

Nineteenth-century butchery and transport for a market economy: Plum Grove as a case study for commercial transactions in the Midwestern USA

Cerisa R. REYNOLDS

Aims Community College, Department of Social Sciences,
Greeley, CO (USA)
cerisa.reynolds@aims.edu

**Bryan KENDALL
William E. WHITTAKER**

University of Iowa, Office of the State Archaeologist,
Iowa City (USA)
bryan-kendall@uiowa.edu
william-whittaker@uiowa.edu

Thomas H. CHARLTON †¹

Department of Anthropology,
University of Iowa,
Iowa City (USA)

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ABSTRACT

Archaeozoologists have long examined the relationships between butchery and consumption sites. When applied to historic sites, this distinction between the location of butchery and places of consumption can be informative regarding market economy, long-distance trade and transport using increasingly modern technologies, and the necessity for urban areas to be fed by more rural regions. This paper will explore the archaeozoological markers of participation in a long-distance market economy through the faunal remains from a bone bed deposited in the late 19th century at the Plum Grove Historic Farm, a site located in the American heartland. The faunal remains here suggest that the site's occupants were involved in a nationwide system providing meat products, likely by refrigerated rail, to an ever growing population in eastern USA.

KEY WORDS
Market economy,
cattle,
transport,
butchering,
refrigerated railcar,
American Midwest,
historic,
farm.

1. Professor Thomas H. Charlton passed away during summer 2010, before the completion of this manuscript. He worked at the Plum Grove Historic Farm for more than 30 years, leading the University of Iowa, Department of Anthropology's field school between 1996 and 2010. We are saddened by his passing and we thank him greatly for working on this project with us.

RÉSUMÉ

Boucherie et transport pour une économie de marché au dix-neuvième siècle: Plum Grove comme étude de cas sur les transactions commerciales du Midwest des États-Unis.

Les zooarchéologues ont depuis longtemps examiné les relations entre les sites de boucherie et de consommation. Lorsqu'appliquée à des sites historiques, cette distinction entre lieu de boucherie et endroits de consommation peut nous instruire au sujet de l'économie de marché, des échanges de longue distance et du transport utilisant des techniques de plus en plus modernes, ainsi que de la nécessité pour les zones urbaines d'être nourries par des régions plus rurales. Cet article explore les marqueurs archéozoologiques de la participation à une économie de marché de longue distance par le truchement des restes fauniques provenant d'un dépôt d'ossements datant de la fin du XIX^e siècle à la Ferme Historique de Plum Grove, un site archéologique de l'Amérique profonde. Les restes fauniques suggèrent que les occupants du site étaient impliqués dans un système transnational qui approvisionnait en produits carnés, probablement par wagons frigorifiques, la population sans cesse croissante de l'Est des États-Unis.

MOTS CLÉS

Économie de marché,
bovins,
transport,
boucherie,
wagons réfrigérés,
Midwest,
historique,
ferme.

INTRODUCTION

In the late 19th century, urban regions in the eastern U.S. required food from distant, rural farmers to support their growing communities. This food came from across the country and farmers in the Midwest were actively raising large numbers of livestock intended for consumers in the east. This paper will explore the archaeozoological evidence that farmers at Iowa City's Plum Grove Historic Farm site, located in the heartland of America, participated in this national economic system. We will begin with a brief history of America's meat market and will then move on to discuss the Plum Grove Historic Farm site and the production of meat products there during the late 1800s, as visible in the 'Bone Feature', a trench containing the remains of more than 30 animals.

AMERICA'S MEAT MARKET

Historically, to support themselves, urban, military, or colonial populations were frequently required to bring in food from sometimes rather distant sources (Clemen 1923; Klippel 2001; Walsh 1999). By the mid-18th century, growing towns in Colonial Maryland and Virginia were already outstripping

their local carrying capacities and were starting to rely upon food from rural farms located as much as 200 miles away (Walsh 1999). As the American frontier spread ever farther west and population levels continued to grow in the east, the migrating rural west played an increasingly important and necessary role in producing food for more urban areas to the east. Animals were brought live, sometimes across hundreds of miles, from rural pastures to urban markets, and the process of transporting these animals became ever more complex as people utilised new technologies (especially the railway) to feed ever-growing populations of people living farther away from the areas of production (Clemen 1923).

By the late 19th century, a complex system had been created wherein cattle spent different parts of their lives in different parts of the country (Azzam and Anderson 1996; Clemen 1923; Fogel 1962; Hopkins 1928; White 1986). One common sequence of events had cattle being raised in the dry Western states (e.g. Kansas, Nebraska, Colorado and Texas), where they were fed cheaply on the available grasslands. After a few short years of life, they were transplanted to the Corn Belt states (including Iowa and Illinois), where they were 'finished' (i.e. fattened) by heavy corn feeding for a five to nine month period (Hopkins 1928). Following this, they were sold to various middle-men



FIG. 1. – Map of the contiguous U.S., with the main course of the Mississippi River highlighted in a thicker grey line. As the site this paper focuses on is located in Iowa City, Iowa, this city is also identified here as a grey circle (map from United-States-Map.com; modified by Cerisa R. Reynolds).

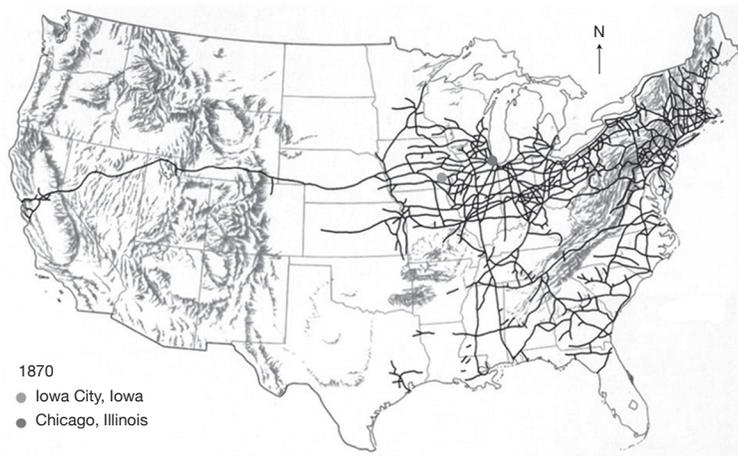


FIG. 2. – A map of railways across the contiguous United States in 1870, with Iowa City, Iowa, and Chicago, Illinois, highlighted (map from <http://www.latinamericanstudies.org/19-century/railroads-1870.jpg>; adapted by Cerisa R. Reynolds).

who moved the cattle to markets in the eastern half of the country.

This was an increasingly necessary system since, “in 1880, 78 per cent of the population of the United States was east, and more than half (56 per cent) of the cattle west of the Mississippi River” (Clemen 1923: 432; Fig. 1). To transfer the animals and their meat products from west to east, loca-

tions that served as markets and processing centres were developed along the waterways and railroads of the Midwest, the most important of which was Chicago, Illinois (Fig. 2). In fact, by the mid-19th century, Chicago had become the most important interface between food producing rural settlements in the west and highly-populated urban centres to the east (Azzam and Anderson 1996: 14; Clemen

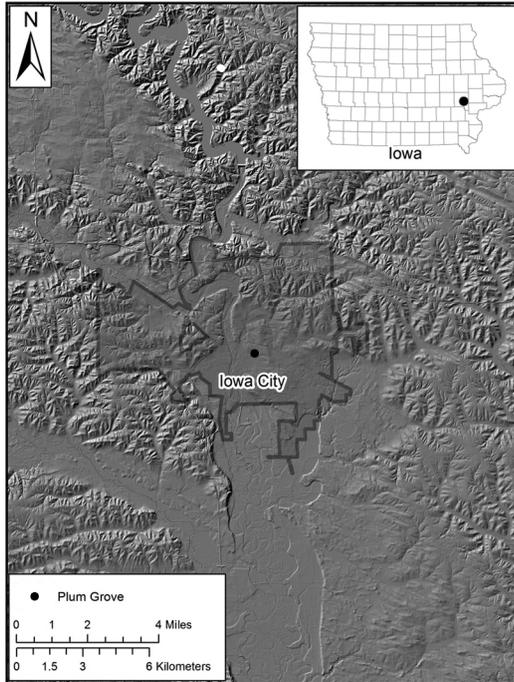


FIG. 3. – Project location in relation the to surrounding topography, highlighting Plum Grove's location within Iowa City as well as Iowa City's location within the state of Iowa. Base map is aerial photograph from ISUGISSRF (2011); figure created by Bryan Kendall.



FIG. 4. – Aerial photograph of the protected Plum Grove Historic Farm as it appears today: a large, manicured plot surrounded by a busy Iowa City neighbourhood. Base map is 2009 aerial photograph from ISUGISSRF (2011); figure created by Bryan Kendall.

1923; Hopkins 1928; Meinig 1998: 23; Skaggs 1986; Wade 1987).

As Chicago's prominence grew and meat-packing companies there thrived, large numbers of live animals were brought –by foot or increasingly by rail –from towns in the west to the now famous stockyards of Chicago. These animals were usually then either killed and packed (which consisted of barrelling or canning prior to the late 1870s) in Chicago, or were sent further east as live animals. While the transport of live animals to and from Chicago was a rather successful practice, live transport was also an expensive and risky task; animals were frequently exposed to various diseases, subjected to heat or dehydration and even died during the journey from their farms to the market. Furthermore, those animals that did survive needed to be re-fattened upon reaching their destination, as the weight lost during live transport

was often substantial (Kujovich 1970; Skaggs 1986: 43-33; Swanson and Morrow-Tesch 2001).

Dealers and packers hoping to find ways to minimise the loss in profit that came with live transport began experimenting with refrigerated packing plants and refrigerated railcars in the mid-19th century. By 1879, a reliable refrigerated railcar had been developed and with the widespread use of these cars to transport carcasses, America's meat market was changed forever. Now animals could be butchered closer to their feeding source and minimally or fully dressed carcasses were able to be safely shipped across the country without spoiling. In addition to eliminating the problems associated with live transport, refrigeration meant that only the edible portions of carcasses needed to be shipped and the monetary value of each pound of product loaded onto a railcar was thus much greater compared to transporting live animals (Clemen 1923;

Kujovich 1970: 460-461; Skaggs 1986; Swanson and Morrow-Tesch 2001: E103; White 1986).

As Skaggs (1986: 90) notes, “using the refrigerator car between 1879 and 1886, a half-dozen firms developed intricate distribution systems stretching from midwestern [*sic*] packing plants to most eastern cities, and between 1886 and 1920 they came to dominate the whole red-meat trade”. In addition, icing stations, cooling boxes and depots were established across the Midwest, supporting meat-packing in smaller communities and stocking the railcars (with goods and ice) from station to station (Clemen 1923). Refrigerated cars carrying fresh products (including eggs, milk, meat and fruit) now made their way across the country, stopping frequently to drop off supplies where they were required and to pick up supplies needed elsewhere (White 1986; Wood 1980). Peddlers often toured each town along the railroads and entered even the most rural of communities, promoting the process of refrigerated transport and their dressed meat products (Kujovich 1970: 467-468; Skaggs 1986). Soon, even many of those rural regions providing the animals for this very system were reliant upon dressed meats shipped back in to their towns by refrigerated railcar (Anon 1889; Skaggs 1986).

As this paper focusses upon a farm in Iowa City, Iowa, it is important to specify that Iowans were heavily involved in this nationwide market economy during the latter half of the 19th century. In fact, Iowans were producing huge quantities of animals – especially cattle – for markets and processing plants in Chicago (Brewer and Wick 1911: 97; Clemen 1923; Whittaker 1999: 45) and to a lesser extent for various locations across Iowa (Hopkins 1928). Though live animals were routinely shipped from Iowa to the Chicago stockyards (Throne 1949), the use of the refrigerated railway would have allowed for carcasses to be easily transported from Iowa City to Chicago or beyond by the 1870s (Whittaker 1999: 45; Fig. 2). Since Plum Grove was located a mere mile from the train station (Hopkins 1928: 166, cited in Whittaker 1999: 54), it would have been very easy for farmers here to transport dressed carcasses to distributors, butchers and eventually consumers in the east. But did the farmers who lived at Plum



FIG. 5. – The northern face of the Plum Grove house, taken in 2010. The Bone Feature discussed throughout this paper was identified roughly 4-5m east (here, to the left) of the house (photography courtesy of William E. Whittaker). Additional photographs of the site as well as digital reconstructions of the property as it would have looked at various times throughout history can be seen at: <http://www.uiowa.edu/~plumgrove/index.html>.

Grove actually participate in such a system and how would that be visible archaeozoologically? An introduction to the farm and its inhabitants is necessary before we can address these questions.

A BRIEF HISTORY OF PLUM GROVE AND ITS INHABITANTS

Plum Grove (now called “The Plum Grove Historic Farm”) was constructed in 1844 as a retirement residence for Robert Lucas, Iowa’s first Territorial Governor, just three years after he was replaced in that job (Charlton *et al.* 1988; Figs 3-5). Governor Lucas had originally moved to Iowa in 1838 after being appointed Territorial Governor by his long-time political colleague, President Van Buren. Originally from Ohio, where he had served as a Senator as well as a two-term Governor, Lucas had moved to Iowa in hopes of continuing a rather tumultuous political career. After being forcefully replaced as Iowa’s Territorial Governor and failing to win an Ohio seat in the U.S. Congress, he bitterly retired to Plum Grove. Here, he was initially joined by his wife Friendly, three of their children and one young granddaughter, though over the years their house would provide shelter for all five of their children, their children’s spouses and a number of grandchildren (Whittaker 2007).

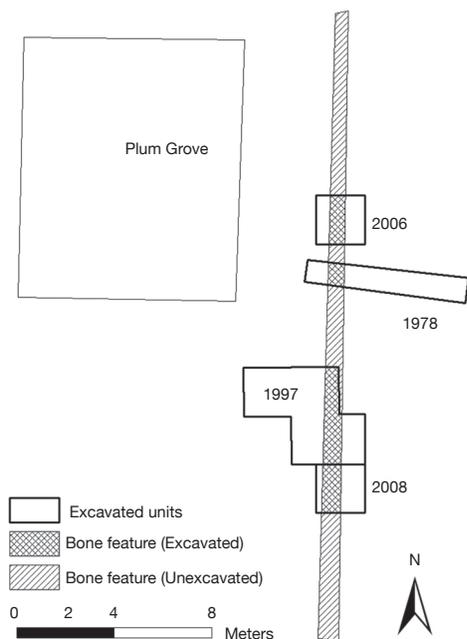


FIG. 6. – A map of the Plum Grove Historic Farm house and the Bone Feature, identifying where unit excavations have been carried out and where testing indicates the extent of the Bone Feature. As is visible here, the Bone Feature is parallel to and runs to the east of the Plum Grove house (figure created by Bryan Kendall).

Plum Grove was much smaller than their large house in Ohio (named ‘Friendly Grove’), a home that had been the social Mecca of the elite in southern Ohio. Though it is likely that Friendly did not want to leave her bustling Ohio social life for the frontier land of Iowa City, Plum Grove was located in what was then an up-and-coming neighbourhood inhabited by other affluent politicians and businessmen, many of which were also from Ohio. Though the family owned limited livestock and likely grew some fruit, there is no indication that the 80-acre farm was ever used intensively. This is likely the result of two factors: 1) the affluence of the Lucas family meant their farm supplied them with some household goods but was not needed to pay their bills; and 2) the railway did not reach Iowa City until 1859 and Iowa City was thus rather isolated at the time, providing little opportunity to participate in any

non-local market system. Importantly, Governor Lucas spent much of his later years working to bring the railway to Iowa (Whittaker 2007), though he did not live long enough to see this actually happen.

Governor Lucas died at the house in 1853 and in 1866 Friendly sold Plum Grove to Walter Hoyt, a man that had travelled much of the eastern states in search of work and adventure. With several of his old business associates having found success in Iowa City, Walter hoped that he too would find economic stability and be able to settle down. Walter and his wife Louise, both ardent abolitionists, chose Plum Grove as their new home in part due to its close proximity to several rather powerful individuals, including their next door neighbour, Iowa’s celebrated Civil War Governor, Samuel Kirkwood (Whittaker 2007).

Work in Iowa City was financially successful for Walter and the family worked hard to foster relationships with their prominent neighbours. One individual that would benefit from these relationships is their daughter Eleanor (‘Nellie May’), born at Plum Grove on January 31st, 1868. Eleanor – known in her adult life as the author and editor turned celebrity Eleanor Hoyt Brainerd – remained a well-connected person for the entirety of her life. Unfortunately, her father did not share in this with her, as Walter died unexpectedly in February of 1869, just one year after Eleanor was born. His death did not leave the family in financial trouble, though, and Louise was able to retain ownership of the property until 1883; she was even able to afford a live-in servant for at least part of their time at Plum Grove. The historical record indicates that Louise spent a considerable sum renovating a number of outbuildings at Plum Grove while she owned the property, but gives no indication that the Hoyt family was actually farming this land. It is thus likely that, after Walter died, they were supplementing their income by leasing parts of the property out to local farmers (Whittaker 2007).

In 1883, the Hoyt family sold Plum Grove to a Civil War veteran and financially unfortunate man by the name of Jacob Carroll Switzer. Though Plum Grove had initially existed in a

rather affluent part of Iowa City and while this certainly influenced Jacob towards purchasing the property, the neighbourhood was increasingly made up of fewer elite individuals and more working class individuals. Jacob himself was a struggling banker – frequently unemployed and regularly underpaid – and this is the first time that the occupants of Plum Grove likely needed the additional income generated by the farm. Shortly after buying Plum Grove, Jacob tapped into city water, erected new out buildings and was quickly running a rather sufficient family farm complete with chickens, pigs, sheep and milking cows (Whittaker 2007). Though there is no written evidence suggesting exactly how the Switzer family endured various times of financial stress, the archaeozoological record – as will be shown throughout this paper – indicates that they took advantage of the national market economy described above to make ends meet.

On Memorial Day 1914, Jacob Switzer passed away. Over the next few years, the Switzer family took in boarders and sold part of the property to pay the bills and in 1919, they even moved out of the house allowing full-time renters to move in. Finally, in 1923, the Switzer family sold what was left of the Plum Grove Farm, a parcel now “too small to support a family of full-time farmers” and “too far from the city to be a desirable residence” (Whittaker 2007: 84). By this time, the neighbourhood was made up mostly of working-class individuals and until the state took possession of the property in 1943, the various owners and renters were often quite poor and living lives far different from those of the home’s earliest occupants (Whittaker 2007).

In 1943, the State of Iowa took possession of Plum Grove and began a lofty restoration project. This project attempted to rebuild the home exactly as people envisioned it had been when the Lucas family lived there. Of course, this required a bit of artistic license and included the addition of previously non-existent interior features (such as numerous fireplaces), the demolition of several buildings on the property, the back-filling of the property’s pond and the removal of a number of additions the house had undergone during the

course of its life (Whittaker 2007). In 1946, the restored Plum Grove was opened to the public and visitors have been touring the property ever since. The furnishings within Plum Grove that visitors see today are time-pieces meant to capture the lives of Iowa City’s elite frontier residents in the 1840s. As such, the lives of many of the poorer people that lived there later are virtually invisible. The house’s later occupants are also comparatively invisible within the historic record itself and we must therefore rely upon the archaeological record to help us understand what their lives at Plum Grove were like. As will be shown here, the site’s Bone Feature is especially telling regarding the economic decisions made by the Switzer family.

THE BONE FEATURE

Archaeological excavations have been conducted periodically at Plum Grove for nearly 35 years. This includes a number of salvage- and academic-based excavations between 1974 and 1996 (Charlton 1974; Charlton and Charlton 1979, 1981; Charlton *et al.* 1981, 1988; Lubbs 1976; Sartain 1980; Snow 1998; Whittaker 1999) as well as annual excavations between 1996 and 2010 as a part of the University of Iowa’s archaeological field school. Though the field school students alone excavated more than 480m² of the site’s surface, revealing a number of historic features and more than one million artefacts, this paper will focus on just one of the site’s features: a bone trench aptly named the ‘Bone Feature’. The Bone Feature consists of a layer of bone, primarily cattle with some sheep and pig, lying 1.0-1.2m below the current land surface. At the time of original deposition, the bones were placed in an excavated trench less than a meter deep and quickly buried. The feature is about 0.5m wide and runs north-south approximately 4-5m east of the main house (Fig. 6). Recent auger testing indicates the feature extends to the northern edge of the house. The southern terminus of the feature remains unknown but it extends at least 6m south of the house with an approximate total length of nearly



FIG. 7. – Photograph of the Bone Feature (facing north) during the 1978 excavations (photograph courtesy of Thomas H. Charlton).

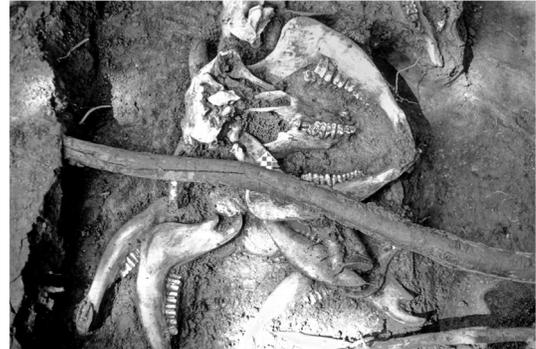


FIG. 8. – Photograph of a part of the Bone Feature (facing north) during the 1997 excavations (photograph courtesy of William E. Whittaker).

TABLE 1. – The total Minimum Number of Individuals (MNI) determined from excavations of the Bone Feature (see Lyman [2008] for an overview of the calculation procedures for MNI values). The data from the 1978 excavations were described in Charlton *et al.* (1988), while the data from the 1978 and 1997 excavations were described in Whittaker (1999).

	1978	1978, 1997	1978, 1997, 2006, 2008
Cattle	11	15	22
Pig	2	2	2
Sheep	2	8	10
Total	15	25	34

24m. The minimal taphonomic damage suffered by the bones as well as the uniformity within the strata suggest the bones were buried together quickly in a single depositional event (Whittaker 1999).

The Bone Feature was first discovered in 1978 during the excavation of a test trench intended to find the boundaries of a historic garden (Charlton *et al.* 1988). Here, archaeologists found the crania of two pigs and two sheep as well as cranial and lower limb bones for at least 11 cattle (Fig. 7; Table 1). These bones showed virtually no evidence of taphonomic damage and were buried in what appeared to have been an artificially created trench (Charlton *et al.* 1988). Since this initial excavation indicated that the trench was oriented north-south along the eastern side of the main house, two units were opened in 1997 in attempts to encounter the southerly portion of the feature (Figs 6; 8; Whittaker 1999). The 1997

excavations revealed six additional sheep crania and found enough cattle crania and lower limb bones to raise the feature's minimum number of cattle to 15 (Table 1; Whittaker 1999). The 1997 excavations did, therefore, confirm the presence of a rather long trench and also supported earlier conclusions (e.g. Charlton *et al.* 1988) that the feature's faunal remains were restricted to the cranial and lower limb bones of just three taxa (Table 2). Importantly, this led Whittaker (1999) to suggest that the meat from these animals was not intended for use by a single family but was instead meant to supply large amounts of meat for the national market economy described above, something we intend to investigate further here.

To further trace the extent of the feature and determine whether or not the skeletal element representation patterns visible during the first two stages of excavation were representative of its entirety, additional units were opened in 2006 and 2008 (Figs 6; 9). Just as with the earlier units, the faunal remains within the 2006 and 2008 units were restricted to cranial and lower limb bones and raised the minimum number of sheep to eight and cattle to 22 (Tables 1; 2). The faunal remains from each unit all suggest one thing: that a large number of animals were butchered over a very brief period of time and that the remains of that butchering event were buried quickly in an artificially created trench placed just east of the main farm house.

Historic artefacts include various ceramic, glass, metal and mineral objects, all of which date to the latter half of the 19th century. A single fragment from

TABLE 2. – The Minimum Number of Elements (MNE) and the Minimum Number of Individuals (MNI) for the cattle, sheep and pig from Plum Grove's Bone Feature (see Lyman 2008 for an overview of the calculation procedures for MNE and MNI values). The greatest MNI values for each species are italicised.

Element	MNE Left	MNE Right	MNE unknown	Total MNE	MNI
Cattle					
Cranium	0	0	19	19	19
Mandible	22	16	2	40	22
Metacarpal	11	13	0	24	13
Metatarsal	16	15	0	31	16
Proximal phalanx	8	7	3	18	2
Intermediate phalanx	9	5	5	19	3
Distal phalanx	7	4	4	15	2
Sesamoid	0	0	21	21	2
Pig					
Cranium	0	0	2	2	2
Sheep					
Cranium	0	0	10	10	10
Mandible	1	1	0	2	1



FIG. 9. – Photograph of the Bone Feature (facing west/towards the house) during the 2008 excavations. The shiny spots visible throughout the photograph are aluminium foil wraps placed on the cattle horns to help protect them from exposure to the air (photograph courtesy of Thomas H. Charlton).



FIG. 10. – Each cattle skull from within Plum Grove's Bone Feature exhibits impact fractures indicative of blunt force trauma, indicating that each individual was killed in the same manner. These impact fractures are clearly visible in this photograph of five of the Feature's cattle skulls (photograph courtesy of William E. Whittaker).

an amethyst glass dish, however, narrows this date down to the final two decades of the 1800s (Whittaker 1999: 49-51). Since we know that the Switzer family owned the property from 1883 to 1923 and relied upon the farm for economic security, we can assume that this family was perhaps responsible for the butchering event that created the Bone Feature.

THE FAUNAL REMAINS FROM THE BONE FEATURE

The faunal remains from Plum Grove's Bone Feature have been identified exclusively as cattle, sheep

and pig. Two fish vertebrae and three unidentified fragments were also found within the Bone Feature's matrix. These are not thought to have been deposited as a part of the feature's main butchering event as they were found within loose feature fill. The pigs are represented by two fragmentary skulls, while the sheep remains consist of one left mandible, one right mandible and ten virtually complete crania. The cattle remains consist exclusively of crania, mandibles and lower limb bones (Tables 1; 2). In sum, these specimens are from a minimum of two pigs, ten sheep and 22 cattle.

Most of the cattle mandibles exhibit some damage from the butchering process, with cut marks and chop marks regularly appearing along the ascending ramus. Furthermore, the lingual portion of many teeth was broken, possibly having occurred during the removal of the tongue or the separation of the mandibles from the skull (Whittaker 1999: 52). The cattle crania all exhibit the same impact fractures indicative of them having been hit over the heads with blunt objects (Fig. 10). Two of the cattle crania also have horizontal cut marks along the occipital condyles, remnants of the decapitation process.

Cut marks are also found on many of the metapodials and while they do not necessarily encircle the metapodials in the consistent and obvious way described by other scholars (e.g. Binford 1981: 107; Landon 1997: 60; Pavao-Zuckerman and LaMotta 2007: 262; Reitz 1986: 324), these marks may still be indicative of the skinning process. There are no known features at the site indicative of what would have been necessary to process such a large number of hides over such a short period of time, so we can conclude that the bones themselves are not solely the result of hide processing activities. Unfortunately, though, the historical record is quite silent regarding the importance (or lack thereof) of hides within the local economy and we are therefore currently unable to adequately discuss what may have happened to the hides of these animals.

Other than human-ascribed damage inflicted during the butchering process, the faunal specimens from the Bone Feature are relatively unharmed. None of them are burned, none of them have evidence of carnivore damage, only two specimens (both mandibles) were gnawed on by rodents and the only other surface damage is likely due to the removal of the bones from the moist Iowa sediments. This lack of carnivore, rodent, or weathering damage on the great majority of the assemblage, the consistent style within which the animals were killed and butchered, and the homogenous nature of the Feature's sediments indicate that the bones were likely buried quite quickly.

Archaeological and ethnoarchaeological research have long shown differences in skeletal part frequen-

cies between butchery and consumption sites (e.g. Binford 1978; Bunn 1993; Metcalf and Jones 1988; O'Connell *et al.* 1988; Perkins and Daly 1968). In short, the portions of an animal's body that have the highest nutritional value would be most likely transported to a site of consumption, while low nutritionally-valued portions would be left at the butchery site. Cranial and lower limb bones generally represent the remains of body parts low in nutritional value, while axial and upper limb bones are often high in nutritional value (e.g. Binford 1978; Emerson 1990). This means that all of the skeletal elements left in place at Plum Grove are from low-value body parts, indicating that the Bone Feature contains the waste elements from the initial stages of butchery.

In addition, there is currently no evidence that the meat from these animals was ever further butchered and eaten at Plum Grove itself, a rather significant statement when students have opened up units across at least 480m² of the site. Furthermore, the sheer amount of meat provided by this butchering event would have far exceeded what any single family would have needed to survive (Charlton *et al.* 1988; Whittaker 1999). So if the more than 30 animals represented in the Bone Feature were not consumed at the Plum Grove Historic Farm, where did the meat go? As will be shown here, the archaeozoological evidence suggests that the meat was intended for a large-scale market economy and possibly transported to distant processors and consumers by refrigerated rail (Whittaker 1999).

IDENTIFYING PARTICIPATION IN A MARKET ECONOMY

Our review of the archaeozoological literature indicates that the process of supplying meat to a market economy can be seen in three important ways, each of which are present with the Plum Grove Bone Feature assemblage. First, one should see the removal of low value skeletal elements at the place of butchery (or, conversely, a lack of these elements at the place of consumption—e.g. Parmalee [1967] and Klippel [2001]). Regarding rural to urban-based market economies specifically, Walsh (1999: 276)

has shown that, as specialisation within market economies increased, governments were forced to “[regulate] what parts of the animals could be sold. Assemblages from highly urbanised market systems, therefore, show an irregular distribution of body parts, a disproportionately large percentage of meat bones and a low number of bones that are commonly associated with butchering waste”. One could thus infer that, at the rural locations of production, low-valued elements would be repeatedly expected. As was just shown, all of the skeletal elements from the Plum Grove Bone Feature are low-value elements representative of a butchery site and the same elements consistently appear, thus providing evidence of the methodical, systematic manner in which these animals were butchered.

In addition to skeletal part profiles, the age distributions of an assemblage can indicate how involved farmers were with market economies. For instance, it has been shown that, while rural families frequently ate their animals only after they were too old to be useful in other arenas (for milk, labour or wool, for instance), animals raised to provide meat for a market-based economy would usually have been killed when they had reached their optimum size (for cattle, between 24 and 44 months; e.g. Bowen 1994; Hopkins 1928; Landon 1997; Walsh 1999). Though this part of our analysis is still in its infancy, metapodial epiphyseal fusion, element dimorphism, cranial sutures and mandibular tooth eruption and wear patterns, suggest that the cattle assemblage from the Bone Feature is dominated by individuals between two and five years old (e.g. Grant 1982; Grigson 1982; Silver 1969), perhaps being made up of older females and younger males (Fig. 11). The unfused cranial sutures suggest that the two pigs were juvenile (Charlton *et al.* 1988: 51) and our current estimate – based on mandibular and maxillary teeth – is that though none of the sheep were old enough to display significant tooth wear, all but one of them were at least older than two years of age (Bullock and Rackham 1982; Deniz and Payne 1982; Whittaker 1999: 52).

In addition to these archaeozoological markers, there should also be evidence (through the historical and/or archaeological records) of a widespread relationship between one area (the site of produc-

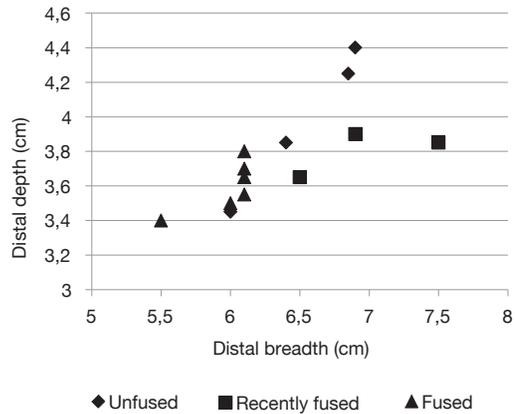


FIG. 11. – Distal measurements of right cattle metatarsals (following von den Driesch 1976). Elements from immature individuals (unfused) are here included with those from mature individuals (fused, with fusion taking place between 2-2.5 years of age [Grigson 1982: 22]). The division in size between older, smaller individuals and younger, larger ones may also represent a break between older females and younger males (figure created by Cerisa R. Reynolds).

tion) and another (the site of consumption) (e.g. Klippel 2001; Landon 1997; Walsh 1999). As was outlined above, by the latter half of the 19th century, there was a very strong economic relationship between eastern Iowa and a nation of processors and consumers.

The three criteria for participation in a market economy outlined above, therefore, are supported through both the archaeozoological remains of the Bone Feature and the historic record: the skeletal element distribution indicates that the site was the location of methodologically organised butchery; the age distributions represent younger individuals that were likely killed for market rather than home consumption; and there was a very strong national network established wherein Iowa was a locus of production for meat products consumed across the eastern half of the country. However, the historic record also suggests that by the end of the 1870s, the refrigerated railway was an important part of transporting meat products across the country. With Plum Grove being located a mere mile from Iowa City’s railway station, this should at least be considered as a possibility. But how does one

archaeozoologically identify the utilisation of the refrigerated rail as the means of transport?

LINKING ECONOMIC DECISIONS WITH THE ARCHAEOZOOLOGICAL RECORD

For a 19th-century farm in the American Midwest, the options for use of cattle, sheep, goat and pigs would have included the following: families could have butchered one or several individuals for household consumption; they could have sold one or more live individuals to local consumers or to middlemen who would take the animals (by foot, rail and/or boat) to a local or distant market; or they could have sold one or more butchered individuals for nearby consumers (either being sold directly to the consumers or via a local butcher/storekeeper). With the widespread use of the refrigerated railway in the 1870s, these options came to include the selling of large numbers of dressed carcasses that would then be easily transported by rail to butchers and consumers in any number of distant markets (Clemen 1923). The archaeozoological evidence for each of these options should be discernible (Whittaker 1999: 53-54).

If, for instance, families participated in the butchering of one or several individual animals for household (on-site) consumption, the archaeozoological record should reflect this in the presence of faunal remains from the entire skeleton (both high- and low-ranked elements), found in various contexts across the property (e.g. Szuter 1996). The number of individual animals butchered should reflect the length of occupation at each site as well as what a family would have needed to survive.

If the farmers participated in the butchering of several animals on site with the meatier portions having been collected by local butchers and/or local consumers, the archaeozoological record should provide us with mostly lower ranked elements of one to a few individuals, depending upon how many times the farmers participated in this type of transaction (Clemen 1923: 226). Especially in smaller, more rural communities, prior to the widespread use of refrigeration by local butchers and eventually most families, the number of individual animals killed

at one time should be relatively small, depending upon immediate, local demands. The number of animals killed for this type of economic decision should thus reflect the local population and level of local demand.

In America, the supply of meat from rural areas to urban areas had long been achieved through the movement of live animals from rural pastures to urban markets (Clemen 1923; Hopkins 1928; Throne 1949: 127). The intensive scale this system achieved in the late 1800s resulted in farmers specialising in certain life stages of the cattle, butchering none of them for local (on-site) consumption and moving them by the thousands across the country. Involvement in the production end of this economy may not be visible through the archaeozoological record, then, as animals were likely to be sold live (as part of cattle drives by foot or by rail) to any number of middle men between their birth and the consumption of their meat. Since it seems as though most farmers involved in this nation-wide system throughout the 19th and 20th centuries sold their products as live animals, this silence within the archaeozoological record is extremely important and the data gathered from the sites of consumption will therefore need to be heavily relied upon if we wish to fully construct herding and butchering decisions made by farmers.

If, however, the farmers participated in the selling of butchered animals for a market that included the use of the refrigerated railway as the initial means of transportation, the archaeozoological signature should indicate this through both the larger number of individuals killed at any one time (since spoilage and local demands would not need to be considered), as well as the extremely consistent (and minimal) butchering patterns necessary for transport by refrigerated rail. A consistent butchering style was especially important since it was necessary to properly pack the carcasses into the available railcar space. Ethnohistoric data (e.g. Wing 1912: 149-151), for example, reveal that sheep were sometimes shipped with only the heads having been removed (Whittaker 1999: 53) and until the 1960s, cattle were shipped as minimally processed quartered or halved carcasses, with only those most wasteful parts (e.g. heads and feet) removed at the earliest stages of

processing (Azzam and Anderson 1996: 23). Furthermore, the archaeozoological data should reflect a heavy involvement in a market-based economy (as outlined above), with individuals of a 'marketable' age dominating the assemblage.

The archaeozoological signature from the Plum Grove Bone Feature matches this economic decision – transporting their goods by refrigerated railcar – most closely, since the assemblage suggests that a large number of animals were killed and minimally butchered in a very short amount of time. The artefactual evidence dating the Bone Feature to the late 1800s, the historic role eastern Iowa played as a producer of nationally consumed meat products and the close proximity of the Plum Grove Historic Farm to a railway depot all further support the possibility that the residents from Plum Grove were integrated within a national market system and that their goods were transported by refrigerated railcar to processors and consumers in the east. Since the historical record provides us with little information regarding the farming activities carried out by the Switzer family while they lived at Plum Grove, the archaeozoological data discussed herein is the best evidence we have for how this economically struggling family made a living and navigated their way through an increasingly expanding market.

CONCLUSIONS

The preparation of meat for transport to a market is visible within the archaeological record in three main ways: (1) the removal of low value skeletal elements at the place of butchery (or, conversely, a lack of these elements at the place of consumption); (2) age at slaughter consistent with the exploitation of animals for meat rather than secondary products; and (3) evidence of a widespread relationship between one area (that of production) and another (that of consumption). Furthermore, confirmation of involvement in a system reliant upon refrigeration and refrigerated railways should be visible in the highly organised, minimal processing of large numbers of animals in regions known to have supplied such remains for nearby rails. Each of these requirements are met by the Bone Feature at the

Plum Grove Historic Farm site, confirming earlier conclusions that the bones were butchery refuse (Charlton *et al.* 1988; Whittaker 1999) and that the assemblage is relevant when discussing the historic, market economy (Whittaker 1999). Importantly, activities such as this are not described in historic documents referring to Plum Grove and this economic transaction is thus only visible through the application of archaeozoological analysis to historic remains.

This snapshot of the economic decisions made by the Plum Grove farmers reminds us that Iowa's role as a local producer for goods consumed nationally has been well established for more than 100 years. Changes in technologies during the 19th century altered the face of the American meat market in a number of ways, most notably of which was the expansion of the railroads, the invention of refrigeration in general and the refrigerated railway more specifically. These changes impacted the decisions made by farmers across the western half of the country, as they pushed their livestock to gain body weight faster and sought to find their place within a complex network of raisers, grazers, finishers, drivers, sellers and processors. However great these changes were on the farm, though, the impact was even greater on America's diet as a whole. With the widespread use of the refrigerated rail, the diet of most Americans changed. Now, meals more easily included fresh fruits, vegetables, seafood, red meat, poultry, eggs and dairy products transported across the country. What had once been a country dependent largely upon locally specific products became a country where diverse goods were available, in demand, and eventually expected. This nation-wide system eventually came to dominate American markets, resulting in a populace largely removed from the production end of any of the goods consumed. The faunal remains from Plum Grove reflect this shift, a shift felt on farms and within homes across America, reminding us of the significant economic changes that can be monitored by historical archaeozoology.

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