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“So bigge as bigge may be”: tracking size and shape change in domestic livestock in London (AD 1220–1900)

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ABSTRACT

This study presents the analysis of 7966 individual cattle, sheep, pig and domestic hen bone measurements from 105 sites excavated in London dating to the period AD 1220–1900. Multiple episodes of size change are identified, although the speed and timing varies by species. The earliest evidence for size change in cattle and sheep occurs in the early 14th century and may be connected to the need to restock livestock populations following the outbreaks of murrain in the first half of that century. Subsequent size increases in livestock size may have occurred as a combined consequence of agricultural innovations in the wake of the Black Death, the increasing commercialisation of animal farming, as the meat requirements of an expanding London grew, and the rise of the ethic of improvement.

1. Introduction

Over the past 40 years, the analysis of animal bone measurements from archaeological sites dating to the medieval and early modern periods in Britain has incrementally shed new light on spatial and temporal variation in the size and shape of domestic livestock. These studies have revealed increases in livestock size occurring from the 14th to the 19th centuries (Thomas, 2009, 138); however, the picture is complex. There is a great deal of regional variation, with outlying sites generally experiencing later developments than central localities (Davis and Beckett, 1999). Moreover, there is considerable variation in the timing of size changes, both within and between species; at some sites the changes occur over a short period of time, while at others it is a much more gradual affair. Taken together, this evidence adds weight to the view held by many economic historians (e.g. Allen, 1991, 1999; Beckett, 1990; Clark, 1999; Havinden, 1961; Jones, 1965; Kerridge, 1967; Thirsk, 1987) that innovations in agriculture and rising output and productivity occurred as part of a long-term and gradual process of agricultural change, with significant developments occurring in the 16th and 17th centuries, rather than as a singular revolution in the late 18th and early 19th century (e.g. Prothero, 1888, 1912; Overton, 1996). Progressive reviews of the zooarchaeological contribution to this debate are provided by Albarella and Davis (1996), Davis (1997), Davis and Beckett (1999), and Thomas (2005a, 2005b). Most recently, the identification of size increases in cattle, sheep, pig and domestic fowl, at the site of Dudley Castle, West Midlands, has raised the possibility that in some places these changes stemmed from agricultural, landscape and tenurial reorganisation in the wake of the Black Death (1348–1350) (Thomas, 2005a, 2005b). While this archaeological evidence has made an important contribution to current debates in agricultural history, there is an important gap in our knowledge: the nature and timing of livestock improvement in the sites supplying the most important centre for meat consumption in Britain in this period – London. The aim of this study is to fill this gap through the analysis of a large, un-synthesised dataset of animal bone measurements generated by Museum of London Archaeology. This permits the exploration of size and shape change in cattle, sheep, pig, and domestic hen in the period AD 1220–1900, within the city and its environs, making a major new contribution to livestock history. In doing so it satisfies two identified research objectives for the city of London – undertaking a “regional synthesis of breeding programmes” and “developing the potential of environmental data to inform us of…economic change” (Nixon et al., 2002) – and realise the potential of post-medieval animal bones

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in London, which have remained largely unexplored (Schofield, 2000, 2011). Furthermore, during the period encompassed by this study, animals were increasingly driven to London from all over the country; consequently, this study potentially provides a snapshot of livestock breeding practices beyond the immediate hinterland of the city.

2. Materials and methods

Since the early 1990s Museum of London Archaeology (MOLA; formally Museum of London Specialist Services and Museum of London Archaeological Service) has systematically recorded zooarchaeological data from developer-funded excavations in London in a single zoological database. Included amongst this dataset is an enormous archive of previously un-synthesised animal bone measurements taken using the standard set forth by von den Driesch (1976).

In this study, metrical data from 105 multi-period sites with contexts dating AD 1220–1900 (Fig. 1, Table 1) were analysed. To assist in the spatial analysis of these data five regional groupings were identified: Greater London (all sites outside the main conurbation of the medieval city, most situated along major medieval roads); Northern Suburbs (areas of Islington and Hackney); City (sites mainly within the city walls); Southwark; and Westminster. Throughout this time period London underwent dramatic change and urban development (Schofield, 2011); however, with the exception of the Greater London sites, the assemblages utilised in each period are from sites within an urban environment.

To facilitate the identification of temporal trends and accommodate the majority of the data, bone measurements were placed into eight overlapping phases (Table 1). Two sub-phases of phase A (A1: 1220–1300; A2: 1230–1350) and B (B1: 1340–1450; B2: 1400–1500) were also introduced to explore diachronic variation immediately before and after the Black Death. Broadly dated and unsecurely dated assemblages (indicated by the presence of residual pottery) were excluded from the analysis, under the presumption that bones and pots shared comparable taphonomic pathways. By using the pottery data to take into account residual deposits all mixed-dumping deposits were excluded. The majority of the assemblage, 78% (6211), comes from cut features with the reminder originating from undisturbed layers. Despite these precautions, the deeply stratified and complex nature of London's archaeology means it is impossible for any study to guarantee that no bones were redeposited. However, the use of only securely dated undisturbed contexts combined with the large sample size limits the effects of redeposition and justifies the use of legacy data and the production of synthetic analyses of metrical data.

Fig. 1. Location of sites within the medieval city of London and its local environs. The light grey hashed-line indicates the boundary used for the city. Points within the hashed-line are defined as being from the city. Points to the north represent Islington and Hackney; to the west Westminster and south of the river Thames Southwark.

Table 1
Phasing used in this study.

Phase	Dates
A	1220–1350
B	1340–1500
C	1450–1600
D	1550–1650
E	1600–1700
F	1650–1725
G	1700–1800
H	1800–1900

Data were included from cattle (*Bos taurus* L., 1758), sheep (*Ovis aries* L., 1758) and sheep/goat (*O. aries*/*Capra hircus* L., 1758), pigs (*Sus scrofa domesticus* Erxleben, 1777) and domestic hen (*Gallus gallus domesticus* L., 1758). Bones identified as goat were not included to reduce the influence of differences in the morphology between sheep and goats. It is conceivable that some goat bones were included in the sheep/goat category, but as sheep far outnumber those of goat throughout the period (Albarella, 1999), and because their bones were positively identified from assemblages at a ratio of 7:1, the biasing effect is considered negligible. Similarly, galliformes such as guinea fowl (*Numida meleagris* L., 1758), pheasant (*Phasianus colchicus* L., 1758) and black grouse (*Tetrao tetrix* L., 1758) are morphologically similar to domestic hen (Tomek and Bocheński, 2009). However, domestic hen was far more commonly identified – only six pheasant bones and no guinea fowl or black grouse were recorded for the period under scrutiny – so it is assumed that the majority of fowl bones derive from domestic hen. It is also worth noting that the discrimination of morphologically-similar taxa was achieved using the same methods and reference material by MOLA zooarchaeologists, if discrimination was not possible, elements were recorded under general categories (i.e. domestic hen sized); thus, the possibility of inter-observer inconsistency was minimised.

Not all bone measurements recorded in the database were used in this study; this partly reflects the infrequency of some measurements, but also their variable reliability. Only fused mammal and adult bird bones were included; furthermore, late-fusing epiphyses were preferred to minimise the effect of post-fusion growth in early fusing bones (Davis, 2000; Popkin et al., 2012). Where possible, dimensions in three anatomical planes (length, breadth and depth) for each bone were included, utilising the most abundant measurements available where there was the potential for more than one to be used. The anatomical elements selected depended on the potential usefulness of measurements likely to be taken. From the axial skeleton only horncores were included for analysis (greatest and least diameter of the horncore base, basal circumference, and length of the outer curvature of the horncore). The latter measurement was used to classify horncores into four size categories (after Sykes and Symmons, 2007). Maxillae, mandibles and pelves were excluded as measurements were not available in three planes and the best discriminators of sex (Greenfield, 2006) were not taken; unfortunately, virtually no tooth measurements were recorded in the database. With regards to the appendicular skeleton, scapulae were discounted because of the