CHAPTER 10

COMMERCIAL ARCHAEOLOGY, ZOOARCHAEOLOGY AND THE STUDY OF ROMANO-BRITISH TOWNS

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INTRODUCTION

This chapter will review the contribution that commercial zooarchaeology has made in advancing our knowledge of the exploitation of animals in Romano-British towns. It will highlight studies on sites excavated after 1990 but will also incorporate analyses that were carried out on assemblages from earlier excavations that were rescue- rather than research-orientated. It will first summarise the information available from the various towns involved and then discuss some of the major trends that have emerged from such studies. It will conclude with a critical evaluation of the impact of commercial zooarchaeology.

THE PUBLISHED SOURCES

BATH

There have been several developer-funded excavations in and around the Roman town but many of these remain unpublished. The most substantial published animal bone assemblage from post-1990 sites comes from excavations at the New Royal Baths. The assemblage produced around 500 identified mammal and bird bones (Higbee 2007) and a few fish bones (Humphrey and Jones 2007). These supplement animal bone evidence obtained from previous excavations in the city (e.g. Grant 1979; Barber 1999a).

BROUGH-ON-HUMBER

Excavations by the York Archaeological Trust at the extramural Welton Road site in 1994 produced a faunal assemblage of around 400 identified mammal and bird bones from later Roman contexts (Hamshaw-Thomas and Jaques 2000). This is the only assemblage of any size from the Roman town.

CANTERBURY

The only substantial Roman assemblage has come from Canterbury Castle (King 1982). This produced over 3,000 identified mammal bones. Developer-funded excavations of sites such as Whitefriars and 18 High Street have also produced good faunal assemblages but these have yet to be published.

CARLISLE

As in many towns, the most substantial assemblages of animal bones from Carlisle have come from English Heritage-funded excavations dating back to the 1970s. Faunal reports on many

of these have taken a long time to be published. Other analyses have never been published. Extensive excavation of the Lanes took place between 1978 and 1982. The South Lanes excavation report included a summary of the animal bone analysis (Stallibrass *et al.* 2000), which was supplemented a decade later by the digital publication of the more detailed reports originally written in the 1990s. Over 3,000 identified mammal (Stallibrass 2010) and nearly 100 bird bones were identified (Allison 2010). Sieved samples produced nearly 500 identified fish bones (Nicholson 2010).

However, excavations of the North Lanes remain unpublished and faunal analyses from several other sites exist only as unpublished Ancient Monuments Laboratory (AML) reports. Developer-funded excavations at Rickergate in 1998–9 produced very few Roman bones (Bates 2011). In contrast, excavations associated with the Carlisle Millennium Project produced over 5,100 identified mammal bones from the Roman timber and stone forts along with small numbers of bird and fish bones (Evans *et al.* 2009; Ingrem 2009).

CHESTER

Several small assemblages from pre-1990 excavations of sites in the *canabae* have recently been published (Ward *et al.* 2012). Ironically, a report on a larger assemblage compiled by Judith Cartledge in 1991 remains unpublished.

CHICHESTER

The history of faunal studies in Roman Chichester follows a familiar pattern. A large assemblage was accumulated from the 1978–1982 excavations of the extramural Cattlemarket site. The site produced over 10,500 mammal bones including substantial numbers of associated bone groups (Levitan 1989). Nearly 200 bird bones were also identified but there is no report on fish bones. Assemblages of less than 1,000 identified fragments have since been examined from other extramural sites at Market Road (Hamilton-Dyer 2004) and Rowe's Garage (Seager Smith *et al.* 2007).

CIRENCESTER

A substantial number of bones have been excavated from Cirencester, particularly from intramural sites. Over 800 bones from military levels and other early Roman deposits were identified by Thawley (1982a), who produced one of the earliest detailed studies of butchery practices. Thawley (1982b) also examined bones from cemetery sites that provided nearly 1,500 identified specimens. The Beeches excavations produced a total of 1,700 identified mammal bones from late Roman buildings (Levitan 1986; King 1986). Levitan also produced a detailed AML report on over 3,000 bones from other intramural excavations of the St Michael's site. This report remains unpublished, although some information can be found in other publications (Maltby 1998; 2010a). The largest assemblage from Cirencester comes from the Chester Street excavations, which produced nearly 3,500 identified mammal bones dominated by cattle butchery waste (Maltby 1998). This report also includes some information from assessments of smaller assemblages from developer-funded sites at Querns Road and Sheep Street. Assessments of animal bones from sites excavated between 1998 and 2007 were incorporated in Holbrook (2008). These included samples from the Stepstairs Lane and Trinity Road sites, both of which produced over 700 identified mammal bones (Hambleton 2008a).

COLCHESTER

Luff's monograph (1993) remains the largest detailed discussion of animal bones from the *colonia*. Over 35,000 mammal and nearly 4,000 bird bones from several intra- and extramural sites were identified. Locker (1992) identified over 350 fish bones from wet-sieved samples from the Culver Street site. Most recent investigations in Colchester have been watching-briefs or very limited excavations that have produced no significant assemblages. However, a major

exception is the assemblage from the excavations at 23–29 Head Street. This is comprised of over 1,700 identified mammal bones and elements (Curl 2004) and around 200 identified fish bones from sieved samples (Locker 2004). The assemblage includes some material from early military and Boudican levels.

DORCHESTER

The largest assemblage from the Roman town came from the Greyhound Yard excavations in 1981–4 (Woodward *et al.* 1993). These excavations to the south of the forum produced nearly 18,500 identified mammal and over 2,500 bird bones (Maltby 1993). Over 500 fish bones were also obtained from hand-collection (Hamilton-Dyer 1993a). Excavations in the north-west of Roman Dorchester at Colliton Park in 1988 produced nearly 1,500 mammal bones, a small number of bird bones and nearly 800 fish bones from sieved samples (Hamilton-Dyer 1993b). Analysis of 1,400 mammal and bird bones plus fish bones from selected sieved samples from the Dorchester Hospital site in the south-west quarter has been published as internet reports (Grimm 2008; Hamilton-Dyer 2008). Faunal assemblages have also been examined from the urban cemetery at Poundbury (Farwell and Molleson 1993) and from sites in the close vicinity of the town, such as Alington Avenue (Maltby 2002) and the Dorchester By-Pass (Bullock and Allen 1997). However, other assemblages from sites within Dorchester have not been fully analysed (Maltby 2010a, 255).

EXETER

Animal bones from several excavations in the 1970s were analysed in detail (Maltby 1979a). Over 6,000 fragments of mammal and nearly 500 bird bones were identified and compared from four main sites (Goldsmith Street; Trichay Street; St Mary Major; Rack Street). However, only a few fish bones were recovered by hand. Subsequently, although a number of excavations in the 1980s and 1990s produced Roman material, these have not been fully analysed and published. The bones from the early legionary fortress are currently being studied (Maltby in prep.). Excavations at the Princesshay site in 2005–6 have produced an important multi-period assemblage which is also currently being analysed (Coles in prep.).

GLOUCESTER

Animal bones from sites near the West, East and North gates were examined by Maltby (1979b; 1983). Together, these produced over 2,000 mammal and around 100 bird bones. Levine (1986) reported upon an assemblage of over 1,000 butchered cattle upper limb bones deposited in pits near the East gate. Animal bones from the London Road cemetery site have been examined by Worley (2008).

ILCHESTER

The main published sources for animal bones from Roman Ilchester are from sites excavated in the 1970s and 1980s. The first report includes the analysis of over 1,900 identified mammal bones from selected features on one intra- and two extramural sites and over 200 bird bones from a slightly broader range of features from the same sites (Levitan 1982). Assemblages from the Almhouse Lane and Limington Road sites produced over 1,000 further identified specimens (Levitan 1994). The Great Yard excavations produced a further 500 mammal and bird bones from hand-excavation (Barber 1999b) and 100 identified fish bones from sieved samples (Locker 1999a).

LEICESTER

Leicester has provided a number of important assemblages from both pre- and post-1990 developer-funded excavations. These include the 1980 and 1991 excavations of the Causeway

Lane site, from which over 7,200 mammal and over 450 bird bones were identified (Gidney 1999). Nearly 500 fish bones recovered by wet-sieving were also identified (Nicholson 1999). However, the report on the large assemblage from the 1988 Shires excavations, also examined by Gidney, remains unpublished. Some information from this and smaller assemblages from Leicester is summarised within Maltby (2010a, 260–300). Some information about more recently excavated assemblages has also been published (e.g. Baxter 2006; Score *et al.* 2010).

LINCOLN

Information from Lincoln relies principally on later Roman assemblages from the suburbs (Dobney *et al.* 1996). They provided detailed analyses of over 6,500 mammal and 200 bird bones. Over 300 fish bones plus large numbers from a fish sauce-processing deposit on the Waterfront site were also examined. Over 2,600 identified mammal and over 100 bird bones from excavations of the Roman defences in the lower city were analysed by Scott (1999). Analyses of bones from recent developer-funded excavations at the Bishop's Palace site have yet to be published (Allen pers. comm.).

LONDON AND SOUTHWARK

As has been discussed elsewhere in this volume, London has had significantly more developer-funded excavations than any other Romano-British town. Space precludes consideration of all these sites but some of the most significant assemblages will be noted. Some early studies highlighted the large accumulations of cattle-processing waste, for example on the Walbrook site (Clutton-Brock and Armitage 1977). Assemblages from post-1990 excavations have been summarised in many of the Museum of London Archaeology (MoLA) monograph reports, although in many cases, full details are confined to unpublished archives. For example, excavations in Cannon Street produced over 650 identified mammal bones with unusually high percentages of pig but the published animal bone report is under two pages long (Pipe 2002). However, in some recent volumes, for example the one concerned with the 1 Poultry site, discussions of significant groups of animal bones have been successfully integrated within period narratives and full details for the bones can be found on CDs or via internet sources (Pipe 2011). This site produced over 4,000 identified animal bones, including substantial numbers from sieved samples.

In addition, excavations south of the Thames in Southwark have also produced several large Roman assemblages. The first of these came from the 199 Borough High Street excavations, which produced nearly 3,000 identified mammal and over 100 bird bones (Locker 1988). Ainsley (2002) identified over 5,000 bones from sites excavated in advance of the Jubilee Line extensions (1991–8). Excavations from the high-status site at Winchester Palace produced an assemblage of over 900 mammal and fish bones (Reilly 2005). Selected assemblages totalling over 5,800 bones from sites excavated between 1973 and 1991 are discussed in Liddle *et al.* (2009). Further information about some of these bones is embedded within the site narrative.

Excavations of cemeteries in Roman London have also produced faunal assemblages. The largest was obtained from the Eastern Cemetery (Reilly 2000). Animal bones have also been analysed from cemeteries in Southwark (Ridgeway *et al.* 2013).

ST ALBANS

The main source of animal bone evidence emanates from excavations of the high-status burial and temple ceremonial site at Folly Lane, which produced over 3,600 identified mammal and bird bones and over 100 fish bones (Locker 1999b). Bones from excavation of Insula XIII in the late 1980s have also been published (Turner 2006), providing a further 1,700 identified mammal and bird bones.

WINCHESTER

The main published report of Winchester animal bones incorporates analyses of bones from

extramural sites subjected to rescue excavations in the 1970s and 1980s. These produced over 18,000 identified mammal and 500 bird bones, mainly from the Northern Suburb (Maltby 2010a). In addition to detailed discussion about these assemblages, the monograph compares evidence from rural sites in the town's hinterland and provides a review of assemblages from other major Romano-British towns (Maltby 2010a, 255–304). However, only a small sample of fish bones was studied and the nature of the deposits limited detailed analysis of chronological trends.

Published information about intramural assemblages is more limited. The Staple Gardens excavations produced over 1,400 mammal bones (Maltby 2010a, 262) but research excavations from intramural sites remain unpublished. However, developer-funded excavations of other intramural sites have produced an assemblage of over 1,700 identified mammal and bird bones (Strid 2011). Nearly 100 identified fish bones were also recovered by wet-sieving (Nicholson 2011). In addition, recent excavations of the Lankhills cemetery have produced animal bones from some graves (Strid and Worley 2010; Worley 2010). These supplement evidence from previous excavations of that cemetery (Brothwell 1979; Harcourt 1979). Animal bones have also been found in graves from other cemeteries in Winchester (e.g. Ottaway *et al.* 2012).

YORK

The assemblage from Tanner Row (O'Connor 1988) remains the only substantial bone assemblage studied from the legionary fortress and *colonia*. It included over 7,700 identified mammal and nearly 600 bird bones collected by hand. A further 260 bird and 700 fish bones were identified in sieved samples. There has since been limited publication of faunal assemblages. Excavations at York Minster produced an early post-Roman assemblage of around 1,000 mammal fragments from the abandoned basilica (Rackham 1995; Gerrard 2007). Assemblages from excavations of an extensive Roman cemetery to the south of the *colonia* have been made available digitally (Foster 2012; Foster and Jacques 2012). Together, they provide a sample of nearly 600 bones. Ottaway (2013) includes evidence from sites in York in the discussion of animal exploitation in Roman Yorkshire.

THE EXPLOITATION OF DOMESTIC MAMMALS

CATTLE

King (1978) was the first to recognise the primacy of cattle bones in most Romano-British urban assemblages. Subsequent surveys have reached the same conclusions (e.g. King 1984; 1999; Grant 1989; 2004; Maltby 2010a). In 59 assemblages containing over 200 specimens from 15 towns, cattle contributed the largest number of identified specimens in 49 samples. They provided over 40 per cent of the specimens of cattle, sheep/goat and pig in 46 of the assemblages, and over 50 per cent in 30 of these. In 12 cases cattle provided over 70 per cent (Maltby 2010a, 264–5). Analyses of several large assemblages from post-1990 excavations have supported these observations. Cattle provided 71 per cent of the cattle, sheep/goat and pig specimens from Southwark sites (Liddle *et al.* 2009) and 77 per cent of these species in the 1 Poultry assemblage from London (Pipe 2011). The South Lanes, Carlisle, assemblage included 55 per cent cattle (Stallibrass 2010) and the material from the Carlisle forts excavated during the Millennium Project produced 75 per cent cattle (Evans *et al.* 2009). Cattle fragments also dominated smaller assemblages from extramural sites in Chichester (78 per cent at Rowe's Garage; Seager Smith *et al.* 2007) and Cirencester (79 per cent at Trinity Road; Hambleton 2008a, 104).

However, Romano-British urban assemblages display substantial amounts of variation in species percentages (Grant 2004; Maltby 2010a, 265). Examples from some London and Southwark sites are shown in Table 1. Percentages of cattle range between 32 and 93 per cent. Similar diversity has been encountered in some other towns (Maltby 2010a, 264–5). It has been commonly observed that cattle bones become relatively more common in later Romano-British assemblages, implying greater reliance on beef (e.g. King 1999). However, comparisons of urban

assemblages show a more complex picture. Cattle only increased in later Roman deposits in 17 out of 28 sites from 13 towns surveyed by Maltby (2010a, 265–7). Diachronic variability can be inconsistent within towns. In Winchester, for example, cattle increased from 39 to 46 per cent in later Roman deposits from Staple Gardens (Maltby 2010a, 267) and from 35 to 49 per cent at Northgate House (Strid 2011), but decreased from 63 to 52 per cent in some assemblages from the Northern Suburb (Maltby 2010a, 267). At 1 Poultry, London, cattle were well represented in all periods, with relatively minor fluctuations in their percentages (Table 2). In contrast, in

TABLE 1. PERCENTAGES OF CATTLE, SHEEP/GOAT AND PIG FROM EXCAVATIONS IN ROMAN LONDON AND SOUTHWARK

	% Cow	% S/G	% Pig	NISP	%Pig/ S/G + Pig	Source
London						
Cannon Street	42	15	43	521	75	Pipe 2002
39 Newgate	54	31	15	157	33	Liddle 2006
Billingsgate	57	14	29	2224	67	Armitage 1980
Baltic House	61	11	19	340	73	Reilly 2002
Eastern Cemetery (D+F)	77	13	10	649	42	Reilly 2000
1 Poultry	77	10	13	2708	56	Pipe 2011
Walbrook	93	5	2	968	29	Clutton Brock and Armitage 1977
Amphitheatre	93	3	4	1102	67	Liddle 2008
Southwark						
Winchester Palace	32	15	53	498	78	Reilly 2005
199 Borough High Street	48	25	27	2970	52	Locker 1988
London Bridge	59	15	27	1076	65	Ainsley 2002
1973–91 sites	71	12	17	4894	57	Liddle *et al.* 2009
Borough High Street	83	6	11	3557	64	Ainsley 2002

NISP = number of individual specimens from hand-collected samples

TABLE 2. PERCENTAGES OF CATTLE, SHEEP/GOAT AND PIG FROM 1 POULTRY, LONDON

	% Cow	% S/G	% Pig	NISP	%Pig/ S/G + Pig
Period 2: A.D. 48–65	73	13	14	292	53
Period 3: A.D. 65–95	72	12	16	374	58
Period 4: A.D. 95–135	81	8	11	1181	58
Period 5: A.D. 135–220	80	8	11	239	57
Period 6: A.D. 220–400	70	14	16	467	53
Period 7: late fourth century	77	12	10	155	46

Data adapted from Pipe 2011

TABLE 3. PERCENTAGES OF CATTLE, SHEEP/GOAT AND PIG FROM 1973–91 SITES, SOUTHWARK

	% Cow	% S/G	% Pig	NISP	%Pig/ S/G + Pig
Period 3: A.D. 50–70	54	22	24	196	52
Period 4: A.D. 70–100	28	45	27	311	37
Period 6: A.D. 120–160	59	17	24	1286	59
Period 8: A.D. 200–270	31	18	51	281	74
Period 9: A.D. 270–350	66	15	19	303	57
Period 10: A.D. 350+	89	5	6	2534	59

Data adapted from Liddle et al. 2009

assemblages from Southwark 1973–91 sites, cattle percentages varied between 28 and 89 per cent with no consistent chronological trend (Table 3).

Liddle *et al.* (2009) point out that the highest percentages of cattle on the Southwark sites were associated with large dumps of bones from specialist processing. This is a phenomenon that has been noted in many towns. Examples from 39 sites are listed by Maltby (2010a, 286). Further examples have been recorded at several sites in Southwark (Liddle *et al.* 2009, 111, 247), at the 1 Poultry and Guildhall (Amphitheatre) sites in London (Pipe 2011, 320; Liddle 2008), Castle Street, Leicester (Score *et al.* 2010), Rowe's Garage, Chichester (Seager Smith *et al.* 2007, 77), Insula XIII in St Albans (Turner 2006), and Trinity Road, Cirencester (Hambleton 2008a, 104).

The correlation between high cattle percentages and specialist processing waste is linked to evidence that urban butchers carried out systematic, large-scale cattle carcase processing. There is remarkable consistency in the types of butchery marks and fragmentation patterns associated with carcase processing in the towns and on other military and civilian sites where these specialists operated. This involved the increased use of cleavers to speed up processing (Seetah 2006). Maltby (2007) described the main types of processing marks characteristic of specialist processing. These include scoop marks on the shafts of upper limb bones made with the tip of a cleaver during filleting; longitudinally-split upper limb bones; chopped femora heads; trimmed scapulae sometimes with perforations on the blade made during hanging; and mandibles with chops on the posterior/lateral border of the ramus. Maltby (2010a, 284) listed 36 sites from 15 Romano-British towns where one or more of these criteria had been reported. Much of this evidence was assembled from developer-funded or other rescue excavations. Further examples can now be added. A group of perforated and trimmed cattle scapulae were deposited in a cesspit at the Guildhall site in Leicester (Score *et al.* 2010, 85). The scapulae had been hung during processing and then had meat filleted from them. This evidence enhances previous insightful discussions of this process based on evidence from York and Lincoln (O'Connor 1988; Dobney *et al.* 1996). Hambleton (2008a) recorded the presence of longitudinally-split upper limb bones and specimens with filleting scoops in further samples from Cirencester. Similar marks were observed in the large dumps of cattle bones from 1 Poultry, London (Pipe 2011, 320). Strid (2011) also observed longitudinally-split, upper limb bones at Northgate House, Winchester. Large accumulations of such split bones have been found on several urban sites (and occasionally at other settlements), suggesting that these bones were sometimes processed in bulk for marrow and, in some cases, additionally for bone-working (Maltby 2010a, 285). The origin of these new practices probably lies with military butchers. Early examples were recorded in military levels at Cirencester (Thawley 1982a) and they have also been observed in deposits from the Exeter legionary fortress (Matlby in prep.). Later examples of perforated scapulae from military contexts have been recovered from Carlisle (Evans *et al.* 2009, 914).

Cattle mortality profiles have been constructed in a large number of urban assemblages. Analyses of mandibular tooth ageing from 12 towns showed a focus towards the acquisition of adult, but not elderly, cattle (Maltby 2010a, 287–9). Following Grant's (1982) methodology, usually over half of

the cattle represented had mandibles wear stages (MWS) of between 36 and 45, with peaks often around 41–44. Similar peaks have now also been observed in assemblages from the Guildhall and 1 Poultry sites in London (Liddle 2008; Pipe 2011), Northgate House, Winchester (Strid 2011), and South Lanes, Carlisle (Stallibrass 2010). This indicates that most cattle were slaughtered between four and ten years old, with a peak perhaps between five and seven years (Jones and Sadler 2012). Therefore the provision of mature beef was prioritised, although many of the older animals may have produced calves, and provided milk and/or traction power prior to slaughter.

Towns where cattle mandibles have been obtained from more than one site do show some variability. For example, the assemblage from Northgate House, Winchester, has higher percentages of mandibles of cattle killed in their second and third years (MWS 21–30 = 15%) than assemblages from the Northern Suburb (6%) (Strid 2011). Mandibles (and other bones) of young calves are poorly represented in most samples but provided between 6 and 12 per cent of the specimens from intramural sites in Caerwent, Dorchester and Silchester (Maltby 2010a, 288). This could imply that veal consumption (or at least the deposition of calf bones) was more prevalent in the central areas of these towns. In contrast, assemblages derived from large-scale processing are largely comprised of adults, providing further evidence that specialist butchers were very influential in the acquisition of cattle for slaughter in the towns.

Metrical analyses of metacarpals from Romano-British towns have indicated that most are gracile specimens that probably belonged to cows rather than oxen or bulls. If that interpretation is correct, the majority of the adult cattle represented in urban assemblages are cows (Maltby 2010a, 288–9). Published examples supporting the bias towards smaller (female) specimens include Carlisle (Stallibrass 2010), Chichester (Levitan 1989), Cirencester (Maltby 1998), Colchester (Luff 1993), Dorchester (Maltby 1993), Exeter (Maltby 1979a), Leicester (Gidney 1999), Lincoln (Dobney *et al.* 1996), London (Liddle 2008), Winchester (Maltby 2010a), and York (O'Connor 1988). The dominance of cows in the large accumulations of butchery waste suggests that cattle of specific age and sex were targeted by urban butchers.

Urban assemblages have produced substantial amounts of metrical data that have made significant contributions to surveys of changes and variations in cattle stature in Roman Britain. Albarella *et al.* (2008) have shown that some Romano-British cattle were substantially larger than their Iron Age counterparts. They have argued convincingly from evidence from South-East England, including Colchester, that new stock were introduced from the Continent during the Roman period.

Maltby (2010a, 292–3) used evidence from towns to argue that there were regional variations in the average size of cattle in Roman Britain. Most sites that have produced evidence for larger cattle are located in the South-East and the Midlands. Assemblages from Wales and Western England, including Dorchester (Maltby 1993) and Exeter (Maltby 1979), show little improvement in cattle size during the Roman period.

SHEEP AND GOATS

Observations of morphometric variations, sometimes supported by metrical analysis, have demonstrated that the vast majority of sheep/goat bones found on Roman urban sites belonged to sheep. In 23 assemblages where this has been quantified, goats have never provided more than 10 per cent of the elements assigned specifically to sheep or goat. In 15 of these samples, this figure fell below 5 per cent (Maltby 2010a, 268). Recent studies have supported this observation. Only 6 per cent of the 158 diagnostic sheep and goat bones from Southwark were identified as goat (Liddle *et al.* 2009). In the hand-collected assemblage from 1 Poultry, London this figure rose to 8 per cent (Pipe 2011). In the sample of 201 bones from the South Lanes, Carlisle, only 1 per cent belonged to goat (Stallibrass 2010).

The sheep's dominance in many Iron Age assemblages has been well documented (Albarella 2007; Hambleton 2008b) and it is arguably the emergence of towns and the need to provision them with meat that was one of the major factors that ended this dominance with cattle becoming more important. Sheep/goat bones are generally less well represented in urban assemblages than on rural sites (King 1984; 1999). As discussed above, they are outnumbered by cattle in most

assemblages quantified by NISP counts. There are some regional variations. Sheep/goat, for example, are well represented in all the assemblages examined from Dorchester, particularly in early Roman deposits (Maltby 1993; 2010a, 266; Grimm 2008). They also outnumbered cattle in all but the late Roman deposits at Canterbury Castle (King 1982). Counts based on minimum number estimates more often have sheep/goat as the most common species even where NISP counts heavily favour cattle, for example in the Winchester Suburbs (Maltby 2010a, 102). However, when carcase weights are taken into account, beef rather than lamb and mutton comfortably accounts for most of the meat that was consumed in towns.

There is more variability in sheep/goat mortality data than encountered for cattle, which perhaps indicates that there was less control over their acquisition and marketing. In 19 samples from 14 towns (Maltby 2010a, 290), the percentage of mandibles from adults (third molar in wear) ranged between 18 and 75 per cent with a median value of 55 per cent. In a sample of 91 mandibles from Southwark sites, 36 per cent belonged to adults (Liddle *et al.* 2009), and 58 per cent of the mandibles from 1 Poultry, London were also from adults (Pipe 2011). Although relatively few mandibles were from elderly sheep, it does suggest that wool as well as meat production may have been an important consideration. On some sites the percentage of adult sheep increased in the later Roman period, indicating that wool production was becoming more important. However, more research is required to confirm this was a widespread trend.

Sub-adult sheep with two molars in wear (mainly one and two years old) provided between 7 and 34 per cent (median 22 per cent) of the assemblages reviewed by Maltby (2010a, 289–90). These represent animals culled when they were nearing their full size. Sites which have particularly high peaks of slaughter of sub-adult sheep include South Lanes, Carlisle (Stallibrass 2010, 153), Greyhound Yard, Dorchester (Maltby 1993), Causeway Lane, Leicester (Gidney 1999), East Gate, Gloucester (Maltby 1983), and several sites in Winchester (Maltby 2010a, 290; Strid 2011). Their presence in substantial numbers indicates that meat production for the urban market was a priority in sheep husbandry.

Mandibles of immature sheep (only the first molar in wear), mainly representing animals killed between six and twelve months old, have been found in variable quantities. They provided no more than 6 per cent of the jaws in 10 of the 19 samples compared by Maltby (2010a, 290) but over 25 per cent in five other cases. Mandibles of neonatal or juvenile lambs under three months old formed less than 10 per cent of the total in ten of these samples but over 20 per cent in some others. High percentages of young lambs have also been encountered in Southwark (Liddle *et al.* 2009). Although, some variability may be due to differential preservation, high percentages of lambs have tended to be found on sites near the centres of towns. Examples include Canterbury Castle (King 1982), Colchester (Luff 1993), Silchester (Grant 2000), and Tanner Row, York (O'Connor 1988). Liddle *et al.* (2009) and Gidney (2000) are amongst those who have suggested that lamb may have been a luxury or expensive meat, which was consumed more frequently by those of high status and/or wealth.

Butchery analyses on sheep/goat (and pig) bones have revealed less systematic processing than observed on cattle, although there are some common patterns, including the increased use of cleavers and heavy blades compared with Iron Age and some Roman rural assemblages (Maltby 2010a, 165–76). Waste associated with large-scale or repetitive processing by specialists has also been reported much less frequently, although there are some significant accumulations of mandibles in Southwark, for example (Liddle *et al* 2009). Although many sheep would have been processed by urban butchers, others may have been acquired by individual households and butchered within their properties.

Much of the evidence regarding the stature of sheep in Roman Britain is derived from urban assemblages. Again, there is evidence for the introduction of new stock at the beginning of the period (Albarella *et al.* 2008). Hornless sheep became more common in the Roman period and have been identified in several early Romano-British urban assemblages including Staple Gardens, Winchester (Maltby 2010a). These may originally have been some of the new imported stock. Several authors have commented upon regional variations, noting that sheep in the South-West and West of Britain were generally slightly smaller than those in the Midlands and the South-East (e.g. Maltby 1981; 2010a, 294–5; O'Connor 1988, 97).

PIG

One of the main dietary changes during the Romano-British period was the increase in pork consumption by some members of the community. In most Iron Age assemblages pig bones are much less well represented than sheep/goat and cattle and sometimes even rank behind horse (Albarella 2007; Hambleton 2008b). They are generally better represented on French Iron Age sites and it was probably influence from the Continent that saw pigs become a more frequent dietary resource, as witnessed in some Late Iron Age assemblages in South-East England such as Braughing and Silchester (Ashdown and Evans 1981; Grant 2000). Pig bones are generally more common on Roman sites but their relative abundance has varied in different regions and on different types of settlement. King (1984; 1999) demonstrated that pigs tended to be found more commonly on large military sites and major towns. He argued that this reflected dietary preferences of the soldiers and urban inhabitants, many of whom may have been immigrants, as has been demonstrated by several subsequent isotopic studies of people buried in urban cemeteries (e.g. Evans *et al.* 2006; Chenery *et al.* 2010).

In 59 urban assemblages surveyed by Maltby (2010a, 264–5), pigs provided between 0 and 53 per cent of the cattle, sheep/goat and pig elements, with a median value of 17 per cent. Removing the bias created by large accumulations of cattle butchery waste, pig provided between 11 and 83 per cent of the sheep/goat and pig elements, with a median of 40 per cent. Pig outnumbered sheep/goat in only 17 of the samples. Particularly high percentages of pigs were found on the high-status sites of Winchester Palace, Southwark and Baltic House, London (Table 1). However, pigs have higher than average percentages on most sites from London (Tables 1–3). They were also very well represented in most assemblages from Colchester (Luff 1993; Curl 2004). This pattern is not universal. In Leicester, for example, sheep/goat elements outnumbered pig on all six sites reviewed by Maltby (2010a, 264). In Winchester, pig elements have never contributed more than 38 per cent of the sheep/goat and pig assemblages from nine sites (Maltby 2010a, 265; Strid 2011).

Pigs have tended to be better represented in intramural assemblages, particularly basilica sites, than in assemblages from the suburbs. Examples include Exeter and Caerwent (Maltby 1979a; 2010a, 264). They are sometimes better represented in later Roman deposits, although the Silchester Basilica site is a notable exception (Grant 2000).

The increase in the abundance of pigs in towns, particularly in regions where they were poorly represented in the Iron Age, begs the question of where they were obtained. One possibility is that some pigs were raised in the towns themselves. This could explain the presence of significant numbers of neonatal mortalities on several urban sites (Maltby 2010a, 291). The discovery of pig slurry in Roman Leicester (Morris *et al.* 2011, 29) could also be evidence for urban pig-keeping. On the other hand, the deposition of large numbers of pig foot bones at Nazeingbury, Essex (Huggins 1978), probably represents waste from the preparation of pig carcasses, possibly by immersion in brine. The salted joints could have been sent to Colchester, London or St Albans. The increase in salt production in the Late Iron Age and particularly in the early Roman period in Essex, Kent and Dorset coincided with urban growth and greater demands for beef and pork. Much of the pork consumed in these towns could have been imported as smoked and/or salted products. Pig bones deposited in Dorchester and Winchester were more diverse in size than those from rural settlements in their hinterland such as Owslebury, which implies that towns were supplied from a variety of sources (Maltby 2010a, 202–3). In some urban samples, there is a bias towards male pigs, which could also indicate preferential selection of larger males (Grant 2004, 379).

It is also plausible that some of the very young piglets found in some towns could have been suckling pigs, which may have been regarded as a luxury food. This would perhaps explain their greater frequency on sites near the centres of some towns (Maltby 2010a, 197). However, in most urban assemblages, juvenile pigs were outnumbered by those killed in their second and third years (e.g. Liddle *et al.* 2009, 247; Maltby 2010a, 291; Stallibrass 2010, 156).

EQUIDS

Nearly all bone reports from Romano-British towns have assumed that all the equid bones

belonged to horse. This may well have been the case but there have been occasional identifications of mule, for example at Billingsgate Buildings, London (Armitage and Chapman 1979; Johnstone 2005). A humerus from 1 Poultry, London was small enough to have perhaps been from a donkey (Pipe 2011, 321). Horses are generally poorly represented on urban sites, particularly in intramural assemblages. Horse provided over 5 per cent of the total horse and cattle elements in only 16 of the 59 assemblages reviewed by Maltby (2010a, 269–70). Horse percentages were of course often depressed in assemblages dominated by large deposits of cattle butchery waste, but they were also poorly represented in samples where such butchery waste was not prevalent. Although horse bones quite frequently bear evidence of butchery, they were not a species that was routinely or intensively consumed for meat and they were therefore infrequently represented amongst food waste. Most horses lived to maturity and were exploited for riding and as pack animals. Horses are often better represented on suburban sites, often in areas which were used as cemeteries. Examples include Winchester (Maltby 2010a), the Eastern Cemetery and Baltic House sites in London (Reilly 2000; 2002), Folly Lane, St Albans (Locker 1999b), and Driffield Terrace, York (Foster 2012; Foster and Jacques 2012). Reasons why horse bones are found in greater numbers in these areas remain to be established. They rarely survive as articulated remains, suggesting that they were not formally buried.

THE EXPLOITATION OF WILD MAMMALS

Wild mammal bones form only very small proportions of most Romano-British urban assemblages. Red and roe deer each formed less than 1 per cent of the total of cattle, sheep/goat, pig and deer in 53 of the 59 sites surveyed by Maltby (2010a, 271). The highest percentages of both species were found at the high-status site of Winchester Palace, Southwark (Reilly 2005), and even there they each formed less than 4 per cent of the total. They were also both quite well represented on another high-status site at Baltic House, London (Reilly 2002). Several sites in Colchester (Luff 1993; Curl 2004) have also produced quite high percentages of deer bones, indicating that venison was consumed slightly more regularly in that *colonia*. Red deer provided 2.5 per cent of the total of cattle, sheep/goat, pig and red deer fragments from the military forts at Carlisle, but in this case 80 per cent of the fragments belonged to antler, presumably imported for working (Evans *et al.* 2009, 917). All of the additional samples considered in this chapter have produced less than 1 per cent red and roe deer.

Fallow deer bones have been very rarely recorded on Romano-British settlements but their presence has now been confirmed on several high-status sites, most notably at Fishbourne Palace (Sykes 2010). A fallow deer bone has been identified from the 1 Poultry site in London (Pipe 2011, 362) but fallow deer was absent from virtually all the sites reviewed by Maltby (2010a).

Hare bones have also only been found in very small numbers. Although this could be partly attributed to their small bones being overlooked during normal excavation, they have also been recovered only rarely in sieved samples (Maltby 2010a, 271). Again, the high-status site at Winchester Palace, Southwark (Reilly 2005) is the only urban site that has produced significant percentages of hare (6.6 per cent of total cattle, sheep/goat, pig and hare). Curl (2004) has suggested that the occasional occurrence of rabbit bones in sealed deposits, such as at 29–39 Head Street in Colchester, may not always be the result of modern intrusions and it is possible that rabbits, like fallow deer, might have been imported in small numbers into the province during the Roman period.

Bones of other wild mammals have occasionally been recovered. Wild boar has been positively identified in Exeter (Maltby 1979a), Lincoln (Scott 1999) and York (O'Connor 1988). However, most authors have stated or assumed that most, if not all, of the suid bones were too small to be from wild boar. Bones of fox, badger and otter have also occasionally been found but there is no clear evidence that they were exploited for their meat or pelts. Bear bones have been recorded in Colchester (Luff 1993; Curl 2004) and London/Southwark. Bears could have been displayed or fought in amphitheatres. Unfortunately the humerus provisionally identified as a brown bear from the London Amphitheatre (Bateman 1997, 58) has since been mislaid (Bateman *et al.* 2008). A cetacean bone was found on the Winchester Palace site (Reilly 2005). The consumption

of dolphin or porpoise would be a further indication of greater dietary diversity on this high-status site. Bearskins could also have been imported.

Developer-funded excavations have confirmed that black rat was introduced to Britain in the Roman period. They have been found in small numbers in several towns. Recent discoveries include specimens from Dorchester (Grimm 2008) and Winchester (Strid 2011).

BIRDS AND FISH

POULTRY

Chickens (domestic fowl) appear to have been the only poultry species kept and exploited in substantial numbers in Roman Britain. They usually form more than half of the identified bird bones on urban sites (Maltby 2010a, 272–7). Although introduced to Britain in the Iron Age, they have been found infrequently on Iron Age sites, and mainly in Late Iron Age assemblages (Hambleton 2008b; Poole 2010). Sykes (2012) has argued that they may originally have been introduced for purposes other than food. They were eaten in the Roman period, as indicated by the presence of butchered bones, but their frequency is variable. Maltby (1997) demonstrated that chicken bones occurred more frequently on urban and military sites than on rural settlements, suggesting that this reflected variations in the dietary and cultural preferences of their inhabitants. Chickens provided between 0 and 69 per cent of the sheep/goat, pig and chicken bones in 48 urban and suburban assemblages (Maltby 2010a, 276), with a median of 7.5 per cent. These results excluded bones from sieved samples, in which percentages of chickens have tended to be higher. The highest percentage of chicken bones came from the London Mithraeum (Macready and Siddell 1998), probably reflecting ritual deposition of chickens. Additional to the sites listed in Maltby (2010a), chicken provided only 3 per cent of the sheep/goat, pig and chicken bones from South Lanes, Carlisle (Stallibrass 2010). In contrast, chickens provided 21 per cent of the sample from the Dorchester Hospital site — a significantly higher percentage than in the Greyhound Yard assemblage in the town (12 per cent). However, many of the chicken bones were associated with one early Roman building (Grimm 2008). Similar intra-site variations in chicken abundance have been observed in other towns. In several cases, chickens formed smaller proportions of suburban assemblages than more central sites (Maltby 2010a, 273).

Medullary bone has been recorded in chicken bones on several Romano-British urban sites, indicating that hens that had been in lay were present (Maltby 2010a). Unhatched eggshells from Dorchester and London indicate that chicken eggs were eaten (Sidell 2008).

There has been some debate about whether domesticated ducks and geese were kept in Roman Britain (Albarella 2005). Bones of grey lag/domestic goose and mallard/domestic duck occur regularly but usually in small numbers in Romano-British towns. Ducks tend to be slightly better represented than geese (Maltby 2010a, 273). The discovery of a hatched goose egg from Dorchester suggests that domestic geese were kept there (Sidell 2008).

Bones of pigeon/doves form a very small percentage of bird bones in most urban assemblages. They have, however, been found in quite large numbers on sites in central Dorchester and Caerwent and it is possible that these assemblages could have included domestic birds (Maltby 2010a, 226).

WILD BIRDS

Reviews of avian species found in Roman Britain can be found in Parker (1988) and within Yalden and Albarella (2009). Species identified in urban assemblages have also been listed by Maltby (2010a, 278–9). These reviews include material obtained from developer-funded sites. Readers are referred to these works for more detailed discussions. Generally, evidence for wildfowling is sparse and none of the species provided more than occasional supplements to the diet. Several species of geese and duck have been identified, although identifications are handicapped by the close skeletal similarities of some species. Teal is the most common duck species but it has occurred in significant numbers only in the Basilica assemblage from Caerwent

(Maltby 2010a, 273–4). Medium-sized ducks (e.g. wigeon/pochard) are quite prevalent in bird bone assemblages from Dorchester (Maltby 1993; Grimm 2008). Barnacle geese have been identified in at least four towns including Carlisle (Maltby 2010a, 278; Allison 2010). Swans have been recorded in very small numbers in at least six towns (Maltby 2010a, 274–5). Woodcock is the most frequently recorded wader species, occurring in 29 sites surveyed by Maltby (2010, 273–5) and forming on average about 2 per cent of the avian assemblages. They tend to be most abundant on basilica and other sites near town centres (e.g. Dorchester, Caerwent, Wroxeter and Exeter). Other waders found in several towns include crane, curlew and snipe (Curl 2004; Liddle *et al.* 2009; Maltby 2010a, 278; Pipe 2011). Black grouse has been identified in York and Carlisle (O'Connor 1988, 101; Allison 2010). Other gamebird species that have occurred in more than one town include golden and grey plover, lapwing, woodpigeon and partridge (Maltby 2010a, 279; Grimm 2008; Liddle *et al.* 2009). Finds of seabirds are extremely rare but cormorant has recently been identified in Winchester (Strid 2011). The discovery of species of the thrush family and smaller passerines is largely dependent upon whether sieving has been carried out. Birds of prey and several corvid species have also been found in most towns and will be discussed below.

FISH

Locker (2007) produced a comprehensive review of fish bones in Roman Britain and readers are referred to her work for a more detailed discussion. Maltby (2010a, 280–2) has also listed finds from most of the urban assemblages excavated prior to 2005. Recent publications of fish bones from wet-sieved assemblages from developer-funded sites have significantly enhanced the evidence from London and Southwark (e.g. Liddle 2006; Liddle *et al.* 2009; Pipe 2011), Carlisle (Nicholson 2010), Dorchester (Hamilton-Dyer 2008), and Winchester (Nicholson 2011).

The general impression gained from these surveys is that fish consumption increased in Roman Britain, perhaps particularly in towns, from very low or non-existent levels on most Iron Age settlements in southern Britain (Dobney and Ervynck 2007). However, isotope analysis suggests that consumption of marine foods did not form a very significant portion of the diet of most townsfolk (Redfern *et al.* 2010). Locker (2007) demonstrated that there were regional variations in the types of fish consumed, based on the local availability. For example, sea bream and bass are quite common in assemblages from towns near the English Channel such as Dorchester (Hamilton-Dyer 1993a; 1993b), whereas cod and other gadids have been found more frequently in London and Southwark (Locker 2007; Liddle *et al.* 2009; Pipe 2011). Eel, herring and plaice/flounder occur quite commonly in sieved assemblages from several towns. Cyprinids (carp family) have also been found in significant numbers in some assemblages, indicating that urban fish supplies were obtained from local rivers as well as estuaries and inshore waters. Evidence for the importation or production of *allec* and other fermented fish products has been found in London, York, Lincoln and Dorchester. These deposits consist of thousands of bones of small fish, including herrings, sprats and sandeels. Again, the exact composition of fish is likely to have been determined by what was locally available (Hamilton-Dyer 2008).

NON-FOOD DEPOSITIONS OF ANIMALS

ANIMALS IN CEMETERIES

Developer-funded excavations have been carried out in cemetery areas of several towns (Pearce, this volume, Ch. 8). Most have produced examples of the deposition of animals in some human graves. The most substantial assemblage has been obtained from the Eastern Cemetery, London (Reilly 2000), but other examples have been found in recent excavations in Winchester (Strid and Worley 2010; Worley 2010), Gloucester (Worley 2008), York (Foster 2012; Foster and Jacques 2012), and Southwark (Ridgeway *et al.* 2013). Animal depositions vary but chickens, dogs and pigs are the most common depositions, representing gifts of food or companionship for the dead. A full survey of such depositions would be beneficial.

ASSOCIATED BONE GROUPS (ABGs)

There has been a lot of discussion about ABGs that have been discovered in large numbers in some Roman towns, particularly in pits and wells. There have been convincing arguments that many of them represent ritual depositions, particularly when multiple burials are found, sometimes associated with complete pottery vessels and other unusual finds (Fulford 2001; Woodward and Woodward 2004). However, there has been a tendency to oversimplify interpretations and not take into account variations in the nature of the ABGs (e.g. context; species; completeness; state of articulation; age; gnawing; weathering; butchery) and other bones found in the same features are sometimes overlooked in interpretations (Maltby 2010b; Morris 2010; 2011). Not all depositions are the same and other interpretations of ABGs cannot be ruled out in some cases (e.g. natural mortalities; population control; butchery waste; skinning waste; pitfall victims). Interpretations need careful consideration of all the available evidence. A good example of this thorough approach is provided by Serjeantson and Morris' (2011) review of the evidence for the deposition of ravens and small corvids in Iron Age and Roman settlements including towns. After careful consideration of all the variables listed above and incorporating some documentary and iconographic evidence for the symbolic significance of these birds, they concluded that many of the depositions were indeed ritual in nature. In some cases, butchery, cooking and ritual deposition are not mutually exclusive. Several ABGs of sheep found in suburban buildings or boundary deposits in Winchester have evidence of dismemberment, cooking and filleting before their remains were gathered together and buried as foundation deposits (Maltby 2012). Irrespective of the interpretations, developer-funded excavations have contributed substantially to the ABG data now available. Dogs are often found as ABGs and the presence of large numbers of puppies in some towns, for example Dorchester (Maltby 1993), indicates that large numbers of dogs were bred and kept in towns. Their presence is also testified by the large number of gnawed bones in most assemblages. ABGs have also supplied much of the evidence that has shown the great variability in the stature of dogs in the Roman period. Specialist breeding was clearly taking place and new types of miniature dogs, for example, have been found in many Roman towns (Harcourt 1974; Maltby 1993; 2010a, 297; Clark 1995; Baxter 2006).

THE CONTRIBUTION OF COMMERCIAL ZOOARCHAEOLOGY IN TOWNS

There is no doubt that rescue and developer-funded archaeology has contributed significantly to enhancing our understanding of how animals were exploited in and around Romano-British towns. Through these excavations and faunal analyses, we have obtained a much broader and deeper understanding of the diet and provisioning of meat and other animal products in these towns. We have recognised regional, chronological, inter-settlement and intra-settlement variations in faunal assemblages, although there is substantial scope for further investigation and interpretation of such variations. We have also begun to form a better understanding of animals' roles in belief systems and worldviews. Gradually, too, the potential of zooarchaeology in contributing to addressing more general questions about the nature and organisation of Roman towns has been recognised. In addition, the development of new scientific techniques such as isotope and genetic analyses are beginning to be incorporated successfully with traditional zooarchaeological analyses, although, to date, relatively few of these studies have focused specifically on animals in Romano-British towns.

However, these achievements have been gained painfully slowly. There are often severe time lags between analysis of assemblages and their publication. Worse, some of these analyses have never been fully published. Even worse still, in some cases there has been insufficient funding for full analyses of important animal bone assemblages. The development of digital technology is gradually enabling easier access to some unpublished detailed reports and data. However, there is a huge amount of information residing in grey literature or museum archives that has great potential to contribute further to our understanding of humans and animals in Romano-British towns. A review of the available resource is urgently required.

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