SIBFORD ROAD, HOOK NORTON (HOSIR17) - FAUNAL REMAINS
by Ian Smith

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Introduction

The animal bone assemblage primarily comprising the remains of cattle (*Bos taurus*), sheep (*Ovis aries*), sheep/goat (*Ovis*/*Capra*), pig (*Sus* sp), horse (*Equus* sp) and dog (*Canis familiaris*) was recovered by hand collection and from sieved samples. A small number of other remains are present including some from chicken (*Gallus gallus*), and hare (*Lepus* sp), mole (*Talpa europaea)*, vole (*Microtus* sp) and toad (*Bufo bufo*).

Recording

In total 3317 fragments were recorded, comprising 3002 hand collected specimens and 315 from sieved soil samples. The bones were identified using comparative skeletal reference collections, in addition to osteological identification manuals and literature (Halstead and Collins 1995; Sisson and Grossman 1938 and 1975; Schmid 1972). Counts were made of both the total number of fragments and of the number that bore an anatomical zone from Serjeantson (1996) or Cohen and Serjeantson (1996). Recorded mandible zones are as in Worley (2017, 1). Where possible all bones were identified to species, element, side and zone. Sheep and sheep/goat were identified following Boessneck *et al*. (1964) Kratochvil (1969), Payne (1985) and Halstead et al (2002) The recorded data includes some elements (mainly cranial vertebra, rib and limb bone fragments) classified by size: 'large mammal', representing cattle, horse and large deer; 'medium mammal' representing sheep/goat, pig and large dog; and 'small mammal' representing small dog and hare. With the exception of the atlas and axis, the latter elements were not assessed with regard to species frequency. Galliformes were identified with reference modern specimens and to Tomek and Bocheński (2009). Hare was identified by comparisons with modern specimens (of hares and rabbits) and according to metrical criteria relating to the mandibular P3 in Aouraghe *et al* (2012). Identifications of frog/toad were based on the scapula, cleithrum, distal humerus, radioulna, ilium (articulation), femur and tibiofibula using modern reference specimens and following Böhme (1977) and Ratnikov (2001).

The condition of the bone was graded on a 5-point system (1-5), grade 1 equating to "excellent" preservation (of bone surface texture), 2 to "good", 3, to "moderate", 4 to "poor" and grade 5 indicating that the bone had suffered such structural and attritional damage that it could not be identified beyond the level of "mammal" or perhaps "large mammal". This system is similar to Behrensmeyer (1978) but with the stage 0 ("greasy, perhaps with skin or ligament attached") omitted. However, the weathering stages outlined by Behrensmeyer (1978) are not closely mirrored amongst this material.

The minimum number of individuals (MNI) was calculated on the most frequently occurring occipital, mandibular or appendicular element for each species, using Serjeantson's (1996) zoning guide and Worley (2017, 1) mandible zones, and taking into account left and right sides.

The number of identified specimens (of a given species) is abbreviated to (NISP), the term MNE (minimum number of anatomical elements) is referred to and associated or articulating animal bone groups, are referred to as ABG's in the text.

There are unsubstantial age and sex related data throughout and few specific age classes could be suggested. However, tooth wear was recorded using Grant's tooth wear stages (Grant 1982) in cattle and pig and using Payne (1973, 1987) for sheep/goat, and was correlated with tooth eruption data (Silver 1969) to arrive at age estimates. In order to arrive at suggested ages based on the mandibular data, the methods of Halstead (1985), Payne (1973) and Halstead (1992) were used for cattle, sheep and pigs respectively. Sex estimation was to be carried out on cattle pelves and pig canines following Grigson (1982).

Measurements were taken according to von den Driesch (1976) using digital callipers with an accuracy of 0.01 mm. The greatest lengths of large mammal long bones, and other measurements where recommended by von den Driesch (1976), were measured using an osteometric board, with an accuracy of 1 mm. Withers' heights of cattle were calculated using Foch (1966) and those of horse by using May (1985).

Phasing

The bulk of recorded fragments were from two phases, 33% (NISP 1091) are from the early Roman and 51% (NISP 1683) were from the late Roman period. A further 11% were recovered from a middle Iron Age pit group. Small groups of bone were recovered from the 2nd century (2%) and the late Iron Age (1%) periods. A further 2% which had not been assigned a specific date range have been excluded from any detailed consideration).

Middle Iron Age

The hand collected remains include those of cattle, sheep, sheep/goat, pig, horse and toad (Table 1) which all originate from pit group (50006), the last probably as an accidental inclusion. The hand collected cattle:sheep/goat:pig NISP proportions are 7:16:6. Thus sheep/goat identifications (including four of sheep and no identifications of goat) are more numerous than cattle. These proportions contrast with the early Roman period where, amongst the hand collected remains, cattle are more frequent than sheep/goat. It is also of interest that in the middle Iron Age "large mammal" remains comprise only 36% of those identified either to the level of "medium" (sheep size) or large sized (cattle size) mammal. This is in distinct contrast to the early Roman period where 94% of this group are from "large mammal". Thus there appears to be evidence (based on NISP) that there was a distinct change in stock proportions by the early Roman period. One must however acknowledge the possibility that the single pit group that produced all of the bone from this phase, may not have been fully representative of stock ratios. The numbers of anatomical elements by zone and side (MNE's) are too low to be considered significant and (although it is highly unlikely) suggest that single specimens of cattle, sheep and pig could account for all of the bones. Pig and toad are present amongst the sieved remains (NISP 61) but overall the sieved material provides little extra information since it is dominated by mammalian remains not identified to taxon (Table 2).

Late Iron Age/early Roman

Single identifications were made of cattle and sheep/goat and two of horse (*Equus* sp), the other identifications are of large mammal (NISP 36) and mammal. There are no sieved remains and the (hand collected) group of identifications to species is too small to comment on in detail.

Early Roman

The hand collected remains identified to taxon comprise cattle, sheep and sheep/goat, horse, pig and dog (Table 1). The cattle:sheep/goat:pig ratio (by NISP) is *circa* 14:5:1, meaning that 69% of this group (NISP 153) were identified as cattle, 26% (NISP 57) as sheep or sheep/goat, and 5% (NISP 11) as pig. The remains of equids (NISP 18) were more common than those of the pigs.

A minimum of four left hand side cattle scapulae were represented by zone 2 of Serjeantson (1996), whereas five sheep/goat were represented by right hand side humeri (zone 6) and one pig was represented by a right hand side mandible (Worley 2017, zone 5). Thus the MNI cattle:sheep/goat:pig ratio is 4:5:1. The *Equus* remains might be accounted for by the presence of two animals based on the presence of left hand side metacarpals (zones 3 to 5) and left hand side pelves (zones 2 to 4). Clearly there is a large discrepancy between the suggested relative stock proportions according to the NISP on the one hand and the MNI's on the other.

The sieved remains from the early Roman phase are not instructive with regard to species ratios comprising a few large and medium mammal fragments and one pig mandibular tooth (Table 2).

If we look at the whole early Roman bone assemblage (Fig 1), 69% came from ditches, 23% from wells and 9% from pits (NISP 1091). Regarding the condition of the early Roman group as a whole, bone preservation was best (the highest proportion of "good" and "moderate" states of preservation) in the wells, followed by the pit fill contexts, and with the highest proportion of "poor" and "very poor" states from the ditches. Root damage is relatively widespread and is sometimes a problem affecting the recognition of butchery evidence. Only a single burnt bone identified to "mammal" was recorded from this phase.

The proportions of cattle and sheep/goat from these context types show clear differences that may relate to differences in disposal and/or in taphonomic differences relating to these context types. A relatively higher proportion (75% NISP) of the sheep/goat were from the ditch contexts (groups 50022, 50025, 50026, 50028, 50029, and 50031) as compared to 48% NISP of the cattle. A high proportion of cattle (41% NISP) were from well contexts (group 1179) as compared to 19% NISP of the sheep/goat. An alternative way to view this is that there was comparatively little sheep/goat recovered from the well (group 1179).

With regard to the condition of the cattle and sheep/goat, although a similar proportion of each are in a "poor" state (stage 4), a higher proportion (14%) of the cattle bones in this period were recorded to be in a "good" state (stage 2) as compared to 2% of the sheep/goat at the same stage. This difference correlates with the presence of a larger number cattle remains in the well (group 1179).

A factor that may be relevant to the frequencies of cattle as compared to sheep/goat is gnawing of the bones by carnivores (here judged largely to be gnawing by dogs according to the type of pitting and furrowing noted). It is probable, given inter species differences in density (Ioannidou 2003) and size that gnawing would remove a higher proportion of sheep/goat bones from the archaeological record than the more robust bones of cattle. Amongst cattle, in the early Roman period, 7% were recorded as carnivore gnawed as compared to 4% of the sheep/goat bones. Clearly none of the latter recorded specimens were destroyed or transported from the site, but they signal a destructive process that may have reduced the numbers of sheep/goat (and pig) bones to a greater degree than those of the larger cattle (and horse). Gnawing was recorded from ditches and wells but not amongst remains from the early Roman pits.

The relative representation of anatomical parts may originate in differential transport to the site and/or through the differential effects of various taphonomic processes. In this period, a wide range of parts (cranial, mandibular limb and foot bones) of the skeletons of cattle and sheep/goat are represented. By NISP, amongst the cattle and sheep/goat, it is notable that the cranial, maxillary and mandibular (including tooth) parts are all more common than any of the appendicular parts (Figs 2 and 3), whereas by MNE appendicular parts appear most frequent. The high frequency, by NISP of cranial and tooth parts is potentially misleading and appears most plausibly to relate the fragmentation of cranial parts and also the durability of teeth. Thus, for instance, there are multiple fragments of cattle horn-core, skull, maxillae and mandible from well fill context (1181) which give a total NISP of 36, but according to the presence of two mandibular right hand side condyles (zone 2 of Worley 2017) and an assessment of the maxillary parts present, all of these head parts might plausibly be accounted for by the presence of two cattle mandibles and by the skulls of one adult and one immature specimen.

Comparisons of the condition by phase (of all fragments of bone regardless of taxon or level of identification) from the Roman phases is of interest in that it reveals that 53% of the early Roman period were at either stages 4 "poor" or 5 "very poor" as compared to 25% of the late Roman assemblage at the same stages. Thus the early Roman groups were relatively poorly preserved, and one might reasonably ask whether this may have affected medium and small sized vertebrates more severely than the large vertebrates. This difference between the main phase groups has possible implications for any inter-period comparisons of the cattle:sheep/goat:pig ratio since such ratios may potentially relate, at least in part, to taphonomic processes (and do not not necessarily relate entirely to managed changes in stock ratios).

One cattle mandible from pit fill (1013) is in tooth wear age class E (30-36 months old) of Halstead (1985). In two other cases there are individual loose mandibular molars that are in wear and one maxilla was estimated to be from an animal less than 36 months old at death. However, there is clearly too little mandibular data from which to construct a kill off profile relating to the cattle. The cattle epiphysial fusion data is similarly scant, comprising a maximum of three fusion states from any proximal or distal end.

One cattle femur from well fill (1210) was affected by eburnation of the anterior aspect of the "head" (*sensu* Sisson and Grossman 1938, 153) which might perhaps relate to (old) age or be the result of heavy work but does not exhibit enough changes to be diagnosed as osteoarthritis (Baker and Brothwell 1981, 115).

There were 16 identifications of sheep from the early Roman phase and 41 of sheep/goat. No identifications were made of goat. Again amongst the sheep/goat there are problems with the fragmentation of the few mandibles that prevent the production of a kill off pattern. Two sheep were aged two to six months plus and one to two years plus. The three sheep/goat mandibles were aged one to three years, two to three years and circa four to six years following Payne (1973). There are seven specimens bearing evidence for epiphyseal fusion states (five of sheep and two of sheep/goat) and so again there is too little data on which to base an age profile. Nevertheless, there was a perinatal or neonatal sheep/goat metatarsal (with proximal articulation not fully formed) from ditch group 50031 (fill 1278) which suggests lambing in the vicinity.

The butchery seen amongst the cattle from the early Roman period includes a scapula from ditch fill (1255) which was chopped with a cleaver from the distal end (Lauwerier 1988, 194 code 3) in a manner that removes at least part of the "spine" (*sensu* Sisson and Grossman 1938, 146). The latter is amongst those butchery traits that are often seen amongst assemblages influenced or produced by the Roman military (Lauwerier 1988, 156; Stallibrass 1991, 34; Dobney et al 1996; Maltby 2006, 62). Two cattle bones (the scapula and a metatarsal) were definitely chopped and four other cattle bones and one large mammal limb bone fragment (from the early Roman *Bos* NISP total of 153) bore fine cut marks. These specimens are from amongst eight scapula fragments (MNE 4) and four metatarsal fragments (MNE 4).

The advanced arthropathy seen at the proximal end of an *Equus* sp. left metacarpal from early Roman well context (1182) bears some resemblance to the condition recorded and illustrated (although in that case affecting a proximal metatarsal) by Ayres and Clark (1999) from the Birdlip Quarry site on Ermin Street, although the extent of bone proliferation is even more advanced in this case. Part of one of the lower carpals can discerned (completely fused to the proximal metacarpal) but the majority of the proximal surface is highly irregular and much enlarged in diameter. It is clear that the second metacarpal is fused in place and the proximal end is completely enclosed by the extraneous bone. The location and form of the bone proliferation suggest the probability that this may be an advanced case of spavin (Baker and Brothwell 1980, 117-120; Bartosiewicz and Gal, 2013, 124-125). These conditions are from a sample of four metacarpal fragments (MNE 3) and single metatarsal specimen.

Dog remains in the form of a part maxilla (including P4, M1, M2) and premaxilla were recovered from early Roman ditch group 50022, fill (1057). This dog was reasonably large, not a lap dog, and larger than a reference collie-cross specimen it was compared to. One isolated maxillary canine from the same ditch group fill (1127) was identified to *Canis/Vulpes* but is most probably from a small dog.

2nd century

The 2nd century remains are all from ditch fills (groups 50003, 50004 and 50023) and comprise small numbers of cattle (NISP 26), sheep/goat (NISP 7) and horse (*Equus* sp) (NISP 1). The majority of identifications are of maxillary teeth (mainly of cattle from group 50023, sample <1092> ditch fill (1396)), followed by various "large mammal" identifications. There is too little here to be confident of species ratios.

Late Roman

The hand collected remains are dominated by the bones of cattle, sheep and sheep/goat, horse, pig, dog and chicken. The hand collected cattle:sheep/goat:pig ratio (by NISP) is *circa* 12:4:1, meaning that 70% of this group (NISP 231) were identified as cattle, 24% (NISP 78) as sheep or sheep/goat, and 6% (NISP 19) as pig. The latter excludes the skeleton of an articulated sheep from group 50032. The remains of dogs (NISP 26 including one *Canis/Vulpes*) were more common that those of the pigs, and horse remains (NISP 19) were also reasonably common.

As in the early Roman period there is a discrepancy between the suggested relative stock proportions according to NISP on the one hand and MNI's on the other. A minimum of four left hand side cattle scapulae were represented by zone 3 of Serjeantson (1996), whereas five sheep/goat were represented by left hand side tibias (zone 5) and three pigs were represented by right hand side mandibles (Worley 2017, zone 5). Thus the MNI cattle:sheep/goat:pig ratio is 4:5:3. (This ratio has been calculated with the sheep ABG from group 50032 excluded). A minimum of two dogs are represented by left hand side mandibular parts (zone 5) whilst the horse remains, according to the complete lack of replicated parts, could, in theory, be accounted for by the presence of a single animal.

The sieved samples include some smaller vertebrate remains but the assemblage is dominated by the remains of domesticated mammals. Sheep/goat are significantly more common than cattle. Taking all of the sieved fragments into account, the cattle:sheep/goat:pig proportions (by NISP) are 3:24:2, but this includes the sheep ABG from group 50032. With the latter excluded, the same proportions from sieved late Roman samples are 3:20:2. It is possible that cattle bones are underrepresented (by NISP) in the sieved samples due to the greater fragmentation of their bones so that a higher proportion are recorded only to the level of "large mammal" (Note 1). Thus, for arguments sake, if one assumes that all of the "large mammal" from sieved samples was from cattle and all of the "medium mammal" was from sheep/goat (and added these totals to the definite species identifications) one would arrive at NISP proportions of cattle 46% and sheep/goat 54% (Note 2).

One must acknowledge that there are potential problems with comparisons between the groups from the early and late Roman periods given the differences in their provenance by context type. In other words, different ratios by species might be explained by the different context type proportions (Stallibrass 1991, 62). What is conclusive and predictable however is that definite identifications of sheep/goat are more common in the sieved samples (Payne 1975).

A wide range of context types (Fig 4) produced the bone (in contrast to the early Roman period) and this is a factor relevant to comparisons by phase of species ratios. If we look at the whole late Roman bone assemblage, 30% came from rubble, 21% from metalled surfaces, 14% from corn dryers, 11% from demolition associated with building 2, 9% from layers over walls, 9% from demolition over building 1, 4% from graves, 2% from pits and <1% from wells.

The provenance of the cattle bone in this period is of interest in that the largest proportion (by context type) are from the metalled surfaces. A large proportion of these bones of cattle from the metalled surfaces (97%) are in a stage 3, or “moderate” state. With regard to condition, and with the inclusion of all context types (including the metalled surfaces) 90% of cattle bones from the late Roman period are at stage 3. Thus the cattle bones from the metalled surfaces are in a better state of preservation than that typically seen from the period. Some of the cattle bones (4%) were recovered from the graves and are presumed to be redeposited there rather than being grave offerings.

As in the early Roman period, maxillary and mandibular parts and teeth are frequent amongst both the cattle and sheep/goat (Figs 5 and 6). The cattle mandibular remains comprise loose teeth and mandibular fragments including one largely complete (after refitting) mandible from metalled surface (1203) that came from an animal at the “senile” stage of Halstead (1985). There is not enough data to produce a kill-off profile since one might only estimate the ages of five further specimens but since all are based on loose teeth there are no further specific age classes. However, various other age classes (Halstead 1985) from age class B plus (0-1months) through to age class I (senile) are represented.

Some of the butchery amongst the cattle suggests that the scapulae were butchered in a fashion that is typical of Roman influenced settlements (Lauwerier 1988, 156) codes 2, 34, 39 (Table 3). Amongst the six cattle speciemens with clear signs of butchery, four were chopped and the other two, both scapulae, were affected by filleting marks.

A cattle metatarsal from the metalled surface (1203) is approximately 222mm long and thus a withers height of 1.21m is suggested following the factors (no sex) of Foch (1966). This metatarsal also exhibits changes indicative of osteoarthritis (Baker and Brothwell 1980, 115) in the form of significant grooving, splaying (or extension of) the distal articular surfaces and extoses around the distal end. Based on the condition of this metatarsal, one might speculate that this animal may have reached a significant age and/or it may have been used in ploughing.

From rubble context (1276) there is an articulating bone group from cattle comprising the proximal end of another metatarsal (left hand side), with the articulating fused second/third tarsal and navicular cuboid. These bones are affected by a form of joint disease (or arthropathy), involving some necrosis and pitting. All of the articular surfaces of these elements are affected but the lateral surfaces between the navicular cuboid and the second/third tarsal are less severely impacted. The rough appearance of the non-articular anterior surface of the metatarsal and the fact that the medial side of the joint is more severely affected than the lateral suggests the possibility that this could be a case of spavin (Baker and Brothwell 1980, 119; Bartosiewicz and Gal, 2013, 123). These cattle metatarsal specimens are from amongst nine cattle metatarsal fragments (MNE 3).

From a layer of rubble over Building 3 (1402) there is a cattle first phalanx with extoses at proximal and distal ends, most pronounced across the anterior aspect. No grooving or eburnation affects either articular end, but whether there is any extension to articular surfaces to lateral is unclear due to recent damage. (The specimen is also affected by root etching). The condition is possibly high ring bone (Baker and Brothwell 1980, 120) and may be indicative of a working animal. This specimen is from the phase group of ten cattle first phalanx specimens (MNE 9).

From the late Roman rubble of Building 2 (1276) there is a cattle maxillary right hand side third molar (M3) with post depositional damage in addition to markedly uneven tooth-wear, such that the most distal part of the tooth forms a projecting spike that extends beyond the usual occlusal surface. This feature is most plausibly the result of a defect in the opposing mandibular third molar and possibly may signal a reduced or missing hypoconulid or a fracture (see Baker and Brothwell 1980, 147; Bartosiewicz, L, and Gal, E. 2013, 174). In one cattle mandibular left third molar from the same context the hypoconulid is present but another right hand side specimen from context (1276) the hypoconulid is damaged. Although damaged, the latter appears to have a congenitally reduced hypoconulid, but the other cusps suggest it cannot relate to the maxillary third molar with unusual wear.

The sheep/goat remains were recovered from all of the bone bearing context types but the largest number (by NISP) came from the corn dryer (group 50032). However, this corn dryer group comprises many articulating parts and probably associated parts (an ABG) judged to relate to a single sheep. If one excludes this group, sheep/goat parts are most common from the "rubble" contexts associated with Building 2, followed by "demolition" contexts associated with the same building.

There were 14 identifications of sheep and 84 of sheep/goat from this period (Note 3). There were four loose deciduous fourth premolars that suggested sheep below the age of two years and a further sheep/goat specimen of approximately the same age. One sheep mandible and one sheep/goat mandibular third molar (loose M3) specimen were judged to be at stage E of Payne (1973), two mandibles and one damaged loose tooth were at stage F, and one loose M3 was judged to be at stage H. Thus the sheep appear to include specimens that span under two years up to six to eight years (Payne 1973). However, it must be stated that this is based on a majority of loose teeth (and possibly associated teeth) and the age assessments based on such specimens are undoubtedly much less secure than those based on complete mandibles. With the exclusion of the ABG, there are only five sheep/goat epiphyseal fusion states that can be assessed and so this sample does not help to elucidate the sheep age at death profile.

The sheep from the corn dryer group 50032, mentioned previously, was recognised on site to be an articulated sheep skeleton and came from the 1m diameter rake-out pit (fill 1178) at the south-eastern end of the oven (Simmons doc). Criteria outlined for the teeth (Halstead et al 2002), distal tibia (Kratochvil 1969) astragalus and calcaneus (Boessneck 1969) confirm the species identification made on site. The maxillary teeth, left and right humeri and radii are present, as are fragmented parts of the pelves, the distal articular part of one metacarpal, damaged metatarsals, one navicular cuboid, one other tarsal, five first phalanges and one second phalanx. The mandibles are fragmented but can be largely reassembled and the degree of tooth wear indicates a sheep at stage F of Payne (1973). It was therefore most probably between about three and four years old at death (Payne 1973) and certainly must have been between within two and a half and six years (Jones 2006, 177). There are possible signs that this sheep may have been a ewe but as the metacarpals and pelves are incomplete and fragmented, the sex remains undetermined. There are no complete long bones from which a withers height might be extrapolated. The distal tibias (Bd 24.08 and 24.35mm) indicate a sheep larger (or stockier) than was typical, in Britain in the late Iron Age (Allen 2017, 106). Gracile and relatively diminutive sheep are not unusual in Roman Britain (Stokes 2000, 145) but relatively large sheep are recorded from the Upper Thames Valley in the late Iron Age and into the Roman period (Allen 2017, 105). No signs of butchery were noted, but the ABG is affected by root etching (*sensu* Binford 1981, 50; Lyman 1994, 376), other post-depositional damage, including some bone surface lamination and recent fragmentation.

An *Equus* metacarpal (the only one from the phase) from the metalled surface (1203) was 193cm in length (GL) (Table 4) which suggests an animal with a withers height of 1.18m using the factors of May (1985). This animal, (donkey or mule have not been excluded) was pony sized (11.6 hands), and thus not large by Roman standards (*cf* Allen 2017, 129). One can speculate on the possibility that horse bones may have been incorporated into the matrix of the metalled surfaces (in the manner suggested for cattle), but equally perhaps this may have been a pack animal which was left where it died.

Other species recovered include chicken (NISP 4) and hare (NISP 1). The chicken bones comprise two femora (left and right), a humerus and a tibiotarsus which were recovered from late Roman rubble context (1276). In the left femur there is no pneumatisation (which excludes many species of Galliforme), and the specimen was also compared to guinea fowl. It is considered probable that this specimen was from a bantam sized chicken. The other specimens were also compared to *Phasianus* specimens (and to criteria in Tomek and Bocheński 2009). A hare (*Lepus* sp) mandible is present from context (1402), a layer over a wall in Building 3, and suggests the possibility that some hunting took place. Mole (*Talpa europaea*) and vole (*Microtus* sp) were both represented by single identifications from demolition (1408) associated with Building 2.

The dog remains from the late Roman period include several that are diminutive and may have been lap-dogs. In the case of one humerus from the demolition over Building 1 (1275) it is difficult to exclude the possibility that fox is represented. Other specimens include largely fragmentary remains including some from clearly small dogs. These dog remains were recovered from the metalled surface (1203), demolition over Building 2, rubble associated with Building 2 (1276), a layer over a wall in Building 3 (1402), a pit and a grave (50013).

Conclusions

It appears probable that differences in the proportions of sheep (and "medium mammal") and cattle (and "large mammal") between the middle Iron Age and early Roman represent a significant change in stock proportions. Sheep appear to have comprised a larger proportion of the managed stock in the middle Iron Age in contrast to the early Roman when cattle become much more frequent. Admittedly, one should be cautious of drawing conclusions about species ratios based on assemblages that originate from a narrow range of context types or a small area of a site. Attention must therefore be drawn to the fact that all of the middle Iron Age assemblage came from a single group (pit group 50006). Similarly, with regard to comparisons between the early and late Roman, one also has to contend with the fact that the range of context types by period is markedly different. This is relevant since "the types of context excavated will affect the overall species ratios in a collection" (Stallibrass 1991, 62). Whilst this is not a Roman fort, the site is complex enough that some of the principles outlined by Stallibrass (1991, 62) and Stokes (2000, 145-151) are relevant. There are some distinct differences in species ratio by context type that may relate variously to spatial, context type (and/or taphonomic) differences. Whilst these caveats need to be acknowledged, the middle Iron Age appears plausibly to represent a sheep dominated group as one might expect, and the early Roman assemblage appears typically "Romanised" (King 1991)

The assemblage raises some questions of interest regarding bone disposal (and species proportions). With regard to the distribution in the late Roman period of cattle bones recovered from metalled surfaces, it appears probable that their high frequency in this context type represents deliberate deposition. High numbers of cattle bones in road surfaces have been recorded from other sites including Annetwell Street, Carlisle where it was concluded that cattle bones may have been selected to put onto roads and other surfaces in order to fill in potholes and as part of the matrix (Stallibrass 1991, 17, 18, 59). At Hook Norton, the fact that the condition of the cattle bones from the late Roman metalled surfaces is better than average for that period does suggest the possibility that they were incorporated into the bulk of road building material, and/or perhaps into ruts and potholes. One can speculate that the latter possibilities appear more probable than the scattering of cattle bones across the surface of a used metalled routeway, which would surely have resulted in a range of states not seen here including a proliferation of fractures and surface striations amongst the bones and ultimately in a high degree of fragmentation.

The bones within the demolition over buildings 1 and 2, and within the rubble contexts, may well originate from the activities of those on site in the late Roman period but it is difficult to exclude the possibility (if wall robbing was taking place for instance) that a proportion might be redeposited.

The fact that the Roman assemblage is dominated by domesticated animals with few wild species is typical amongst sites reflecting the Romano-British economy (Allen 2017, 85). The presence of hare (*Lepus sp*) is of interest but there are few other obvious signs of a high status presence in the form of deer or other wild game or birds (*cf* Stokes 2000, 151). Arguably no significance can be claimed in the latter respect since the assemblage is relatively small. The fact that amongst the cattle remains, scapulae are most frequent (by MNE) could be taken as a sign of Roman influence and provisioning in the late Roman period although the MNE totals are not high enough to conclusively demonstrate provisioning of scapulae from elsewhere. However, some of the butchery amongst the cattle is clearly indicative of a Roman influence and suggests special treatment such as smoking (Lauwerier 1988, 156) which would have preserved the scapulae (and made them possible to transport).

The pathological condition recorded from the early Roman well context (1182) is indicative, perhaps, of a working horse that may have endured a period of lameness, and although this might not necessarily have signalled the immediate end to its life (Baker and Brothwell 1980, 119; Bartosiewicz and Gal, 2013, 124) it is questionable whether a lame horse would have been maintained for any length of time by the Roman military. Although the total sample is not large it is of note that several of the horse and cattle remains are afflicted by conditions which might relate to heavy work such as the transport of goods or ploughing.

The NISP species proportions from the early Roman period are closest to the values one expects from cattle rearing areas in the Severn and Avon Valleys and are in contrast to the sheep dominated values from the Cotswolds (Allen 2017, 92). The MNI ratios however introduce the likelihood that the NISP proportions may exaggerate the frequency of cattle (Note 4). This does appear probable since there are multiple refitting or most plausibly associated fragments from this species. Thus, whilst the NISP totals are useful with regard to intra-species anatomical representation and alerts us to the involvement of taphonomic processes, the diagnostic zones (Serjeantson 1996) from which the MNI's are derived, are considered to provide a more accurate guide to species ratios.

Further, regarding species proportions in the early Roman period, it is of interest and perhaps predictable that the highest proportion of cattle bones in a "good" state originated from a deepest negative feature (a well) whereas there are poorer states of preservation (on average) from the ditches. Bones in a ditch are more likely to have been exposed for longer to sub-aerial weathering, possibly to alternating wet and dry conditions and to the attentions of scavengers (and to damage and redeposition during ditch cleaning). An important factor regarding these context/feature types is that the proportions of cattle and sheep/goat vary considerably between them. Some biases are evident in the body part representation of both cattle and sheep/goat, most obviously a prevalence of maxillary and mandibular parts and this suggests a taphonomic influence which however varies by context type. In addition to taphonomic biases, however, this site clearly has some degree of complexity regarding the patterns of animal bone deposition.

Based on the hand collected fraction from the early Roman period sheep/goat were marginally more common than the cattle, but given their size, cattle would have provided much more of the meat (Note 5). In theory, ploughing and hides may have been of as much importance or more important than beef, and wool as important as mutton, but such arguments should be based on reconstructed age at death profiles, which, due to the low numbers of mandibular rows and fusion states has not been possible here. That all parts of the cattle skeletons are present in both the early and late Roman periods suggests that cattle were largely driven to the site rather than being supplied as joints. Regionally, one can state that the proportions of cattle to sheep/goat in this region vary markedly depending on whether one is up on the Cotswolds or down in the valleys, with higher proportions of sheep on the higher ground (Allen 2017, 91-92). The site at Hook Norton is on relatively low ground, at 164m OD, but close to the Cotswolds and with rising ground to the west and a minor stream to the east (Simmonds doc). The presence of perinatal or neonatal sheep in the early Roman period certainly suggests some lambing took place close by. Some of the enclosures identified in the early Roman period, and which had no internal features (Simmonds doc) could quite plausibly relate to livestock management. Some twenty miles to the south of Hook Norton, at Gill Mill, a cattle dominated assemblage in association with a large complex of roads and enclosures suggests the possibility of cattle management on a large scale (Allen 2017, 92-93). The cattle at Hook Norton could well have been driven from such areas but it appears quite plausible that some cattle (and sheep) herding was taking place in the landscape surrounding this site.

Note 1: Other reasons for the under representation of cattle in samples are discussed by Stallibrass (1991, 65). Another possible source of such bias is the possibility of a failure to adhere to a "whole earth" sampling strategy. It appears reasonable to speculate on the probability that it is the largest bones that, during sampling, are the most likely to be placed in a general finds tray (as opposed to the sample tub).

Note 2: methodology regarding the inclusion of large mammal with cattle *etc* is based on Stallibrass (1991, 65).

Note 3: With the ABG from group 50032 excluded but including all other material regardless of phase (and including some unphased bones), 34 bones were identified as sheep and 160 as sheep/goat.
Note 4: problems associated with the use of NISP to estimate the relative frequencies of taxa are discussed by Reitz and Wing (1999, 192-193).
Note 5: With regard to the comparative sizes of cattle and sheep, Stallibrass (1991, 65) states that a Dexter cow weighs approximately twelve times as much as a Soay ewe.

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