

RESEARCH ARTICLE

# Putting the Life Back into Livestock in Archaeology

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Archaeology has long congratulated itself on the success it has achieved in exploring the domestication of animals. This work was largely undertaken by examining animal bone remains from archaeological sites, studies that encourage a focus on meat consumption. The emphasis on domestication and on direct exploitation leads to the prioritisation of the earlier occurrences of livestock. Thereafter livestock are not regarded as having been significant to human societies. Such perspectives encourage the idea that livestock lack agency. This paper explores three rich examples, each demonstrating the active role that livestock play in creating complex social relationships, in particular emphasising the importance of living animals. Maasai herding systems show that living animals reveal important information about their owners. In nineteenth century London, livestock, for transport as well as consumption, permeated all aspects of life within the city. Finally, the colonisation of Australia was hugely dependent on livestock and they continue to have a great impact on the physical environment and on human social relationships. Collectively, these examples indicate that livestock remain agents into the present day. Archaeology's inability to consider such dynamics is a failing that needs to be rectified and some suggestions are provided on how this might be achieved.

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In introductory undergraduate lectures archaeology typically celebrates the domestication of livestock as an early achievement of the human career and congratulates itself on having been able to reconstruct the major characteristics of the event, based largely on the analysis of animal bone remains. Core texts do very little to dispel such ideas (e.g. Renfrew and Bahn 2008; Scarre 2005). This construct maintains archaeology's general perception that livestock history essentially begins and ends in these initial phases.

Livestock are thereafter under investigated and under theorised in the human past, with the notable exception of secondary product exploitation and those societies in which livestock can be argued to have had great symbolic significance. It is largely assumed that livestock existed in later periods in a normative state, a constant that was bypassed by the ever more complex array of social and political complexity in the human career. This tallies with the general perception of livestock in a country like Britain today; that domesticated animals belong in fenced-off enclosures, far away from our towns and cities where the crucial decisions and cultural transformations are made. Such

a simplistic stereotype can be seen, not surprisingly, to be driven by urban ideologies and completely ignores the complexities of the landscapes around us, both rural and urban. This exposes the simplistic manner in which archaeology in general continues to treat livestock and, perpetuated by its introductory lectures, continues to misconceive the role and significance of livestock. Whilst faunal specialists would not agree with such perceptions, increasingly finding innovative ways to explore recent assemblages (e.g. Sykes 2014), they are hindered by the very material they look at. What is argued here is that archaeologists in general, as well as bone specialists, need to rethink how they look at livestock, focusing on living animals and their interplay with humans.

Within archaeology our focus on domestication, economy and animal bones leads us away from considering issues such as animal agency and to perpetuate ideas of passive livestock. In broader society the assumed ignorance of livestock has been used in constructing ideologies pertaining to human politics, society and religion (in the case of pigs see for example Malcolmson and Mastoris 1998: 1–28). Urban dwellers equally use such ideologies to distance themselves from rural life (e.g. Metzger 2015). In the present, such views regarding the ignorance and commodification of livestock rationalise the industrialised slaughter and processing of billions of animals every year (Silbergeld 2016). Yet studies of modern animal behaviour show that livestock are still capable of independent action, choosing particular grazing, accessing shelter, or developing aggressive territorial behaviour (e.g. Stolba and Wood-Gush 1989). In the foot and mouth epidemic of 2001, Herdwick sheep in Cumbria were spared culling because a flock takes six years to become “hefted” to their difficult upland homes—that is to learn how to access resources such as food and shelter and to avoid dangers in the specific ranges in which they were placed—and that such an ability was irreplaceable (Law and Mol 2008). This learning of their range was entirely built on their own agency, discovering and

communicating features and characteristics of their pasture.

Herders of course recognise such characteristics in their animals, but are marginalised precisely because of their knowledge of, and association with, livestock. Familiarity with and understanding of livestock are perceived negatively in broader society and regarded with derision. Farmers are set apart and set themselves apart from general society, through their lived experience, their preferred and distinct material culture and their very different concerns. This paper will encourage focus on how livestock themselves, together with those who tend them, have shaped and continue to shape human history. Livestock have not ceased to be an important means for constructing human relationships; rather, human relationships have become so complex that it is frequently forgotten that animals, their behaviour and their exploitation may lie unrecognised either at the very base of these constructs or permeating within and around these complex structures (see for example Donaldson and Kymlicka 2011).

### **Domestication, economy and animal bones**

An immediate association is formed in the fledgling archaeological mind between domestication and animal bones, encouraged by the theme of economy. Animal bone studies emerged from a desire to define the economy of past societies and although studies which challenge such presumptions are well-known there is still a general inclination to see faunal remains as directly linked to human consumption. By rooting studies in animal bone remains archaeologists learn very little about living animals and where there are attempts to go beyond this, the focus is on what the bones tell us about *human* behaviour. From such a perspective it will be very difficult to discover anything about how humans and animals lived together and how animals, and their agency, shaped human society, although recent work on dog domestication may offer such potential (Pierotti and Fogg 2017).

To consider such issues, it will be necessary to go back to the archaeological record and explore how humans and livestock shape their lived worlds. Livestock have basic needs which are provided by humans and/or the landscapes they find themselves within. For some reason archaeology has chosen to ignore a wealth of ethnographic examples in which it is quite clear that humans shape and mould their animals' lived space, but in ways which then also enables livestock themselves to shape and impact humans. A good example can be drawn from studies of Maasai herders. Depending on time of year, weather, and social and political events, Maasai make use of a range of different settlements ranging from temporary seasonal camps and men's feasting sites, through the main family enclosure (*enkang*) to compounds where several families come together (*manyatta*) in order to observe social and cultural events such as weddings and initiation ceremonies (Mbae 1990). Within these compounds, livestock occupy specific enclosures and draw on the resources of the landscape around them

(**Figure 1**). Each herd and flock collectively make statements about their owner as they live out their lives; the appearance, health and productivity, cohesion and organisation of the animals all providing a means to evaluate the herder's skills and standing. In such societies, each animal also has an individual identity that provides important indications of their owner's place in the world. All cattle are individually named and recognised as individuals (Ryan et al. 2000). Their presence within the herd, as well as their name and their behaviour and appearance, may reveal much about their owner: animals received from bridewealth payments, through bonds of friendship or patron-client arrangements, or through raiding, all help to establish the place of their owner in broader society, each animal's entangled set of relations confirming the social entanglements of the herder. Recent studies have also emphasised the imprint that these livestock have on the environment. Ecological work has identified the importance of "glades" in these landscapes, small enriched areas within the generally



**Figure 1:** A *manyatta* in Amboseli, Kenya, with smallstock penned and clustered near the respective households of their owners (photograph courtesy of Paul Lane).

nutrient-poor surrounds, where herbivores tend to focus their grazing (Boles and Lane 2016). These glades have been found to be the sites of former livestock enclosures, where dung rich deposits inhibit bush encroachment and encourage rich grass growth. The preference of herbivores for such grazing locations means that they are further sustained by dung from the grazing animals for hundreds, or even thousands of years after the abandonment of the enclosure (see Marshall et al. 2018), emphasising the interrelationship between archaeology, landscape and ecology through time.

Within such active and constantly emerged living environments the daily routine takes on a far more dynamic role in shaping lives. Furthermore, this dynamism is fuelled by the need to fulfil the basic needs of the livestock population. Archaeology tends to assume that essentials, such as grazing and water, are normative, unchanging and without culture. Grazing, fodder and water can all be highly complex issues, access possibly being determined by lineage, needing to be negotiated, or purchased, all of which further complicates the social relationships that swirl around livestock. Hence a focus on living animals and their relationships with humans, as well as the human relationships defined by facets of livestock well-being, all combine together to create complex cultural and historical relationships. Such relationships are often overlooked by archaeology's concentration on animal bone remains, although studies have demonstrated just how involved and complex the social relations around an act such as butchery may be (Seetah 2019).

However, the general emphasis on domestication and meat economy that archaeology encourages leads to a focus on earlier time periods. Such views largely regard more recent time periods as being defined by historical records or that the livestock contribution can be assumed as livestock have not significantly changed once husbandry was established. Two themes will be examined to challenge this, which demonstrate

the importance of considering living animals and their agency as key dynamics in relatively recent times in the human career.

### **Livestock in cities**

In Gordon Childe's classic understanding of human society, the Neolithic Revolution introduced farming, but it was regarded as a necessary preliminary and an inferior phase to the Urban Revolution (1941). Whilst archaeology has moved on from such rigid ideas, there is still a perception that urbanism and urban environments are not impacted by the significant presence or contribution from livestock (see for instance Yoffee 2005). Livestock are considered part of the rural landscape, the productivity of which makes possible the development of urban forms, but livestock are regarded as having no presence in such urban worlds, barring their role as a meat source or for transport.

To critique these ideas, use can be made of an example that is neither exotic nor unfamiliar: 19<sup>th</sup>-century London. Conventional archaeological approaches might suggest that horses were important for traction and riding whilst cattle, pigs, sheep, chickens, turkeys and geese were all consumed, but these statements are hardly novel. Instead the focus needs to be on living animals and their entangled relations with humans. **Figure 2** is a depiction of Bloomsbury in 1835, showing the area that is now the central part of University College London. In the distance can be seen the façade of the Portico building that dominates the main courtyard within UCL. Notice, that behind this still stand abandoned cranes and construction activity, as the original building ran out of funds and was not completed. The main street view is of Malet Place in which today lie a number of UCL's core facilities including the Faculty of Engineering, The Science Library and the Petrie Museum. In 1835, Malet Place was almost entirely given over to stables and carriage houses, maintaining the transport industry upon which the city depended. In the 19<sup>th</sup> century around 300,000 horses



**Figure 2:** *London University from Old Gower Mews* (1835) by George Sidney Shepherd.

were used to move people and goods around the city. In Malet Place horses were rested, tended and prepared for work in the ground floor stables and outside on the street, whilst families lived above.

A water source to the left could have provided for both horses and humans, but at this time water sources in London were privately operated and charged for usage. Horses may well have been taken elsewhere to the margins of the city to places like Hackney and Highgate which had communal watering ponds. Fodder and straw for the stable floor would have been brought in, whilst used bedding and dung would have had to be removed. In the right foreground a child is pushing a barrow of waste out of the street. Such waste, known as “London mix”, was regularly transported out of the city by Thames’ barges and canal boats to the agricultural lands that surrounded and supplied the

city, forming the return loads for in-coming cargoes of crops, bricks and other produce. Notwithstanding such efforts, the accumulation of horse manure on the streets of the city was a major issue. In 1894, *The Times* declared “The Great Horse Manure Crisis of London” and, failing to identify the impending introduction of the internal combustion engine, predicted that within 50 years London would be buried under nine feet of manure (Jackson 2014). London’s mud, with its heavy component of horse manure was a major problem for the city, impacting and besmirching all its citizens.

Above a doorway on the righthand side of the Malet Place image, there is a sign advertising the Torrington Dairy. Before long distance transport, electrification and refrigeration, the principal means to supply the large urban demand for milk, butter and cream was by producing within the city

itself and these were predominately associated with Welsh proprietors (Hayes 2018). Prior to the railways, and the impact they had on supplying milk, cows were stall fed in the basements of these dairies. The façade of a former Welsh Dairy still stands today in Warren Street (**Figure 3**). This regular if small presence within the city was dwarfed by the numbers of cattle, sheep, turkeys, geese and pigs brought in to supply its demand for meat. By 1800 more than 100,000 head of cattle a year reached the city and until the mid-19<sup>th</sup> century they were all driven, ultimately either from Wales, Scotland, or latterly Ireland (Bonser 1972). The focal point of this beef industry was the principal meat market at Smithfield. Its clamour and rowdiness were not to the taste of Victorian reformers such as Dickens, but he gives a sense of its complex character:

“The ground was covered, nearly ankle deep, with filth and mire; a

thick steam perpetually rising from the reeking bodies of the cattle and mingling with the fog, which seemed to rest upon the chimney-tops, hung heavily above. All the pens in the centre of the large area, and as many temporary pens as could be crowded into the vacant spaces were filled with sheep; tied up to posts by the gutter side were long lines of beasts and oxen, three or four deep. Countrymen, butchers, drovers, hawkers, boys, thieves, idlers and vagabonds of every low grade were mingled together in a mass; the whistling of drovers, the barking of dogs, the bellowing and plunging of oxen, the bleating of sheep, the grunting and squeaking of pigs, the cries of hawkers, the shouts, oaths and quarrelling on all sides; the ringing of bells and the roar of voices that issued from every public-house; the crowding, pushing, driving,



**Figure 3:** The former premises of J. Evans Dairy Farmer on Warren Street.

beating, whooping and yelling; the hideous and discordant din that resounded from every corner of the market; and the unwashed, unshaven, squalid and dirty figures constantly running to and fro, and bursting in and out of the throng, rendered it a stunning and bewildering scene, which quite confused the senses."

(Dickens [1838] 2007: 153)

Besides the presence of horses and cattle, it is also worth mentioning pigs. Long associated with the rural poor and a key productive strategy for getting through their year, the *urban* poor also made extensive use of pigs. In 1850, the Potteries district of North Kensington, a notorious slum, had a pig population of over 3000 (Richson 1854: 12). Often residents would rent out the waste ground behind their homes where people specialising in fattening pigs would set up styes and the pigs would feed on the waste from the homes. For noted observers such as Friedrich Engels these living conditions were appalling and he particularly targeted the Irish, then amongst the most impoverished populations in Britain.

"The Irishman loves his pig as the Arab his horse, with the difference that he sells it when it is fat enough to kill. Otherwise he eats and sleeps with it, his children play with it, ride upon it, roll in the dirt with it, as any one may see a thousand times repeated in all the great towns of England."

(Engels [1845] 1987: 124–5)

Such living conditions may well have contributed to the general impression that pigs are dirty and undesirable. More importantly, this together with the carriage stables, the dairies and the market are all forms of social space where human relationships are formed and defined. Livestock clearly animated and shaped life in the city through their presence and movement through its space as well as their exploitation. Each

horse, through its work, maintenance and welfare would therefore have created a complex social geography within the city. Beyond the city, cattle were a single point of contact linking the disparate social elements across the state: joining the inhabitants of the remotest croft, via a bewildering cast of drovers, buyers, sellers, market workers, innkeepers, landowners, blacksmiths, slaughtermen, butchers and renderers, to the urban consumers, both rich and poor alike. There cannot have been many other entities that had such a wide and all-encompassing encounter with 19<sup>th</sup> century Britain. Understanding how human relationships were animated by these livestock and their produce would seem to be an important element of archaeological enquiry, one that needs to focus on living animals as much as, if not more so, the dead.

### Colonisation and feralization

In the case of London, urban life was animated, influenced and flowed around livestock and the presence of those animals imposed actions and activities on the city's inhabitants. A further example, also taken from a recent episode in history, shows how the agency of livestock shaped and formed events, created ideologies and new sources of power and left an impact that still dominates today. The European colonisation of Australia was made possible by livestock, shaping and influencing strategies, ideologies and relationships with indigenous communities. In this it was not dissimilar to the European colonisation of North America (Anderson 2004), but circumstances led to the impact of livestock being still greater and more acute.

The initial exploitation of Australia was confined to the eastern coastal littoral. The early colony at Sydney was for decades prevented from breaking into the interior by their inability to find a suitable route for wagon teams or pack animals to use in crossing the Blue Mountains. In the meantime, much effort was expended in harvesting quality timber from the coastal forests, for export to Europe. Coachwood

(*Ceratopetalum apetalum*), so named for its suitability for horse-drawn coach interiors, was just one of a number of indigenous tree species which were searched for and almost completely removed from these forests. Once stripped and trimmed the timber was dragged and hauled to the coast by horse or oxen teams, livestock thus providing both the demand for the product and the means for its acquisition, a connection that spanned the entire world.

Having crossed the Blue Mountains and penetrated the interior, colonisation took place on the backs of livestock, a role that is celebrated in photographs and in decaying hardware throughout country museums in Australia. Horses, oxen and mules, and even occasionally teams of camels, were used to move goods and hardware into new locations, bringing European culture to the interior, whilst hauling produce down to the coast. The latter could include timber, skins, minerals and eventually also wool. Huge, strongly built wagons were constructed to carry heavy loads of

densely packed wool, piled high on their beds, taking loads of between 10 and 20 tonnes. The semi-arid climate and poorly structured soils, together with the heavy use, meant that roads were often waterlogged, quickly became rutted and ultimately were very difficult to pass (Harris 1977: 9–11). Wagons overturned and had to be unloaded, righted and repaired. For the most extreme loads oxen teams of as many as 96 head were assembled.

The favouring of wool production into the 20<sup>th</sup> century led to vast enterprises on an incredibly large scale. A great example of this is the preserved remains of a pastoral station in the Willandra National Park. Established in 1870, this station became famous for its development of a Merino stud, and its prize rams were housed in specially built, thatched ramsheds, designed to keep them at their breeding best. Of particular note for this discussion of the intersection between humans and livestock is the shearing precinct at Willandra (**Figure 4**). Situated 1.5 kilometres from the main station, this



**Figure 4:** Inside the Woolshed at Willandra featuring the mechanised shearing stations, holding pens and chutes for clipped animals.

was a complex given over to a single event in the year. Itinerant shearing teams would rotate through the major stations, occupying the quarters built for them next to the shearing shed. The thousands of sheep on the station were mustered to this point, processed through fenced lanes and holding pens, driven into the shearing shed, shorn at a row of shearing posts and dropped down a chute into the release channels. In 1931 two other stations, alongside Willandra, brought their sheep for shearing in one great event which took 14 weeks to complete and generated 2000 bales of wool, at least 25 wagon loads (Harris 1977: 30). The woolshed and surrounding precinct are an amazing testament to the organisation of production in the early stages of industrialised agriculture and allow us to explore a formative element in Australia's colonial history. Wool production employed huge numbers, was run through the complex interplay of different elements in society and ultimately was increasingly dependent on government subsidies to maintain the system. Fixing the wool price and finding markets for the produce became a delicate balancing act for any political party wishing to stay in power (see Massy 2011).

Much as in North America, colonisation thus proceeded on the backs of livestock. In Australia, however, livestock can be argued to have had a much more profound impact and were themselves responsible for significant changes and developments. Unlike indigenous animals, which mostly have pads, the hard hooves of imported livestock, particularly the cloven hooves of cattle and sheep, had a significant impact on soils. Whereas pre-European soils tended to have a light spongy, matted humic surface, livestock hooves, together with land clearance, denuded these surfaces creating compacted and poorly aerated soil horizons (e.g. Massy 2018; Rolls 2011: 28–29). Indigenous dung beetles in Australia do not process cattle dung, which meant that until the late 1950s, when African and South American beetle species began to be introduced, cattle dung remained as unprocessed scabs on fields, rich

breeding grounds for fly pests, whilst nutrients were not being returned into the soil (Bornemissza 1960). To date at least 55 different dung beetle species have been introduced to try to tackle this problem across the entire country. Besides these impacts, livestock have also contributed to deforestation. Farmers would typically remove all but one or two isolated forest trees within paddocks to provide shade for the livestock. These remnant trees frequently die, unsuited to the exposed conditions they are maintained under, being forest species, and assaulted by the toxicity of the manure generated by the livestock sheltering at their base. This then leads to the complete removal of tree cover, the exposure of the ground surface and the diminishing of water retention within the landscape. It impacts such as these that have exacerbated current conditions and the drought that has gripped eastern Australia for the last two years. Soils are denuded, vegetation degraded and water sources over-exploited. These consequences and the attitudes adopted towards the land can further be linked to the ideologies of colonisation developed from livestock.

From the outset, livestock escaped human control and thrived, cattle from the first fleet lost in 1788 being discovered in 1795 having found their way to what were subsequently recognised as the ideal grazing lands (Rolls 2011: 16). Once through the coastal rainforests, with their associated pests, livestock thrived in the interior, partly due to the absence of indigenous predatory species. The general availability of water and grazing within natural landscapes fuelled colonisation and created peculiar possibilities for speculation and wealth generation. One model was to acquire cattle on the seaboard, drive them beyond the western limits of existing land titles, release the stock that had survived the journey into the chosen location, put up rough fences and a central compound using the local trees and wait a few years for the government surveyor to come to register the land in the speculator's name (for a number of examples of this see Toohy

1994). Once title was granted, the speculator returned to one of the coastal ports to sell on the land and its cattle to newly arrived colonists. The latter bought an estate with stock, but on arrival after their acquisition, they had to spend their first years repairing the fences, yards and homesteads, before rounding up, processing and rebranding the cattle. This meant that the cattle had usually fended for themselves for a period of between 5 and 10 years. On rounding up the cattle, the animals were processed keeping most but culling those deemed too wild and uncontrollable (e.g. Toohey 1994: 81). Rather than the conventional notion of domesticated animals as compliant and dependent what this demonstrates is that livestock have the ability to survive unassisted. This they do by drawing on their own agency to identify key resources (water, pasture, minerals) in the landscape, in a process that can lead to genetic change and re-selection of wild genetic characteristics that has been called feralization (e.g. Barbato et al. 2017; Johnsson et al. 2016), which implies a reverse trajectory to domestication. Feral populations of once domesticated animals have long been recognised by archaeologists, but they have often been disregarded as not properly wild. In Australia, feralization of livestock has had a massive, and in some cases catastrophic impact on landscapes with huge populations of feral cattle, horses, camels, pigs, rabbits, cats, dogs and water buffalo.

This impact of the agency of livestock has not just been on the Australian environment but has also had a profound influence on social attitudes and on the treatment of indigenous communities. The opportunists who spread the original cattle became known as squatters, as they had to operate illicitly beyond government territory and their success, through repeated episodes of stock rearing and land acquisition, gave rise to a new source of wealth and political influence which is still of great significance today, known as the “squattocracy” (e.g. Watson 2016). Independence, distrust of and contempt for authority and the right to exploit

the land they own was bred through the battles they had with colonial government surveyors and officials. Movement of stock by new routes through the bush led to potential conflicts with Aboriginals. The release or, perhaps more accurately, the abandonment of stock into new locations led to conflict with Aboriginal groups in the area, who were tempted to hunt the new “wild” animals. Retaliation for slaughtered stock usually took the form of raids which massacred entire bands (e.g. Curr 1886: 408–9). At its foundation, therefore, livestock served to alienate Aboriginal groups and set them in direct opposition to European settlers. In addition, however, both the squatters and the subsequent landowners were dependent on Aboriginals for their labour in establishing and maintaining the cattle and sheep stations (Harrison 2004). In this instance, livestock created an economic power imbalance that impoverished Aboriginals. Aboriginals were often coerced into work, becoming regarded as possessions and landowners and managers often used corporal punishment to discipline their workforce. In some cases owner’s control even extended to approving and permitting marriages amongst the Aboriginals and administering the ceremony themselves (e.g. Toohey 1994: 159). Livestock, therefore, were fundamental in binding European settlers to the land and in creating ideologies which enshrined their rights to exploit their land in any manner they deemed fit. Attitudes to Aboriginals were antagonistic and dismissive in order to preserve these land rights and maintain their livestock, ideologies which still pervade Australian society today. Australia is littered with country museums celebrating European livestock-based life through rows of decaying animal-powered machinery and livestock related equipment, with very occasional and perfunctory displays of Aboriginal artefacts marking communities that have become invisible. Thus, the role of living livestock as active agents is crucial in understanding the colonisation of Australia, the continued marginalisation and alienation of

Aboriginals and the ecological consequences of politically encouraged, evermore intensive exploitation of land and resources.

### Conclusion

These examples drawn from ethnography and recent history demonstrate that the significance of livestock does not begin and end with the initial process of domestication, nor does it lie in the economic potential of an animal's carcass weight. Living animals impact human societies in a range of different ways and individual animals shape humans through their own actions. These examples demonstrate that archaeology's often narrow focus on domestication and economy together with its almost total reliance on animal bone prevent the discipline from exploring the contribution of living animals to human life in the past. The observations by Dickens and Engels, cited above, both demonstrate how intertwined the lives of humans and livestock were in Britain's recent past. They evoke a similarly complex and interwoven array of relationships to those observed in Maasai societies. This suggests that such perspectives are not to be ignored when looking at European societies, but rather that they are inherent to all situations in which livestock feature in the human past. Moreover, these relationships are dynamic, changing and, as demonstrated in the case of the European colonisation of Australia, are still impacting human society today. Most importantly, they are all impacted by the agency of livestock. The lesson for archaeology is that whilst animal bone does have an important role to play in exploring activity and behaviour in the acts of butchery and meat distribution, different means are needed to explore the impact of living livestock.

The examples used above provide some clues as to how to explore these human-livestock relationships. All four of the figures used here feature physical structures and constructed space. These are the basic elements archaeologists generate through area excavation. The raw materials for the livestock approach being advocated here are

therefore already available to archaeologists. What is needed is the willingness to consider such perspectives. A landscape approach is also important as livestock necessarily draw upon and prioritise key resources in the surrounding landscape, whether that be accessing water and feed from constrained environments in East Africa or Central London. The examples used have also emphasised the significance of dung produced by livestock. In the Maasai example, dung accumulations had a positive impact on future grazing, whilst in Australia cattle dung has proved to be problematic, hindering soil development and nutrient replenishment until recent introductions of dung beetles. Manure was a huge issue for London, and although the problem was not fully resolved until the appearance of motorised transport, the proportion of manure that was removed to the surrounding counties did have a beneficial impact on agricultural systems. Recent archaeological work has made significant strides in identifying the presence of animal dung (e.g. Shahack-Gross, Marshall and Weiner 2003). This offers the potential to be able to trace livestock presences in and around the physical spaces we excavate as archaeologists. Incorporating suitable soil science alongside reviewing spatial relationships in the archaeological record can allow the development of new perspectives on the entangled human interactions with livestock and their by-products, particularly those with living animals. It is time to revisit those first year lectures and introductory texts and to retrain all Holocene archaeologists about the potential they may be overlooking in their explorations of the past.

### Competing Interests

The author has no competing interests to declare.

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