
TRAC Theoretical Roman Archaeology Conference

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Paper Information:

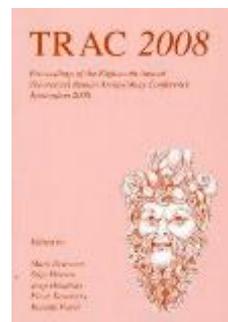
Title: Meat Consumption in Roman Britain: The
Evidence from Stable Isotopes

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Pages: 73–83

DOI: http://doi.org/10.16995/TRAC2008_73_83

Publication Date: 17 April 2009



Volume Information:

Driessen, M., Heeren, S., Hendriks, J., Kemmers, F., and Visser, R. (eds)
2009. *TRAC 2008: Proceedings of the Eighteenth Annual Theoretical
Roman Archaeology Conference, Amsterdam 2008*. Oxford: Oxbow Books

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Meat Consumption in Roman Britain: The Evidence from Stable Isotopes

Colleen Cummings

Introduction

There are many ways of approaching the study of dietary practices in the ancient world. While early studies focussed primarily on textual evidence, recent work has increasingly incorporated evidence from the archaeological record. New developments in methodology, particularly from the field of archaeological science have the potential to provide new insights on ancient diet, but all too often the results of these studies are published in scientific journals or appendices of excavation reports and not made readily accessible to scholars creating syntheses of Roman diet. This paper will attempt to redress this imbalance by showing how carbon and nitrogen stable isotope analysis can contribute to our understanding of ancient Roman diet, especially in relation to the consumption of animal products. I will first discuss some of the views in academia on meat consumption in the Roman world, paying particular attention to the claim that lower class individuals did not have regular access to meat. Then, I will describe the theories and methodologies behind the use of carbon and nitrogen isotopes in palaeodietary studies and, in particular, how stable isotope analysis can indicate animal sources in a person's diet. Lastly, using a case study from Roman Britain, I will illustrate how carbon and nitrogen stable isotope analysis can contribute to our understanding of the use of animal foods in the ancient Roman diet.

Meat Consumption in the Roman world

There is a longstanding, often-perpetuated assumption that the majority of the population in the ancient Roman world consumed a primarily vegan diet (White 1976; Foxhall and Forbes 1982; Garnsey 1998; 1999; Alcock 2006). Although cheese is occasionally allowed for, the idea persists that 'the Roman diet was largely grain based, with modest infusions of legumes and vegetables' (Donahue 2004: 36). The grain-based nature of the diet has led several scholars to conclude a rather negative view of the nutritional health of the ancient Roman people (Sippel 1987; Garnsey 1991; Cherry 1993). The basis for this assumption relies on the prevalence of records relating to grain, particularly administrative records about grain distribution. In contrast to this, there is a paucity of references to meat outside of what could be deemed 'elite' literature. Explanations for this contrast have led to two primary arguments used to explain the rarity of meat consumption in the Roman world. The first is social, and involves the link between meat consumption and sacrificial ritual, and the second is strictly economic and relies on investigations of the agricultural potential of land.

The first of these arguments for a primarily vegetarian diet stems from studies on ancient Greek diet, where there is ample evidence suggesting that the consumption of meat primarily occurred following animal sacrifices (Berthiaume 1982). This link has led many to conclude that in the Roman world meat was similarly only consumed after large religious festivals involving animal sacrifice (e.g., Scheid 1985; Faas 2003: 245; Aldrete 2004: 197). In discussions of sacrifice and

dietary practices, the animals in question are typically the large ones – cows, sheep, goats and pigs – perhaps reflecting modern conceptions of what is ‘proper meat’. In our society chicken and fish is somehow less ‘meaty’ than meats from large mammals (Fiddes 1991: 4). In relation to the ancient world, only rarely is the suggestion made that smaller animals – fish, poultry, hares, etc. – may have been available as meat outside of sacrificial contexts (Wilkins 1995: 104).

The other main argument for the vegan/vegetarian diet of the Romans is that it was simply not economical for most people to produce meat (Garnsey 1999: 16; Donahue 2004: 19; Wilkins and Hill 2006: 142). The crux of this argument rests on the simple ecological reality that raising meat requires more agricultural resources than plant crops do. Domesticated animals require fodder, which must be grown, taking up additional field space that could be used to grow crops for direct human consumption. When expressed strictly in caloric value, this means that producing one calorie worth of animal flesh requires the equivalent of ten calories of grain (Fiddes 1991: 211).

While this may be true for cattle, sheep, or goats that require extensive pasturage and supplementary fodder, other animals such as pigs or geese are particularly efficient to raise as they transform waste materials directly into high protein food. Furthermore, certain meats are often the resulting by-products of a different trade, for example the lambs that result from culling a flock of sheep being raised primarily for wool production. In relation to sacrifice as the only source of animal products, there are also several problems, such as instances of meat trade that are not specifically connected to sacrificial contexts (Isenberg 1975; Frayn 1995) and the regular presence of meat in recipes and other texts which show no connection to sacrifice (briefly discussed in Wilkins and Hill 2006: 143, 153).

Indeed, there do exist many arguments that could be made to counter these vegetarian view of diet (Corbier 1989a; 1989b), but, for the most part, these have not made their way into larger syntheses on the subject. Archaeology, in particular the study of animal bones, raises the most serious critique, as bones with butchery marks are commonly found at a variety of different sites throughout the Roman world indicating that cows, sheep, goats, pigs and a range of other animals both domestic and wild were regularly consumed, even if their primary economic importance may have been related to labour, wool or milk (King 1999; Grant 2004; MacKinnon 2004). In contrast to the arguments for a cereal based diet presented by scholars approaching the issue from a textual or ecological angle, animal bone specialists warn us that ‘the size and ubiquity (except in very acidic environments) of animal bones may tempt us to overemphasize the role of meat in past diets’ (Grant 2004: 383).

The evidence for meat consumption in the Roman world, therefore, has accurately been described as ‘ambiguous’ (Corbier 1989a, 1989b). Although the assumption of vegetarianism has been vigorously challenged for certain sub-populations (Davies 1971; Roth 2005), much of the evidence we have supporting the regular consumption of meat could arguably pertain only to the higher class and have little relevance to the broader populace. Archaeological finds of animal bones at a wide range of site types are very useful, but the possibility remains that only a small portion of a site’s inhabitants could be responsible for the large amounts of butchered bones present. Accessing dietary practices at the individual level is more elusive, though the analysis of individual human skeletal remains found in cemeteries can greatly help. In particular, biochemical studies of bone, such as carbon and nitrogen stable isotope analysis can elucidate dietary practices at the individual level, especially as this provides information on the types of animals consumed and the approximate proportions of animal protein in the diet.

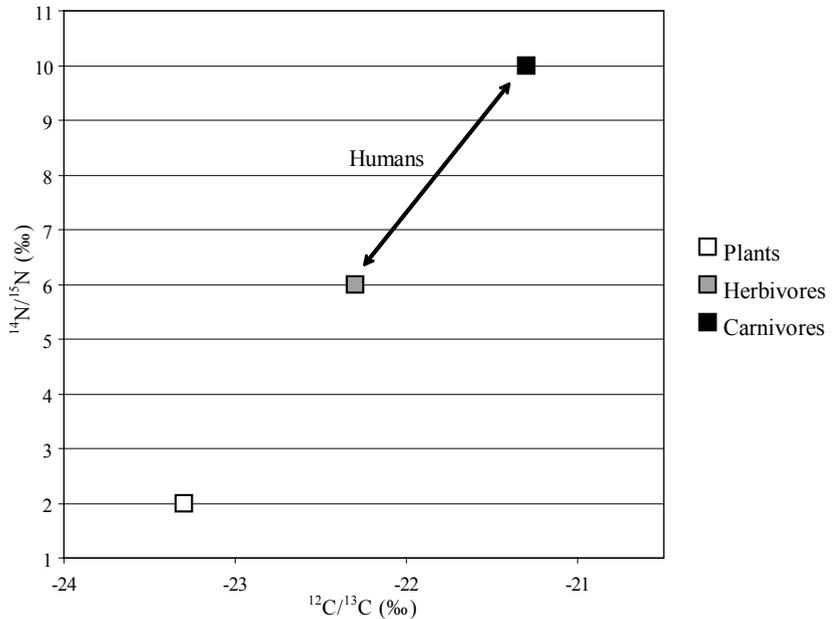


Figure 1. Linear approach to stable isotope analysis.¹

Stable Isotope Analysis

Researchers interested in ancient diet first began using carbon and nitrogen stable isotope analysis in the late 1970s (Vogel and van der Merwe 1977). Much of the initial work was related to the spread of maize agriculture in the new world (see Larsen 1997: 270–280), but the method has increasingly been used to answer a broad range of research questions. In brief, isotopes are different forms of an element, each with a different atomic mass. Some isotopes are unstable and subject to nuclear decay, such as the unstable isotope carbon 14, which forms the basis of radiocarbon dating in archaeology. However, in palaeodietary studies we are interested in the stable isotopes – those that do not decay through time – in particular, carbon 12 and 13 and nitrogen 14 and 15. Stable isotope analysis functions on the basic principle ‘you are what you eat’. When an organism consumes another organism, the isotopes of the matter being consumed are preserved and incorporated into newly forming bodily tissues. Typically, when this happens the metabolic process favours one isotope – this changes the ratio of one isotope to another within the new tissue. In stable isotope analysis we are trying to detect these changes

¹ The herbivore, pig and fowl values in the graphs throughout this paper are an average of the stable isotope values of animals found at Cirencester and Alchester (no animal remains were recovered from Stanton Harcourt). The animals at these two sites did not have significantly different results, so the values were combined. The plant and carnivore values presented in these figures are extrapolations based on the herbivore values – subtracting or adding average fractionations of 4‰ nitrogen and 1‰ carbon. The freshwater fish values are drawn from a literary survey of published European freshwater fish values. The marine fish values are the results from a fish processing site in London (Bateman and Locker 1982; Milne 1985: 87–91). For a complete discussion of materials and methods, see Cummings 2008.

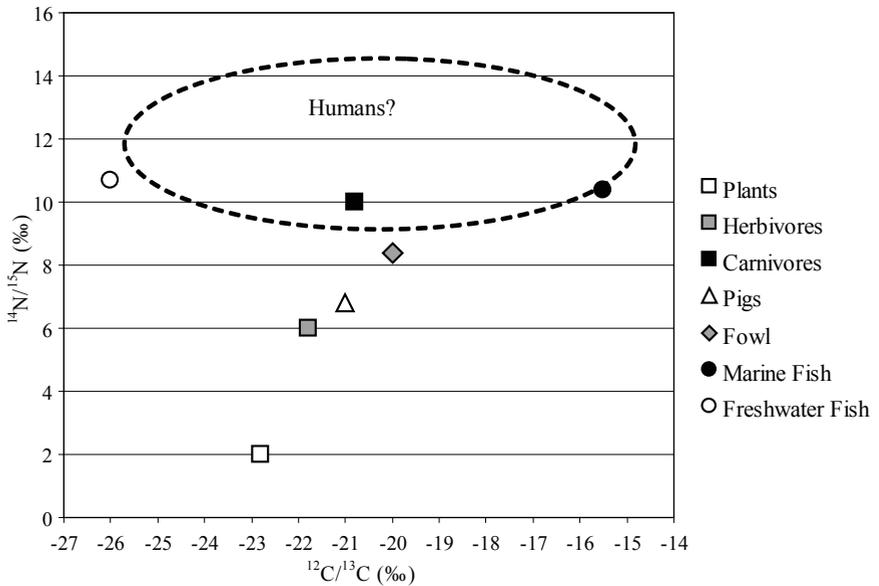


Figure 2: Inclusion of additional dietary components into the basic stable isotope model.

and are therefore specifically interested in this ratio – how much carbon 12 compared to how much carbon 13? These values are measured by assessing the ratio of one isotope to another in relation to an international standard and are expressed in parts per thousand (‰). The metabolic changes that occur, called fractionation, have been studied in many clinical settings and have been shown to act in predictable ways. In particular, each step in the food chain – e.g., from plant to herbivore and from herbivore to carnivore – entails a fraction of roughly 3 to 5‰ in nitrogen and 1‰ in carbon.

There are a few different tissues that can be used for stable isotope analysis in archaeological studies. In instances of excellent preservation hair, skin and nails can be used, but bones and teeth are far more commonly analysed. In my analyses, I have examined the protein collagen, which comprises about 90% of the organic component in bone. Collagen survives well in most archaeological material, with the exception of particularly old material, or where extreme heat has been applied, as in cremation. As a protein, collagen records primarily the protein portion of the diet, so in this study I am not looking at total diet, but only sources of dietary protein. Indeed, it is important here to point out that the title of this paper is actually a misnomer – while stable isotopes can identify animal protein in the diet, they cannot distinguish meat from dairy products.

Although carbon isotopes are extremely useful, particularly in assessing the presence of fish in the diet, nitrogen isotopes are of primary interest in understanding the contribution of animal protein in the diet. This is due to the large shift in nitrogen isotope ratios that occurs with each step in the food chain. For example, several studies on prehistoric European populations have emerged in the last few years (see review in Hedges and Reynard 2007), which use nitrogen isotopes to estimate the proportion of meat in the diet. Many of these studies assume two primary food groups – products from herbivorous animals and plant foods – and assume a linear

animal protein in the diet or the consumption of animals who also have elevated nitrogen isotope ratios, or both. Enrichment in carbon of over 1‰ more than the terrestrial animals indicates the presence of marine fish in the diet. Similarly, depletion in carbon isotope ratio values compared to the terrestrial animals can signify consumption of freshwater animals. By examining the data from a range of sites we can begin to detect patterns in dietary consumption both between the sites and between different population groups at a single site. Once we have an idea of what people are consuming, we can evaluate the different positions on ancient Roman diet.

Dietary practices in Roman Britain

The research for this paper forms part of my doctoral work, a much larger study examining eight different Romano-British sites, but here presentation of the data from three sites will suffice to illustrate how stable isotope analysis can be used to explore dietary practices. These three sites are in southern-central England (Gloucestershire and Oxfordshire), are all part of the same road-network (Fig. 3), and the cemeteries from which the individuals studied come date to the late third and fourth centuries. These sites provide an apt example as they represent three different site types – a large administrative urban centre (Cirencester), a ‘small town’ (Alchester), and a small rural settlement (Stanton Harcourt).

Cirencester was a large fortified town, possibly the second largest town in Roman Britain (Frere 1978: 297), and likely possessed all the amenities expected of a Roman town – forum, basilica, baths, amphitheatre etc. (Wacher 1995). Aside from Cirencester’s clear administrative function, it also served as a market of both local and imported goods for the town’s residents as well as those inhabiting the many villas in the surrounding area. The individuals and animals sampled for this study come from the Bath Gate cemetery immediately to the west of the town (McWhirr *et al.* 1982).

Of the three sites, the data from Cirencester have the broadest distribution (Fig. 4), indicating that there were many different dietary patterns at Cirencester, as we might expect from a large urban centre with a diverse population. In addition to this dietary variety, it is immediately apparent that many of the individuals have nitrogen levels in excess of what we would expect if people were subsisting off herbivore protein alone – that is meat and dairy products from sheep, goats and cows. Indeed, the diet of the bulk of the population can only be explained by the incorporation of pork and chicken protein, probably in substantial amounts.

Further, the spread in carbon values among those individuals most enriched in nitrogen suggests the incorporation of some fish in the diet. In the case of those with depleted carbon isotope ratios this would suggest freshwater fish and for those with more enriched ratios, marine fish. It is important to note that only small amounts of fish would be required to shift the carbon isotopes in these ways. For the marine fish input, this could be met by roughly 80 to 100 grams of fish per day, which is approximately six raw oysters or one mackerel filet, or alternately one or two larger fish-based meals per week. These small amounts of fish could easily come from local catches at the nearby rivers, the preserved fish products common throughout the Roman Empire, or the ubiquitous oysters that seem to have been present on nearly all Romano-British sites (Cool 2006: 106–107).

Alchester was a much smaller town, but still situated along a major road and provided with a circuit of walls and a ditch. As a classic ‘small town’, Alchester likely served a local

administrative function as well as providing a market for local and some imported goods (Booth *et al.* 2001). The human and animal remains presented here come from a small extramural cemetery to the north of the town.

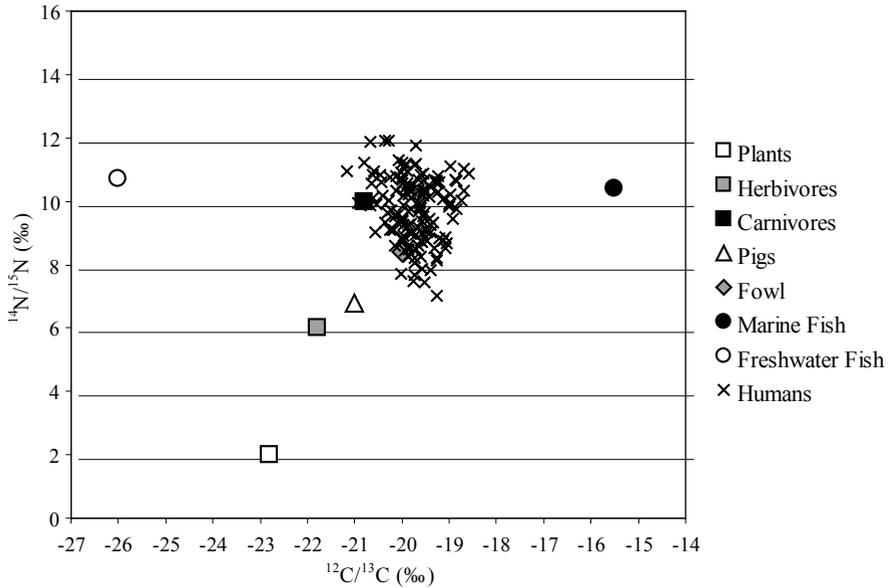


Figure 4: Stable isotope results from Cirencester.

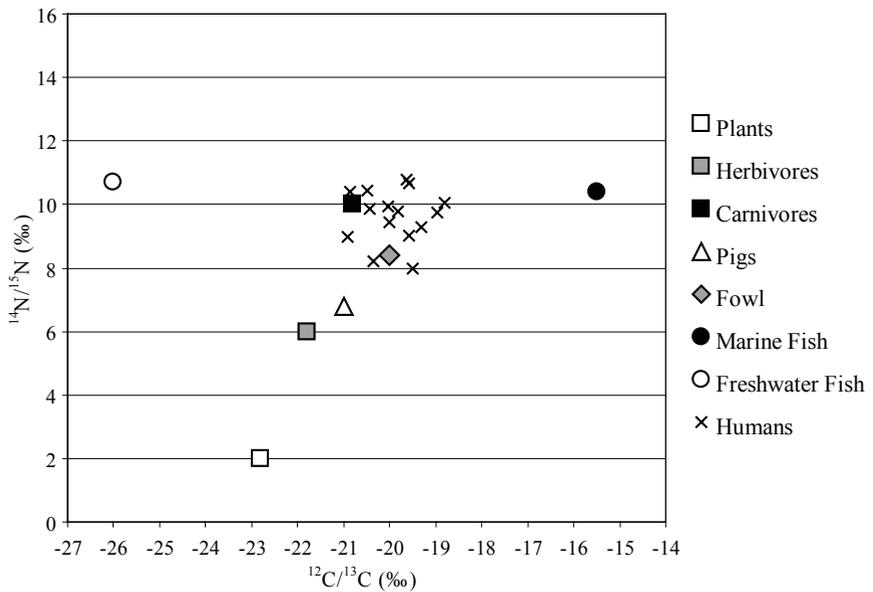


Figure 5: Stable isotope results from Alchester.

Considerably fewer individuals were interred at this small cemetery than the large cemetery at Cirencester. Despite the small sample size though, it's clear that there is somewhat less variation than at Cirencester, indicating that the population here had a more narrowly defined range of dietary practices (Fig. 5). Like Cirencester, however, there is no evidence for a vegetarian or vegan diet, and again the elevated nitrogen isotopes cannot be accounted for by herbivore protein alone, highlighting the range of different types of animals that must have been in the diet. However, compared to Cirencester, there is less spread in the carbon isotope values, suggesting that fish, either freshwater or marine, were not a substantial component of the diet.

The third site, Stanton Harcourt, is a small rural cemetery not clearly attached to a particular settlement. There are a number of small farmstead-type settlements in the immediate area that are possibilities, but no elaborate villas or larger towns. In all likelihood, the cemetery represents rural farmers, who may have sold surplus produce at a market town such as Alchester or possibly Cirencester. As a small, non-elite agrarian community, we might expect, more so than the other sites to find here a primarily vegetarian diet. However, as can be seen from Fig. 6, the result is the opposite. Although the very narrow range of values suggests that the diet here was more homogenous than the other two sites, the nitrogen isotope ratios are also more enriched than the other two sites. This would suggest even more incorporation of various animal proteins in the diet.

Conclusion

This brief presentation of these three sites clearly demonstrates that the people buried in these cemeteries were certainly not vegan nor likely even vegetarian. The enriched nitrogen isotope ratios indicate the fairly substantial incorporation of animal protein in the diet including omnivorous animals such as pigs and chickens. Fish are also important at the large urban centre, but not at the smaller sites.

Anyone who is familiar with the myriad of zooarchaeological reports from Roman Britain will immediately notice the discrepancy between the stable isotope data and the animal bone record – how can species such as pig, chicken and fish be important components of the diet when remains of these animals are infrequently found at Romano-British sites? Although taphonomic processes, excavation techniques, and underreporting of animal remains can explain some of the differences (especially for fish and oysters, see Cool 2006: 107), more recent archaeological studies are becoming increasingly more rigorous in the excavation and analysis of environmental remains. Indeed, I think the real problem is the lack of consideration for foods that do not leave skeletal remains, particularly eggs and preserved meats. A single chicken skeleton can account for a lifetime of eggs and the widespread practice of preserving both pork and fish products in the Roman world is well known (Curtis 1991; Thurmond 2006). Although the Roman fish sauces contain little protein, whole preserved fish were undoubtedly an important product and like our modern cans of sardines, allow for consumption of the entire fish, including the bones.

What these results have shown is as important as what they have not shown. Although not presented here, my more in-depth analysis of these sites (Cummings 2008) found no differences in the isotope values between males and females or different age groups. There is, however, some evidence for variation in status, for example all of the people at Cirencester buried in limestone coffins are enriched in both nitrogen and carbon, indicating that they were among those individuals who had regular access to marine fish. Nonetheless, there is not a sharp dichotomy

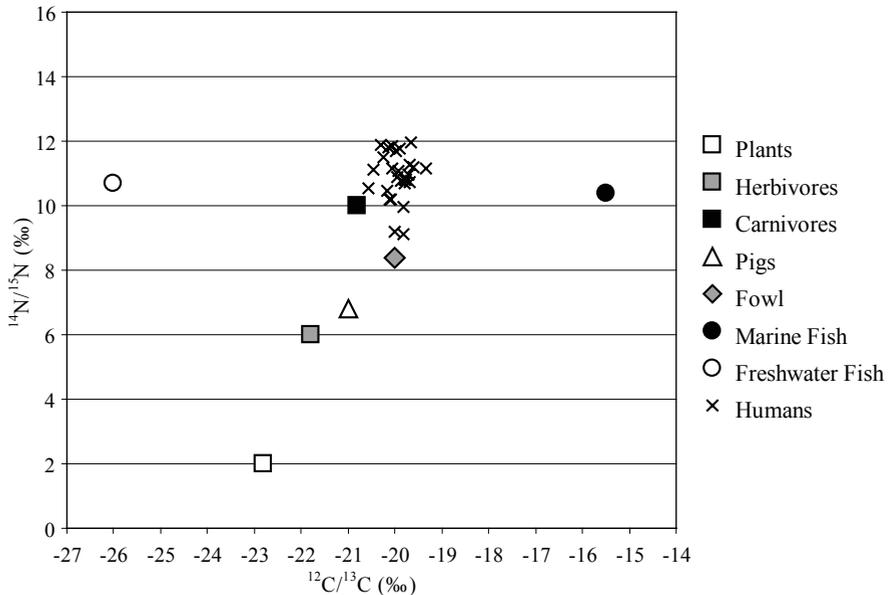


Figure 6: Stable isotope results from Stanton Harcourt.

in the population as we might expect if the wealthy consumed *substantially* more meat or fish than poorer individuals. Instead, at Cirencester there is a fairly broad continuum of different dietary practices. The precision of this method is, indeed, one of the primary benefits of stable isotope analysis; because the unit of analysis is the individual, it is possible to examine internal divisions within the site as well as the population as a whole. The results at all three sites indicate that animal protein was not the exclusive reserve of an elite minority, but rather standard fare for the whole population.

This has important implications for the understanding of broader Roman diet, as it strongly calls into question the general assumption of a grain based diet throughout the Roman world and for the lower classes in particular. Although it is likely that Britain had different dietary practices from other areas of the empire (King 1999), stable isotope results from Italy (Prowse *et al.* 2004) and Egypt (Dupras 1999) show surprisingly similar differences in isotope values between the humans and animals. Much more work is needed to explore different sites from diverse areas of the Roman Empire, to see if they conform to this overall pattern.

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Acknowledgements

Special thanks to Robert Hedges and Peter Ditchfield at the University of Oxford for their contribution to the analysis. Access to skeletal material was kindly granted by the Corinium Museum and the Oxfordshire County Museum. Research was generously funded by the Clarendon Fund, University of Oxford.

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