

# The 19th-century animal bones from Stafford Castle<sup>1</sup>

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## 1 Introduction

Between 1978 and 1994 a series of archaeological investigations were undertaken at Stafford Castle (centred at SJ 9025 2225) to 'rehabilitate the castle as an educational and recreational resource, an amenity, and a major tourist attraction for the area' (Stafford Borough Council 1989, cited in Darlington 2001, 7). While the bulk of the animal bones recovered from these excavations was deemed worthy of detailed scrutiny (Hamilton-Dyer 2007; Sadler 2007; Sadler and Jones 2007), the material from phase 8 (c. 1800-1900) and phase 9 (c. 1900–present day) contexts was considered to have low archaeological potential (Nicholson 1990).

Further investigation established that some of the 19th-century animal bones were worthy of study because they derived from securely-dated contexts (see below). Furthermore, they derive from a fascinating, yet archaeologically-neglected, period with respect to animal husbandry and changing human-animal relationships (Thomas 2009). The purpose of this report is to summarise the key zooarchaeological findings and make available the raw data for future comparative analyses.

## 2 Historical context

The history of Stafford Castle in the 19th century is largely a story of the attempts by the Jerningham's to rebuild the castle; the subsequent decline of the site and occupation by a series of caretakers. The following summary has been adapted from Darlington and Wilkinson (2001)

Following the slighting of Stafford Castle in the wake of the Civil War in 1647, the site appears to have been left in ruin and was used as a repository for local building stone. At the end of the 18th century however, at the behest of Sir William Jerningham, the castle was landscaped into a public park. In 1811, Sir William's son, Edward Jerningham employed a local mason to reconstruct the keep as part of his attempt to claim the Stafford estate and have the barony restored in his family's name. Edward's son George completed this work; however the family did not reside in the newly re-constructed castle for long. After the Jerningham's had moved out in 1822 the castle was managed by caretakers, and the buildings gradually deteriorated until they were consolidated in 1960.

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### 3 Archaeological context

The animal bone considered in this report was excavated from two areas of the castle: the motte and keep (Site A); and the inner bailey (Site B). The 19th-century archaeological deposits in Site A can be broken down into three phases of activity. The first of these phases (8.1), relates to the reconstruction of the keep in the first quarter of the period, while the second (8.2 and 8.3) pertains to the construction and occupation of six timber buildings within the central courtyard of the keep. It appears that these buildings were constructed *c.* 1817 and they were probably intended to provide extra accommodation and storage facilities (Darlington *et. al.* 2003). The other 19th-century phase of activity in Site A spanned the last quarter of the period (*c.* 1875-1900) and witnessed the dismantling of the timber buildings within the courtyard and the erection of three new, but less substantial, timber structures upon a newly levelled surface. One of these buildings (structure 10) was a lean-to structure, constructed using timber posts, chicken wire and corrugated sheeting and occupied the entire northern half of the central courtyard. This evidence, together with the identification of lines of posts suggest that the structure was divided into section drew the interpretation that this structure represents the “remains of a series of coups or outhouse for keeping chickens” (Darlington *et. al.* 2003). One of the other, more substantial buildings within the courtyard was interpreted as a chicken shed that was roofed to protect the hens during lay (Darlington *et. al.* 2003.).

There is good evidence to suggest that the earlier of these deposits do not contain significant amounts of residual material since, “little archaeological evidence for earlier occupation had survived the wholesale removal of material” which took place at the end of the 18th century and the beginning of the 19th century (Darlington *et. al.* 2003). The deposits associated with the construction of the chicken coops in the latter quarter of the 19th century appear also to be well dated, and the ceramic evidence suggests that they were built around the last decade of the 19th century (Darlington *et. al.* 2003). The levelled surface, upon which these enclosures were built contained significant quantities of early-mid 19th century pottery and probably derived from occupation horizons from the inner bailey (Darlington *et. al.* 2003).

The archaeology of Site B is largely associated with the backfilling of the inner bailey with waste from the quarry process and from rubbish associated with the re-occupation of the keep and the estate (Darlington 2003). Four phases were designated for this area of the site; however, it is important to note that these do not map onto the phases for Site A and should all be considered 19th-century:

- |           |   |
|-----------|---|
| Phase 8.1 | Terracing and backfill - demolition of the east-end of the chapel building within the inner bailey and construction of a ‘sham’ keep. |
| Phase 8.2 | The 19th-century occupation of the ‘sham’ keep, and the adaptation of the chapel building.  |
| Phase 8.3 | The backfilling of the quarry and well, along with other buildings in the inner bailey. Occupation deposits within the keep.          |

Phase 8.4 Occupation deposits within the keep. Adaptation of chapel building within the inner bailey: south room and internal, some Jerningham features.

Inevitably, because of the nature of backfilling, Site B is likely to contain more residual bone than Site A. Indeed, Darlington (2003) notes that many medieval and 17th-century artefacts were present in some of the contexts, although the majority contained a significant amount of 19th-century material. Fortunately, however, some of these contexts have been highlighted in the excavation report (Darlington 2003) and can therefore be isolated: only bones from securely-dated contexts are included in this analysis.

Overall, the archaeological evidence appears to justify the further analysis of the animal bones from 19th-century deposits at Stafford Castle. However, some caution must be exercised in the interpretation of the animal bones from Site B.

## 4 Recording methods

The 19th-century animal bone assemblage from Stafford Castle was recorded using a modified version of the approach advocated by Davis (1992) and Albarella and Davis (1994), in which only a restricted suite of skeletal elements are considered. For mammals, all mandibular teeth were recorded, together with the following post-cranial bones: the cranium (complete or sub-complete zygomaticus); atlas; axis; scapula (glenoid cavity); distal humerus; proximal ulna; distal radius; carpal 3 (or 2+3); distal metacarpal; ischial part of the acetabulum (pelvis); distal femur; distal tibia; calcaneum (sustentaculum); astragalus; distal metatarsal; and the proximal end of the phalanges. For birds the following skeletal parts were recorded: the articular end of the scapula; proximal coracoids; distal humerus; proximal ulna; carpo-metacarpus; distal femur; distal tibiotarsus; and the distal tarso-metatarsus. To prevent the recounting of very fragmented bones at least 50% of a given part was required before it was counted. Interesting specimens that did confirm to these recording criteria were designated 'non-countable' elements, to minimise the loss of useful data.

The distinction of sheep and goat was attempted on selected elements following Boessneck (1969), Kratchovil (1969) and Payne (1985, 143). The closely related galliforms - domestic fowl (*Gallus gallus*); guinea fowl (*Numida meleagris*); and pheasant (*Phasianus colchicus*) – were separated using the criteria of (MacDonald 1992, 313).

Animals were aged using epiphyseal fusion and the eruption sequence and wear of mandibular teeth. Four fusion categories were recorded: fused (where the line of fusion between the epiphysis and metaphysis was not visible); fusing (where the epiphysis and metaphysis had fused but the line of fusion was still visible); unfused epiphysis; and unfused metaphysis. Tooth wear was recorded for cattle and pig using Grant (1982) and Payne (1987) for sheep on the following mandibular teeth:

deciduous fourth premolar; permanent fourth premolar; and first, second and third molars.

Pig canines were sexed based on the morphology of the canine and its alveolus as shown in Hillson (2005, 131). Domestic fowl were sexed based on the presence or absence of a spur, or spur scar, on the tarsometatarsus.

Taphonomic modifications such as gnawing, butchery and burning were recorded on all 'countable' bones. Carnivore and rodent gnawing were identified following the descriptions outlined in Binford (1981, 44-49). Butchery was recorded as either 'cut', 'chop' or 'saw'. Burnt bone was recorded as either, 'singed', 'burnt' or 'calcined'.

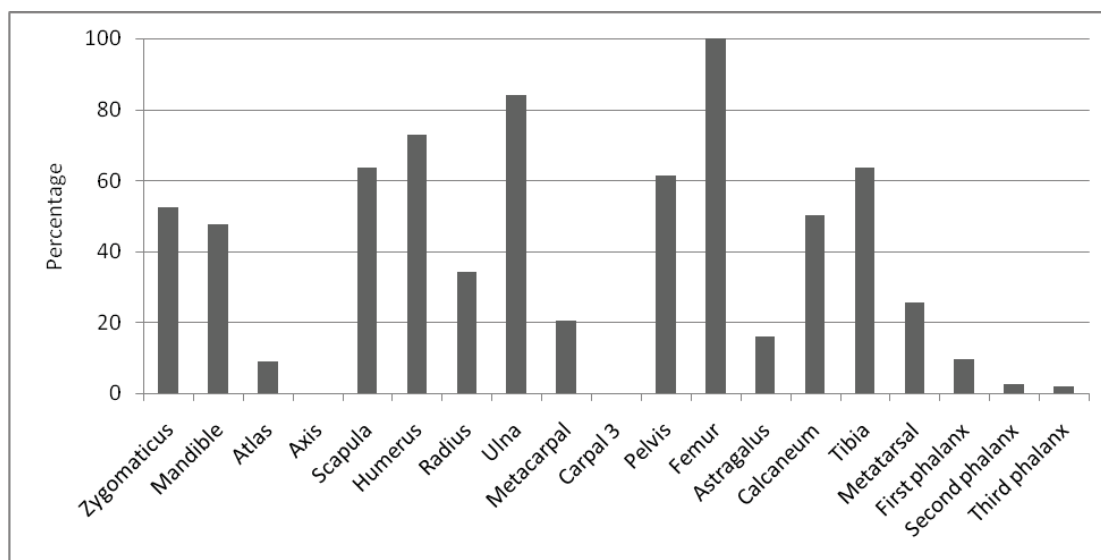
Measurements were taken on all skeletally-mature specimens and were recorded in tenths of millimetres, primarily using the criteria established by von den Driesch (1976). A number of other measurements were also taken: humerus HTC, humerus BT and tibia Bd were taken for all species using the method described by Bull and Payne (1988) for pigs; and measurements on cattle and caprine metapodia follow Davis (1992, figures 1 and 2).

The primary quantitative unit employed in the analysis of the faunal remains from Stafford Castle was the number of identified specimens present (NISP); only 'countable' fragments were included in the NISP calculation, thus, non-countable elements, such as ribs and most vertebrae, as well as unidentified fragments have been excluded. Effectively, the NISP in this study is equivalent to the Minimum Number of Elements (MNE; Lyman 2008). In the calculation of the minimum number of individuals (MNI) right- and left-sided elements were not discriminated. The minimum number of individuals was thus calculated by dividing the most frequently occurring element per taxon by the frequency with which that element occurs in a complete skeleton. This value is equivalent to the minimum number of animal units (MAU; Lyman 2008)

## **5 Taphonomy**

Although no sieving was conducted the collection of fragments of bone from small birds (Table 1) indicates that the standard of hand-collection was reasonably effective. In any assemblage where hand-collection provides the principal means of recovery, however, there is likely to be a bias against the smaller bones and the bones of smaller species (Payne 1972). This fact can be demonstrated by comparing the representation of recovered body parts for a particular species against the bones that would be recovered if the minimum number of individuals present were represented by their entire skeleton. Rabbit is perhaps the best species to demonstrate this fact: not only were they numerous, but they were present as complete skeletons and their skeletal distribution was not biased by butchery practices (see below). Figure 1 clearly illustrates a bias against the smaller bones of the skeleton, such as the phalanges and astragalus, while the larger limb bones are recovered more frequently. From this evidence it is possible to infer that the hand-

collected assemblage is biased in favour of the larger fragments, larger anatomical elements and the bones of larger taxa.



**Figure 1:** Relative proportion of recovered rabbit bones (calculated out of the total number of bones that would be present if the minimum number of 22 animals were represented by complete skeletons).

Overall, the preservation of the bones was extremely good. Carnivore gnawing marks were present on only 2% of the post-cranial bones, which might suggest that the majority of the animal bones were disposed of rapidly. However, if we consider just the domestic mammals, which almost certainly represent the waste from the preparation of food, or food waste itself, then the proportion is much higher. Indeed 10% of domestic mammal bones were exposed long enough after they were initially discarded for dogs and cats to gnaw upon them. At Dudley Castle the proportion of gnawing marks on post-cranial bones ranged between 11% and 37% in the medieval and post-medieval periods (Thomas 2005a, figure 10). It appears therefore, that waste disposal in the 19th century at Stafford Castle was better than it was at Dudley Castle in earlier periods. Only one case of rodent gnawing was noted, and that was upon a pig mandible from phase 8.2.

## 6 Species representation

In contrast to the faunal composition from late post-medieval contexts elsewhere in England (e.g. Albarella and Davis 1996; Dobney *et. al* 1996; Thomas 2005a) the 19th-century faunal assemblage from Stafford Castle is not dominated by the remains of domestic mammals (Table 1). The relatively paucity of bones from domestic mammals most likely reflects the fact that occupation (and thus food consumption and disposal) only occurred for a short period during the 19th century. However, this evidence could also testify to increased consumption of meat ‘off the bone’ or the presence of a more efficient waste-disposal system.

| Taxa           | Site A   |            |          |            |          |            | Site B   |           |           |           |            |           | Total       |
|----------------|----------|------------|----------|------------|----------|------------|----------|-----------|-----------|-----------|------------|-----------|-------------|
|                | 8        | 8.1        | 8.2      | 8.2-8.3    | 8.3      | 8.4        | 8        | 8.1       | 8.2       | 8.2-8.3   | 8.3        | 8.4       |             |
| Cattle         | 1        | 23         |          | 8          |          |            | 1        | 7         | 8         |           | 43         | 3         | 93          |
| Sheep/goat     |          | 51         |          | 11         |          | 31         | 4        | 7         | 2         |           | 32         | 2         | 140         |
| Pig            |          | 16         |          | 4          |          | 12         |          |           | 7         |           | 59         | 5         | 103         |
| Horse/donkey   |          |            |          |            |          |            | 1        |           |           |           | 3          |           | 4           |
| Red deer       |          |            |          |            |          |            |          |           |           |           | 2          |           | 2           |
| Fallow deer    |          | 6          |          | 1          |          | 1          |          |           |           |           | 15         |           | 23          |
| Roe deer       |          |            |          |            | 1        |            |          |           |           |           | 1          |           | 2           |
| Dog            |          | 76         |          |            |          |            |          |           |           |           | 1          |           | 77          |
| Cat            |          | 31         |          |            |          | 235        | 1        |           |           |           | 3          |           | 270         |
| Stoat          |          |            | 2        |            |          |            |          |           |           |           |            |           | 2           |
| Hare           |          |            |          | 2          | 1        | 7          |          |           |           |           |            |           | 10          |
| Rabbit         |          | 93         |          | 74         | 2        | 261        | 2        | 32        | 27        |           | 36         |           | 527         |
| Mole           |          |            |          |            |          | 5          |          |           |           |           |            |           | 5           |
| Rat            |          |            |          |            |          | 3          |          |           |           |           |            |           | 3           |
| Rat/water vole |          | 1          |          |            |          | 8          |          |           | S         |           | 1          | 1         | 11          |
| Small rodent   |          | 2          |          |            |          | 10         |          |           |           |           | 1          |           | 13          |
| Tortoise       |          |            |          |            |          | *          |          |           |           |           |            |           | *           |
| Amphibian      |          | 1          |          |            |          |            |          |           |           |           |            |           | 1           |
| Domestic fowl  |          | 30         | 1        | 58         |          | 308        | 1        |           |           |           | 21         |           | 419         |
| Turkey         |          |            |          |            |          |            | 15       |           |           |           |            |           | 15          |
| Grey partridge |          | 4          |          |            |          | 6          |          |           |           |           | 1          |           | 11          |
| Goose          |          | 2          |          | 6          |          | 5          | 1        |           |           |           | 2          |           | 16          |
| Duck           |          |            |          |            | 1        |            |          |           |           |           | 1          |           | 2           |
| Pigeon/dove    |          | 37         |          | 32         |          | 7          |          |           |           |           | 2          |           | 78          |
| Crow/rook      |          |            |          | 1          |          | 1          |          |           |           |           |            |           | 2           |
| Jackdaw        |          | 12         |          | 2          |          | 1          |          |           |           |           | 2          |           | 17          |
| Small turdid   |          | 1          | 1        | 7          |          | 4          |          |           |           |           |            |           | 13          |
| Passerine      |          |            |          |            |          | 19         |          |           |           |           |            |           | 19          |
| <b>Total</b>   | <b>1</b> | <b>386</b> | <b>4</b> | <b>206</b> | <b>5</b> | <b>924</b> | <b>7</b> | <b>33</b> | <b>49</b> | <b>27</b> | <b>226</b> | <b>11</b> | <b>1879</b> |

**Table 1:** Numbers of identified specimens from 19th-century contexts at Stafford Castle. To maintain a valid comparison between the NISP counts, some values have been corrected to account for differences in the number of bones; thus: pig metapodia and half distal ruminant metapodials have been divided by two; carnivore, lagomorph and rodent metapodia have been divided by four. Isolated teeth are counted as one specimen as are mandibular rows. Unfused epiphyses are not counted. \* indicates specimens present as ‘non-countable’ elements.

The range of species was much smaller than in medieval and early post-medieval deposits from the same site (Sadler and Jones 2007). This too probably attests to the fact that the castle was only briefly occupied, and that after the Jerningham’s had moved out in 1822, the occupation of the site by the caretakers was of fairly low status.

Of the 140 sheep/goat bones that were recorded, 41 were positively identified as sheep. The fact that no goat (*Capra hircus*) bones were found is unsurprising and is typical of post-medieval sites (Albarella 1999). Indeed it was noted in 1795 that “the numerous goats formerly kept in the higher regions had vanished” (Fussell 1937, 196), although the 19th century did witness a reviving interest in goat-keeping with the establishment of the British Goat Society in 1879 (Whitlock 1977).

The fact that rabbit (*Oryctolagus cuniculus*) was the most numerically abundant species is unusual, although it is likely that most of these specimens were intrusive

(see section 3.8). Considerable proportions of cat (*Felis catus*) and dog (*Canis familiaris*) were also identified; these specimens largely derived from partial skeletons and probably represent the burial of pets (see below). The presence of a few specimens of deer and hare may represent residual specimens, since they were present in abundant quantities in the medieval period at Stafford (Sadler and Jones 2007). However, it is entirely possible that they are contemporary and represent the last vestiges of high-status dining at the castle following the re-construction of the keep. The mole (*Talpa europea*), stoat (*Mustela erminea*), and rat/water vole (*Rattus/Arvicola*) specimens are all probably animals that were living around the site.

Domestic fowl dominated the bird bone assemblage, an unsurprising observation given the use of the central courtyard of the keep for chicken rearing in the latter quarter of the 19th century (see below). The recovery of a partial skeleton of a turkey (*Meleagris gallapavo*) is equally unremarkable considering the late date of this assemblage. Other, putatively domestic species present in small quantities include duck (*Anas* sp.) and goose (*Anser* sp.)

The majority of the wild birds that were present on the site probably represent non-anthropogenic accumulations of species living on, or around, the castle. They include substantial numbers of pigeon/dove (*Columba* sp.), and the occasional bones of crow/rook (*Corvus frugilegus/corone*), jackdaw (*Corvus monedula*), starling/thrush (*Sturnus/Turdus*) and two partial skeletons of a small passeriform – probably sparrow. The only wild bird species that probably represents food waste is grey partridge (*Perdix perdix*), represented by 11 specimens. This species was only present in small numbers in the medieval and early post-medieval deposits at Stafford Castle (Sadler 2007), but it has been recovered in higher numbers on other high-status sites (Albarella and Thomas 2002). It is possible that the presence of grey partridge is another indicator of high-status dining at the castle.

Undoubtedly, the most remarkable specimen recovered from 19th-century contexts at Stafford Castle was the proximal humerus of a tortoise. The post-cranial bones of tortoises are notoriously difficult to speciate; however the morphology of this bone closely matches that of the spur-thighed tortoise (*Testudo graeca*). The wider significance of this specimen has been discussed at length elsewhere (Thomas 2010).

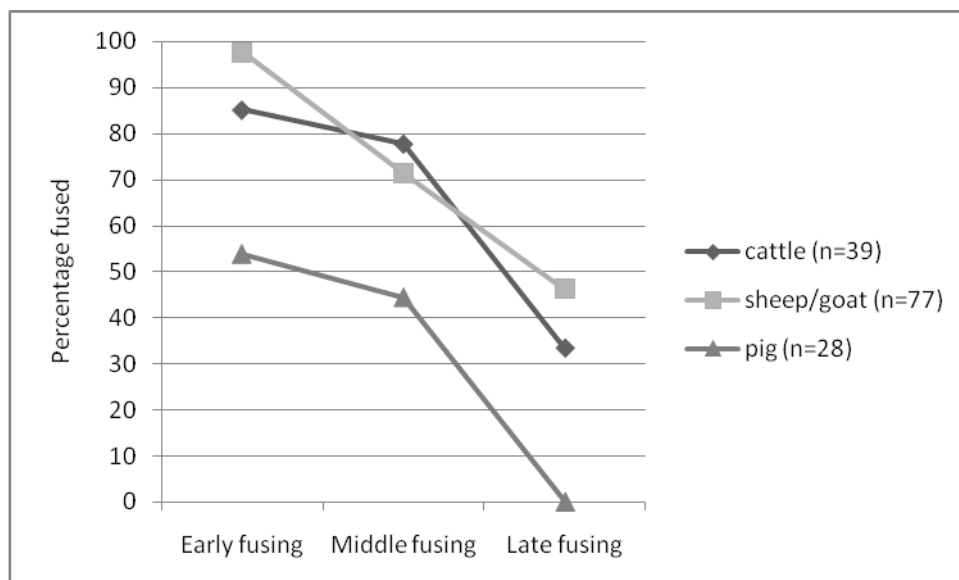
## **7 Domestic livestock**

The small numbers of domestic mammals that were recovered from 19th-century Stafford Castle precludes any detailed analysis of body part representation. However, a cursory examination of the available data for cattle, sheep and pig (Appendix 1, Tables 1-3) reveals that all parts of the body were present and indicates that some of these animals were slaughtered on site.

The paucity of mandibles with at least two ageable-teeth present in the mandibular row renders meaningless any interpretation of age of slaughter based on these data (Appendix 3, Tables 1-3). While the epiphyseal fusion data for domestic livestock is more substantial (Appendix 2, Tables 1-3), it is only sufficient to make generalised



comments about slaughtering policy (Figure 2). It also has to be emphasised that the ageing of animals based only on the fusion of their bones is fraught with many biases (Watson 1978). For example, unfused bones tend to be more porous than their adult counterparts and thus more susceptible to post-depositional degradation.



**Figure 2:** epiphyseal fusion for cattle, sheep/goat, and pig (age categories follow Reitz and Wing 1999, table 3.5).

Figure 2 reveals that approximately 15% of the cattle on site were slaughtered before they reached two years of age; only 7% were killed between two and three years of age, while the majority (45%) were killed between the ages of three and four. Thirty-three percent of cattle survived beyond their fourth year. While virtually none of the sheep on site appear to have been slaughtered before they were sixteen months old, approximately 25% were killed between 16 and 36 months of age and again between 36 and 42 months of age. Over 45% of sheep were kept beyond three and half years. The situation for pig is rather different, with nearly half the animals being slaughtered in the earliest age category (12-24 months). Not a single bone was found which indicated the presence of pigs over the age of three and a half years.

The slaughter pattern observed for all three domestic mammals is in-line with expectations. Cattle at Stafford Castle were slaughtered at a younger age than at earlier post-medieval sites (e.g. Thomas 2005a, figure 49), but in similar proportions to other 19th-century sites (e.g. Thomas submitted). The trend towards a decreasing slaughter age for cattle commences in the late medieval period (Grant 1988, Albarella 1997) and has been attributed to a number of factors including: the replacement of cattle with horse as the principal traction animal; and the specialisation of farming, following the rise of dairying and the emergence of farms specialising in meat production to feed the growing urban market. The mechanisation of agriculture must also be considered as a factor that further reduced the need for keeping cattle as traction animals during the 19th century.



The epiphyseal fusion data for sheep at Stafford Castle closely mirrors the pattern witnessed at medieval and post-medieval Dudley Castle (Thomas 2005a, figure 81). This evidence indicates that the sheep were slaughtered at a variety of ages, and reflects the multitude of purposes to which this animal was put. Thus, the majority of sheep were old enough to have yielded several clips of wool before they were slaughtered. The fact that sheep, unlike cattle, were not slaughtered at a younger age in the later post-medieval period may relate to their continuing use as providers of wool; however, it may also reflect the growing taste for mutton: Chartres (1985, 445) records that the sale of sheep for meat increased by over 50% in the first half of the 18th century.

The slaughter age of pigs closely parallels the patterns established at other medieval and post-medieval sites, and indeed earlier deposits at Stafford Castle (Sadler and Jones 2007). The fact that the majority were killed when they were one year old also accords well with contemporary agricultural writers (Albarella 1997, 25; Davis 2002, 56). This is unsurprising since pigs are fecund, rapid converters of food to meat. and during the 19th century fast-growing and fattening breeds were preferred (Trow-Smith 1959, 288-296).

With respect to butchery, 17% of domestic mammal bones displayed evidence of cut, chop or sawing marks; the distribution of these marks is outlined in Table 2. The differences in frequency between cut and chop marks in cattle and sheep is almost certainly a reflection of the fact that the butchery of the larger bones of cattle was more efficient with a cleaver. The presence of a high proportion of sawing marks reflects the increased use of this tool for butchery by the 19th century. Almost all butchery marks were associated with flesh removal and dismemberment.

Unfortunately, there were insufficient measurements to conduct an analysis of the shape and size of cattle: measurements were only possible on eleven post-cranial elements and ten teeth (Appendix 4, Tables 1-6). Similarly for pig, measurements were only available on six bones from 19th-century contexts and nine loose teeth or mandibles (Appendix 4, Tables 13-15).

|               | Cut |    | Chop |    | Saw |   | Total |    |
|---------------|-----|----|------|----|-----|---|-------|----|
|               | n   | %  | n    | %  | n   | % | n     | %  |
| <b>Cattle</b> | 8   | 6  | 18   | 14 | 2   | 2 | 28    | 18 |
| <b>Sheep</b>  | 17  | 11 | 13   | 8  | 1   | 1 | 31    | 20 |
| <b>Pig</b>    | 3   | 3  | 5    | 4  | 1   | 1 | 9     | 6  |

**Table 2:** number and proportion of butchered domestic mammal bones from 19th-century Stafford Castle.

The dataset for sheep is more substantial, although the numbers of individual post-cranial bone measurements remains small (Appendix 4, Tables 7-12). One way of overcoming the problem of small sample sizes is by employing a log-scaling technique. Metrical studies have demonstrated that measurements taken along the same axis, i.e. lengths, widths and depths, are highly correlated (Davis 1996). Using

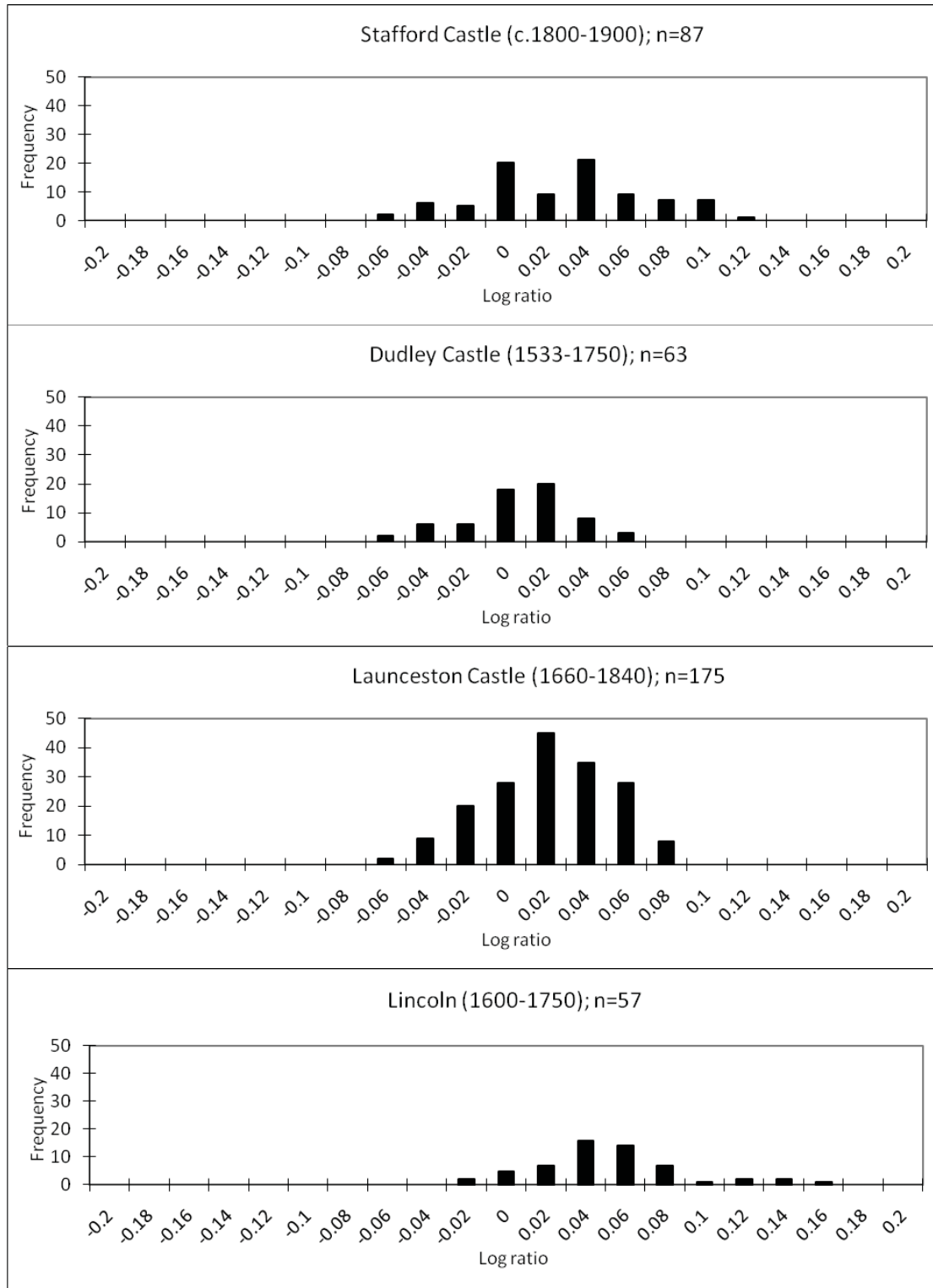
log-scaling methods, it is therefore possible to combine these measurements and increase the sample size. This technique involves converting all measurements to logarithms. A single specimen, or group of specimens, is then chosen as a standard for comparison; in this study a population of female Shetland sheep has been employed (Davis 1996). Log-scaled values are then calculated by subtracting the log of each measurement from the log of the standard, and the results can be plotted on a histogram. A log ratio of zero implies the measurement is the same size as the standard, a positive value implies that it is larger and a negative value that it is smaller. Unfortunately, because 19th-century faunal remains are often unpublished (Thomas 2009), there are very few sites that provide comparative measurements. In Figure 3, post-cranial data from three other sites have been compared: 16th-18th-century deposits at Dudley Castle (Thomas 2005a); 17th-19th-century contexts from Launceston Castle (Albarella and Davis 1996); and 17th-18th-century deposits from Lincoln (Dobney *et. al.* 1996.).

The sheep measurements from 19th-century Stafford Castle exhibit a wide distribution (Figure 3). This pattern is different to that seen on other medieval and early post-medieval sites where the measurements tend to have a more discrete distribution (Thomas 2005a, figures 89-90, 94), and suggests that the sheep used to feed the occupants of the castle did not derive from a homogeneous population. This is an interesting finding in an assemblage dating to 19th century, since the number of sheep breeds was much greater (Trow-Smith 1959) and it is likely that the animals reaching the market did so from a wider range of localities.

Inter-site comparison reveals that while the 19th-century sheep from Stafford Castle were significantly larger than the sheep from slightly earlier dating deposits at Dudley Castle and Launceston Castle, the sheep at Lincoln were marginally larger (Figure 3; Table 2). This latter fact may reflect regional variation; however, the fact that the Stafford sheep were larger than the sheep from nearby Dudley might suggest that new breeds of sheep were introduced into the region, or that existing sheep were improved, sometime in the later 18th or 19th century. These data make an important contribution to ongoing debates concerning the nature and timing of ‘improvements’ in domestic livestock and supports the view that increases in livestock size occurred as part of a long-term and gradual process that varied temporally and spatially (see Thomas (2005b, 2009) for a more thorough discussion of this topic.

|  | <b>T-stat</b> | <b>Probability</b> |
|--|---------------|--------------------|
| Stafford Castle (19th century) – Dudley Castle (1533-1750)     | 5.77          | 0.000              |
| Stafford Castle (19th century) – Launceston Castle (1660-1840) | 2.89          | 0.004              |
| Stafford Castle (19th century) – Lincoln (1600-1750)           | -2.40         | 0.018              |

**Table 2:** statistical examination of the metrical data presented in Figure 3.



**Figure 3:** inter-site comparison of sheep post-cranial bone measurements. The standard is drawn from average measurements from a contemporary population of female Shetland sheep (Davis 1996).

## **8 Cats and dogs**

A large number of dog and cat bones, predominantly deriving from partial skeletons, were recovered in the 19th-century assemblage from Stafford Castle (Table 1). One complete dog skeleton was recovered from a phase 8.1 context (1748) in Site A and at least nine partial cat skeletons were found on site. One adult cat skeleton was recovered from a phase 8.1 deposit in Site A (context 1530), while two cats, one of which was adult and one of which must have been approximately seven months of age (based on a fusing distal humerus – see Luff and Moreno Garcia (1995, table 2)) and at least six kittens, were recovered from phase 8.4 contexts in the same area. It is possible that these animals represent the burials of family pets that belonged to the Jerningham's or the caretakers, within the inner bailey and keep. However, a high proportion of cat bones derived from either neonatal or extremely young kittens. Out of the deposit of 235 bones from phase 8.4 in Site A, for example, 138 (59%) were unfused and 89 bones were qualitatively classified as 'perinatal'. These must either represent the bones of unwanted cats that had been euthanased or kittens that had died naturally at, or around, the time of birth.

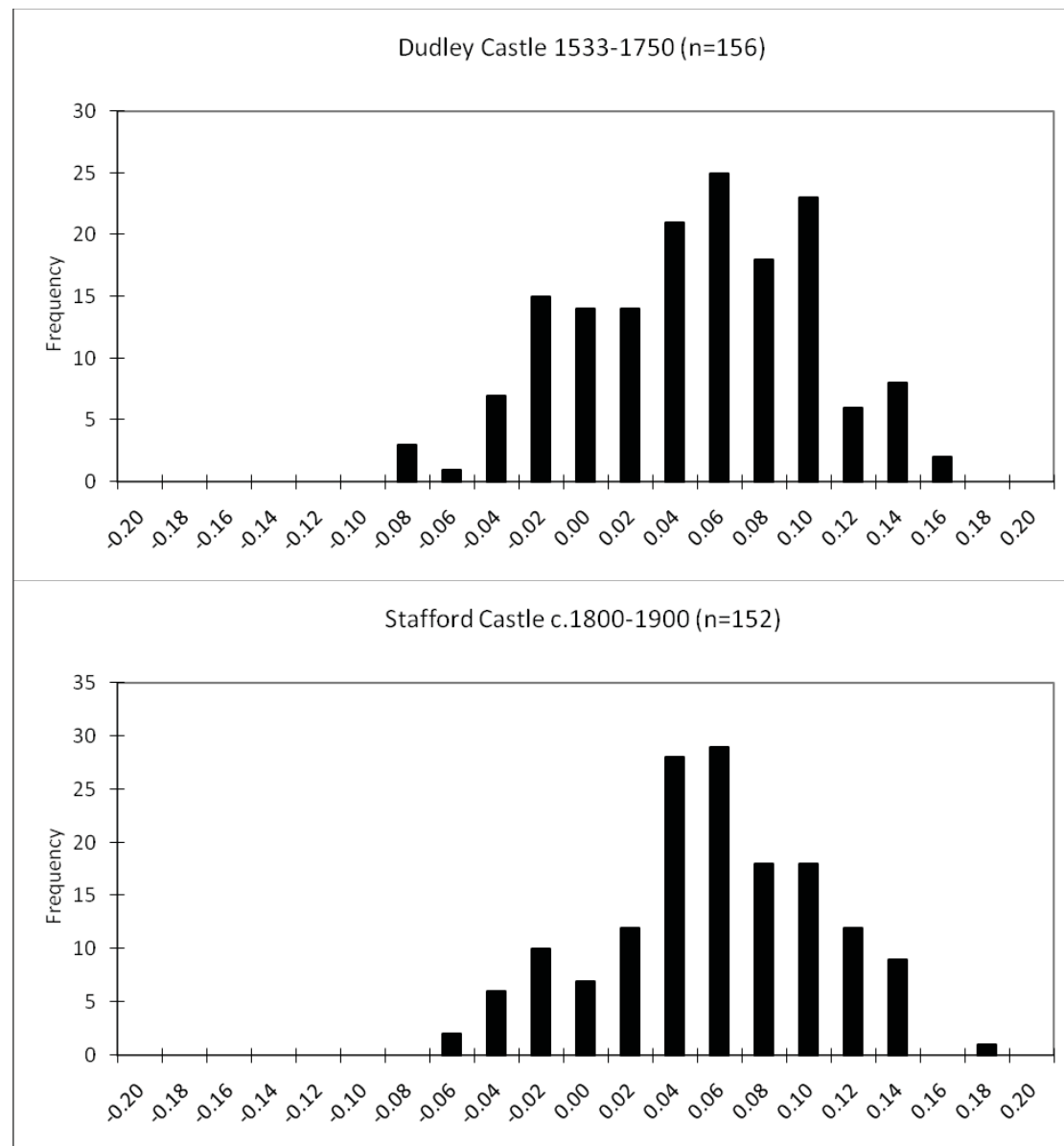
## **9 Rabbits**

The fact that rabbit is the most abundant species is extremely unusual on a British archaeological site, although 16th-century deposits at the site of Little Pickle, Bletchingley, Surrey (Bourdillion 1998) provide a parallel. At the latter site, analysis of body part representation revealed a predominance of cranial elements and bones of the feet. The fact that the distal tibia was the most abundant main limb bones lead to the suggestion that these specimens represented the waste from the preparation of rabbit carcasses for food (Bourdillion 1998, 162). However, because rabbits are burrowing animals it is entirely possible that their presence at Stafford Castle relates to recent activity, rather than contemporary occupation of the site. The most obvious means of determining whether the rabbit bones were intrusive or represent food waste is through the identification of butchery marks. The fact that only a single specimen bore any sign of butchery – a distal radius with multiple cut marks from phase 8.3 (2623) – makes it more likely that the rabbits represent a natural, non-anthropogenic accumulation. This interpretation is supported by the fact that all body parts were represented (Figure 1), partial skeletons were recovered from specific contexts, and a number of extremely young and perinatal rabbit bones were recovered.

## **10 Domestic birds**

The abundance of domestic fowl bones in this assemblage (Table 1) provides additional support for the interpretation that the late 19th-century buildings within the central courtyard of the keep were chicken coops. Indeed, of the 423 domestic fowl bones recorded from all contexts at Stafford Castle, 73% derive from the area containing these structures. As noted above, the bones of chicken, guinea fowl and

pheasant are somewhat difficult to distinguish. However, of those that could be separated, not a single guinea fowl or pheasant was identified.



**Figure 4:** inter-site comparison of log-scaled domestic fowl post-cranial bone measurements. The standard is drawn from average measurements of 15th-century fowl from Launceston Castle (Albarella and Davis 1996).

Of the 400 domestic fowl bones that could be aged, the majority (57%) were juvenile. This percentage is much higher than the proportion witnessed at other medieval and early post-medieval sites. At Dudley Castle, for example, the proportion in the period 1533-1750 was 42% (Thomas 2005a, figure 145). In one phase 8.4 context in Site A (258), 81 bones of extremely juvenile domestic fowl bones were recovered, representing at least seven chicks. While many of the bones came from very young birds, several specimens clearly derived from extremely old birds. One partial skeleton from a phase 8.1 context within Site A (1530), for example, exhibited osteophytosis and ossification of ligament attachments on all its

limb bones. The shafts of two limb bones from this skeleton, together with nine other long bones from 19th-century contexts contained medullary bone: a woven bone that is temporarily laid down in the marrow cavity of chicken long bones to provide a reservoir of labile calcium during egg production. The presence of medullary bone and chicks (which could represent natural fatalities or unwanted male chicks), when considered alongside the archaeological evidence, provides clear evidence for the husbandry of chickens for egg production. This interpretation is bolstered by the virtual absence of butchered chicken bones – indicating that these birds were not consumed on site.

The large number of domestic fowl bones from 19th-century contexts at Stafford Castle has generated a significant body of measurements (Appendix 4, Tables 45-48). This is an important dataset since there is general paucity of biometric data for late post-medieval domestic fowl. Figure 4 compares the metrical data from 19th-century Stafford Castle chickens, with those from Dudley Castle (AD 1533-1750). While the chickens from Stafford Castle appear slightly larger, this difference is not statistically-significant ( $t\text{-stat}=-1.445$ ;  $P=0.149$ ). These data further support the idea that different livestock underwent different transformations in size at different places and times.

## 11 Conclusion

Animal bones are ubiquitous archaeological finds and it is well-recognised that their detailed study can shed light on a diverse range of past human activities. These include the identification of: subsistence strategies; economic regimes; the use of animals and animal parts in craft and industry; attitudes to animals; and the symbolic role of animals in cosmology, ritual/religion and as food items. The importance of these lines of investigation, together with the abundance of faunal remains on many sites, has meant that analyses of animal bone are now routinely undertaken as part of the post-excavation process. Despite their centrality, however, later post-medieval faunal assemblages have been seriously neglected in comparison to animal bones from earlier periods in British archaeology. Most studies tend to discontinue at AD 1750 on the grounds that such data are ‘modern’ and therefore unworthy of study because the information is already documented in texts (Murphy 2007; Thomas 2009).

The analysis of the animal bones from 19th-century Stafford Castle clearly demonstrates that such perceptions are unfounded and that later post-medieval faunal assemblages have the potential to address key questions of wider archaeological and historical concern and should thus be afforded a higher research priority. Key findings in this study include: the first archaeological evidence for the importation of tortoises, shedding light on the emergence of the exotic pet trade in England (Thomas 2010); insight into methods of chicken husbandry in the 19th century; and new perspectives on the nature and timing of ‘improvements’ in domestic livestock. Further publications of later post-medieval zooarchaeological data will only serve to enrich our understanding of the dynamic nature of human-animal relationships in a period of profound social change.

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