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CATTLE, SHEEP/GOATS AND PIGS FROM NORTHERN AND CENTRAL HAMPSHIRE: IRON AGE, ROMAN AND EARLY SAXON FAUNAL REMAINS FROM EXCAVATION ASSEMBLAGES

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ABSTRACT

This paper is a survey of overall species counts from northern and central Hampshire sites, of Iron Age, Roman and early Saxon date, and their implications for chronological changes in animal husbandry and diet. Three zones, around Basingstoke, Andover, and central Hampshire, are compared with each other, and also with the Roman urban centres of Silchester and Winchester. The Andover region shows the greatest degree of continuity from Iron Age to Roman times and later, while the Basingstoke region has a pattern of change from sheep/goat dominated assemblages to ones with higher cattle numbers. This may be due to agricultural intensification, and an orientation of the animal economy in northern Hampshire more towards the Thames Valley and supply to Silchester, than an earlier 'Wessex pattern' more focussed on sheep and wool production.

Northern and central Hampshire have a significant number of faunal remains analyses for the Iron Age and Roman periods, especially if the two Roman towns of Silchester and Winchester are included (Tables 1–4). Generally favourable soil conditions, combined with the large number of excavations in advance of housing and other developments in Basingstoke and Andover, have yielded many thousands of animal bones. Most of these have been published, either in monographs, or in Hampshire Studies, with a few relevant reports also available in unpublished reports generated through commercial archaeology. Most date from the 1980s onwards, but there are a few from earlier decades; in many respects, this period has been an era of large-scale excavation and unprecedented recovery of large animal bone assemblages. There is an observable drop-off in size of the assemblages in more recent reports, probably due to more focussed sampling and selective context excavation in current commercial archaeological strategies.

This paper is a survey of overall species counts from northern and central Hampshire sites, and their implications for chronological changes in animal husbandry and diet. Little consideration is given here to aspects such as slaughter patterns, breed size and herd/flock health, but there is much scope for further regional work on these elements of archaeozoological study.

APPROACHES TO REGIONAL STUDIES OF ANIMAL BONE ASSEMBLAGES

Faunal remains nearly always represent the detritus from consumption, usually of meat, but also of industrial processes and secondary products. Even on so-called 'producer' sites, the faunal remains will largely represent the remains from consumption, though the representation of different livestock may be fairly close to the proportions of species raised at those sites. Iron Age/Roman rural settlement sites and Roman villas are often regarded as classic types of site engaged in food production, usually for regional, local and home consumption (King 1988a).

To take this forward in terms of regional analysis, it is possible to look at 'producer' sites only, to get a general picture of relative percentages of cattle, sheep/goat and pig bones, and to gain more detail from individual sites. The choice of size and scale of the most appropriate regional unit for this type of analysis has been discussed mainly for the medieval period in Britain; the Roman period much less so (Rippon *et al.* 2014, 195–201; Rippon 2013). The most recent

study to include Roman data is the *Fields of Britannia* project, which divided Britain south of Hadrian's Wall into nine regions, based on landscape characteristics and cultural development: the regions are the South-East, East Anglia, Central Zone, South-West, Lowland Wales, Western Lowlands, North-East Lowlands, Upland Wales and Northern Uplands (Rippon *et al.* 2014, 206). In further work, the project used groupings based on predominant surface geology, e.g. Boulder Clay, Chalk, heathland, etc. (Rippon *et al.* 2014, 215). As will be seen below, soil types are to be preferred over surface geology, particularly for local characterisation of soil type and fertility. The relevant major regions for northern and central Hampshire, namely Wessex and the Thames Valley, are similar to the *Fields of Britannia* project, and also based on landscape character in fairly generalised terms.

Regional studies covering Hampshire have been undertaken by several archaeozoologists over the past half-century, as a result of the growing number of reports from the 1970s onwards (cf. Maltby 2019). One of the first was commissioned by Historic England's predecessor, the Department of the Environment, and covered all periods (Coy & Maltby 1984). It set the agenda for much later research. Period studies of relevance to the region were also being produced, usually arising from university research; on the Iron Age (Hambleton 1999; Albarella 2007), the Roman period (Allen 2018; King 1978; 1984; 1999; 2019; Luff 1982), and Saxon England (Holmes 2013; 2014; 2016). Sub-regional surveys have included the Test Valley, as part of the Danebury Environs Roman Programme (Hammon 2008), or have been part of individual site reports, e.g. Sparsholt (Ward 2014). Specific studies of the urban assemblages at Winchester (Maltby 1994a; 2010; 2017) and Silchester (Ingrem 2012; Clark 2012) have also placed these towns into the context of both their hinterlands and other comparable urban centres. An interesting comparison of Hampshire with the territory of the Suessiones in Gallia Belgica (Paris 2018) has placed the region in an international context, and there are several studies of relevance to Wessex and Hampshire covering regions of Gaul and Germany (e.g. Groot *et al.* 2009; Kooistra 1996; Kooistra & Groot 2015; Lepetz 1998; Pigière 2017), and elsewhere in Britain (e.g. Albarella *et al.* 2008; Ayton 2013; Hesse 2011).

The regional picture in general

In gross terms, agricultural animal economies in Iron Age southern Britain were dominated by sheep husbandry, with cattle also a significant element, but pigs much less so (Albarella 2007; Hambleton 1999). By contrast, Roman Britain, particularly in the 3rd and 4th centuries, was strongly dominated by cattle with the trend over time from younger to older animals in terms of the slaughter pattern (King 1984; 1999). This generalised picture has to be modified when more regional and chronologically detailed analyses are undertaken, as will be apparent in the following paragraphs. The high sheep and goat pattern in Iron Age and early Roman Britain, deriving from the Iron Age, is unusual for the Roman north-west provinces, and may represent a regional culture, the foodways of which survived into the Roman period and remained a significant element in some areas as late as the 4th century AD (Albarella 2007; Hambleton 1999). However, the definite shift through time, with 3rd and 4th century sites more dominated by cattle bones (King 1984, 193), can be seen at individual sites, e.g. Wilcote in the Thames Valley (Hamshaw-Thomas 1993; 2000). As Hesse (2011, 239–41) has established, this trend in the Thames Valley area is accompanied by a parallel trend to increasing age-at-death for cattle. Several questions arise from this: are chronological differences driven by economic or cultural factors? What influence did the environment have? Was there intensification of agriculture and animal husbandry during the Roman period, and if so, how far did the environment determine and allow for this? In relation to the last question, research on the Iron Age to Roman transition has emphasised size changes and breed improvement, particularly in cattle (Rizzetto *et al.* 2017; Albarella *et al.* 2008; cf. also Lepetz 1996 for northern Gaul). Also, the introduction and increasing mobility of livestock into and across new provinces has

been highlighted by strontium isotope analysis on cattle samples from Owslebury, Hampshire (Minniti *et al.* 2014).

In Wessex, the high sheep and (to a much lesser extent) goat husbandry trend is obvious but there are some individual sites which are exceptional, for instance Ower, Poole Harbour, which has evidence for Late Iron Age pig processing (Coy 1987a), and Great Bedwyn, a low-lying villa site in Wiltshire, with an exceptional assemblage containing 70% pig bones (Payne 1997). The Thames Valley has high cattle numbers, and most sites could be linked to intensification in arable agriculture. Environmental analysis in the Thames Valley shows very low afforestation in the Roman period, averaging approximately 3% tree/shrub species in pollen analysis (Hesse 2011, 231), and this may back up the notion of intensification in arable agriculture. On most sites in the Thames Valley there are low pig numbers, except at Silchester which may be linked with the site originating as a high-status Iron Age oppidum (Grant 2000; Ingrem 2012a; 2018; this is also seen elsewhere, e.g. Puckeridge-Braughing, Herts, King 1988b).

Data from Romano-British regions (King 2019, fig. 3) shows that East Anglia, the Midlands, the Thames Valley and the South-East are roughly equivalent. The Cotswolds and Somerset have higher sheep and goat numbers, implying more grazing sheep and presumably more wool production. This also applies to Yorkshire and Wessex, but in fact the trend to high sheep and goat numbers is even more accentuated in these two regions. The Cotswolds, Yorkshire and Wessex have all been associated with wool production in historic times. In the Roman period, British wool products are mentioned for instance in Diocletian's price edict and in the Notitia Dignitatum, and we have the mention of a *gynaecium* (wool-weaving factory) at Venta, probably Winchester or Caistor by Norwich (Cleary 2005, 38; Not. Dig. Occ. XI).

NORTHERN AND CENTRAL HAMPSHIRE (FIG. 1)

The area to the south of the Thames Valley in northern Hampshire is also of some interest, especially in the Basingstoke hinterland (Fig. 2;

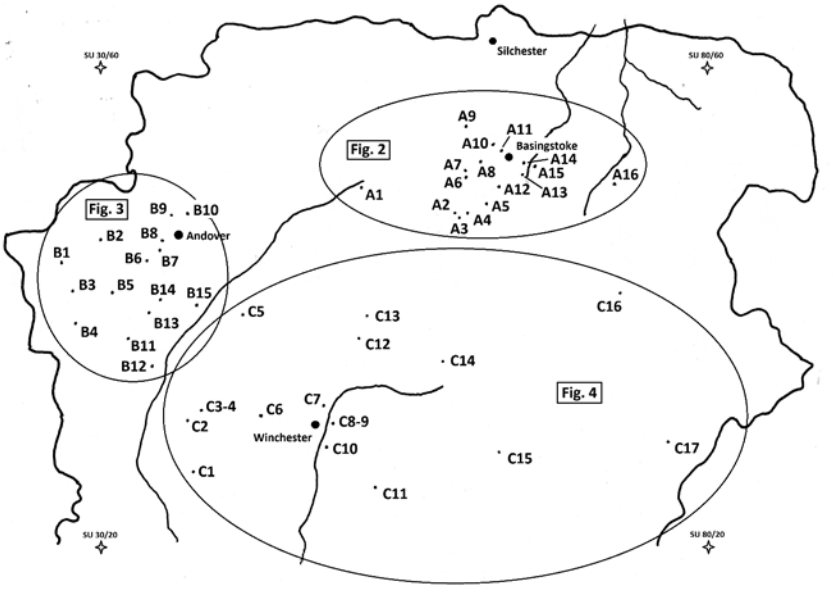

Fig. 1 Outline map of northern and central Hampshire, showing sites used for data tables (Tables 1–4) and graphs (Figs 2–6)

Table 1). There are a lot of animal bone assemblages from this area, and, as Fig. 2 shows, there is a chronological spread of assemblages. The diamonds (Early and Middle Iron Age) cluster in the high sheep (and goat) sector of the tripole graph, with one exception, having high cattle percentages, from Old Kempshott Hill, Basingstoke (Rielly 2012). This outlier is based on a very small sample and therefore may be misrepresentative (but see below for this site in the Roman period). It should be pointed out that the data used here has drawn on the full range of reports available. As a consequence, some totals are very low, but it can be seen that they still conform well to the general pattern visible in the graph. Apart from this outlier, the assemblages with high sheep/goat percentages can be seen elsewhere for the earlier Iron Age (see Figs 3 & 4) and conform to the general pattern described in earlier paragraphs of this paper.

By the Late Iron Age, and LIA/Early Roman period (stars on the graph), increasing numbers of cattle, in relative terms, are being found in the assemblages. Changes are happening to diet and animal husbandry, with the result that the sheep dominant animal economy is becoming more mixed, and indeed more like the Thames Valley pattern, as set out above. By the full Roman period (triangles for Early Roman, and inverted triangles for Late Roman), these changes have been consolidated, so that there is a cattle dominated pattern for meat supply, with sheep and goats now relatively high, but pigs quite low, generally under 10%. For pig percentages, this marks a reduction from the Iron Age.

A couple of Roman assemblages show the very high cattle percentages that have been noted elsewhere in Britain (King 1984, 189; 1978, 225). As was the case for the Iron Age outlier, the site is again at Old Kempshott Lane (Rielly 2012) and may suggest that there was a specific orientation towards raising, or at least, usage of cattle (but the low total numbers of bones should be noted). Rielly (2012, 111–2, Tab 5) reports that the Iron Age and LIA phases included partially articulated remains of cattle in pits, together with the complete skeleton of a red deer (Haslam 2012, figs 9–10). There is a strong component in the assemblage of structured deposition, which may mark this site out as different, even in the Roman period (Haslam 2012, 84–5). By contrast, the nearby site of Brighton Hill South shows the higher sheep/goat pattern that would generally be expected (Maltby 1995b).

The other assemblages from the Basingstoke area that stand out are two of Saxon date (squares on the graph), namely Riverdene

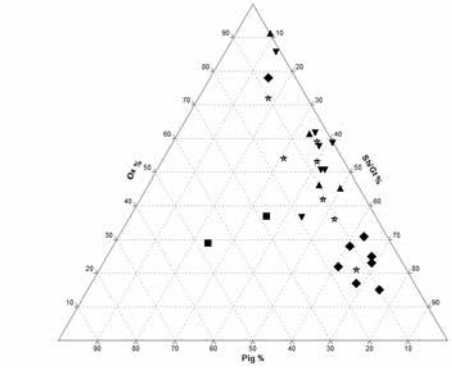

Fig. 2 Tripole (ternary) graph, showing cattle, sheep/goat and pig percentages for sites in the Basingstoke area. Data from Table 1. Key: diamond = EIA and MIA; star = LIA and LIA/early Roman; up triangle = early Roman; down triangle = late Roman; square = early/mid Saxon

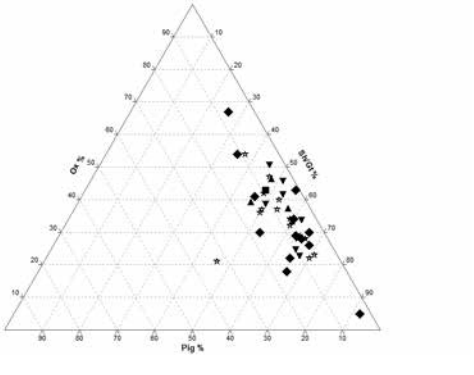

Fig. 3 Tripole graph, as Fig. 2, for sites in the Andover and west Hampshire area. Data from Table 2. Key as Fig. 2

Table 1 Summary of bone assemblage data from the Basingstoke area; all sites are within Basingstoke, except where indicated. Quantification is numbers of identified specimens to species (NISP). The Total in column 9 is for cattle, sheep/goat and pig NISP. Key to species abbreviations in column 10: H = Horse; D = Dog; Red = Red Deer; Roe = Roe Deer; DF = Domestic Fowl

Map	*NGR SU (41)*	*Site*	*Type*	*Dating*	*Ox %*	*S/G %*	*Pig %*	*Total (n)*	*Others (n), excluding small mammals & other birds*	*Reference*
A1	519498	London Road, Overton	Sett	LIA/ER	53.8	30.7	15.6	212	H 30, D 3, Cat 1	Ingrem 2012b
			Sett	AS	37.5	34.7	27.8	72	H 1	
A2	594485	Winchester Road	Sett	MIA/LIA	15.0	75.2	9.7	226	H 4, D 3, Roe 1	Holmes 2019
			Sett	LIA/ER	42.5	46.6	10.9	193	H 16, D 8, Red 2	
A3	598485	Kennel Farm A	Sett	MIA	24.4	68.2	7.4	406	H 32, D 54	Locker 2006
A4	604479	Kennel Farm F	Sett	EIA	16.7	67.6	15.7	102		Deighton 2002
			Sett	EIA	21.8	61.2	17.0	147	D, 1, Red 2	
			Sett	MIA	22.9	69.9	8.4	83	H 1, Red 1	
			Sett	LIA	21.1	65.9	13.0	123	H 1	
A5	610486	Brighton Hill South	Sett	EIA/MIA	28.0	61.1	10.9	478	H 36, D 1, Red 1	Maltby 1995b
			Sett	MIA/LIA	28.6	60.9	10.5	555	H 19, D 9, Red 1	
			Sett	LIA/ER	52.6	40.0	7.4	1803	H 131, D 154, Red 11, Fox 1, Weasel 1	
A6	602514	Old Kempshott Lane	Sett	MIA/LIA	78.0	14.6	7.3	41	H 6, D 6, Red 372	Rielly 2012
			Sett	ER	91.2	8.8	0.0	125	H 11, D 125, Red 1, DF 1	
			Sett	LR	86.4	12.5	1.1	88	H 14, D 5, Cat 1	
A7	601523	Worting	Sett	LIA/ER	36.0	52.9	11.1	225	H 3	Lalor 2015, 36-7
A8	617536	Park Prewett Hospital	Sett or Villa?	MR to LR	61.8	35.3	2.9	34	Red 1	Holmes 2011
			Sett or Villa	LR	57.7	38.1	4.1	194	H 27, D 17, Cat 1, Roe 1, DF 10	
A9	607556	Manor Farm, Monk Sherborne	Villa	LR	51.2	42.1	6.6	574	H 50, D 2 skels, Cat 17, Roe 2, Red 2, DF 34	Ingrem 2005; Clark 2005
A10	6354	Popley	Sett	ER	60.7	33.8	5.6	394	H 1, Hare 1	Grimm 2009
			Sett	Ro & LR	51.0	42.8	6.2	306	H 21, D 13, Red 3	
A11	640534	Oakridge II	Sett (well)	MR to LR	37.3	43.5	19.2	13575	H 262, D 4919, Cat 175, Red 142, Roe 466, Hare 301, Fox 176, Polecat 527, Pine Marten 39, DF 56	Maltby 1994b
A12	632500	Viables Two	Sett	LIA-Ro	71.6	18.3	10.1	109	H 5, D 3, Red 1, Roe 1, Fox 1, DF 1	Baxter 2004
A13	651515	Ructstalls Hill	Sett	MIA/LIA	31.0	62.6	6.4	751	H 25, D 3, Red 2	Gregory 1979
			Sett	ER	45.7	44.0	10.3	564	H 22, D 12	
			Sett	LR	59.3	40.7	0.0	189	H 5, D 6, Roe 1	
A14	647526	Basing View	Sett	LIA/ER	59.0	36.7	4.5	268	H 11, D 5, Red 2	Allen 2020
A15	650523	Riverdene	Sett	AS	29.0	24.3	46.7	169	H 4, D 1, Red 4, Roe 1	Hamilton-Dyer 2003
A16	725500	Choseley Farm, Odiham	Sett	Ro	44.8	50.0	5.2	58	H 5, D 19, Red 5, DF 2	Clark 1986

Table 2 Andover and other rural sites in the western Test Valley area. Key as Table 1

Map	*NGR SU (41)*	*Site*	*Type*	*Dating*	*Ox %*	*S/G %*	*Pig %*	*Total (n)*	*Others (n), excluding small mammals & other birds*	*Reference*
B1	269444	Lains Farm, Amport	Sett	MIA	33.7	60.1	6.2	760	H 23, D 1	Coy 1992
B2	298461	Thruxton	Sett	LIA	36.4	49.5	14.1	99	H 5, D 6	Hammon 2008, 76
			Sett	ER	46.4	47.4	6.3	192	H 13, D 8, DF 9	
			Villa	LR	46.5	50.6	2.8	389	H 11, D 14, DF 10	
B3	274411	Grateley	Sett	LIA	31.8	60.5	7.8	617	H 9, D 7, DF 29	Hammon 2008, 76
			Sett	ER	33.3	60.0	6.6	453	H 17, D 8, DF 12	
			Villa	LR	34.2	62.4	3.4	298	H 13, D 10, DF 5	
B4	279376	Suddern Farm, Over Wallop	Sett	LIA	46.8	46.9	6.3	1474	H 97, D 128, DF 5	Hammon 2008, 76
			Sett	LIA/ER	28.3	66.4	5.3	1102	H 53, D 17, DF 1	
			Sett	ER/LR	51.3	45.1	3.6	1598	H 92, D 39, DF 2	
B5	313419	Dunkirt Barn, Abbots Ann	Sett	ER	39.1	45.7	15.2	138	H 1, D 2, DF 3	Hammon 2008, 76
			Villa	LR	39.2	49.9	10.9	919	H 17, D 4, DF 50	
B6	345435	Bury Hill, Upper Clatford	Sett	MIA	30.3	66.2	3.5	509	H 466, D 10	Hammon 2008, 76
B7	350445	Balksbury, Andover	Sett	LBA/EIA	67.1	25.8	7.1	295	H 55, D 25, Red 2	Maltby 2001
			Sett	EIA	28.0	64.9	7.1	633	H 102, D 89, Badger 2	Maltby 1995a
			Sett	MIA/LIA	30.4	53.1	16.5	4906	H 512, D 604, Red 16, Roe 4, Stoat 2	
			Sett	LIA/ER	21.2	45.6	33.3	463	H 28, D 14, Red 1	
			Villa	LR	41.5	53.2	5.3	720	H 101, D 13, Red 5, Roe 1, DF 2	
B8	356465	Old Down Farm, Andover	Sett	EIA	5.5	91.6	2.9	724	H 4, D 37	Maltby 1981
			Sett	EIA	41.1	46.3	12.5	734	H 162, D 354	
			Sett	EIA/MIA	53.7	34.8	11.5	462	H 42, D 9	
			Sett	EIA/MIA	26.1	68.3	5.6	1534	H 251, D 180	
			Sett	LIA/ER	37.0	53.9	9.2	414	H 27, D 7	
			Sett	AS	43.1	48.3	8.6	290	H 8, DF 14	Bourdillon 1980
B9	366471	Shepherds Spring School, Andover	Sett	MIA/LIA	42.5	56.3	1.1	87	H 17, D 4, Red 1, Fox 1	Higbee 2017
			Sett	LIA/ER	53.7	37.2	9.1	121	H 19, D 3	
B10	367476	Viking Way, Andover	Sett	MIA/LIA	29.2	62.5	8.3	24	H 64, D 1	Hamilton-Dyer 2002
B11	323376	Danebury	Sett	MIA/LIA	18.4	65.8	15.8	7004	H 273, D 502, DF 1	Hammon 2008, 76
			Sett	MIA/LIA	21.7	65.3	13.0	32581	H 1149, D 745, DF 5	
			Sett	LIA	22.0	69.8	8.2	25184	H 871, D 467, DF 6	
			Sett	LIA	34.2	58.6	7.2	1221	H 96, D 291	
B12	342361	Houghton Down	Sett	LIA	41.9	48.6	9.5	315	H 24, D 6	Hammon 2008, 76
			Sett	LIA/ER	29.4	63.9	6.8	1392	H 114, D 100, DF 4	
			Villa	LR	24.5	65.2	10.2	420	H 36, D 8, DF 11	
B13	341390	Nettlebank Copse, Wherwell	Sett	LIA	37.3	49.4	13.3	2951	H 192, D 51	Hammon 2008, 76
			Sett	LIA/ER	28.4	63.7	7.9	215	H 10, D 4	
B14	353401	Rowbury Farm, Wherwell	Sett	LIA	40.5	52.9	6.7	420	H 38, D 8	Hammon 2008, 76
			Sett	LIA/ER	22.7	71.6	5.7	229	H 31, D 6	
			Sett	ER	37.5	56.9	5.5	650	H 74, D 5	
B15	374400	Fullerton, Wherwell	Villa	LR	22.9	66.8	10.3	572	H 45, D 4, DF 64	Hammon 2008, 76

(Hamilton-Dyer 2003) and London Road, Overton (Ingrem 2012b). The high pig percentages are a feature noted on Anglo-Saxon sites before (Holmes 2013, fig. 2; 2014), and have sometimes been linked to high-status consumption (King 1978, 226); Riverdene has also been suggested as a site of specialist pig production (Holmes 2013, 268).

The bone assemblages from the Andover and Test Valley area (Fig. 3; Table 2) show much less variation through time. There is strong continuity from the Iron Age through to the Saxon period, with sheep/goat in the 50–70% range, cattle at 20–50% and pigs at 0–20%. This is a classic 'Wessex pattern' and it appears to have been maintained over many centuries. Roman-period rural settlements show much continuity of site usage and development from the Iron Age, as demonstrated by the Danebury Environs Roman Programme, and this is confirmed in their bone assemblages (Hammon 2008). It is very likely that the wool and sheep meat economy of the region in the Iron Age continued to be significant into the Roman period and beyond.

The site of Old Down Farm, Andover, stands out in its initial Early Iron Age phase for a very high sheep/goat percentage (Maltby 1981). This assemblage is quite large, but included partial and complete sheep skeletons, some being neonate or very juvenile (Maltby 1981, 98–100). Balksbury, Andover, is another site worthy of note (Maltby 1995a; 2001), mainly due to a high cattle percentage in its earliest, LBA/EIA phase. This is partly a result of much of the faunal material coming from the bank, ditch and associated peripheral dumps. As Maltby points out (2001, 79–80), a higher percentage of cattle in these locations is a phenomenon observed on several Iron Age sites in southern Britain as a whole and may be the result of differential disposal practice across the site. On Fig. 3, the LIA/Early Roman assemblage at Balksbury also stands apart from the main cluster, due to a higher than average pig percentage. The site also has high numbers of horse bones (Table 2), especially through the Iron Age, which may indicate a specialist function at the site, possibly including the raising of horses for ranching of cattle. The large size of the enclosure (18ha) in the EIA,

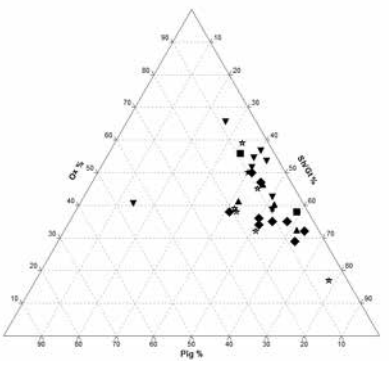

Fig. 4 Tripole graph, as Fig. 2, for rural sites in central Hampshire. Data from Table 3. Key as Fig. 2

with non-intensive human occupation within it, supports this hypothesis (Cunliffe 1993, 142), and ranching may have continued after the site developed into a smaller farmstead from the MIA onwards.

Moving to the central area of Hampshire (Fig. 4; Table 3), the picture is fairly consistent and clustered, too, but with slightly higher cattle percentages on average compared with Andover and western Hampshire. There are some indications of chronological change from the Iron Age to the Roman period, in that the Early and Late Roman assemblages all have higher cattle percentages than those of the Iron Age, and thus conform to the often-observed trend to higher cattle numbers seen elsewhere (King 1984, 193).

The main anomaly in this region is the Roman villa at Liss, with its high pig percentage at *c.* 45% (Hamilton-Dyer 2016). The site is located on different geology from the others in Table 3, being on greensand and adjacent to Wealden clays and similar deposits (Liss Archaeology Group 2016, 24). It is also not a classic Hampshire chalkland villa on the Sparsholt model (cf. Johnston 1978), and it may have had a focus on pig production.

The two major Roman urban sites in Hampshire, Silchester and Winchester (Figs 5–6; Table 4) both have patterns that place greater emphasis on pigs, typically being in the range 15–35%. This applies to LIA, early and late Roman periods, and also demonstrates a reasonably consistent pattern for both of

Table 3 Rural sites in central Hampshire. Key as Table 1

Map	*NGR SU (41)*	*Site*	*Type*	*Dating*	*Ox %*	*S/G %*	*Pig %*	*Total (n)*	*Others (n), excluding small mammals & other birds*	*Reference*
C1	382265	Braishfield, Romsey	Villa	LR	53.8	43.1	2.8	106	H 1, D 1, Red 1, Badger 1, DF 3	Maltby & Foot 1985
C2	371310	Ashley	Sett	MR to LR	56.8	39.6	3.6	139	H 5, D 1, Cat 1	Locker 1980
C3	389328	Little Somborne	Sett	MIA	47.1	45	7.9	569	H 47, D 120, Red 2	Locker 1980
C4	392332	Little Somborne	Sett	ER	32.5	61.9	5.6	357	H 28, D 6, Red 1, Weasel 18, DF 2	Maltby 1984a
			Sett	LR	55.1	38.8	6.1	263	H 50, D 170, Hare 8, DF 19	Maltby 1984a
C5	411391	Chilbolton Down	Sett	MIA	31.7	64.1	4.2	357	H 63, D 3	Maltby 1984a
C6	415301	Sparsholt	Sett	LIA	39.3	51.8	8.8	272	H 10, D 201, Red 2, Roe 21	Ward 2014
			Villa	MR to LR	43.3	49.9	6.8	1549	H 124, D 140, Cat 10, Red 31, Fallow 14, Roe 15, Fox 146, Hare 3, DF 28	
C7	486311	Abbots Barton, Winchester	Sett	AS	56.2	34.7	9.1	121	H 5, Cat 1, DF 4	Higbee 2015
C8	496303	Easton Lane, Winchester	Sett	MIA	35.2	58.2	6.6	457	H 61, D 8, Pine Marten 80, Weasel 23	Maltby 1989
			Sett	LIA/ER	59.4	33.7	6.9	202	H 30, D 3	
C9	498303	Winnall Down, Winchester	Sett	EIA	49.5	41.7	8.7	1411	H 165, D 24, Red 5	Maltby 1985
			Sett	MIA	34.9	54.4	10.8	2404	H 244, D 74, Red 14, Hare 2	
			Sett	LIA/ER	44.8	45.5	9.7	154	H 26, D 1, Red 1	
			Sett	ER	46.4	46.4	7.2	1791	H 227, D 80, Red 3, DF 2	
C10	483270	Twyford Down	Sett	LIA/ER	16.5	78.3	5.1	254	D 4, Red 3	Powell *et al.* 2000
C11	525247	Owslebury	Sett	MIA	33.6	50.9	15.5	4140	H 179, D 94, Cat 3, Red 14, Roe 11, Hare 2, Fox 1, Hedgehog 1, Weasel 11, DF 1	Maltby 1987, Sections 4 & 9
			Sett	LIA	31.6	51.3	17.1	2787	H 152, D 64, Cat 52, Red 2, Hare 2, Hedgehog 2, Weasel 4, DF 13	
			Sett	LIA/ER	38.9	42.2	18.9	13631	H650, D 486, Cat 51, Red 8, Hare 14, Fox 1, Hedgehog 1, Weasel 4, DF 83	
			Sett	ER	41.3	42.3	16.4	5849	H 353, D 217, Cat 38, Red 5, Roe 5, Hare 3, Hedgehog 4, Weasel 2, DF 25	
			Sett	LR	38.9	52.2	8.8	13566	H 874, D 3838, Cat 100, Red 19, Roe 10, Hare 70, Fox 1, Badger 3, DF 298	
C12	527370	Micheldever Wood	Sett	MIA	36.2	49.7	14.1	2309	H 87, D 54, Red 4, Fox 3, Stoat skel, Hare 1, DF 4	Coy 1987b
			Sett	LIA/ER	38.6	42.9	18.6	830	H 86, D 34, Red 1, Fox 2	
C13	515396	Northbrook, Micheldever	Sett	AS	37.7	58.8	3.5	114	DF 7	Taylor & Chrismas 1998
C14	5836	Abbotstone Down	Sett	LIA/ER	50.4	39.9	9.7	647	H 46, D 24, Red 2, Badger 11, DF 2	Maltby 1986
C15	627281	Bramdean	Sett	EIA/MIA	38.1	40.5	21.4	257	H 2, D 11, Red 1	Clutton-Brock 1982
			Sett	MIA	28.7	62.8	8.5	627	H 47, D 9	
C16	738412	Neatham	Vicus	ER	40.5	52.0	7.5	442	n/a	Done 1986
			Vicus	LR	66.4	26.3	7.3	1740	n/a	
			Vicus	LR	52.3	39.9	7.8	371	D 9, Cat 31, DF 4	Grimm 2014
C17	768280	Liss	Villa	LR	41.3	44.3	44.4	518	H 15, D 136, Cat 1, Red 16, Roe 2, Hare 1, Badger 8, DF 39	Hamilton-Dyer 2016

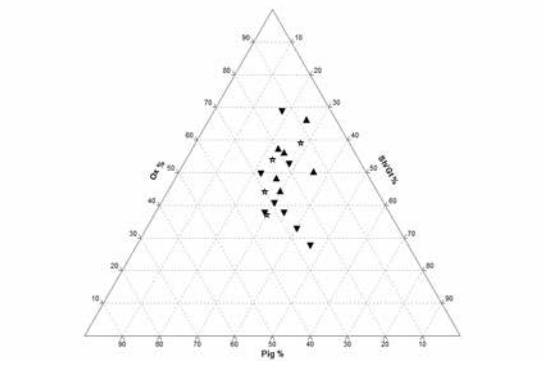

Fig. 5 Tripole graph, as Fig. 2, for assemblages from Silchester. Data from Table 4. Key as Fig. 2

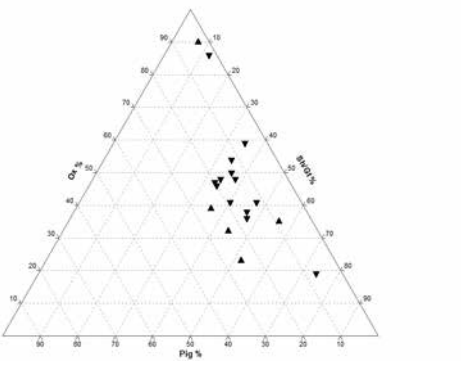

Fig. 6 Tripole graph, as Fig. 2, for assemblages from Winchester. Data from Table 4. Key as Fig. 2

the *civitas* capitals. They are, however, slightly different from each other, in that Silchester has a higher representation of cattle, especially in the early Roman period. It is likely that this town had food supplies from the Thames Valley as well as the Basingstoke area, and therefore conformed in part to the Thames Valley pattern (King 2019, 44; Ingrem 2012a, 202). The levels of cattle and sheep/goat numbers in the Basingstoke area (Fig. 2) are roughly the same as those for Silchester (Fig. 5), and it is possible that this region, too, formed part of Silchester's food supply (cf. Ingrem 2012a, 196). Pigs, however, may have been more locally sourced, given their high numbers in the town assemblages, and also a local food preference.

Winchester is similar in showing good conformity between its rural hinterland (Fig. 4) and the town itself (Fig. 6), in terms of cattle and sheep/goat. As with Silchester, pig numbers are elevated compared with the rural supply region, and pigs may have been more locally sourced for the town's meat supply. Maltby (2017, 199–200; 2010, 269) has noted that Winchester has higher pig percentages from town centre sites compared with the suburbs, and suggests that the relatively high numbers are due to their being raised within the urban area (cf. Ingrem 2012a, 188, for a similar situation at Silchester). There is also good evidence for consumption of young animals, i.e. suckling pig, in Winchester, Silchester and other towns. This would have been a high-status meat (cf. King 1999) and may be linked to the greater relative wealth of the *civitas* capitals. This overall pattern is common in Roman Britain, also being seen at major towns such as Colchester (Ayton 2013; Allen 2018).

In considering the three rural regions and two Roman towns together, it appears that the most significant changes occurred in northern Hampshire and the Basingstoke area. There appears to have been a chronological change from a Wessex pattern with high sheep and goat numbers to a cattle-dominated pattern more similar to the Thames Valley. This may reflect changes in agricultural practices or alternatively it could reflect increasing exploitation of new areas and different soil types, in order to supply the urban site of Silchester. The establishment of the Iron Age *oppidum* and the Roman town may have led to a realignment of animal husbandry in the Basingstoke area, and possible intensification, as Applebaum (1953) long ago postulated. The heavier tertiary soils to the north-east of Basingstoke seem to have been increasingly exploited, and this would have led to a more 'Thames Valley pattern' within the animal bone assemblages.

Animal bones and soil types in northern and central Hampshire

As Johnston (1978, figs 22–23) has demonstrated for Hampshire, there is a strong spatial correlation between geology and Roman settlement preferences. Chalk was the preferred location for higher-status sites such as villas,

Table 4 Silchester and Winchester. Key as Table 1

Site	*Type*	*Dating*	*Ox %*	*S/G %*	*Pig %*	*Total (n)*	*Others (n), excluding small mammals & birds other than Domestic Fowl*	*Reference*
SILCHESTER								
Basilica 1	Opp	LIA	54.2	22.9	22.9	428	H 7, D 1, DF 2	Grant 2000
Basilica 2	Opp	LIA	44.1	26.1	29.8	2768	H 46, D 35, DF 11	
Basilica 3	Opp	LIA	36.7	30.3	33.0	3201	H 26, D 17, Roe 2, Hare 4, DF 95	
Basilica 4	Urb	ER	47.6	26.9	25.5	1231	H 34, D 1, Red 2, DF 33	
Basilica 5	Urb	ER	44.4	29.3	26.2	1330	H 14, D 4, Red 3, Roe 1, DF 56	
Basilica 6	Urb	MR	37.9	34.3	27.8	1091	H 7, D 8, Red 1, Roe 1, Hare 10, Cat 2, Fox 4, DF 39	
Basilica 7	Urb	LR	28.4	46.4	25.2	3190	H 21, D 15, Red 3, Roe 2, Hare 27, DF 578	
Insula IX	Opp	LIA	58.8	28.2	13.0	1746	H 22, D 12	Ingrem 2018; Clark 2018
Insula IX	Urb	MR	37.8	28.9	33.3	2274	H 14, D 143, Red 24, Roe 19, Hare 14, DF 90	Ingrem 2011, Clark 2011
Insula IX	Urb	MR	40.7	29.8	29.4	707	H 6, D 27, Roe 15, Hare 10, DF 14	
Insula IX	Urb	MR	52.6	28.3	19.0	2721	H 11, D 315, Red 15, Roe 8, Hare 10, Badger 15, Black Rat 1, DF 105	
Insula IX	Urb	MR	32.5	40.3	27.2	437	H 8, D 18, Roe 3, Hare 1, DF 8	
Insula IX	Urb	LR	69.4	17.7	12.9	2118	H 26, D n/a, Cat 124, Red 8, Roe 10, Hare 6, Pine Marten 1, DF 65	Ingrem 2006, Clark 2006
South Gate	Urb	ER	65.9	26.3	7.7	414	H 1, D 3, DF n/a	Maltby 1984b
South Gate	Urb	ER	55.5	25.1	19.3	362	H 6, D 9, Red 3, Roe 2, DF n/a	
South Gate	Urb	LR	50.0	22.3	27.7	328	H 6, D 2, Red 7, Roe 1, Hare 1, DF n/a	
Manor Farm	Urb	ER	49.5	36.0	14.4	111	DF 2	Maltby 1984b
Manor Farm	Urb	ER	57.1	23.2	19.6	112	H 2	
WINCHESTER								
Northgate House 2.1	Urb	ER	35.3	55.5	9.2	272	H 3	Strid 2011
Northgate House 2.3	Urb	LR	47.9	34.1	17.9	803	H 8, D 14, Red 2, DF 16	
Northgate House 2.4	Urb	LR	48.3	37.7	14.1	555	H 13, D 2, Red 4, DF 14	
Staple Gardens	Urb	ER	39.0	35.6	25.4	236	H 4, D 7, DF n/a	Maltby 2010, 262
Staple Gardens	Urb	LR	46.8	33.4	19.9	1118	H 34, D 26, Red 4, Roe 1, Otter 1, DF n/a	
Crown Hotel	Urb	MR/LR	40.5	47.0	12.4	338	H 11, D 1, Cat 1, DF 2	Maltby 2010, 262
27 Jewry Street	Urb	MR/LR	50.4	36.3	13.3	339	H 11, DF 6	Maltby 2010, 262
Henly's Garage	Urb	MR/LR	45.8	33.6	20.6	685	H 24, D 12, Red 4, Roe 2, Hare 2, DF 9	Maltby 2010, 262
Oram's Arbour	Suburb	ER	23.4	51.5	25.1	171	H 74, D 9	Coy & Bradfield 2010
Oram's Arbour	Suburb	LR	37.7	46.1	16.2	154	H 17, D 20, Roe 1, DF 1	
Oram's Arbour	Suburb	LR	59.2	34.7	6.1	98	H 29, D 1	
Crowder Terrace	Suburb	MR	86.4	11.7	1.9	308	H 72, D 2, Roe 1, DF 2	Coy & Bradfield 2010
Crowder Terrace	Suburb	LR	18.5	74.1	7.4	108	H 7	
Victoria Road G2	Suburb	ER	90.4	6.7	2.9	1094	H 103, D 43, DF 5	Pfeiffer 2010
Victoria Road G4	Suburb	ER	32.0	44.2	23.8	975	H 26, D 16, Red 3, Poe 1, Hare 2, DF 31	
Victoria Road East	Suburb	MR/LR	54.3	33.9	11.7	8682	H 420, D 122, Cat 2, Red 24, Roe 6, Hare 9, Df 184	Maltby 2010, 262, 275
Victoria Road West	Suburb	MR/LR	41.0	40.3	18.7	2142	H 105, D 30, Cat 2, Red 13, Roe 2, Hare 8, DF 37	
Hyde Abbey	Suburb	MR/LR	36.2	46.7	17.1	1662	H 82, D 10, Cat 2, Red 1, Roe 1, Fallow 1, Hare 2, DF 30	Maltby 2010, 262, 275

and appears to account for the cluster of such sites around Winchester, which is dominated by its chalkland surroundings, and by contrast, the distinct lack of villas in the hinterland of Silchester, in a different landscape setting of tertiary soils. In order to take this further, soil types rather than underlying geology have been used as the basis for analysis, while acknowledging that the latter has a strong influence on the former.

For assessment of soil quality, the Soilscapes (2020) website was used, which is based on the National Soil Map. The overall quality and agricultural potential of each soil group is graded from 1 to 5 in terms of its natural fertility (i.e. prior to any improvement such as from liming or other nutrient supplementation). The definition given on the Soilscapes website is as follows: 'Natural fertility [is] the natural lime status and the 'reaction' of the whole soil – whether it is naturally acid or alkaline. Soils of very low natural fertility are very acid, have low numbers of soil-living organisms and support heathland and acid woodland habitats. Soils of low natural fertility are associated with a wide range of habitat types and are usually acid in reaction. The moderate class contains neutral to slightly acid soils, again with a wide range of potential habitats. Artificial liming of farmland reduces natural soil acidity. Soils of high natural fertility are both naturally productive and able to support the base-rich pastures and woodlands that are now rarely encountered. Lime-rich soils contain chalk and limestone in excess, and are associated with downland, herb-rich pastures and chalk and limestone woodlands.' (Soilscapes 2020, definition of the fertility category). Although there is some danger in using modern soils as a factor for understanding ancient pastoral practices, since they could have changed since the Roman period, it is possible to be reasonably confident in the assessment of the dominant soil type within a radius of 2km of each site used in the analysis. The rural sites in Tables 1–3 were used for the analysis; each site was located by NGR grid reference on the large-scale interactive Soilscapes map and the predominant soil type identified within a 2km radius. The secondary soil types were also noted, as many of the sites were in locations that could exploit different soils and habitats, e.g. both a river valley and chalk downland.

Results of this analysis for northern and central Hampshire were fairly consistent, mainly because there was a limited range of soil types across all the sites in the sample. This is largely due to the dominant chalkland landscape for the great majority of the sites. The actual Soilscapes groups encountered are given on Table 5, and it can be seen that Group A, chalk soils, are those linked to most of the sites in the sample, followed by Group B, slightly acid loamy soils (also usually over chalk geology), and Group C, base-rich soils, usually in river valleys. For each soil type, Soilscapes allocates a fertility quotient (FT), ranging from 1 (low and unsuitable for crop raising), through to 5 (very high yielding). Group A scores FT 3, which is average to good fertility, while Group B is less fertile, with FT 2. Group C has the most fertile soil type, 7, which has a high-yield FT 5, but also includes a minority of sites in soil type 20, which has a lower score FT 3. There are some soil types that only occur as secondary in importance for any of the sites, namely very acidic soil (soil type 14, FT 1), seasonally wet loamy and clayey soils (type 18, FT 3), and fen peat (type 27, FT 4). All of the secondary soils are either in river valleys or just off the chalk geology, either over the tertiary levels to the north-east of Basingstoke, or the Wealden beds in the east of the central Hampshire group of sites.

When the average cattle, sheep/goat and pig percentages are plotted against the three soil groups outlined above, an interesting pattern emerges (Fig. 7). The chalk soils have the highest percentage of cattle, and the lowest percentage of pigs. The slightly less fertile Group B sees a decrease in cattle percentages, and an increase in pig. Group C has the fewest sites, and the lowest cattle percentage. In many ways, these results appear to run counter to expectations. Group C includes rich river valley soils, and might be expected to have high cattle percentages, on the basis of using water meadows and low-lying, but rich grasslands for grazing cattle. It may be that river valley soils were in fact heavily wooded and prone to flooding, so were not chosen for cattle grazing. The opposite can be said of the Group A and B soils, which are mainly on higher ground, usually with chalk as the underlying geology.

Table 5 Soilscapes assessment of sites used in the study. The Soil Type and the Fertility quotient refer to the descriptors used in the Soilscapes (2020) website and map

Group in Fig. 7	*Soil Type*	*Brief description*	*Fertility quotient*	*Agricultural potential*	*Number of sites - primary*	*Number of sites - secondary*
A	3	shallow lime-rich soils over chalk or limestone	3	cereals and grazing	25	21
A	5	freely draining lime-rich loamy soils	3	crops and grazing	1	6
B	6	freely draining slightly acidic loamy soils	2	grazing and grasslands – long growing season	16	25
C	7	freely draining acidic but base-rich soils	5	crops and grazing, usually in river valleys	5	27
-	14	freely draining very acidic sandy and loamy soils	1	grazing	-	1
-	18	slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils	3	grazing, best for cattle	-	7
C	20	loamy and clayey floodplain soils with naturally high groundwater	3	grassland, usually in river valleys	1	9
-	27	fen peat soils	4	crops or wet grazing	-	11

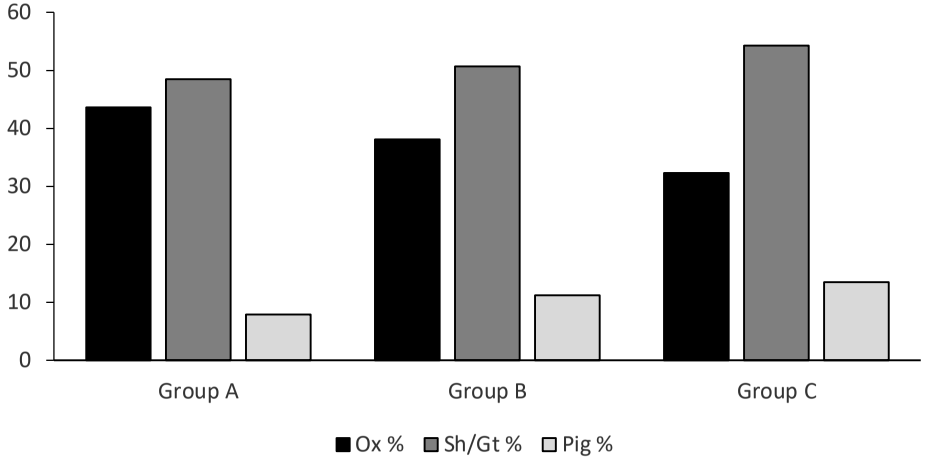

Fig. 7. Bar graph showing cattle, sheep/goat and pig percentages from northern and central Hampshire, for soil groups A, B and C. See Table 5 and the text for further details of soil types

In these environments, we might expect high sheep (and goat) numbers, as the downland landscape seems best suited to this type of animal husbandry. However, the percentages in Fig. 7 appear to indicate that cattle were a significant element of the pastoral exploitation of these habitats.

It should be noted that the overall variation between the three groups in Fig. 7 is not very great, and it is likely that nearly all the sites in the sample had access to both higher ground and river valleys (or soils linked to tertiary/Wealden derived soils), as is indicated on Table 5 in the final column. The national picture presents much more variation (King 2019, fig. 6). Low-grade soils, FT 1 to 2, associated with acidic and wet poor soil, have relatively low numbers of cattle and high numbers of pigs. The middle-grade FT 3, mainly chalk and clay soils, often clay-with-flints over chalk, is also linked to high numbers of cattle and sheep/goats; in other words, wool production appears to have been important on the chalk lands. This is the pattern also seen in Fig. 7 in this paper, for all three soil groups.

A significant point of contrast between this paper and the national survey is that base-rich and lime rich soils, FT 3 to 5, usually river floodplains, alluvium, gravel, etc., for instance in the Thames Valley, are areas with high numbers of cattle. Therefore, the best arable soils are also linked with the raising of cattle. In the Thames Valley and South-East England, this probably reflects intensification, as in the Iron Age these areas had fewer cattle and more sheep and goats. Cattle, and therefore beef, are possibly ancillary products in a largely agrarian economy. It is of interest to note in this respect, the historical reference to the supply of surplus grain from Britain to the Roman army in the Rhineland during the fourth century (Ammianus Marcellinus, *Res Gestae* 18.2.3; Cleary 2013, 257). This was probably also occurring in those villa economies on the Hampshire chalklands, where wool production, as well as arable crops and the raising of cattle in a mixed agricultural system, was the most viable and profitable mode of exploitation.

CONCLUSION

By way of conclusion, it is helpful to consider a general issue; is there evidence of increasing specialisation in production through the Roman period (cf. Branigan 1988)? For Britain, this may have resulted in Wessex, Yorkshire, the Cotswolds and possibly also the Fens shifting towards wool production, while the rest of East Anglia, the Thames Valley, the Midlands and the South East focussed on intensive arable and high numbers of cattle associated mainly with grain production. In this general context, the changes in the Basingstoke area of northern Hampshire may indicate a shift over time from a wool-focussed economy to one of greater intensification, and food supply to Silchester and other urban centres. It seems that this part of Hampshire saw the greatest degree of change in its animal economy compared to other regions within northern and central Hampshire.

Another conclusion is that environment, specifically soil quality, plays a significant role in directing the choices of producers. This had a strong influence in western Hampshire and the Test Valley, where change appears to have been slow, and habitat constraints probably played a significant role in preserving a wool economy, and cattle ranching, from the Iron Age into the Roman and Saxon periods. However, cultural traditions going back to the Late Iron Age or connected with new 'Roman' lifestyles, must have also played a significant part in agricultural and dietary choices, as exemplified at urban sites like Silchester and Winchester, with their elevated percentages of pig numbers in most assemblages. The history of northern Hampshire and Silchester was also almost certainly one of dislocation at the end of the Iron Age, as political and military conflict appears to have directly affected this region in the run-up to the Roman conquest of AD 43. It is perhaps no surprise, therefore, that northern Hampshire saw changes in animal economies at the same time, arising from probable disruption of traditional agricultural patterns.

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