Longstone Edge Animal Bones
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The site of Longstone Edge, located in the Peak District National Park, comprises two adjacent Neolithic-Bronze Age barrows. Barrow 2 had been excavated in the 19th century and was heavily disturbed. The broad sequence of construction and use of Barrow 1 consists of a pre-mound mortuary deposit, a cist with skeletons and a stone cairn, followed by a Food Vessel cremation deposit and a larger stone and earth barrow mound. Phasing of both Barrows is found in Table 1.

The cist and mound of Barrow 1 yielded a very large quantity of microfauna, which were recovered primarily in heavy residues from flotation and by wet-sieving, and which have been assessed by Peter Andrews of the Natural History Museum, London (Andrews 2003). In addition to the microfauna, a small quantity of macrofauna was recovered by hand excavation. The small size of the macrofaunal assemblage limits its usefulness with regards to investigating local animal economy, however very general conclusions can be reached. The assemblage has greater potential to inform on the depositional history and activities directly associated with the monument.

With regard to the latter, deposits of single and articulated animal bones were noted during the excavations (P. Reeves, Site Diary) and thought to represent possible offerings: human and animal bones had apparently been placed on the cleared rock surface below Barrow 2 (2059) while a 'leg of pork' was noted alongside one of the skeletons in the cist beneath Barrow 1. This 'leg of pork' has been identified as comprising a single, unarticulated immature left pig humerus. The distal end of this bone is unfused indicating that the animal was less than one year of age when it died (Silver 1969). Figure 1 shows this pig humerus was clearly associated with the lower legs and feet of one of the skeletons recovered from the Early Bronze Age cist burial (75502). A juvenile left pig ulna of a similar size and showing a similar state of weathering was also recovered from context 75502. It is possible that these two bones were once associated forming a true 'leg of pork', however as they were not recovered in articulation *in situ* it is impossible to determine this with certainty. Because the cist burials were disturbed when movement of the bedrock underlying Barrow 1 created a fissure across the barrow it must be determined whether the macrofaunal remains recovered with the burials are truly associated with them. Burial 75502 remained for the most part within its grave however a small amount of both residual and intrusive material dating from the Mesolithic and the Late Bronze Age/Iron Age was found associated with it. The residual material consisted of a Mesolithic microlith and the intrusive a very small (1g) late Bronze Age/Iron Age pot sherd. Andrews (2003) notes that there was no evidence the cist acted as a natural trap where animals (and presumably other items) would have accumulated. On balance, it is likely that the large fragments of macrofauna associated with the human remains in the cist were deposited at the same time as the remains themselves.

Twelve identifiable bones/teeth were recovered from the subsoil beneath Barrow 2 (2058, 2059, 2078), all of which belong to cattle. A further 19 unidentifiable medium mammal bones were recovered from the same contexts. All of the cattle remains were either mandibular or maxillary elements including both bone fragments and loose teeth. These elements may all derive from a single individual (there is no repetition of

teeth) intentionally placed as an offering in association with the human remains recovered as suggested by the excavator.

Figure 1: Immature pig humerus (circled) associated with human burial in context

Methods

All of the bones were recorded in detail where identifiable to taxon. When bones were not identifiable to taxon they were recorded by mammal size class (large = cattle/horse size; medium = sheep/goat size), fragment size class and general body area (long bone, rib, vertebrae, other), noting incidence/degree of burning, gnawing, butchering and weathering. Five fragment size classes were used: size class 1 = 0-2.5cm; size class 2 = 2.6-5.0cm; size class 3 = 5.1-7.5cm; size class 4 = 7.6-10cm; size class 5 > 10cm.

For mammals, the following bones and bone parts were recorded: all identifiable main limb bones; the innominate and scapula where at least half of the acetabulum and glenoid respectively were present. All carpals and tarsals, astragalus and calcaneum were recorded regardless of fragmentation (all were over half complete). All phalanges were recorded where at least half of the proximal or distal articulation was present. The upper and lower teeth (where more than half of the crown was present) and occipital condyle were recorded. For birds, all long bones were recorded and the presence of the bony part of the beaks was recorded also, but these were not identified to taxon. Measurements were recorded following von den Driesch (1976) and Payne and Bull (1988). Tooth wear in cattle and pigs was recorded following Grant (1982) and that of sheep/goat follows Payne (1987). Sheep and goat bones and teeth were distinguished where possible, following Boessneck (1969), Payne (1985) and Prummel and Frisch (1976). The few secure identifications of postcranial elements are of sheep, primarily astragali, but one deciduous fourth premolar may be from goat.

Identifiable bones were examined under a binocular light microscope (25X magnification) to assist the identification of bone modifications such as cutmarks and carnivore gnawing.

Foetal/neonatal remains were identified to taxon where possible, using modern foetal/neonatal fox, pig and sheep reference material, and published guides (Prummel 1987; Amorosi 1989). Foetal/neonatal fox was distinguished from foetal/neonatal dog on the basis of size. All adult dog remains at the site derive from medium-large size animals approximately the size of a greyhound suggesting that smaller breeds of dog were not present at the site. Harcourt (1974) has suggested that a single type of large dog, of a similar size to the remains recovered at Longstone Edge, existed in Britain during the Bronze Age, though his available sample size was small. Following from this it has been assumed that the very small (fox size) foetal/neonatal canid remains (all but one of which were recovered from secure Bronze Age contexts) belong to foxes and the foetal/neonatal canid remains that are too large to belong to foxes (determined by comparison with fox foetal/neonatal reference material) must belong to dogs.

Taphonomy

The remains are poorly preserved, with most consisting of weathered unidentified fragments (1124 in total) (Table 2); only a small quantity are identifiable to taxon or element. A total of 311 identifiable bones were recorded, 291 from Barrow 1 and 20 from Barrow 2. The latter are listed in Table 3 but do not merit further discussion.

The Barrow 1 assemblage comprises 291 specimens identified to order, family, genus or species, including 32 bones of foetal animals. Three fragments of antler from large cervids (likely red deer) were also recovered but are not included in the total. Small mammal remains were quantified but not identified to taxon, however, almost all appear to be from the water vole, *Arvicola terrestris*. The sieved remains of small mammals provide a more secure indication of species and element distributions in the deposits (Andrews 2003).

Unidentified remains consisted mostly of large (cattle/horse size) and medium (sheep/goat size) mammal fragments of long bones, ribs, vertebrae or 'other', unidentified, body parts. All of these bones were measured to determine their greatest length. The unidentified fauna from three groups of contexts (potentially undisturbed contexts containing the highest numbers of fragments) have been examined in detail to determine whether they can provide information about the taphonomy or deposition processes occurring during the Bronze Age (Phases 3-4). Tables 4-6 show the fragment size class breakdown for groups of contexts relating to the Barrow 1 cist burial, the Barrow 1 mound itself and areas of the Barrow 1 mound associated with human remains. The large mammal bones of all three context groups were most often fragment size class two (2.6-5.0cm) while the medium mammal bones were most often size class one (0.1-2.5cm). The medium mammal bones from Barrow 1 mound associated with human remains were recovered in a more fragmented state (fragment size class one) more often then the other two context groups.

Burning

Two context groups in Barrow 1 (the disturbed mound and the contexts associated with human remains) show a higher rate of burning on the unidentified bones relative to the other context groups (Table 2). This increased amount of burning is also seen on the identified bones recovered from those contexts groups (Table 7) as well as on the identified bones recovered from the fissure.

Carnivore Gnawing

Contexts in Barrow 1 associated with human remains (1098, 3041, 3042) show the highest rate of carnivore gnawing (Table 8). Lesser amounts of carnivore gnawing are seen on the bones from context groups associated with the disturbed mound and the fissure. Very few instances of gnawing were recorded on the unidentified bones.

Butchery

Five identified bones showed evidence of cutmarks; four sheep/goat bones and a pig bone. The sheep/goat bones with cutmarks include a navicular-cuboid and an astragalus, suggesting that the animals were processed to remove their lower limb and feet, and a radius and femur, suggesting that whole limbs were divided into smaller joints. Cutmarks were also found on a pig radius suggesting that meat from this animal was also disjointed. Overall too little evidence of butchery practice is available for detailed analysis.

Discussion

The macrofauna recovered from disturbed Barrow 1 mound contexts (1052, 1087) and those associated with human remains (1098, 3041, 3042) have a different taphonomic history to the macrofauna in the rest of Barrow 1. Their taphonomic signature is similar to contexts within the fissure (1050, 1080) but as the creation of the fissure was a relatively recent event and the material within it can not be securely dated it is not considered in this discussion. The macrofauna within the mound associated with human remains displays a relatively high amount of burning, carnivore gnawing and increased fragmentation (smaller fragment sizes) than the rest of the undisturbed mound remains and the remains securely dated to the Bronze Age and earlier. The macrofauna recovered from the disturbed Barrow 1 contexts have a similar signature of burning and carnivore gnawing to the macrofauna within the mound associated with human remains suggesting that these two groups of macrofauna had similar taphonomic histories. This, in turn, suggests that the mound contexts with human remains and the disturbed mound contexts are in some way associated. The exact date of the disturbance of the mound is unclear but it is thought to have occurred between phases 4 and 7 inclusive (Last pers. comm. 2007). Following from this the human remains found within the mound were also deposited between phases 4 and 7 inclusive. Leary (2002) suggests that the contexts within the mound of Barrow 1 containing human bone fragments result from the deposition of the remains of Romano-British cremation events, a supposition supported by the evidence of burning found on the macrofauna in those contexts. The same contexts also contain a number of Romano-British pottery sherds (type DBYb) that display post-firing burning. It must be stated that the human remains recovered from these contexts (particularly 3042) were not thought to represent discreet deposits and did not show high amounts of burning. In the end the evidence for Romano-British cremation events redeposited within Barrow 1 is equivocal, however the macrofaunal taphonomic analysis suggests that the human remains within the mound are intrusive rather than residual. Accordingly, faunal remains recovered from contexts within the mound associated

with human remains, while officially phased as 4? are treated as being phased 4-7 (as with the disturbed material) and not considered securely dated to the Bronze Age.

Andrews' (2003) thorough analysis of the microfauna from Longstone Edge can not be used to verify or dispute the difference in taphonomic history suggested for the macrofauna because he did not analyse any context from the mound associated with human remains and only included a single context from the disturbed mound deposit (sample 5070, context 1052). Other samples from these areas contained too few microfauna to warrant study. The lack of large numbers of microfauna does not in and of itself confirm a difference between the areas because many contexts securely dated to the Bronze Age also contained too few microfauna for robust analysis.

Pathology

A single pathological specimen was recognized amongst the identified remains. The specimen is an immature (unfused) pig middle phalanx that belonged to an individual which was less than one year of age when it died (Silver 1969). This specimen was recovered in context 1052, a disturbed section of Barrow 1 so can not be securely dated to the Bronze Age. The plantar face of the phalanx shows a deep recess (Figure 2) between the two distal articular condyles. The medial and lateral shaft faces show moderate amounts of exostoses and active (pathological) remodelling – a condition unlikely to be age related as the individual is so young. The pathology appears to be a case of osteomyelitis which may have developed subsequent to an injury to the foot but is more likely the result of a case of foot-rot or hoof infection. Similar cases have been noted on the phalanges of archaeological cattle (Baker and Brothwell 1980).

Figure 2: Pathology (osteomyelitis) on immature pig phalanx

Taxonomic distribution

The taxonomic distribution is listed by area and phase in Table 3. Highly disturbed or contaminated deposits and contexts are distinguished (e.g. barrow mound contexts with Roman material 1052, 1087; fissure 1050, 1080) from the more secure ones.

Cattle, sheep/goat and pig dominate the assemblage. Canid bones and teeth are common also and derive both from medium-large size dogs, with several approximating the size of a greyhound, and red fox. Less common taxa include equid, cervid, and hare. Amphibian bones were very occasionally recovered and are not included in this report. The few bird bones identified include probable black grouse (*Tetrao tetrix*), a Columbidae (possibly woodpigeon – *Columba palumbus*), a small corvid (possibly a magpie – *Pica pica* – or a jay – *Garrulus glandarius*) and a passerine size bird.

A total of 24 red fox bones were recovered from Barrow 1, 19 of which derive from secure Bronze Age phases (3-4) (see Table 3). Two fox bones were found within the pre-mound/mortuary deposit, and three are from disturbed barrow mound contexts. The large canid/dog remains (41 in total) show a different distribution. Three bones were recovered from the pre-mound/mortuary deposit, 15 from secure Bronze Age phases, two from the disturbed mound deposits, 16 from the mound deposits associated with human remains and a further five from the fissure. Uniquely, large canid/dog remains are recovered as frequently from mound deposits associated with human remains as cattle (each with 30%) and more frequently than sheep/goat and pigs (23% and 15% respectively).

In order to consider the macrofaunal remains recovered from Bronze Age Longstone Edge within a regional context the relative percentage of the three main taxa groups cattle, sheep/goat and pig were calculated (33%, 41%, 26% respectively). The Longstone Edge counts are based on number of identified specimens (NISP) and derive from those context groups dating to the Bronze Age (NISP = 120) and assigned to phases three and four (this excludes all contexts from the mound that are disturbed or contain human remains as well as those from the fissure). Both identified bones and teeth (including loose teeth) are included. A comparison of the relative percentages of cattle, sheep/goat and pig at Longstone Edge with 17 other Bronze Age sites/site divisions in central and southern England is found in Figures 3 and 4. Figure 3 shows the sites grouped by general site type and Figure 4 groups the same sites by geographic area, county in this case. Additional Bronze Age sites with published faunal material contained too few specimens to be useful or were not presented in sufficient detail for this analysis. Table 9 shows the type and location of each site used in the analysis. We can see from Figures 3 and 4 that, within the sample of sites used here, neither general site type nor region dictates the relative amounts of sheep/goats, cattle and pigs recovered from Bronze Age sites. On average, the 18 Bronze Age sites have sheep/goat, cattle and pig representations of 40%, 43% and 17% respectively. This is a major shift from the typical Late Neolithic Groove Ware sites where pigs make up the majority of the assemblage and cattle typically dominated over sheep/goat (Grigson 1982).

In order to better understand the proportions of species present in the 18 Bronze Age sites the data are shown in a triangle-plot (Figure 5). Two groups (both divided into two subgroups) of sites are apparent in Figure 5: those where pigs make up greater than 25% of the assemblage (Groups 1 and 2), and those where pigs make up less than 15% of the assemblage (Groups 3 and 4). Longstone Edge is included in subgroup 1 along with Pottern, Wallingford and Wigber Low. These sites are not related by site type or geography (see Table 9). The dashed lines in Figure 5 are a visual aid indicating the 33% contribution line for each species – the point at which they intersect represents an equal amount of each taxa within a given assemblage. Subgroups 1 and 2 cluster around this equivalence point because pigs are a major contributor to their total assemblages. They are differentiated by the relative amounts of sheep/goat and cattle with subgroup 2 having a higher percentage of cattle in their assemblages. Subgroups 3 and 4 cluster along the left-hand side of the triangle because pigs make up only a small portion of their assemblages. They are also differentiated by their relative amounts of sheep/goat and cattle with subgroup 3 having a very high percentage of sheep/goat. There is not a particularly strong break between any of the groups (though subgroup 3 is relatively isolated) indicating that variations in livestock husbandry occurred across a continuum of broad strategies that utilized all three taxa to a greater or lesser degree.

In her examination of faunal remains from Iron Age settlement sites in Britain, Hambleton (1999) notes that, unlike the Bronze Age sites studied here, Iron Age sites with high percentages of pig remains relative to sheep/goat and cattle are grouped by geography and most frequently located in western England and Wales. She suggests that that while pigs may represent high status sites in this period, they may equally represent the presence of woodland or dietary preference and no authoritative conclusion can be reached without detailed knowledge of the ancient cultural and environmental situation. No sites from Hambleton's geographic area of western England and Wales were used in this analysis.

Grigson (1982) has shown that during the Late Neolithic in southern England and Yorkshire, pigs dominated over sheep/goat and cattle, typically representing over 50% of the assemblage at sites associated with Grooved Ware pottery. She states that while most of these Grooved Ware sites are interpreted as ceremonial the animals must nevertheless have been integrated into the local economy and (contra Serjeantson 2007) she argues against associating particular animal species with social hierarchies (feasting). Grigson proposes that the dominance of pigs during the late Neolithic is related to the regeneration of woodland and associated increase in bracken. Bracken is a good source of food for pigs but is poisonous for cattle and sheep making pigs more ecologically suitable for raising in a woodland environment.

Despite Grison's assertions that the abundance of pig at Late Neolithic sites in England is the result of environmental considerations, Serjeantson (2007) makes a compelling argument that, in southern Britain at least, environmental conditions alone cannot account for the high percentages of pigs found at certain sites (specifically Runnymede, Potterne and Wallingford) during the Bronze Age. She proposes that a better explanation for the relatively high amount of pig remains at these sites is the occurrence of feasting as a means for the elite to reinforce their social dominance. The choice of pigs for feasting is clearly shown by Albarella and Serjeantson (2002) at the Late Neolithic site of Durrington Walls.

Done (1991) takes a slightly different view of the pig remains from Runnymede eschewing the notion that the pigs were the result of ceremonial (feasting) events. Rather, she proposes that the pigs are an original component of a prosperous livestock system and not a secondary result; that is to say the presence of pigs at the site is a cause of its relative prosperity rather than an effect.

It is unclear at this time whether it is sensible to ascribe a singular interpretation (feasting) to the relative amounts of different species recovered from a variety of site types across a wide array of ecological regions and a broad temporal range. However, the assumption that an increased occurrence of pigs at British Bronze Age sites (relative to sheep/goat and cattle) reflects the occurrence of feasting, regardless of whether this is a product or an engine of prosperity, potentially explains the relatively high amounts of pig recovered from the barrow sites of Longstone Edge and Poors Heath and the cairn site of Wibger Low. The high percentage of pig remains (relative to sheep/goat and cattle) at settlement sites such as Wallingford, Potterne, and Runnymede (>27%) has also been ascribed to feasting (Serjeantson 2007) and used as an indicator of high status. One wonders, if this is the case, why settlement sites with very low amounts (<4%) of pig remains such as Bishops Cannings Down, Dean Bottom, and Brean Down would have eschewed such feasting activity (and pig rearing in general) if it was an effective way to consolidate power structures and increase wealth and status.

Element distribution

No clear deposition of animal skeletons or part carcasses was identified within the assemblage save for the potential 'offerings' discussed above. In context 1053 (subsoil associated with the Barrow 1 'pre-mound deposit'), three bones of a foetal/neonatal caprine (scapula, radius, humerus) show a similar stage of ossification and may be associated. Several red fox foetal/neonatal bones recovered from the barrow mound (context 1055) may be associated also.

Tables 10 and 11 show the breakdown of the hand-collected remains of cattle, sheep/goat, pig, horse, dog and fox into elements by NISP and percentage values. Because the assemblage size is so small it was decided that using raw NISP counts and percentage values was more appropriate than calculating other zooarchaeological measures such as minimum number of individuals (MNI) or minimum number of elements (MNE) values. It is important to remember when considering raw counts of body parts that an abundance of cranial, axial and feet elements is generally to be expected because these areas of the body contain more small bones (carpals, tarsals, phalanges, teeth, multiple vertebrae etc.) than the limbs which contain relatively few large bones. With the previous caveat in mind we can examine the element distribution of the main mammal species recovered.

Sheep/goat and pig have very similar body part profiles (and they are not unlike the dog/large canid profile) where feet are dominant and cranial elements are recovered slightly more often than limb elements. It is safe to say that whole skeletons, or in any case, all parts of the skeleton, of sheep/goat, pig and dogs were deposited within the barrow. Cattle show a very different body part profile; one that is dominated solely by head and feet elements. This type of body part profile is typically associated with

primary butchery waste rather than consumption debris and suggests that cattle may have been killed and prepared for consumption at the site but consumption and disposal of the 'meaty' parts of the animal took place elsewhere. It must be remembered, however, that the unidentified large mammal remains were principally composed of limb shaft fragments (Table 2) indicating that cattle limb bones were deposited on site albeit in a very fragmented state.

Red fox is interesting because it is dominated by limbs and very few foot elements were recovered. It is possible that, because of the small size of many of the fox foot bones, this profile is a reflection of hand-collection missing many of the very small bones. If this is the case it is likely that whole skeletons of foxes, or at least all parts the skeleton, were deposited within the barrow. Considering the high number of foetal/neonatal fox remains recovered it is likely that these fox remains represent natural accumulation within the barrow through denning activity. Most of this activity seems to have taken place during the Bronze Age (Table 3).

Axial elements are rarely identified from any species save for the red fox. This is in part due to the difficulty with assigning ribs and post-axis vertebral remains to species level rather than an absence of these elements. As Table 2 shows, these elements were recovered from both large and medium mammals.

Age at Death

Relatively few bones and teeth provide fusion or tooth wear data, but the state of ossification of many other specimens suggest that they are from juvenile animals. Considering the site as a whole, 66 identified bones were aged as juvenile/subadult by noting their fusion status (unfused or fusing) or by their state of ossification (very small and porous). A further 36 bones and teeth were aged as juvenile/subadult by noting their state of dental eruption, wear and cranial ossification. A total of 102 identified bones were recorded as juvenile/subadult; a full third of the assemblage, not including the 32 bones identified as foetal/neonatal. A more detailed division of ageing stages is not possible due to the small numbers of specimens available.

Considering only the faunal remains from the securely dated Bronze Age phases of Barrow 1 (phases 3 and 4; excluding mound contexts associated with human remains) (Table 12) it is possible to age 95 bones as foetal/neonatal, juvenile/subadult or adult. The majority of the cattle, sheep/goat and pig bones are from juvenile/subadult animals (87%, 70% and 58% respectively). Bones of juvenile/subadult cattle, sheep/goat and pig were noted in most deposits.

High amounts of juvenile/subadult pig bones are not uncommon from archaeological sites as pigs are typically raised for their meat (rather than wool, milk or traction power) and, because they have a high litter count and grow so quickly, are often slaughtered before their bones are fully fused at 3-3.5 years (Dobney et al. 1996: 44). When cattle and sheep/goat are killed young the usual interpretation is that they have been targeted for their meat alone as obviously they can no longer be used for their potential secondary products of milk, wool and traction. Unless the animals are killed as a by-product of a dairying industry which rids itself of young males to increase the available milk from lactating females, killing juvenile animals is an expensive proposition. There is not enough evidence to suggest that the juvenile cattle and

sheep/goats recovered from Barrow 1 were in any way related to a dairy industry and given the ceremonial nature of the site it is possible that juvenile animals were preferred for funerary/feasting purposes.

Little comparative material relating to Bronze Age barrow sites is available however Levitan and Serjeantson (1999) report that at the Barrow Hills Neolithic and Bronze Age monument complex in Oxfordshire most of the pig bones recovered were juvenile, many of the cattle were juvenile and roughly half of the sheep/goat were juvenile. These findings indicate, if nothing else, that the high amount of juvenile remains at Longstone Edge is not unique amongst Bronze Age barrow sites.

If the high amounts of cattle in particular but also sheep/goat represented by juvenile/subadult and foetal/neonatal animals are not by-products of an intensive dairying industry it is likely they were selected for offerings/consumption at the barrow specifically because of their young age. While there is no evidence for it, it is also possible that the population chose young animals for sacrifice precisely because they were by-products of dairying, thereby making efficient use of finite resources. On balance, considering the specialized nature of the site, the limited quantity of faunal material recovered from Longstone Edge is more likely to represent specific activity engaged in and limited to the site itself rather than reflecting the wider husbandry strategies of the population living in the vicinity of the site during the Bronze Age.

A total of 17 foetal/neonatal bones were recovered from Bronze Age phases of Barrow 1, including examples from cattle, sheep/goat, pig, fox and dog. Seven of the foetal/neonatal specimens from the securely dated Bronze Age phases of Barrow 1 belong to red fox. These foetal/neonatal bones make up nearly half of the entire fox assemblage (47%) recovered from Barrow 1 suggesting denning within the mound. Foetal/neonatal remains of cattle, sheep/goat, pig and canid were recovered in the securely dated Bronze Age phases of Barrow 1 in much lower amounts relative to fox.

Is it certain that the foetal/neonates recovered are the result of human action or is it possible that they accumulated naturally at the site through predator activity? Andrews (2003) indicates that one of the principal predators responsible for the accumulation of the large amounts of microfauna at the site was a European eagle owl (*Bubo bubo*). This owl is very large and will feed on animals the size of an adult hare (Snow and Perrins 1998). Foxes also lived in the vicinity of the barrow and they too would have been active predators. None of the foetal/neonatal remains show evidence of digestion as might be expected if they were deposited by owls or foxes. Because of this it reasonable to assume the foetal/neonatal bones of domestic animals are indicative of human activity occurring in the vicinity of the mound rather than representing natural predator-prey activity.

Grant (1984: 507) has suggested that the presence of foetal/neonatal lambs, calves and piglets within faunal assemblages indicates that herds (or at least pregnant females and newborns) were being kept on or near the site, at least during lambing/calving season. Grant was referring to Danebury, a relatively large Iron Age hillfort when making the previous assertion; obviously it is much less likely that herds of domestic animals were kept directly upon a small barrow site. Andrews (2003) concludes the great concentrations of micromammal bones deposited within the barrows are the

remains of short eared owl and eagle owl meals and indicate that humans could not have been occupying the site for an extended period of time or else these birds would not have been nesting near-by. Nevertheless, the amount of foetal/neonatal remains of domestic animals recovered makes one suspect they were raised within the vicinity of the site and it was not necessary to transport them a great distance.

Of interest are two possible roe deer (*Capreolus capreolus*) foetal/neonatal bones (a pelvis and metatarsal) recovered from the pre-mound (1082) and mound (1055) deposits. Neither of these bones shows signs of digestion but their wild status makes it unclear whether they are associated with natural or cultural deposition.

Measurements

Very few measurements were recorded for the main domestic animals cattle, sheep/goat and pig (all measurements are presented in Tables 13-18). These provide limited information about Bronze Age livestock. A greater number of canid bones and teeth provide measurements, however the sample size is still very small and most of these remains were not found in secure Bronze Age contexts. A single hare and two bird bones were complete enough to provide measurements.

The presence or absence of wild boar and domestic pig is often possible to determine metrically. The few available measurements of pig bones from Longstone Edge suggest that they derive from large examples of domestic animals. Figures 6 and 7 show pig astragalus and mandibular M3 measurements from the Longstone Edge specimens compared with archaeological domestic pigs in England (University of Southampton 2003), modern wild boar from Poland (Magnell 2006) and Mesolithic wild boar from Sweden (Magnell 2006). The Longstone Edge pig astragalus comes from a Neolithic/Early Bronze Age context while both mandibular M3s come from Early Bronze Age contexts.

Legge (1992) presents ranges of domestic pig astragali GLl at Bronze Age Runnymede and Beaker Mount Pleasant, Dorset as between 38-42mm and 41-44mm respectively. The Longstone edge specimen (41.8mm) falls within these domestic ranges. Grigson gives as a general lower limit for wild boar mandibular M3 length in Neolithic Europe a range of 37-40mm; larger than either M3s recovered from Longstone Edge (Grigson 1982).

The dogs recovered are all of a very large type. The one complete long bone (tibia) had a greatest length of 212mm indicating a shoulder height of approximately 628.5mm for the animal (Harcourt 1974). Two large dog calcanei were also recovered (50.0 and 50.1mm) consistent with a very large dog type.

Worked Bone

Two fragments of worked bone were recovered from the following contexts:

- 1055 (72452) - fragment of cortical bone from large mammal worked into a point;
- 75502 (72545) - fragment of polished bone (or antler?), possibly part of a pin.

Conclusions

The assemblage of hand-collected macrofaunal bones is very small restricting the information it can deliver about local diet, economy or husbandry. Too few bones were collected from Barrow 2 for meaningful analysis. A total of 1376 bone fragments were collected from Barrow 1, 291 of which were identified to taxa. A total of 165 identified bones were securely dated to the Bronze Age. Of the bones securely dated to the Bronze Age, 120 belonged to cattle, sheep/goat and pig with a taxa breakdown of 33%, 41% and 26% respectively. This pattern of domestic taxa, where all three taxa contribute significant amounts to the whole and no one species is vastly dominant, is common in the Bronze Age at sites with both ceremonial associations (barrows such as Poors Heath, cairns such as Wigber Low) and domestic functions (middens such as Potterne and Wallingford and settlements such as Runnymede).

The presence of large numbers of juvenile/subadult animals from Bronze Age contexts is of interest as is the recovery of bones from foetal animals. Considering the ceremonial nature of the site, it can not be assumed that the faunal remains are representative of the local pastoral economy. The large numbers of juvenile/subadult animals recovered can not be used as evidence for a particular husbandry strategy such as dairying because they may have been chosen to satisfy ceremonial needs, rather than as by-products of an economic strategy. Regardless of whether or not the juvenile remains were by-products of a broader husbandry strategy, they were deemed acceptable (perhaps necessary) by the Bronze Age population for consumption (or offerings?) at the barrow. The bones of foetal livestock indicate local stock-raising, though do not confirm extended occupation of the site. Some of the foetal bones from the barrow mound are from red fox and indicate denning within or near to the monument.

It is possible that the relatively high percentage of pig bones recovered (26%) from Bronze Age contexts indicate feasting events took place at the barrows. Furthermore, the recovery of whole (though unfused) pig bones associated with the cist burial (75502) may represent offerings related to these potential feasting events. On the other hand it is also possible that pigs were simply fully integrated into the animal economy of the local population and are not signifiers of ritual or ceremonial events but rather signify that the local population engaged in a diffuse husbandry strategy spreading risk across three taxa instead of relying on only one or two to provide their dietary (and other social/economic) needs. Whether or not feasting, centred around pigs, took place at Longstone it is likely that the pig bones associated with cist burial 75502 were genuine offerings.

Taphonomic analysis (fragmentation, burning and carnivore gnawing) indicates that the macrofauna recovered from the Barrow 1 mound deposits associated with human remains share a similar taphonomic history to the macrofauna from the disturbed mound deposits and that both are different than the macrofauna from the undisturbed mound deposits. Because the disturbances to the mound deposit are known to be of a post-Bronze Age date we can extrapolate that the human remains within the mound are intrusive (possibly Romano-British) rather than residual (Neolithic).

Table 1: Phasing of Longstone Edge (Descriptions provided by J. Last pers. comm. 2007)

Phase	Period	Description
1	Mesolithic	Subsoil and pre-mound deposits, no features
2	Neolithic	Human remains and artefacts from subsoil and pre-mound deposits; possibly the enclosure wall
3	Early Bronze Age (Beaker)	Human remains and artefacts; possibly the enclosure wall and/or primary stone mound
4	Early Bronze Age (Food Vessel)	Cremation vessel, human remains and artefacts; main barrow mound, possibly primary stone mound
5	Late Bronze Age/Iron Age	Pottery from mound deposit; no features
6	Romano-British	Pottery from mound deposit; stone-capped features
7	Post-Medieval and Modern	Various disturbances and artefactual material from mound deposit and surface

Table 2: Longstone Edge, hand-collected assemblage: counts of unidentified mammal bones

				Large Mammal				Medium Mammal				Total			
Area	Phase	Description	Contexts	Long bone	Rib	Vertebrae	Other	Long bone	Rib	Vertebrae	Other	Burning	Gnawing	Butchery	**Total**
Barrow 1															
1\2	1-3	subsoil below enclosure wall	1106	0	0	0	0	0	0	0	0	0	0	0	**0**
12	2\3	pre-mound/mortuary deposit	1053, 1057, 1082	1	0	0	13	4	4	3	10	0	0	0	**35**
1	2\3	enclosure wall and tumble	1008, 1097	3	0	0	0	0	0	0	0	0	0	0	**3**
12	3	cist and skeletons	75501, 75502, 75502/3	2	1	0	3	45	3	11	56	1	1	0	**121**
2	3\4	stone mound	1095	24	0	0	2	19	0	0	34	1	0	0	**79**
12	4	cremation deposit	3030	0	0	0	0	0	1	0	3	1	0	0	**4**
12	4	barrow mound undisturbed	1013, 1055, 1058, 1081	15	4	3	19	34	21	14	206	9	1	1	**316**
12	4-7	barrow mound disturbed	1052, 1087	11	2	0	6	21	10	10	129	43	1	0	**189**
1\12	4?	barrow mound with human remains	1098, 3041, 3042	23	2	4	17	24	19	10	195	35	1	0	**294**
12	4\7	fissure	1050, 1080	0	0	0	1	7	0	4	32	11	0	0	**44**
Barrow 1 Total				**79**	**9**	**7**	**61**	**154**	**58**	**52**	**665**	**101**	**4**	**1**	**1085**
Barrow 2															
4\6	1-3	subsoil	2058, 2059, 2078	0	0	0	0	5	1	0	13	0	0	0	**19**
5	7	basal grave fill	2066	0	0	0	0	0	0	0	1	0	0	0	**1**
4\5\6	4	barrow mound undisturbed	2003, 2004, 2008, 2074	0	0	0	3	2	4	0	10	0	0	0	**19**
Barrow 2 Total				**0**	**0**	**0**	**3**	**7**	**5**	**0**	**24**	**0**	**0**	**0**	**39**

Table 3: Longstone Edge, hand-collected assemblage: identified birds and mammals. Taxonomic distribution by area and phase (bone counts), cleaning and surface layers are excluded. Small Mammals: x 1-10; xx 11-50; xxx 51-100; xxxx 101-500

Area	Phase	Description	Contexts	Cattle	Sheep/Goat	Sheep	Goat	Pig	Equid	Lrg Cervid	Roe deer	Dog	Lrg Canid	Fox	Hare	Sm. Mam.	Bird	**Total**
Barrow 1																		
1\2	1-3	subsoil below enclosure wall	1106												1			**1**
12	2\3	pre-mound/mortuary deposit	1053, 1057, 1082	4	8			3			1	2	1	2		x		**21**
1	2\3	enclosure wall	1008					1										**1**
12	3	cist and skeletons	75501, 75502, 75502/3	11	14			14		1		2	1	6		x		**49**
2	3\4	stone mound	1095	1					1	[1 antler]						xxx		**2**
12	4	cremation deposit	3030	2					1									**3**
12	4	barrow mound undisturbed	1013, 1055, 1058, 1081	26	30	4	1	17	1	[1 antler]	2	7	5	13		xx	5	**111**
12	4-7	barrow mound disturbed	1052, 1087	5	14			4	2	2	1	1	1	3		xx		**33**
1\12	4?	barrow mound with human remains	1098, 3041, 3042	16	11	1		8		[1 antler]	1	3	13			xx		**53**
12	4\7	fissure	1050, 1080	1	8			1		2		1	4			xx		**17**
Barrow 1 Total				**66**	**85**	**5**	**1**	**48**	**5**	**5 + [3 antler]**	**5**	**16**	**25**	**24**	**1**	**xxxx**	**5**	**291**
Barrow 2																		
4\6	1-3	subsoil	2058, 2059, 2078	12														**12**
5	7	basal grave fill	2066					1								xxxx		**1**
4\5\6	4	barrow mound undisturbed	2003, 2004, 2008, 2074	7												x		**7**
Barrow 2 Total				**19**				**1**								**xxxx**		**20**

Table 4: Barrow 1 Cist contexts 72547, 75501, 75502, 75502/3; size classes of unidentified mammal remains

Unident.	Large mammal						Medium Mammal					
Frag. size	Long bone	Rib	Vertebrae	Other	Total	% Total	Long bone	Rib	Vertebrae	Other	Total	% Total
0-2.5cm	0	0	0	0	0	0	22	0	10	50	82	71
2.6-5.0cm	2	1	0	3	6	100	22	3	1	6	32	28
5.1-7.5cm	0	0	0	0	0	0	1	0	0	0	1	1
7.6-10cm	0	0	0	0	0	0	0	0	0	0	0	0
>10cm	0	0	0	0	0	0	0	0	0	0	0	0
Total	2	1	0	3	6	100	45	3	11	56	115	100
% of Total	33	17	0	50	100		39	3	10	49	100	

Table 5: Barrow 1 undisturbed contexts 1013, 1055, 1058, 1081; size classes of unidentified mammal bones

Unident.	Large mammal						Medium Mammal					
Frag. size	Long bone	Rib	Vertebrae	Other	Total	% Total	Long bone	Rib	Vertebrae	Other	Total	% Total
0-2.5cm	1	0	1	0	2	5	14	8	8	187	217	79
2.6-5.0cm	13	3	2	19	37	90	20	13	6	19	58	21
5.1-7.5cm	0	1	0	0	1	2	0	0	0	0	0	0
7.6-10cm	0	0	0	0	0	0	0	0	0	0	0	0
>10cm	1	0	0	0	1	2	0	0	0	0	0	0
Total	15	4	3	19	41	100	34	21	14	206	275	100
% of Total	37	10	7	46	100		12	8	5	75	100	

Table 6: Barrow 1 with human remains contexts 1098, 3041, 3042; size classes of unidentified mammal bones

Unident.	Large mammal						Medium Mammal					
Frag. size	Long bone	Rib	Vertebrae	Other	Total	% Total	Long bone	Rib	Vertebrae	Other	Total	% Total
0-2.5cm	1	0	1	0	2	4	5	13	7	188	213	86
2.6-5.0cm	14	2	3	17	36	78	16	6	3	7	32	13
5.1-7.5cm	7	0	0	0	7	15	3	0	0	0	3	1
7.6-10cm	1	0	0	0	1	2	0	0	0	0	0	0
>10cm	0	0	0	0	0	0	0	0	0	0	0	0
Total	23	2	4	17	46	100	24	19	10	195	248	100
% of Total	50	4	9	37	100		10	8	4	79	100	

Table 7: Longstone Edge, hand-collected assemblage: identified birds and mammals. Incidence of burning recorded on identified bones. Cleaning and surface layers are excluded.

Area	Phase	Description	Contexts	Total	Burnt	% Burnt
Barrow 1						
1\2	1-3	subsoil below enclosure wall	1106	1	0	0
12	2\3	pre-mound/mortuary deposit	1053, 1057, 1082	21	0	0
1	2\3	enclosure wall	1008	1	0	0
12	3	cist and skeletons	75501, 75502, 75502/3	49	1	2
2	3\4	stone mound	1095	2	0	0
12	4	cremation deposit	3030	3	0	0
12	4	barrow mound undisturbed	1013, 1055, 1058, 1081	111	6	5
12	4-7	barrow mound disturbed	1052, 1087	33	8	24
1\12	4?	barrow mound with human remains	1098, 3041, 3042	53	12	23
12	4\7	fissure	1050, 1080	17	5	29
Barrow 1 Total				291	32	11
Barrow 2						
4\6	1-3	subsoil	2058, 2059, 2078	12	2	17
5	7	basal grave fill	2066	1	0	0
4\5\6	4	barrow mound undisturbed	2003, 2004, 2008, 2074	7	0	0
Barrow 2 Total				20	2	10

Table 8: Longstone Edge, hand-collected assemblage: identified birds and mammals. Incidence of carnivore gnawing recorded on identified bones. Cleaning and surface layers are excluded.

Area	Phase	Description	Contexts	Total	Gnawed	% Gnawing
Barrow 1						
1\2	1-3	subsoil below enclosure wall	1106	1	0	0
12	2\3	pre-mound/mortuary deposit	1053, 1057, 1082	21	0	0
1	2\3	enclosure wall	1008	1	0	0
12	3	cist and skeletons	75501, 75502,	49	1	2
2	3\4	stone mound	1095	2	0	0
12	4	cremation deposit	3030	3	0	0
12	4	barrow mound undisturbed	1013, 1055, 1058, 1081	111	3	3
12	4-7	barrow mound disturbed	1052, 1087	33	2	6
1\12	4?	barrow mound with human remains	1098, 3041, 3042	53	10	19
12	4\7	fissure	1050, 1080	17	1	6
Barrow 1 Total				291	17	6
Barrow 2						
4\6	1-3	subsoil	2058, 2059, 2078	12	0	0
5	7	basal grave fill	2066	1	0	0
4\5\6	4	barrow mound undisturbed	2003, 2004, 2008, 2074	7	1	14
Barrow 2 Total				20	1	5

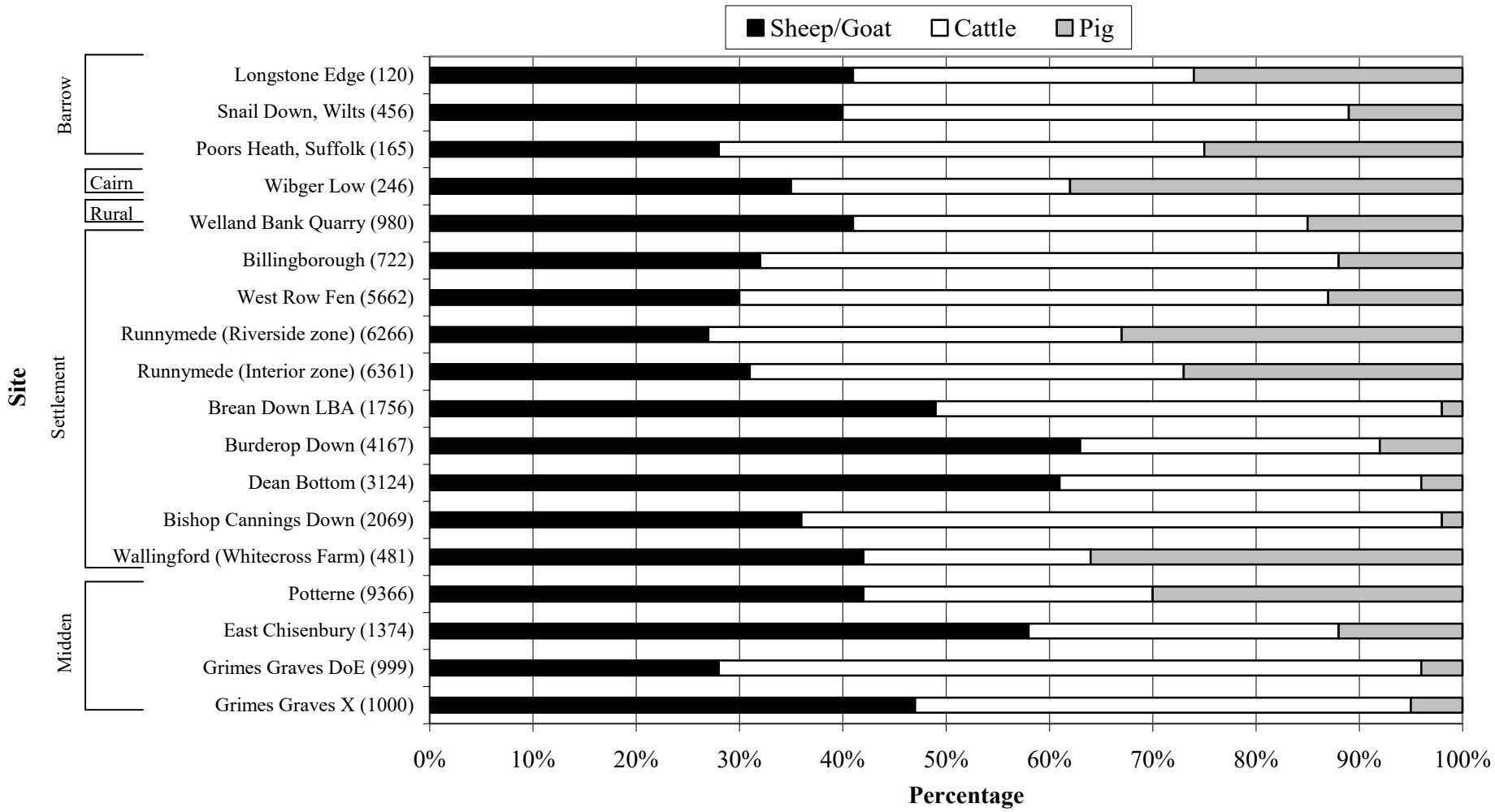

Figure 3: Percentage of sheep/goat, cattle and pigs on Bronze Ages Settlements, Middens and Barrows

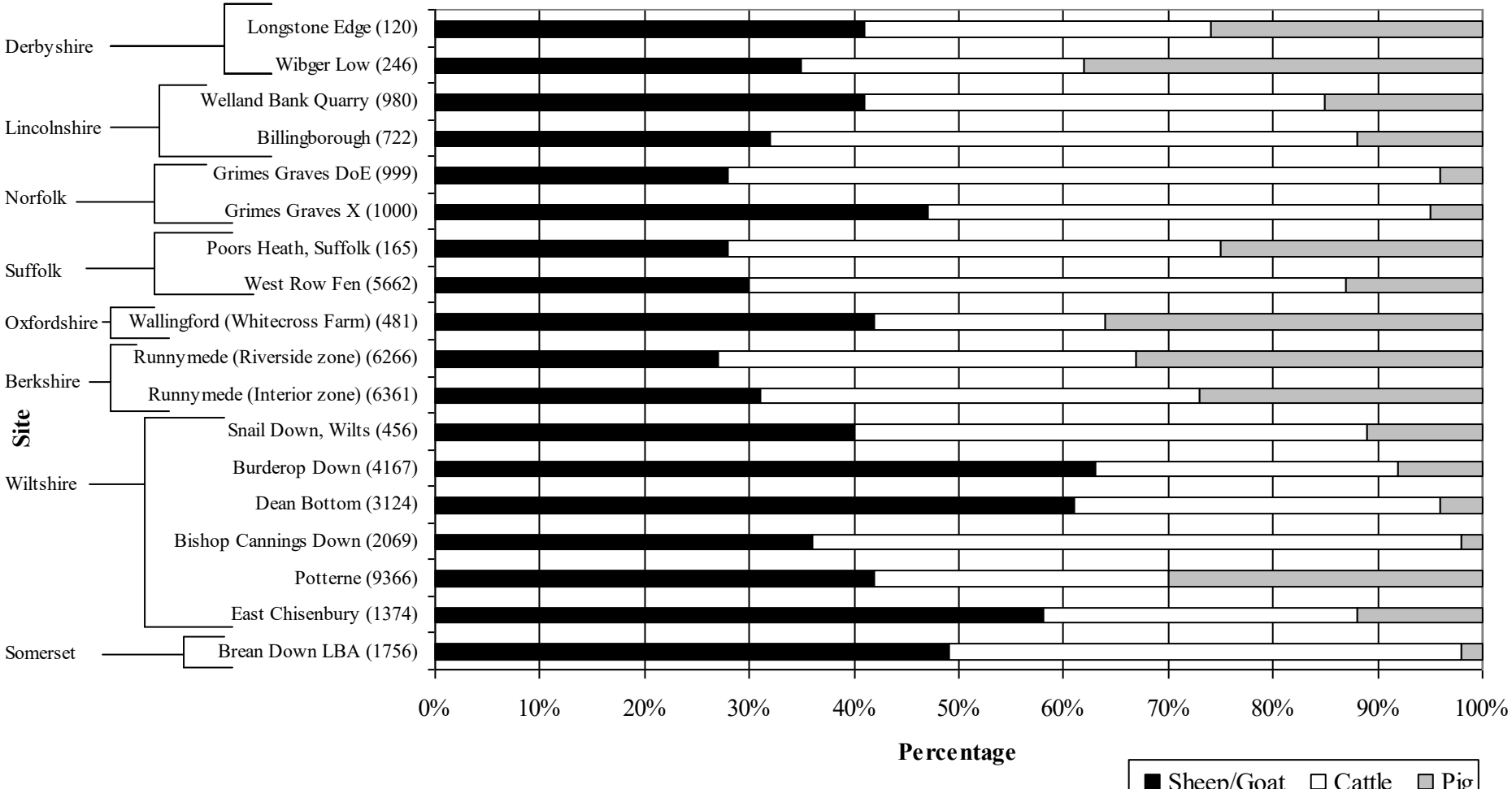

Figure 4: Percentage of sheep/goat, cattle and pigs on Bronze Age Sites by County

Table 9: Sites used for taxa comparison

Site	Location	NISP	Site Type	Period	Group (Figure 5)	Reference
Grimes Graves X	Norfolk	1000	Midden	MBA	4	Serjeantson 2007
Grimes Graves DoE	Norfolk	999	Midden	MBA	4	Serjeantson 2007
East Chisenbury	Wiltshire	1374	Midden	LBA/EIA	3	Serjeantson 2007
Potterne	Wiltshire	9366	Midden	LBA/EIA	1	Serjeantson 2007
Wallingford	Oxfordshire	481	Settlement/Midden	LBA/EIA	1	Serjeantson 2007
Bishop Cannings Down	Wiltshire	2069	Settlement/Topsoil	MBA	4	Serjeantson 2007
Dean Bottom	Wiltshire	3124	Settlement/Topsoil	MBA	3	Serjeantson 2007
Burderop Down	Wiltshire	4167	Settlement/Topsoil	LBA	3	Serjeantson 2007
Brean Down	Somerset	1756	Settlement	LBA	4	Serjeantson 2007
Runnymede (Interior zone)	Berkshire	6361	Settlement	LBA/EIA	2	Serjeantson 2007
Runnymede (Riverside zone)	Berkshire	6266	Settlement	LBA/EIA	2	Serjeantson 2007
West Row Fen	Suffolk	5662	Settlement	EBA	4	Olsen 1994
Billingborough	Lincolnshire	722	Settlement	LBA/EIA	4	Iles 2001
Welland Bank Quarry	Lincolnshire	980	Rural	LBA	4	Albarella in prep
Wigber Low	Derbyshire	246	Cairn	BA	1	Maltby 1983
Poors Heath	Suffolk	165	Beaker Barrow	EBA	2	Grigson 1982
Snail Down	Wiltshire	456	Round Barrow	EBA	4	Grigson 1982
Longstone Edge	Derbyshire	120	Barrow	EBA	1	This report

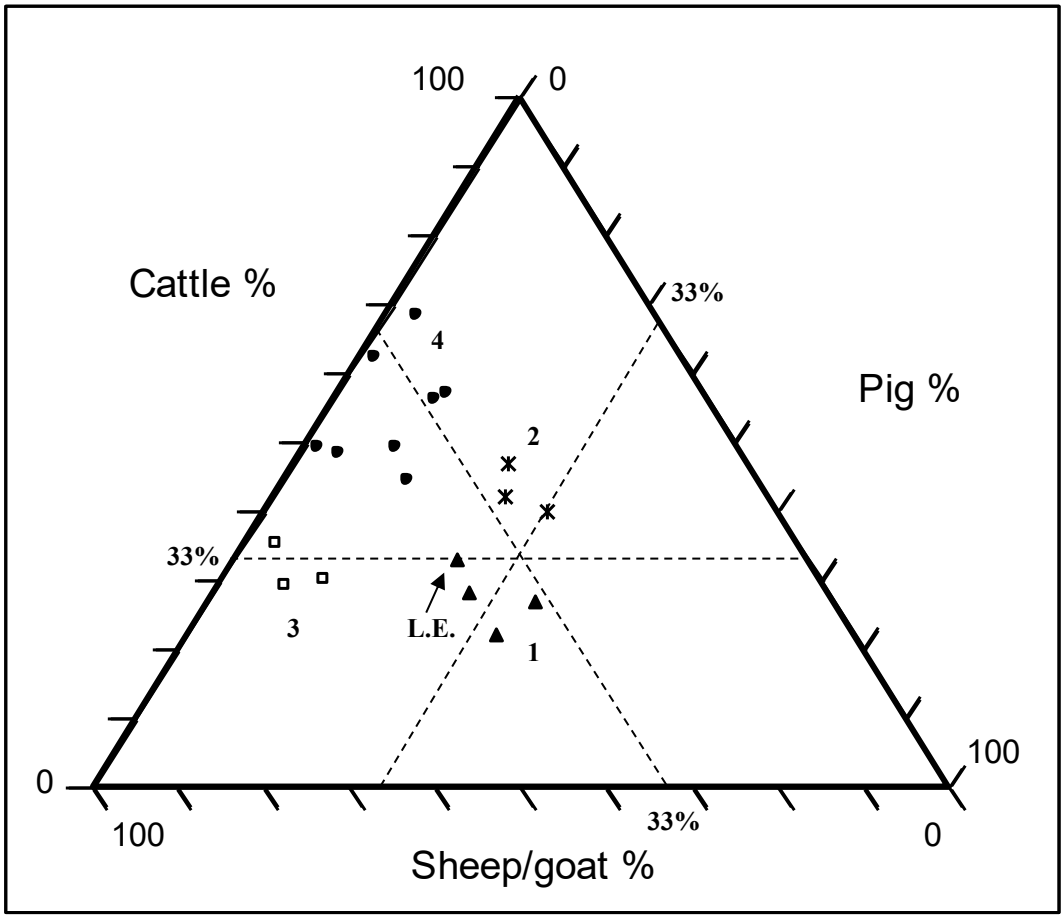

Figure 5: Percentage of sheep/goat, cattle and pig from comparative sites. See text and Table 9 for details.

Table 10: Element details (NISP) from the main mammal species in Barrow 1. Only hand-collected elements shown, cleaning and surface layers excluded.

Element	Body Area	Bos (NISP)	Sheep/Goat (NISP)	Pig (NISP)	Equid (NISP)	Dog/Lrg Canid (NISP)	Fox (NISP)
Antler	Cranial	0	0	0	0	0	0
Skull	Cranial	4	2	1	0	0	0
Maxilla (+Teeth)	Cranial	9	12	2	1	5	2
Mandible (+Teeth)	Cranial	16	11	12	0	10	3
Atlas	Axial	0	1	0	0	0	2
Axis	Axial	0	0	0	0	1	0
Cervical Vertebra	Axial	0	1	0	0	1	0
Lumbar vertebra	Axial	0	0	0	0	0	0
Thoracic Vertebra	Axial	0	0	0	0	0	1
Sacrum	Axial	0	0	0	0	0	0
Caudal Vertebrae	Axial	0	0	0	0	0	0
Sternum	Axial	0	0	0	0	0	0
Rib	Axial	0	0	0	0	0	0
Pelvis	Axial	0	2	1	0	0	1
Humerus	Limb	2	4	3	0	2	3
Scapula	Limb	0	1	0	0	0	0
Radius	Limb	1	3	1	0	1	1
Ulna	Limb	2	0	3	0	1	3
Femur	Limb	0	1	2	0	2	5
Patella	Limb	0	4	0	0	0	0
Tibia	Limb	1	5	2	1	3	2
Fibula	Limb	0	0	0	0	0	0
Carpal	Feet	6	8	1	0	3	0
Metacarpal	Feet	0	3	1	1	1	0
Proximal Phalanx	Feet	5	13	6	0	6	0
Medial Phalanx	Feet	5	2	6	0	1	0
Distal Phalanx	Feet	0	3	1	0	1	0
Sesmoid	Feet	10	1	0	0	0	0
Astragalus	Feet	0	7	1	0	0	0
Calcaneum	Feet	2	1	0	0	2	1
Tarsal	Feet	0	2	0	1	0	0
Metatarsal	Feet	1	2	0	1	0	0
Metapodial	Feet	2	2	5	0	1	0
Total Cranial		29	25	15	1	15	5
Total Axial		0	4	1	0	2	4
Total Limb		6	18	11	1	9	14
Total Feet		31	44	21	3	15	1
Grand Total		66	91	48	5	41	24

Table 11: Element details (%) from the main mammal species in Barrow 1. Only hand-collected elements shown, cleaning and surface layers excluded.

Element %	Bos (NISP)	Sheep/Goat (NISP)	Pig (NISP)	Equid (NISP)	Dog/Lrg Canid (NISP)	Fox (NISP)
Cranial	44	27	31	20	37	21
Axial	0	4	2	0	5	17
Limb	9	20	23	20	22	58
Feet	47	48	44	60	37	4

Table 12: Ageing data from secure Bronze Age phases in Barrow 1

	Total Bronze Age (NISP)				% Bronze Age		
Barrow 1	Foetal/ Neonatal	Juvenile	Adult	Total	Foetal/ Neonatal	Juvenile	Adult
Bos	2	20	1	23	9	87	4
Ovis/Capra	1	16	6	23	4	70	26
Pig	6	14	4	24	25	58	17
Vulpes	7	1	7	15	47	7	47
Canid	1	3	6	10	10	30	60

Table 13: Measurements for sheep/goat bones (in millimetres)

Astragalus	GLl	GLm	Dl	Bd	Species	Phase
	26	25.5	14.9	17.3	*Ovis aries*	4?
	26.8	25.1	14.9	17.3	*Ovis aries*	4
	26.8	25.9	14.6	16.9	*Ovis aries*	4
	27.8	26.9	15.3	17.5	*Ovis aries*	4
	26	25.2	14.3	16.6	*Ovis aries*	4
Pelvis	SBPu	SHPu			Species	Phase
	4.8	7.1			ovis/capra	4\7

Table 14: Measurements for pig bones and teeth (in millimetres)

Mandible	(*dP4 and M1 likely belong to the same individual)		
dP4*	L	W	Phase
	18.2	5.6	4?
M1*	L	W	Phase
	16.4	8.9	4?
M2	L	W	Phase
	21	14.2	4
M3	L	W	Phase
	34.8	15.6	4
	33.8	15.9	4
Radius	Bp		Phase
	23.4		4
Astragalus	GLl	GLm	Phase
	41.8	37.8	2\3

Table 15: Measurement for hare bones (in millimetres)

Radius	Bp	Phase
	9.0	1 -- 3

Table 16: Measurements for dog/large canid bones and teeth (in millimetres)

Mandible (*P3 and P4 measurements likely from same individual)							
P1	L	W					Phase
	6.3	4.1					4\7
P3*	L	W					
	10.5	5.2					2\3
P4*	L	W					
	12.4	6.6					2\3
M2	L	W					
	10.4	7.6					4?
Maxilla (*from same individual)							
P4	L	W					Phase
	18.7	10.8					4
*	17.3	10.2					4\7
M1	L	W					
	13.7	15.4					4 -- 7
*	13.8	15.3					4\7
M2	L	W					
	7.3	9.7					4?
*	7.2	10.3					4\7
Radius	SD	Bd					Phase
Ψ	[illegible]	[illegible]					[illegible]
Tibia	GL	SD	Bp	Bd	DD	Withers	Phase
			36				4
Ψ	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
[illegible]							
Calcaneus	GL						Phase
	50.1						4?
	50.0						4?
Proximal Phalanx	GL	SD	Bp	Dp	Bd		Phase
	24.5	6.5	10.2	8.8	7.9		4
	29.3	6.3	10		7.9		4\7
	23.9	6	9.8		7.6		4\7
	28.5	6.5	10.1		8.3		4 -- 7
	22.2	6.2	8.9		7.3		4?
	23.9	5.8	9.7				4?
Distal Phalanx	Bp						Phase
	7.4						2\3

Table 17: Measurements for red fox bones and teeth (in millimetres)

Mandible (*dP3 and dP4 from same individiual)			
dP3*	L	W	Phase
	4.0	1.6	4 -- 7
dP4*	L	W	
	5.4	2.1	4 -- 7
Humerus	HTC	BD	Phase
	7.4	18.6	3
Femur	Bd		Phase
	19.6		4

Table 18: Measurements of bird bones (in millimetres)

Coracoid	GL	Lm	BF	species	Phase
	59.1	54.7	18.3	*Tetrao tetrix*	4
Ulna	Bp			species	Phase
	8.5			cf. *Columba palumbus*	4

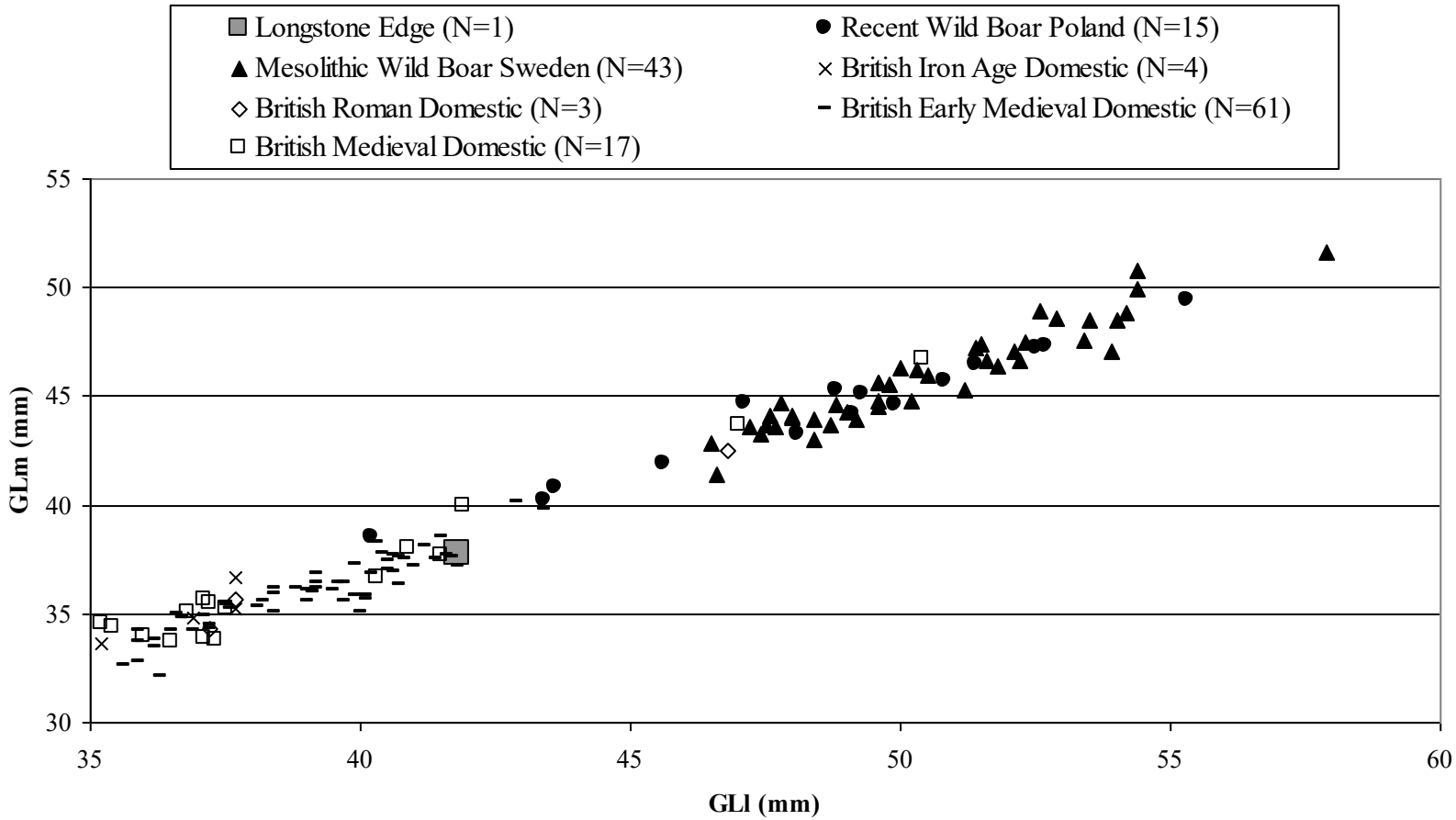

Figure 6: Sus Astragalus Measurements from domestic pigs in Britain and wild boars in Poland and Sweden compared to examples from Longstone Edge

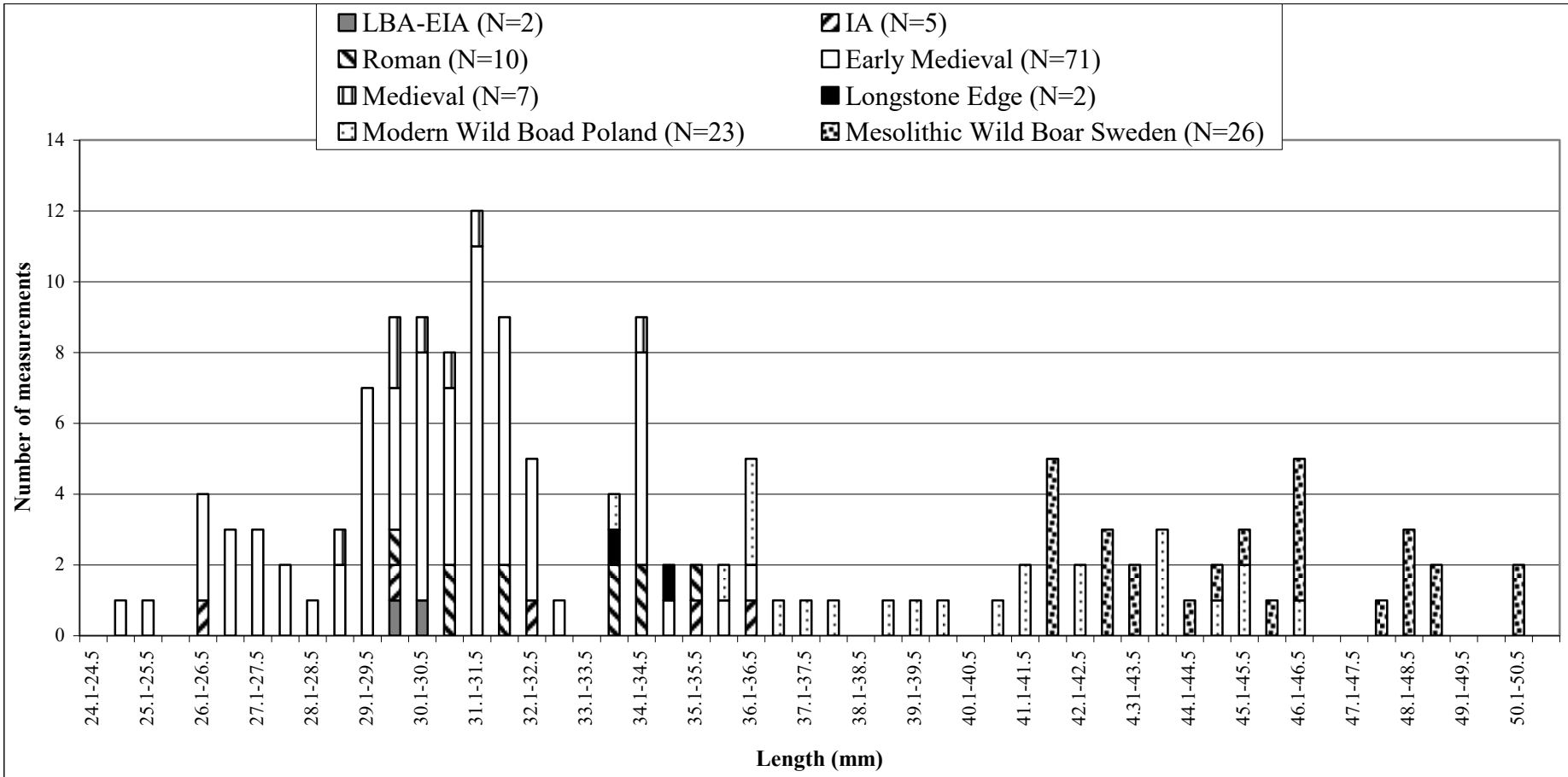

Figure 7: Sus Mandibular M3 Length Measures from domestic pigs in Britain and wild boars in Poland and Sweden compared to Longstone Egde

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