med.	0.266
Pig	M1WA	LAU Late Med. - WC MidLate Med.	0.900
Pig	M1WA	WC MidLate Med. - LAU Mid Med.	0.400
Pig	M1WA	WC MidLate Med. - WC Early Med.	0.892
Pig	M1WA	LAU Mid Med. - WC Early Med.	0.510
Equid	Phalanx 1 GL	WC MidLate Med. - WC Early Med.	0.060

Table 14

West Cotton (WC), Launceston Castle (LAU), Leicester, The Shires (LEI) (Gidney 1991a & 1991b) and York, Coppergate (YORK) (O'Connor 1986). **Significance of the size differences** between different periods and different sites as indicated by a **t-test**.
** = the difference is highly significant (with less than a 1% probability that it is due to chance)
no asterisk = no significant difference (more than a 5% probability that it is due to chance)

	Early Mediæval				Mid-Late Mediæval			
	Cattle		Equid		Cattle		Equid	
	n	%	n	%	n	%	n	%
Scapula	-	**0**	-		-	**0**	1	**8**
Humerus	4	**15**	-		2		-	**0**
Radius	2	**5**	1	**8**	-		-	
Pelvis	2	**3**	1	**8**	2	**17**	2	**18**
Femur	-	**0**	-		-		-	
Tibia	4	**7**	1	**8**	-	**0**	2	**12**
Astragalus	12	**27**	-		12	**33**	1	**8**
Calcaneum	5	**10**	-		2	**8**	-	
Metapodials	11	**16**	1	**4**	4	**16**	6	**22**
Phalanx 1	12	**17**	5	**26**	3	**10**	11	**37**

Table 15

West Cotton. Numbers of **cut marks** recorded on body parts of cattle and equid. Percentages are given only for samples larger than 10. Whereas cut marks on bones such as humerus, astragalus and calcaneum are generally produced while severing tendons, cut marks on phalanges, and probably metapodials too, are more probably due to skinning.

	Late Saxon	Early Mediæval	Mid-Late Mediæval	Post Mediæval	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

Table 16

West Cotton. Number of **cut marks** interpreted as due to **skinning**. These are cut marks on cranial extremities, such as nasal bones and anterior part of the mandible, and foot extremities, such as metapodials and phalanges.

	Early Mediæval			Mid-Late Mediæval		
	NISP	MNI	%	NISP	MNI	%
INCISORS	23	3	**4**	85	11	**11**
DECIDUOUS + PERMANENT PREMOLARS	211	36	**52**	238	40	**40**
$M_{1/2}$	273	69	**100**	400	100	**100**
M_3	85	43	**62**	155	78	**78**
CRANIUM	5	3	**4**	5	3	**3**
SCAPULA	17	9	**13**	25	13	**13**
HUMERUS	29	15	**22**	30	15	**15**
RADIUS	25	13	**19**	15	8	**8**
METACARPAL	20	10	**14**	14.5	8	**8**
PELVIS	35	18	**26**	23	12	**12**
FEMUR	10	5	**7**	10	5	**5**
TIBIA	48	24	**35**	49	25	**25**
ASTRAGALUS	5	3	**4**	16	8	**8**
CALCANEUM	12	6	**9**	13	7	**7**
METATARSAL	19.5	10	**14**	14	8	**8**
PHALANX 1	22	3	**4**	30	4	**4**
PHALANX 3	3	1	**1**	1	1	**1**
TOTAL	842.5			1123.5		

Table 17

West Cotton. **Parts of sheep skeleton** by number of fragments (NISP) and minimum number of individuals (MNI). Unfused epiphyses are not counted.
Each individual tooth within mandibles has been counted, hence the total is greater than the total NISP in table 1.
The MNI has been calculated as follows:
Incisors and phalanges have been divided by 8, deciduous + permanent premolars by 6, $M_{1/2}$ by 4, all other elements, but metapodials, by 2.
Metacarpal = (MC1 + MC2/2 + MP1/2 + MP2/4) / 2.
Metatarsal = (MT1 + MT2/2 + MP1/2 + MP2/4) / 2.
Where:

MC1 = complete distal metacarpal.
MC2 = half distal metacarpal.
MT1 = complete distal metatarsal.
MT2 = half distal metatarsal.
MP1 = complete distal metapodial.
MP2 = half distal metapodial.

% = frequency of an element expressed in relation to the most common one (by MNI).

		C	V	E	H	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	21	22	23
dP_4	Mid-Late Mediæval																		3	13		12	2	2			2	
	Early Mediæval												1						6	12		6	4	1	2	2	3	4
P_4	Mid-Late Mediæval		1	2		4	1	1			1	2	3	9	28	1	9	18		2	3							
	Early Mediæval	1	3	2		3							1	8	12		8	9		6	1							
M_1	Mid-Late Mediæval				1							4	2	4	40	6	8	8	2	4	9							
	Early Mediæval				1			2	1		3	3	3	9	36	6	2	7		2	17							
M_2	Mid-Late Mediæval	1	1	1				1			1	2	6	9	51	6		3			1							
	Early Mediæval	2		3	1			6			1	1	6	7	41	7	3	2			1							
$M_{1/2}$	Mid-Late Mediæval				1	2		6	2	1	5	9	27	20	124	2	6	3		1	1							
	Early Mediæval					1		5		1	4	7	11	6	50	2	6	2		1								
M_3	Mid-Late Mediæval			1		3		5	1	4	8	4	6	18	24	16	59	1		1								
	Early Mediæval		2	1		1	3	4		4	6	4	3	9	7	5	32	1										

Table 18

West Cotton. **Sheep** wear stages of individual teeth (following Payne 1973 & 1987). Both teeth in mandibles and isolated teeth are included. Unworn isolated teeth which could have been in one of the eruption stages (C,V,E,H) are coded as "0".

Mid-Late Mediæval

Age ranges	Tooth	Wear stage	% killed within age range	cumulative % killed	Age
0-2 years	36 dP_4		30%	30%	c.2 years
> 2 years	85 P_4		70%		
2-3 years	10 M_3	2-4	5%	35%	c.3 years
3-5 years	76 M_3	5-10	36%	71%	c.5 years
6-10 years	59 M_3	11G	28%	99%	c.10 years
> 10 years	2 M_3	>11G	1%	100%	

Early Mediæval

Age ranges	Tooth	Wear stage	% killed within age range	cumulative % killed	Age
0-2 years	42 dP_4		44%	44%	c.2 years
> 2 years	54 P_4		56%		
2-3 years	8 M_3	2-4	6%	50%	c.3 years
3-5 years	34 M_3	5-10	25%	75%	c.5 years
6-10 years	32 M_3	11G	24%	99%	c.10 years
> 10 years	1 M_3	>11G	1%	100%	

Table 19

West Cotton. **Sheep, kill off pattern deduced from both single teeth (dP_4/P_4 and M_3) and teeth (dP_4/P_4 and M_3) in mandibles**, using the system suggested by Payne (1988). Unworn P_4s are included and wear stages are as in Payne (1973).

	Early Mediæval				Mid-Late Mediæval			
	Fused		Unfused		Fused		Unfused	
Element	n	%	n	%	n	%	n	%
Scapula d	11	**92**	1	**8**	15	**94**	1	**6**
Humerus d	27	**93**	2	**7**	29	**97**	1	**3**
Radius d	7	**28**	18	**72**	2	**13**	13	**87**
Metacarpal d	8	**38**	13	**62**	7	**44**	9	**56**
Pelvis a	24	**100**	-	**0**	18	**100**	-	**0**
Femur d	3	**30**	7	**70**	5	**50**	5	**50**
Tibia d	38	**79**	10	**21**	40	**83**	8	**17**
Calcaneum	4	**36**	7	**64**	5	**50**	5	**50**
Metatarsal d	8	**40**	12	**60**	9	**64**	5	**36**
Phalanx 1 p	17	**77**	5	**23**	28	**93**	2	**7**

Table 20

West Cotton. **Sheep, fusion data**. Fused and fusing epiphyses are amalgamated. Only unfused diaphyses, not epiphyses, are counted. a=acetabulum, p=proximal, d=distal.

MID-LATE MEDIÆVAL

Measurement	Mean	V	Min.	Max.	N
dP_4 W	65	5.1	56	71	30
M_1 W	73	6.1	62	82	83
M_2 W	81	5.4	69	89	80
M_3 W	83	4.4	74	91	148
$M_{1/2}$ W	77	6.9	62	90	193
Scapula SLC	174	8.3	141	196	17
Humerus BT	268	7.6	223	309	22
Humerus HTC	134	8.0	116	161	23
Tibia Bd	250	6.0	218	279	35
Astragalus GLl	268	3.4	253	280	10
Astragalus Bd	173	5.0	158	185	11
Astragalus Dl	148	3.5	141	157	10

EARLY MEDIÆVAL

Measurement	Mean	V	Min.	Max.	N
dP_4 W	64	3.5	59	69	30
M_1 W	72	5.0	65	79	80
M_2 W	80	4.5	67	88	74
M_3 W	83	4.9	70	91	72
$M_{1/2}$ W	77	6.0	65	87	84
Horncore W_{max}	356	34.6	248	605	12
Horncore W_{min}	241	33.5	165	392	12
Scapula SLC	176	7.2	157	192	13
Humerus BT	273	5.6	255	307	15
Humerus HTC	136	5.4	122	153	21
Pelvis LA	269	5.4	247	296	18
Tibia Bd	249	4.4	229	273	34

Table 21

West Cotton: means, coefficients of variation (V), ranges and sample sizes for the **sheep measurements**. Fusing bones are included, unfused ones are not. A few measurements are approximated. All the measurements are in tenths of millimetres. Only samples of at least 10 measurements are given.

	Early Mediæval			Mid-Late Mediæval		
	NISP	MNI	%	NISP	MNI	%
INCISORS	92	16	**52**	56	10	**53**
CANINE	61	31	**100**	38	19	**100**
DECIDUOUS + PERMANENT PREMOLARS	108	18	**58**	44	8	**42**
$M_{1/2}$	76	19	**61**	48	12	**63**
M_3	28	14	**45**	15	8	**42**
CRANIUM	4	2	**6**	-	-	**-**
SCAPULA	10	5	**16**	8	4	**21**
HUMERUS	7	4	**13**	3	2	**11**
RADIUS	-	-	**-**	2	1	**5**
METACARPAL	4.5	2	**6**	5	2	**11**
PELVIS	7	4	**13**	3	2	**11**
FEMUR	1	1	**3**	-	-	**-**
TIBIA	9	5	**16**	3	2	**11**
ASTRAGALUS	1	1	**3**	1	1	**5**
CALCANEUM	5	3	**10**	5	3	**16**
METATARSAL	4.5	2	**6**	2.5	1	**5**
PHALANX 1	9	2	**6**	3	1	**5**
PHALANX 3	-	-	**-**	-	-	**-**
TOTAL	427			236.5		

Table 22

West Cotton. **Parts of the pig skeleton** by number of fragments (NISP) and minimum number of individuals (MNI). Unfused epiphyses are not counted.
Each individual tooth within mandibles has been counted, hence the total is greater than the total NISP in table 1.
The MNI has been calculated as follows:
Phalanges have been divided by 8, deciduous + permanent premolars and incisors by 6, $M_{1/2}$ by 4, all other elements, except metapodials, by 2.
Metacarpal = (MC/2 + MP/4) / 2.
Metatarsal = (MT/2 + MP/4) / 2.
Where:

MC = metacarpal.
MT = metatarsal.
MP = metapodial.

% = frequency of an element expressed in relation to the most common one (by MNI).

		C	V	E	H	a	b	c	d	e	f	g	h	j	k	l	m
dP_4	Mid-Late Mediæval									1		1		1			
	Early Mediæval							1	2	2	1	3		1	1		
P_4	Mid-Late Mediæval		1	1		5	4		1		1						
	Early Mediæval	2	1			10	9	2	4	2	2	2	1				
M_1	Mid-Late Mediæval	1				1	2		2	5	3	2	7	2		1	
	Early Mediæval	2			1	2	2	1	7	4	3	2	6	2	1	1	4
M_2	Mid-Late Mediæval					9	3	2	3	2		1	1				
	Early Mediæval		1	1	2	10	1	7	2	6	3	2	3				1
M_3	Mid-Late Mediæval			2	1	5	3	3	1								
	Early Mediæval	2		2	2	10	3	5	2		2						

Table 23

West Cotton. **Pig wear stages of individual teeth** (following Grant 1982). Both teeth in mandibles and isolated teeth are included. Since it was possible to distinguish them on the basis of the different size (see fig   ), isolated M_1s and M_2s have also been included. Grant's stage "U" is considered equivalent to stage "a". Unworn isolated teeth which could have been in one of the eruption stages (C,V,E,H) are coded as "a".

MID-LATE MEDIÆVAL

Measurement	Mean	V	Min.	Max.	N
M_1L	165	6.0	147	182	21
M_1WA	100	5.0	92	110	24
M_1WP	105	5.0	97	116	19
M_2L	205	4.2	189	224	21
M_2WA	126	5.2	117	144	22
M_2WP	128	5.3	119	144	21
M_3WA	141	5.7	125	152	10

EARLY MEDIÆVAL

Measurement	Mean	V	Min.	Max.	N
dP_4L	189	2.7	177	196	10
dP_4W	87	3.6	81	93	11
M_1L	166	6.6	143	188	29
M_1WA	100	5.9	90	111	27
M_1WP	106	6.4	94	118	28
M_2L	202	6.4	172	224	33
M_2WA	124	4.8	114	134	30
M_2WP	126	5.7	117	137	31
M_3L	303	9.2	255	341	20
M_3WA	141	5.7	127	161	25
M_3WC	138	4.2	125	146	22

Table 24

West Cotton: means, coefficients of variation (V), ranges and sample sizes for the **pig measurements**. A few measurements are approximated. All the measurements are in tenths of millimetres. Only samples of at least 10 specimens are given. Isolated M_1s and M_2s, identified on the basis of different size (see fig. 17), are included.

Period	Females	Males
Mid-Late Mediæval	14 (2)	24 (1)
Early Mediæval	21 (10)	40 (5)
Total	35 (12)	64 (6)

Table 25

West Cotton. **Pig sex ratio**. Both isolated canines and mandibles with canines are included. The numbers of canines in mandibles are given in parenthesis.

	Early Mediæval			Mid-Late Mediæval		
	NISP	MNI	%	NISP	MNI	%
INCISORS	25	3	**43**	27	3	**38**
PREMOLARS + MOLARS	51	5	**71**	81	7	**88**
CRANIUM	-	-	-	-	-	-
SCAPULA	8	4	**57**	13	7	**88**
HUMERUS	8	4	**57**	13	7	**88**
RADIUS	12	6	**86**	9	5	**63**
METACARPAL	11	6	**86**	10	6	**75**
PELVIS	13	7	**100**	11	6	**75**
FEMUR	6	3	**43**	3	2	**20**
TIBIA	13	7	**100**	17	8	**100**
ASTRAGALUS	8	4	**57**	13	7	**88**
CALCANEUM	4	2	**29**	9	5	**63**
METATARSAL	9	5	**71**	13	7	**88**
PHALANX 1	19	5	**71**	30	8	**100**
PHALANX 3	3	1	**14**	5	2	**20**
TOTAL	190			254		

Table 26

West Cotton. **Parts of the equid skeleton** by number of fragments (NISP) and minimum number of individuals (MNI). Unfused epiphyses are not counted.
Each individual tooth within mandibles has been counted, hence the total is greater than the total NISP in table 1.
The MNI has been calculated as follows:
Incisors (upper and lower) and premolars + molars have been divided by 12, phalanges by 4, all other elements, except metapodials, by 2.
Metacarpal = (MC + MP/2) / 2.
Metatarsal = (MT + MP/2) / 2.
Where:

MC = metacarpal.
MT = metatarsal.
MP = metapodial.

% = frequency of an element expressed in relation to the most common one (by MNI).

	Early Mediæval				Mid-Late Mediæval			
	Fused		Unfused		Fused		Unfused	
Element	n	%	n	%	n	%	n	%
Scapula d	5		-		9		-	
Humerus d	7		1		12	**100**	-	**0**
Radius d	10	**83**	2	**17**	9		-	
Metacarpal d	7	**64**	4	**36**	10	**100**	-	**0**
Pelvis a	7		-		7		-	
Femur d	5		1		3		-	
Tibia d	9	**69**	4	**31**	17	**100**	-	**0**
Calcaneum	1		-		-		-	
Metatarsal d	9		-		13	**100**	-	**0**
Phalanx 1 p	16	**89**	2	**11**	29	**100**	-	**0**

Table 27

West Cotton. **Equid, fusion data**. Fused and fusing epiphyses are amalgamated. Only unfused diaphyses, not epiphyses, are counted. Percentages are given for samples with a minimum of 10 specimens. a=acetabulum, p=proximal, d=distal.

MID-LATE MEDIÆVAL

Measurement	**Mean**	**V**	**Min.**	**Max.**	**N**
Humerus HTC	342	5.6	302	366	10
Metacarpal Bd	462	7.4	431	543	10
Tibia Bd	664	6.4	593	721	14
Astragalus GH	524	7.2	465	575	11
Astragalus GB	556	7.0	485	599	11
Astragalus BFd	483	7.3	416	530	12
Astragalus LmT	534	7.4	466	573	11
Metatarsal Bd	458	4.7	412	485	11
Phalanx 1 GL	765	4.2	702	842	20
Phalanx 1 SD	306	5.9	277	349	25
Phalanx 1 Bd	398	5.4	361	451	20
Phalanx 1 Dd	228	6.0	209	262	18

EARLY MEDIÆVAL

Measurement	**Mean**	**V**	**Min.**	**Max.**	**N**
Phalanx 1 GL	799	8.2	688	889	14
Phalanx 1 SD	318	9.7	276	372	15
Phalanx 1 Bd	414	7.3	376	456	12
Phalanx 1 Dd	239	6.0	223	268	11

Table 28

West Cotton: means, coefficients of variation (V), ranges and sample sizes for the **equid measurements**. Fusing bones are included, unfused ones are not. A few measurements are approximated. All the measurements are in tenths of millimetres. Only samples of at least 10 measurements are given.

	Early Mediæval		Mid-Late Mediæval	
	Fused	Unfused	Fused	Unfused
Humerus d	10	2	4	-
Femur d	4	5	1[2]	3
Tibia d	3	4	2	-
Metapodial d	7[1]	9	4	1

[1] 3 are "fusing"
[2] This specimen is "fusing"

Table 29

West Cotton. **Cat, fusion data**. Only unfused diaphyses, not epiphyses, are counted. d=distal.

SITE	TYPE	PERIOD	PUBPER	N.BOS	N.OVIS	N.SUS	%BOS	%OVIS	%SUS	REFERENCE
ABINGDON, STERT STREET	U	LM	XV-XVI	21	48	14	25	58	17	Wilson 1979
ABINGDON, STERT STREET	U	MM	XIII-XIV	229	453	127	28	56	16	"
ABINGDON,WEST ST.HELEN STREET	U	MM	lateXIII-earlyXV	62	79	12	41	52	8	Wilson 1975
ABINGDON,WEST ST.HELEN STREET	U	EM+MM	XII-XIII	38	41	7	44	48	8	"
AILESBURY	U	MM	2-3 (XIII-XIV)	488	396	170	46	38	16	Jones G. 1983
BANBURY CASTLE	C	PM	XVII-XVIII	47	22	3	65	31	4	Wilson 1976
BANBURY CASTLE	C	EM+MM	XIII-XIV	48	67	42	31	43	27	"
BARNARD CASTLE	C	PM	10 (XVII onwards)	521	430	279	42	35	23	Jones R. et al. 1985a
BARNARD CASTLE	C	LM	8 (XV-XVI)	130	150	93	35	40	25	"
BARNARD CASTLE	C	MM	5 (XIII)	959	302	2108	28	9	63	"
BATH	U	M	X-XIII	581	767	219	37	49	14	Grant 1979
BEVERLEY, 33-35 EASTGATE	U	MM	6-12 (XIII-XIV)	3029	4558	808	36	54	10	Scott 1992
BEVERLEY, 33-35 EASTGATE	U	EM	3-5 (XI-XII)	2706	3499	622	40	51	9	"
BEVERLEY. LURK LANE	U	PM	9 (XVI)	202	230	54	42	47	11	Scott 1991
BEVERLEY. LURK LANE	U	LM	8 (XV)	384	337	137	45	39	16	"
BEVERLEY. LURK LANE	U	MM	7 (XIII-XIV)	1068	1339	500	37	46	17	"
BRAMBER CASTLE	C	M		274	182	254	39	26	36	Westley 1977
BRISTOL, MARY-LE-PORT	U	M		660	571	113	49	42	8	Noddle 1985
BURYSTEAD & LANGHAM ROAD	V	M	XII-XV	181	199	79	39	43	17	Davis 1992b
CARLISLE, BLACKFRIARS STREET	U	PM	postmed.	142	86	45	52	32	16	Rackham 1990
CARLISLE, BLACKFRIARS STREET	U	M	XII-XVI	179	40	27	73	16	11	"
CASTLE LANE	V	MM	XIII	455	904	123	31	61	8	Jones R. et al. 1985b
CHEDDAR PALACE	P	MM+LM	6 (XIII-XVI)	118	141	134	30	36	34	Higgs et al. 1979
CHEDDAR PALACE	P	EM+MM	4-5 (XI-XII)	274	95	57	64	22	13	"
CHESTER, DOMINICAN FRIARY	M	MM+LM	XIII	331	217	182	45	30	25	Morris 1990
CHESTER, DOMINICAN FRIARY	M	MM	XIV-XVI	210	67	184	46	15	40	"
CHRISTCHURCH	U	PM	postmed.	73	75	25	42	43	14	Coy 1983
CHRISTCHURCH	U	M	mediev.	88	85	21	45	44	11	"
COPT HAY	V	EM+MM	3-5	98	105	124	30	32	38	Pernetta 1974
COPT HAY	V	EM	1-2	39	23	13	52	31	17	"
DROITWICH	U	LM	5ii-6 (XIII-XIV)	58	60	38	37	38	24	Locker 1992
DROITWICH	U	MM	7 (XV-XVI)	644	427	340	46	30	24	"
EARL'S BU	V	M	XI-XV	373	244	170	47	31	22	Mainland 1993
ECKWEEK	V	MM	XIII-XIV	113	333	54	23	67	11	Davis 1991a
EXETER	U	PM	Pm1-Pm4 (XVI-XVIII)	2156	2900	608	38	51	11	"
EXETER	U	LM	Md10 (XIV-XV)	112	133	37	40	47	13	"
EXETER	U	MM	Md5-Md9 (XIII-XIV)	2454	2871	913	39	46	15	Maltby 1979
FACCOMBE NETHERTON	V	LM	XIII-XIV	105	127	114	30	37	33	Sadler 1990
FACCOMBE NETHERTON	V	MM	XV and later	616	682	754	30	33	37	"
GLOUCESTER, EAST GATE	U	M		1219	942	283	50	39	12	Maltby 1983
GLOUCESTER, WEST GATE	U	M	5-7	?	?	?	27	48	25	"
GORHAMBURY	V	M		81	110	76	30	41	28	Locker 1990
GRENSTEIN	V	M	XI-XV	130	214	78	31	51	18	Ambros 1980
ILCHESTER	U	M		1483	1614	250	44	48	7	Levitan 1982
KING'S LYNN	U	PM	postmed. (XIV-XVIII)	895	513	195	56	32	12	Noddle 1977
KING'S LYNN	U	LM	3 (XIV-XV)	674	411	209	52	32	16	"
KING'S LYNN	U	MM	2 (XIII-XIV)	2493	1861	764	49	36	15	"
KIRKSTALL ABBEY	M	LM	XV-XVI	?	?	?	92	5	3	Ryder 1959
LAUNCESTON CASTLE	C	PM	9 (XVI-XVII)	577	409	156	51	36	14	Albarella & Davis, forthcoming
LAUNCESTON CASTLE	C	LM	8 (mid-late XV)	1185	854	764	42	30	27	"
LAUNCESTON CASTLE	C	MM	6 (late XIII)	397	427	463	31	33	36	"
LINCOLN, FLAXENGATE	U	LM	S6-S10 (XV-XVI)	959	970	208	45	45	10	O'Connor 1982
LINCOLN, FLAXENGATE	U	MM	S1-S5 (XIII-XIV)	919	856	177	47	44	9	"
LINCOLN, BISHOPS PALACE	P	LM	XV	65	186	7	25	72	3	Ellison 1975
LYVEDEN	V	MM+LM		253	254	126	40	40	20	Grant 1975
MIDDLETON STONEY	C	PM	7	?	?	?	31	43	27	Levitan 1984a
MIDDLETON STONEY	C	LM	6	?	?	?	26	38	37	"
MIDDLETON STONEY	C	MM	5	?	?	?	21	47	32	"
NEWCASTLE, QUEEN STREET	U	PM	6-6i (lateXVI-earlyXVII)	144	121	31	49	41	10	Allison 1988
NEWCASTLE, QUEEN STREET	U	MM+LM	5-5i (mid XIV-XV)	920	557	217	54	33	13	"
NEWCASTLE, QUEEN STREET	U	MM	1-4ii (XIII)	475	227	111	58	28	14	"
NEWCASTLE, CLOSEGATE I & II	U	PM	XVII-XVIII	44	121	8	26	70	5	Davis 1991b
NEWCASTLE, CLOSEGATE I & II	U	LM	XV-XVI	299	585	66	31	62	7	"
NEWCASTLE, CLOSEGATE I & II	U	MM	XIII-XIV	39	71	13	32	58	11	"
NORTH ELMHAM PARK	V	PM	6 (XVI-XVII)	1169	623	419	53	28	19	Noddle 1980
NORTH ELMHAM PARK	V	M	5	1025	1063	1225	31	32	37	"
NORTH ELMHAM PARK	V	EM	3-4	290	291	321	32	32	36	"
NORTH PETHERTON	V	LM	3	46	34	10	51	38	11	Adcock 1976/77
NORTHAMPTON, ST PETER'S STREET	U	PM	5 (XVI-XVII)	58	100	12	34	59	7	Harman 1979
NORTHAMPTON, ST PETER'S STREET	U	LM	4 (XV)	391	784	107	30	61	8	"
NORTHAMPTON, ST PETER'S STREET	U	EM+MM	3 (XII-XIV)	1042	2006	377	30	59	11	"

(cont..)

SITE	TYPE	PERIOD	PUBPER	N.BOS	N.OVIS	N.SUS	%BOS2	%OVIS2	%SUS2	REFERENCE
NORWICH, WHITEFRIARS	U	EM	2-3 (lateX-XII)	504	374	294	43	32	25	Cartledge 1983
OKEHAMPTON CASTLE	C	PM	postmed.	631	467	54	55	41	5	Maltby 1982
OKEHAMPTON CASTLE	C	LM	late med.	489	674	185	36	50	14	"
OKEHAMPTON CASTLE	C	MM	XIV	264	271	214	35	36	29	"
OXFORD CASTLE	C	MM+LM	XIII-midXV	68	30	28	54	24	22	Marples 1976
OXFORD, QUEEN STREET	U	MM	4a-4b (XIII)	63	69	26	40	44	16	Wilson et al. 1985
OXFORD, QUEEN STREET	U	LM	5b (XV-XVI)	19	136	32	10	73	17	"
OXFORD, THE HAMEL	U	PM	9-10 (XVI)	376	435	73	43	49	8	Wilson & Bramwell 1980
OXFORD, THE HAMEL	U	MM+LM	7-8 (lateXIII-XVI)	415	531	194	36	47	17	"
OXFORD, THE HAMEL	U	MM	4-5 (XIII-XIV)	370	577	232	31	49	20	"
OXFORD, THE HAMEL	U	EM	2-3 (XII)	257	435	141	31	52	17	"
PORTCHESTER CASTLE (INN.BAIL.)	C	PM	C (XVI-XVII)	89	88	27	44	43	13	Grant 1985
PORTCHESTER CASTLE (INN.BAIL.)	C	MM	A-B (XIII-XIV)	182	202	220	30	33	36	"
PORTCHESTER CASTLE (OUT.BAIL.)	C	LM	6 (XV-XVI)	70	99	13	38	54	7	Grant 1977
PORTCHESTER CASTLE (OUT.BAIL.)	C	MM	3-4 (XIII-XIV)	390	155	107	60	24	16	"
PRUDHOE CASTLE	C	PM	9-11 (midXVI-XVIII)	351	352	45	47	47	6	Davis 1987b
PRUDHOE CASTLE	C	LM	6-8 (XV-midXVI)	177	85	34	60	29	11	"
PRUDHOE CASTLE	C	MM	4-5 (XIII-XIV)	249	129	141	48	25	27	"
SANDAL CASTLE	C	PM	"+"-1 (XVI-XVIII)	684	521	154	50	38	11	Griffith et al. 1983
SANDAL CASTLE	C	LM	2-4 (XV)	526	314	149	53	32	15	"
SANDAL CASTLE	C	MM	5-6 (XII-XIV)	99	49	33	55	27	18	"
SOUTHAMPTON	U	PM	C (XVI-XVIII)	47	49	12	44	45	11	Noddle 1975
SOUTHAMPTON	U	MM	B (XIII-XIV)	73	62	88	33	28	39	"
SOUTHAMPTON	U	EM+MM	A (XI-XIII)	145	73	104	45	23	32	"
SOUTHAMPTON, QUILTER'S VAULT	U	PM	C	29	67	15	26	60	14	Bourdillon 1979
SOUTHAMPTON, QUILTER'S VAULT	U	MM	B	88	55	32	50	31	18	"
SOUTHAMPTON, QUILTER'S VAULT	U	EM	A	412	442	118	42	45	12	"
TAUNTON, BENHAM'S GARAGE	U	PM	postmed.	154	120	6	55	43	2	Levitan 1984b
TAUNTON, BENHAM'S GARAGE	U	MM	4 (XIII-XIV)	1346	1316	125	48	47	4	"
TAUNTON, BENHAM'S GARAGE	U	EM+MM	3 (XII-XIII)	374	242	20	59	38	3	"
TAUNTON, PRIORY BARN	U	EM+MM	1 (XII-XIII)	199	367	35	33	61	6	"
THRISLINGTON	V	MM	XIII-XIV	252	249	67	44	44	12	Rackham 1989
TOTNES	U	PM		79	169	21	29	63	8	Bovey 1984
UPTON	V	EM+MM	XII-XIII	106	452	23	18	78	4	Noddle et al. 1969
WALTON	V	M	mediæv.	645	827	292	37	47	17	Noddle 1976
WALTON	V	EM	saxo-norman	726	871	396	36	44	20	"
WEST COTTON	V	MM+LM	mid-late med. (XIII-XV)	406	825	230	28	56	16	
WEST COTTON	V	EM	early med. (XII-XIII)	760	531	318	47	33	20	
WHARRAM PERCY	V	LM	XIII-XIV	328	851	132	25	65	10	Ryder 1974
WHARRAM PERCY	V	MM	XV-early XVI	438	886	126	30	61	9	"
WINCHCOMBE	U	PM	XVI-XVII	31	24	4	53	41	7	Levitan 1985
WINCHCOMBE	U	M	XII onwards	280	259	23	50	46	4	"
YORK, FISHERGATE	U	EM	4 (XI-XII)	1025	660	237	53	34	12	O'Connor 1991
YORK, GENERAL ACCIDENT SITE	U	MM	12 (XIV)	581	200	76	68	23	9	O'Connor 1988
YORK, GENERAL ACCIDENT SITE	U	EM+MM	10-11 (XII-XIV)	4059	1054	656	70	18	11	"
YORK, GENERAL ACCIDENT SITE	U	EM	9 (XI-XII)	139	38	33	66	18	16	"
YORK, SKELDERGATE	U	LM	SkD-SkE (earlyXV)	438	674	80	37	57	7	O'Connor 1984
YORK, SKELDERGATE	U	EM	SkK+SkN+SkZ (XI-XII)	1223	410	159	68	23	9	"
YORK, PETERGATE	U	MM	XI-XIV	207	117	141	45	25	30	Ryder 1971

Table 30

List of **mediæval and postmediæval sites** whose faunal assemblages are plotted in the tripolar diagrams (figs. 24 & 25). Assemblages with less than 150 identified specimens have been excluded from the diagrams.

Key: C=castle, M=monastic, P=palace, U=urban, V=village. M=mediæval, EM=early mediæval (late XI-XII), MM=middle mediæval (XIII-XIV), LM=late mediæval (XV-early XVI), PM=postmediæval.

PUBPER is the code and date of each period in the original publication. In order to avoid confusion between period codes and dates, the periods are given in Arabic numbers, even if in the original publication they were numbered with Roman numbers.

The number of fragments (NISP) is calculated in different ways by different authors; when a "diagnostic zones" method was used this has been preferred to the crude number of identified fragments. In most of the sites the figure for *Ovis* includes *Capra*.

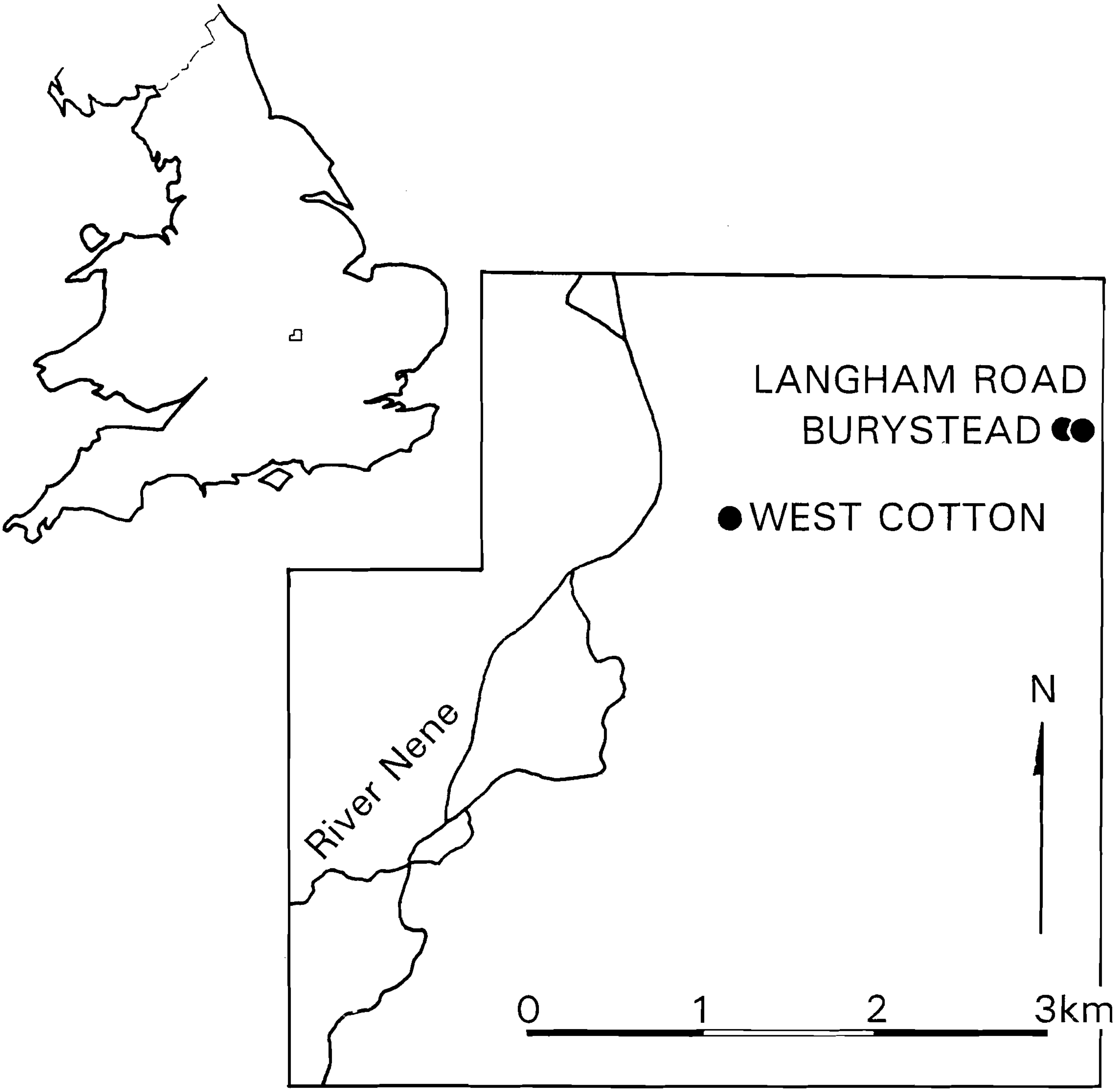


Figure 1

Map to show the location of West Cotton, Burystead and Langham Road.

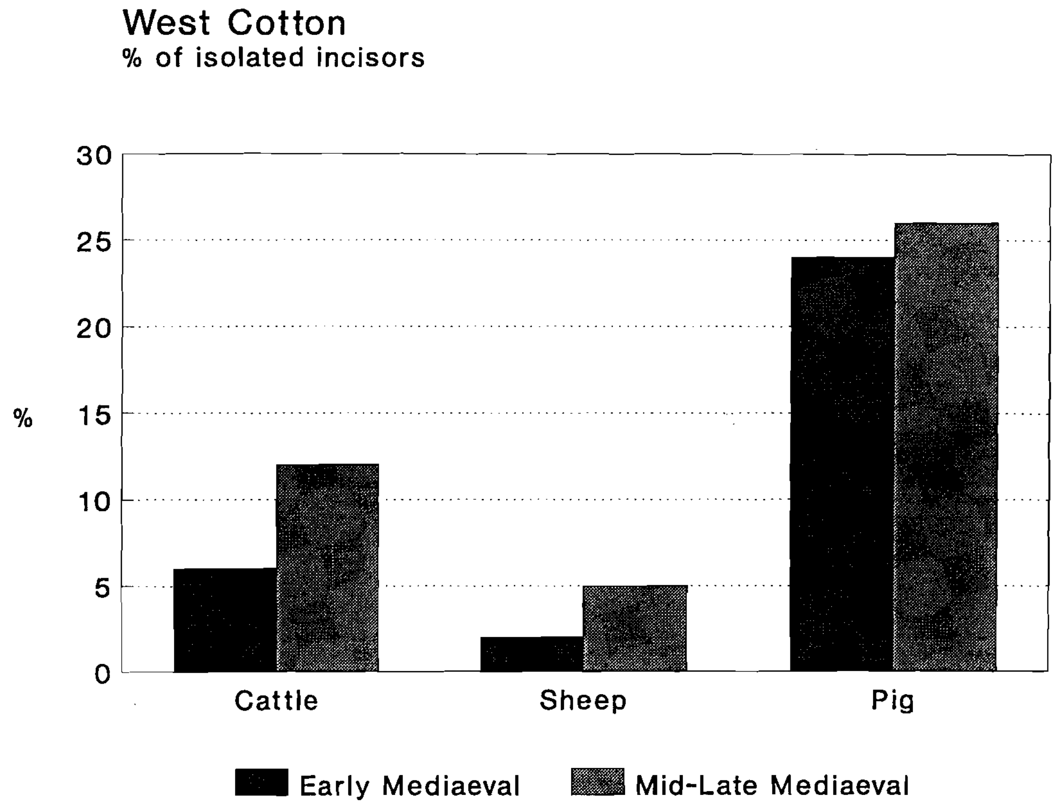


Fig. 2
The percentage of isolated incisors is:
[MNI of incisors / (MNI incisors + MNI dP/P + MNI M_1/M_2 + MNI M_3) x 100].

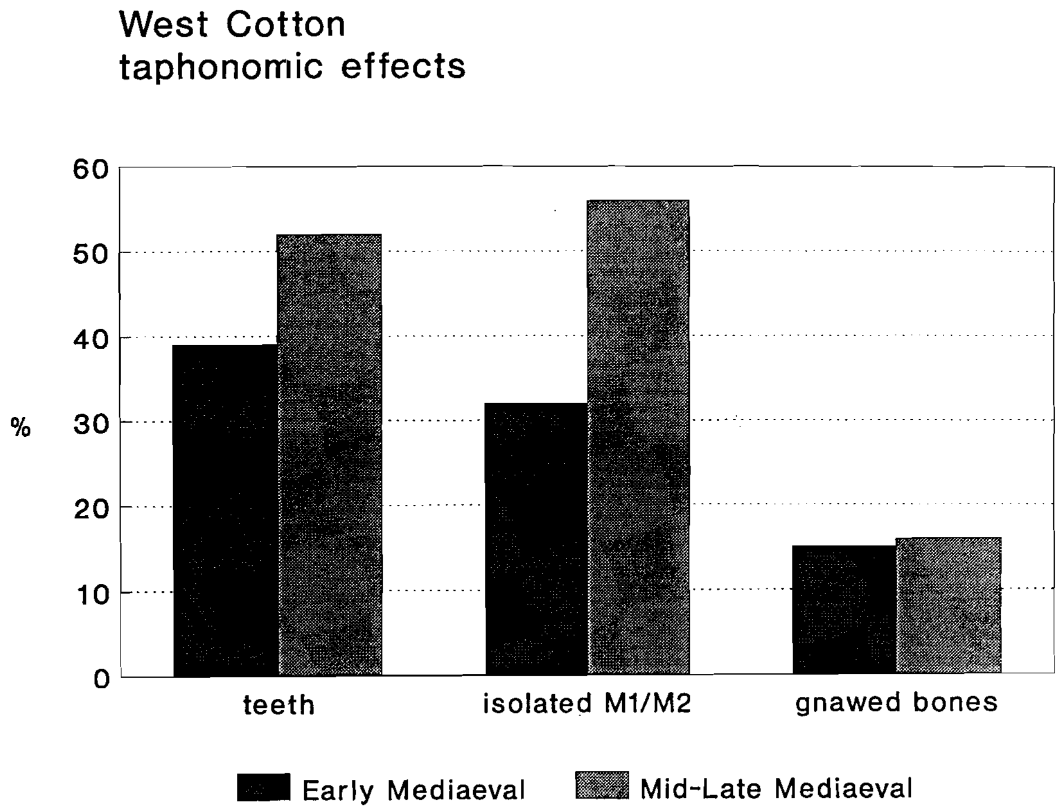


Fig. 3

Degree of fragmentation and damage to the teeth and bones as shown by:
a) Percentage of teeth expressed as a proportion of all teeth and postcranial bones.
b) Percentage of isolated M_1s and M_2s expressed as a proportion of all M_1s and M_2s (cattle, sheep and pig only)
c) Percentage of gnawed postcranial bones.

Fig.4 West Cotton
Frequencies of main domestic taxa (NISP)

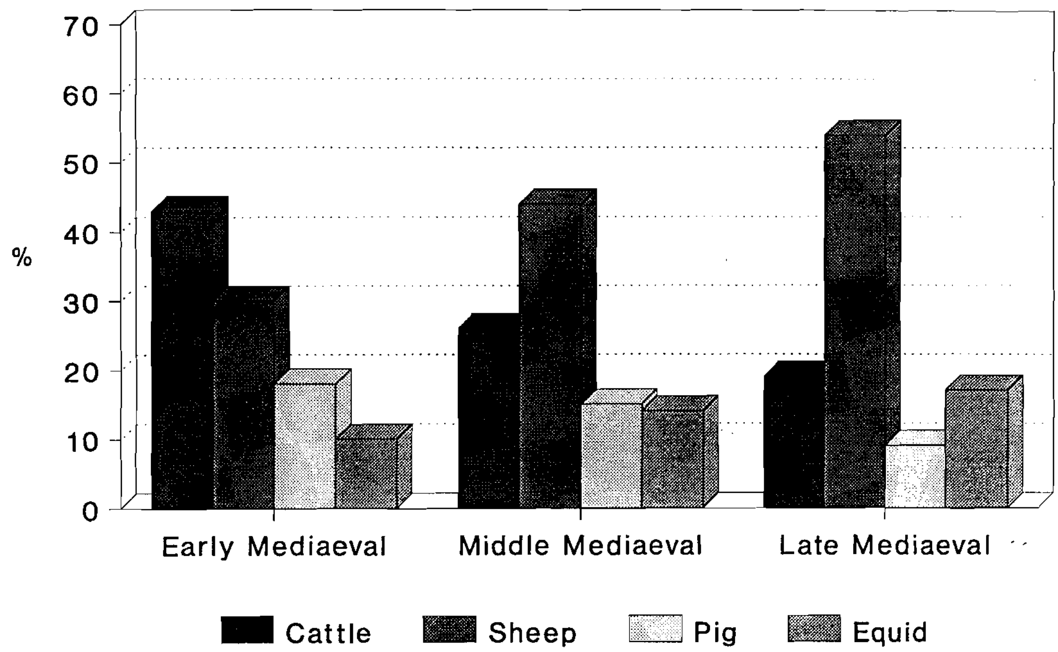


Fig.5 West Cotton
Frequencies of main domestic taxa (MNI)

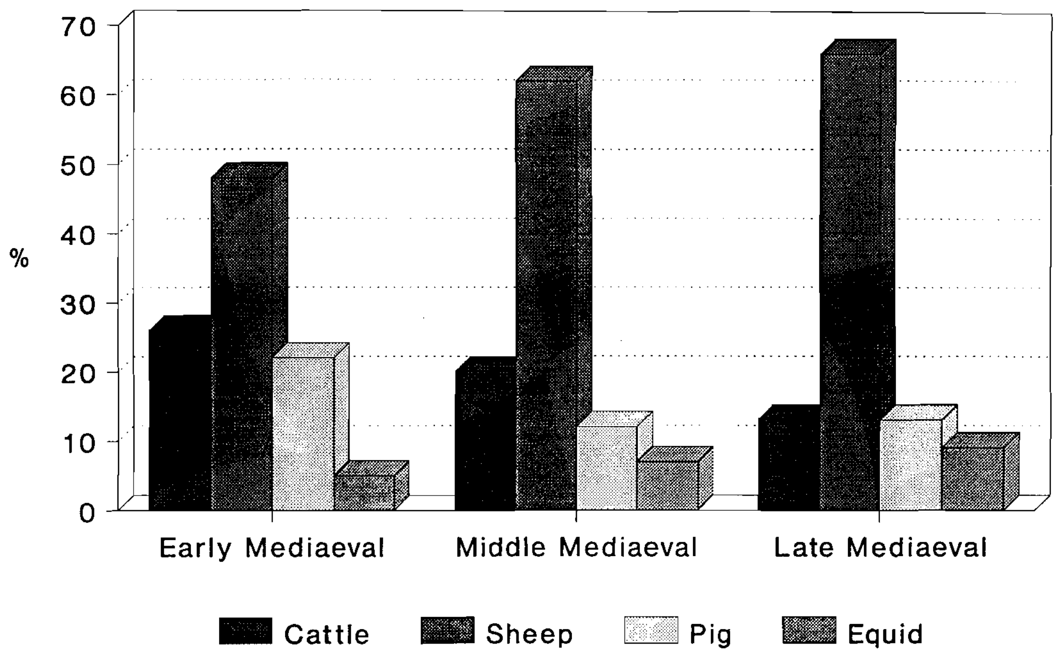
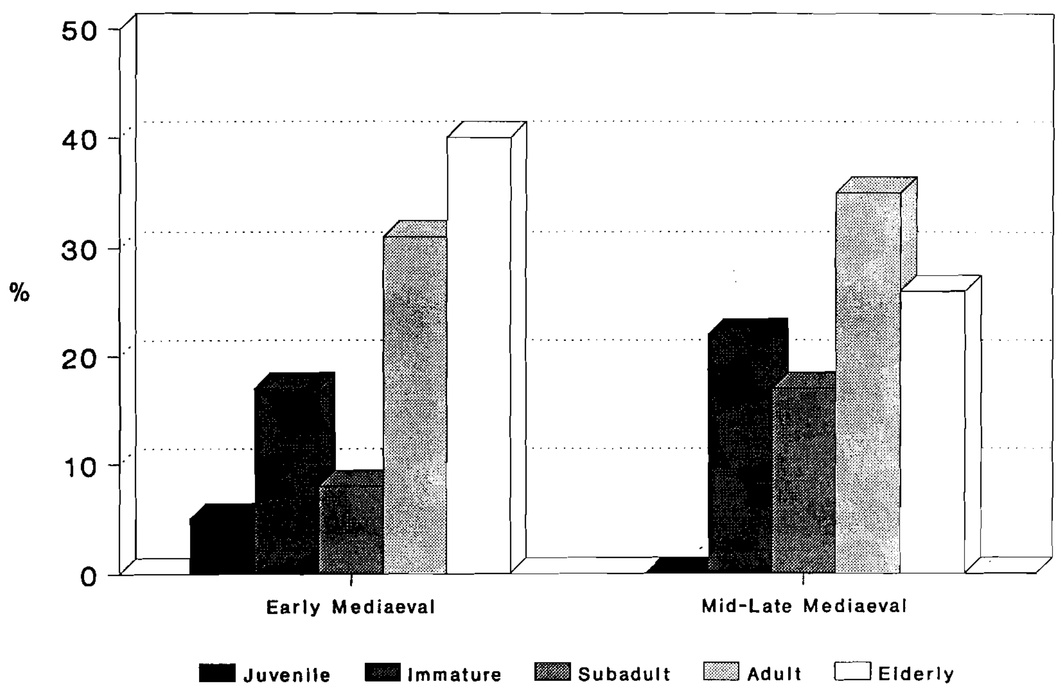


Fig. 6 West Cotton
Cattle, % of mandibles by age stage



age stages from O'Connor (1988)

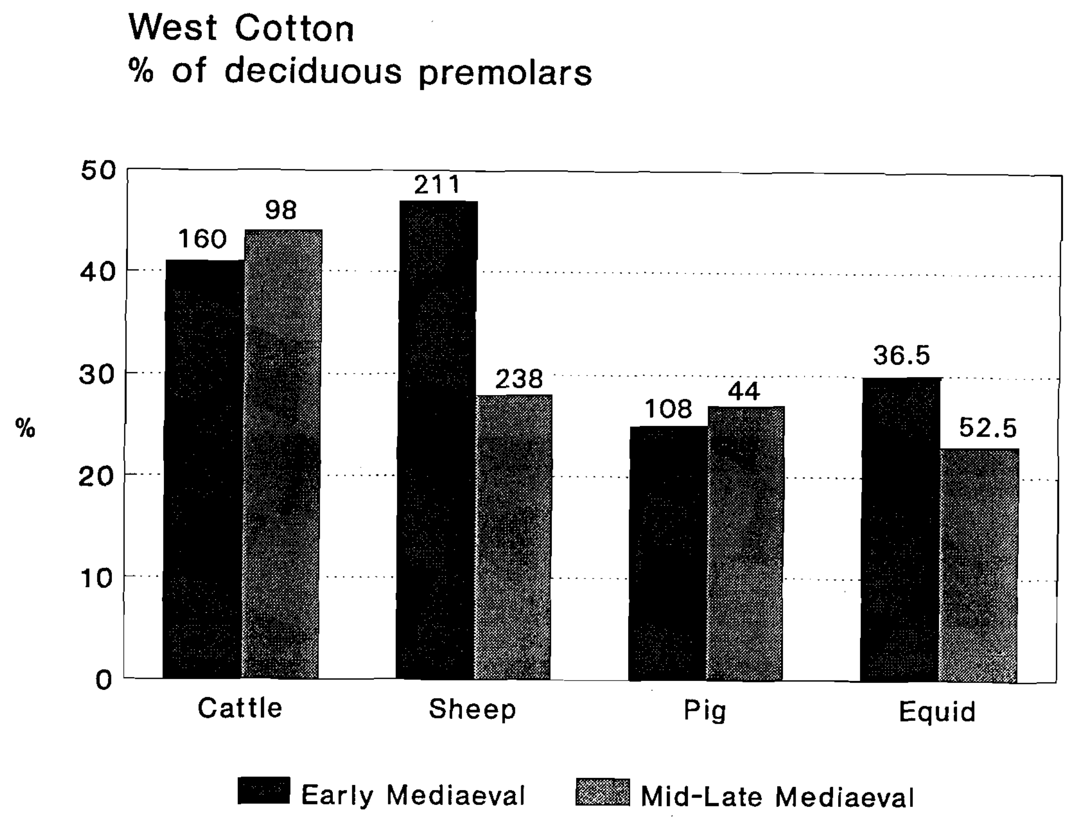


Fig. 7 . Percentages of deciduous premolars of the four main taxa at West Cotton calculated by [dP / (dP + P)] x 100. Due to the difficulty in distinguishing between premolars and molars in equids, the equid percentage is calculated as {dP / [dP + ((P + M) / 2)]} x 100.
Numbers of (dP + P) for cattle, sheep and pig and [dP + (P + M) / 2] for equid are given above the bars.

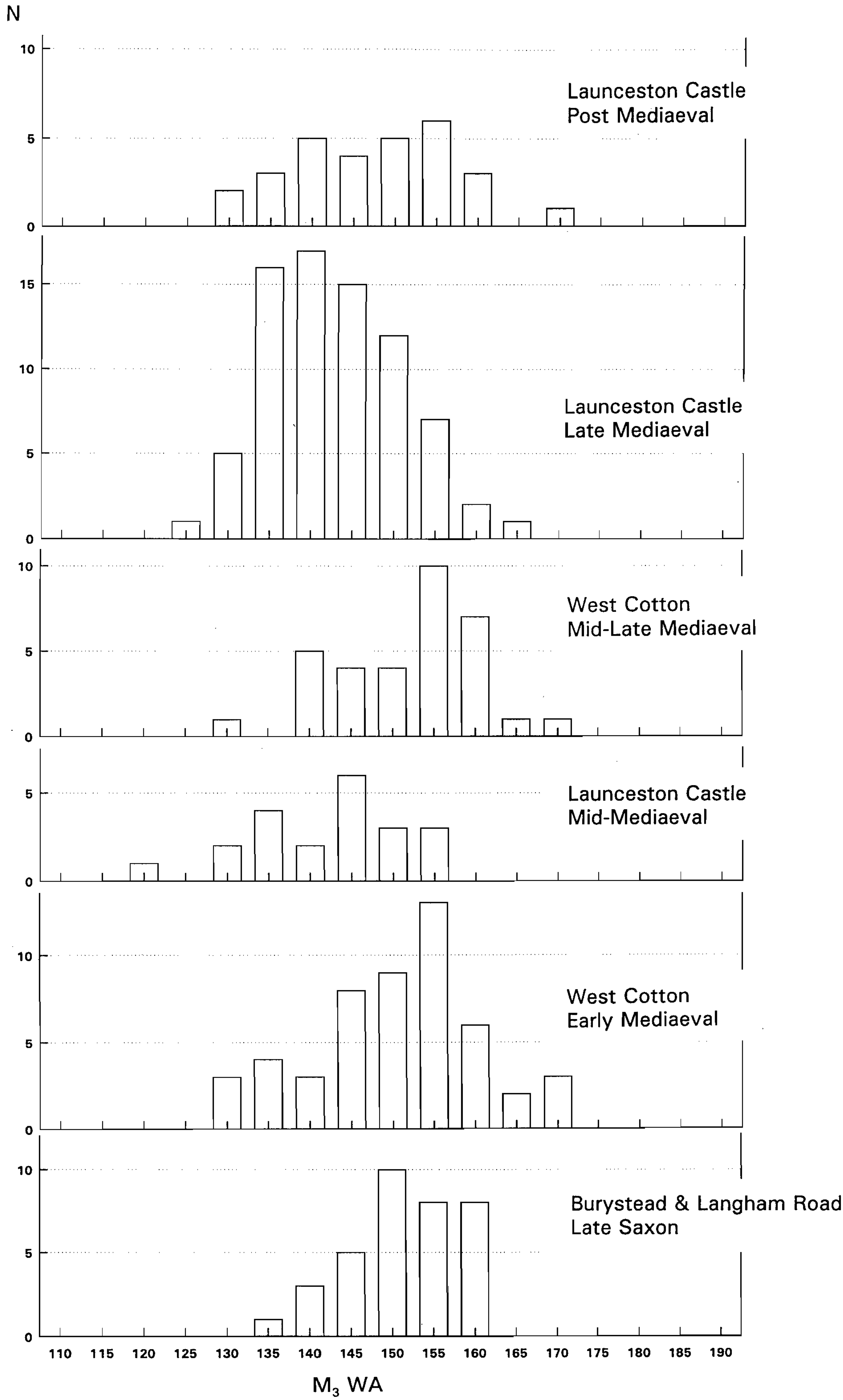


Figure 8

Cattle lower third molars: Width of the anterior cusp. A comparison between specimens from Burystead/Langham Road (Northants.), Launceston Castle (Cornwall) and West Cotton

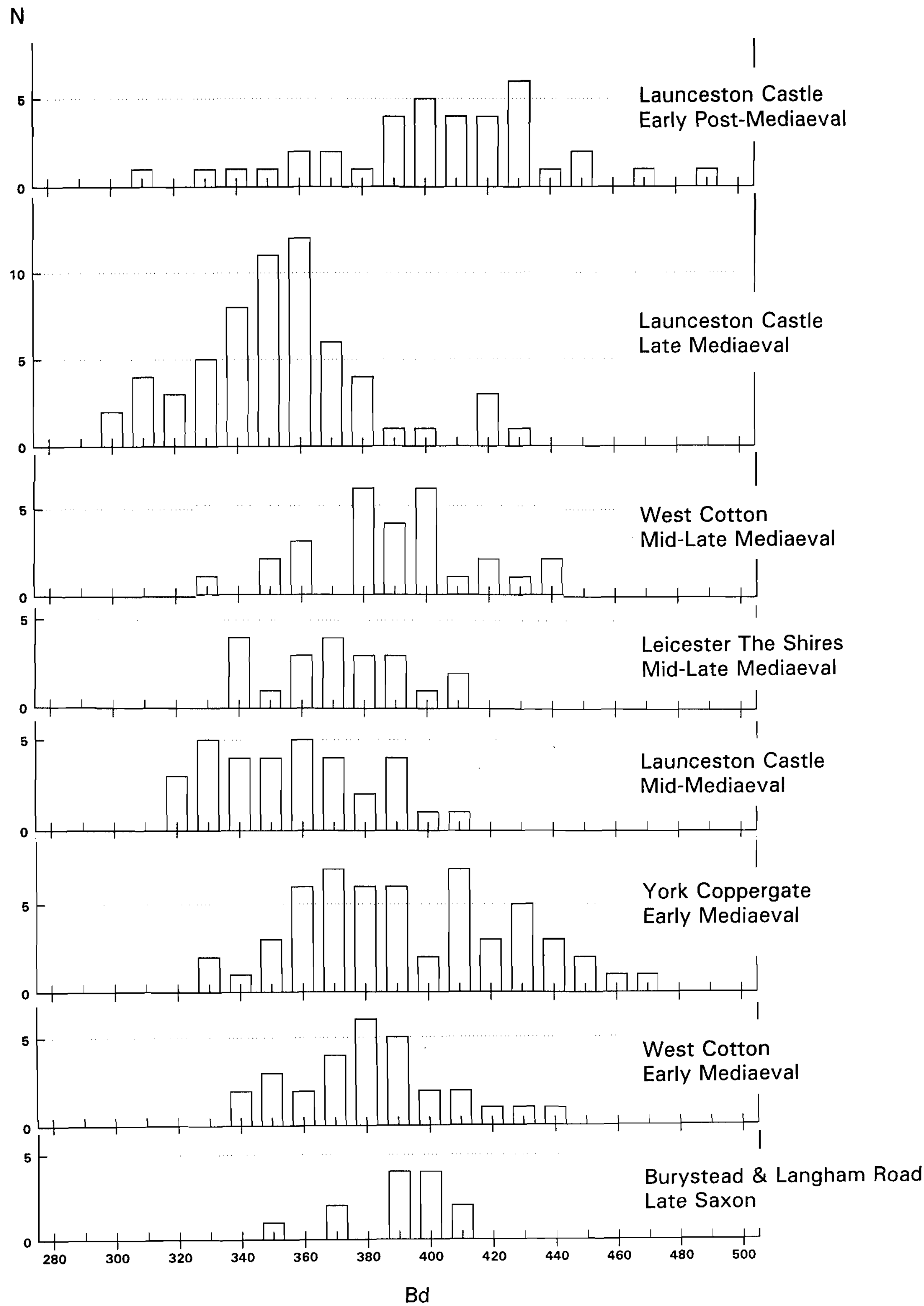
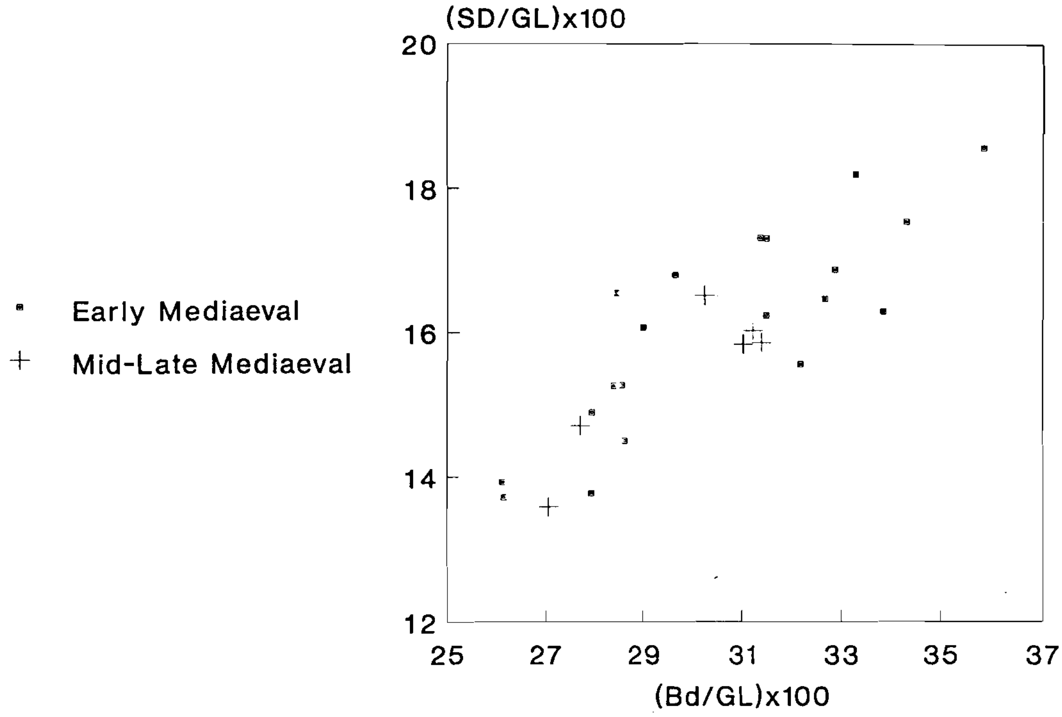
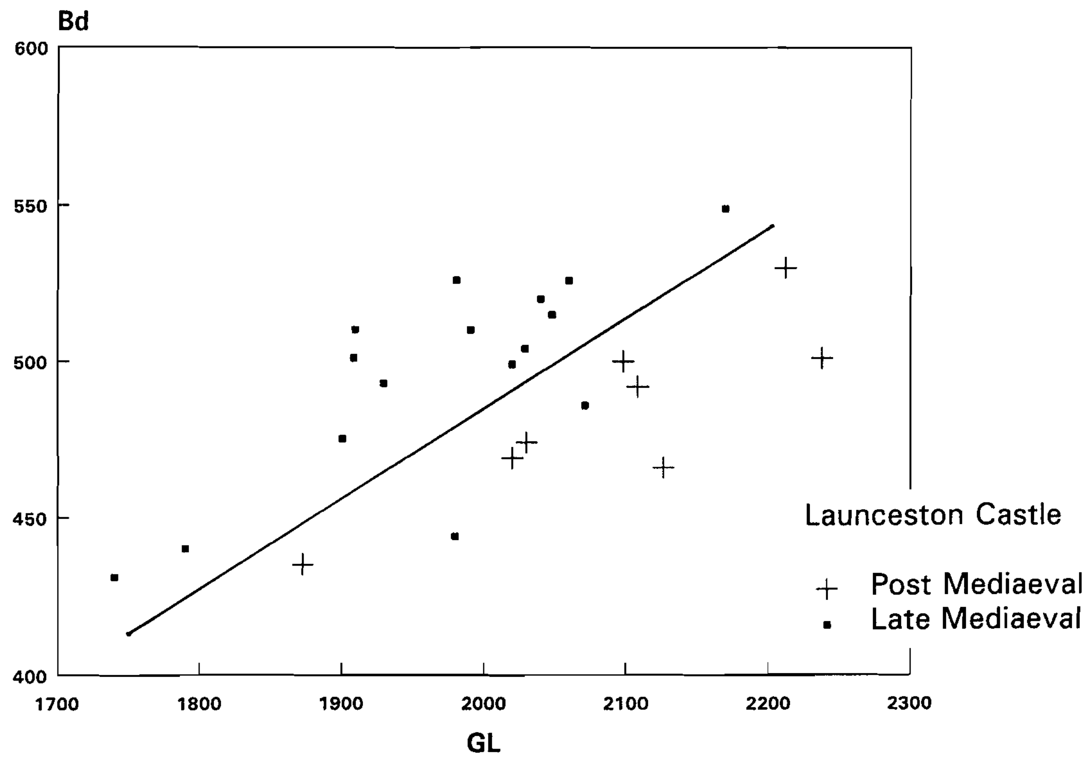


Figure 9

Cattle astragali: Distal width. A comparison between specimens from Burystead/Langham Road (Northants.), Launceston Castle (Cornwall), York, Coppergate (O'Connor, 1986), Leicester, The Shires (Gidney, 1991a and 1991b) and West Cotton

Fig.10 West Cotton
Shape of cattle metacarpals





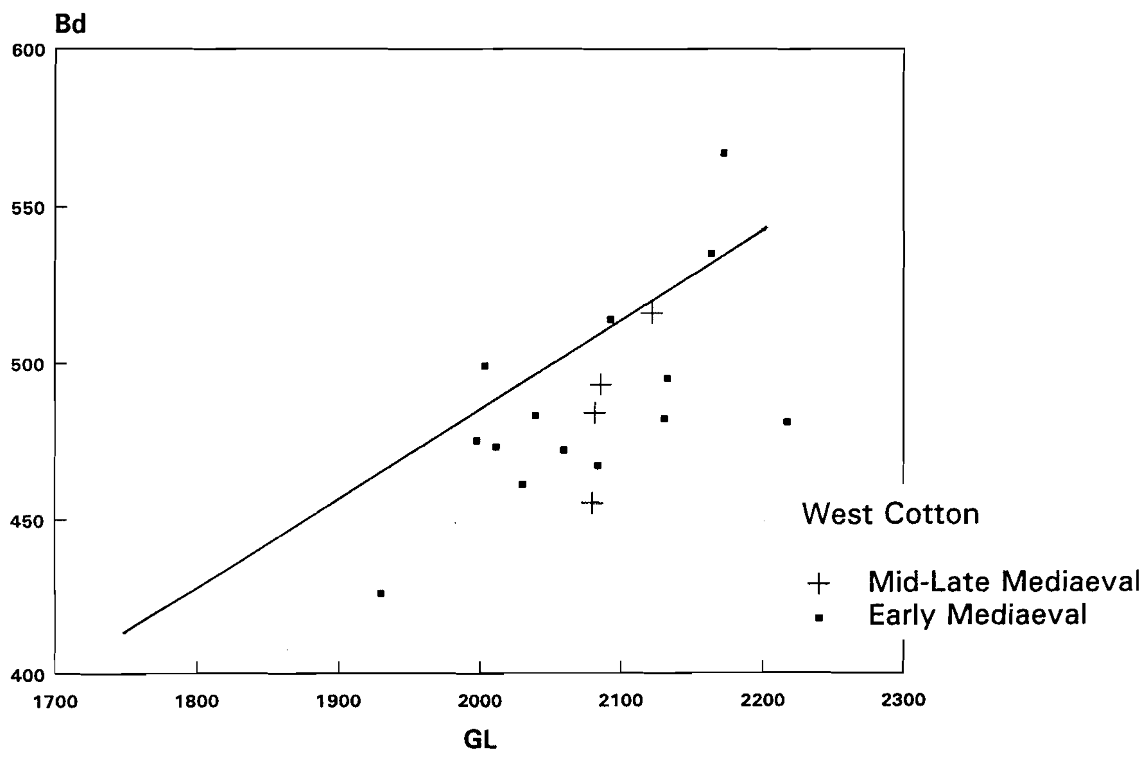


Figure 11

Cattle Metatarsals: Distal width v greatest length.
A comparison between specimens from Launceston Castle (Cornwall) and West Cotton

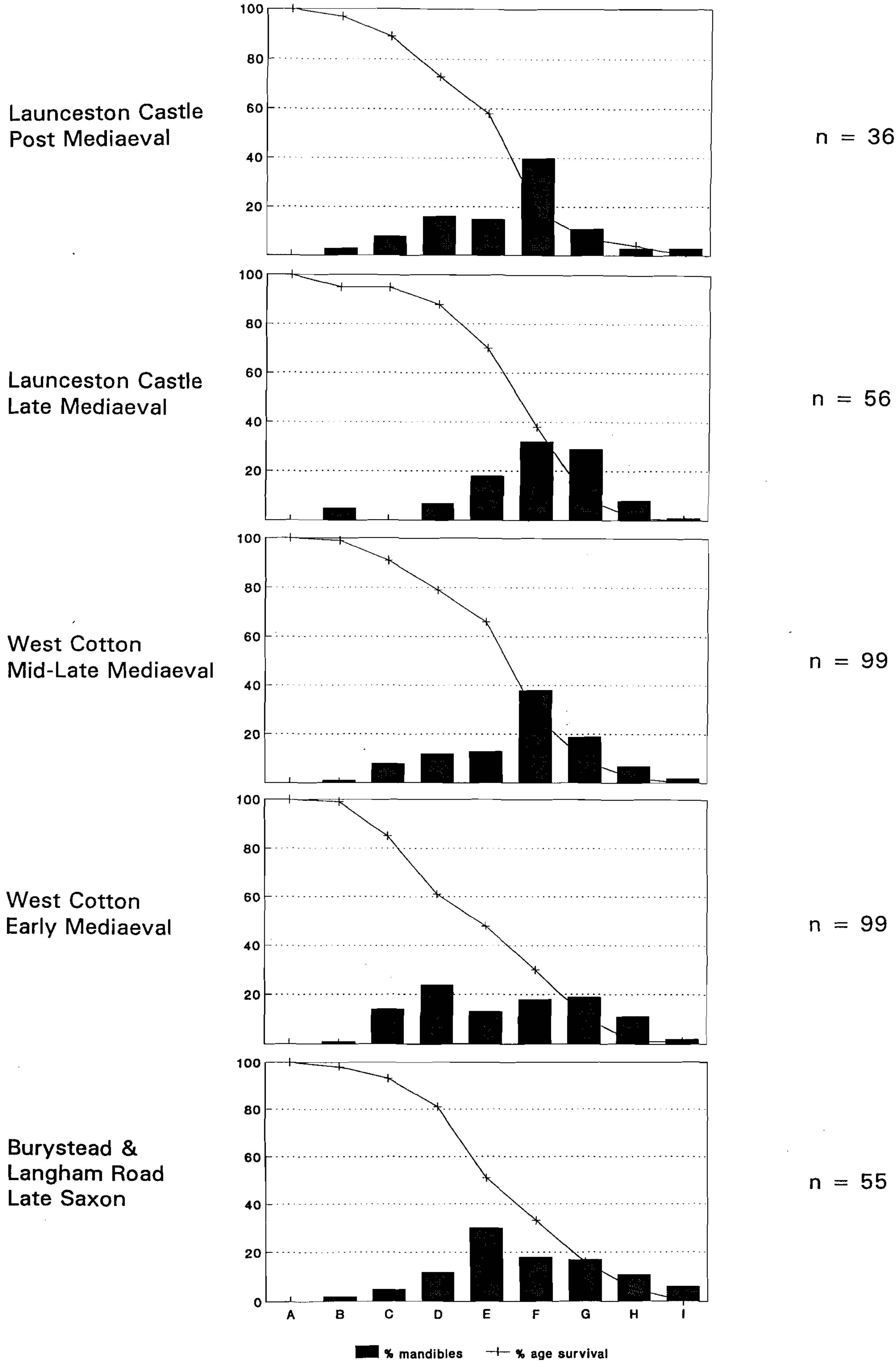


Fig.12 **Sheep, percentages of mandibles by age stage** at different sites and in different periods. Age stages are from Payne (1973). All mandibles with two or more teeth with recordable wear in the dP_4/P_4 - M_3 row were considered. At both West Cotton and Launceston Castle no significant differences were noticed between this method and the one wich considers only mandibles with recordable wear on dP_4 or P_4.

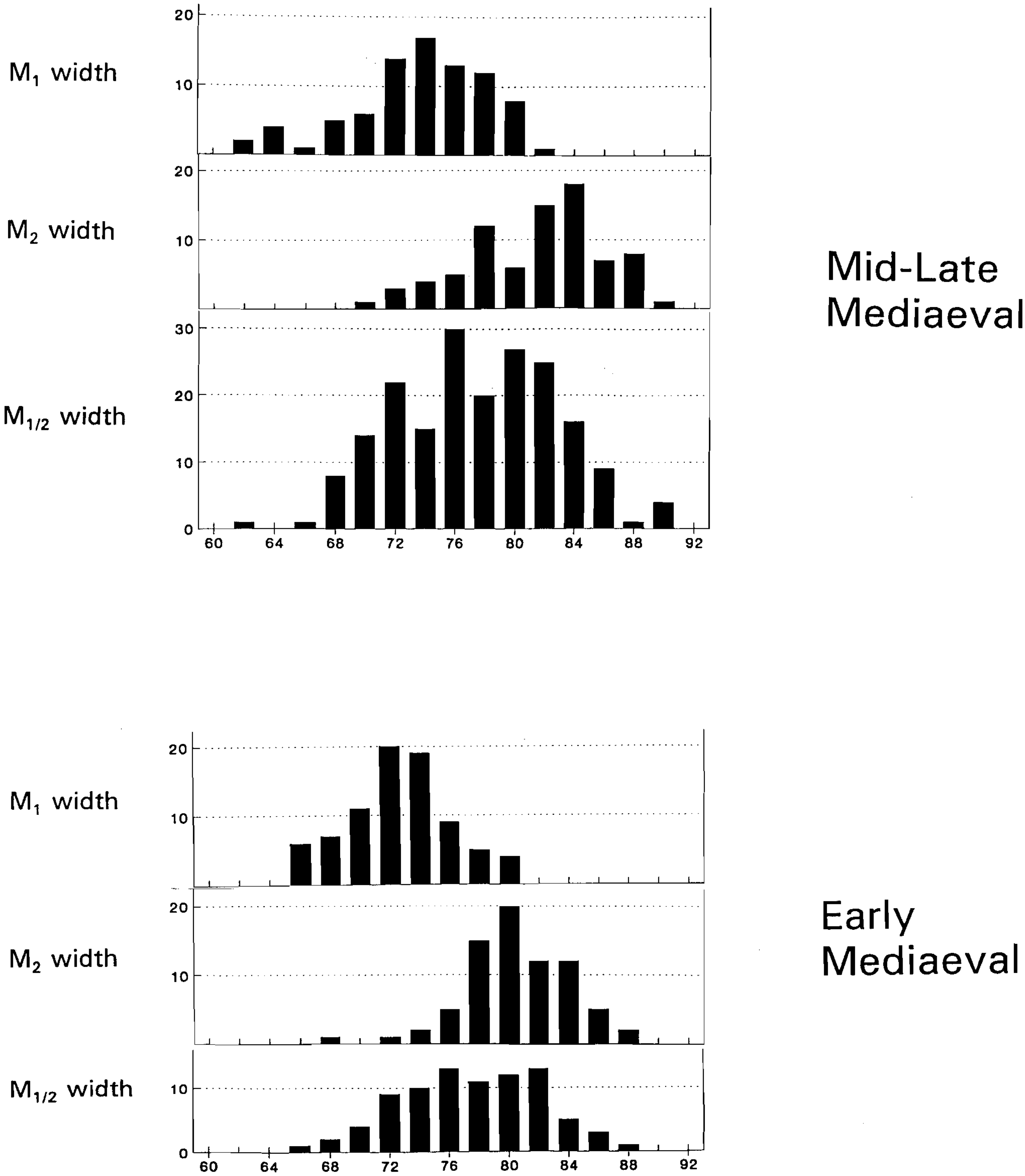


Fig 13

Variation of sheep molar size at West Cotton

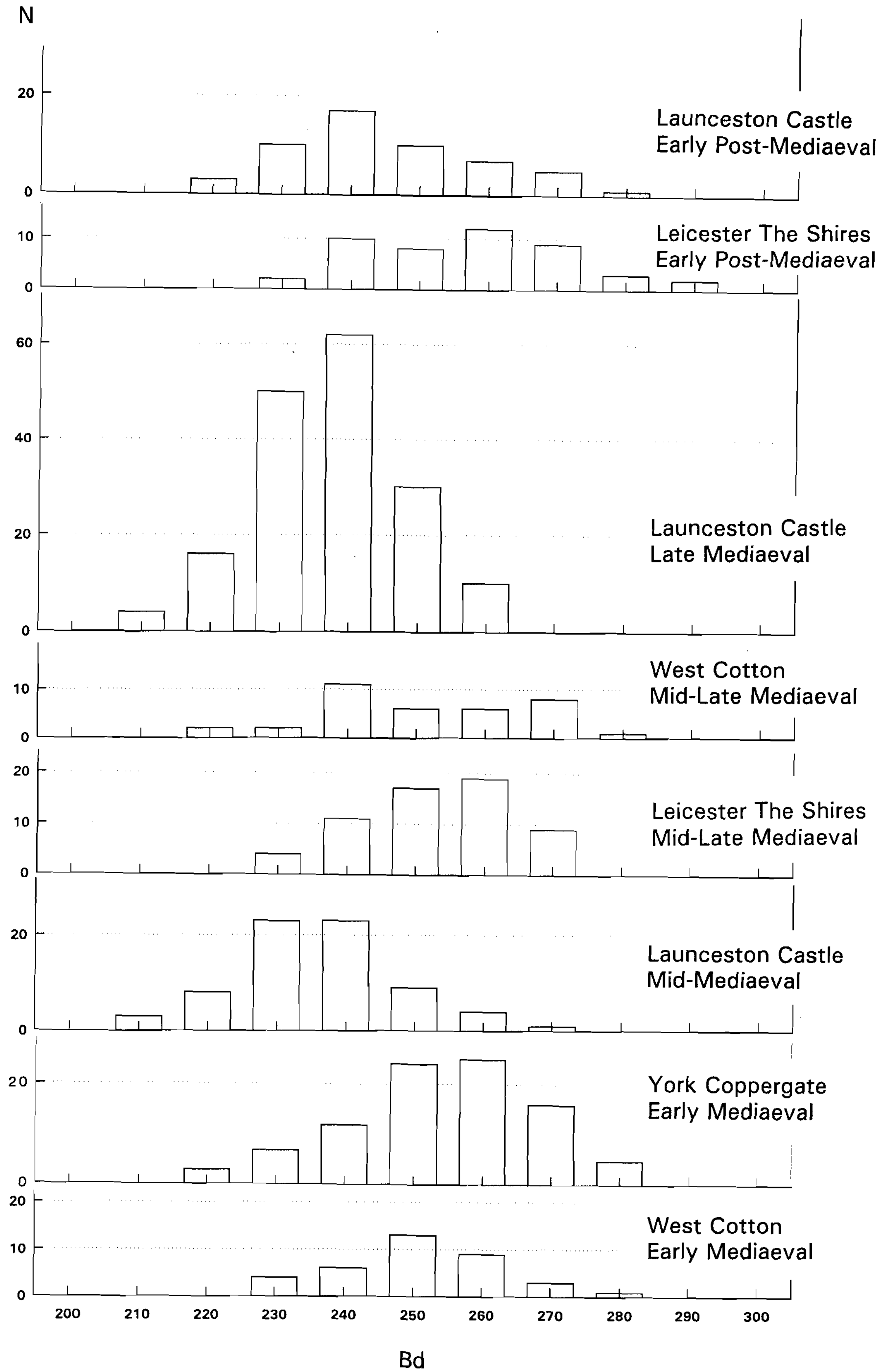


Figure 14

Sheep tibia: Distal width. A comparison between specimens from Launceston Castle (Cornwall), York, Coppergate (O'Connor, 1986), Leicester, The Shires (Gidney, 1991a and 1991b) and West Cotton. Fusing specimens are included, unfused ones are excluded.

Fig.15 West Cotton sheep horncores

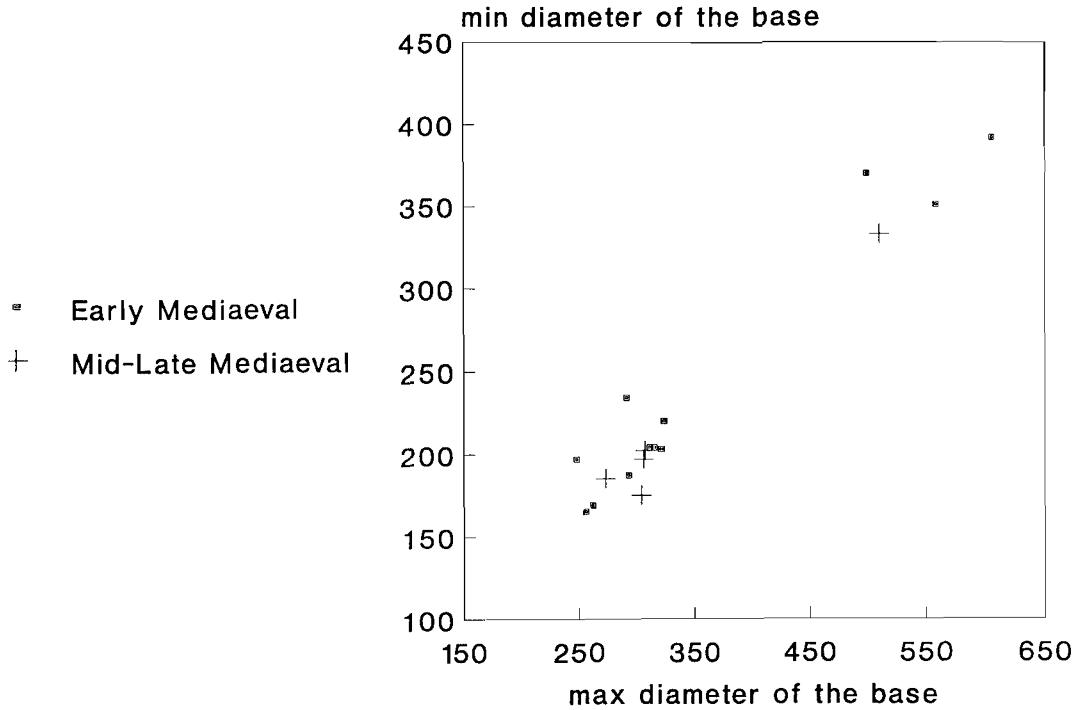
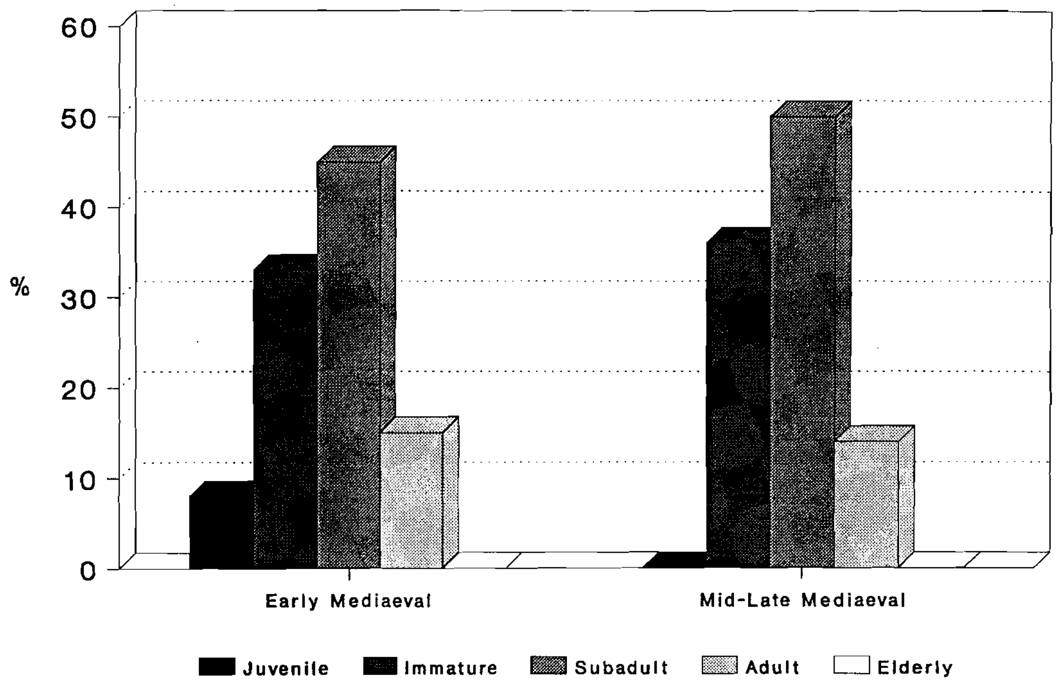


Fig.16 West Cotton
Pig, % of mandibles by age stage



age stages from O'Connor (1988)

West Cotton
pig molars

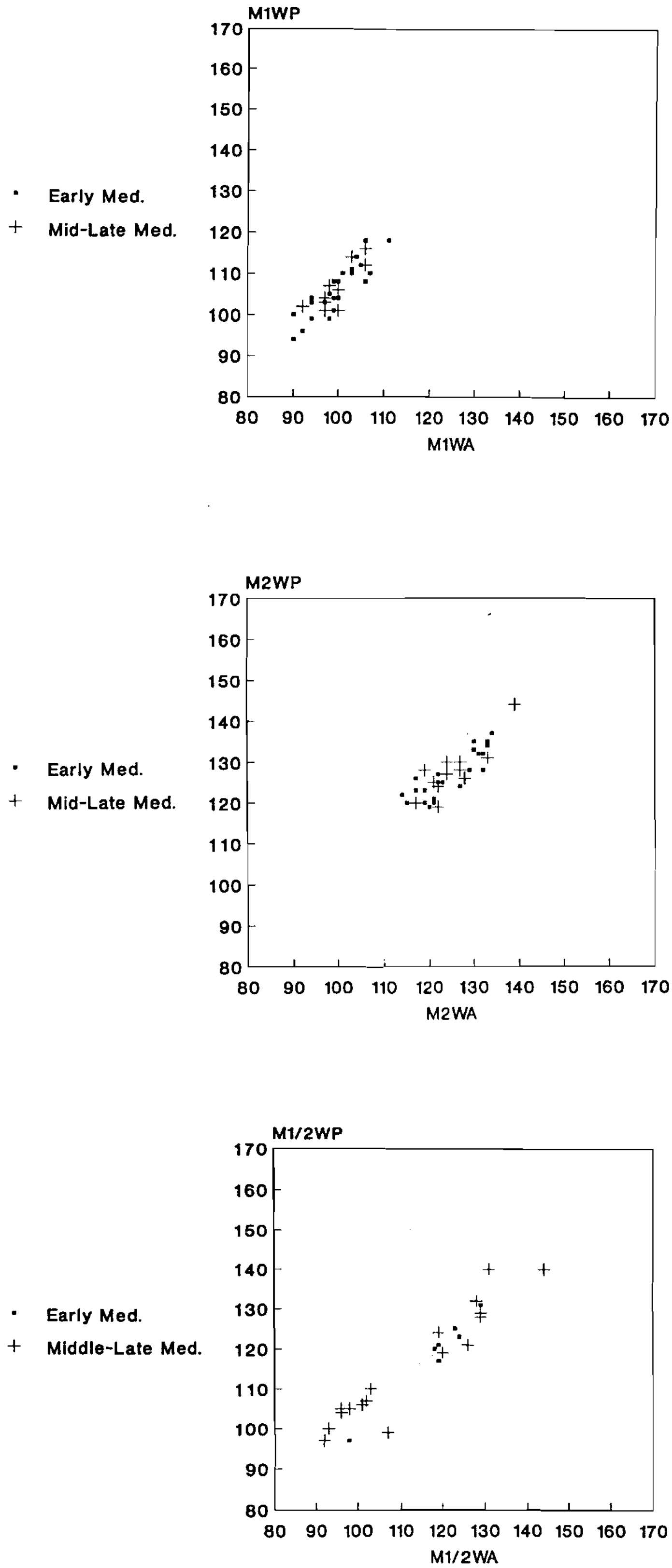


Fig. 17
Scatter diagram of anterior and posterior widths of pig M_1, M_2 and M_1/M_2. Since there is no overlap between the two groups, isolated M_1/M_2s can be confidently identified as either smaller M_1s and or larger M_2s.

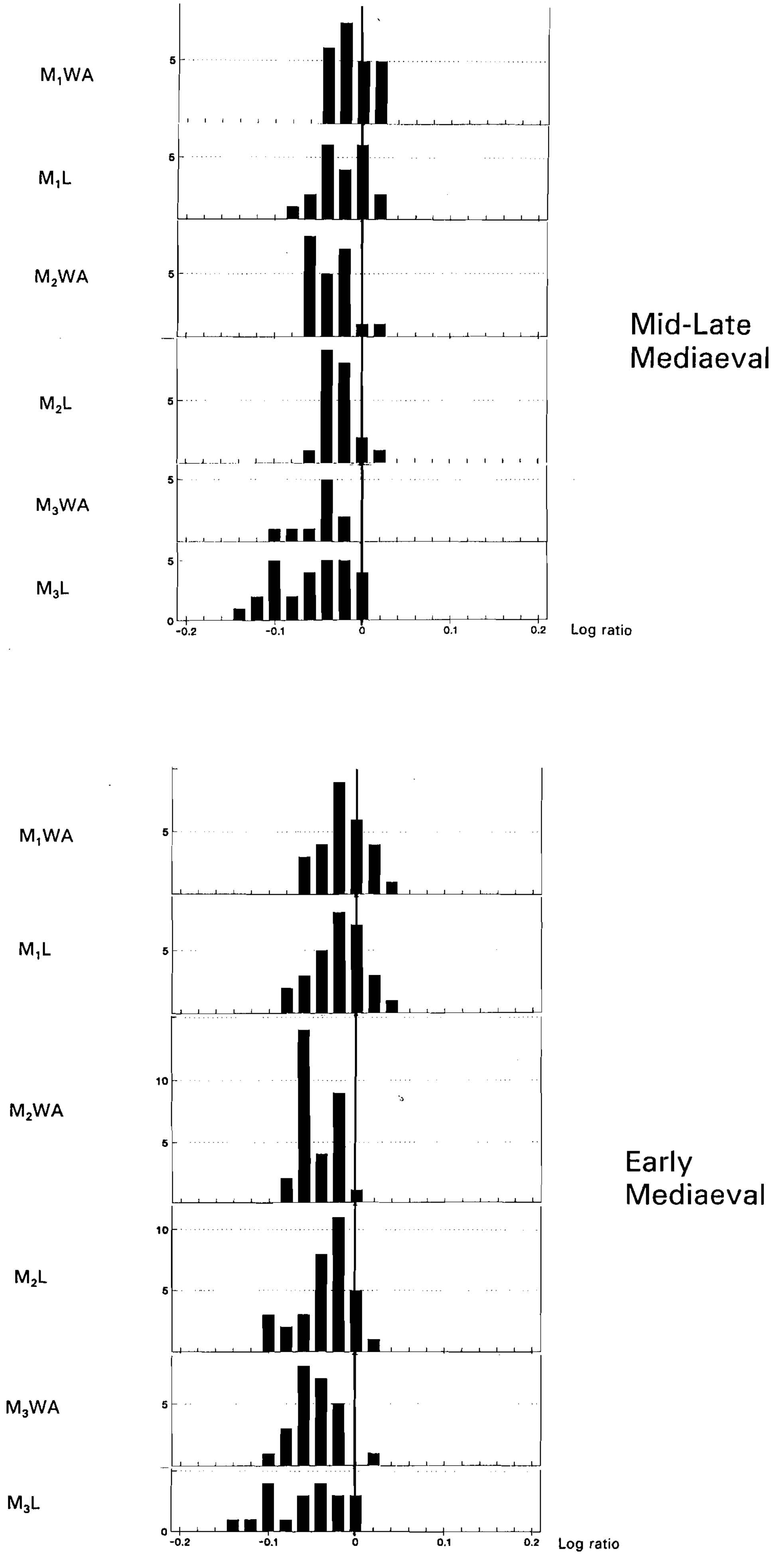


Fig 18

Variation in West Cotton pig tooth measurements. A comparison of the pig teeth with a standard Neolithic pig sample from Durrington Walls, England (Albarella & Payne, in prep.), using the log ratio technique (Payne & Bull 1988). Isolated M_1s and M_2s, identified on the basis of their different size (see fig), have been included.

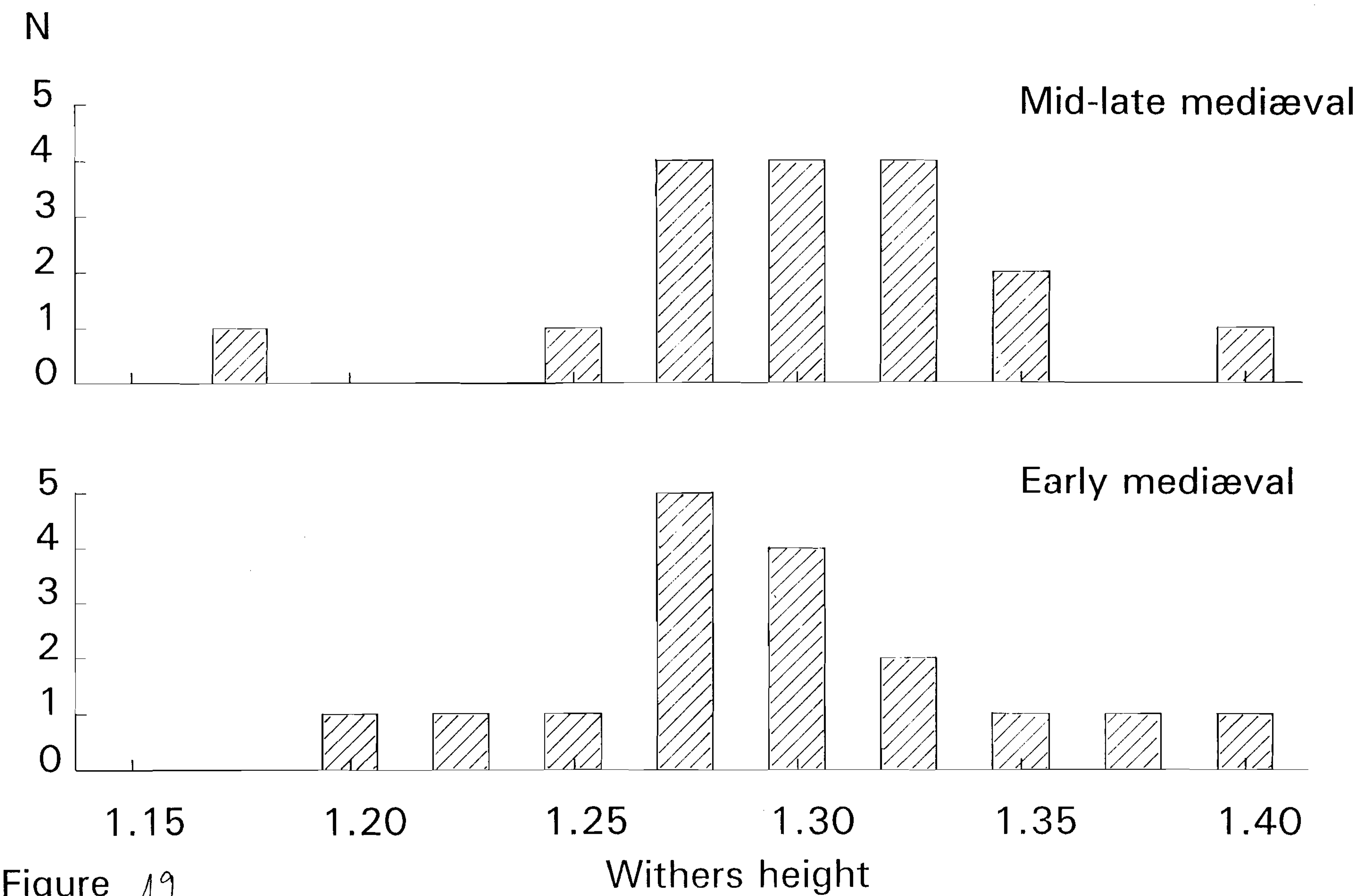


Figure 19

West Cotton, equid withers heights in metres

Fig.20 West Cotton, Burystead & Langham
Equid astragalus

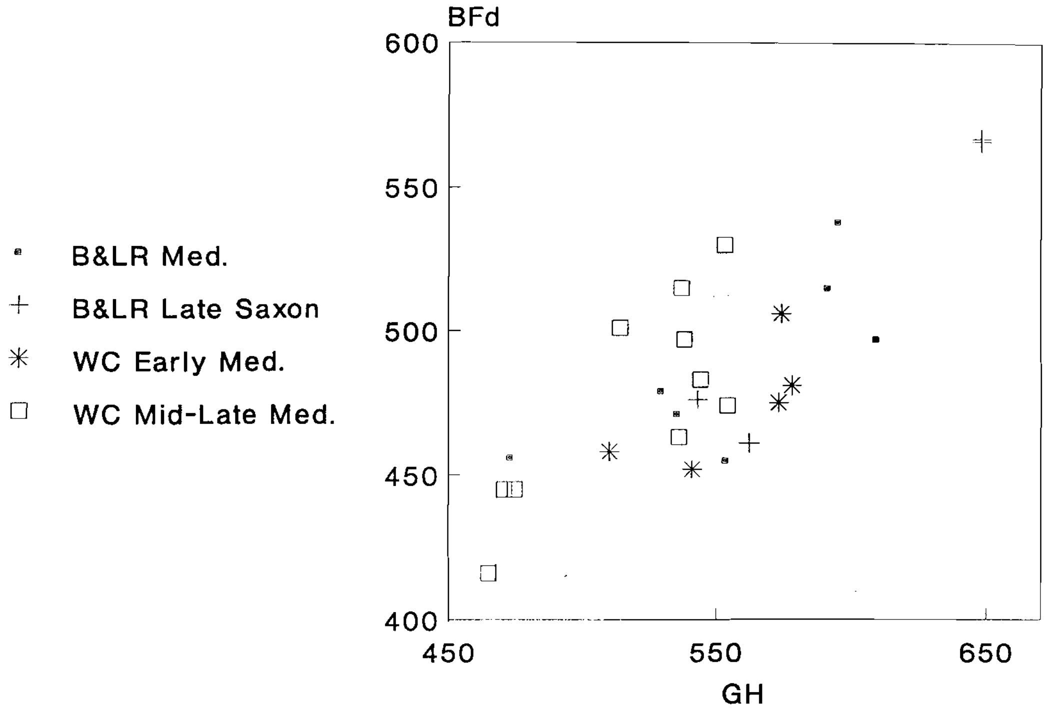


Fig.21 West Cotton
Equid 1st phalanx

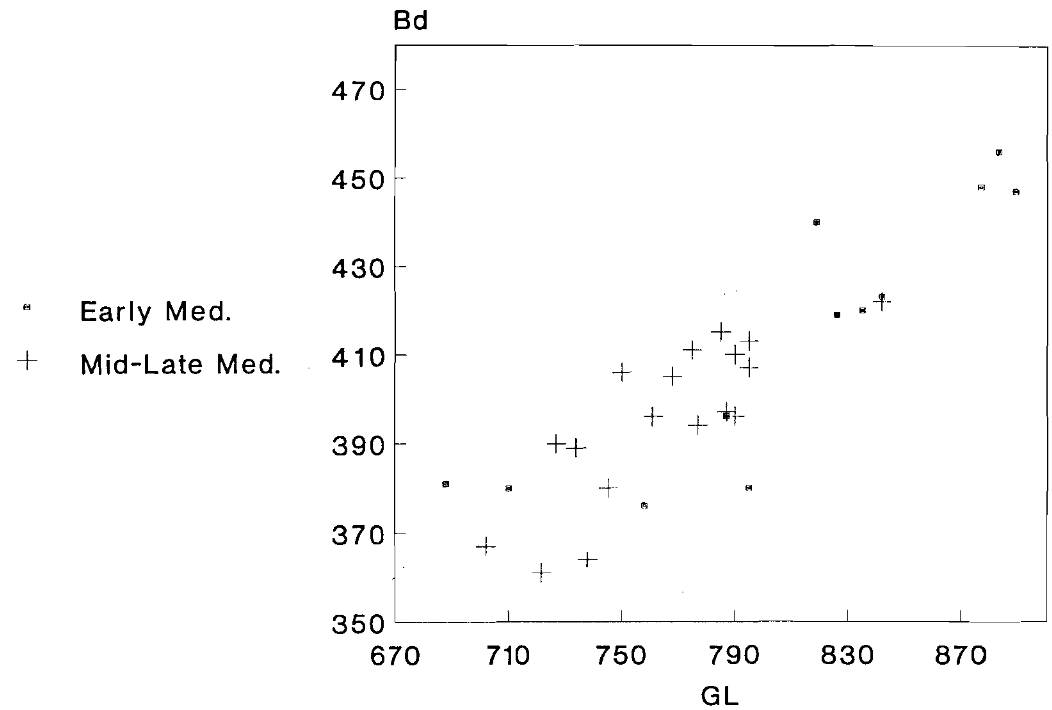


Fig.22 Mediaeval cat size
M1 length versus width

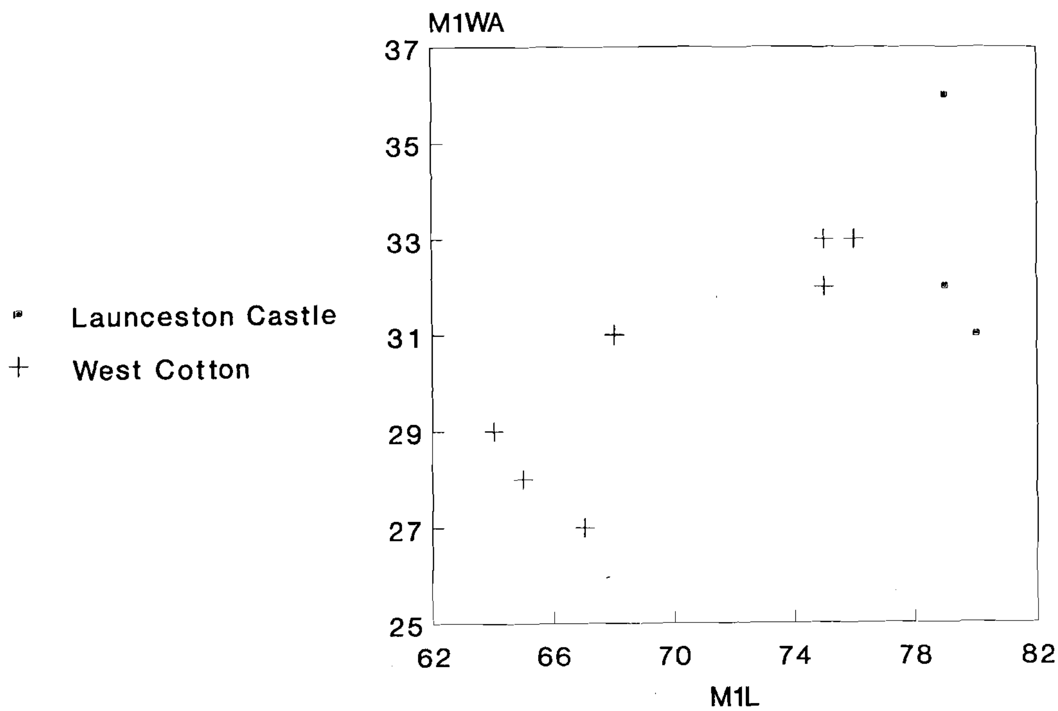
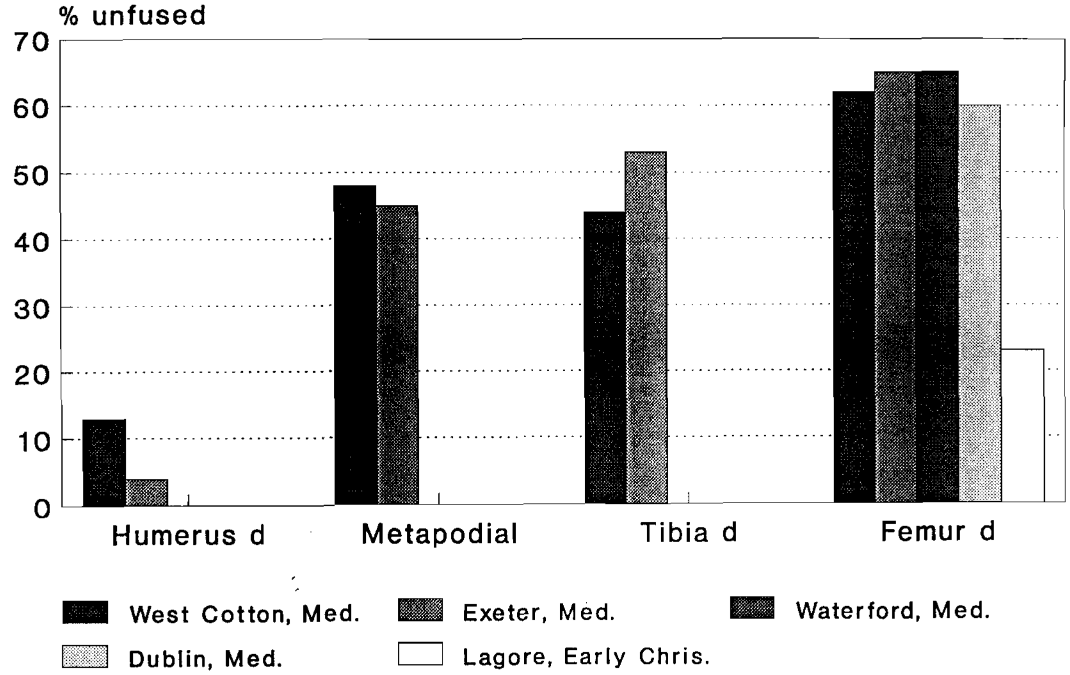


Fig 23 Cat fusion data
comparison of several mediaeval sites



WC early and mid-late med. are unified

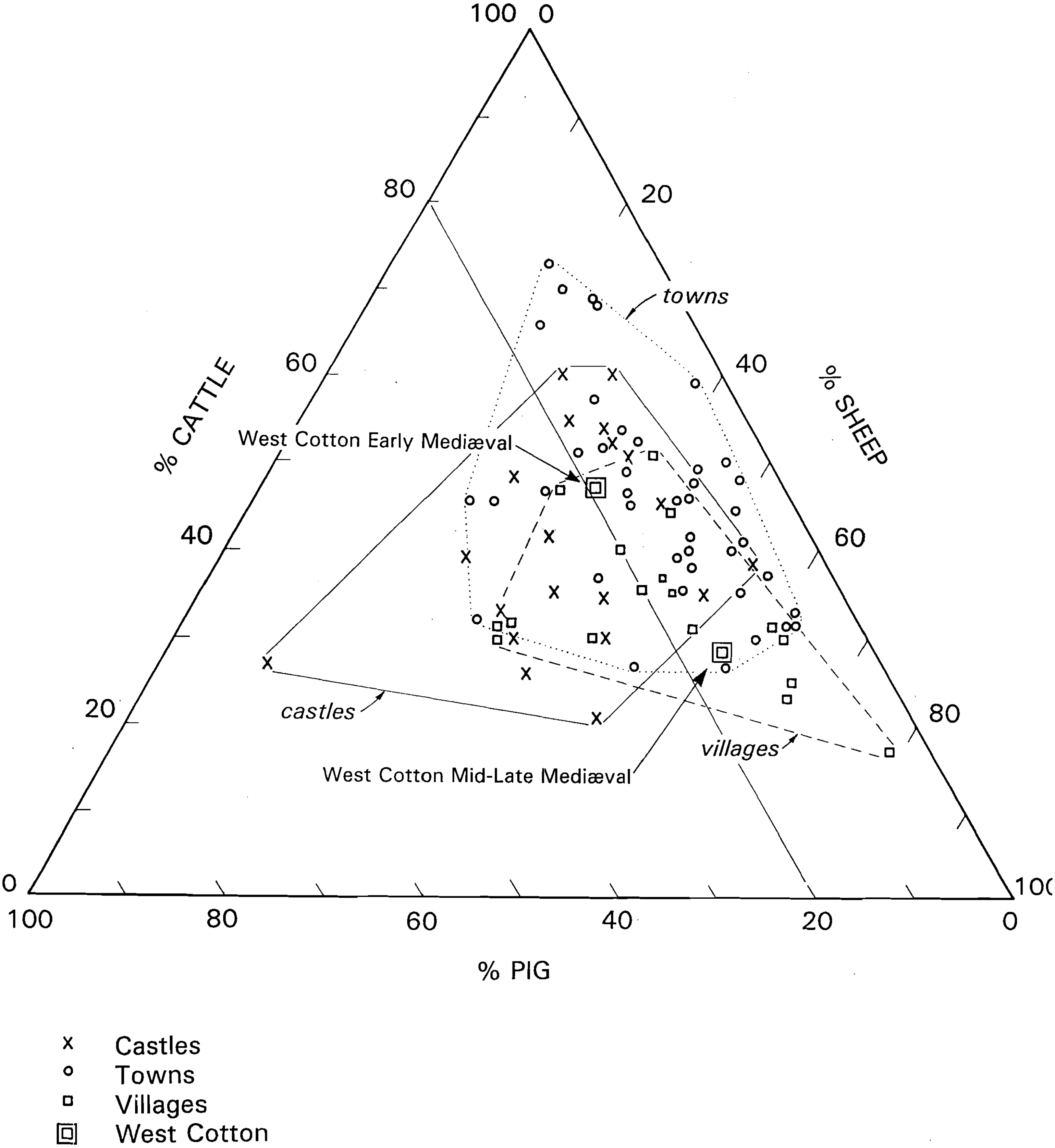
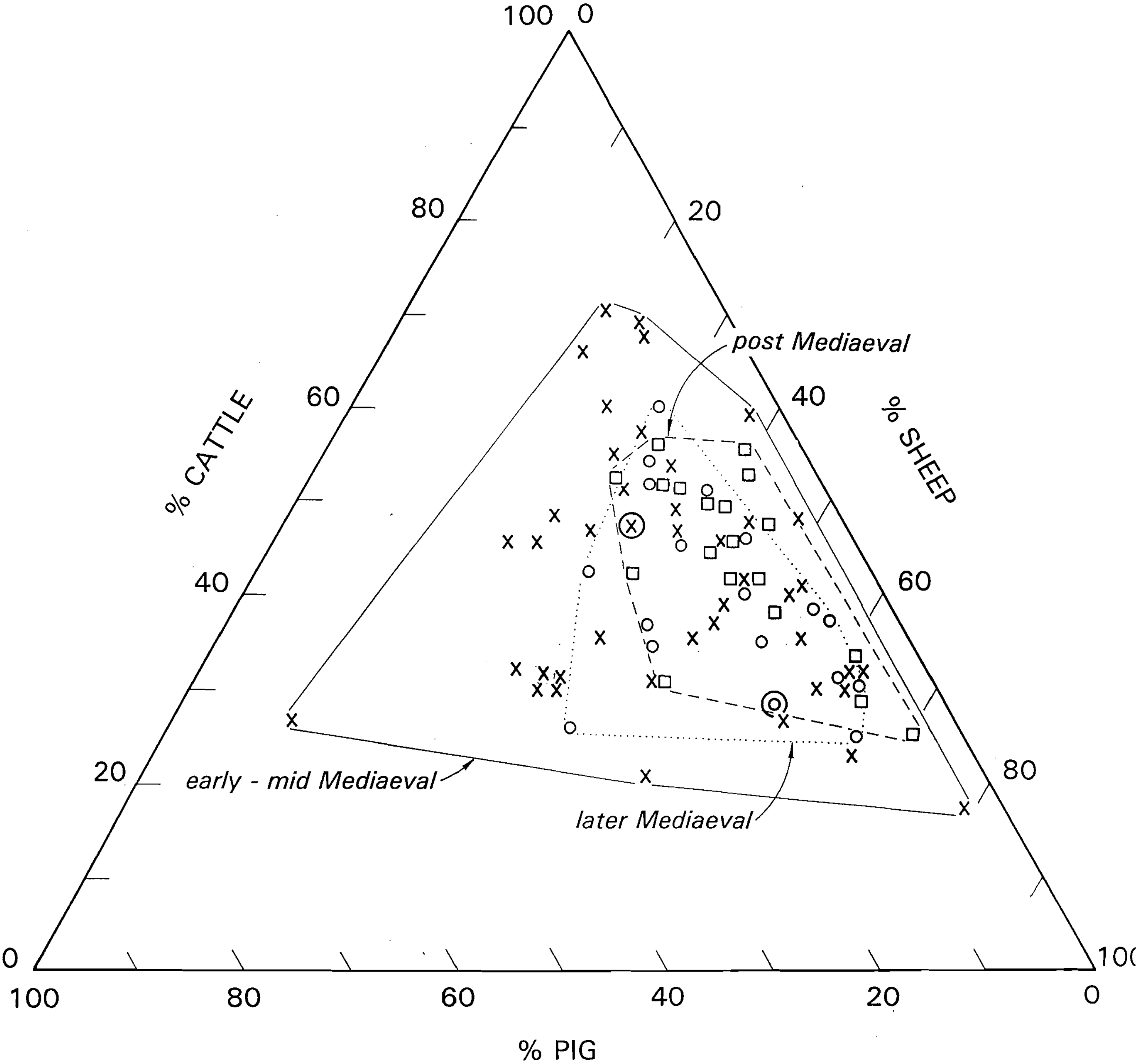


Figure 24

English Mediæval - post-Mediæval castle, town and village faunal assemblages: towns, castles and villages compared



x Early and mid Mediæval (11th - 14th century)
o Later Mediæval (15th - early 16th century)
□ post Mediæval
◯ West Cotton

Figure 25

English Mediæval - post-Mediæval castle, town and village faunal assemblages: change of food animals through time

Legends for Plates 1 - 4 Animal bones from West Cotton. Scale in centimetres

Plate 1a	Cranial part of a hornless sheep skull, (unit 6232, box 84) early post-Mediæval, c. 1450-1550
Plate 1b	Chopped sheep horn core (unit 1349, box 32) early Mediæval, c. 1100-1250
Plate 1c	Horse first phalanx (unit 6347, box 88) early Mediæval, c. 1100-1250. Note the cut marks across the shaft, probably the result of skinning
Plate 1d	Distal end of a chopped equid metapodial (unit 309, box 14) late Mediæval, c. 1300-1450

Plate 2a	Distal equid metatarsal (unit 1135, box 29) mid-Mediæval, c. 1250-1400.
Plate 2b	Distal equid tibia (unit 1696, box 43) early Mediæval, c. 1100-1250
Plate 2c	Cattle metatarsal (unit 3051, box 49) mid-Mediæval, c. 1250-1400
Plate 2d	Distal equid metatarsal with anomalous marks across the articular surface (unit 761, box 23) late Mediæval, c. 1300-1450

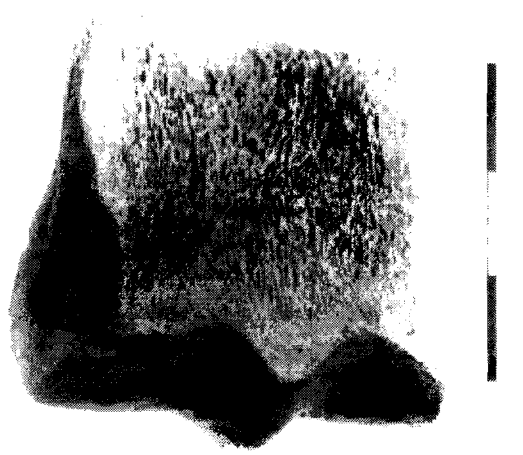
Plate 3a	Chopped red deer antler (unit 2095, box 47) early Mediæval, c. 1100-1250
Plate 3b	Dog skull (unit 783, box 24) early Mediæval, c. 1100-1250
Plate 3c	Magnified view of 3b to show the nasal bones with cut (skinning?) marks
Plate 3d	Dog mandible with cut marks (unit 6238, box 84) mid-Mediæval, c. 1250-1400

Plate 4a	Canid (small dog?) pelvis with cut marks on the acetabulum ridge possibly made during dismemberment (unit 226, box 11) early post-Mediæval, c. 1450-1550
Plate 4b	Cat mandible with cut marks (unit 246, box 12) late Mediæval, c. 1300-1450
Plate 4c	Polecat/ferret mandible (unit 684, box 22) late post-Mediæval, c. 1550-1800

1a

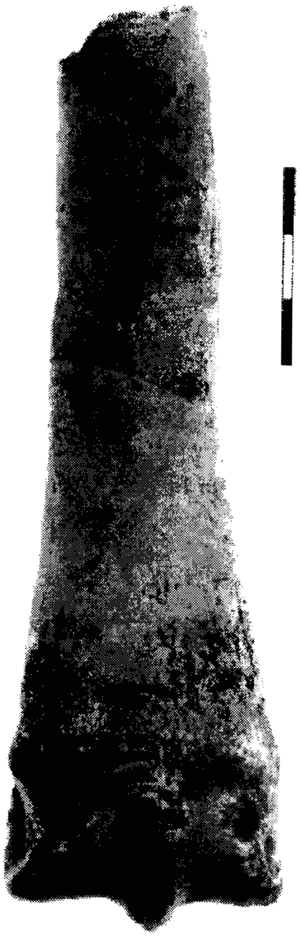
1b

1c



1d

Plate 1



2a

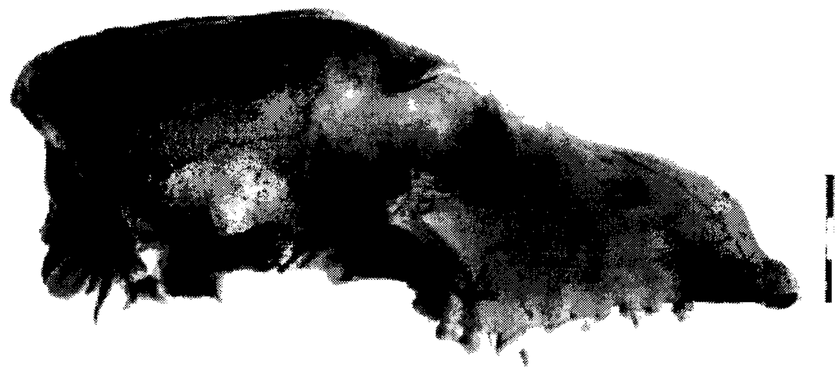
2b

2c

2d

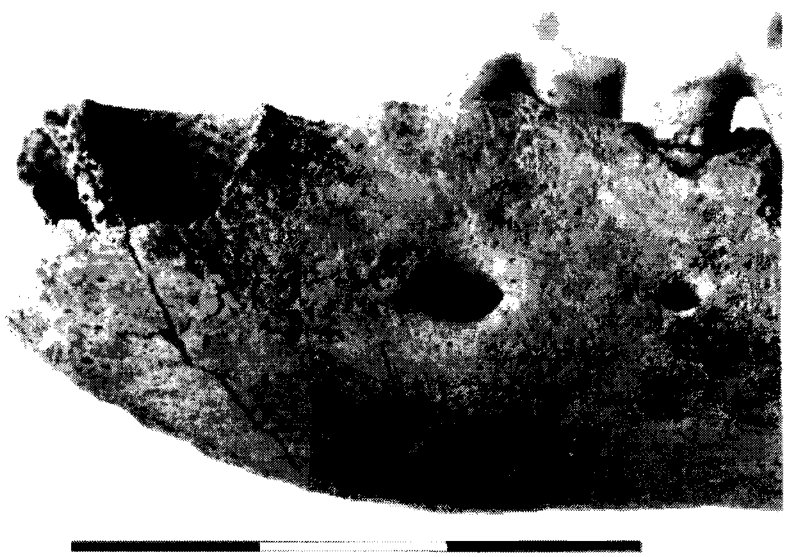
Plate 2

3a



3b

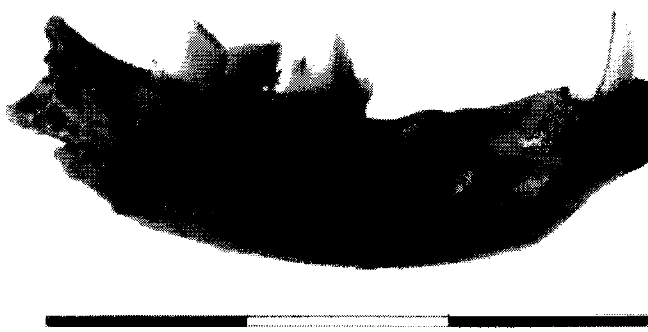
3c



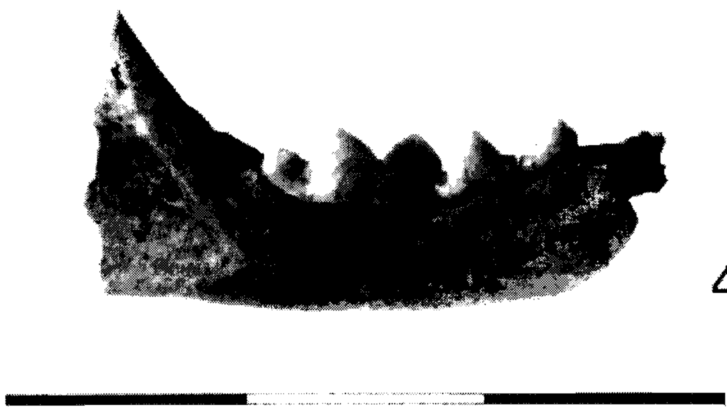
3d

Plate 3

4a



4b



4c

Plate 4

Appendix 1.

West Cotton. **Mandibular tooth wear stages** for the main species. Tooth wear stages for cattle and pig follow Grant (1982), for sheep/goat follow Payne (1973 & 1987). Mandibular wear stages for cattle and pig follow O'Connor (1988), for sheep/goat follow Payne (1973). Only mandibles with two or more teeth (with recordable wear stage) in the dP_4/P_4 - M_3 row are given. "P" = tooth present, but wear stage not recordable.

Mandibular wear stages:

Cattle & Pig:
J = Juvenile
I = Immature
S = Subadult
A = Adult
E = Elderly

Sheep/Goat:
B = 2-6 months
C = 6-12 months
D = 1-2 years
E = 2-3 years
F = 3-4 years
G = 4-6 years
H = 6-8 years
I = 8-10 years

Period	Box	Taxon	P_4	dP_4	M_1	M_2	M_3	Mandibular stage
Post Mediaeval	7	Cattle		f	H			J
Post Mediaeval	15	Cattle		f	H			J
Post Mediaeval	76	Cattle			o	m	m	E
Late Mediaeval	30	Cattle		j	f	c	C	S
Late Mediaeval	81	Cattle		k	g	b		S
Late Mediaeval	83	Cattle	b		k			A
Late Mediaeval	22	Cattle				f	b	A
Late Mediaeval	21	Cattle	g		l	k		A/E
Mid Mediaeval	29	Cattle		j	c			I
Mid Mediaeval	37	Cattle		j	c	V		I
Mid Mediaeval	17	Cattle		g	d			I
Mid Mediaeval	87	Cattle		j	f	E		I
Mid Mediaeval	36	Cattle		j	f			I/S
Mid Mediaeval	38	Cattle		j	f			I/S
Mid Mediaeval	64	Cattle		k	g	b		S
Mid Mediaeval	25	Cattle			g	b	c	A
Mid Mediaeval	86	Cattle			j	j	d	A
Mid Mediaeval	36	Cattle			k	h	d	A
Mid Mediaeval	46	Cattle				j	g	A
Mid Mediaeval	62	Cattle	f		k	k	g	A
Mid Mediaeval	19	Cattle	e		k			A/E
Mid Mediaeval	85	Cattle			l	k	j	E
Mid Mediaeval	17	Cattle	f		m	l	l	E
Mid Mediaeval	26	Cattle	g		m	l	j	E
Mid Mediaeval	32	Cattle	g		m	l	l	E
Mid Mediaeval	62	Cattle			o	m	m	E
Early Mediaeval	125	Cattle		C	V			J
Early Mediaeval	150	Cattle			H			J
Early Mediaeval	100	Cattle		j	a			J
Early Mediaeval	48	Cattle		f	b			I
Early Mediaeval	24	Cattle		f	b	C		I
Early Mediaeval	124	Cattle		j	b			I
Early Mediaeval	134	Cattle		k	c	V		I
Early Mediaeval	121	Cattle		j	f	V		I
Early Mediaeval	46	Cattle		j	g	E		I
Early Mediaeval	46	Cattle		j	g	H		I
Early Mediaeval	104	Cattle			g	H		I
Early Mediaeval	95	Cattle	f		e			I/S
Early Mediaeval	44	Cattle		j	e			I/S
Early Mediaeval	140	Cattle		j	f			I/S
Early Mediaeval	29	Cattle	a		g			I/S
Early Mediaeval	31	Cattle		m	g	g	E	S
Early Mediaeval	137	Cattle	a	j	g	b		S
Early Mediaeval	113	Cattle			j	g		S/A
Early Mediaeval	119	Cattle			j	g	c	A
Early Mediaeval	153	Cattle			j	j	g	A
Early Mediaeval	118	Cattle	d		k	g	d	A
Early Mediaeval	160	Cattle	e		k	g		A
Early Mediaeval	111	Cattle		k	k	g	b	A
Early Mediaeval	118	Cattle	g		k	g	g	A
Early Mediaeval	33	Cattle		n	k	g	b	A
Early Mediaeval	31	Cattle			l	j	g	A
Early Mediaeval	161	Cattle	f		k	j	g	A
Early Mediaeval	107	Cattle				b	c	A
Early Mediaeval	51	Cattle				g	b	A
Early Mediaeval	140	Cattle				h	c	A
Early Mediaeval	28	Cattle				j	g	A
Early Mediaeval	106	Cattle				k	g	A
Early Mediaeval	139	Cattle	e				g	A
Early Mediaeval	117	Cattle	g		l	k	g	A
Early Mediaeval	45	Cattle	f		k			A/E
Early Mediaeval	24	Cattle			l	k		A/E
Early Mediaeval	70	Cattle			l	k		A/E
Early Mediaeval	71	Cattle	f		l			A/E
Early Mediaeval	96	Cattle			l	k	j	E
Early Mediaeval	152	Cattle			l	k	l	E
Early Mediaeval	72	Cattle			k	k	j	E
Early Mediaeval	46	Cattle	f		l	k	j	E
Early Mediaeval	126	Cattle	f		l	k	j	E

Period	Box	Taxon	P_4	dP_4	M_1	M_2	M_3	Mandibular stage
Early Mediaeval	142	Cattle	f		l	k	j	E
Early Mediaeval	43	Cattle	g		l	k	j	E
Early Mediaeval	113	Cattle	g		l	k	j	E
Early Mediaeval	50	Cattle	g		l	k	k	E
Early Mediaeval	46	Cattle	j		l	k	k	E
Early Mediaeval	51	Cattle	f		l	k	k	E
Early Mediaeval	114	Cattle			m	k		E
Early Mediaeval	41	Cattle			m	l		E
Early Mediaeval	107	Cattle			m	l	l	E
Early Mediaeval	127	Cattle			m	l	l	E
Early Mediaeval	136	Cattle	g		m	k		E
Early Mediaeval	58	Cattle	g		m	l	l	E
Early Mediaeval	26	Cattle	j		m	l		E
Early Mediaeval	122	Cattle				k	j	E
Early Mediaeval	46	Cattle				k	k	E
Early Mediaeval	134	Cattle				k	k	E
Early Mediaeval	115	Cattle	f			l	P	E
Late Saxon	161	Cattle		f	E			J
Late Saxon	161	Cattle		f	E			J
Late Saxon	9	Cattle		j	c			I
Late Saxon	52	Cattle		j	c			I
Late Saxon	130	Cattle		j	f	E		I
Late Saxon	141	Cattle		m	j	f	V	S
Late Saxon	141	Cattle	f		l	k	j	E
Late Saxon	132	Cattle	g		l	k	k	E
Early Mid Saxon	157	Cattle		e	b			I
Early Mid Saxon	157	Cattle		j	c			I
Early Mid Saxon	129	Cattle		j	f	V		I
Post Mediaeval	76	Sheep		13L	0			B
Post Mediaeval	15	Sheep		14L	8A	V		C
Post Mediaeval	19	Sheep		16L	8A			C/D
Post Mediaeval	20	Sheep/Goat			9A	7A	0	D
Post Mediaeval	16	Sheep/Goat		18L	9A			D
Post Mediaeval	9	Sheep/Goat	E		9A	8A	E	D
Post Mediaeval	28	Sheep/Goat	H		9A	7A	0	D
Post Mediaeval	15	Sheep/Goat			9A	9A	9G	E
Post Mediaeval	18	Sheep/Goat	9A		9A	8A	2A	E
Post Mediaeval	18	Sheep/Goat			9A	9A		E/F
Post Mediaeval	20	Sheep/Goat	12S		9A			E/F
Post Mediaeval	20	Sheep/Goat	8A		9A	9A		E/F
Post Mediaeval	6	Sheep/Goat				9A	9G	F
Post Mediaeval	20	Sheep/Goat			9A	9A	9G	F
Post Mediaeval	22	Sheep/Goat	9A		9A	9A	7G	F
Post Mediaeval	6	Sheep/Goat	9A		9A	9A	9G	F
Post Mediaeval	88	Sheep/Goat	9A		9A	9A	9G	F
Post Mediaeval	17	Sheep/Goat	12S		11B	9A	9J	F
Post Mediaeval	17	Sheep/Goat	12S		9A	9A	9G	F
Post Mediaeval	13	Sheep/Goat	9A		11B			F/G
Post Mediaeval	82	Sheep/Goat	12S		15A	9A		F/G
Post Mediaeval	16	Sheep/Goat				9A	11G	G
Post Mediaeval	13	Sheep/Goat			10A	9A	11G	G
Post Mediaeval	18	Sheep/Goat			12A	9A	11G	G
Post Mediaeval	13	Sheep/Goat	9A		10A	9A	11G	G
Post Mediaeval	13	Sheep/Goat	9A		11B	9A	11G	G
Post Mediaeval	18	Sheep/Goat	12A		15A	9A	11G	G
Post Mediaeval	18	Sheep/Goat	12S		10A	9A	11G	G
Post Mediaeval	18	Sheep/Goat	12S		11B	9A	11G	G
Post Mediaeval	20	Sheep/Goat	12S		12A	9A	10G	G
Post Mediaeval	6	Sheep/Goat	12S		12A	9A	11G	G
Post Mediaeval	13	Sheep/Goat	14S		15A			G/H/I
Post Mediaeval	22	Sheep/Goat	12S		15A	10A	11G	H
Post Mediaeval	7	Sheep/Goat			15A	12A	13H	I
Late Mediaeval	14	Sheep		14L	6A			C
Late Mediaeval	79	Sheep		14L	6A	V		C
Late Mediaeval	20	Sheep		16L	6A			C

Period	Box	Taxon	P_4	dP_4	M_1	M_2	M_3	Mandibular stage
Late Mediaeval	12	Sheep		16L	7A			C/D
Late Mediaeval	77	Sheep			9A	6A		D
Late Mediaeval	36	Sheep		17L	9A	2A		D
Late Mediaeval	17	Sheep/Goat			9A	9A	7A	E
Late Mediaeval	21	Sheep/Goat	8A		9A	8A	5A	E
Late Mediaeval	21	Sheep/Goat	8B		9A	9A		E/F
Late Mediaeval	12	Sheep/Goat	9A		9A			E/F
Late Mediaeval	79	Sheep/Goat	9A		12A	9A	8G	F
Late Mediaeval	21	Sheep/Goat				9A	9G	F
Late Mediaeval	79	Sheep/Goat	8A		10A	9A		F
Late Mediaeval	29	Sheep/Goat	9A		9A	8A	7G	F
Late Mediaeval	33	Sheep/Goat	9A		9A	9A	9G	F
Late Mediaeval	8	Sheep/Goat	10A		12A	9A	9G	F
Late Mediaeval	25	Sheep/Goat	11S		10A	9A	9G	F
Late Mediaeval	46	Sheep/Goat	11S		9A	9A	10H	F
Late Mediaeval	21	Sheep/Goat	11S		10A			F/G
Late Mediaeval	79	Sheep/Goat	11S		12A	9A		F/G
Late Mediaeval	81	Sheep/Goat	12S		14A			F/G
Late Mediaeval	30	Sheep/Goat	12S		12A			F/G
Late Mediaeval	21	Sheep/Goat				9A	11G	G
Late Mediaeval	81	Sheep/Goat	12S		11B	9A	11G	G
Late Mediaeval	12	Sheep/Goat	12S		12A		11G	G
Late Mediaeval	21	Sheep/Goat	12S		12A	9A	11G	G
Late Mediaeval	21	Sheep/Goat			13B	9A	11G	G
Late Mediaeval	35	Sheep/Goat	12S		15A			G/H
Late Mediaeval	81	Sheep/Goat				10A	11G	H
Late Mediaeval	17	Sheep/Goat			14A	10A	11G	H
Late Mediaeval	15	Sheep/Goat	15A			15A	12G	I
Mid Mediaeval	25	Sheep		14L	H			B
Mid Mediaeval	13	Sheep		14L	6A	C		C
Mid Mediaeval	39	Sheep		14L	8B	E		C
Mid Mediaeval	25	Sheep		14L	7A			C/D
Mid Mediaeval	36	Sheep		16L	8A			C/D
Mid Mediaeval	108	Sheep		16L	8A			C/D
Mid Mediaeval	77	Sheep		18L	8A			C/D
Mid Mediaeval	26	Sheep		13L	9A	7A		D
Mid Mediaeval	39	Sheep		22L	9A	6A		D
Mid Mediaeval	61	Sheep		22L	9A	7A	0	D
Mid Mediaeval	63	Sheep/Goat				7A	E	D
Mid Mediaeval	58	Sheep/Goat	V		9A	7A		D
Mid Mediaeval	84	Sheep/Goat	8B		9A	5A		D
Mid Mediaeval	17	Sheep/Goat	0		9A	7A		D
Mid Mediaeval	14	Sheep/Goat	E		9A	8A		E
Mid Mediaeval	84	Sheep/Goat	E		9A	8A		E
Mid Mediaeval	64	Sheep/Goat	2B		9A	9A		E
Mid Mediaeval	22	Sheep/Goat	5B		9A	7A		E
Mid Mediaeval	35	Sheep/Goat				8A	6A	E
Mid Mediaeval	35	Sheep/Goat	6A		9A	9A	7A	E
Mid Mediaeval	29	Sheep/Goat	8A		9A	9A	6A	E
Mid Mediaeval	35	Sheep/Goat	9A		9A	9A	5A	E
Mid Mediaeval	30	Sheep/Goat	6A		9A	8A	2A	E
Mid Mediaeval	86	Sheep/Goat	7A		9A			E/F
Mid Mediaeval	110	Sheep/Goat	7A		9A	9A		E/F
Mid Mediaeval	91	Sheep/Goat	9A		9A	8A		E/F
Mid Mediaeval	14	Sheep/Goat	8A		9A			E/F
Mid Mediaeval	37	Sheep/Goat	12S			9A		E/F/G
Mid Mediaeval	88	Sheep/Goat				9A	8G	F
Mid Mediaeval	6	Sheep/Goat				9A	9G	F
Mid Mediaeval	66	Sheep/Goat			9A	9A	10H	F
Mid Mediaeval	36	Sheep/Goat	8A		9A	9A	6G	F
Mid Mediaeval	84	Sheep/Goat	9A		10A	9A	9G	F
Mid Mediaeval	88	Sheep/Goat	9A		11B	9A	9H	F
Mid Mediaeval	17	Sheep/Goat	9A		9A	8A	8G	F
Mid Mediaeval	37	Sheep/Goat	9A		9A	8A	8G	F
Mid Mediaeval	32	Sheep/Goat	9A		9A	9A	7G	F
Mid Mediaeval	40	Sheep/Goat	9A		9A	9A	8G	F
Mid Mediaeval	6	Sheep/Goat	9A		9A	9A	9G	F
Mid Mediaeval	25	Sheep/Goat	9A		9A	9A	9G	F
Mid Mediaeval	37	Sheep/Goat	9A		9A	9A	9G	F
Mid Mediaeval	37	Sheep/Goat	9A		9A	9A	9G	F
Mid Mediaeval	62	Sheep/Goat	9A		9A	9A	9G	F

Period	Box	Taxon	P_4	dP_4	M_1	M_2	M_3	Mandibular stage
Mid Mediaeval	10	Sheep/Goat	11S		10A	9A	10G	F
Mid Mediaeval	88	Sheep/Goat	11S		11A	9A	8G	F
Mid Mediaeval	61	Sheep/Goat	11S		12A	9A	9G	F
Mid Mediaeval	48	Sheep/Goat	11S		9A	9A	9G	F
Mid Mediaeval	25	Sheep/Goat	12S		14B	10A	10G	F
Mid Mediaeval	62	Sheep/Goat	12S		9A	9A	10H	F
Mid Mediaeval	85	Sheep/Goat			15A	10A		F/G
Mid Mediaeval	80	Sheep/Goat	9A		11B			F/G
Mid Mediaeval	39	Sheep/Goat	9A		11B	9A		F/G
Mid Mediaeval	108	Sheep/Goat	11S		11A			F/G
Mid Mediaeval	39	Sheep/Goat	12S		11B	9A		F/G
Mid Mediaeval	87	Sheep/Goat				9A	11G	G
Mid Mediaeval	77	Sheep/Goat			12A	9A	11G	G
Mid Mediaeval	37	Sheep/Goat			13A	9A	11G	G
Mid Mediaeval	86	Sheep/Goat			14A	9A	11G	G
Mid Mediaeval	39	Sheep/Goat			15A	9A	11G	G
Mid Mediaeval	65	Sheep/Goat	9A		15A	9A	11G	G
Mid Mediaeval	35	Sheep/Goat	12S		10A	9A	11G	G
Mid Mediaeval	35	Sheep/Goat	12S		11B	9A	11G	G
Mid Mediaeval	26	Sheep/Goat	15A		15A	10A		G/H
Mid Mediaeval	108	Sheep/Goat	15A		15A			G/H/I
Mid Mediaeval	39	Sheep/Goat	12S		15A	10A	11G	H
Mid Mediaeval	37	Sheep/Goat				12A	11G	H
Mid Mediaeval	37	Sheep/Goat	14S		15A	12A	11G	H
Mid Mediaeval	15	Sheep/Goat	14S		15A	12A		H/I
Early Mediaeval	117	Sheep		13L	H	C		B
Early Mediaeval	48	Sheep		13L	8A			C
Early Mediaeval	42	Sheep		14L	2A			C
Early Mediaeval	49	Sheep		14L	3A			C
Early Mediaeval	101	Sheep		14L	5A			C
Early Mediaeval	26	Sheep		14L	5B			C
Early Mediaeval	105	Sheep		14L	6A			C
Early Mediaeval	46	Sheep		14L	6A	C		C
Early Mediaeval	135	Sheep		14L	7A	E		C
Early Mediaeval	92	Sheep		14L	8A	E		C
Early Mediaeval	47	Sheep		16L	5A			C
Early Mediaeval	42	Sheep		18L	8A	E		C
Early Mediaeval	161	Sheep		16L	7A			C/D
Early Mediaeval	27	Sheep		16L	8A			C/D
Early Mediaeval	113	Sheep		16L	8A			C/D
Early Mediaeval	45	Sheep		17L	8A			C/D
Early Mediaeval	113	Sheep		17L	8A			C/D
Early Mediaeval	72	Sheep		13L	2A			D
Early Mediaeval	110	Sheep		14L	7A	2A		D
Early Mediaeval	110	Sheep		14L	8A	2A		D
Early Mediaeval	137	Sheep		17L	9A			D
Early Mediaeval	142	Sheep?	0	20L	9A	7A		D
Early Mediaeval	34	Sheep		21L	9A			D
Early Mediaeval	40	Sheep		22L	9A	2A		D
Early Mediaeval	136	Sheep		22L	9A	7A		D
Early Mediaeval	41	Sheep		23L	9A	2A		D
Early Mediaeval	40	Sheep/Goat		17L	8A			D
Early Mediaeval	48	Sheep/Goat				5A	V	D
Early Mediaeval	44	Sheep/Goat			9A	2A		D
Early Mediaeval	100	Sheep/Goat			9A	2A		D
Early Mediaeval	138	Sheep/Goat	C		9A	7A	V	D
Early Mediaeval	30	Sheep/Goat	E		9A	7A		D
Early Mediaeval	135	Sheep/Goat	V		9A	6A		D
Early Mediaeval	48	Sheep/Goat	V		9A	7A		D
Early Mediaeval	29	Sheep/Goat	V		9A	P		D
Early Mediaeval	58	Sheep/Goat	0		9A	7A		D
Early Mediaeval	41	Sheep/Goat			9A	8A	E	D
Early Mediaeval	161	Sheep		21M	9A	8A		D/E
Early Mediaeval	27	Sheep		23L	9A	8A		D/E
Early Mediaeval	44	Sheep		23L	9A	9A	1B	E
Early Mediaeval	44	Sheep		23L	9A	9A	1B	E
Early Mediaeval	153	Sheep/Goat	9A		9A	9A	2A	E
Early Mediaeval	33	Sheep/Goat	8A		9A	9A	4A	E
Early Mediaeval	30	Sheep/Goat	8A		9A	9A	5A	E
Early Mediaeval	103	Sheep/Goat	8A		9A	9A	5A	E
Early Mediaeval	105	Sheep/Goat	9A		9A	8A	7A	E

Period	Box	Taxon	P_4	dP_4	M_1	M_2	M_3	Mandibular stage
Early Mediaeval	136	Sheep/Goat				9A	5A	E
Early Mediaeval	113	Sheep/Goat	E		9A	8A		E
Early Mediaeval	112	Sheep/Goat	7A		9A	8A		E/F
Early Mediaeval	128	Sheep/Goat	8A		9A	9A		E/F
Early Mediaeval	102	Sheep/Goat	8A		9A	9A	P	E/F
Early Mediaeval	40	Sheep/Goat	9A		9A	9A		E/F
Early Mediaeval	94	Sheep/Goat	8A		9A	P	P	E/F
Early Mediaeval	10	Sheep/Goat				8A	8G	F
Early Mediaeval	43	Sheep/Goat	9A		9A	9A	10G	F
Early Mediaeval	47	Sheep/Goat				9A	10G	F
Early Mediaeval	58	Sheep/Goat			9A	9A	8G	F
Early Mediaeval	101	Sheep/Goat			10A	9A	9G	F
Early Mediaeval	23	Sheep/Goat	8A		9A	9A	9G	F
Early Mediaeval	96	Sheep/Goat	9A		11B	11B	8G	F
Early Mediaeval	105	Sheep/Goat	9A		12A	9A	8G	F
Early Mediaeval	69	Sheep/Goat	9A		12A	9A	9G	F
Early Mediaeval	8	Sheep/Goat	9A		9A	9A	8G	F
Early Mediaeval	138	Sheep/Goat	9A		9A	9A	8G	F
Early Mediaeval	154	Sheep/Goat	11S		10A	9A	9G	F
Early Mediaeval	137	Sheep/Goat	11S		9A	9A	9G	F
Early Mediaeval	46	Sheep/Goat	12S		10A	9A	8G	F
Early Mediaeval	103	Sheep/Goat			10A	9A		F/G
Early Mediaeval	19	Sheep/Goat	9A		10A			F/G
Early Mediaeval	121	Sheep/Goat				9A	11G	G
Early Mediaeval	126	Sheep/Goat				9A	11G	G
Early Mediaeval	146	Sheep/Goat				9A	11G	G
Early Mediaeval	126	Sheep/Goat			11B	9A	11G	G
Early Mediaeval	8	Sheep/Goat			15A	9A	10G	G
Early Mediaeval	32	Sheep/Goat			15A	9A	11G	G
Early Mediaeval	112	Sheep/Goat			15A	9A	11G	G
Early Mediaeval	46	Sheep/Goat	9A		15A	9A	11G	G
Early Mediaeval	63	Sheep/Goat	11S		12A	9A	11G	G
Early Mediaeval	72	Sheep/Goat	11S		12A	9A	11G	G
Early Mediaeval	135	Sheep/Goat	11S		14A	9A	11G	G
Early Mediaeval	50	Sheep/Goat	11S		15A	9A	11G	G
Early Mediaeval	43	Sheep/Goat	12S		10A	9A	11G	G
Early Mediaeval	31	Sheep/Goat	12S		12A	9A	10G	G
Early Mediaeval	31	Sheep/Goat	12S		12A	9A	11G	G
Early Mediaeval	49	Sheep/Goat	12S		14A	9A	11G	G
Early Mediaeval	42	Sheep/Goat	12S		15A	9A		G
Early Mediaeval	102	Sheep/Goat	12S		15A	9A	11G	G
Early Mediaeval	92	Sheep/Goat				10A	11G	H
Early Mediaeval	135	Sheep/Goat				10A	11G	H
Early Mediaeval	44	Sheep/Goat			15A	10A	11G	H
Early Mediaeval	127	Sheep/Goat	11S		15A	10A	11G	H
Early Mediaeval	31	Sheep/Goat	12S		15A	10A		H
Early Mediaeval	33	Sheep/Goat	12S		15A	10A	11G	H
Early Mediaeval	10	Sheep/Goat	14S		15A	10A	11G	H
Early Mediaeval	105	Sheep/Goat	14S		15A	11A	11G	H
Early Mediaeval	30	Sheep/Goat	14S		15A	11B	11G	H
Early Mediaeval	92	Sheep/Goat	14S		15A	12A	11G	H
Early Mediaeval	42	Sheep/Goat	15A		15A	15A		H/I
Early Mediaeval	71	Sheep/Goat	14S		15A	12A	12G	I
Late Saxon	105	Sheep		13L	7A			C
Late Saxon	162	Sheep/Goat	6A		9A			E/F
Late Saxon	105	Sheep/Goat	7A		9A			E/F
Late Saxon	105	Sheep/Goat	8A		P	9A	10G	F
Late Saxon	9	Sheep/Goat	12S		14A			F/G
Early Mid Saxon	139	Sheep		17L	9A	6A	0	D
Early Mid Saxon	104	Sheep		23L	9A			D/E
Late Mediaeval	16	Pig	V			a		I
Mid Mediaeval	19	Pig	E		d	a		I
Mid Mediaeval	48	Pig	a		e	a		I
Mid Mediaeval	35	Pig	b		f	a		I

Period	Box	Taxon	P_4	dP_4	M_1	M_2	M_3	Mandibular stage
Mid Mediaeval	39	Pig	a		e			I/S
Mid Mediaeval	58	Pig	a		h			I/S
Mid Mediaeval	85	Pig				d	H	S
Mid Mediaeval	91	Pig			h	e		S
Mid Mediaeval	62	Pig			j	e	a	S
Mid Mediaeval	21	Pig	b		g	c		S
Mid Mediaeval	87	Pig	b		h	c		S
Mid Mediaeval	63	Pig	b		h	d	E	S
Mid Mediaeval	80	Pig	P			g	b	A
Mid Mediaeval	111	Pig	f		l	h	b	A
Early Mediaeval	30	Pig		e	H			J
Early Mediaeval	101	Pig		f	C	H		J
Early Mediaeval	101	Pig		g	C	H		J
Early Mediaeval	14	Pig				a	C	I
Early Mediaeval	123	Pig			d	E	C	I
Early Mediaeval	30	Pig			d	a		I
Early Mediaeval	117	Pig			d	a		I
Early Mediaeval	118	Pig			f	a		I
Early Mediaeval	127	Pig			h	a		I
Early Mediaeval	103	Pig		g	b			I
Early Mediaeval	125	Pig		g	c			I
Early Mediaeval	117	Pig		j	a			I
Early Mediaeval	145	Pig		k	d	V		I
Early Mediaeval	95	Pig	V		e	a		I
Early Mediaeval	14	Pig	a		e			I/S
Early Mediaeval	95	Pig	a		h			I/S
Early Mediaeval	110	Pig	b		f			I/S
Early Mediaeval	151	Pig	b		f			I/S
Early Mediaeval	134	Pig				e	a	S
Early Mediaeval	160	Pig				e	a	S
Early Mediaeval	34	Pig				g	a	S
Early Mediaeval	127	Pig			g	c		S
Early Mediaeval	120	Pig			h	e	a	S
Early Mediaeval	88	Pig	C		l	f	a	S
Early Mediaeval	138	Pig	a			c		S
Early Mediaeval	118	Pig	a		e	c	E	S
Early Mediaeval	103	Pig	a		h	b	E	S
Early Mediaeval	103	Pig	a		h	e	a	S
Early Mediaeval	125	Pig	b		d	c		S
Early Mediaeval	155	Pig	b		h	d		S
Early Mediaeval	26	Pig	b		j	e	H	S
Early Mediaeval	94	Pig	b		j	e	H	S
Early Mediaeval	42	Pig	c		m	f	a	S
Early Mediaeval	150	Pig	g		e			S
Early Mediaeval	116	Pig				f	b	A
Early Mediaeval	114	Pig				h	d	A
Early Mediaeval	46	Pig	d		m	h	b	A
Early Mediaeval	115	Pig	e		k	a	c	A
Early Mediaeval	71	Pig	f		m	h	c	A
Early Mediaeval	113	Pig	f		m	m	f	A
Late Saxon	112	Pig			e	a		I
Late Saxon	17	Pig	a		g	a		I
Late Saxon	104	Pig		l	c	V		I
Late Saxon	162	Pig	a		f			I/S
Late Saxon	162	Pig	d		h			I/S
Late Saxon	112	Pig				d	a	S

Appendix 2.

West Cotton. **Measurements** of vertebrate bones and teeth, arranged by taxon, part of skeleton and period. All measurements are in tenths of a millemetre. See text for an explanation of how measurements are taken. Measurements are given in the following order: horncores, teeth, postcranial bones.

Key:

Taxa (TAX) are coded as follows:

B *Bos* (cattle)
O *Ovis/Capra* (sheep/goat)
OVA *Ovis* (sheep)
CAH *Capra* (goat)
S *Sus* (pig)
EQ *Equidae* (equid)
CEE *Cervus elaphus* (red deer)
LE *Lepus* (hare)
LEE *Lepus europaeus* (brown hare)
ORC *Oryctolagus cuniculus* (rabbit)
RA *Rattus* (rat)
ART *Arvicola terrestris* (water vole)
RAV *Rattus/Arvicola terrestris*
CAS *Castor fiber* (beaver)
CAF *Canis familiaris* (dog)
FEC *Felis catus* (cat)
MUP *Mustela putorius* (polecat/ferret)
MUX *Mustela erminea/nivalis*(stoat/weasel)
ERE *Erinacaeus europaeus* (hedgehog)
TAL *Talpa* (mole)
AMP *Anura* (frog/toad)
GAG *Gallus gallus* (chicken)
GNP *Gallus/Numida/Phasianus* (chicken/guinea fowl/pheasant)
GN *Gallus/Numida*
GP *Gallus/Phasianus*
ANA *Anas* (duck)
ANS *Anser* (goose)
COL *Columba* (pigeon/dove)
TU *Turdus* (turdid)
CO *Corvus frugilegus/corone* (rook/crow)
MIM *Milvus milvus* (red kite)
FAL *Falco* (?kestrel)

The following taxa are also mentioned in this report, but they did not have any measurable element:

Dama dama (fallow deer)
Capreolus capreolus (roe deer)
Vulpes vulpes (fox)
Mus musculus (house mouse)
Apodemus sylvaticus (wood mouse)
Apodemus flavicollis (yellow-necked mouse)
Clethrionomys glareolus (bank vole)
Microtus agrestis (field vole)
Sorex araneus (common shrew)
Gallinago gallinago (snipe)
Pluvialis apricaria (golden plover)
Pluvialis squatarola (grey plover)
Vanellus vanellus (lapwing)
Phalacrocorax aristotelis (cormorant)
Buteo buteo (buzzard)
Accipiter nisus (sparrowhawk)
Rana (frog)
Bufo (toad)
Anguilla anguilla (eel)
Perca fluviatilis (perch)
Molva molva (ling)
Clupea harengus (herring)
Cyprinidae (cyprinid)

Parts of skeleton (ELEM) are coded as follows:

HC horncore (antler in deer)
CO coracoid
SC scapula
HU humerus
RA radius
MC metacarpal (carpometacarpus in birds)
PE pelvis
FE femur
TI tibia (tibiotarsus in birds)
AS astragalus
CA calcaneum
MT metatarsal (tarsometatarsus in birds)
MP metapodial
P1 1st phalanx

Periods (PER) are coded as follows:

LPMED late postmediaeval
EPMED early postmediaeval
LMED late mediaeval
MMED mid mediaeval
EMED early mediaeval
LSAX late Saxon
SAXN early-mid Saxon

Epiphysial fusion/age (FUS) is coded as follows:

F fused
H fused/fusing
G fusing
UM unfused metaphysis
UE unfused epiphysis

Pig canines (SEX) are coded as follows:

AF female alveolus
AM male alveolus
F female canine
M male canine

The presence/absence of a spur on a bird tarsometatarsus is coded as follows:

A absent
P present
S scar

Approximate measurements are designated:

c - within 0.2 mm
e - within 0.5 mm

PER	BOX	UN	ELEM	TAX	L	W_{max}	W_{min}
LMED	27	6116	HC	B		346	288
LMED	91	4264	HC	B		400	272
MMED	39	1620	HC	B		336	312
EMED	25	858	HC	B	844	346	
EMED	31	1257	HC	B	c 1132	462	354
EMED	42	1696	HC	B		509	
EMED	100	4419	HC	B		568	497
EMED	113	6505	HC	B		534	437
EMED	120	6552	HC	B	1514	c 552	451
EMED	138	4884	HC	B		c 407	
EMED	142	5621	HC	B		402	266
EMED	150	7000	HC	B	1045	404	332
LSAX	104	4472	HC	B		373	294
LSAX	130	6762	HC	B		447	360
LSAX	135	4614	HC	B		500	436
LPMED	76	6000	HC	OVA	c 533	218	177
EPMED	28	1098	HC	OVA	869	323	186
EPMED	82	6168	HC	OVA		262	
LMED	11	243	HC	OVA			155
LMED	11	243	HC	OVA		307	202
LMED	13	288	HC	OVA		306	197
LMED	29	1152	HC	OVA		304	175
MMED	25	837	HC	OVA		273	185
MMED	26	992	HC	OVA		e 510	333
EMED	14	337	HC	OVA		293	187
EMED	24	783	HC	OVA	c 553	248	197
EMED	27	1047	HC	OVA	e 1320	605	392
EMED	32	1349	HC	OVA	e 730	291	234
EMED	41	1661	HC	OVA		315	204
EMED	98	4375	HC	OVA	e 1500	558	351
EMED	110	6450	HC	OVA		311	204
EMED	114	6513	HC	OVA	e 1440	499	370
EMED	127	6661	HC	OVA	626	262	169
EMED	134	4608	HC	OVA	947	321	203
EMED	137	4801	HC	OVA		256	c 165
EMED	139	4921	HC	OVA		323	220
LSAX	47	2047	HC	OVA		471	342
SAXN	158	7109	HC	CAH		294	c 185
MMED	25	839	HC	CEE		363	355
EMED	47	2095	HC	CEE		468	336

PER	BOX	UN	TAX	M_3L	M_3WA
EPMED	15	353	B	c 392	c 154
EPMED	76	6003	B	390	157
EPMED	82	6168	B		152
EPMED	82	6168	B	353	157
LMED	12	246	B	373	161
LMED	20	620	B	347	161
LMED	22	686	B		162
LMED	29	1153	B	336	145
LMED	61	4159	B	380	152
LMED	64	4224	B	359	156
LMED	81	6156	B	346	152
LMED	81	6164	B	315	131
LMED	83	6195	B	370	157
LMED	83	6195	B		155
MMED	17	449	B		139
MMED	23	759	B		142
MMED	25	860	B	356	152
MMED	26	992	B	c 333	
MMED	32	1275	B	390	157
MMED	33	1440	B	346	156
MMED	36	1543	B		155
MMED	36	1544	B	336	142
MMED	37	1553	B	382	161
MMED	37	1567	B		145
MMED	37	1571	B	377	168
MMED	39	1644	B	340	154
MMED	46	1567	B	c 380	162
MMED	48	3043	B	354	155
MMED	61	4158	B		147
MMED	62	4165	B	351	140
MMED	62	4165	B	325	148
MMED	62	4168	B	351	156
MMED	77	6004	B		141
MMED	85	6247	B	360	161
MMED	85	6254	B	317	145
MMED	86	6262	B	366	162
MMED	86	6262	B	371	156
MMED	87	6291	B	380	167
EMED	10	171	B		162
EMED	24	783	B	331	155
EMED	24	783	B	346	155
EMED	24	783	B	347	133
EMED	26	901	B		85
EMED	27	1042	B	360	156
EMED	28	1111	B	371	155
EMED	31	1245	B	340	135
EMED	31	1264	B	347	147
EMED	32	1349	B	350	159
EMED	40	4040	B		170
EMED	42	1696	B	358	155
EMED	43	1716	B	c 364	168
EMED	45	2007	B	333	155
EMED	46	2032	B		141
EMED	46	2037	B		144
EMED	46	2037	B	377	154
EMED	46	2038	B	387	153
EMED	47	2045	B	346	
EMED	47	2049	B		152
EMED	47	2049	B	c 327	128
EMED	50	3099	B		148
EMED	51	3099	B	333	131
EMED	51	3101	B	343	146
EMED	58	149	B	353	145
EMED	69	5017	B	343	141
EMED	69	5017	B	358	147
EMED	72	5007	B	343	151
EMED	95	4339	B	363	147
EMED	96	4358	B	303	128
EMED	106	4519	B	338	153
EMED	107	5360	B		164
EMED	111	6456	B	337	151
EMED	113	6504	B	361	157
EMED	115	6526	B		137

Per	BOX	UN	TAX	M3L	M3WA
EMED	116	6532	B	335	149
EMED	117	6540	B	357	135
EMED	118	6540	B		166
EMED	118	6542	B	336	152
EMED	119	6545	B	369	154
EMED	124	6603	B	366	162
EMED	125	6604	B	320	144
EMED	125	6612	B	363	150
EMED	127	6733	B	350	152
EMED	134	4608	B		154
EMED	139	4921	B	382	158
EMED	140	5574	B	352	155
EMED	142	5623	B	c 377	c 171
EMED	152	7054	B	342	140
EMED	153	7068	B	345	162
EMED	154	7075	B	341	159
EMED	155	7077	B	346	150
EMED	161	7222	B	332	147
LSAX	132	4494	B		144
LSAX	141	5609	B	340	144
LSAX	141	5609	B	397	169
LSAX	143	5625	B	363	156

PER	BOX	UN	TAX	dP_4W	M_1W	M_2W	M_3W	$M_{1/2}W$
LPMED	6	5	O				82	
LPMED	6	6	O					79
LPMED	6	6	O					82
LPMED	6	6	O					83
LPMED	6	6	O			88	87	
LPMED	6	6	O		79	88	87	
LPMED	13	263	O					70
LPMED	13	263	O		68	80	84	
LPMED	13	263	O		72	83	82	
LPMED	13	263	O		75			
LPMED	13	263	O		73	84	85	
LPMED	13	294	O		75			
LPMED	15	347	O				80	
LPMED	15	347	O		72	77	79	
LPMED	19	497	O				72	
LPMED	19	571	O					67
LPMED	19	571	O					84
LPMED	19	571	O				80	
LPMED	22	684	O				87	
LPMED	22	684	O				82	
LPMED	22	684	O		73	83	85	
LPMED	22	684	O		75	82	84	
LPMED	25	802	O					77
LPMED	25	802	O					84
LPMED	25	802	O				86	
LPMED	76	6000	O					71
LPMED	19	497	OVA	63	73			
LPMED	19	571	OVA	61				
LPMED	19	571	OVA	62				
EPMED	6	3	O					72
EPMED	6	3	O					76
EPMED	6	3	O					76
EPMED	6	3	O					81
EPMED	6	3	O				84	
EPMED	6	3	O		70	82	81	
EPMED	7	4	O					82
EPMED	7	4	O					71
EPMED	7	4	O					74
EPMED	7	4	O					76
EPMED	7	4	O					78
EPMED	7	4	O					68
EPMED	7	4	O					72
EPMED	7	4	O					73
EPMED	7	4	O					75
EPMED	7	4	O					76
EPMED	7	4	O					77
EPMED	7	4	O					77
EPMED	7	4	O					78
EPMED	7	4	O					79
EPMED	7	4	O					80
EPMED	7	4	O				77	
EPMED	7	4	O				79	
EPMED	7	4	O				88	
EPMED	7	4	O				83	
EPMED	7	4	O		62	77	73	
EPMED	9	70	O					82
EPMED	9	70	O					75
EPMED	9	70	O					69
EPMED	9	70	O					73
EPMED	9	70	O					77
EPMED	9	70	O					78
EPMED	9	70	O					78
EPMED	9	70	O					80
EPMED	9	70	O				75	
EPMED	9	70	O				84	
EPMED	9	70	O				78	
EPMED	9	70	O				81	
EPMED	9	70	O				91	
EPMED	9	70	O		69	77		
EPMED	10	216	O					78
EPMED	10	217	O				87	
EPMED	11	222	O					76
EPMED	11	222	O					85
EPMED	11	222	O				84	
EPMED	11	226	O				85	

PER	BOX	UN	TAX	dP_4W	M_1W	M_2W	M_3W	$M_{1/2}W$
EPMED	13	296	O					78
EPMED	13	296	O					81
EPMED	13	296	O					69
EPMED	13	296	O					69
EPMED	13	296	O					74
EPMED	13	296	O					84
EPMED	13	296	O				87	
EPMED	13	296	O	63				
EPMED	13	296	O					75
EPMED	15	350	O					82
EPMED	16	390	O					79
EPMED	16	390	O					68
EPMED	16	390	O					79
EPMED	16	390	O					72
EPMED	16	390	O					82
EPMED	16	390	O					82
EPMED	16	390	O					84
EPMED	16	390	O					87
EPMED	16	390	O					68
EPMED	16	390	O					71
EPMED	16	390	O					74
EPMED	16	390	O					77
EPMED	16	390	O					77
EPMED	16	390	O					83
EPMED	16	390	O				83	
EPMED	16	390	O				89	
EPMED	16	390	O				78	
EPMED	16	390	O				76	
EPMED	16	390	O				78	
EPMED	16	390	O				80	
EPMED	16	390	O			82	82	
EPMED	16	390	O	64	74			
EPMED	16	391	O					81
EPMED	17	431	O		75	77	81	
EPMED	17	431	O		74	79	82	
EPMED	18	458	O					74
EPMED	18	458	O					68
EPMED	18	458	O					78
EPMED	18	458	O					87
EPMED	18	466	O					76
EPMED	18	466	O					68
EPMED	18	466	O					78
EPMED	18	466	O					68
EPMED	18	466	O					71
EPMED	18	466	O				82	
EPMED	18	466	O				78	
EPMED	18	466	O				68	
EPMED	18	466	O		71	78	81	
EPMED	18	466	O		68	75	73	
EPMED	18	466	O		73	82	81	
EPMED	18	466	O		79	85		
EPMED	18	466	O		70	80	82	
EPMED	18	466	O		73	81	82	
EPMED	18	469	O					89
EPMED	20	575	O		67	75		
EPMED	20	575	O		76	84	86	
EPMED	20	575	O		69	79	81	
EPMED	20	575	O		74			
EPMED	20	576	O		81	88		
EPMED	20	590	O					81
EPMED	20	590	O					75
EPMED	20	613	O					75
EPMED	21	680	O					85
EPMED	21	680	O				86	
EPMED	28	1056	O				78	
EPMED	28	1056	O		76	78	83	
EPMED	29	1131	O				78	
EPMED	34	1476	O					70
EPMED	48	3038	O					70
EPMED	48	3038	O				88	
EPMED	76	6003	O					85
EPMED	76	6003	O					75
EPMED	81	6167	O				86	
EPMED	81	6167	O				86	
EPMED	82	6168	O					72
EPMED	82	6168	O					73

PER	BOX	UN	TAX	dP_4W	M_1W	M_2W	M_3W	$M_{1/2}W$
EPMED	82	6168	O					84
EPMED	82	6168	O					62
EPMED	82	6168	O					74
EPMED	82	6168	O					84
EPMED	82	6168	O				74	
EPMED	82	6168	O				82	
EPMED	82	6168	O				77	
EPMED	82	6168	O				83	
EPMED	82	6168	O		74	83		
EPMED	84	6203	O					85
EPMED	84	6203	O				78	
EPMED	84	6232	O					84
EPMED	88	296	O		76	85	88	
EPMED	110	6442	O					70
EPMED	110	6442	O					84
EPMED	6	3	OVA	72				
EPMED	7	4	OVA	62				
EPMED	7	4	OVA	71				
EPMED	15	350	OVA	69	73			
EPMED	18	466	OVA	64				
EPMED	76	6003	OVA	67	85			
LMED	8	10	O		77	81	82	
LMED	11	243	O					89
LMED	11	243	O					86
LMED	11	243	O					90
LMED	11	244	O					85
LMED	11	244	O					71
LMED	11	244	O					83
LMED	11	244	O				79	
LMED	12	246	O					77
LMED	12	246	O					71
LMED	12	246	O					73
LMED	12	246	O					80
LMED	12	246	O					84
LMED	12	246	O				82	
LMED	12	246	O				78	
LMED	12	249	O					77
LMED	12	249	O					82
LMED	12	249	O					80
LMED	12	249	O				85	
LMED	12	249	O				80	
LMED	12	249	O		80			
LMED	12	249	O		64		83	
LMED	13	288	O					72
LMED	13	288	O					83
LMED	14	297	O				78	
LMED	14	341	O				80	
LMED	14	343	O					74
LMED	14	343	O					65
LMED	15	365	O			c 78	87	
LMED	16	402	O				79	
LMED	17	418	O					76
LMED	17	419	O		76	80	84	
LMED	17	447	O					75
LMED	17	447	O					80
LMED	17	447	O					72
LMED	17	447	O					75
LMED	17	447	O					81
LMED	17	447	O		65	75	80	
LMED	18	475	O					73
LMED	19	539	O					76
LMED	19	549	O					70
LMED	19	549	O					79
LMED	19	549	O				86	
LMED	20	591	O				84	
LMED	20	624	O					81
LMED	20	624	O					83
LMED	20	624	O					76
LMED	20	624	O					76
LMED	20	624	O					79
LMED	20	624	O				83	
LMED	21	636	O		75	86	90	
LMED	21	646	O			77	85	
LMED	21	650	O					70
LMED	21	650	O					82

PER	BOX	UN	TAX	dP_4W	M_1W	M_2W	M_3W	$M_{1/2}W$
LMED	21	652	OVA	70				
LMED	28	1058	OVA	65				
LMED	36	1547	OVA	67	78			
LMED	77	6007	OVA		74	83		
LMED	79	6134	OVA	62	71			
LMED	79	6134	OVA	67				
LMED	83	6195	OVA	64				
MMED	6	6	O					79
MMED	6	6	O					82
MMED	6	6	O					83
MMED	6	6	O			88	87	
MMED	6	6	O		79	88	87	
MMED	10	204	O		72	85	88	
MMED	14	303	O					84
MMED	14	316	O					84
MMED	14	316	O					71
MMED	14	317	O					82
MMED	14	317	O					77
MMED	14	323	O		74			
MMED	14	325	O					83
MMED	14	339	O					81
MMED	14	339	O					81
MMED	14	344	O				86	
MMED	14	344	O		75	83		
MMED	15	345	O			79		
MMED	16	399	O				79	
MMED	17	403	O		77	84		
MMED	17	449	O					80
MMED	17	449	O					79
MMED	17	449	O					85
MMED	17	449	O					72
MMED	17	449	O					79
MMED	17	449	O					80
MMED	17	449	O					81
MMED	17	449	O					82
MMED	17	449	O				c 83	
MMED	17	449	O				81	
MMED	17	449	O		75	87	91	
MMED	19	551	O				81	
MMED	20	619	O				87	
MMED	21	634	O				79	
MMED	21	668	O					75
MMED	21	668	O				75	
MMED	21	668	O				87	
MMED	22	688	O		73	75		
MMED	22	696	O					68
MMED	23	701	O					77
MMED	23	736	O					74
MMED	23	747	O					70
MMED	23	759	O					79
MMED	23	759	O					88
MMED	23	759	O					69
MMED	25	840	O				82	
MMED	25	840	O		75	81	80	
MMED	25	860	O					75
MMED	25	860	O		71	82	82	
MMED	26	888	O					74
MMED	26	916	O					78
MMED	26	979	O					75
MMED	26	979	O					75
MMED	26	992	O		72	77		
MMED	27	1008	O				84	
MMED	28	1106	O				82	
MMED	29	1135	O					74
MMED	29	1135	O					72
MMED	29	1135	O				87	
MMED	29	1138	O		73	87	84	
MMED	30	1200	O					81
MMED	30	1200	O		80	87	89	
MMED	30	4248	O					69
MMED	32	1315	O		76	80	85	
MMED	33	1440	O					70
MMED	33	1440	O					75
MMED	33	1440	O				83	
MMED	33	1440	O				80	

PER	BOX	UN	TAX	dP_4W	M_1W	M_2W	M_3W	$M_{1/2}W$
MMED	35	1513	O		82	89	88	
MMED	35	1515	O					75
MMED	35	1515	O					76
MMED	35	1525	O		71	80	84	
MMED	35	1525	O		75	85	81	
MMED	35	1528	O				83	
MMED	35	1528	O			77	81	
MMED	35	1528	O		74	83	87	
MMED	36	1542	O				77	
MMED	36	1543	O					83
MMED	36	1543	O					67
MMED	36	1543	O					71
MMED	36	1543	O					83
MMED	36	1543	O				88	
MMED	36	1543	O				89	
MMED	36	1543	O				83	
MMED	36	1544	O					78
MMED	36	1544	O		72	75	80	
MMED	36	1550	O					68
MMED	36	1550	O					76
MMED	36	1550	O					84
MMED	37	1551	O					81
MMED	37	1551	O				83	
MMED	37	1551	O				81	
MMED	37	1553	O				88	
MMED	37	1553	O		74	84	89	
MMED	37	1553	O		76	87	91	
MMED	37	1553	O			78		
MMED	37	1556	O				81	
MMED	37	1557	O					75
MMED	37	1557	O		68	72	74	
MMED	37	1557	O		68	83	88	
MMED	37	1561	O		74	82	87	
MMED	37	1562	O			78	80	
MMED	37	1564	O					75
MMED	37	1567	O				84	
MMED	37	1569	O					75
MMED	38	1578	O					85
MMED	38	1578	O					71
MMED	38	1578	O					78
MMED	38	1578	O					82
MMED	38	1578	O					85
MMED	38	1578	O				85	
MMED	38	1578	O			74		
MMED	38	1578	O			81		
MMED	38	1578	O			82		
MMED	38	1617	O				82	
MMED	38	1619	O					78
MMED	38	1619	O					71
MMED	39	1620	O		63	74	77	
MMED	39	1620	O		62	72	74	
MMED	39	1635	O					82
MMED	39	1637	O		69	83		
MMED	39	1644	O					72
MMED	39	1644	O					70
MMED	39	1644	O				74	
MMED	39	1644	O				84	
MMED	39	1644	O				86	
MMED	39	1644	O					68
MMED	39	1644	O		77	83		
MMED	40	1562	O		69	77	81	
MMED	40	1646	O					71
MMED	40	1646	O				79	
MMED	40	1646	O				81	
MMED	48	3041	O				88	
MMED	48	3042	O					83
MMED	48	3043	O		74	83	82	
MMED	58	4001	O		76	85		
MMED	58	4009	O				85	
MMED	61	4158	O					84
MMED	61	4158	O					74
MMED	61	4158	O					76
MMED	61	4158	O					78
MMED	61	4158	O					81
MMED	61	4158	O				78	
MMED	61	4158	O		72	81	80	
MMED	62	4165	O					67
MMED	62	4165	O					67
MMED	62	4165	O					72
MMED	62	4165	O					75
MMED	62	4165	O					78
MMED	62	4165	O					80
MMED	62	4165	O				82	
MMED	62	4165	O		79	84	85	
MMED	62	4165	O		70	79	83	
MMED	62	4168	O					74
MMED	62	4168	O				83	
MMED	62	4168	O				81	
MMED	62	4168	O				82	
MMED	63	4208	O					82
MMED	63	4216	O					82
MMED	63	4216	O			83	85	
MMED	64	4222	O					78
MMED	64	4222	O		71	78		
MMED	64	4228	O					73
MMED	65	4234	O		63	74	80	
MMED	66	4256	O		74	84	83	
MMED	77	6004	O		68	80	83	
MMED	77	6005	O				85	
MMED	78	6044	O					77
MMED	78	6115	O					81
MMED	78	6115	O					70
MMED	78	6115	O					72
MMED	78	6115	O				78	
MMED	78	6115	O				88	
MMED	81	6161	O				78	
MMED	81	6161	O				81	
MMED	82	6170	O					79
MMED	82	6170	O					80
MMED	82	6185	O				85	
MMED	84	6221	O		77	86		
MMED	84	6225	O		74	78		
MMED	84	6237	O					79
MMED	84	6237	O		70	81	81	
MMED	84	6238	O					76
MMED	85	6243	O					79
MMED	85	6243	O				79	
MMED	85	6249	O					85
MMED	85	6249	O		62	69		
MMED	85	6251	O					79
MMED	85	6258	O					69
MMED	85	6258	O					74
MMED	85	6258	O				79	
MMED	86	6262	O					82
MMED	86	6265	O				81	
MMED	86	6265	O		74			
MMED	86	6266	O					80
MMED	86	6266	O		64	78	85	
MMED	87	6287	O					71
MMED	87	6289	O					68
MMED	87	6289	O					76
MMED	87	6289	O					82
MMED	87	6289	O				80	
MMED	87	6289	O				84	
MMED	87	6289	O				85	
MMED	87	6291	O					82
MMED	87	6291	O					72
MMED	87	6291	O					73
MMED	87	6291	O				86	
MMED	87	6291	O			74	82	
MMED	88	6378	O					72
MMED	88	6378	O			82	86	
MMED	88	6378	O		69	81	84	
MMED	88	6389	O				82	
MMED	88	6397	O					71
MMED	88	6397	O		77	83	87	
MMED	91	4235	O					62
MMED	91	4235	O		78	85		
MMED	91	4276	O					69
MMED	91	4277	O				81	
MMED	92	4292	O				79	
MMED	108	6246	O		71			

PER	BOX	UN	TAX	dP_4W	M_1W	M_2W	M_3W	$M_{1/2}W$
MMED	108	6264	O					75
MMED	108	6264	O					73
MMED	108	6264	O					76
MMED	108	6264	O				81	
MMED	108	6264	O				80	
MMED	108	6383	O				82	
MMED	108	6389	O					77
MMED	108	6389	O					85
MMED	108	6389	O		75			
MMED	109	6433	O					78
MMED	109	6433	O					80
MMED	109	6433	O					82
MMED	109	6433	O					90
MMED	109	6433	O				82	
MMED	109	6433	O				82	
MMED	109	6433	O				84	
MMED	109	6433	O				83	
MMED	109	6433	O				82	
MMED	109	6435	O				90	
MMED	110	6436	O				90	
MMED	110	6449	O		80	84		
MMED	111	6462	O				78	
MMED	13	388	OVA	64	73			
MMED	25	814	OVA	65				
MMED	25	837	OVA	65	78			
MMED	26	977	OVA	65				
MMED	26	977	OVA	56	68	72		
MMED	30	4248	OVA	71				
MMED	36	1544	OVA	65				
MMED	37	1569	OVA	67				
MMED	39	1635	OVA		72	77		
MMED	39	1644	OVA	63	73	75		
MMED	61	4158	OVA	67				
MMED	61	4158	OVA		74	83		
MMED	77	6004	OVA	62	73			
MMED	78	6115	OVA	66				
MMED	91	4235	OVA	67				
MMED	91	4235	OVA	60				
MMED	91	4277	OVA	68				
MMED	108	6264	OVA	64	79			
MMED	108	6264	OVA	66				
EMED	8	25	O		68	77		
EMED	8	36	O					75
EMED	8	43	O		78	85	88	
EMED	8	58	O					81
EMED	9	66	O					81
EMED	10	175	O		71	81	86	
EMED	10	218	O			83	84	
EMED	19	495	O					81
EMED	23	729	O					77
EMED	23	729	O				83	
EMED	23	729	O		76	85	88	
EMED	24	783	O					81
EMED	24	783	O					84
EMED	24	783	O					71
EMED	24	783	O					73
EMED	24	783	O					79
EMED	24	783	O				85	
EMED	25	858	O					81
EMED	26	893	O					71
EMED	26	903	O				76	
EMED	27	1047	O					73
EMED	27	1047	O					74
EMED	28	1061	O					75
EMED	28	1075	O					81
EMED	28	1075	O					81
EMED	29	1124	O		74	78		
EMED	29	1157	O					72
EMED	29	1158	O					78
EMED	30	1190	O		65	73	81	
EMED	30	1214	O		71	78		
EMED	30	1243	O		72	82	83	
EMED	31	1257	O		74	84		
EMED	31	1262	O		68	80	84	
EMED	31	1264	O		79	88	91	

PER	BOX	UN	TAX	dP_4W	M_1W	M_2W	M_3W	$M_{1/2}W$
EMED	32	1349	O					80
EMED	32	1349	O		67	80	87	
EMED	33	1382	O		69	76	82	
EMED	33	1386	O		76	79		
EMED	33	1406	O					70
EMED	34	1469	O					73
EMED	34	1680	O					78
EMED	38	1594	O					77
EMED	38	1594	O					83
EMED	40	1652	O					76
EMED	40	1652	O				79	
EMED	40	1652	O	63	73			
EMED	40	1654	O					68
EMED	40	1654	O		78	84		
EMED	40	1657	O					76
EMED	40	1657	O				87	
EMED	41	1658	O				76	
EMED	41	1668	O		72	80		
EMED	42	1676	O		67	76		
EMED	42	1686	O					85
EMED	42	1696	O					85
EMED	42	1696	O			79		
EMED	43	1696	O		74	79	81	
EMED	43	1718	O		79	86	90	
EMED	43	1723	O					72
EMED	44	1734	O		69			
EMED	44	2003	O		65	80	83	
EMED	45	2007	O					78
EMED	45	2030	O				82	
EMED	46	2032	O				80	
EMED	46	2036	O		69	82	87	
EMED	46	2038	O		76	83	86	
EMED	47	2075	O					85
EMED	47	2095	O			78	86	
EMED	48	3045	O					73
EMED	48	3045	O					82
EMED	48	3045	O					70
EMED	48	3045	O					c 75
EMED	48	3045	O			78		
EMED	48	3045	O		73	83		
EMED	49	3059	O					78
EMED	49	3066	O		72	84	87	
EMED	49	3070	O					74
EMED	50	3094	O					87
EMED	50	3099	O		71	81	82	
EMED	51	3102	O				83	
EMED	58	4000	O		73	80		
EMED	58	4026	O		71	78	79	
EMED	58	4036	O					72
EMED	59	4119	O					82
EMED	59	5089	O					76
EMED	63	4202	O					81
EMED	63	4202	O		73	81	85	
EMED	64	4278	O					80
EMED	65	4233	O				84	
EMED	69	5019	O		71	78	83	
EMED	70	5021	O					76
EMED	71	5045	O		c 68	71	70	
EMED	71	5046	O					78
EMED	72	5050	O		70	80	83	
EMED	72	5075	O					83
EMED	88	6347	O					80
EMED	92	4303	O			82	85	
EMED	92	4305	O		69	79	76	
EMED	94	4318	O		71	82	85	
EMED	95	4331	O				76	
EMED	95	4339	O				80	
EMED	96	4356	O					68
EMED	96	4356	O		76	81		
EMED	97	4361	O				86	
EMED	97	4369	O					80
EMED	98	4370	O					80
EMED	100	4424	O		76	82		
EMED	101	4427	O		77	85	85	
EMED	102	4419	O					79
EMED	102	4447	O		65	78	88	

PER	BOX	UN	TAX	dP_4W	M_1W	M_2W	M_3W	$M_{1/2}W$
EMED	102	4447	O		71	81		
EMED	103	4457	O			67		
EMED	103	4457	O		75	80	84	
EMED	103	4461	O				80	
EMED	105	4490	O			74	78	
EMED	105	4496	O		79	85	88	
EMED	105	4499	O		74	80	85	
EMED	106	4516	O					69
EMED	106	4520	O					75
EMED	110	6444	O					70
EMED	111	6439	O					78
EMED	112	6484	O				82	
EMED	112	6492	O		71	76		
EMED	112	6492	O		65	78	81	
EMED	113	6495	O		c 70	80		
EMED	113	6503	O					78
EMED	113	6503	O					72
EMED	113	6505	O					77
EMED	114	6506	O				79	
EMED	115	6527	O				81	
EMED	116	6535	O				80	
EMED	116	6538	O					81
EMED	116	6538	O					83
EMED	116	6538	O					65
EMED	116	6538	O					84
EMED	116	6538	O					77
EMED	116	6538	O					79
EMED	116	6538	O					72
EMED	116	6538	O					74
EMED	116	6538	O					79
EMED	116	6538	O					82
EMED	116	6538	O				85	
EMED	116	6538	O				75	
EMED	119	6548	O					73
EMED	121	6553	O					75
EMED	121	6553	O			81	82	
EMED	122	6566	O					76
EMED	125	6607	O					82
EMED	125	6629	O					75
EMED	126	6633	O			87	89	
EMED	126	6633	O		73	79	80	
EMED	127	6661	O		71	78	81	
EMED	128	6737	O					74
EMED	128	6738	O		74	80		
EMED	128	6745	O					76
EMED	134	4608	O				82	
EMED	134	4608	O				79	
EMED	135	4612	O		72	80		
EMED	135	4613	O			77	81	
EMED	135	4623	O		65	76	81	
EMED	136	4746	O					80
EMED	136	4746	O			76	81	
EMED	136	4754	O				82	
EMED	137	4883	O		78	80	85	
EMED	138	4884	O		76	84		
EMED	138	4884	O		77	84	85	
EMED	140	5608	O					80
EMED	146	6928	O			78	88	
EMED	149	6995	O					72
EMED	152	7054	O					74
EMED	153	7068	O		72	83	89	
EMED	153	7068	O		76			
EMED	154	7075	O				76	
EMED	154	7075	O		75	82	85	
EMED	154	7076	O				91	
EMED	155	7077	O					72
EMED	155	7077	O					80
EMED	155	7077	O				83	
EMED	156	7083	O				81	
EMED	156	7091	O					75
EMED	157	7101	O					
EMED	8	25	OVA	68				
EMED	26	939	OVA	64	67			
EMED	27	995	OVA	63	73			
EMED	27	1049	OVA	61	70	78		
EMED	33	1451	OVA	63				
EMED	34	1469	OVA	62	69			
EMED	40	1645	OVA	65				
EMED	40	1652	OVA	63	73	77		
EMED	41	1664	OVA	65	72	84		
EMED	41	1668	OVA	64				
EMED	42	1680	OVA	59				
EMED	42	1680	OVA	66				
EMED	42	1696	OVA		72	80		
EMED	43	1716	OVA	60				
EMED	44	1742	OVA	64	74	84		
EMED	44	1742	OVA	63	73	84		
EMED	45	2009	OVA	61	68			
EMED	46	2032	OVA		65			
EMED	47	2088	OVA	65				
EMED	48	3045	OVA	69	79			
EMED	49	3066	OVA	64				
EMED	72	5050	OVA	65				
EMED	92	4303	OVA	62	71			
EMED	97	4361	OVA	65				
EMED	110	6451	OVA		72			
EMED	110	6451	OVA		72			
EMED	113	6495	OVA	62	69			
EMED	113	6505	OVA	66	74			
EMED	117	6540	OVA	63	70			
EMED	135	4611	OVA	65	74			
EMED	136	4671	OVA		71	80		
EMED	137	4873	OVA	67	74			
EMED	142	5623	OVA	68	70	79		
EMED	161	7222	OVA	66	74	78		
EMED	161	7222	OVA	65	73			
LSAX	9	74	O		72			
LSAX	104	4472	O					79
LSAX	105	4497	O				79	
LSAX	112	6485	O					71
LSAX	112	6485	O					80
LSAX	131	6836	O					78
LSAX	162	7289	O		73			
LSAX	105	4494	OVA	64	74			
SAXN	133	4585	O					75
SAXN	139	4952	OVA	63				
SAXN	139	4952	OVA	61	86	74		
SAXN	104	4466	OVA	c 61	72			

PER	BOX	UN	TAX	SEX	dP_4L	dP_4W	M_1L	M_1WA	M_1WP	M_2L	M_2WA	M_2WP	M_3L	M_3WA	M_3WC	$M_{1/2}L$	$M_{1/2}WA$	$M_{1/2}WP$
EPMED	9	70	S			78												
EPMED	11	225	S													149	95	99
EPMED	13	296	S													173	96	105
EPMED	38	1605	S		177	86												
EPMED	84	6206	S														121	
EPMED	84	6206	S													172	91	103
EPMED	84	6232	S		188	84												
LMED	11	245	S													224	129	129
LMED	12	246	S			83												
LMED	14	297	S															
LMED	16	402	S							213	124	127						
LMED	17	414	S													179	110	
LMED	17	447	S													203	120	119
LMED	20	577	S													198	119	124
LMED	61	4157	S													201	126	121
LMED	77	6007	S															
LMED	79	6129	S											143	136			
LMED	80	6150	S										315	145	145			
MMED	14	344	S													154	92	97
MMED	19	548	S				164	100	106	199	122	124						
MMED	21	640	S															
MMED	21	667	S				169	97	101	c 102	117	120						
MMED	23	716	S													182	102	107
MMED	23	760	S													212	144	140
MMED	30	1191	S											125				
MMED	35	1525	S													161	107	99
MMED	35	1525	S				159	100	101	197	128	126						
MMED	36	1540	S													196	129	128
MMED	36	1543	S													160	93	100
MMED	36	1544	S		196	87												
MMED	36	1550	S													177	96	104
MMED	37	1571	S															
MMED	37	1571	S															
MMED	38	1578	S										293	140	122			
MMED	38	1606	S													170	103	110
MMED	39	1644	S	AF			172	106	112									
MMED	48	3024	S				162	97	103	205	124	130						
MMED	48	3043	S													213	128	132
MMED	58	4008	S					96										
MMED	58	4021	S				177	98	107		121							
MMED	62	4165	S				165	106	116	215	139	144	c 345	138	149			
MMED	63	4216	S				158	92	102	207	121	125						
MMED	64	4222	S													212	131	140
MMED	64	4228	S		171	79												
MMED	77	6004	S										332	152	141			
MMED	80	6151	S							189	127	130	330	150	142			
MMED	85	6241	S							201	119	128						
MMED	85	6245	S													218	128	132
MMED	85	6245	S													160	98	105
MMED	85	6245	S										c 142					
MMED	85	6249	S													156	c 101	106
MMED	86	6265	S															
MMED	87	6289	S													175	96	105
MMED	87	6291	S				149	97	104	196	122	119						
MMED	88	6397	S										294	142	139			
MMED	91	4276	S				c 170	103	114	206	133	131						
MMED	110	6436	S										261	133	129			
MMED	110	6436	S				147	106										
MMED	111	6462	S	F				104		204	127	128	c 280	146	135			
EMED	14	328	S							210	132	128						
EMED	14	328	S	F			169	99	101									
EMED	24	783	S													201	118	120
EMED	24	783	S											129				
EMED	26	900	S				c 157		105	198								
EMED	29	1183	S															136
EMED	30	1194	S				175	103	110	215	132	132						
EMED	30	1196	S		189	82												
EMED	31	1247	S													195	124	123
EMED	31	1262	S													207	119	117
EMED	34	1469	S							202		127	c 260	127	128			
EMED	42	1676	S													176	109	
EMED	42	1696	S										299	145	141			
EMED	42	1696	S	F						212	121	121	316	136	137			

PER	BOX	UN	TAX	SEX	dP_4L	dP_4W	M_1L	M_1WA	M_1WP	M_2L	M_2WA	M_2WP	M_3L	M_3WA	M_3WC	$M_{1/2}L$	$M_{1/2}WA$	$M_{1/2}WP$
EMED	46	2035	S	F				90		c 197	114	122	e 255	130	133			
EMED	46	2038	S	M														
EMED	48	3045	S													c 210		
EMED	51	3101	S										328	143	134			
EMED	58	4003	S											148				
EMED	69	5017	S										310	146	143			
EMED	71	5041	S	AM						185	117	126	301	137	138			
EMED	88	6348	S				c 160	104		216	134	137	341	150	146			
EMED	94	4317	S				165	103	111	206	133	134		142				
EMED	95	4339	S															
EMED	95	4339	S				172	107	110									
EMED	95	4339	S	P			167	99	104		122							
EMED	99	4383	S															
EMED	100	4391	S		191	87												
EMED	100	4419	S															
EMED	101	4427	S		196	91	178	111	118									
EMED	101	4427	S		190	93	179	106	118									
EMED	103	4461	S		194	87	177	104	114									
EMED	103	4461	S				160	98	105	203	123	125	272	136	141			
EMED	103	4461	S				152	97	103	210	122	125	335	139	138			
EMED	108	4333	S													209	123	125
EMED	110	6453	S				161	106	108									
EMED	113	6497	S															
EMED	113	6500	S	M														
EMED	113	6502	S	AM						c 177	c 121		280	132	133			
EMED	113	6505	S										268	136	125			
EMED	114	4518	S															
EMED	114	6506	S							c 172	121	120	296	150	134			
EMED	115	6525	S															119
EMED	115	6526	S				c 146	94	104	175	117	123	283	136	132			
EMED	116	6530	S	M														
EMED	116	6531	S							197	127	124	c 321	140	144			
EMED	117	6540	S						109	220		126						
EMED	117	6540	S			88	164	99	108									
EMED	118	6540	S				154	90	100	184	120	119						
EMED	118	6541	S				177	105	112	214	130	c 133		161	146			
EMED	118	6542	S										280	136	133			
EMED	120	6550	S						116	210	130	135	c 339	150	c 137			
EMED	123	6586	S				180	94	103									
EMED	123	6589	S				188	100	104									
EMED	124	6603	S		187	84												
EMED	125	6612	S		177	81	162	92	96									
EMED	125	6627	S				168			210	129	128						
EMED	127	6660	S				165		106	205	119	120						
EMED	127	6675	S				158	94	99	202	122	127						
EMED	128	6755	S		191	85												
EMED	132	4386	S													175	98	97
EMED	134	4608	S							206	133	135		149	140			
EMED	138	4884	S							194	119	123						
EMED	138	4892	S		188	87												
EMED	145	6801	S	M	188	89	175	101	110									
EMED	150	7000	S				164	98	99									
EMED	151	7035	S	M			152	100	108									
EMED	154	7076	S													192	119	121
EMED	155	7077	S				143	c 90	94	192	115	120						
EMED	156	7088	S										314	135	137			
EMED	156	7088	S										324	144	146			
EMED	156	7088	S															
EMED	160	7146	S													218	129	131
EMED	160	7185	S							224	131	132	341	141	141			
LSAX	17	411	S	F			c 154		103	187	108	117						
LSAX	104	4472	S		181	86	166	97	106									
LSAX	112	6485	S							212	132	136	e 335	146	143			
LSAX	112	6485	S				c 153	96	102	c 198								
LSAX	112	6485	S	M														
LSAX	162	7280	S				158	102	108									
LSAX	162	7280	S				154	99	103									

PER	BOX	UN	TAX	P_2L_1	P_2W_a	P_3L_1	P_3W_A	P_4L_1	P_4W_a	M_1L_1	M_1W_a	M_1W_b	M_2L_1	M_2W_a	M_2W_b	M_3L_1	M_3W_a	M_3W_b	$M_{1/2}L_1$	$M_{1/2}W_a$	$M_{1/2}W_b$
EPMED	9	70	EQ																202	117	93
EPMED	9	70	EQ													271	135	107			
EPMED	15	350	EQ					234	135	208	130	122		119	112						
EPMED	16	390	EQ													309	142	144			
EPMED	16	390	EQ	322	c 114																
EPMED	84	6203	EQ													313	137	139			
LMED	12	250	EQ	293	109																
LMED	19	512	EQ										241	126	122	311	122	122			
LMED	61	4157	EQ	306	103																
LMED	77	6006	EQ							224		121	236		108	346		108			
LMED	79	6137	EQ	307	101																
LMED	83	6195	EQ	316	121																
MMED	10	204	EQ																		
MMED	21	639	EQ			258	128	c 242	133	213	133	119									
MMED	32	1315	EQ	317	103	272	149	253	152	230	147	131	243	137	127	336	125	113			
MMED	48	3043	EQ	315	114	272															
MMED	49	3051	EQ																261	138	133
MMED	49	3051	EQ	311	120																
MMED	64	4270	EQ	296	114																
MMED	91	4276	EQ	321	101																
EMED	50	3096	EQ	275	99	259	144	240	151	224	141	127	239	134	117	305	124	113			
EMED	69	5010	EQ	299	115																
EMED	95	4333	EQ																		
EMED	102	4447	EQ					242	155	217	151	124	233	132	118						
EMED	107	4556	EQ	313	117	264	154	265	158	247	157	148	242	137	129	315	133	124			
EMED	121	6552	EQ	327	104	262	132	249	244	224	131	127	234	124	117						
EMED	122	6555	EQ													307	131	123			
EMED	124	6593	EQ	322	102																
EMED	125	6604	EQ	325	128																
EMED	125	6606	EQ	341	107	301	115	327	111												
EMED	127	6683	EQ	329	126																
EMED	131	6822	EQ	e 298	102	245	139														
EMED	154	7075	EQ										255	124	129	294	114	113			
EMED	155	7081	EQ													321	138	128			
EMED	156	7088	EQ																243	131	128
LSAX	163	7302	EQ	326	114																

PER	BOX	UN	TAX	P_2L	P_2W	P_3L	P_3W	P_4L	P_4W	M_1L	M_1W	M_2L	M_2W	M_3L	M_3W	P_1-M_3L	P_2-M_3L	P_1-$P4_L$	P_2-P_4L	M_1-M_3L	HEIGHT
EPMED	34	1476	CAF	91	49	107	54	11	63												
LMED	11	243	CAF							178	67										
LMED	20	624	CAF	73	34	78	37	91	44	173		73	55	41	34	554	521	290	258	274	196
MMED	32	1315	CAF	82	45			125	63	230		93	69				702	331		376	243
MMED	50	3098	CAF	74	43	104	52	11	60	223	97	91	70			741	639	390	332	362	235
MMED	61	4158	CAF									100	76								
MMED	61	4158	CAF									103	64	51	46						
MMED	61	4158	CAF	81	45	108	52	118	60	224	89	86	66								
MMED	61	4158	CAF	105	44	114	46	125	55												
MMED	65	4231	CAF					96	46	181	66										
MMED	65	4234	CAF							231	93										
MMED	78	6115	CAF							204	80										
MMED	80	6151	CAF	96	52	112	58														
MMED	84	6238	CAF	101	47	114	51	134	63	229	88	92	68			795	748	428	376	c 367	228
MMED	88	6409	CAF					101	51												166
MMED	109	6433	CAF							231	91	90	73								
MMED	109	6433	CAF	102	48	115	52	132	63	226	93	92	68						371		227
EMED	24	783	CAF	102	50	114	57	126	68	232	96	95	72	52	44	360	212	415	367	366	366
EMED	48	3032	CAF							175	71										
EMED	100	4391	CAF	86	42	104	46		55	233	82	91	65						329	364	199
EMED	100	4392	CAF	85	39	91	43														
EMED	100	4419	CAF	86	47	102	56			227	91							374	334		246
EMED	101	4446	CAF					124	68	213	93	96	72					404		365	233
EMED	106	4555	CAF							202	84	86	65							338	244
EMED	124	6593	CAF	63	33	80	41	95	51	177	68							304	266		
EMED	125	6609	CAF					93	49												
EMED	126	6643	CAF					94	52												
EMED	128	6755	CAF	91	46			120	62	216	84	92	66					431	377		233
EMED	157	7101	CAF	87	46	98	50	112	61	205	84	76	61						360		236
LSAX	161	7254	CAF	70	36	78	40	93	48												153

PER	BOX	UN	TAX	P_2L	P_2W	P_3L	P_3W	P_4L	P_4W	M_1L	M_1W	P_3-M_1L	HEIGHT
LMED	12	246	FEC					56	26	67	27		
LMED	35	1531	FEC					62	29	75	32	184	95
LMED	79	6134	FEC							68	31		89
MMED	35	1506	FEC			50	23	68	28	75	33	186	90
MMED	36	1535	FEC			48	24	59	27	64	29	178	95
MMED	36	1535	FEC			48	24	60	27	65	28	175	93
MMED	38	1585	FEC			48	23	65	29	75	32	181	88
EMED	105	4496	FEC			51	24	72	29	76	33	186	87
EMED	116	6530	FEC			45	23						80
LPMED	22	684	MUP			28	18	42	20	77	30		69
MMED	65	4238	MUP							83	34		90

PER	BOX	UN	ELEM	TAX	FUS	SLC
LPMED	10	152	SC	B	F	395
EPMED	76	6003	SC	B	F	485
EPMED	81	6167	SC	B	F	468
LMED	81	6156	SC	B		470
LMED	19	539	SC	B	F	427
MMED	39	1620	SC	B		335
MMED	36	1550	SC	B		445
MMED	87	6331	SC	B		501
MMED	25	837	SC	B	F	419
MMED	63	4216	SC	B	UM	171
EMED	137	4873	SC	B		675
EMED	115	6529	SC	B		313
EMED	139	4921	SC	B		446
EMED	100	4419	SC	B		366
EMED	10	139	SC	B	F	424
EMED	29	1124	SC	B	F	439
EMED	43	1697	SC	B	F	464
EMED	51	3099	SC	B	F	407
EMED	117	6540	SC	B	F	497
EMED	148	6995	SC	B	F	410
EMED	135	4621	SC	B	F	509
EMED	138	4888	SC	B	F	381
EMED	113	6504	SC	B	F	594
EMED	150	7000	SC	B	F	497
EMED	97	4363	SC	B	F	454
LSAX	105	4498	SC	B	F	448
SAXN	97	4359	SC	B		386
SAXN	104	4466	SC	B	F	453

PER	BOX	UN	ELEM	TAX	FUS	BT	HTC
EPMED	7	4	HU	B	F	668	302
EPMED	18	466	HU	B	F	c 620	
LMED	61	4156	HU	B	G		252
MMED	27	1033	HU	B	H	621	277
EMED	33	1393	HU	B	F	615	266
EMED	51	3101	HU	B	F		270
EMED	119	6543	HU	B	F		297
EMED	129	6781	HU	B	F		336
EMED	154	7077	HU	B	F		323
EMED	45	2031	HU	B	F	697	307
EMED	75	5090	HU	B	F	602	275
EMED	68	5008	HU	B	F	612	284
EMED	138	4888	HU	B	F		266
EMED	124	6603	HU	B	F		311
EMED	153	7074	HU	B	F		318
EMED	160	7146	HU	B	F		310
EMED	131	6806	HU	B	F		284
EMED	121	6552	HU	B	F		305
EMED	121	6553	HU	B	F	c 730	364
EMED	76	5224	HU	B	G	622	284
EMED	24	783	HU	B	H	623	269
EMED	116	6538	HU	B	H	615	261
EMED	43	1696	HU	B	H	e 610	266
EMED	154	7076	HU	B	H	593	276
EMED	123	6586	HU	B	H	c 566	247
EMED	150	7000	HU	B	H		276
EMED	135	4634	HU	B	H	656	309
LSAX	162	7287	HU	B	F	674	299
LSAX	162	7288	HU	B	F	689	290
LSAX	141	5609	HU	B	F	672	293
LSAX	112	6485	HU	B	H	724	333
SAXN	157	7109	HU	B	G	626	284

PER	BOX	UN	ELEM	TAX	FUS	GL
EMED	132	4386	RA	B	F	2795
EMED	99	4381	RA	B	F	2480
EMED	117	6540	RA	B	G	2657
EMED	99	4386	RA	B	G	2963

PER	BOX	UN	ELEM	TAX	FUS	GL	Bd	Dd	SD	BatF	a	b	1	4
EPMED	7	4	MC	B	F	1860	548	298	280	505	262	261	224	211
LMED	25	803	MC	B	F		570			523	277	c 266	235	
LMED	19	549	MC	B	F		e 585			570				
LMED	78	6125	MC	B	F					510				
LMED	79	6132	MC	B	F	c 1747			283					
MMED	16	399	MC	B	F	1916	598	e 327	307	533	284	275	242	230
MMED	37	1552	MC	B	F	1819	564	289	288	529	272	261	c 228	211
MMED	38	1591	MC	B	F					573	318			
MMED	39	1620	MC	B	F	1857	514		273	450	253	247		195
MMED	39	1644	MC	B	F	c 1853	c 560		306	e 520	c 282		229	
MMED	108	6202	MC	B	F		536	284	c 280	469	c 259	257	218	203
MMED	85	6248	MC	B	F	1873	588	315	297	505	289	282	234	209
MMED	87	6288	MC	B	F		606	332	320		297	282	251	237
MMED	63	4216	MC	B	G	1759	476	258	239	451	226	222	187	186
MMED	86	6266	MC	B	UM				184					
EMED	131	6813	MC	B	F	1806			300			251		208
EMED	24	783	MC	B	F				281					
EMED	88	6347	MC	B	F	1731	491		264	446				191
EMED	88	6347	MC	B	F	1938	637	343	327	554	303	310	267	247
EMED	70	5037	MC	B	F	1717	490		262	443	238	231	203	191
EMED	71	5040	MC	B	F	1871	602	325	291	533		286	256	242
EMED	26	926	MC	B	F	1817			259				218	
EMED	10	174	MC	B	F	1787	511	276	259	471	247	236	200	186
EMED	119	6543	MC	B	F		609		339	536	293	290	248	229
EMED	120	6549	MC	B	F	1834	512	292	273		251	240	207	190
EMED	155	7077	MC	B	F		483	c 247		452	c 227	223	195	186
EMED	150	7001	MC	B	F	1852	605	301	305	521	299	276	243	226
EMED	41	1658	MC	B	F		561	c 272		496	c 275	c 265	c 210	200
EMED	46	2036	MC	B	F	1797	598	315	327	538	286	280	240	223
EMED	46	2037	MC	B	F	c 1744			272					
EMED	70	5021	MC	B	F	1862			306		292		246	
EMED	140	5594	MC	B	F		c 470							
EMED	59	4108	MC	B	F	1718	498	270	276	454	238	c 234	208	195
EMED	111	6481	MC	B	F	1936	610	c 312	335	541	303	274	254	240
EMED	122	6571	MC	B	F	c 1822	c 540	c 285	306	520			213	197
EMED	124	6593	MC	B	F	1854	584		301	505	280	279	242	220
EMED	125	6606	MC	B	F	1932	663		339	595	324	300	265	248
EMED	151	7035	MC	B	F	1857			295				223	
EMED	107	5360	MC	B	F		559	296		508	286	250	231	217
EMED	140	5606	MC	B	F	1906	598	c 304	330	550	272	274	238	235
EMED	142	5623	MC	B	F	1932	505	279	265	475	237	234	201	184
EMED	142	5623	MC	B	F	1938	506	273	270	479	240	236	200	184
EMED	103	4461	MC	B	F		578	295	271	487	277	270	225	209
EMED	94	4328	MC	B	F	1910	543	c 300	c 316		257	258	233	220
EMED	106	4501	MC	B	F	1605	e 448		221	394			193	179
EMED	145	6894	MC	B	F	1686	604	317	313	538	296	279	246	236
EMED	145	6894	MC	B	F	1841	623		300	539	292	307	236	225
EMED	122	6573	MC	B	UM				201					
LSAX	161	7228	MC	B	F	1778	503	277	269	444	248	235	206	191
LSAX	162	7291	MC	B	UM				198					
SAXN	133	4585	MC	B	F		518	287		480	256	242	220	204

PER	BOX	UN	ELEM	TAX	FUS	LA
LMED	12	246	PE	B	F	c 576
LMED	14	343	PE	B	F	653
MMED	92	4292	PE	B	F	630
MMED	39	1620	PE	B	F	545
MMED	48	3042	PE	B	F	c 632
MMED	31	1256	PE	B	F	654
EMED	70	5038	PE	B		e 650
EMED	119	6543	PE	B		658
EMED	70	5021	PE	B		e 600
EMED	110	6453	PE	B		e 600
EMED	96	4356	PE	B		547
EMED	106	4555	PE	B		e 570
EMED	40	1645	PE	B	F	596
EMED	76	5233	PE	B	F	599
EMED	45	2010	PE	B	F	627
EMED	43	1708	PE	B	F	631
EMED	51	3099	PE	B	F	593
EMED	118	6540	PE	B	F	643
EMED	118	6541	PE	B	F	623
EMED	149	6995	PE	B	F	614
EMED	126	6646	PE	B	F	567
EMED	49	3048	PE	B	F	c 600
EMED	138	4884	PE	B	F	601
EMED	142	5623	PE	B	F	c 569
EMED	143	5623	PE	B	F	617
EMED	148	6992	PE	B	F	505
EMED	103	4461	PE	B	F	639
EMED	115	6527	PE	B	G	642
LSAX	43	1720	PE	B	F	622
LSAX	133	4507	PE	B	F	580
SAXN	158	7109	PE	B	F	718

PER	BOX	UN	ELEM	TAX	FUS	GL
EMED	42	1696	CA	B	F	1142
EMED	45	2030	CA	B	F	1195
EMED	45	2030	CA	B	G	1326
LSAX	9	74	CA	B	F	1200

PER	BOX	UN	ELEM	TAX	FUS	GL	Bd
LMED	20	624	TI	B	F		526
LMED	30	1202	TI	B	F		522
LMED	21	625	TI	B	F		632
MMED	91	4277	TI	B	F		661
MMED	92	4292	TI	B	F		c 517
MMED	36	1538	TI	B	F		558
MMED	14	344	TI	B	F		532
MMED	76	3092	TI	B	F		563
EMED	45	2012	TI	B	F		536
EMED	44	2003	TI	B	F		536
EMED	26	893	TI	B	F		522
EMED	117	6540	TI	B	F		532
EMED	152	7054	TI	B	F		543
EMED	153	7068	TI	B	F		539
EMED	155	7077	TI	B	F		465
EMED	43	1716	TI	B	F		499
EMED	32	1349	TI	B	F		528
EMED	68	5009	TI	B	F		533
EMED	69	5018	TI	B	F		592
EMED	99	4383	TI	B	F		532
EMED	102	4447	TI	B	F		526
EMED	138	4890	TI	B	F		595
EMED	127	6733	TI	B	F		514
EMED	122	6573	TI	B	F		c 552
EMED	131	6811	TI	B	F		600
EMED	149	6999	TI	B	F		587
EMED	120	6552	TI	B	F		570
EMED	121	6553	TI	B	F		627
EMED	145	6801	TI	B	F		655
EMED	94	4328	TI	B	F		634
EMED	62	4171	TI	B	F		569
EMED	101	4434	TI	B	F		623
EMED	76	3099	TI	B	G		614
EMED	123	6575	TI	B	G		590
EMED	119	6545	TI	B	G		576
EMED	148	6993	TI	B	G		633
EMED	42	1680	TI	B	G		534
EMED	71	5046	TI	B	G		c 563
EMED	132	4385	TI	B	G		582
EMED	97	4365	TI	B	G		490
EMED	103	4461	TI	B	G		c 535
EMED	95	4339	TI	B	G		609
EMED	132	4344	TI	B	G		628
EMED	142	5621	TI	B	H		c 542
EMED	98	4375	TI	B	U		521
EMED	155	7077	TI	B	U		544
EMED	155	7077	TI	B	U		555
LSAX	9	74	TI	B	F		558
LSAX	141	5609	TI	B	F		613
LSAX	141	5609	TI	B	F	3428	599
SAXN	104	4466	TI	B	F		536

PER	BOX	UN	ELEM	TAX	GL1	Bd	Dl
LMED	25	803	AS	B	c 596	c 353	c 322
LMED	91	4264	AS	B	679		c 365
LMED	35	1508	AS	B	583	364	325
LMED	34	1465	AS	B	586	378	318
LMED	20	624	AS	B	588	379	300
LMED	34	1474	AS	B	645	419	361
LMED	23	703	AS	B	638	397	347
LMED	64	4224	AS	B	651	439	362
MMED	14	318	AS	B	588	380	327
MMED	20	619	AS	B	585	c 376	
MMED	92	4282	AS	B	636	434	
MMED	37	1567	AS	B	684	442	382
MMED	38	1617	AS	B	537	332	296
MMED	14	301	AS	B		399	
MMED	98	476	AS	B	588	361	322
MMED	26	888	AS	B	594	358	328
MMED	23	709	AS	B	587	351	330
MMED	52	3290	AS	B	628	409	348
MMED	31	1248	AS	B	c 603	c 397	329
MMED	108	6175	AS	B	c 615	391	352
MMED	63	4214	AS	B	c 605		336
MMED	86	6266	AS	B		404	
MMED	85	6242	AS	B			c 294
MMED	86	6265	AS	B	c 579		320
MMED	86	6265	AS	B	c 623		
MMED	109	6433	AS	B		418	
MMED	109	6433	AS	B	638	390	339
MMED	64	4220	AS	B	643	391	343
MMED	64	4222	AS	B	c 615	c 384	c 341
MMED	63	4216	AS	B	c 590	381	331
MMED	25	837	AS	B	623	395	352
MMED	76	3092	AS	B	588	393	322
MMED	76	3092	AS	B	641	398	359

PER	BOX	UN	ELEM	TAX	GL1	Bd	Dl
EMED	33	1386	AS	B	591	378	
EMED	31	1264	AS	B	568	369	314
EMED	24	783	AS	B	617	385	344
EMED	24	783	AS	B	622	386	
EMED	59	4119	AS	B	639		c 358
EMED	146	6968	AS	B	648	430	348
EMED	147	6988	AS	B	591	391	c 334
EMED	147	6989	AS	B	536	335	302
EMED	33	1406	AS	B	598		
EMED	26	904	AS	B	530	339	297
EMED	45	2007	AS	B		354	
EMED	49	3066	AS	B	606		335
EMED	67	928	AS	B	612	405	344
EMED	119	6543	AS	B	585	356	322
EMED	126	6643	AS	B		393	325
EMED	152	7054	AS	B	568	374	315
EMED	154	7077	AS	B	616	382	338
EMED	154	7077	AS	B	622	378	341
EMED	46	2037	AS	B	587		325
EMED	134	4608	AS	B	580	362	320
EMED	138	4888	AS	B	555	349	310
EMED	98	4370	AS	B	651	389	351
EMED	48	3045	AS	B	589	382	328
EMED	59	4109	AS	B	607		323
EMED	103	4457	AS	B	582	371	
EMED	113	6503	AS	B	593	354	328
EMED	115	6526	AS	B	590	366	324
EMED	149	6997	AS	B	605	411	319
EMED	122	6569	AS	B	c 603		
EMED	126	6633	AS	B	604	396	340
EMED	149	6999	AS	B	593	395	318
EMED	149	6998	AS	B	654	443	362
EMED	140	5608	AS	B		419	
EMED	96	4353	AS	B	615	365	345
EMED	101	4434	AS	B	c 586	376	319
EMED	133	4555	AS	B	626		346
EMED	145	6894	AS	B	597	375	309
LSAX	9	74	AS	B		366	
LSAX	9	74	AS	B	605	382	324
LSAX	17	411	AS	B	604	445	377
LSAX	130	6762	AS	B			c 330

PER	BOX	UN	ELEM	TAX	FUS	GL	Bd	Dd	SD	BatF	a	b	1	4
LPMED	22	684	MT	B	F	1971	473	289	216	431	219	211	213	198
LMED	12	246	MT	B	F		c 465	e 275		420	228	212	213	191
LMED	79	6132	MT	B	F	c 2080	455	c 261	222	416	217	207	192	176
MMED	17	412	MT	B	F	2086	493	291	233	460	232	220	219	210
MMED	17	449	MT	B	F	2082	484	275	232		231	c 215	198	186
MMED	109	6433	MT	B	F	c 2122	516	293	240	481	246	233	215	203
EMED	24	783	MT	B	F		556	295		516	266	243	228	209
EMED	112	6487	MT	B	F	2164	535	308	246	481	263	246	236	217
EMED	107	5420	MT	B	F	c 2173	567	315	c 261	522	279	256	248	233
EMED	42	1685	MT	B	F	2093	514	295	225	415	244	236	219	207
EMED	42	1696	MT	B	F			296	232	459	243		220	209
EMED	42	1696	MT	B	F	2031	461	280	213	431	221	207	201	189
EMED	42	1696	MT	B	F	2084	467	283	225	431	221	212	211	192
EMED	148	6995	MT	B	F	c 2004	c 499		210	c 459	c 247	c 225	c 208	c 205
EMED	9	66	MT	B	F	e 2012	473	282	226	431		207	209	202
EMED	45	2031	MT	B	F	1998	475	285	226	434	227	220	201	191
EMED	72	5067	MT	B	F		e 530	c 284					216	206
EMED	137	4859	MT	B	F	2060	472	c 268	224	432	223	217	196	187
EMED	13	291	MT	B	F	e 2110			226			238		208
EMED	59	4108	MT	B	F	1930	426	260	201	381	204	198	191	176
EMED	103	4460	MT	B	F	c 2040	483		245		229		207	191
EMED	120	6552	MT	B	F	c 2131	482	286	241	446	231	219	205	c 200
EMED	43	1705	MT	B	F					505				
EMED	142	5623	MT	B	F	2218	481	269	214	446	229	217	192	183
EMED	104	4479	MT	B	F	2133	495		232	439	233	231	212	195
EMED	71	5048	MT	B	H				220					
EMED	10	139	MT	B	UM				218					
EMED	51	3101	MT	B	F	2196			265		273		240	
EMED	45	2031	MT	B	F	c 2022			219			217		201
LSAX	143	5625	MT	B	F	2211	479	276	215	449	228	215	202	179

PER	BOX	UN	ELEM	TAX	FUS	SLC
LPMED	10	151	SC	O		191
LPMED	19	571	SC	O	F	201
EPMED	11	222	SC	O		199
EPMED	18	458	SC	O		166
EPMED	20	575	SC	O		186
EPMED	9	70	SC	O	F	168
EPMED	9	70	SC	O	F	170
EPMED	10	217	SC	O	F	149
EPMED	10	217	SC	O	F	159
LMED	11	243	SC	O		175
LMED	13	295	SC	O		173
LMED	16	402	SC	O	F	182
LMED	12	246	SC	O	F	157
LMED	19	549	SC	O	F	176
LMED	83	6198	SC	O	F	159
LMED	17	447	SC	O	H	158
LMED	78	6127	SC	O	H	185
MMED	37	1553	SC	O		188
MMED	37	1551	SC	O		185
MMED	64	4222	SC	O		196
MMED	78	6115	SC	O		191
MMED	23	759	SC	O	F	182
MMED	39	1644	SC	O	F	176
MMED	14	303	SC	O	F	176
MMED	23	709	SC	O	F	141
MMED	78	6115	SC	O	H	c 162
MMED	39	1644	SC	O	UM	88
EMED	34	1469	SC	O		174
EMED	27	1016	SC	O		175
EMED	115	6529	SC	O		184
EMED	40	1645	SC	O	F	183
EMED	42	1695	SC	O	F	186
EMED	71	5046	SC	O	F	157
EMED	72	5054	SC	O	F	192
EMED	112	6488	SC	O	F	181
EMED	142	5623	SC	O	F	165
EMED	113	6499	SC	O	F	189
EMED	100	4396	SC	O	F	158
EMED	45	2007	SC	O	H	160
EMED	123	6575	SC	O	H	190
EMED	126	6633	SC	O	UM	117
SAXN	97	4359	SC	O	F	192

PER	BOX	UN	ELEM	TAX	FUS	BT	HTC
LPMED	6	5	HU	O	H	266	132
LPMED	13	263	HU	O	H		118
LPMED	13	263	HU	OVA	F	293	147
EPMED	20	575	HU	O	F		126
EPMED	20	575	HU	O	F		136
EPMED	20	613	HU	O	F	277	144
EPMED	7	4	HU	O	H		118
EPMED	11	222	HU	OVA	F	261	131
EPMED	11	222	HU	OVA	F	266	133
EPMED	13	296	HU	OVA	F		126
EPMED	13	296	HU	OVA	F	274	149
EPMED	16	390	HU	OVA	F	257	126

PER	BOX	UN	ELEM	TAX	FUS	BT	HTC
EPMED	17	431	HU	OVA	F	270	134
EPMED	18	458	HU	OVA	F		137
EPMED	7	4	HU	OVA	F	275	137
EPMED	7	4	HU	OVA	F	288	153
EPMED	18	466	HU	OVA	F	279	142
EPMED	81	6167	HU	OVA	F		136
EPMED	82	6168	HU	OVA	F	269	130
EPMED	7	4	HU	OVA	G	255	130
EPMED	7	4	HU	OVA	G	260	140
LMED	23	771	HU	O	F		121
LMED	79	6136	HU	O	F	300	149
LMED	13	288	HU	O	G	256	137
LMED	17	447	HU	OVA	F	291	142
LMED	12	249	HU	OVA	F	c 273	135
LMED	8	13	HU	OVA	F	281	143
LMED	11	244	HU	OVA	F	256	125
LMED	16	402	HU	OVA	F	294	149
LMED	12	246	HU	OVA	F	309	161
LMED	30	1202	HU	OVA	F	273	134
LMED	14	341	HU	OVA	F	265	131
LMED	84	6217	HU	OVA	F	287	147
LMED	13	269	HU	OVA	H	250	135
LMED	64	4224	HU	OVA	H	238	118
MMED	17	449	HU	O	F		c 126
MMED	23	709	HU	O	G	223	116
MMED	38	1578	HU	O	H	246	
MMED	65	4244	HU	O	H	c 263	133
MMED	92	4292	HU	OVA	F	258	130
MMED	37	1563	HU	OVA	F	270	134
MMED	37	1554	HU	OVA	F	264	128
MMED	67	884	HU	OVA	F	263	130
MMED	83	6187	HU	OVA	F	263	130
MMED	85	6252	HU	OVA	F	278	128
EMED	145	6894	HU	OVA?	F		169
EMED	145	6894	HU	OVA?	F	267	135
EMED	40	1652	HU	OVA?	G		129
EMED	26	902	HU	O	F	267	135
EMED	112	6484	HU	O	F	258	135
EMED	121	6554	HU	O	F		140
EMED	113	6504	HU	O	H	c 255	c 133
EMED	24	783	HU	OVA	F	287	145
EMED	28	1076	HU	OVA	F		148
EMED	118	6542	HU	OVA	F	258	122
EMED	153	7068	HU	OVA	F	273	133
EMED	153	7068	HU	OVA	F	288	139
EMED	10	218	HU	OVA	F	278	129
EMED	10	218	HU	OVA	F	307	148
EMED	49	3054	HU	OVA	F	292	153
EMED	150	7000	HU	OVA	F	269	128
EMED	98	4375	HU	OVA	F	282	139
EMED	103	4451	HU	OVA	F		132
EMED	31	1257	HU	OVA	G	c 258	135
EMED	137	4858	HU	OVA	G		c 138
EMED	142	5623	HU	OVA	G	264	139
EMED	45	2007	HU	OVA	H	263	132
EMED	117	6540	HU	OVA	H		132
EMED	134	4608	HU	OVA	H		131

PER	BOX	UN	ELEM	TAX	FUS	GL
LPMED	19	497	RA	O	F	1330
EPMED	11	226	RA	O	F	1343
EPMED	18	458	RA	O	F	1258
LMED	14	341	RA	O	F	1329
EMED	126	6633	RA	O	F	1412
EMED	145	6905	RA	O	F	1324

PER	BOX	UN	ELEM	TAX	FUS	GL	Bd	Dd	SD	a	b	1	4
EPMED	10	217	MC	OVA	F		288	176		135	131	111	118
EPMED	20	613	MC	OVA	F		246	154		116	115	102	96
LMED	83	6198	MC	OVA	G	1103							
LMED	80	6146	MC	OVA	UE		251	160		123	118	115	110
MMED	39	1635	MC	OVA	F		217	c 135					
MMED	110	6452	MC	OVA	F	1108	233		126	112	11	94	91
MMED	65	4235	MC	OVA	F	1133			121		104		100
MMED	25	820	MC	OVA	F	e 1138			124				
EMED	59	4119	MC	OVA	F	1088	234	138	129	110	104	96	89
EMED	117	6540	MC	OVA	F	1193	229	150	128	107	104	103	97
EMED	150	7001	MC	OVA	F	1261	c 232	147	138	112		101	96
EMED	46	2036	MC	OVA	F	1223	239	147	125	111	108	105	95
EMED	72	5054	MC	OVA	F		235	c 151		116	110	98	98
EMED	156	7088	MC	OVA	F	1129	242	155	127	114	107	102	95
EMED	105	4481	MC	OVA	F	1191	243	151	134	114	111	104	98
EMED	135	4634	MC	OVA	F	1305	262	160	140	121	120	107	101
LSAX	131	6844	MC	OVA	F		234			113	111	109	103

PER	BOX	UN	ELEM	TAX	FUS	LA
LPMED	13	263	PE	O	F	270
LPMED	22	684	PE	O	G	327
EPMED	11	222	PE	O	F	c 264
EPMED	16	390	PE	O	F	304
EPMED	18	466	PE	O	F	273
EPMED	81	6167	PE	O	F	262
LMED	83	6195	PE	O		302
LMED	17	447	PE	O	F	270
LMED	12	249	PE	O	F	255
LMED	11	243	PE	O	F	254
LMED	11	243	PE	O	F	c 301
LMED	34	1470	PE	O	F	252
MMED	37	1553	PE	O	F	278
MMED	91	4238	PE	O	F	268
MMED	64	4222	PE	O	F	251
EMED	160	7145	PE	O		252
EMED	100	4426	PE	O		287
EMED	139	4921	PE	O		266
EMED	34	1469	PE	O	F	296
EMED	27	995	PE	O	F	272
EMED	40	1652	PE	O	F	262
EMED	40	1652	PE	O	F	294
EMED	42	1696	PE	O	F	264
EMED	43	1723	PE	O	F	247
EMED	10	174	PE	O	F	264
EMED	150	7001	PE	O	F	260
EMED	46	2036	PE	O	F	252
EMED	99	4383	PE	O	F	270
EMED	49	3060	PE	O	F	271
EMED	114	6514	PE	O	F	264
EMED	142	5623	PE	O	F	265
EMED	103	4461	PE	O	F	261
EMED	65	4233	PE	O	F	292
LSAX	160	7161	PE	O		275
LSAX	106	4536	PE	O		c 247
LSAX	112	6485	PE	O	F	c 246
LSAX	137	4863	PE	O	F	243

PER	BOX	UN	ELEM	TAX	FUS	Bd
LPMED	13	263	TI	OVA	F	c 248
LPMED	19	571	TI	OVA	F	257
LPMED	13	263	TI	OVA	G	258
LPMED	76	6000	TI	OVA	G	257
LPMED	76	6000	TI	OVA	G	258
LPMED	25	802	TI	OVA	G	282
EPMED	9	70	TI	OVA	F	231
EPMED	9	70	TI	OVA	F	242
EPMED	9	70	TI	OVA	F	259
EPMED	9	70	TI	OVA	F	270
EPMED	9	70	TI	OVA	F	c 258
EPMED	10	217	TI	OVA	F	247
EPMED	11	222	TI	OVA	F	248
EPMED	11	222	TI	OVA	F	267
EPMED	16	390	TI	OVA	F	238
EPMED	17	431	TI	OVA	F	253
EPMED	18	458	TI	OVA	F	241
EPMED	20	576	TI	OVA	F	245
EPMED	6	3	TI	OVA	F	266
EPMED	20	575	TI	OVA	F	245
EPMED	20	575	TI	OVA	F	246
EPMED	76	6003	TI	OVA	F	c 248
EPMED	81	6167	TI	OVA	F	259
EPMED	82	6168	TI	OVA	F	250
EPMED	28	1098	TI	OVA	F	244
EPMED	28	1100	TI	OVA	F	243
EPMED	84	6232	TI	OVA	F	269
EPMED	16	390	TI	OVA	G	269
EPMED	17	431	TI	OVA	G	233
EPMED	18	458	TI	OVA	G	220
EPMED	82	6168	TI	OVA	G	255
EPMED	20	575	TI	O	F	233
EPMED	20	575	TI	O	F	272
EPMED	7	4	TI	OVA?	F	254
LMED	17	447	TI	OVA	F	268
LMED	12	249	TI	OVA	F	242
LMED	8	13	TI	OVA	F	236
LMED	19	539	TI	OVA	F	264
LMED	35	1500	TI	OVA	F	244
LMED	14	343	TI	OVA	F	252
LMED	83	6197	TI	OVA	F	256
LMED	34	1465	TI	OVA	G	240
LMED	14	341	TI	OVA	G	242
LMED	14	341	TI	OVA	G	242
LMED	61	4157	TI	OVA	G	237

PER	BOX	UN	ELEM	TAX	FUS	Bd
MMED	30	1200	TI	OVA	F	232
MMED	63	4208	TI	OVA	F	266
MMED	39	1637	TI	OVA	F	222
MMED	35	1506	TI	OVA	F	259
MMED	36	1544	TI	OVA	F	245
MMED	35	1528	TI	OVA	F	249
MMED	35	1528	TI	OVA	F	272
MMED	34	1490	TI	OVA	F	254
MMED	19	548	TI	OVA	F	267
MMED	27	1008	TI	OVA	F	235
MMED	27	1008	TI	OVA	F	258
MMED	88	6396	TI	OVA	F	c 218
MMED	77	6005	TI	OVA	F	c 225
MMED	85	6245	TI	OVA	F	255
MMED	88	6378	TI	OVA	F	235
MMED	110	6436	TI	OVA	F	265
MMED	109	6433	TI	OVA	F	271
MMED	20	616	TI	OVA	G	243
MMED	17	449	TI	OVA	G	279
MMED	38	1617	TI	OVA	G	257
MMED	62	4165	TI	OVA	G	c 253
MMED	64	4222	TI	OVA	G	254
MMED	37	1560	TI	OVA?	G	273
MMED	48	3042	TI	O		266
MMED	23	732	TI	O	F	243
MMED	63	4216	TI	O	UE	245
EMED	33	1358	TI	OVA	F	232
EMED	24	783	TI	OVA	F	257
EMED	40	1645	TI	OVA	F	249
EMED	107	4556	TI	OVA	F	254
EMED	161	7222	TI	OVA	F	259
EMED	133	4594	TI	OVA	F	243
EMED	42	1696	TI	OVA	F	240
EMED	31	1257	TI	OVA	F	247
EMED	153	7068	TI	OVA	F	252
EMED	41	1668	TI	OVA	F	248
EMED	133	4604	TI	OVA	F	249
EMED	134	4608	TI	OVA	F	245
EMED	99	4383	TI	OVA	F	233
EMED	19	495	TI	OVA	F	267
EMED	76	5153	TI	OVA	F	272
EMED	103	4457	TI	OVA	F	234
EMED	113	6505	TI	OVA	F	246
EMED	122	6563	TI	OVA	F	241
EMED	121	6554	TI	OVA	F	253
EMED	124	6593	TI	OVA	F	249
EMED	127	6658	TI	OVA	F	245
EMED	156	7089	TI	OVA	F	240
EMED	146	6918	TI	OVA	F	264
EMED	97	4369	TI	OVA	F	251
EMED	58	4000	TI	OVA	F	259
EMED	105	4491	TI	OVA	F	255
EMED	145	6894	TI	OVA	F	236
EMED	27	1047	TI	OVA	G	273
EMED	137	4847	TI	OVA	G	229
EMED	123	6574	TI	OVA	G	c 256
EMED	105	4496	TI	OVA	G	256
EMED	161	7222	TI	OVA?	F	275
EMED	103	4451	TI	OVA?	F	264
EMED	33	1418	TI	O	F	257
EMED	137	4797	TI	O	F	c 248
EMED	142	5623	TI	O	F	238
LSAX	141	5609	TI	OVA	F	238
SAXN	158	7109	TI	OVA	G	252

PER	BOX	UN	ELEM	TAX	GL1	Bd	D1
LPMED	6	5	AS	OVA	305	196	c 173
LPMED	25	802	AS	OVA	e 300	201	164
LPMED	22	684	AS	O	303		166
EPMED	9	70	AS	OVA	249	c 166	141
EPMED	16	390	AS	OVA	138	162	
EPMED	6	3	AS	OVA	291	191	162
EPMED	20	575	AS	OVA	261	167	141
LMED	16	400	AS	OVA	273	178	154
LMED	34	1488	AS	OVA	273	169	145
MMED	20	616	AS	OVA	258	168	147
MMED	22	688	AS	OVA	273	185	153
MMED	30	1205	AS	OVA	258	158	143
MMED	25	853	AS	OVA	253	165	141
MMED	26	915	AS	OVA	280	180	144
MMED	108	6375	AS	OVA	275	177	147
MMED	111	6472	AS	O	267	164	150
MMED	85	6242	AS	O		177	
MMED	78	6115	AS	O	277	182	157
EMED	120	6552	AS	O	274		154
EMED	43	1723	AS	OVA	257	170	147
EMED	151	7002	AS	OVA	276	177	

PER	BOX	UN	ELEM	TAX	FUS	GL
EPMED	9	70	CA	OVA	F	546
EPMED	17	431	CA	OVA	F	534
EPMED	20	576	CA	OVA	F	538
EPMED	7	4	CA	OVA	F	542
EPMED	20	575	CA	OVA	F	502
LMED	19	564	CA	OVA	F	516
MMED	23	712	CA	OVA	F	506
EMED	10	148	CA	OVA	F	504
EMED	116	6530	CA	OVA	F	538
EMED	95	4331	CA	OVA	F	582

PER	BOX	UN	ELEM	TAX	FUS	GL	Bd	Dd	SD
EPMED	17	431	MT	OVA	F		221	148	
LMED	17	447	MT	OVA	F		239	168	
MMED	20	614	MT	OVA	F		245	157	
MMED	39	1635	MT	OVA	F	1360	247	162	127
MMED	36	1544	MT	OVA	F		c 236	149	
MMED	38	1617	MT	OVA	F	1181	229	141	113
MMED	35	1525	MT	OVA	F	c 1230	226		
MMED	21	640	MT	OVA	F	1293	228	151	112
MMED	108	6264	MT	OVA	F	1385	236	156	124
EMED	155	7078	MT	OVA	F		216	147	105
EMED	148	6993	MT	OVA	F	1348	219	159	103
EMED	99	4388	MT	OVA	F	c 1267	238	156	116
EMED	157	7106	MT	OVA	F		c 219		c 103
EMED	142	5623	MT	OVA	F	1296	c 222	c 140	106
EMED	151	7014	MT	OVA	F	1220	219	146	105

PER	BOX	UN	ELEM	TAX	FUS	GL	Bd	BT	HTC	LAR	SLC
EPMED	15	353	SC	S	F						e 207
LMED	83	6198	SC	S							122
MMED	17	449	SC	S							191
MMED	36	1550	SC	S							209
MMED	38	1578	SC	S						240	
MMED	16	399	SC	S	UM						53
MMED	39	1644	SC	S	UM						180
EMED	26	902	SC	S							206
EMED	123	6588	SC	S							209
EMED	72	5054	SC	S							242
EMED	48	3045	SC	S							223
EMED	123	6584	SC	S							210
EMED	98	4375	SC	S							227
EMED	122	6573	SC	S	F						249
LSAX	112	6485	SC	S							246
EPMED	20	576	HU	S	F			317	235		
MMED	23	759	HU	S	F				197		
MMED	32	1275	HU	S	G			278	173		
EMED	116	6538	HU	S	F			286	182		
EMED	97	4361	HU	S	F			275	173	173	
EMED	153	7068	HU	S	G			255	175		
EMED	65	4232	HU	S	G			298	185		
EMED	49	3066	HU	S	UM						47
MMED	39	1644	PE	S	F					275	
MMED	64	4221	TI	S	F		323				
MMED	92	4302	TI	S	F		c 278				
MMED	30	1191	TI	S	G		310				
EMED	116	6535	TI	S	F		274				
EMED	10	139	TI	S	G		e 290				
EMED	134	4609	TI	S	G		320				
EMED	103	4461	TI	S	G		c 270				
EMED	100	4426	TI	S	G		284				
LSAX	107	4573	TI	S	G		305				
MMED	23	744	AS	S		385					
EMED	148	6995	AS	S		374					

PER	BOX	UN	ELEM	TAX	FUS	SLC
EPMED	123	6578	SC	EQ		520
LMED	81	6164	SC	EQ		500
LMED	17	447	SC	EQ	F	555
LMED	83	6197	SC	EQ	F	479
MMED	58	4018	SC	EQ		533
MMED	23	759	SC	EQ		601
MMED	36	1544	SC	EQ	F	558
MMED	26	968	SC	EQ	F	489
MMED	108	6389	SC	EQ	F	601
MMED	86	6263	SC	EQ	F	445
EMED	70	5038	SC	EQ		609
EMED	128	6735	SC	EQ	F	612
LSAX	162	7287	SC	EQ		540

PER	BOX	UN	ELEM	TAX	FUS	GL	BT	HTC
EPMED	84	6203	HU	EQ	F		686	328
LMED	19	549	HU	EQ	F		e 640	326
LMED	12	249	HU	EQ	H		c 665	354
LMED	34	1498	HU	EQ	H		697	344
LMED	21	652	HU	EQ	H		699	348
MMED	48	3018	HU	EQ	F		601	302
MMED	76	3092	HU	EQ	F			c 340
MMED	72	5072	HU	EQ	H			328
MMED	18	472	HU	EQ	H			362
MMED	82	6174	HU	EQ	H		c 741	366
MMED	88	6344	HU	EQ	H			c 347
EMED	107	4556	HU	EQ	F		e 612	343
EMED	31	1246	HU	EQ	F		738	401
EMED	51	3099	HU	EQ	F	2693	699	338
EMED	117	6540	HU	EQ	F		749	394
EMED	152	7054	HU	EQ	F		c 628	352
EMED	103	4458	HU	EQ	F		654	330
EMED	122	6572	HU	EQ	H			388
EMED	30	1190	HU	EQ	UE		639	327

PER	BOX	UN	ELEM	TAX	FUS	GL	Bd
EPMED	80	6141	RA	EQ	F	3427	
LMED	35	1526	RA	EQ	F	c 3040	
LMED	30	1209	RA	EQ	F	3107	
LMED	77	6006	RA	EQ	F	3173	696
MMED	21	632	RA	EQ	F	3257	
MMED	31	1251	RA	EQ	F		c 626
MMED	86	6263	RA	EQ	G	3240	
EMED	34	1469	RA	EQ	F	2955	660
EMED	120	6549	RA	EQ	F	2961	635
EMED	150	7001	RA	EQ	F	3146	
EMED	98	4377	RA	EQ	F	3404	c 732
EMED	10	218	RA	EQ	F		c 698
EMED	143	5623	RA	EQ	F	3096	649

PER	BOX	UN	ELEM	TAX	FUS	GL	Bd	Dd	SD
EPMED	80	6149	MC	EQ	F		457	344	
EPMED	80	6141	MC	EQ	F	2064	449	c 320	
LMED	12	249	MC	EQ	F		431		
LMED	21	650	MC	EQ	F		458	360	
LMED	30	1209	MC	EQ	F	1997	452	339	311
LMED	77	6007	MC	EQ	F	2098	459	336	299
MMED	17	449	MC	EQ	F		c 480	c 353	
MMED	35	1528	MC	EQ	F		432	319	
MMED	23	760	MC	EQ	F	2170	482	330	297
MMED	88	6397	MC	EQ	F	2116	431		306
MMED	83	6196	MC	EQ	F	2050	447	335	304
MMED	49	3051	MC	EQ	F		543	400	
EMED	24	783	MC	EQ	F		c 445		
EMED	135	4613	MC	EQ	F	c 2050	442	327	292
EMED	28	1075	MC	EQ	F		451	c 354	
EMED	118	6542	MC	EQ	F	2183	460		301
EMED	46	2036	MC	EQ	F	2024	456	328	305
EMED	121	6553	MC	EQ	F	2261	497	367	332
LSAX	129	6762	MC	EQ	F	1971	439	317	289
SAXN	158	7109	MC	EQ	F	2099	c 446		310

PER	BOX	UN	ELEM	TAX	FUS	LAR
EPMED	123	6578	PE	EQ	F	558
LMED	30	1209	PE	EQ	F	556
MMED	35	1528	PE	EQ		541
MMED	18	472	PE	EQ		561
MMED	38	1578	PE	EQ	F	498
MMED	85	6252	PE	EQ	F	539
MMED	108	6383	PE	EQ	F	576
MMED	78	6044	PE	EQ	F	573
EMED	119	6543	PE	EQ	F	588
EMED	68	5008	PE	EQ	F	567
EMED	68	5008	PE	EQ	F	589
EMED	154	7074	PE	EQ	F	607
EMED	34	1469	PE	EQ	F	552
EMED	76	5233	PE	EQ	F	561
EMED	42	1676	PE	EQ	F	630
EMED	111	6481	PE	EQ	F	562
EMED	146	6913	PE	EQ	F	584

PER	BOX	UN	ELEM	TAX	FUS	GL	Bd
EPMED	11	222	TI	EQ	F		664
EPMED	15	350	TI	EQ	F	3180	
EPMED	82	6168	TI	EQ	F		707
LMED	34	1479	TI	EQ	F		721
LMED	20	591	TI	EQ	F		e 610
LMED	80	6142	TI	EQ	F		620
LMED	81	6164	TI	EQ	F		c 662
MMED	25	828	TI	EQ	F		674
MMED	39	1635	TI	EQ	F		700
MMED	36	1543	TI	EQ	F		655
MMED	35	1525	TI	EQ	F		673
MMED	35	1515	TI	EQ	F		712
MMED	21	677	TI	EQ	F		714
MMED	26	881	TI	EQ	F	2989	593
MMED	30	1191	TI	EQ	F		686
MMED	66	4248	TI	EQ	F		c 662
MMED	44	1754	TI	EQ	F		607
EMED	34	1469	TI	EQ	F	3277	671
EMED	27	1047	TI	EQ	F	3259	696
EMED	102	4447	TI	EQ	F		608
EMED	156	7089	TI	EQ	F	3265	632
EMED	120	6552	TI	EQ	F		741
EMED	140	5606	TI	EQ	F		662
EMED	45	2007	TI	EQ	UE		642
LSAX	129	6762	TI	EQ	F	3172	e 630

PER	BOX	UN	ELEM	TAX	GH	GB	BFd	LmT
EPMED	16	390	AS	EQ	569	c 586	510	564
EPMED	7	4	AS	EQ	588	588	494	584
EPMED	84	6206	AS	EQ	510	553	479	545
LMED	12	249	AS	EQ	465	485	416	466
LMED	30	1209	AS	EQ	544	577	483	544
LMED	62	4164	AS	EQ	537	589	515	556
LMED	79	6138	AS	EQ	554	565	474	571
MMED	22	696	AS	EQ	553	599	530	571
MMED	91	4277	AS	EQ	475	501	445	487
MMED	92	4282	AS	EQ			500	
MMED	61	4158	AS	EQ	536	560	463	559
MMED	38	1578	AS	EQ	514	555	501	513
MMED	26	881	AS	EQ	471	512	445	c 482
MMED	87	6334	AS	EQ	575	590	524	573
MMED	63	4216	AS	EQ	538	579	497	548
EMED	34	1469	AS	EQ	541	566	452	557
EMED	45	2007	AS	EQ	573	552	475	563
EMED	49	3066	AS	EQ	510	571	458	542
EMED	155	7077	AS	EQ			468	
EMED	38	1594	AS	EQ	574	559	506	561
EMED	145	6905	AS	EQ	c 578	610	481	c 592

PER	BOX	UN	ELEM	TAX	FUS	GL	Bd	Dd	SD
EPMED	9	70	MT	EQ	F		464	378	283
EPMED	18	466	MT	EQ	F		470		
EPMED	82	6168	MT	EQ	F	2617			
LMED	21	650	MT	EQ	F		e 485		
LMED	30	1209	MT	EQ	F		482	367	
LMED	23	761	MT	EQ	F		447	347	281
LMED	18	475	MT	EQ	F	2428	412	334	260
LMED	78	6127	MT	EQ	F	2564	466	372	285
LMED	78	6127	MT	EQ	F	c 2548	461	362	272
LMED	79	6138	MT	EQ	F		439		
MMED	29	1135	MT	EQ	F		462	c 350	
MMED	33	1396	MT	EQ	F	2672	464	347	282
MMED	19	504	MT	EQ	F	c 244			
MMED	38	1590	MT	EQ	F		441	348	
MMED	63	4215	MT	EQ	F	c 2497	475	347	306
EMED	34	1469	MT	EQ	F	2531	448	351	282
EMED	45	2007	MT	EQ	F		433		
EMED	28	1066	MT	EQ	F		472	368	
EMED	27	1047	MT	EQ	F		c 461	c 363	
EMED	27	1047	MT	EQ	F	2530	464	358	
EMED	76	3096	MT	EQ	F		502	381	
EMED	120	6551	MT	EQ	F	2494	c 429		247
EMED	124	6603	MT	EQ	F		491	382	
EMED	28	1075	MT	EQ	G	c 2640	451	350	234
LSAX	129	6762	MT	EQ	F	2354	e 436	c 330	266
SAXN	148	7109	MT	EQ	F	2621	452	365	301

PER	BOX	UN	ELEM	TAX	FUS	Bd	Dd
LPMED	15	347	MP	EQ	F	e 420	
EPMED	9	70	MP	EQ	F	c 420	
LMED	22	685	MP	EQ	F	c 466	
LMED	14	309	MP	EQ	F	418	
LMED	14	343	MP	EQ	F	c 464	341
EMED	43	1711	MP	EQ	F	477	379
EMED	122	6573	MP	EQ	F	511	365

PER	BOX	UN	ELEM	TAX	FUS	GL	Bp	SD	Bd	Dp	Dd
EPMED	16	390	P1	EQ	F	787	512	340	413	325	c 240
EPMED	76	6003	P1	EQ	F	837	518	351	449	333	249
EPMED	48	3038	P1	EQ	F	c 746		303	406		
LMED	61	4157	P1	EQ				279	377		c 212
LMED	17	447	P1	EQ	F	722	444	291	361	296	209
LMED	34	1465	P1	EQ	F			296			
LMED	20	624	P1	EQ	F	738	415	277	364	282	c 215
LMED	21	650	P1	EQ	F	750	536	314	406	366	
LMED	21	650	P1	EQ	F	775	504	305	411	333	234
LMED	19	549	P1	EQ	F	790	468	303	410	319	c 262
LMED	78	6121	P1	EQ	F	c 785	c 525	311	415	c 343	c 225
LMED	83	6188	P1	EQ	F	c 777					
LMED	77	6008	P1	EQ	F			300			
MMED	58	4018	P1	EQ	F	787	491	314	397		231
MMED	37	1553	P1	EQ	F		490	296		347	
MMED	37	1553	P1	EQ	F	745	474	309	380	310	c 214
MMED	108	6259	P1	EQ	F	842	496	326	422	347	c 237
MMED	36	1542	P1	EQ	F	749		295	521	e 347	c 226
MMED	35	1520	P1	EQ	F	727	511	291	390		229
MMED	14	306	P1	EQ	F	795	500	324	c 413	325	230
MMED	21	668	P1	EQ	F	777	494	323	394	317	e 230
MMED	19	551	P1	EQ	F			297			
MMED	16	384	P1	EQ	F			349	451		c 234
MMED	87	6339	P1	EQ	F	734	495	297	389	339	228
MMED	86	6266	P1	EQ	F	761	e 500	313	396	c 347	236
MMED	86	6266	P1	EQ	F	c 702		278	367		210
MMED	111	6472	P1	EQ	F	c 790		315	c 396		
MMED	78	6044	P1	EQ	F			343			
MMED	84	6225	P1	EQ	F	795	515	308	407	380	250
MMED	109	6433	P1	EQ	F	c 768			405		
EMED	88	6347	P1	EQ	F	688	461	276	381	322	234
EMED	116	6538	P1	EQ	F	795	485	280	380	343	223
EMED	161	7222	P1	EQ	F	c 750		326			
EMED	133	4592	P1	EQ	F	721	474	295			
EMED	42	1696	P1	EQ	F	819	548	372	440	366	237
EMED	123	6575	P1	EQ	F			308			
EMED	117	6540	P1	EQ	F	842	487	311	423	337	233
EMED	155	7077	P1	EQ	F	758	484	287	376	346	226
EMED	41	1671	P1	EQ	F	835	504	332	420	342	236
EMED	42	1680	P1	EQ	F	883	535	339	456	346	268
EMED	112	6488	P1	EQ	F			323		343	
EMED	113	6505	P1	EQ	F	826	566	368	419		
EMED	122	6573	P1	EQ	F	787	481	282	396	345	230
EMED	122	6573	P1	EQ	F	877	580		448	360	263
EMED	124	6593	P1	EQ	F	710	494	321	380	339	237
EMED	121	6553	P1	EQ	F	889	544	349	447	359	245
LSAX	162	7280	P1	EQ	F	c 756		322	400		
SAXN	104	4466	P1	EQ	F	c 807	e 473	348	406	e 358	c 243
SAXN	158	7109	P1	EQ	F	838	559	350	421	377	239

PER	BOX	UN	ELEM	TAX	FUS	GL	Bd	Dd	HTC	SD
EMED	151	7008	HU	CEE	F				274	
SAXN	157	7109	MT	CEE	F	2913	c 389	c 267		207

PER	BOX	UN	ELEM	TAX	FUS	GL	Bd	HTC	LAR
LMED	12	246	HU	LEE	F		123	68	
MMED	17	443	HU	LE	F		122	68	
EMED	116	6538	HU	LEE	F			66	
EMED	148	6995	HU	LEE	F		131	65	
EPMED	16	390	RA	LE	F	1023			
LMED	16	400	PE	LE	F				126
LMED	21	652	PE	LE	F				124
LMED	16	400	TI	LE	F	c 1383	160		
LMED	81	6158	TI	LE	F		156		
MMED	82	6183	TI	LE	F		164		

PER	BOX	UN	ELEM	TAX	FUS	Bd	HTC
LMED	78	6116	HU	ORC	F	93	46

PER	BOX	UN	ELEM	TAX	FUS	GL	Bd	LAR
MMED	18	477	PE	RA	F			36
EMED	117	6540	FE	RA	G	362	67	
EMED	117	6540	FE	RA	G	c 352	66	
EMED	118	6540	TI	RA	F	395		

PER	BOX	UN	ELEM	TAX	FUS	LAR
LMED	79	6136	PE	ART	F	39

PER	BOX	UN	ELEM	TAX	FUS	Bd	HTC
LPMED	76	6000	HU	RAV	F	63	16
LMED	79	6131	TI	RAV	F	38	
LMED	64	4224	TI	RAV	F	40	

PER	BOX	UN	ELEM	TAX	FUS	GL	Bd	Dd
SAXN	158	7109	FE	CAS	F	e 1180	420	281

PER	BOX	UN	ELEM	TAX	FUS	GL	Bd	HTC
LMED	11	243	HU	CAF	F		279	c 99
MMED	65	4244	HU	CAF	F		253	89
MMED	92	4302	HU	CAF	F		408	160
MMED	76	3098	HU	CAF	F		317	128
EMED	51	3100	HU	CAF	F		303	122
EMED	148	6995	HU	CAF	F		324	123
EMED	98	4370	HU	CAF	F		278	108
EMED	120	6552	HU	CAF	F	1399	253	196
LMED	17	425	CA	CAF	F	401		
MMED	49	3051	CA	CAF	F	434		
EMED	148	6995	CA	CAF	F	448		

PER	BOX	UN	ELEM	TAX	FUS	GL	Bd	LAR	SLC
MMED	62	4165	PE	CAF	F			235	
MMED	76	3098	PE	CAF	F			212	
EMED	51	3100	PE	CAF	F			201	
EMED	98	4370	RA	CAF	F	1514			
MMED	30	1200	SC	CAF	F				296
EMED	149	6995	SC	CAF	F				241
EMED	46	2037	SC	CAF	F				234
EPMED	13	268	TI	CAF	F		224		
MMED	48	3016	TI	CAF	F		225		
EMED	148	6995	TI	CAF	F		240		
EMED	126	6643	TI	CAF	F		142		
EMED	138	4896	TI	CAF	F		162		
EMED	123	6588	TI	CAF	G		245		

PER	BOX	UN	ELEM	TAX	FUS	GL	Bd	HTC	LAR	SLC
EPMED	7	4	SC	FEC	F					99
LMED	17	405	SC	FEC	F					102
MMED	36	1535	SC	FEC	F					106
MMED	111	6476	SC	FEC	F					109
LMED	28	1058	HU	FEC	F		157	51		
LMED	16	402	HU	FEC	F		176	56		
LMED	29	1153	HU	FEC	F		173	61		
MMED	25	837	HU	FEC	F	779	141	50		
EMED	10	148	HU	FEC	F		149	52		
EMED	68	5008	HU	FEC	F		147	49		
EMED	99	4380	HU	FEC	F		163	53		
EMED	99	4388	HU	FEC	F		173	61		
EMED	115	6524	HU	FEC	F		165	57		
EMED	115	6526	HU	FEC	F		158	55		
EMED	115	6527	HU	FEC	F		165	57		
EMED	142	5623	HU	FEC	F		144	47		
EMED	125	6627	HU	FEC	F		145	53		
SAXN	97	4359	HU	FEC	F	840	159	51		
LSAX	137	4795	PE	FEC	F				103	
EMED	102	4447	FE	FEC	F	917				
EMED	102	4447	FE	FEC	F	932	161			
LMED	30	1209	TI	FEC	F		153			
MMED	66	4252	TI	FEC	F	971	122			
EMED	28	1076	TI	FEC	F	1011	132			
EMED	28	1076	AS	FEC		162				
EMED	28	1076	CA	FEC	F	260				

PER	BOX	UN	ELEM	TAX	FUS	GL	Bd	LAR	SD
EMED	98	4372	RA	MUP	F	347	67		
EPMED	82	6168	PE	MUP	F			57	
EMED	91	4274	PE	MUP	F			73	
EMED	91	4274	FE	MUP	F	530	117		38
MMED	30	1205	FE	MUP	F		114		
EMED	91	4274	TI	MUP	F	553	83		35

PER	BOX	UN	ELEM	TAX	FUS	GL	Bd	HTC	SD
EMED	49	3066	HU	MUX	F	284	62	18	21
EMED	95	4339	TI	MUX	F	324	43		

PER	BOX	UN	ELEM	TAX	FUS	GL	Bd	HTC	LAR	SLC
EPMED	13	268	SC	ERE	F					70
EPMED	18	458	HU	ERE	F		111	32		
LMED	78	6116	PE	ERE	F				79	
LMED	78	6119	PE	ERE	F				66	
MMED	21	667	FE	ERE	G	436				
LMED	11	243	TI	ERE	F		88			

PER	BOX	UN	ELEM	TAX	FUS	GL	Bd	LAR
LMED	67	5006	SC	TAL		251		
LMED	16	402	SC	TAL	F	273		
LMED	83	6198	SC	TAL	F	272		
LMED	79	6136	SC	TAL	F	222		
LMED	83	6193	SC	TAL	F	238		
MMED	62	4169	SC	TAL		262		
MMED	25	853	SC	TAL	F	260		
MMED	83	6187	SC	TAL	F	263		
MMED	108	6264	SC	TAL	F	254		
EPMED	16	390	HU	TAL	F	176		
MMED	17	403	HU	TAL	F	172		
LMED	12	250	PE	TAL	F			33
MMED	25	814	PE	TAL	F			37
LMED	79	6136	FE	TAL	F	170		
LMED	83	6195	FE	TAL	F	181		
MMED	82	6183	FE	TAL	F	180		
MMED	111	6463	FE	TAL	F	183		
MMED	85	6243	FE	TAL	F	171	43	
MMED	78	6115	FE	TAL	F	171	44	
LPMED	76	6000	TI	TAL	F	204	39	
LMED	83	6195	TI	TAL	F	221	45	
MMED	26	979	TI	TAL	F	206	39	

PER	BOX	UN	ELEM	TAX	GL
LMED	14	321	TI	AMP	343
LMED	79	6136	TI	AMP	323
EMED	113	6500	FE	AMP	308

PER	BOX	UN	ELEM	TAX	SPUR	GL	Bd	SC
EMED	139	4921	MT	GAG	S		133	63
EMED	139	4921	MT	GAG	S	760	130	64

PER	BOX	UN	ELEM	TAX	SPUR	GL	Bd	Dd	SC	La
LMED	78	6127	HU	GNP		623	154		59	
MMED	20	601	HU	GNP			c 149			
MMED	36	1546	HU	GNP		e 620				
MMED	38	1585	HU	GNP					61	
MMED	25	853	HU	GNP		661	145		73	
MMED	21	632	HU	GNP		701	150		62	
MMED	32	1315	HU	GNP			137		61	
EMED	40	1645	HU	GNP		672	141		62	
EMED	76	3094	HU	GNP		656	150		65	
EMED	118	6540	HU	GNP		634	137		62	
EMED	133	4576	HU	GNP		648	139		66	
EMED	111	6466	HU	GNP		706	159		69	
MMED	22	687	FE	GNP			138			
MMED	14	339	FE	GNP			146	133		
LSAX	105	4494	FE	GNP			105	84		
EPMED	11	222	TI	GNP			108	114	57	972
EPMED	13	296	TI	GNP			123	125		
LMED	14	343	TI	GNP			109	113		
LMED	83	6199	TI	GNP			111	c 106		
MMED	37	1554	TI	GNP			97	102	53	
MMED	36	1543	TI	GNP			99	102		917
EMED	33	1418	TI	GNP		1155	120	120		1111
EMED	26	980	TI	GNP			108	108	51	
EMED	48	3032	TI	GNP			102	108		
EMED	31	1245	TI	GNP		1045	107	115	60	1015
EMED	40	1657	TI	GNP			116	121	63	
EMED	100	4392	TI	GNP			104			
EMED	13	292	TI	GNP			113	127	67	
EMED	138	4884	TI	GNP		c 1015			54	c 882
EMED	114	6509	TI	GNP		c 1002	101	110	53	977
EMED	114	6517	TI	GNP			102	97		
EMED	104	4476	TI	GNP			132	137	71	
EMED	96	4358	TI	GNP		1108	117	123	64	1061
EMED	139	4921	TI	GNP		1150	118	122	62	1106
EMED	96	4357	TI	GNP			111	c 101		
LSAX	42	1681	TI	GNP			101	105		
SAXN	97	4359	TI	GNP			92	101		
MMED	21	676	MT	GNP		715	57			
EMED	26	939	MT	GNP	A	679			57	
EMED	125	6629	MT	GNP			118			

PER	BOX	UN	ELEM	TAX	SPUR	GL	Bd	Dd	SC	Lm
LMED	78	6116	FE	GN		737	154	137	65	685
MMED	33	1440	FE	GN		690	142			644
MMED	32	1315	FE	GN		678	131	120	57	636
EMED	59	4119	FE	GN		743	142	124	68	687
EMED	123	6589	FE	GN			129	99		636
EMED	132	4370	FE	GN		823	154	132	63	768
EMED	30	1194	FE	GN		792	164	140	72	c 727
EMED	98	4375	FE	GN		805	158	135	69	758
EMED	139	4921	FE	GN		819	153	135	62	771
EMED	94	4328	MC	GP	A	657				
MMED	19	515	MT	GN	A	657	121		59	
MMED	66	4256	MT	GN	A		142		69	
EMED	118	6540	MT	GN	A	662	121		59	
EMED	99	4381	MT	GN	A	665	119		54	
EMED	59	4108	MT	GN	S	811	135		68	
EMED	97	4361	MT	GN	A		125		61	
EMED	94	4313	MT	GN	A	618	113		53	
EMED	103	4451	MT	GN	A	675			55	
EMED	95	4332	MT	GN	A	c 610			53	
EMED	135	4644	MT	GN	A				58	

PER	BOX	UN	ELEM	TAX	GL	Bd	Dd	SC	Lm
LMED	83	6197	CO	ANA	532				
EMED	46	2036	CO	ANA	536				
EPMED	18	466	HU	ANA		89		44	
LMED	91	4264	HU	ANA		152			
LMED	79	6137	HU	ANA	920	144		71	
EMED	123	6589	HU	ANA		163			
EMED	126	6641	HU	ANA	876	144		71	
LSAX	132	4494	HU	ANA		900	150	72	
EMED	115	6524	MC	ANA	c 354				
EPMED	11	222	FE	ANA		98		42	
EMED	26	893	FE	ANA	510	128	111	49	483
EMED	150	7001	FE	ANA	525	127	106	50	495
EMED	97	4367	FE	ANA		109		41	488
LMED	79	6136	TI	ANA		70	72	31	
EMED	89	4136	MT	ANA	443	89		43	

PER	BOX	UN	ELEM	TAX	GL	Bd	Dd	SC	Lm	La
MMED	63	4216	HU	ANS		232				
EMED	72	5067	HU	ANS		247				
EMED	26	894	HU	ANS		242		112		
EMED	100	4425	HU	ANS		232		112		
LMED	78	6116	MC	ANS	730					
MMED	85	6243	FE	ANS	c 829	220	c 172	88	774	
EMED	28	1087	FE	ANS	768	200		82	722	
EMED	31	1245	FE	ANS	804	212	168	88	743	
EMED	153	7068	FE	ANS		202	162	82		
EMED	160	7145	FE	ANS	803	210		94	750	
EMED	105	4496	FE	ANS	743	190	160	85	691	
EMED	104	4479	FE	ANS		203	e 164	83	746	
EMED	163	7301	FE	ANS	818	221	c 179	91	756	
EMED	163	7301	FE	ANS	819	213	175	88	772	
MMED	85	6245	TI	ANS		c 169	c 174			
EMED	26	939	TI	ANS		c 175	c 178			
EMED	45	2007	TI	ANS	1448	170	172	81		1387
EMED	103	4454	TI	ANS	1402	163	163	86		1339
EMED	103	4451	TI	ANS		167				
EMED	128	6752	TI	ANS		170	165			
EMED	27	1041	MT	ANS		198				

PER	BOX	UN	ELEM	TAX	GL	Bd	Dd	SD	Lm	La
LMED	83	6195	CO	COL	352					
EPMED	16	391	HU	COL	434	103		51		
LMED	12	249	HU	COL		111		55		
LMED	78	6116	HU	COL		112		54		
LMED	61	4156	HU	COL		107				
MMED	62	4169	HU	COL		104				
MMED	63	4209	HU	COL	452	108		49		
MMED	66	4256	HU	COL		108		51		
EMED	104	4477	HU	COL		114				
EMED	94	4328	HU	COL	445	106		51		
LMED	83	6198	MC	COL	320					
LPMED	13	294	FE	COL		73	60	30		
EPMED	81	6167	FE	COL		76	66			
LMED	61	4156	FE	COL		77				
MMED	25	853	FE	COL	c 402	80	67	34	378	
MMED	91	4238	FE	COL	423	80	71	35	399	
MMED	87	6291	FE	COL		75	62	37		
MMED	92	4302	FE	COL	398	75	65	34	376	
EMED	106	4520	FE	COL		c 79	66	37	402	
EMED	94	4328	FE	COL	406	81		39	383	
LMED	78	6116	TI	COL		67	60	31		
MMED	63	4208	TI	COL		63	62	31		
MMED	25	853	TI	COL	552	67	69	29		542
MMED	91	4238	TI	COL	549	66	63	31		538
MMED	92	4302	TI	COL	540	64	58	31		533
MMED	92	4302	TI	COL	569	64	63	30		564
EMED	116	6538	TI	COL		68	62			
EMED	103	4460	TI	COL	532	63	58	31		529
EMED	94	4328	TI	COL		69	62			
EMED	94	4328	TI	COL	573	67	62	29		566
EMED	106	4501	TI	COL	574	73	65	32		567
LSAX	106	4528	TI	COL	585	71	63	31		
LMED	81	6157	MT	COL	310			29		
LMED	78	6116	MT	COL	299	80		29		
MMED	83	6187	MT	COL		72		28		
MMED	92	4302	MT	COL	295	82		30		
EMED	103	4451	MT	COL	279			30		
EMED	139	4921	MT	COL		82				
LSAX	106	4528	MT	COL	315	78		30		

PER	BOX	UN	ELEM	TAX	FUS	GL	Bd	Dd	SC	La
LMED	11	243	HU	TU		247	66		21	
LMED	79	6132	HU	TU		200	49		20	
LMED	79	6133	HU	TU		309	73		31	
LMED	83	6198	HU	TU	F	254	65		22	
MMED	19	548	HU	TU		305			29	
EPMED	11	222	MC	TU		223				
EPMED	16	391	MC	TU		207				
LMED	83	6198	MC	TU		236				
LMED	21	653	TI	TU			42	42	19	
LMED	14	298	TI	TU		427	35	35	17	417
LMED	79	6137	MT	TU		331	37		17	
LMED	83	6197	MT	TU		331	c 34		19	

PER	BOX	UN	ELEM	TAX	GL	Bd	Dd	SC	Lm	La
EPMED	16	391	HU	CO		151		64		
EPMED	81	6167	HU	CO	637	139		58		
EPMED	48	3038	HU	CO		138				
EPMED	48	3038	HU	CO		139				
LMED	12	246	HU	CO		138		58		
LMED	79	6137	HU	CO	621	138		55		
MMED	25	839	HU	CO	661	160		62		
MMED	25	839	HU	CO	663	145		59		
EMED	43	1712	HU	CO		140				
EMED	117	6540	HU	CO	667	152		57		
EMED	156	7088	HU	CO	631	142		57		
LMED	12	246	FE	CO		102	79	41		
LMED	13	295	FE	CO	477	98		47	452	
LMED	78	6116	FE	CO	483	100	79	44	458	
MMED	25	853	FE	CO	433	83	67	37	413	
EMED	95	4339	FE	CO	541	114		50	510	
LSAX	33	1426	FE	CO		101				
EPMED	13	266	MT	CO		65		35		
LMED	78	6127	MT	CO	561	68		32		
EPMED	48	3038	TI	CO		83	77			
LMED	67	5006	TI	CO		89	80			
LMED	21	653	TI	CO		88	82	39		
LMED	17	419	TI	CO	862	80	79	37		849
LMED	78	6116	TI	CO		80	79	40		
LMED	79	6131	TI	CO		80	78	42		
MMED	25	839	TI	CO		88	79			
MMED	49	3051	TI	CO		80				
EMED	70	5038	TI	CO		90	86	43		913

PER	BOX	UN	ELEM	TAX	Bd	SC
EMED	119	6543	HU	MIM	c 204	
EMED	98	4376	HU	MIM	183	72
EMED	96	4352	MT	MIM	135	

PER	BOX	UN	ELEM	TAX	GL
EPMED	81	6167	MC	FAL	342

ENGLISH HERITAGE

Centre for Archaeology

The Centre for Archaeology was formed by the merger of the Ancient Monuments Laboratory and the Central Archaeology Service. Its strength lies in the breadth and diversity of specialisms that it includes, and in the integration of these skills in a wide range of projects.

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