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AN OFFPRINT FROM

Agriculture and Industry in South-Eastern Roman Britain

Paperback Edition: ISBN 978-1-78570-319-5

Digital Edition: ISBN 978-1-78570-320-1 (epub)

edited by
David Bird

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Oxford & Philadelphia

www.oxbowbooks.com

Published in the United Kingdom in 2017 by
OXBOW BOOKS
10 Hythe Bridge Street, Oxford OX1 2EW

and in the United States by
OXBOW BOOKS
1950 Lawrence Road, Havertown, PA 19083

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Paperback Edition: ISBN 978-1-78570-319-5
Digital Edition: ISBN 978-1-78570-320-1 (epub)

A CIP record for this book is available from the British Library

Library of Congress Cataloging-in-Publication Data

Names: Bird, D. G. (David G.), editor of compilation.

Title: Agriculture and industry in south-eastern Roman Britain / edited by
David Bird.

Description: Oxford ; Philadelphia : Oxbow Books, 2016. | Includes
bibliographical references.

Identifiers: LCCN 2016044907 (print) | LCCN 2016047110 (ebook) | ISBN
9781785703195 (paperback) | ISBN 9781785703201 (ePub) | ISBN 9781785703201
(epub) | ISBN 9781785703218 (mobi) | ISBN 9781785703225 (pdf)

Subjects: LCSH: Weald, The, Region (England)--Antiquities, Roman. | Kent
(England)--Antiquities, Roman. | Surrey (England)--Antiquities, Roman. |
Sussex (England)--Antiquities, Roman. | Romans--England--Weald,
The--History. | Agriculture, Ancient--England--Weald, The, Region. |
Industrial archaeology--England--Weald, The, Region.

Classification: LCC DA147.W532 A47 2016 (print) | LCC DA147.W532 (ebook) |
DDC 338.09362/2--dc23

LC record available at <https://lcn.loc.gov/2016044907>

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*Front cover: Stylised 'mosaic' of agricultural and industrial activity based mostly on representations from the
2nd and 3rd centuries in the north-western Roman provinces. Illustration by Lyn Spencer.*
*Back cover: Topography and woodland south of the North Downs. A view from Ranmore Common, Surrey
(photograph: John Edwards).*

Contents

List of Figures	v
List of Tables.....	ix
Contributors.....	x
Editor's Foreword.....	xi
1. Introduction: Population and the Dynamics of Change in Roman South-Eastern England	1
<i>Michael Fulford and Martyn Allen</i>	
2. The Environment of Southern Roman Britain	15
<i>Petra Dark</i>	
3. The Countryside of the South-East in the Roman Period	35
<i>David Bird</i>	
4. Kent Roman Rural Settlement.....	55
<i>Paul Booth</i>	
5. Rural Settlement in Roman Sussex.....	84
<i>David Rudling</i>	
6. Rural Settlement in Roman-Period Surrey.....	111
<i>David Bird</i>	
7. Market Forces - A Discussion of Crop Husbandry, Horticulture and Trade in Plant Resources in Southern England	134
<i>Gill Campbell</i>	
8. Querns and Millstones in Late Iron Age and Roman London and South-East England.....	156
<i>Chris Green</i>	
9. The Exploitation of Animals and Their Contribution to Urban Food Supply in Roman Southern England.....	180
<i>Mark Maltby</i>	

10. The Roman Salt Industry in South-Eastern Britain.....	210
<i>Edward Biddulph</i>	
11. Leatherworking in South-Eastern Britain in the Roman Period.....	236
<i>Jackie Keily and Quita Mould</i>	
12. Working Skeletal Materials in South-Eastern Roman Britain	255
<i>Nina Crummy</i>	
13. The Development of Iron Production in the Roman Weald.....	282
<i>Jeremy Hodgkinson</i>	
14. Ironwork and Its Production.....	301
<i>Ian Scott</i>	
15. Roman Non-Ferrous Metalworking in Southern Britain.....	330
<i>Justine Bayley</i>	
16. Clay, Water, Fuel: An Overview of Pottery Production in and Around Early Roman London.....	346
<i>Louise Rayner</i>	
17. The Supply of Tile to Roman London	368
<i>Ian M. Betts</i>	

List of Figures

Editor's foreword: Edward Walker.

- Fig. 1.1: Graphs showing proportional change in Roman rural settlements over time across Greater London, Kent, Surrey and Sussex between the 1st century BC and the late 4th century AD.
- Fig. 1.2: Distribution of rural settlements, including villas, in relation to geology across Greater London, Kent, Surrey and Sussex between the late 1st century BC and the mid-1st century AD.
- Fig. 1.3: Distribution of rural settlements, including villas, in relation to geology across Greater London, Kent, Surrey and Sussex between the mid-1st century and the end of the 2nd century.
- Fig. 1.4: Distribution of rural settlements, including villas, in relation to geology across Greater London, Kent, Surrey and Sussex in the 3rd century.
- Fig. 1.5: Distribution of rural settlements, including villas, in relation to geology across Greater London, Kent, Surrey and Sussex in the 4th century.
- Fig. 2.1: Summary pollen percentage diagram from Sidlings Copse, Oxfordshire, showing the estimated position of the Roman-period part of the sequence.
- Fig. 2.2: Ancient beech pollards near Lodge Road Bog, Epping Forest.
- Fig. 2.3: Summary pollen percentage diagram from Lodge Road Bog, Epping Forest, Essex, showing the estimated position of the Roman-period deposits.
- Fig. 3.1: Ashtead Roman villa room 6; excavation in progress 1926.
- Fig. 3.2: Comparison of overall settlement in the Roman period and nucleated settlement in the 19th century.
- Fig. 3.3: Topography and woodland south of the North Downs. A view from Ranmore Common, Surrey.
- Fig. 3.4: View of the stokehole end of a large tile kiln near Reigate, showing the worked stone blocks, probably seconds from a nearby quarry.
- Fig. 3.5: Cocks Farm, Abinger: polished *Paludina* limestone slab probably from the villa bath-house.
- Fig. 4.1: The distribution of sites recorded for the Roman Rural Settlement Project: a partial reflection of relative densities of settlement in Kent.
- Fig. 4.2: Chronology (based on pottery) of sites along the line of HS1 Section 1 in Kent.
- Fig. 5.1: Distribution map of various Roman-period sites in Sussex.
- Fig. 5.2: Comparative plans of the Flavian palace at Fishbourne and the contemporary Period 1 'mini-palace' at Southwick.

- Fig. 5.3: Plan of field systems, trackways and settlement sites on Bullock Down (Beachy Head).
- Fig. 5.4: Bullock Down Site 44. Large corn-drying oven viewed from the stoke-hole.
- Fig. 5.5: Barcombe villa. Artist's impression of the villa c. AD 250 with the winged-corridor house and aisled building.
- Fig. 5.6: Bignor villa. A revised plan of the villa.
- Fig. 6.1: Surrey: geology and the location of major places mentioned in the text.
- Fig. 6.2: Chiddingfold: late Iron Age enclosures identified by geophysical survey and selective excavation with the likely position of the buildings recorded in the later 19th century superimposed.
- Fig. 6.3: Enclosures at Hengrove Farm, Staines and Wey Manor Farm.
- Fig. 6.4: Thorpe Lea Nurseries, Iron Age and Roman features.
- Fig. 6.5: Simplified plans of selected enclosures.
- Fig. 6.6: Simplified plan of enclosures at Runfold.
- Fig. 6.7: Barnwood School, Guildford: detail of villa estate building with associated enclosure and earlier aisled structure.
- Fig. 6.8: Farleigh Court. Simplified plan of enclosure and corn-drying oven.
- Fig. 7.1: Complete spelt wheat spikelet from a late Roman corn-drying oven.
- Fig. 7.2: Hay meadow in flower, Cherwell meadows, Oxford.
- Fig. 7.3: Fennel, a Roman escape from cultivation, growing on the south coast.
- Fig. 7.4: Young Stone Pines bearing nut-producing cones on Southsea seafront, suggesting that cultivation in the Roman period would have been viable.
- Fig. 8.1: Simplified solid geology of South-East England, with the location of quern and millstone industries, and places mentioned in the text.
- Fig. 8.2: Distant and overseas sources of supply mentioned in the text.
- Fig. 8.3: Late Iron Age querns of Ragstone and Folkestone greensand.
- Fig. 8.4: Rotary querns and a mortar in Folkestone greensand.
- Fig. 8.5: Millstones in Folkestone greensand.
- Fig. 8.6: Lodsworth greensand querns.
- Fig. 8.7: French *Poudingue* querns and Hertfordshire Puddingstone quern.
- Fig. 8.8: Worms Heath Puddingstone querns.
- Fig. 8.9: Mayen lava querns and millstones.
- Fig. 8.10: Querns/millstones from Vauxrezis and Reculver.
- Fig. 9.1: Percentage of cattle of total cattle, sheep/goat and pig (over time).
- Fig. 9.2: Percentage of cattle of total cattle, sheep/goat and pig (over urban space).
- Fig. 9.3: Sheep/goat, distal tibia breadth measurements, Colchester AD 44–60/1.
- Fig. 9.4: Sheep/goat, distal tibia breadth measurements, Colchester AD 60–125.
- Fig. 9.5: Sheep/goat, distal tibia breadth measurements, Colchester AD 60–300.
- Fig. 9.6: Sheep/goat, distal tibia breadth measurements, Colchester AD 225–400.
- Fig. 9.7: Sheep/goat, distal tibia breadth measurements, Exeter AD 50–400.
- Fig. 10.1: Map showing salt-related sites in Kent and Sussex.
- Fig. 10.2: Plan of salt-production features at Broomhey Farm, Kent.

- Fig. 10.3: Plan of salt-production features at Chidham, Sussex.
- Fig. 10.4: Map showing areas of salt-making in Essex.
- Fig. 10.5: Plan of salterns in Area A, Stanford Wharf Nature Reserve, Essex.
- Fig. 10.6: Late Roman briquetage from Stanford Wharf Nature Reserve, Essex.
- Fig. 10.7: Early Roman lid-seated jars.
- Fig. 11.1: A map of Roman London showing the major sites with finds of leather mentioned in the text.
- Fig. 11.2: Replica Roman military equipment.
- Fig. 11.3: Shoemaking waste from excavations at 60 London Wall.
- Fig. 11.4: Iron half-moon knife from London.
- Fig. 11.5: Iron awls with leather handles from London.
- Fig. 11.6: Leather one-piece shoe from Kitchenham Farm, Ashburnham, Hastings.
- Fig. 12.1: Bone objects.
- Fig. 12.2: Antler objects.
- Fig. 12.3: Bone-working waste from Winchester.
- Fig. 12.4: Bone-working waste from Colchester.
- Fig. 12.5: Bone and antler objects and waste from Lullingstone villa.
- Fig. 12.6: Bone-working waste from the Marlowe Car Park site, Canterbury.
- Fig. 13.1: Pre-Roman ironworking sites in the Weald; named sites are mentioned in the text.
- Fig. 13.2: Remains of a 1st-century Roman bloomery furnace; Little Furnace Wood, Mayfield.
- Fig. 13.3: Diagrammatic cross section of a typical Wealden bloomery site.
- Fig. 13.4: Scaled comparison of four major Roman iron sites.
- Fig. 13.5: Major Roman iron sites in the Weald with sites of *Classis Britannica* tiles.
- Fig. 13.6: Detail of a *Classis Britannica* stamped tile from Beauport Park.
- Fig. 13.7: Reconstruction of the bath-house, Beauport Park.
- Fig. 13.8: The area around Bardown ironworking site, near Wadhurst.
- Fig. 13.9: The area around Great Cansiron ironworking site, near Hartfield.
- Fig. 14.1: Smithing, leatherworking and carpentry tools.
- Fig. 14.2: Carpentry and agricultural tools.
- Fig. 14.3: Agricultural and butchery tools.
- Fig. 15.1: The metalworking cycle.
- Fig. 15.2: Crucibles.
- Fig. 15.3: Names used for copper alloys.
- Fig. 15.4: Brass-making crucibles from Colchester, Canterbury and London.
- Fig. 15.5: Early Roman parting vessels from London, Exeter and Chichester.
- Fig. 15.6: Reconstruction of one of the Verulamium workshops.
- Fig. 16.1: Location of key sites.
- Fig. 16.2: Selection of early Alice Holt/Surrey vessels found in London.
- Fig. 16.3: Plan of excavations at Highgate Wood.
- Fig. 16.4: Selection of vessels produced at Highgate Wood.

- Fig. 16.5: Highgate Wood kiln 5.
- Fig. 16.6: Selection of vessels in Sugar Loaf Court ware.
- Fig. 16.7: Selection of vessels from 60–63 Fenchurch Street.
- Fig. 17.1: Location of sites in London with wasters from tile production.
- Fig. 17.2: Civilian tile stamp from Cloak Lane, London.
- Fig. 17.3: Distribution of the yellow, cream, white and pink tiles believed to have been made in the Eccles area.
- Fig. 17.4: Distribution of north Kent red tiles in fabric 3226.
- Fig. 17.5: Distribution of tiles believed to have been made by Sussex tilemakers.
- Fig. 17.6: Voussoir tile believed to have been made by the Sussex tilemakers.
- Fig. 17.7: Large relief-patterned curved brick from Bloomberg, London.
- Fig. 17.8: Distribution of sandy and silty tiles in fabric 3069.
- Fig. 17.9: Distribution of calcareous tiles.
- Fig. 17.10: Distribution of *Classis Britannica* stamped tiles, with inset showing distribution in London.
- Fig. 17.11: Distribution of shelly tiles from Harrold, Bedfordshire.

List of Tables

- Table 9.1: Domestic mammal bones recovered from major Roman towns in southern England.
- Table 9.2: Percentages of cattle in early and late urban Romano-British assemblages (from sites in Table 9.1).
- Table 9.3: Percentages of cattle from sites in different parts of towns (all periods combined).
- Table 9.4: Percentages of sheep/goat of total sheep/goat and pig in early and late urban Romano-British assemblages.
- Table 11.1: Summary of leather finds from sites in south-eastern England known to the authors.
- Table 12.1: Evidence for working skeletal materials in southern Britain.
- Table 12.2: Artefact-types present on sites in the region.
- Table 14.1: Evidence for tools, agricultural tools and metalworking.
- Table 14.2: Numbers of tools and agricultural tools by site type.

Chapter 9

The Exploitation of Animals and Their Contribution to Urban Food Supply in Roman Southern England

Mark Maltby

Introduction: the scope of this chapter

This chapter will provide a brief synopsis of the evidence for the exploitation of domestic animals in major towns in southern England during the period of Roman occupation and rule of this region. The towns included in this survey are Exeter, Dorchester, Cirencester, Gloucester, Winchester, Silchester, Chichester, Colchester, St Albans, London (including Southwark) and Canterbury. The discussion will be mainly based on evidence derived from urban excavations that have taken place in these towns over the past 40 years. This paper will provide an update of the evidence presented in a previous review by including more recently excavated assemblages and some reports that were overlooked in that survey (Maltby 2010, 255–304). This review will focus only on domestic stock (cattle, sheep, goat, pig, horse, poultry). It will also only briefly consider evidence for animals found with burials in urban cemeteries and other animal depositions that may have been associated with ritual activities. For more detailed discussions about wild species and/or depositions of animal bone groups in Roman Britain, readers are referred to other surveys (Fulford 2001; Grant 2004; King 2005; Locker 2007; Maltby 2010; 2012; 2015; Morris 2011).

Although this review will focus on towns, reference will be made where appropriate to other types of settlement. Towns relied very heavily on the countryside for their provisioning and the demands of the urban populations significantly influenced the development of farming and the distribution of its produce.

The urban assemblages

This survey is based on the animal bone reports from over 70 sites from 13 towns. The reports vary greatly in the size of the assemblages, the methods of analysis, and the depth and detail of reporting. Table 9.1 provides the basic data about

Table 9.1: Domestic mammal bones recovered from major Roman towns in southern England

Town	Site	Period	Cow	S/G	Pig	Horse	% Cow	% S/G	% Pig	Si:P	H:C	Source
Canterbury	Castle	60-90	219	415	398	A	21	40	39	51	0	King 1982
		70-90	195	484	324	8	19	48	32	60	4	
		50-150	195	273	239	7	28	39	34	53	3	
		150-400	196	107	128	5	45	25	30	46	2	
Canterbury	Castle	Total	805	1279	1089	20	25	40	34	54	2	
Chichester	Cattlemarket	C1	326	122	52	6	65	24	10	70	2	Levitan 1989
		C1-2	1756	740	301	37	63	26	11	71	2	
		C2-3	797	368	153	23	60	28	12	71	3	
		C3-4	739	330	208	41	58	26	16	61	5	
		C4-5	2255	1262	499	70	56	31	12	72	3	
Chichester	Cattlemarket	Total	5873	2822	1213	177	59	28	12	70	3	
Chichester	Market Road	RB	47	20	12	9						Hamilton-Dyer 2004
Chichester	Rowes Garage	C1-2	166	31	17	7	78	14	8	65	4	Seager Smith <i>et al.</i> 2007
Chichester	All	Total	6086	2873	1242	193	60	28	12	70	3	
Cirencester	33 Sheep St	C1-2	425	349	163	5	45	37	17	68	1	Maltby 1998
		C2-3	97	94	37	2	43	41	16	72	2	
		C3-4	170	107	75	8	48	30	21	59	4	
		Total	692	550	275	15	46	36	18	67	2	
Cirencester	Cemetery	C2-3	787	129	59	8	81	13	6	69	1	Thawley 1982b
		C3-4	381	31	30	0	86	7	7	51	0	
		Total	1168	160	89	8	82	11	6	64	1	
Cirencester	Chester St	C1-2	152	105	95	2	43	30	27	53	1	Maltby 1998
		C3-4	2869	116	123	8	92	4	4	49	0	
		Total	3021	221	218	10	87	6	6	50	0	
Cirencester	Chester St	M-L1	391	260	142	12	49	33	18	65	3	Thawley 1982a

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Table 9.1: Domestic mammal bones recovered from major Roman towns in southern England (Continued)

Town	Site	Period	Cow	S/G	Pig	Horse	% Cow	% S/G	% Pig	Si:P	H:C	Source
Cirencester	Querns Road	C2	162	168	78	10	40	41	19	68	6	Maltby 1998
		C3-4	216	208	84	16	43	41	17	71	7	
Cirencester	Querns Road	Total	378	376	162	26	41	41	18	70	6	
Cirencester	St Michael's	C1-2	2262	361	335	10	76	12	11	52	0	Levitan 1990
		C3	1044	614	445	16	50	29	21	58	2	
		C4	1074	550	472	9	51	26	23	54	1	
Cirencester	St Michael's	Total	4380	1525	1252	35	61	21	17	55	1	
Cirencester	Stepstairs Lane	LC1-2	204	181	58	4	46	41	13	76	2	Hambleton 2008b
Cirencester	Trinity Road	C3-4	350	46	36	10	81	11	8	56	3	Hambleton 2008b
Cirencester	Beeches Rd CQ+CX/CY	C4	504	136	87	15	69	19	12	61	3	Levitan 1986
	Beeches Rd DE/DF	C4	453	272	228	27	48	29	24	54	6	King 1986
Cirencester	Beeches Rd	Total	957	408	315	42	57	24	19	56	4	
Cirencester	All	Total	11150	3467	2405	150	66	20	14	59	1	
Colchester	Balkerne Lane	60-150	3488	1323	738	55	63	24	13	64	2	Luff 1993
		100-300	6813	692	438	29	86	9	6	61	0	
		150-400+	5100	1824	1291	47	62	22	16	59	1	
Colchester	Balkerne Lane	Total	15401	3839	2467	131	71	18	11	61	1	
Colchester	Butt Road	200-320	63	48	101	14	30	23	48	32	18	Luff 1993
		200-400+	66	47	88	7	33	23	44	35	10	
		320-400+	478	348	533	33	35	26	39	40	6	
Colchester	Butt Road	Total	607	443	722	54	34	25	41	38	8	
Colchester	Culver St	60-150	626	579	778	10	32	29	39	43	2	Luff 1993
		60-225	314	281	166	6	41	37	22	63	2	
		75-300	416	432	782		26	27	48	36	0	
		100-350	192	127	184	1	38	25	37	41	1	
		150-400+	781	567	734	17	38	27	35	44	2	
Colchester	Culver St	Total	2329	1986	2644	34	33	29	38	43	1	

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Exeter	St Mary Major	55-75 (M)	119	125	109	0	34	35	31	53	0	Maltby 1979a
		75-100	143	172	124	0	33	39	28	58	0	
		100-200	126	169	148	14	28	38	33	53	10	
		200-300	163	107	143	0	39	26	35	43	0	
		300+	140	43	85	8	52	16	32	34	5	
Exeter	St Mary Major	Total	691	616	609	22	36	32	32	50	3	
Exeter	Trickhay St	55-75 (M)	61	66	40	0	37	40	24	62	0	Maltby 1979a
		75-100	33	37	37	0	31	35	35	50	0	
		75-150	11	6	14	0					0	
		100-200	102	68	41	0	48	32	19	62	0	
		200-300	35	37	33	0	33	35	31	53	0	
		300+	589	97	138	17	71	12	17	41	3	
Exeter	Trickhay St	Total	831	311	303	17	58	22	21	51	2	
Exeter	All	Total	4344	2339	1817	126	51	28	21	56	3	
Gloucester	East Gate	C1-4	399	158	80	16	63	25	13	66	4	Maltby 1983
		C4	560	284	136	17	57	29	14	68	3	
Gloucester	East Gate	Total	959	442	216	33	59	27	13	67	3	
Gloucester	Eastgate St	C2	1094	1	0	0	100	0	0		0	Levine 1986
Gloucester	1, Westgate St	C3-4	217	30	16	4	83	11	6	65	2	Maltby 1979b
Gloucester	All	Total	2270	473	232	37	76	16	8	67	2	
London	Aldgate (Pit 15)	L1-E2	175	7	7		93	4	4	50	0	Watson 1973
London	Amphitheatre	125-200	370	17	24	20	90	4	6	41	5	Liddle 2008
		L3-M4	27	3	9	13	69	8	23	25	33	
		Late C4	625	8	19	37	96	1	3	30	6	
London	Amphitheatre	Total	1022	28	52	70	93	3	5	35	6	
London	Baltic House	50-250	21	12	23	18	38	21	41	34	46	Reilly 2002
		250-400	186	24	74	58	65	8	26	24	24	
London	Baltic House	Total	207	36	97	76	61	11	29	27	27	

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Table 9.1: Domestic mammal bones recovered from major Roman towns in southern England (Continued)

Town	Site	Period	Cow	S/G	Pig	Horse	% Cow	% S/G	% Pig	S:P	H:C	Source
London	Billingsgate	C1-2	1272	316	636	24	57	14	29	33	2	Armitage 1980
London	Cannon St	C1-4	219	77	225	0	42	15	43	25	0	Pipe 2002
London	E. Cemetery (D+F)	C1-4	498	85	66	276	77	13	10	56	36	Reilly 2000
London	Mithraeum	C2-4	98	28	58	0	53	15	32	33	0	Macready and Sidell 1998
London	1, Poultry	48-65	214	37	41	8	73	13	14	47	4	Pipe 2011
		65-95	270	44	60	1	72	12	16	42	0	
		95-135	952	93	131	5	81	8	11	42	1	
		135-220	192	20	27	0	80	8	11	43	0	
		220-400	326	66	75	2	70	14	16	47	1	
		Late C4	120	19	16	3	77	12	10	54	2	
London	1, Poultry	Total	2074	279	350	19	77	10	13	44	1	
London	Walbrook	C2-4	896	51	21	4	93	5	2	71	0	C-Brock/Armitage 1977
London	All	Total	6461	907	1512	469	73	10	17	37	7	
Southwark	15-23 Southwark St	M-L C1	46	50	46	5	32	35	32	52	10	Pipe and Rackham 1992
		Late C1	42	48	53	3	29	34	37	48	7	
		C2-3	49	43	58	4	33	29	39	43	8	
		C4	15	13	17	1						
Southwark	15-23 Southwark St	Total	152	154	174	13	32	32	36	47	8	
Southwark	199 Borough H St	C1-4	1413	754	803	2	48	25	27	48	0	Locker 1988
Southwark	Borough H St	C1-2	2967	215	375	7	83	6	11	36	0	Ainsley 2002
Southwark	Fennings Wharf	C1-4	45	29	48		37	24	39	38	0	Reilly 2001
Southwark	Hunt's House	Late C1	4		1	1						Bendrey 2002
		170-190	5	6	1	38						
		190-240	59	11	23	6	63	12	25	32	9	
		240-LC4	1554	49	101	32	91	3	6	33	2	

	L4C-E5C	260	12	30	1	86	4	10	29	0	
	5C	65	3	8							
Southwark	Hunt's House	1947	81	164	78	89	4	7	33	4	
Southwark	London Bridge 95	632	157	287	20	59	15	27	35	3	Ainsley 2002
Southwark	Winchester Palace	81	63	206	2	23	18	59	23	2	Reilly 2005
	C3-4	77	12	59	2	52	8	40	17	3	
Southwark	Winchester Palace	158	75	265	4	32	15	53	22	2	
Southwark	1973-91 sites	106	43	47	1	54	22	24	48	1	Liddle <i>et al.</i> 2009
	70-100	88	141	83	1	28	45	27	63	1	
	120-160	743	214	329	40	58	17	26	39	5	
	200-270	87	50	144	1	31	18	51	26	1	
	270-350	201	44	58	23	66	15	19	43	10	
	Late C4	2251	116	167	7	89	5	7	41	0	
Southwark	1973-91 sites	3476	608	828	73	71	12	17	42	2	
Southwark	All	10790	2073	2944	197	68	13	19	41	2	
St Albans	1955-61	118	37	36	14	62	19	19	51	11	Wilson 1984
St Albans	Folly Lane P3-7	2201	603	209	285	73	20	7	74	11	Locker 1999
St Albans	All	2319	640	245	299	72	20	8	72	11	
Silchester	Basilica	586	331	314	34	48	27	26	51	5	Grant 2000
	85-125/50	591	390	349	14	44	29	26	53	2	
	125-150	414	374	303	7	38	34	28	55	2	
	250-400	906	1479	805	21	28	46	25	65	2	
Silchester	Basilica	2497	2574	1771	76	36	38	26	59	3	
Silchester	Insula IX	1148	868	965	20	39	29	32	47	2	Ingrem 2011
	200-250	1574	947	625	19	50	30	20	60	1	
	300-400	1354	374	253	13	68	19	13	60	1	Ingrem 2006
Silchester	Insula IX	4076	2189	1843	52	50	27	23	54	1	

(Continued on next page)

Table 9.1: Domestic mammal bones recovered from major Roman towns in southern England (Continued)

Town	Site	Period	Cow	S/G	Pig	Horse	% Cow	% S/G	% Pig	S:P	H:C	Source
Silchester	North Gate	C3-4	225	79	85	16	58	20	22	48	7	Hamilton-Dyer 1997
	South Gate	50-85	273	109	32	1	66	26	8	77	0	Maltby 1984
Silchester	South Gate	85-150	201	91	70	6	56	25	19	57	3	
		300-400	164	73	91	6	50	22	28	45	4	
		Total	638	273	193	13	58	25	17	59	2	
Silchester	Manor Farm	RB	109	66	38	2	51	31	18	63	2	Maltby 1984
Silchester	All	Total	7545	5181	3930	159	45	31	24	57	2	
Winchester	Crowder Terrace	C2	266	36	6	72	86	12	2	86	21	Coy/Bradfield 2010
	Crowder Terrace	C3-4	20	80	8	7	19	74	7	91	26	
Winchester	Oram's Arbour	C1-3	40	88	43	74	23	51	25	67	65	
	Oram's Arbour	C3-4	116	105	31	46	46	42	12	77	28	
Winchester	Western Suburb	Total	442	309	88	199	53	37	10	78	31	
Winchester	Staple Gardens	C1-2	92	84	60	4	39	36	25	58	4	Maltby 1986
	Staple Gardens	C3-4	523	373	222	34	47	33	20	63	6	
Winchester	Staple Gardens	Total	615	457	282	38	45	34	21	62	6	
Winchester	Victoria Rd G2	C1-2	989	73	32	103	90	7	3	70	9	Pfeiffer 2010
	Victoria Rd G4	C1-2	312	431	232	26	32	44	24	65	8	
Winchester	Victoria Rd East	C2-4	5035	3198	1151	448	54	34	12	74	8	
	Victoria Rd West	C2-4	878	864	400	105	41	40	19	68	11	Maltby 2010
Winchester	Hyde Abbey	C2-4	602	776	284	82	36	47	17	73	12	
	Northern Suburb	Total	7816	5342	2099	764	51	35	14	72	9	
Winchester	Northgate House	C1-2	111	156	28	5	38	53	9	85	4	Strid 2011
Winchester	Northgate House	C3	385	274	144	8	48	34	18	66	2	
		C4	268	209	78	13	48	38	14	73	5	
Winchester	Northgate House	Total	764	639	250	26	46	39	15	72	3	

Winchester	JS Crown Hotel	C2-4	137	159	42	11	41	47	12	79	7	Maltby 2010
	27 Jewry St	C2-4	171	123	45	11	50	36	13	73	6	
	Henly's Garage	C2-4	314	230	141	24	46	34	21	62	7	
Winchester	Defences	Total	622	512	228	46	46	38	17	69	7	
Winchester	All	Total	10259	7259	2947	1073	50	35	14	71	9	

Counts are of NISP or selected bone elements (refer to reports for details) and usually exclude sieved samples. Cow = cattle; S/G = sheep/goat

P = species present but not quantified by NISP; A: species represented by associated bone groups only. % Cow; % S/G; % Pig = percentages of total cow, sheep/goat and pig.

S:P = percentage of sheep/goat and pig; H:C = percentage of horse of total horse and cattle.

the number of bones from those assemblages which include quantification of the domestic mammals. Counts are usually based on the number of identified specimens (NISP). These are raw counts based on the original reports. It should be borne in mind that different analysts count different suites of elements. For example, many do not include most of the vertebrae and ribs; some include loose teeth whilst others exclude them. It is often impossible from the information available to manipulate the data into a standardised count. Some counts are based on a selected suite of elements. In broad surveys of this type, it is generally assumed that these variations in recording do not significantly affect the relative abundance of species represented. Comparisons of the results from NISP counts and a selected suite of elements at Winchester showed close similarities in the percentages of species calculated (Maltby 2010, 97–102). Here and elsewhere, however, it has been shown that NISP calculations usually favour cattle whereas estimates of minimum number of individuals usually produce higher percentages of sheep and pig than NISP counts from the same assemblages. Where known, bones in large associated groups (partial and complete skeletons) have been excluded from the counts. Most of the counts are based on hand-collected assemblages only. Again, these are likely to be biased (to an unknown extent) towards larger bones, meaning that sheep, pig and birds are under-represented. Preservation factors are also biasing factors that are difficult to control in reviews such as this. More fragile elements are undoubtedly under-represented, as can be shown in published element counts from these sites (*e.g.* Maltby 2010, 91–2; Ingrem 2011, 246–8).

Cattle

Beef production was of paramount importance in animal husbandry practices in Roman Britain. There is little doubt that beef was by far the most common meat consumed throughout the province, even allowing for biases against sheep and pig in faunal assemblages due to taphonomic and recovery factors. The importance of beef in urban provisioning has long been established through general surveys of animal bone counts by King (1978; 1984; 1999). Cattle carcasses supply substantially more meat than those of pigs and sheep. So even if more sheep than cattle were kept in some areas of southern England, beef products may have provided over 90 per cent of the meat diet in some towns according to some estimates (*e.g.* Dobney *et al.* 1996).

The updated survey presented here shows that the average percentage of cattle of the total cattle, sheep/goat and pig assemblages (in 151 samples of >100 elements) was 51 per cent. In 68 cases, the percentage of cattle in the assemblages lies above 50 per cent and in 30 cases this figure rises over 70 per cent (Table 9.2). However, there is much variation in these results with cattle percentages ranging between 19 per cent and 100 per cent. There are many potential reasons for these variations, including chronological and regional variations, cultural preferences, butchery processes, and

Table 9.2: Percentages of cattle in early and late urban Romano-British assemblages (from sites in Table 9.1)

	10–19%	20–29%	30–39%	40–49%	50–59%	60–69%	70–79%	80–89%	90–100%	Total
50–100	1	4	7	5	2	2	3			24
50–200		4	7	4	4	2	2	1	2	26
100–200		1	4	2	1			4	2	14
100–300		2	6	2		1		2		13
150–400			2	4	3	1			1	11
200–300			4	1	2	1				8
200–400	1	1	4	5	3	3	1	3	2	23
300–450			1	5	8	2	2	2	1	21
Roman			1	5	1	2	2			11
Total	2	12	36	33	24	14	10	12	8	151

recovery and preservation biases. The following paragraphs will examine some of these factors.

King (1984; 1999) showed that later Roman assemblages tended to produce higher percentages of cattle than in earlier phases. He argued that this showed increasing reliance on cattle in the agricultural economy. King's initial results and interpretations have generally been supported in later surveys (*e.g.* Grant 2004). Current research on a vast survey of Roman rural assemblages is also demonstrating that this trend is found consistently throughout the province (Allen forthcoming). The results from large towns are more complex. Maltby (2010, 265) showed that in Roman urban sites with multi-period assemblages, cattle percentages increased in the latest Roman phase in 17 cases but decreased in 11 other cases. Even within the same town there are sometimes contrasting trends. In Silchester, for example, as shown in Table 9.1, cattle increased significantly in the Insula IX assemblages (from 39 to 68 per cent) but decreased on the Basilica site from 48 per cent to 28 per cent during the same period (Ingrem 2006; 2011; Grant 2000). In some other assemblages, the percentages of cattle fluctuated both upwards and downwards, for example in the 1973–1991 assemblages from Southwark (Liddle *et al.* 2009). Nevertheless, there is a general tendency for percentages of cattle to increase in later Roman urban assemblages, as indicated in Table 9.2, where the mode of cattle percentages increases from 30–39 per cent in samples dated between AD 50 and 200 to 50–59 per cent in assemblages of 4th-century date. These data are amalgamated in Fig. 9.1 to compare assemblages of broadly early (AD 50–200) and late Roman (AD 300–450) date and these results confirm that cattle percentages tend to be higher in assemblages from the later period.

Although this supports the contention that beef production and consumption became increasingly important during the Romano-British period, it does not account for all of the variations observed. There are variations within different areas of the towns. Although there is a wide range of variability, assemblages from the centre

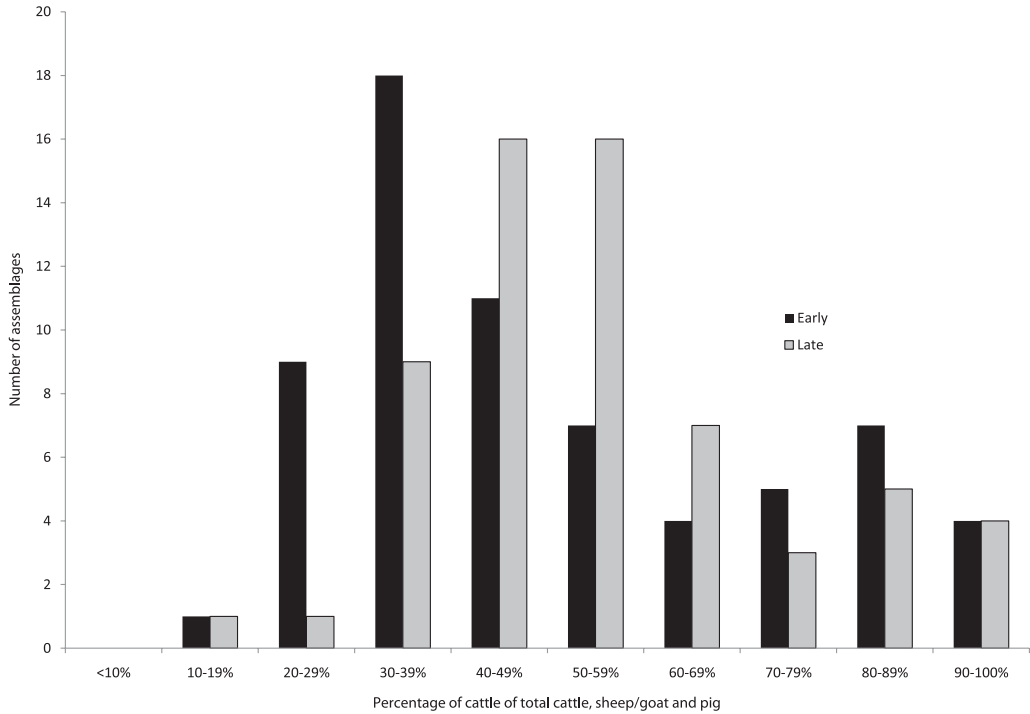


Fig. 9.1: Percentage of cattle of total cattle, sheep/goat and pig (over time).

of towns tend to produce fewer cattle bones than those from extra-mural sites. Percentages of cattle from intra-mural sites situated away from the central zones fluctuate widely but generally the percentages are higher than those from the central areas but lower than those from sites situated on or outside the defences (Fig. 9.2).

Many of the assemblages with high percentages of cattle bones have evidence for the systematic disposal of butchery waste from specialist processing. Most of the Roman towns from southern England have produced evidence of these dumps. Sometimes these assemblages are dominated by heads and feet, such as the one from Rack Street in Exeter (Maltby 1979a). Other assemblages, most notably from Eastgate Street, Gloucester (Levine 1986) are dominated by split upper limb bones or by scapulae. These and other examples are listed in previous discussions (Maltby 2007; 2010, 286).

The specialist butchers developed very systematic and distinctive methods of carcase dismemberment, filleting and marrow extraction (Maltby 2007). It is clear that they handled a significant number of cattle brought to the towns for slaughter and processing. Although some of the cattle may have been reared close to the towns themselves, it is likely that they were obtained from a wide range of sources both from the local hinterland and probably from further afield. Recent strontium stable isotope studies have shown that some of the cattle from the rural settlement

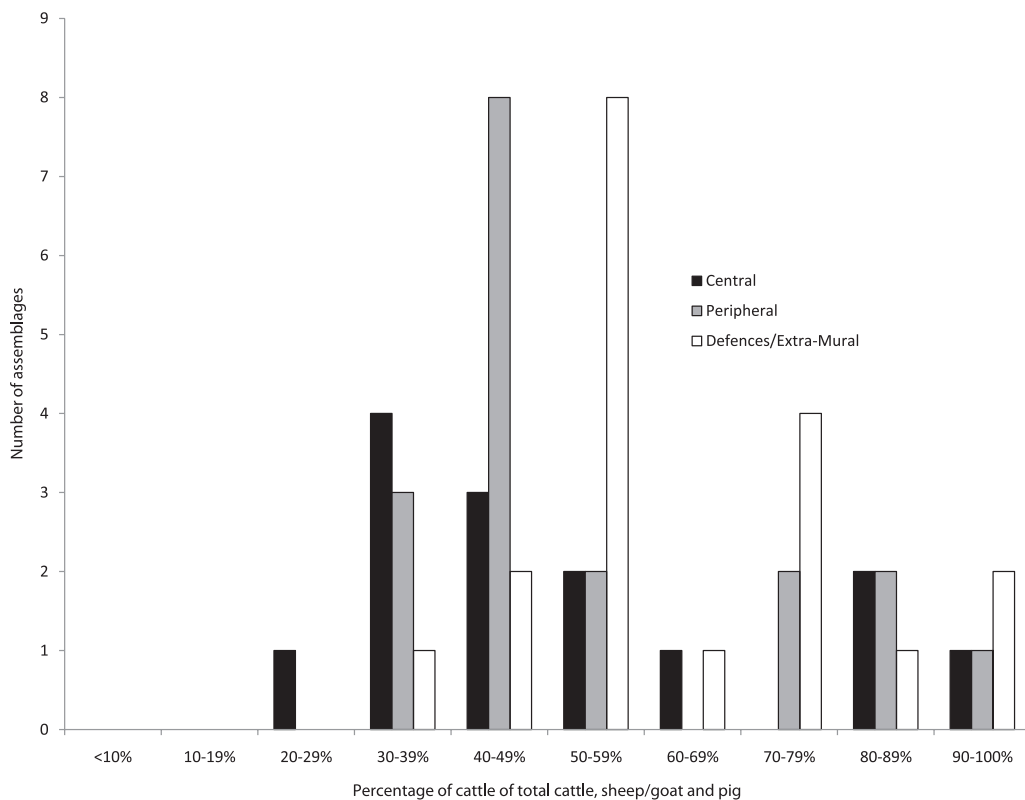


Fig. 9.2: Percentage of cattle of total cattle, sheep/goat and pig (over urban space).

of Owslebury near Winchester were not raised locally (Minniti *et al.* 2014). Similar analyses on the cattle from the Roman towns themselves would be very interesting and may also show that cattle were obtained from different regions.

The focus on provisioning towns with beef is also evident in the mortality profiles. The majority of cattle found on all types of site in Roman Britain are adults. However, many urban assemblages have quite distinct peaks of mortality that suggests that significant percentages of cattle were slaughtered between four and eight years of age, with a peak perhaps between five and seven years (Grant 2004; Maltby 2010, 288). Therefore, many of these animals were old enough to have produced calves, and to have provided dairy produce and/or have been used as beasts of burden prior to slaughter. Rural assemblages generally follow the same pattern but tend to produce less marked peaks of slaughter (Maltby 2010, 144). There are some exceptions to this general trend. For example, the assemblages from Insula IX at Silchester included an unusually large percentage of cattle killed between 2–3 years of age (Ingrem 2006, 345; 2011, 249). Another more common feature of some of the urban assemblages is the presence of calf bones. Calf mandibles, for example, form over 10 per cent of the assemblages from Greyhound Yard, Dorchester (Maltby 1994) and the Basilica site at

Silchester (Grant 2000). This indicates that veal was consumed in significant quantities in at least some of the towns. Veal may well have been regarded as a luxury food. The slaughter of calves can also be a by-product of dairy production.

Another consistent feature of cattle assemblages from Romano-British towns is the bias towards bones of female cattle based on evidence of measurements of the metacarpals. Metacarpals of cows are generally more gracile than those of bulls and oxen (Grigson 1982; Davis *et al.* 2012). Therefore, after the distal epiphyses have fused (by c. 36 months), measurements can indicate the sexes of adult cattle represented. Interpretations are complicated by the systematic breakage of metacarpals for marrow (results from complete bones are more reliable), regional and chronological variations in cattle sizes (Albarella *et al.* 2008) and by pathological changes that increase the distal breadth of some bones (Hammon 2011). Nonetheless, assemblages from Roman towns have been consistently biased towards smaller bones, suggesting that most of the adult cattle represented were females. These patterns have been observed in Exeter (Maltby 1979a, 33–34); Dorchester (Maltby 1993), Chichester (Levitan 1989); Cirencester (Maltby 1998); Colchester (Luff 1993), London (Pipe 2011), Southwark (Liddle *et al.* 2009) and Winchester (Maltby 2010, 148). The rural site at Owslebury, near Winchester, included a higher proportion of larger specimens, probably signifying the presence of more oxen on this farming settlement (Maltby 1994). More assemblages from rural sites in southern England still need to be analysed to see whether this pattern is repeated consistently. However, it would appear that the butchers in the towns targeted mature, mainly female, cattle that had become surplus to, or were considered unsuitable for, breeding and milk production.

There is convincing evidence that the Roman period saw an increase in the overall size of cattle, particularly in south-east England (Albarella *et al.* 2008). Some of these improvements may have been brought about by the importation of new stock. Larger cattle would have both increased the effectiveness of beef production and also for their strength for ploughing. The evidence for this increase in towns is somewhat masked by the bias towards smaller females, as discussed above. However, increases in size during the Roman period show up clearly in some samples from Southwark (Liddle *et al.* 2009) and Colchester (Albarella *et al.* 2008, 1835), for example. Evidence for size increases is much less marked in the south-west with cattle from Exeter and Dorchester being generally smaller than those from settlements such as Winchester (Maltby 2010, 292–3).

Table 9.3: Percentages of cattle from sites in different parts of towns (all periods combined; data adapted from Table 9.1 but excludes Southwark sites)

	10–19%	20–29%	30–39%	40–49%	50–59%	60–69%	70–79%	80–89%	90–100%	Total
Central		1	4	3	2	1		2	1	14
Peripheral			3	8	2		2	2	1	18
Extra-mural			1	2	8	1	4	1	2	19

Sheep and goats

The prevalence of sheep within sheep/goat assemblages on Romano-British sites including urban assemblages has long been established. Goats have been specifically identified in nearly all the towns surveyed but rarely provide more than 5 per cent of the diagnostic bones positively identified as sheep and goat (Maltby 2010, 268).

Sheep are the dominant species in most Iron Age assemblages in southern England (Hambleton 2008a) but tend to decrease in Romano-British assemblages (Albarella 2007). Although sheep percentages tend to be lower in urban sites compared to rural assemblages (King 1984; 1999), there are substantial variations both within and between towns (Table 9.1). As discussed above, some of these biases are due to the presence of large dumps of cattle-processing waste, which deflate the percentages of other species. Therefore, it is more informative to exclude cattle from the calculations and compare sheep and pig elements only. Sheep/goat elements outnumber pig in 101 of the 150 assemblages compared in Table 9.1. In 31 cases sheep/goat provide over 70 per cent of the total sheep/goat and pig elements (Table 9.4). There are some chronological variations. Sheep/goat tend to be better represented in earlier assemblages from multi-period sites. On 35 multi-period sites there were decreases in the percentages of sheep/goat in the latest phase in 17 cases. However, sheep/goat percentages increased in later Roman phases in 10 other sites. The remaining eight sites either showed minimal chronological variations in sheep/goat percentages or percentages that fluctuated inconsistently. In some towns the trend is fairly consistent. In Dorchester, sheep/goat percentages decreased in later Roman assemblages in all five of the multi-period sites compared, although their percentages varied significantly between sites (Table 9.1). However, inconsistent

Table 9.4: Percentages of sheep/goat of total sheep/goat and pig in early and late urban Romano-British assemblages (from sites in Table 9.1)

	10–19%	20–29%	30–39%	40–49%	50–59%	60–69%	70–79%	80–89%	90–100%	Total
50–100		1	1	4	7	7	4			24
50–200		1	4	3	7	5	4	2	1	27
100–200			1	2	3	3	1	1		11
100–300			1	5	1	2	3			12
150–400			1	2	1	1	2			7
200–300		1	2	1	2	2				8
200–400	1	2	2	4	4	6	5	1	1	26
300–450		1	3	3	6	5	3			21
Roman		1	1	1	5	3	3			14
Total	1	7	16	25	36	34	25	4	2	150

chronological variations can also be found within other towns. For example, sheep/goat percentages increased in the Basilica and Insula IX assemblages in Silchester but decreased on the South Gate site.

Where minimum numbers of animals represented have been calculated, sheep/goat have sometimes been found to outnumber cattle. Examples include Insula IX, Silchester (Ingrem 2011, 263) and Winchester (Maltby 2010, 102). In some of the towns, it seems probable that sheep were the most commonly slaughtered species but, despite this, lamb and mutton provided a much smaller proportion of the meat diet than beef. There is much less evidence for significant dumps of processing waste of sheep in urban deposits than in the case of cattle. Although it is very likely that many sheep were acquired and processed by the specialist urban butchers, some may have been acquired and processed by individual households.

Although sheep/goat mandibular ageing evidence shows a lot of variations within and between towns, there are some common trends. Most urban assemblages have produced substantial percentages of mandibles from sheep slaughtered between six and 36 months of age. Often there is a marked peak of slaughter of animals aged between 18 and 36 months old, indicating a focus on meat production. There is, however, an increase in the percentage of older sheep in some later Roman urban assemblages (Grant 2004, 378), suggesting that wool production became an increasingly significant factor in sheep husbandry in southern Britain, although few very old animals are represented in urban assemblages (Maltby 2010, 290). Quite high percentages of bones of young lambs have been encountered on some sites, for example in several intra-mural assemblages from Colchester (Luff 1993, 73) and on the Basilica site in Silchester (Grant 2000).

As in the case of cattle, there is evidence for some improvements in the size of sheep during the Romano-British period, particularly in central and south-east England. Using log ratio analysis of a suite of measurements, Albarella *et al.* (2008) demonstrated that there were increases in sheep sizes during the Roman period at rural sites such as Heybridge, Essex, as well as in the neighbouring town of Colchester. This trend can also be demonstrated by specific measurements, as indicated by distal tibia breadth measurements from Colchester (Figs 9.3–9.6 – data adapted from Luff (1993)). The bones from the late Roman deposits are generally larger than those from the earliest Roman phases. It should be noted that some large specimens appear even in the earliest period, which may indicate the importation of new stock. A similar observation was made in Winchester (Maltby 1994), where it has been argued that some of the larger stock may have been a hornless type. Larger sheep would have provided more meat and possibly more wool.

It should be noted, however, that size improvements in sheep were not found in all regions of Roman Britain. For example, there is little evidence that sheep in Exeter came from larger types (Fig. 9.7). Here, and in some other parts of western England and Wales, the sheep were no larger than those found on Iron Age sites in those regions (Maltby 2010, 294–5).

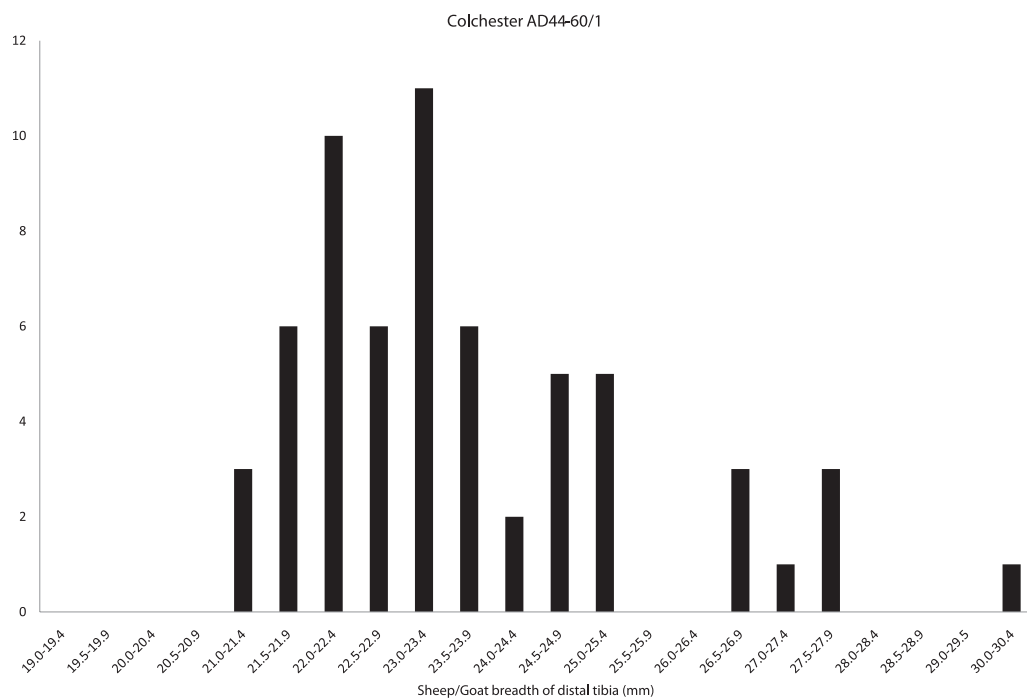


Fig. 9.3: Sheep/goat, distal tibia breadth measurements, Colchester AD 44-60/1.

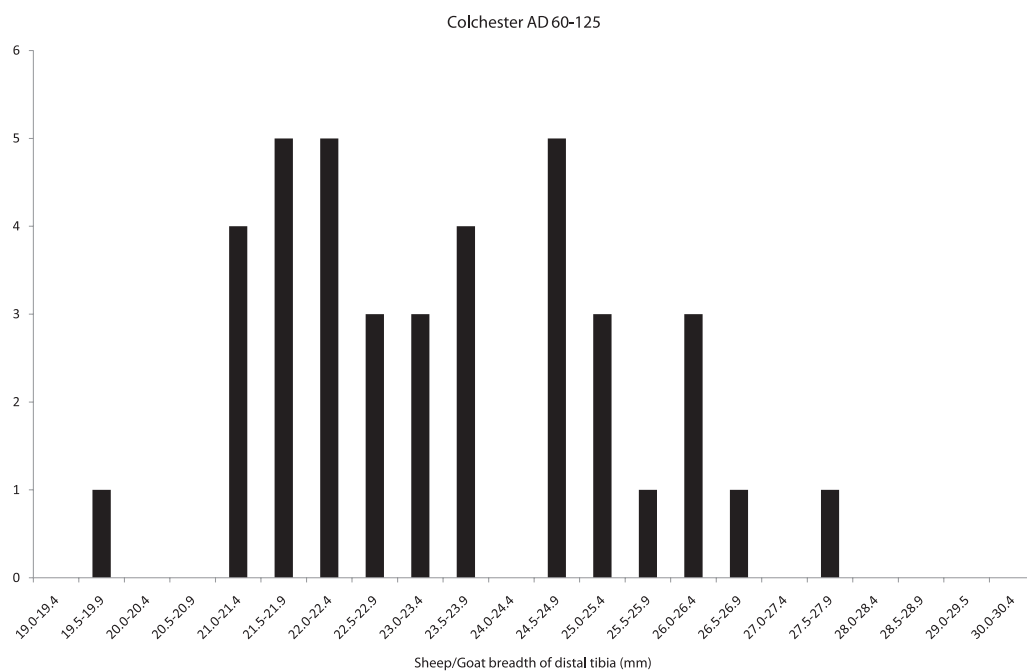


Fig. 9.4: Sheep/goat, distal tibia breadth measurements, Colchester AD 60-125.

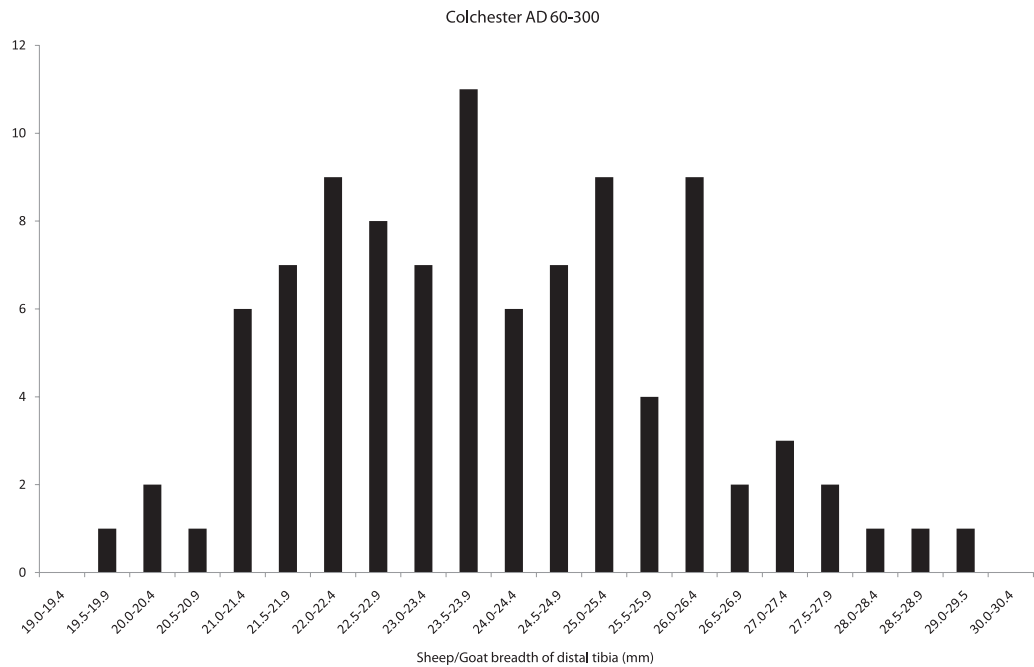


Fig. 9.5: Sheep/goat, distal tibia breadth measurements, Colchester AD 60–300.

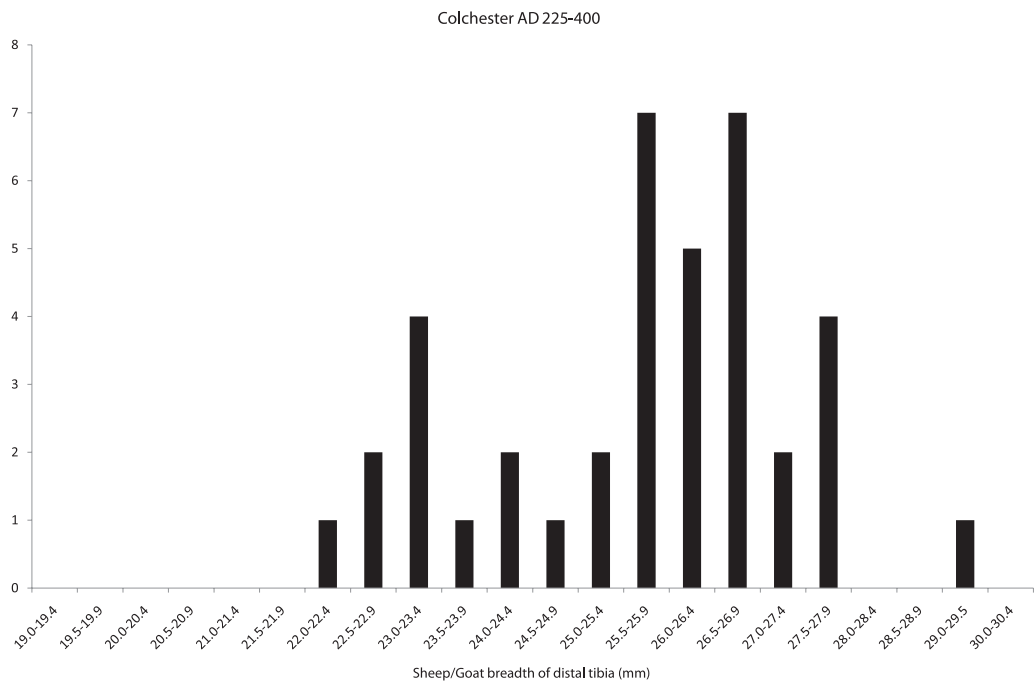


Fig. 9.6: Sheep/goat, distal tibia breadth measurements, Colchester AD 225–400.

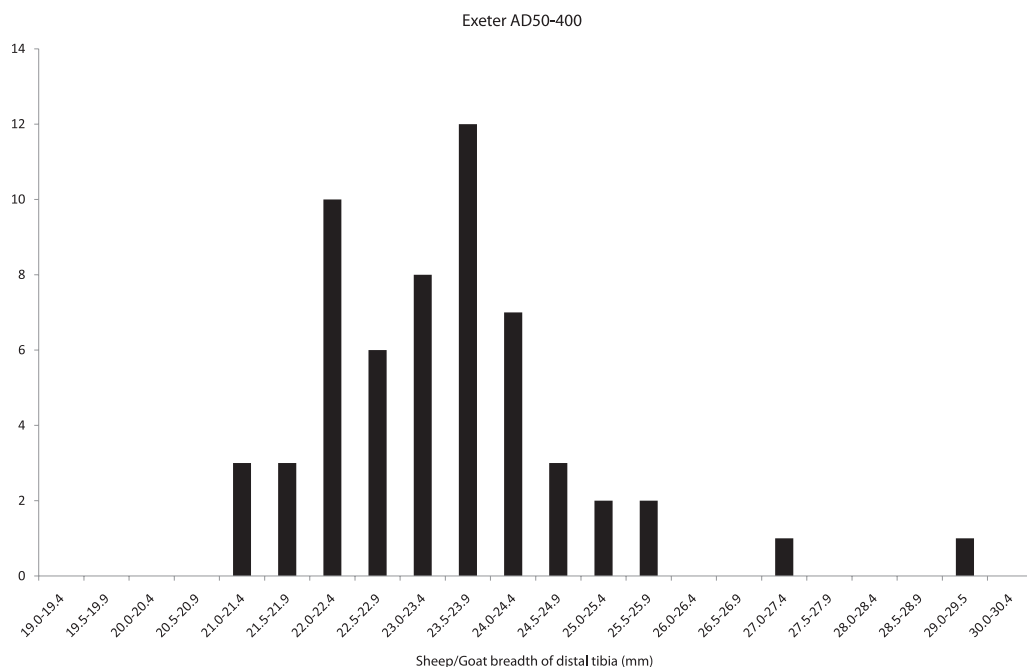


Fig. 9.7: Sheep/goat, distal tibia breadth measurements, Exeter AD 50-400.

Pigs

The relative abundance of sheep to pigs in the urban assemblages under consideration has been discussed above. King (1984; 1999) has shown that pigs tend to be better represented in large urban and military assemblages in Roman Britain. There is, however, a large amount of variation. Pigs are particularly common on sites from London and Southwark, where they usually outnumber sheep/goat in the assemblages studied. They are also well represented on most sites in Colchester. They are much less well represented in some other towns such as Chichester and Winchester, particularly on sites not in the central areas of the towns (Table 9.1). King (1984) and Grant (2004) have both suggested that the increase in pork consumption may be linked to the cultural preferences of immigrant communities. The high percentages of pigs in the London region in the Roman period follows on from their occurrence in very high frequencies in assemblages from some proto-historic trading sites in the region, particularly Braughing (Ashdown and Evans 1981; Maltby 2006; Hambleton 2008a). Either the conditions for pig keeping were particularly favourable in this region, and/or the increase in pig rearing, along with significant local and long-distance trade in pork products, developed through interactions with Gallic and Roman communities during the late Iron Age and continued after the Roman occupation. Pigs would have been an attractive source of food for expanding urban communities, particularly if their inhabitants included immigrants with inherited preferences for pork dishes.

Pigs tend to be well represented on high status sites, one notable urban example being the Winchester Palace site in Southwark (Reilly 2005), where pig provided 78 per cent of the total sheep/goat and pig elements (Table 9.1).

Pigs are also animals that can adapt to being kept within towns and pig slurry has been identified in Roman Leicester (Morris *et al.* 2011, 29). The skeletons of three very young piglets found near the centre of Roman Exeter (Maltby 1979a, 11) could well have belonged to ritual depositions but their presence also infers that pigs were farrowing within the town. Very young pig bones have also been recorded in Silchester and Dorchester. Pig bones were generally larger in Winchester and Dorchester than in neighbouring rural settlements and some of these could have been animals that had been raised and fattened in sties (Maltby 2010, 203). However, other explanations could also account for the size increase, for example, introduction of new stock, or the preferential selection of larger male animals for slaughter in towns. More mandibles from domestic boars than sows were found in deposits from Dorchester and in most of the assemblages from the Basilica and Insula IX sites in Silchester (Ingrem 2011, 266).

As pigs are raised solely for meat, produce large litters and can tolerate a high rate of slaughter of immature animals, few pigs in archaeological assemblages from all periods belong to elderly animals. In most Roman urban assemblages in southern England, analysis of mandibular tooth ageing data has shown that the majority of pigs were slaughtered during their second and third years when they were approaching full size. Good examples of this culling pattern can be found in Southwark (Liddle *et al.* 2009, 247) and Winchester (Maltby 2010, 200). There is, however, again a lot of variability between assemblages both within and between towns. Bones of piglets under a year old have formed a significant component of some assemblages, particularly on sites near the centres of towns such as Dorchester and Silchester (Maltby 1993; Grant 2004, 379). The meat of suckling pigs, veal calves and young lambs may well have been regarded as luxury food items.

Butchery marks on pig bones from Winchester and Dorchester are quite consistent on vertebrae, mandibles and scapulae in particular (Maltby 2010, 188–94), suggesting that many pigs were processed by specialist butchers. Whether they acquired the pigs mainly from urban and other local sources or relied on a wider trading network remains to be established, although the likelihood that some joints of pork were imported to towns has been suggested by several authors on the basis of discrepancies in body part representation or evidence for large-scale processing on rural sites (*e.g.* Grant 2000; Ingrem 2011, 263; Maltby 2016).

Horses and other equids

It is usually assumed that all equid bones found on Romano-British sites belonged to horses, although there are now several positive identifications of mules and donkeys, mainly from London (*e.g.* Armitage and Chapman 1979; Bendrey 2002).

Horses are generally poorly represented on urban sites. Horse provided 5 per cent or less of the total horse and cattle elements in 39 of the 151 assemblages listed in Table 9.1. The highest percentages of horses usually occur on extra-mural sites, often in areas which were also used as cemeteries. Examples include the Western and Northern suburbs of Winchester (Coy and Bradfield 2010; Maltby 2010; Pfeiffer 2010), the Eastern Cemetery and Baltic House sites in London (Reilly 2000; 2002), Folly Lane, St Albans (Locker 1999) and Butt Road, Colchester (Luff 1993). This suggests that horse carcasses were often deposited in those burial areas, although not necessarily given formal burial themselves. Horses have generally been found in greater abundance on Roman rural settlements (Maltby 2016). Although horse bones occasionally bear evidence of skinning and, even more rarely, butchery, they were not eaten frequently in towns or elsewhere. Hence their rarity in assemblages derived mainly from food processing and consumption debris is to be expected. It is possible that some of the population may have had a taboo on eating horseflesh.

On all types of settlement, most horse bones represented in the assemblages belonged to adult animals – a further indication that they were not regarded primarily as meat producers. Their value to the agricultural economy lay elsewhere. They were mainly exploited as beasts of burden. Abnormal wear has been observed on a number of premolars resulting from the frequent use of a bit during riding and horses, mules and donkeys would also have been used to pull carts. Horses were, however, not used as plough animals until the medieval period.

There is also evidence that some Roman horses were larger than those found on Iron Age sites (Albarella *et al.* 2008, 1841), although the majority found on civilian sites were no larger than modern New Forest ponies.

Poultry

Although chickens (domestic fowl) were introduced to Britain sometime after 500 BC, they are absent from most Iron Age sites in southern England. Where they have been found, it is usually only in very small numbers and mainly in assemblages dating to the 1st century BC or 1st century AD (Hambleton 2008a; Poole 2010). They may have been originally introduced for purposes other than food (Sykes 2012). There is also the enigmatic, unsubstantiated, but often quoted, statement from Julius Caesar's *Gallic War* (5, 12) which stated that, although the Britons (in the middle of the 1st century BC) kept chickens, they did not eat them. Butchered bones, however, have been observed on some late Iron Age sites, including Braughing (20 BC–AD 20), where they were found in substantially greater numbers than on other Iron Age sites (Ashdown 1981; Maltby 1997), again indicating continental influence at that trading settlement. However, here and elsewhere, chickens also continue to be frequently deposited as complete or partial skeletons or accompanying human burials (Sykes 2012).

Chickens were the only types of poultry commonly exploited in Roman Britain. They usually form over 50 per cent of the identified bird bones on major urban

sites (Maltby 2010, 272–7). Their flesh was eaten in the Roman period, as indicated by the presence of butchered bones, but their frequency on different types of site is variable. Maltby (1997) demonstrated that chicken bones occurred more frequently on urban and military sites than on rural settlements, suggesting that this reflected variation in the dietary and cultural preferences of their inhabitants. This pattern has been confirmed by more recent work on a much wider range of assemblages from rural (Allen forthcoming) and urban sites (Maltby 2010, 272–6). In 39 assemblages from urban sites in southern England surveyed in the latter study, chickens provided between 0 per cent and 69 per cent of the sheep/goat, pig and chicken bones (Maltby 2010, 276), with a mean of 12.3 per cent. These results excluded bones from sieved samples, in which percentages of chickens have usually been found to be higher.

Additional to the sites reviewed in Maltby (2010), chickens provided 21 per cent of the sheep/goat, pig and domestic fowl sample from the Dorchester Hospital site. This is substantially higher than encountered in the large assemblage from the Greyhound Yard site (12 per cent) in the same town (Maltby 1993). However, many of the chicken bones from the Hospital site were associated with one early, probably high status, Roman building (Grimm 2008). Similar substantial variations in chicken abundance between sites have been observed in other towns. Chickens provided 11 per cent of the sheep/goat, pig and domestic fowl assemblage from sites excavated between 1973 and 1991 in Southwark (Liddle *et al.* 2009, 245). This percentage lies between percentages of chickens that have been calculated in assemblages from other Southwark sites, which range between 6 per cent and 26 per cent (Maltby 2010, 276). In recent reports on sites from *Londinium* itself, chickens provided 10 per cent of the total sheep/goat, pig and chicken bones from the Amphitheatre (Guildhall Yard) site (Liddle 2008) and 8 per cent from the 1, Poultry site (Pipe 2011), ironically one of the lowest percentages obtained from London sites.

Indeed, the highest percentage of chicken bones from sites in this survey (69 per cent) has been obtained from the London mithraeum (Macready and Siddell 1998), probably reflecting that ritual depositions of chickens were frequently made at this site. Cockerels in particular seem to have been associated with the cult of Mithras and large deposits of chicken bones have been found, for example, at the mithraeum at Tienen in Belgium (Lectacker *et al.* 2004). Chickens generally tend to be well represented on temple sites in Roman Britain (King 2005). The best-known example comes from Uley, Gloucestershire (Levitan 1993) where large numbers of chickens and goats were found at shrines dedicated to Mercury. These may have been from flocks specifically raised for sacrifice. Chickens also quite frequently continue to accompany human burials, for example in the Eastern Cemetery in London (Reilly 2000), Poundbury, Dorchester (Farwell and Molleson 1993) and Lankhills, Winchester (Strid and Worley 2010, 430). Chickens were probably highly regarded as exotic birds and hence would have served at this time both as a luxury food item and as an animal that fulfilled other roles in ritual and sport.

Medullary bone is deposited within the shafts of bird bones (particularly the femur and tibiotarsus). It is a source of calcium for eggshell formation and its presence is therefore indicative of females in lay. Medullary bone has been recorded in chicken bones from several Romano-British sites, including Silchester, Winchester and Dorchester, indicating that the hens in question were in lay or had recently been in lay before they died (Maltby 2010). Unhatched eggshells from Dorchester and London indicate that chicken eggs as well as chicken meat were eaten (Sidell 2008). The presence of very young chickens in most Roman urban assemblages attests to the keeping of chickens in these towns, although it would be surprising if urban populations relied on urban supplies for all their chicken supplies. Nevertheless, chicken husbandry may not have been as widely practised in the countryside compared with longer established and more economically important domestic species, particularly sheep and cattle.

As with other domestic species, there is some evidence for an increase in stature of chickens on some sites in south-east England during the Roman period (Albarella *et al.* 2008, 1842).

Whether many domestic ducks and geese were kept in Roman Britain is less clear (Albarella 2005). Bones of grey lag/domestic goose and mallard/domestic duck have been found in most Romano-British towns but usually only in small numbers. Ducks are usually better represented than geese in the assemblages surveyed by Maltby (2010, 273). The discovery of a hatched goose egg from Dorchester suggests that domestic geese were kept there (Sidell 2008).

Future research directions

The above discussion has briefly summarised the evidence for relative species abundance, butchery and other processing practices, the use of secondary products (milk, eggs etc.) and the culling patterns of domestic animals consumed in towns. It has shown that there are substantial variations within and between towns and between different regions. However, there are some consistent trends in husbandry and consumption practices that have been found in many of the towns. The focus was on beef production, supplemented by pork, lamb and mutton plus a relatively small contribution from chickens. Horses were only rarely included in the meat diet. There were variations in diet between towns and between different communities within the towns and their suburbs. Some of these variations were the result of cultural preferences; others were linked to increased productivity; many were the result of large-scale disposal of cattle-processing waste. Most cattle were processed by specialist butchers who processed the carcasses intensively and quickly, including preserving some of the meat through smoking and salting. They also collected and processed large quantities of marrow from cattle limb bones. The presence of neonatal animals of all domestic species, but particularly pigs and chickens, shows that some animals were raised in towns and in their local hinterland. Undoubtedly,

however, towns would have made major demands upon rural production from further afield for their supplies. The acquisition of substantial numbers of animals for the urban market would have had a major and detrimental effect on traditional redistribution practices.

This discussion has focused on towns because, to date, these have formed the largest assemblages and because many developer-funded sites have produced material over the last 30 years (Maltby 2015). Evidence from towns can, of course, provide only a partial picture of the pastoral economy in southern England during the Roman period. Towns were major consumer sites and, as has been shown, are likely to have focused on specific targets of animals to be acquired for their provision. To get the full picture, comparisons need to be made between urban and rural sites in their hinterland. Unfortunately, in the past this has not been possible to any great extent. Sometimes this is the result of poor preservation and retrieval. Acidic soils in the hinterland of Exeter, for example, have prevented the survival of bones from farms in its vicinity. There have, until quite recently, been only limited excavations of villas that have acquired good faunal assemblages. Fishbourne has produced a very good bone sample (Grant 1971; Allen and Sykes 2011) but Fishbourne was an exceptionally opulent palace and its inhabitants and their consumption practices are not likely to be typical of inhabitants of later smaller villa estates. Many non-villa rural settlements have produced very small bone assemblages, which are too small to compare on an individual basis with urban samples. However, the Leverhulme Rural Settlement of Roman Britain Project is currently accumulating faunal and other data from thousands of sites, which will form the basis of a more general review (Allen forthcoming). This will provide an excellent opportunity to compare urban assemblages with all types of rural sites from small farmsteads to small towns. It will also advance inter-regional comparisons, which have not as yet been fully considered.

Any considerations of animal husbandry also need to take into account their contribution to the arable sector of the economy. For example, the relatively high percentage of bones of large male cattle found on rural sites such as Owslebury is undoubtedly linked to the employment of cattle for ploughing. These cattle therefore made significant contributions to grain production. The manure of domestic stock would also have enhanced soil fertility.

Finally, there is now a suite of new scientific techniques that can be used to supplement and enhance traditional zooarchaeological studies. To consider a few of these techniques, the expansion of stable isotopic studies on animal remains has the potential to provide us with a much more detailed understanding of the movement of animals in Roman Britain and the sources of urban food supply (Minniti *et al.* 2014). Carbon and nitrogen isotopes can also be used to study subtle variations in the diets of the animals themselves, which can also provide information about where the animals were feeding and whether they were receiving supplementary foods. There has been surprisingly little analysis of lipid residues in Roman pottery, which has proved so enlightening for previous periods in detecting residues of dairy produce and animal

fats (e.g. Copley *et al.* 2005). Genetic (aDNA) studies in combination with metrical analyses would also advance our understanding of breeding patterns and importations of new stock, and how widely new types of stock spread across the province.

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