Appendix B: Analysis of Faunal Materials from Feature 8, Prince Henry Avenue Lot

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Introduction

In October of 2002, the Center for Archaeological Research at the College of William and Mary submitted for analysis faunal remains excavated from Feature 8, a Civil War feature excavated at City Point. (Feature 8 is described above with the results from the Prince Henry Avenue study area.) An initial inspection of the bones revealed that they were very well preserved and largely intact. Based on the overall preservation, the lack of major recovery bias, and the large percentage of identifiable bones, both parties agreed that all the bones would be analyzed. In total, after the bones were mended within their own contexts, 826 bones were sorted, identified, and analyzed to provide some insights into the foodway patterns of the Union Army while located at City Point (Table B-1).

Faunal remains from Civil War sites not only reveal what species were present in the soldier's diet, they also provide critical information on butchery patterns, available cuts of meat, and animal husbandry practices. Bone studies from Union and Confederate sites can also be used to confirm or question what has traditionally been written about rations and the relative importance of certain types of meat. For example, historical documentation on the Civil War suggests salt pork was the principal ration issued to troops on both sides of the war, while faunal analysis, at least from Union sites, has indicated beef was the main meat in the diet. Discrepancies in the two sources of data indicate that there are still many questions that need to be answered about military rations. Only by closely examining the historical accounts along with the archaeological evidence, can a more complete picture be drawn on military provisioning during the Civil War.

City Point is one site that will provide some interesting insights into the provisioning patterns of the Union Army. Located in Hopewell, Virginia, along the James River, City Point's strategic position served as the headquarters for Grant and the Union Army from 1864 to 1865. More important than being the headquarters for the Union Army, City Point was also the supply base for the Union troops fighting at Petersburg and the surrounding area. Rations were not only stored there, but large herds of cattle were maintained to supply the Union forces with fresh beef. For this reason, the faunal assemblage from City Point will provide a unique opportunity to examine the foodway patterns of an army that had a direct link to the source of rations.

The goal of this report is to first examine the faunal remains from Feature 8 to determine what the archaeological record discloses about subsistence patterns of the Union Army headquarters during the last year of the Civil War. Secondly, historical accounts will be investigated to reveal what has been written about the type of rations supplied to the Union army, how they were provided, the role of rations in the soldier's diet, and specific references to food being supplied and prepared at City Point. Thirdly, any differences between the faunal and written record will be compared and discussed in an attempt to reveal biases that may be present in each source of data. Finally, another objective of this report is to provide a detailed faunal analysis of the City Point pit that can be easily added and compared to the growing database of faunal assemblages from other Civil War sites. As this database continues to grow and further research is done on the historical documents, Union camp life during the Civil War can be better understood.

Assemblage	Identifiable Bone	Unidentifiable Bone	Total Bone
Upper Fill (I, II, and IIA in East Half)	52	98	150
Lower Fill (III and IV in East Half)	377	299	676
Overall Totals	429	397	826

Table B-1. Assemblages analyzed.

The first section of this report will discuss the specific laboratory and analytical techniques used to examine the faunal remains from the Union encampment site. The second section of the report will separately examine the faunal remains excavated from the Upper Fill of the pit and those remains from the Lower Fill of the pit. Historical texts will be used to look at the role of rations in the Union Army and finally, whenever possible, the faunal data will be compared to faunal assemblages from other Civil War sites.

Recovery Methods

The first, most basic step in zooarchaeological analysis is to evaluate the methods used to recover the faunal material. The bones from the City Point pit were from soil that had either been excavated or screened through quarter-inch mesh. Quarter-inch screening is a standard technique used on historic-period sites, although there are some sites that are not screened at all. As early as 1969, David Thomas demonstrated in his article on quantitative methods for faunal analysis that screening has an enormous positive influence on the recovery of bone, particularly the recovery of smaller or more fragile elements. The smaller the screen size, the better the recovery rate, but the amount of time required to screen through one-eighth-inch screen must be weighed against the gains in recovery rates. The combination of quarter-inch screening and flotation sampling is a responsible compromise that allows comparison with a large number of sites that have been excavated similarly.

Most of the identified bones in the assemblages included the more durable elements such as mammalian long bones and teeth. Only four chicken bones were recovered and no fish, turtle, or small mammal elements were identified in any of the assemblages. Normally, the overwhelming presence of large mammal bones in faunal assemblages would suggest either biases in recovery techniques or a reflection of taphonomic influences on the bones. However, as with what has been seen in other Civil War assemblages, the lack of bird, fish and small mammal bones in Feature 8 appears typical of faunal assemblages from other Civil War sites (Table B-2). For example, the breakdowns of bones excavated from both a Union encampment site located in Stafford, Virginia and from a Union headquarters located in New Bern, North Carolina, also demonstrate a lack of fish, amphibian/reptile, and bird bones (Andrews 2000, 2002).

Both of these assemblages also have a high percentage of unidentifiable bones, suggesting that there was a considerable amount of bone fragmentation occurring on the sites which may account for the lack of the more fragile, smaller bones. However, all of the unidentifiable bones from these sites were recorded as either being from large or medium sized mammals. The well-preserved City Point assemblage does not have the high degree of fragmentation and still it lacks the smaller, more fragile bones. All of these Union sites suggest that the dominating presence of the domestic mammal bones is a reflection of dietary choices rather than recovery biases.

Lab Techniques

The study of animal bones from archaeological sites is a burgeoning field that is still developing new analytical techniques that influence how faunal assemblages are interpreted. Early on, until the 1960s, the pioneers of zooarchaeology concentrated on producing "species lists," simply naming the various species that were represented on an archaeological site. By counting the bone fragments from each specific species, zooarchaeologists attempted to estimate the importance of some animals over others.

Assemblage	Domestic Mammal Bones	Bird Bones	Fish Bones	Reptile/ Amphibian Bones	Unidentifiable Bones	Total
City Point/Union Headquarters	425	4	0	0	397	826
Stafford Union Encampment	34	0	0	0	764	798
Hay House/Union Headquarters	43	3	0	0	347	393

Table B-2. Breakdown of faunal assemblages recovered from Civil War sites.

Over time, zooarchaeological research has evolved more complex and discriminating methods (Chaplin 1971; Grayson 1984; Reitz and Cordier 1983; White 1953). Different analysts use different methods, though the goals of determining subsistence patterns in assemblages are generally the same. The following section of the report explains some of the standard procedures and how they have contributed to this study.

In the lab, analysis of the City Point remains began with sorting the faunal fragments into "identifiable" and "unidentifiable" categories. The unidentifiable bone—that which could not be taken at least to the taxonomic level of Order—was then further sorted into broad taxon groupings such as bird, fish, small mammal, medium mammal, and large mammal. Finally, within their taxon groupings, the bones were sorted into broad element categories such as long bones, teeth, ribs, and skull fragments. All of the unidentifiable bones were then counted, weighed, and examined for evidence of burning, butchering, or other types of modification. This data was then entered into a custom-designed microcomputer program developed by Greg Brown and Dr. Joanne Bowen for Colonial Williamsburg's Department of Archaeological Research.

Each of the identifiable bones was assigned a "unique bone number." By working with the comparative collection, which was created and currently is maintained by Dr. Joanne Bowen of Colonial Williamsburg's Zooarchaeology Lab, the "identifiable" bone fragments were identified to the lowest taxonomic level possible. The taxon, bone element, symmetry (side), location, weight, fusion state, tooth type and wear, relative age, butchering marks, and evidence of burning, weathering, and gnawing were recorded and entered into the computer program. Once entered, the data were manipulated to provide the summary information described in this report.

Once these steps were completed, all bones identified to either genus or species were laid out to determine the minimum number of individuals. MNIs were calculated for each assemblage separately by pairing comparable rights and lefts, taking into account size, state of fusion, tooth eruption, and general morphology. Before the bones were put away, evidence of butchery and gnawing marks was recorded. Osteological measurements of the major domesticates (pig, cattle, and sheep/goat) were also taken using the standards defined in von den Dreisch (1976). Summary diagrams of butchery patterns can be found in Attachment B-2 and the osteological measurements in Attachment B-3.

Analytic Techniques

Relative Dietary Estimates

Zooarchaeologists have devised several methods of quantification to estimate relative dietary importance and to help adjust for differential preservation. These quantification methods include determining the Number of Identified Specimens (NISP), Minimum Number of Individuals (MNI), Usable Meat Weight totals, and Biomass estimates. The most common goal of these analyses is to identify relative dietary importance, but zooarchaeologists have long debated their relative strengths and weaknesses (Grayson 1984; Reitz and Cordier 1983; Wing and Brown 1979). In our view, each measure provides a different measure of relative importance, and therefore we regularly compute all four estimates, a step that allows us to take advantage of the strengths of each, as well as to make the broadest possible comparisons of our data with the work of others.

NISP

At the simplest level, the Number of Identified Specimens (NISP) is used to calculate the relative abundance of any species within a faunal assemblage. After identification, all the bones within each species are added together to determine the frequency of fragments for each animal. Though still perhaps the most frequently used measure of abundance, this method has several shortcomings, most notably its assumption that the bones being counted are representative of the sampled population, and that each item is independent of every other item. There is no way, however, to demonstrate which bone fragments came from different individuals across an entire faunal sample. Other problems with this method include the unequal numbers of bones in different classes, differential preservation rates, uneven fragmentation rates that occur with different classes and sizes of animals, and misrepresentation of complete skeletons that are often intermixed with fragmented pieces from an indeterminate number of individuals (Grayson 1984).

From an interpretive standpoint, NISP represents only the number of fragments identified to taxon. It does not directly consider the differences in size and meat weight between various classes of animals. For this reason, as well as the potential biases described above, many zooarchaeologists have come to the conclusion that this technique alone cannot provide an accurate assessment of the relative dietary importance of various species.

MNI

One popular method for estimating species abundance is the method called Minimum Number of Individuals (MNI). While NISP attempts to calculate the maximum number of individuals on a site, MNI most often establishes the minimum number of animals by examining the most common element for each taxon. Taking into consideration differences in age, sex, and size for each taxon, the rights and lefts of each of the main elements are carefully matched. Once comparisons are completed, the individual MNI for each element is considered, and by taking into consideration gross size and age differences, a figure representing the entire animal is derived.

The MNI effectively corrects for the differential number of bones found in bird, mammal, and fish skeletons, as it also corrects for the presence of complete skeletons. But the thoroughness of the analyst, the units of aggregation, and the sample size all affect the interpretation of an MNI figure. Accurate estimations of dietary importance based on MNI require a large number of bones, since in small assemblages infrequently occurring animals are overrepresented. As Grayson (1984) pointed out, MNI values are intimately tied to units of aggregation, and therefore, in small samples the least common species on a site will be overemphasized. While this problem is greatly diminished in larger samples, the MNIs, no matter how well executed, do not provide a true dietary estimate. Since large and small taxa are given equal weight, this method produces a skewed picture of the relative dietary importance. For example, one pig and one cow are presented as equally important in dietary terms, despite the differences in pounds of meat (Grayson 1984).

Usable Meat Weight

In the 1950s Theodore White introduced to the field a method that would translate MNIs into dietary estimates. To obtain a rough estimate of the relative importance of different taxa, the MNI for a given taxon was multiplied by the average amount of usable meat derived from an estimate of meat yield. Average values used in this study are based on the average weight of modern wild birds, mammals, turtles, and rough estimates for the more variable fish. Domestic livestock weights are based on colonial figures from historic records and from "historic breeds" research, making them far more realistic than modern livestock weights. Averages used for this study are largely those developed by Henry Miller (1984) in his dissertation.

Since this method relies on MNI directly, usable meat weight estimates suffer from the same problems inherent in the MNI method. In small assemblages, particularly those where even the more frequently occurring taxa are represented by only one or two MNI, the least frequently occurring taxa are grossly inflated.

Biomass

The fourth technique that is quickly becoming a standard procedure in zooarchaeological analysis is known as the "biomass" or "skeletal mass allometry" method. Unlike other methods, this method is based on the biological premise that the weight of bone is related to the amount of flesh it supports. Since two dimensions of an animal grow in a relatively predictable exponential curve, an equation relating the two can be derived. Developed for zooarchaeology by Elizabeth Reitz and other scholars, this method is based on firm biological ground. Body size and body weight can then be determined from the size of a bone element, since a specific quantity of bone represents a predictable amount of tissue (Reitz and Cordier 1983; Reitz and Scarry 1985). This estimate, therefore, provides a balance to the NISP and MNI methods. It successfully counters the problem of interdependence, since it accounts for the presence/absence of partial and complete skeletons. It does not rely on thoroughness or assemblage composition, and fragmentation is not a problem. It does, however, require that each bone (or set of bones) be weighed individually.

In a later section, where relative dietary estimates are used to show trends over time, biomass estimates have been used, despite the fact that all of the early analyses by Miller, Bowen, and others are based on usable meat weight. However, recent research by Bowen and others have shown biomass estimates to be far more consistent than meat weight estimates (Bowen in Walsh et al. 1997). In general, it allows the weight of the fragments identified only to class to become part of the dietary estimates, it avoids the idiosyncrasies of the MNI method, and it circumvents the "averaging" problem that plagues any assemblage containing a large proportion of fish.

Taphonomy

There are many physical, chemical, and biological processes that modify the appearance of bones and affect the interpretations of faunal assemblages from archaeological sites. The study of these mechanisms is known as "taphonomy," or the study of environmental phenomena and processes that affect organic remains after death (Efremov 1940). The determination of which cuts of meat are represented in a faunal assemblage begins with the careful analysis of taphonomic modifications. Identifying alterations resulting from natural processes such as temperature variation that can dry out, split, or otherwise degrade bone, carnivores and rodents that gnaw bone, and human feet that can further fragment bone, is the important first step. Equally important is identifying modifications resulting from cultural activities such as butchering with an ax, cleaver, or saw. Modifications resulting from percussion tools look to the unschooled and unwary much like stress fractures resulting from temperature variation (Bonnichsen and Sorg 1989; Gifford 1981; Johnson 1985; Lyman 1987).

During the identification phase of this project, burn marks, evidence of gnawing, weathered appearance, and butchering evidence were recorded (Tables B-3–B-5). In these assemblages, bones were recorded as "burned" only if they exhibited distinctive charring or scorch marks. Experiments on cooking bones, by either roasting or boiling, has shown that it often takes extreme temperatures to produce burn marks on a bone. The size and density of the bone, combined with the temperature and type of cooking, influences the appearance of burn marks on bones (Pearce and Luff 1994). For this reason, there may have been other bones in the assemblages that had been burned and cooked but not recorded as having been burned. Evidence of the bones being gnawed was apparent from puncture holes made by canine teeth or by specific gnawing patterns left on the surface of the bone. Carnivores such as dogs will typically gnaw on the soft ends of long bones

	Taxonomic Name	Common Name
Birds		
	Gallus gallus	Chicken
Mammals		
	Class Mammalia	Mammal
	Class Mammalia I	Large Mammal
	Class Mammalia II	Medium Mammal
	Sus scrofa	Domestic Pig
	Bos taurus	Domestic Cattle
	Ovis aries/Capra hircus	Domestic Sheep/Goat

Table B-3. Taxa identified from Upper and Lower fills of Feature 8.

	Total Bone	Gnawed	Hack Marks	Saw Marks	Weathered	Burned
Cattle	17	0	1	3	0	0
Pig	33	0	1	2	0	0
Sheep/Goat	2	0	0	0	0	0
Chicken	0	0	0	0	0	0
Total	52	0	2	5	0	0

Table B-4. Upper fill, taphonomic influences on domestic mammal and bird bones.

	Total Bone	Gnawed	Hack Marks	Saw Marks	Weathered	Burned
Cattle	75	8	19	20	0	1
Pig	270	7	18	7	0	0
Sheep/Goat	28	0	2	0	0	2
Chicken	4	0	0	0	0	0
Total	377	15	39	26	0	3

Table B-5. Lower fill taphonomic influences on domestic mammal and bird bones.

to create channels that allow them to get at the marrow. Smaller bones belonging to fish, birds, and small mammals are easily broken and digested by carnivores, so there is rarely any evidence of carnivore gnawing on these bones. Gnaw marks left by rodents are distinguished by a characteristic pattern made by incisor teeth and therefore were recorded separately from carnivore marks.

Bones were recorded as having a weathered appearance if the surface of the bone was cracked or flaking. A weathered appearance on the surface of a bone can occur if bones are left in the open, where they can be exposed to extreme temperatures and the changing elements. Usually if bones are left exposed for a period of time, they are also susceptible to gnawing by animals and fragmentation due to the trampling of feet. Weathering can also occur when the chemistry of the soil has a direct influence on bone preservation. Generally speaking, if the soil environment is acidic, then the mineral content of the bone will be removed. According to Carbone and Keel (1985), bones will not survive very well under conditions where the pH is lower than 6.3.

Finally, butchering leaves obvious taphonomic signs on the bone. Although most of the faunal material from the Upper and Lower Fills from Feature 8 had probably been butchered, almost half of the faunal remains were highly fragmented, resulting in bones too small to identify to species or to element. Those butchered bones that could be identified to element and species were recorded on drawings in Attachment B-2. All of the butchered identifiable elements from the City Point assemblage were primarily long bones that had either been hacked by an ax or cleaver or had been sawn. Wherever the cut was placed, the resulting piece of meat would probably have been substantial since it generally would have included almost half the element.

Age Data

Another form of faunal analysis, the determination of the age at which an animal was slaughtered, is important because it provides data critical to the study of animal husbandry and agricultural economies. In general terms, "kill-off" patterns are determined by several aging techniques, including evaluating the relative size and characteristics of the bone, tooth wear, and the degree of fusion of the long bone epiphyses.

Essential for any study of animal husbandry, evidence for the age of slaughter is based on individual bone that can be "aged," i.e., a long bone that has one or more epiphyseal ends or a mandible having either the fourth premolar and one or more molars. Once the "age" has been determined for each individual bone, then they are aggregated to form the demographic structure of the dead herd, known as "kill-off," or slaughter patterns. As with so many other techniques in zooarchaeology, these methods require assemblages with large numbers of ageable bones and/or teeth.

Briefly, the process of epiphyseal fusion is based on general developmental morphology. There are three growth areas in a typical mammalian long bone: the shaft or diaphysis and epiphyses on either end, separated by cartilage that is progressively ossified as the epiphyses "fuse" to the shaft. The rate at which these epiphyses fuse varies, on either end of the same bone and among different elements. By noting which epiphyses are fused and which are not in animals of known age, the sequence of bone fusion can be determined. This sequence appears to be fairly consistent for a species, but can vary within different breeds of the same species. The age at which epiphysial fusion occurs can also be influenced by diet and environmental factors.

Even though the exact age at which long bones fuse can vary, the process and sequence of bone fusion remains the same and thus can serve as a guide to relative age. Following the outlines on epiphyseal fusion from Raymond Chaplin (1969) and J. Watson (1987), the fused or unfused condition of the epiphyses of the limb bones from the City Point pit were recorded whenever possible for cattle, caprines (sheep and goat), and swine.

Unfortunately, neither of the assemblages contained sufficient numbers to reconstruct kill-off patterns from mandibular tooth wear for any of the domesticates. Neither was long bone data from cattle and sheep/goat strong enough to be able to make interpretation of animal husbandry practices. Even if the two assemblages are combined together into one assemblage, there are only seven cattle bones and 15 sheep/goat bones that could be used for calculating age distribution patterns. However, the presence of at least 112 pig bones with epiphyseal ends has allowed for some basic interpretations and insights into the kill-off patterns for pigs. Age distribution tables for all of the domesticates are included in Attachment B-1.

Results of the Faunal Analysis from the City Point Site

Taxa Identified

There were a total of 826 bones analyzed from the City Point pit, with at least 52% of bones identified to genus or species. A total of four different species were identified including three domestic mammal and one domestic bird species. A list of each species by their taxonomic and common names can be found in Table B-3.

Before relative dietary importance, meat cuts, taphonomic processes, and husbandry patterns from the Union site are discussed in detail, it is necessary to briefly describe the habitat, availability, and economic importance of each animal. Although the following paragraphs provide brief summaries on each identified species, more in-depth information can be obtained from the field guides, traveler's accounts, and wild game and livestock management texts listed in the references.

Birds

Chicken. All of the four domestic chicken (*Gallus gallus*) bones came from the Lower Fill of the City Point Pit. Chickens were probably found on most rural and some urban properties throughout the eighteenth and nineteenth centuries. They were easy to raise and, though often kept in hen houses, they were also allowed to roam free. Chickens provided a year-round source of meat and their eggs were prepared in a number of ways: roasted, boiled, fried, broiled, and minced (Noël Hume 1978). Although eggs and poultry were not included in the day to day rations issued by the government, Union soldiers found other ways to acquire them. They could purchase them from sutlers, who made a business of supplying food and other items to troops, or they could have acquired them by foraging through nearby farms and houses (Billings1993). Although only four chicken bones were found in the assemblage, chickens and other poultry were considered a precious commodity during the Civil War whenever the soldiers had access to them.

Domestic Mammals

Pig. The most frequently identified species was domestic pig (*Sus scrofa)* including 33 elements from the Upper Fill and 270 elements from the Lower Fill. Although the ranking of pork among early diets may be argued by some, it is clear the domestic pig was an important food source from the initial years of settlement on through the twentieth century. Pigs were and still are an efficient, inexpensive animal for farmers to raise, and their meat, being easily salted, was the best choice for use as a year-round source of preserved meat (Bowen 1990a). Allowed to roam in the woodlands, it fed on mast, roots, and whatever else was available. They required little care, were prolific breeders, and rapidly grew to slaughter weight. In addition, pigs provided 65–80% of dressed meat per individual after slaughter, in comparison to cattle, which provided only about 50–60% (Reitz et al. 1985). According to documentary sources salt pork became a principal meat ration for both the Union and Confederate armies. It was appreciated not only because it could be preserved and easily sent as rations to the troops, but it also provided an excellent source of energy for soldiers on the march.

Cattle. There were 17 bones from the Upper Fill and 75 bones from the Lower Fill identified as domestic cattle (*Bos taurus*). Cattle arrived with the early colonists, quickly flourishing in the woodland environment. As early as the 1620s, herds had become so large that beef became the mainstay of both the northern and southern diet, a pattern that stood firm throughout the colonial period (Miller 1984, Bowen 1990a, 1990b). Cattle were almost universally raised on farms to provide their owners not only meat, but also milk and dairy products. Unlike pork, beef did not preserve particularly well, and salt beef was never as important as salt pork (Bowen 1992; Price and Schweigert 1971). Thus, cattle were killed and the meat distributed during the slaughtering season, usually fall or winter. Around 50–60% of a cow's body weight could be used for edible meat which, loosely translated, means typically 400 pounds of meat could have been used from a mature cow in the eighteenth-century (Miller 1984).

During the Civil War, beef was provided as a ration to the soldiers both as preserved meat and fresh meat. When preserved, it was thoroughly penetrated with salt and commonly referred to as "salt horse" by the troops. Much more appreciated by the men was the fresh beef that came freshly slaughtered from government herds that were kept near camp.

Sheep/Goat. Two bones from the Upper Fill and 28 bones from the Lower Fill were identified as either sheep (*Ovis aries*) or goat (*Capra hircus*). Despite their outward appearance, these species are usually grouped together by faunal analysts because they are almost skeletally indistinguishable. The caprine remains that were identified, however, were not suitable for such differentiation, and it is not clear which species was represented. Although, considering the time period and what has been found in other urban assemblages the remains are probably from sheep.

Goats were introduced to the New World, possibly with the first arrivals, but certainly with the first supplies. Goats were hardy, they browsed on undergrowth, and they were better able to protect themselves from predators than sheep (Dandoy 1997; Walsh et al. 1997). With the first years of colonization, they supplied both milk and meat, but as fields were established and predators brought under better control, sheep were introduced in increasingly large numbers (Walsh et. al. 1997). While pigs and cows were allowed to roam free, sheep never became really profitable since they were unable to defend themselves from predators and would not freely reproduce (Reitz 1979; Walsh et al. 1997). By the 1690s, however, when the wolf population declined and more pasture land became available, sheep were raised in increasingly more numbers (Walsh et al. 1997). While sheep were raised primarily for their wool, the byproduct, mutton, remained a relatively small but important meat source of meat (Noël Hume 1978: Walsh et al. 1997). Although there are only a few sheep/goat bones excavated from the City Point pit, mutton was included as an ingredient in several recipes given in the Military Handbook for Soldiers in 1861 (Beadle Publishers 1861).

Taphonomic Influences

The following paragraphs briefly describe each of the taphonomic influences and how they influenced the bones from both the Upper and Lower Fills of the City Point pit (see Tables B-4 and B-5).

Upper Fill

After the bones from the pit were separated into the two assemblages, a total of 52 domestic mammal bones from the Upper Fill were analyzed for taphonomic influences (see Table B-4). While none of the bones appear to have been burned, weathered, or gnawed, there are seven bones that appear to have been butchered using either a saw, ax, or cleaver. Elements that had been butchered using a saw include a femur, rib, and innominate from a cow, as well as an innominate and humerus from a pig. Bones that had been hacked using an ax or a cleaver include a pig scapula and a cow vertebra. As mentioned earlier, only bones that were identified to species and element were examined for evidence of butchering. For this reason, there may have been unidentifiable bones that had also been hacked or sawn but were not recorded as butchered or included in the description of taphonomic influences.

Lower Fill

A total of 377 domestic mammal and domestic bird bones from the Lower Fill were analyzed for taphonomic influences (see Table B-5). While there were no bones with a weathered appearance, there were at least one cattle and two sheep/goat bones that appeared to have been burned. As mentioned in the "Analytic Techniques" section of this report, it often takes extreme temperatures to produce burn marks on a bone so there may be other bones in this assemblage that had been burned but do not exhibit a charred appearance.

In addition to the burned bones, there were also 15 cattle and pig bones that have gnaw marks consistent of a carnivore. As mentioned earlier, evidence of carnivore gnawing is apparent from puncture holes left by canine teeth or by specific gnawing patterns left on the surface of the bone. Carnivores such as dogs will typically gnaw on the soft ends of long bones to create channels that allow them to get at the marrow. Smaller bones belonging to fish, birds, and small mammals are easily broken and digested by larger carnivores, so usually there is minimal evidence of carnivore gnawing on these bones.

Marks left by butchering was noted on a total of 65 bones including 19 cattle bones, 18 pig bones, and 2 sheep/goat bones that had been hacked with either an ax or a cleaver. Both the cattle and pig bones that had been hacked include vertebrae, sacrums, innominates, scapulas, and ribs. In addition to these elements, hacked pig and sheep/goat bones also include several long bones and a calcaneous bone. There are also 20 cattle bones and 7 pig bones that had been butchered using a saw. The majority of these elements include innominates, ribs, long bones, and vertebrae. Like the Upper Fill assemblage, only bones from the Lower Fill that were identified to species and element were examined for evidence of butchering. For this reason, there may have been unidentifiable bones that had also been hacked or sawn but were not recorded as butchered or included in the description of taphonomic influences.

Relative Dietary Importance

The following section discusses the relative dietary importance of each taxon based on each of the four main quantification methods mentioned earlier in the "Analytic Techniques" section of this report. It must be realized that these are relative measures and they do not reflect anything absolute about the amount of meat provided.

Upper Fill

When the bones from the City Point pit were sorted into the two assemblages, the Upper Fill produced a total of 150 bones, of which 34.5% are identifiable to at least three species (Table B-6). As the NISP numbers reveal, unidentifiable mammal remains make up the largest percentage, totaling 65.3%. In terms of identifiable bones, domestic pig are the highest contributors to the NISP at 21.9%, followed by domestic cattle at 11.3%, and finally sheep/goat at 1.3%.

When looking at the MNI values, domestic cattle and sheep/goat each contribute one adult individual, while two adult individuals represent domestic pig. In terms of meat weight, the domestic mammals make up a total of 635 pounds of meat. When looking at the species individually, domestic cattle have the greatest amount of usable meat weight (62.9%), followed by pig (31.5%), and sheep/goat (5.5%).

When the bone weight is taken into account, domestic cattle also contribute the greatest amount to the biomass percentages accounting for 64.3% of the total diet. Domestic pigs make up 25.6% of the biomass totals and sheep/goat only contributes 1.0% to the overall diet. It must also be kept in mind that the domestic mammal figures can be somewhat masked by the "other mammal" category, composed of indeterminate mammal bones that are almost certainly cattle, pig, and sheep/goat which are simply too fragmented to identify to species. Unidentifiable mammal bones make up 3.6% and medium mammals make up 5.0% of the biomass figures. It is interesting to note that no unidentifiable large mammal remains were present in the assemblage.

Lower Fill

As the larger of the two assemblages, the Lower Fill produced a total of 676 bones, of which 377 bones are identifiable to four different species (Table B-7). Typically in faunal assemblages from historic sites, only 25–30% of the bones can be identified to species. The Lower Pit faunal assemblage is unique in that 55.5% of the bones were identifiable. As the NISP figures show, domestic pig bones account for

	NISP		MNI		Meat Weight		Biomass	
	No.	Pct.	MNI	Pct.	Lbs.	Pct.	Kg	Pct.
Class Mammalia (Mammal)	60	40.0	–	–	–	–	0.56	3.6
Class Mammalia II (Medium Mammal)	38	25.3	–	–	–	–	0.77	5.0
Sus Scrofa (Domestic Pig)	31	20.6	2	50.0	200.0	31.5	3.53	23.2
cf. *Sus Scrofa* (Domestic Pig)	2	1.3	–	–	–	–	0.37	2.4
Bos taurus (Domestic Cow)	15	10.0	1	25.0	400.0	62.9	9.50	62.7
cf. *Bos taurus* (Domestic Cow)	2	1.3	–	–	–	–	0.25	1.6
Ovis aries/Capra hircus (Domestic Sheep or Goat)	2	1.3	1	25.0	35.0	5.5	0.16	1.0
Fish	0	0.0	–	–	–	–	0.00	0.0
Reptiles/Amphibians	0	0.0	–	–	–	–	0.00	0.0
Wild Birds	0	0.0	–	–	–	–	0.00	0.0
Wild Mammals	0	0.0	–	–	–	–	0.00	0.0
Domestic Birds	0	0.0	–	–	–	–	0.00	0.0
Domestic Mammals	52	34.5	4	100.0	635.0	100.0	13.81	90.9
Commensals	0	0.0	–	–	–	–	0.00	0.0
Wild	0	0.0	–	–	–	–	0.00	0.0
Domestic	52	34.5	4	100.0	635.0	100.0	13.81	90.9
Identified	52	34.5	4	100.0	635.0	100.0	13.81	90.9
Unidentified	98	65.3	–	–	–	–	1.33	8.
Totals	150	100.0	4	100.0	635.0	100.0	15.14	100.0

Table B-6. Upper fill, summary of faunal remains.

39.9%, domestic cattle bones contribute 11.0%, sheep/goat bones make up 4.1%, and finally, the remains of a chicken account for 0.5% of the NISP.

MNI numbers reveal that one adult individual can be found in the chicken and the sheep/goat remains. Domestic cattle bones include two adult individuals and the domestic pig remains are made up of at least five adult individuals. With at least nine adult individuals in this assemblage, it is not surprising that domestic species account for a total of 1,335 pound of usable meat. Individually, domestic cattle account for 59.8%, domestic pig account for 37.3%, sheep/goat contribute 2.6%, and chickens make up only 0.1% of the meat weight totals.

The biomass data for cattle demonstrates that the soldiers diet was overwhelmingly comprised of beef, making up 66.3% of the biomass percentage. Domestic pigs are the second greatest contributors with 22.2%, followed by sheep/goat with 2.9%. As mentioned previously, the domestic mammal biomass figures can be somewhat masked by the "other mammal" category, composed of indeterminate mammal bones that are almost certainly mostly cattle, pig, and sheep/goat which are simply too fragmentary to identify to species. Unidentifiable large mammals make up 3.8% and medium mammals make up 2.2% of the biomass figures.

Kill-off Patterns

When examining animal husbandry patterns, there is a direct relationship between the agricultural economy and how livestock are bred, raised, and slaughtered. In subsistence farming, animal husbandry focuses on raising livestock to serve multiple purposes. For example, a farmer might raise cattle for milk, meat, and draft uses, or sheep for

	NISP		MNI		Meat Weight		Biomass	
	No.	Pct.	MNI	Pct.	Lbs.	Pct.	Kg	Pct.
Gallus gallus (Chicken)	4	0.5	1	11.1	2.5	0.1	0.07	0.0
Class Mammalia (Mammal)	166	24.5	–	–	–	–	1.63	2.1
Class Mammalia I (Large Mammal)	48	7.1	–	–	–	–	2.89	3.8
Class Mammalia II (Medium Mammal)	85	12.5	–	–	–	–	1.71	2.2
Sus scrofa (Domestic Pig)	249	36.8	5	55.5	500.0	37.3	15.47	20.5
cf. *Sus scrofa* (Domestic Pig)	21	3.1	–	–	–	–	1.33	1.7
Bos taurus (Domestic Cow)	54	7.9	2	22.2	800.0	59.8	46.72	62.2
cf. *Bos taurus* (Domestic Cow)	21	3.1	–	–	–	–	3.12	4.1
Ovis aries/Capra hircus (Domestic Sheep or Goat	26	3.8	1	11.1	35.0	2.6	2.05	2.7
cf. *Ovis aries/Capra hircus* (Domestic Sheep or Goat	2	0.3	–	–	–	–	0.15	0.2
Fish	0	0.0	–	–	–	–	0.00	0.0
Reptiles/Amphibians	0	0.0	–	–	–	–	0.00	0.0
Wild Birds	0	0.0	–	–	–	–	0.00	0.0
Wild Mammals	0	0.0	–	–	–	–	0.00	0.0
Domestic Birds	4	0.5	1	11.1	2.5	0.1	0.07	0.0
Domestic Mammals	373	55.0	8	88.8	1335.0	100.0	68.84	91.3
Commensals	0	0.0	–	–	–	–	0.00	0.0
Wild	0	0.0	–	–	–	–	0.00	0.0
Domestic	377	55.5	9	100.0	1337.5	100.0	68.91	91.3
Identified	377	55.5	9	100.0	1337.5	100.0	68.91	91.4
Unidentified	299	44.1	–	–	–	–	6.23	8.1
Totals	676	100.0	9	100.0	1337.5	100.0	75.14	100.0

Table B-7. Lower fill, summary of faunal remains.

both their wool and their meat. The farmers typically raise the livestock to provide for their own household's needs, and only after their needs are met is any surplus sold (Walsh et al. 1997).

Specialized farming, on the other hand, focuses on raising livestock to produce meat and animal products for sale. On these specialized farms, subsistence farming is secondary, and the focus is on carefully managing livestock to produce the greatest profit in a short period of time. Since this is best accomplished by focusing on a single product from an animal, commercially oriented farming has developed very specialized farms with livestock to produce a single product: dairy cows to produce milk, beef cattle to produce meat. Since animals on these specialized farms are bred for a specific purpose, they are also slaughtered at a certain age to ensure the most profit.

The rations issued to the Union soldiers should reflect kill-off patterns similar to a specialized from of animal husbandry. Since the main purpose of these animals was to provide food for the soldiers, they would have been raised and fattened quickly and slaughtered at the most optimal age for acquiring meat. To accurately assess the kill-off patterns from an assemblage, large numbers of elements are needed in proportions that are roughly even to that of a normal skeleton. Unfortunately, the cattle and sheep/goat remains did not produce enough bones to make any conclusive statements about their kill-off patterns. There were, however, at least 20 bones from the Upper Fill and 92 bones from the Lower Fill which are examined in the following paragraphs in an attempt to make some generalizations about the kill-off patterns for pig. For the purpose of future comparative work, the epiphyseal fusion tables for all of the assemblages are included in Attachment B-1.

Pig Kill-Off Patterns

Pigs were an adaptable livestock that were commonly raised throughout the eighteenth and nineteenth century. Pig husbandry techniques were very similar to cattle husbandry in that it developed from subsistence-oriented practices that combined the use of open woodlands and pens. With the increase of commercially oriented pig farming came the increased use of sties and fattening methods. Slaughter ages have varied, but typically they were killed either at 8-10 months or at 18–24 months of age. Historians and zooarchaeologists specializing in British agriculture have stated that pigs under 12 months have been the target slaughter age for subsistence farming. Born in the spring, allowed to mature throughout the summer, the pigs would have been fattened during the fall and slaughtered as soon as temperature dropped. Pigs intended for sale were typically slaughtered between 18–24 months of age (Walsh et al. 1997).

As Table B-8 demonstrates, all of the pig bones from the Upper Fill and 75% of the pig bones from the Lower Fill were from individuals 24 months and younger, the target age for commercial farming. In addition to the pigs slaughtered before two years of age, the Lower Fill assemblage also contained a few older individuals. At least 14.5% of the pigs were slaughtered between two and three years of age, 6.5% were killed between three and four years of age, and the remaining 4.0% were from individuals older than 42 months when they were slaughtered. While the soldiers were probably also supplied with pork that occasionally came from pigs older than two years of age, the presence of the older individuals may also represent animals that may have been acquired in raids of local farms.

Element Distribution and Cuts of Meat

Faunal research has demonstrated that the more a consumer is removed from the production of foods, the more the procurement system determines the availability of the types and cuts of meat that are available to them (Maltby 1979, 1982, 1985; Zeder 1988, 1991). Since most of the food that the Union army consumed was directly from their daily rations issued by the government, one would expect to find an element distribution similar to that of a nineteenth century urban site, whose faunal remains were regulated by a local market system. By examining the presence and absence of certain skeletal parts it is possible to determine what parts of the carcass were disposed of, and which parts were available to the consumer, or soldier, to eat. The following section will examine the element distribution patterns for each of the domesticates.

Cattle Element Distribution

As Table B-9 shows, a total of 17 cattle bones were excavated from the Upper Fill, while 75 were retrieved from the Lower Fill. None of the cattle bones came from the head or the foot region of the body. Although it is known that cattle were being raised in the vicinity of City Point, the overwhelming presence of bones from the body suggests that the Union soldiers were predominately being supplied with the more meaty elements of the body.

Fresh beef was supplied to the Union Army from cattle that were kept near camp, then slaughtered as needed for rations. The butchers, who typically had first choice of the meat, favored certain portions of cattle, such as the liver, heart, and tongue (Billings 1993). The lack of cranial bones may be a reflection of butchers taking the choice head elements, while the lack of foot bones may also be an indication that waste elements were deposited away from camp.

Pig Element Distribution

Similar to the cattle element distribution patterns, there are very few domestic pig head elements in either assemblage (Table B-10). Only a single pig tooth fragment from the Upper Fill was excavated, accounting for the only bone identified from the head region. But in contrast to the cattle bones, foot elements account for a significant percentage of the domestic pig bones. While 36.4% of the pig bones from the Upper Fill are from foot elements, a surprising 55.5% of the pig bones from the Lower Fill comes from foot elements. Bones from the body make up 60.6% of the pig element distribution figures from the Upper Fill and 44.4% of the pig bones from the Lower Fill.

This distribution pattern suggests that the Union soldiers who utilized this pit had access to both body and foot portions of domestic pigs in greater than normal distribution percentages. Accounts from Union soldiers indicate they mainly acquired and ate pork that had been salted, preserved, and sent to them in barrels, although there are also a few accounts of eating fresh pork stolen during raids. It is not possible to tell if the meat on these bones was fresh or salted and the exact process of salting pork was not mentioned in any of the Civil War histories used for this report. When traditionally prepared at home, pork was salted with the bone still attached, which may account for the high number of foot bones.

Sheep/Goat Element Distribution

There are only 2 sheep/goat bones from the Upper Fill assemblage and 28 sheep/goat bones from the Lower Fill assemblage (Table B-11). Body elements make up the only two bones from the Upper Fill, while the Lower Fill has 64.3% of the sheep/goat bones coming from the body and 35.7% of the bones coming from foot elements. While it is hard to analyze element distribution patterns with so few bones, the percentages do suggest that soldiers consumed primarily body portions. While sheep were not typically a meat issued to the soldiers, they could acquire them during raids. For this reason, mutton was included as an ingredient in several recipes given in the Military Handbook for Soldiers in 1861 (Beadle Publishers 1861).

Butchering and Cuts of Meat

Although every zooarchaeologist must deal with butchery on a daily basis when analyzing faunal remains, few working with historical sites have dealt with butchery-related problems in print. With notable exceptions such as Lyman (1987), Landon

Assemblage	0-12 Months	12-24 Months	24-36 Months	36-42 Months	>42 Months	Number of Bones
Upper Fill	33.3%	66.7%	0.0%	0.0%	0.0%	20
Lower Fill	25.0%	50.0%	14.5%	6.5%	4.0%	92

Table B-8. Domestic pig kill-off pattern based on long bone fusion.

Assemblage	Head		Body		Feet		Total Bones
	No.	%	No.	%	No.	%	No.
Normal Distribution		29.7		42.2		28.1	
Upper Fill	0	0.0	17	100.0	0	0.0	17
Lower Fill	0	0.0	75	100.0	0	0.0	75

Table B-9. Element distribution for adult domestic cattle.

Assemblage	Head		Body		Feet		Total Bones
	No.	%	No.	%	No.	%	No.
Normal Distribution		28.2		34.5		37.3	
Upper Fill	1	3.0	20	60.6	12	36.4	33
Lower Fill	0	0.0	120	44.4	150	55.5	270

Table B-10. Element distribution for domestic pig.

Assemblage	Head		Body		Feet		Total Bones
	No.	%	No.	%	No.	%	No.
Normal Distribution		29.7		42.2		28.1	
Upper Fill	0	0.0	2	100.0	0	0.0	2
Lower Fill	0	0.0	18	64.3	10	35.7	28

Table B-11. Element distribution for domestic sheep/goat.

(1996), and Crader (1992), zooarchaeologists have tended to leave their observations as only a laboratory function. Yet butchering data holds fascinating information on the transformation in foodways that occurred during the eighteenth and early nineteenth centuries. It shows the transition from when individuals produced and processed meat, to when business took over the distribution and eventually the processing of meats.

As faunal assemblages have come through Colonial Williamsburg's Zooarchaeology Laboratory, it has become apparent that a fundamental change occurred in butchering techniques during the seventeenth, eighteenth, and early nineteenth centuries. By working closely with the archaeologists to create tightly dated assemblages, we have had the opportunity to observe when the butchering technique shifted from chopping to sawing and formulate ideas on how and why this change occurred. Specifically, extensive research on sites such as Harper's Ferry in Virginia, has helped to reveal how butchering methods evolved as the marketing of meat became increasingly commercialized (Bowen and Manning 1993).

In his illustrative encyclopedia, Diderot (1978) depicts butchers in the seventeenth century with cleavers, knives, and broad axes, but no saws. Drawings of markets and butcher shops from eighteenth century London also show broad axes and cleavers, not saws. Saws begin to appear only during the late eighteenth century or early nineteenth century. In fact, the earliest evidence of a saw is a 1799 drawing of Philadelphia, where a butcher is holding a saw (Bowen and Manning 1993).

Assemblages that we have seen have shown us that the earliest sawn food remains appear in urban sites dating to the turn of the nineteenth century (Bowen and Brown 1994). One example is the Narbonne House in Salem, Massachusetts that contained several sawn veal bones, as well as, chopped bones (Bowen 1982). This is typical with other nineteenth century faunal assemblages that have a mixture of both sawn and chopped bones. Saws were increasingly used throughout the nineteenth century to butcher meat, particularly cattle bones and occasionally pig and sheep/goat bones. Even in the early part of the nineteenth century, bones appear to have been sawn into cuts that were much like the large cuts common during the previous century. Over time meat cuts decreased into smaller pieces closely resembling the thin steaks and chops that we find in the grocery stores today (Bowen and Manning 1993).

During the nineteenth century, cuts of meat gradually became "sanitized," losing any resemblance to the live animal it came from. Classically, chopping followed the internal structure of the mammalian skeleton, so that even stress breaks tended to follow the natural contours of the bone. The saw, on the other hand, allowed butchers to slice through joints, long bones, and other compact bones to produce "neat" individual portions, so much so that today only the most skeletally-aware urban consumer can distinguish the fragment of bone imbedded in a ham or a roast. This method of butchering also removed the last trace of the live animal from the dinner table—bone chips that had been the byproduct of the chopping technique were gone. No longer did diners have to either consume bone chips or extract them from their mouths.

During the Civil War, the Union Army appointed men who served as butchers, supplying the troops with fresh beef while they were in camp. One of these butchers served the 10th New York Volunteers who were also known as the National Zouaves, a regiment that was at the siege of Petersburg and probably spent some time at City Point. Their regimental butcher, Fred Dauenhauer, was described as a "strong, burly fellow, unmistakably 'Dutch,' filled with good humor, though noisy and demonstrative at times…he filled his rather onerous position with considerable tack." Although his actual butchering techniques were not described in detail, Fred was known to have had "a good eye, and a head for quantities" (Cowtan 1882).

As the bones from the pit were identified, any evidence of butchering was recorded, including whether the bones had been chopped or sawn. Bones that had been sawn were closely examined to determine whether they had been sawn by hand or by mechanical means. All of the sawn bones from the two assemblages had either hinge scars, irregular/uneven saw scars on the sawn surface, or both. The presence of these characteristics indicates that the bones were being butchered with handsaws (Kenyon 1992). Drawings showing the butchering cuts for each domestic mammal bone were made for each assemblage indicating the relative abundance of different portions of the carcass (see Attachment B-2). As the butchering drawings demonstrate, most of the cattle and pig bones were sawn, although there were also a few bones that had been hacked and several that had been both hacked and sawn.

The following paragraphs will examine each assemblage and discuss evidence of butchering on the cattle, pig, and sheep/goat elements. As mentioned earlier in the "Analytic Techniques" section of this report, a lot of the faunal remains from the pit had been butchered, resulting in many highly fragmented bones that were simply too small to identify to species or to element. Only those butchered bones that could be identified to element and species were recorded on drawings in Attachment B-2 and are discussed in the following paragraphs. In addition to examining how the bones were butchered, some general interpretations will also be made about the cuts of meat represented by the butchered elements. Using late nineteenth century diagrams and retail information, the cuts of meat from beef will be ranked according to their retail value during the late nineteenth century. The cuts of pork will also be examined but in more general terms since twentieth century standards and diagrams will be referenced.

Upper Fill

Cattle. In total, there are four butchered adult cattle bones from the Upper Fill, including one thoracic vertebra that had been hacked longitudinally along the axis with either an ax or a cleaver and one rib that had been sawn by hand, leaving the central portion of the bone. Thoracic vertebrae would have been included in either a chuck or a rib cut of beef, while the center portion of ribs could be found in cross rib and short rib cuts. An innominate, sawn in two sections of the ilium, would have resulted in a sirloin cut of meat, while a sawn section from a femur would have come from a round cut of beef. Both the sirloin and round cut would have been considered choice pieces of meat using late nineteenth-century values (Schulz and Gust 1983).

Pig. Butchered pig remains from the Upper Fill include a humerus bone sawn through the shaft below the proximal epiphyses and just above the distal epiphyses, resulting in a cut of meat from the shoulder section called the picnic shoulder. Also from a picnic shoulder cut of meat is a butchered scapula bone hacked through the neck with either an ax or a cleaver. Finally, there is a sawn innominate bone from the leg, butt portion of a pig considered part of a ham cut of meat.

Lower Fill

Cattle. Butchered adult cattle bones from the Lower Fill assemblage include at least eight thoracic vertebrae and nine lumbar vertebrae. The majority of these appear to have been hacked longitudinally along the axis using either an ax or a cleaver. While the thoracic vertebrae could have been part of either a chuck or a rib cut of meat, the lumbar vertebrae were probably part of a short loin, considered to be the most prime cut of beef in the late nineteenth century (Schulz and Gust 1983). Sirloin was another choice cut of beef, which can be found in three butchered sacrum bones and two of the butchered innominates. Both of these innominates had been sawn through the ilium, one of the sacrum bones had been sawn along the axis, and the remaining two sacrum bones had been hacked with either an ax or a cleaver. There were also three more innominates sawn through the ischium, which would have been part of a rump cut of beef. All but one of the seven butchered ribs included the head of the rib. These had been sawn about midway through the shaft, suggesting they were part of a rib cut of beef. One rib, probably from a short rib cut, had been hacked to include only the bottom section of the shaft.

Other butchered elements include three sawn femurs, three sawn scapulas, and one hacked scapula. Two of the femurs were cut just below the proximal epiphyses and just above the midway point of the shaft. The other femur had been sawn just above the distal end and just below the midway point of the shaft. Using Schulz and Gust's (1983) late nineteenth century ranking of cuts of beef, these bones would have come from a round cut of beef, considered a middle to high quality piece of meat. Finally, all of the scapulas were from large sections of beef, probably from a chuck cut of meat, one of the middle to lower end quality cuts of beef.

Pig. The 24 butchered pig elements from the Lower Fill include three cervical vertebrae and three thoracic vertebrae, all hacked with either an ax or a cleaver along the axis. The cervical vertebrae would have come from one of the shoulder cuts of pork, while the thoracic vertebrae could have come from one of the loin cuts of pork. In addition to the butchered vertebrae, there is one hacked sacrum, four sawn innominates, and one hacked innominate. While the sacrum would have been from a tenderloin cut, the innominates all suggest a cut of pork from the ham portion, specifically the leg, butt area.

Butchered long bones include three femurs that had all been hacked through the shaft below the proximal epiphyses or just above the distal epiphyses. Like the butchered innominate bones, all of the femurs would have also come from the ham section of the pig, making up the center leg cut of the animal. The shank portion of the ham is also represented by the presence of seven tibia bones predominately hacked with either an ax or a cleaver. Six of the tibias had been cut just below the proximal epiphyses and midway through the shaft, and one tibia had been cut just above the distal end and midway through the shaft. Finally, there was one calcaneous bone hacked through the shaft making up an additional cut of pork from the shank.

Rations and the Strategic Role of City Point in Feeding the Union Army

Napoleon once said that an army marches on its stomach. For a soldier in any war, food is of the utmost importance since it can offset extreme fatigue, boost morale, and carry a soldier through many demanding trials. The Civil War was no exception to this as soldiers in both the Union and Confederate armies depended upon their daily rations or "grub" for their everyday existence. In order to understand the role food played in the Union army while in camp and on the march, the following section will look at the historical written accounts for discussions on rations, how soldiers supplemented their diet, and the role City Point played in providing subsistence.

A "ration" was defined as the amount of food authorized for one man for one day. In the Union army, a typical camp ration included "twelve ounces of pork or bacon, or one pound four ounces of salt or fresh beef; one pound six ounces of soft bread or flour, or one pound of hard bread, or one pound four ounces of corn meal" (Billings 1993:111). While this provided the main allotment for their meal, soldiers were also provided with various other items such as beans, peas, coffee, rice, sugar, salt, pepper, potatoes, and the occasional vegetable or molasses to supplement their rations. Rations for marching or campaigning included one pound of hard bread, three-quarters pound of salt pork or one and one-fourth pounds of fresh meat plus sugar, coffee, and salt (Billing 1993).

Transporting and supplying food to the Union Army fell under the responsibility of the Quartermaster Department and the Commissary of Subsistence. The Quartermaster was mainly responsible for transporting all goods, including food supplies, to the various Union troops. The Chief Quartermaster for the Army of the Potomac was General Rufus Ingalls, who was appointed by General Grant to supply all Union armies operating against Petersburg and Richmond (Quartermaster Museum 2002a). Anticipating the importance of the supply depot at City Point, Ingalls oversaw the construction of many storage areas, train depots, and docks to unload and house all the supplies needed to support 125,000 men and 65,000 animals. During its operation, City Point not only became the second largest city in Virginia but also played a critical role in the victory of the Union army. General Grant bestowed his highest praise for Ingalls and his staff when he stated, "There has been no army in the United States where the duties of the Quartermaster have been so well preformed" (Zinnen 1991).

While the Quartermaster Department was in charge of supplying the food, it was the role of the Commissary Department to receive, store, and issue all rations. The Commissary Department was also in charge of the feeding, care, and slaughtering of cattle (Quartermaster Museum 2002b). At the beginning of the war only twelve Commissary Officers were appointed, but this number eventually increased to 29 as the Subsistence Department expanded to supply the troops. These Subsistence Officers often faced extreme difficulty in feeding the troops, but without their services the battles that brought fame to many a victorious general could not have been fought. For the Army of the Potomac, Colonel H. F. Clark was appointed as the Chief Commissary Officer in 1861 (Lord 1960). He oversaw the work of all of the Commissary Officers, including Captain Benedict, who ran the Commissary Department at City Point (Zinnen 1991).

One officer who first worked for Colonel Clark wrote of his experiences establishing a subsistence office when he became a Commissary Officer for the Union troops in Kentucky. In his report, Major H. C. Symonds commented that from his first arrival, his work increased from 3,000 rations a day to 300,000 rations a day by 1864. Not only was he responsible for purchasing, receiving, and forwarding rations to the troops, he also ran a cracker bakery, a bread bakery, three pork packing houses, a pickle factory and provided food to 21 hospitals and their patients (Symonds 1888).

The job of the Commissary Officer at City Point was even more daunting since the standard operating procedure required that they have 30 days of rations on hand for all personnel, as well as 20 days of rations for the animals. This meant, that at any time, City Point housed over 16,000 tons of food that could be used to serve 10,800,000 meals. Since animals received a daily ration of 26 pounds of food, there was also an additional 33,800,000 pounds or nearly 17,000 tons of rations for animals. The Commissary Department organized and stored all of these items in the nearly 27,000 square feet of storage space they had available to them in the warehouses located on the wharf (Zinnen 1991). In another area located in the eastern section of City Point, the Commissary also oversaw the bakery, consisting of seven buildings that daily produced over 100,000 loaves of bread. Often, the bread was loaded directly onto the trains and reached the troops while still hot (Petersburg National Battlefield 2002).

Although bread often reached the troops before it had spoiled, it was one of the job descriptions of the Commissary Officer to also ensure that the salted meats reached the troops before they had spoiled. Barrels of salted meat were to be rolled over monthly, inspected frequently to ensure undissolved salt still existed, and they were to be kept out of the sun (Quartermaster Museum 2002b). This was often a problem since much of the pork would arrive frozen from the pork packing houses. When the pork was sent directly to the front, it often sat in the Southern sun for hours, eventually rotting as the meat thawed. When faced with this problem, the Commissary Department's Major H. C. Symonds was able to salvage meat by repacking it after the frost was removed (Symonds 1888).

In an attempt to free the government from these extra expenses and from the high costs of meat packing houses they had contracts with, Symonds suggested the government get involved in curing and packing their own pork meat. He demonstrated how they could save money and also make a profit on items such as feet, lard, and bristles that could be sold to other manufacturers. After much discussion, Symonds was allowed to establish government owned pork packing houses. These houses supposedly supplied the Union army with some of the best tasting hams (Symonds 1888).

Fresh beef was also supplied to the Union troops and the Commissary Department at City Point maintained on a daily basis 2,500 head of cattle within City Point and another similar sized herd across the James River (Zinnen 1991). Once the cattle was sent to the camps they would have been put in corrals until the army was on the move. At that time, men who acted both as butchers and drovers were excused from all of their other duties so they could herd the cattle to their next destination. When a halt was made for the night, some of the steers would then be killed with a rifle, slaughtered, and the meat distributed by the Commissary Officer (Billings 1993).

Within the Army of the Potomac, the Washington government organized a separate department in 1861 to supply the troops with fresh beef. This responsibility fell to Captain John H. Woodward who was determined to furnish the army with a fresh ration of beef two days of every week. To do this he first erected a small building, at the present site of the Washington Monument, called Headquarters of the Fresh Beef Department where he kept a supply of beef to supply the army for a week. Later the Headquarters were moved to White House, Virginia to better supply the Army of the Potomac as they were on the move (Volo and Volo 1998).

Woodward kept his main herd of wild steers just off the western ranges where they often caused considerable damage to farms, fences, and growing crops. When cattle needed to be moved, Woodward was considered by his superiors to be one of the best drovers in the business. For example, in 1864, he was faced with the challenge of crossing the James River near Petersburg with 3,000 head of wild cattle. Due to the width and depth of the water, it was not possible for the cattle to swim across the river. Instead, they had to travel across a pontoon bridge that did not have any side rails and was only wide enough for two cattle at a time. Woodward came up with a plan of having two soldiers on the bridge followed by two cattle; then two more men followed by two more cattle; and so on. This allowed the cattle to calmly cross the bridge without crowding and falling into the river. Woodward later commented it must have been "an inspiring sight, to see more than 3,000 head of wild cattle moving in close order over a bridge nearly a mile long and twelve feet wide, without a rail on either side…steadily and easily and without confusion" (Volo and Volo 1998:125).

Although getting the cattle to their destination and maintaining such large herds was an impressive endeavor for the City Point Commissary Department, they were not free from problems. One of the ongoing problems Captain Benedict faced was the constant threat of raids by the Confederates. In an incident known as the "Great Beefsteak Raid," about 4,000 Confederate soldiers surprised Union troops located at Coggin's Point, a few miles east of City Point. Along with 300 prisoners, the Rebels were able to gather 2,486 head of cattle and drive them back to their own commissary. While one Confederate soldier wrote home " we are now having Yankee beef every day," Union soldiers wrote that they now had to face the taunting comments of the Rebels who would yell across the lines, "Hey, Yanks, want any fresh beef?" (West 2001).

In addition to fresh beef, other rations were sent from the office of the Chief Commissary by railroad, boat, and wagon to the troops in their camps or on the march. Once the rations arrived, they were distributed by one of a variety of methods. For example, one method used when they were on active duty involved spreading a blanket on the ground and on it the orderly-sergeant piled mounds of coffee, salt, sugar, or salt meat in equal portions. Once the mounds were evenly distributed the orderly-sergeant would turn his back to the blanket and take out his roll of the company. Then someone else would point to one of the piles and ask, "Who shall have this?" Next the sergeant would randomly call a name from the roll for a man to his share of the rations (Billings 1993; Coco 1996).

When fresh meat was distributed to the soldiers, equal and fair rations were not always possible. Butchers often took some of the choice meats including the liver, heart, and tongue for themselves, and soldiers often complained the cooks kept the largest or the choicest portion for themselves and the company officers. The remaining portions of meat were given out by the quartermaster, who in drawing his own ration of meat from the commissary had to be governed by his last selection. To help ensure fairness, if he chose a hindquarter, then he must chose a forequarter the next time (Billings 1993).

At the beginning of the war, company cooks often prepared the rations and distributed the cooked meals when the army was in a settled camp. Once the cooks had prepared the food, a bugle signal would sound and to receive their rations the soldiers would form a single line at the cook-house door or the cook's open fire. However, during the course of the war the role of the company cook gradually deteriorated. One reason for their disappearance was the apparent lack of culinary skill of some cooks. Company cooks were generally appointed. While some of them were chosen for their culinary knowledge or experience, others were chosen because they could not learn drills or they were unable to pass inspections and needed to get out of the ranks (Lord 1960). As one Pennsylvanian soldier remarked, "the company-cook system introduced was found to be a total failure, principally because of the selection for the trying position of the most uncouth and disqualified men in the companies. As a result of dissatisfaction, company cooks were discontinued, and each mess of three or four comrades accepted the raw rations distributed to the companies and did their own cooking in messes" (Robertson 1989:65).

Other reasons for the decreasing role of company cooks may be associated with their lack of dependability, along with the disappearance of the company cookware. Each cook was issued a set of the company cookware or camp chest filled with items such as knives, forks, butcher knives, teacups, plates, bowls, spices, glasses, a sifter, rolling pin, coffee tin, frying pan, coffee pot, teapot, and bread oven. At the beginning of the war cooks continued to do their job as long as the wagons and the mules carried all of the necessary cooking equipment. Soldiers soon realized empty stomachs often followed being dependent upon the cooks. Many times the cook's wagons did not arrive at the camps or the mules, not carefully watched, had disappeared with the whole cooking kit. As the war progressed, regulations were also passed that limited the amount of baggage an infantry regiment was allowed to carried. For this reason, items from the company cook chest were the first things to be abandoned (Coco 1996).

While at City Point, most of the Union soldiers probably ate food that had been prepared by themselves or their company cooks. However, they may have also come in contact with some of the other individuals who served as cooks at City Point on a permanent basis. For example, the United States Sanitary Commission, a forerunner of the American Red Cross, set up a station at City Point to work in the hospitals, manage the kitchens, and maintain dockside feeding for wounded soldiers. Many of the workers of the Sanitary Commission were women who would often work a fifteen-hour day when the wounded soldiers arrived at City Point. Typically, they would meet wounded soldiers along the shore closest to a battle, tend to their medical needs, give them food and drink, and transport them to one of the seven hospitals at City Point. Along the docks at City Point, women from the Sanitary Commission also set up feeding stations where soldiers coming in from the field or being sent out could find soup, coffee, bread, and other food items (Christie 1997).

The United States Christian Commission, a charitable organization that dealt with the spiritual needs of the soldiers, also set up a base at City Point. Women in this organization worked in the kitchens as cooks and served food to wounded soldiers. One woman, Annie Wittenmyer, believed that wounded soldiers should have "delicate food in homelike preparation," to ensure a quick recovery. She was successful in establishing the Christian Commission Special Diet Kitchens at City Point (Christie 1997). In addition to the women who had come down from the North, there were also African American women working at City Point. Many of these women were hired as cooks for the ships, for the hospitals, for the Union Officers and their families, and for the Northern women in residence at City Point. With all of their domestic skills, freed slaves could easily find jobs at City Point and earn money for their families (Christie 1997).

When soldiers were away from City Point and on the march they were typically in charge of preparing their own rations with their own issued cookware. If cookware was limited they often improvised by making makeshift utensils. For example, one common cookware solution was to unsolder the seam between the two halves of an extra canteen. Each half could serve as a lightweight frying pan or plate easily carried by strapping it to their existing canteen. Also, tin cans with wire handles doubled as coffee boilers and soldiers often shared larger frying pans taken from the company camp chest (Volo and Volo 1998).

In terms of the actual preparation of the food most soldiers lacked any cooking skills, simply learning on the job. When soldiers were first enlisted they were often given the *Soldiers' Health Companion*, a booklet that warned the soldiers of too much strong coffee and outlined recipes for 37 nutritious dishes such as Turkish Falaff stew, semi-citric lemonade, and macaroni pudding (Lord 1960). In actuality, soldiers rarely had the ingredients to make many of the suggested dishes but instead, made do with what was available to them. For this reason, sickness due to improper nutrition was prevalent in many of the army camps. Diarrhea, dysentery, and malnutrition were often attributed to the steady diet of fried meat, hard bread, strong coffee, unripe fruits, and rotten vegetables the soldiers ate (Robertson 1988).

If fresh beef was the ration of the day, it could have been prepared in a number of ways. In the case of the company cooks, fresh beef was typically boiled and sometimes used in a soup or stew. If the meat was of good quality, a cook might try to broil steaks or even prepare a roast beef for the troops. When the raw meat ration was served individually to the men to prepare as they wished, the cuisine usually depended on the quality of meat they received. Stringy and flabby portions of beef were usually combined with available vegetables to make a thick stew. Solid pieces of beef were cooked as a beefsteak either fried in pork fat or impaled on a stick and broiled in the flames (Billings 1993).

The least appreciated of rations was salted or pickled beef, usually so foul-smelling the soldiers did not have the appetite to cook it. If properly preserved the beef was too salty to eat, but it was not adequately preserved then it probably smelled and was too spoiled to eat. Some of the troops referred to it as "salt horse" because they said iron horse shoes and mule shoes were found in the barrels of meat, but never an ox shoe (Robertson 1988). Other troops would poke fun of the ration by holding a mock funeral for the meat, complete with bearers, music, a mournful procession, a service, and coffin with scraps of old horse harnesses to indicate the origin of the remains (Billings 1993).

Salt pork was a preferred meat ration for both the Union and Confederate armies. If properly prepared in sealed barrels it could last, unspoiled for long periods of time. However, once the barrels were opened the meat had to be used quickly before it rotted. To help remove some of the salt it was sometimes boiled but more often it was fried. On the march it could have been eaten raw in between two pieces of hard bread or used to flavor beans in a stew (Billings 1993). Bacon also was a common ration. Prepared by soaking the pieces in brine and then smoked, this process helped to slow down the growth of bacteria. This allowed the pieces to be kept for several days wrapped in an oilcloth and carried in a haversack (Volo and Volo 1998).

Besides their daily rations, a second source of food for the Union troops came from the army sutlers, who were civilian vendors and storekeepers who set up their business within the army camp and occasionally traveled with the army on campaign. Their prices were supposed to have been set by a board of officers, but with no competition or supervision, sutlers typically raised their prices until they were making a large profit. They sold a variety of dry good items to the soldiers as well as food items such as fruits, vegetables, dairy products, canned meats, condiments, pickles, codfish, oysters, eggs, flour, spices, and poultry (Lord 1969).

The condemnation of sutlers by the Union troops seems to have been universal. As one soldier described, "Sutlers would skin a louse for its hide and tallow." Another soldier wrote in a letter to his father that the prices sutlers charged were so outrageous, a common sized chicken would often cost a soldier as much as $6.00. Many sutlers were so intent on making a quick profit they sold questionable products that not only made some men sick but also caused several deaths. For example, one sutler sold small pies to men in the 1st Iowa Infantry shortened with grease obtained from diseased pork. Another sutler in Halltown, Virginia was charged with selling small meat pies that had been filled with cat and dog meat (Lord 1969).

Many soldiers sought revenge on the sutlers and their high prices by "cleaning out" the sutler's shop. This usually involved cutting the ropes of the sutler's tent, causing it to collapse and then, in the confusion, helping themselves to the goods. Other times, troops would charge a sutler's wagon causing it to overturn, stealing items they could quickly pick up. Either method proved to be an effective warning to those sutlers that took advantage of the soldiers (Lord 1969).

One of the best sources for supplementing their diet with extra food, was through "foraging." Translated, it meant stealing from farms in the neighborhood of an army's march or camp. Although the government and most of the commanding officers forbade this behavior, their orders had little effect. As one soldier from Maine confessed, "Despite most stringent orders against foraging, every morning, the ground between the different encampments of the regiments was covered with sheep skins and feathers from turkeys, geese and hens that had given their lives, during the preceding night, for the relief of the hungry soldiers" (Robertson 1988:73).

Union soldiers had a reputation of being able to completely strip a Southern farmstead clean in several minutes. One Southern housewife who had the misfortune of this experience recalled, "To my smokehouse, my dairy, pantry, kitchen, and cellar, like famished wolves they came…breaking locks and whatever is in their way…in a twinkling my flour, my meat, my lard, butter, eggs, pickles of various kinds, wine, and jugs were all gone. My eighteen fat turkeys, my hens, chickens, and fowls, my young pigs, are shot down in my yard and hunted as if they were rebels themselves." When the woman pleaded to one of the men to leave her something he only replied, "I cannot help you, Madam; it is orders" (Volo and Volo1998:174).

One final source for food was special packages from family and friends sent to the troops while they were in camp. For those soldiers fortunate enough to receive one, the contents typically included not only personal items and dry goods, but also various types of food such as boiled ham, turkey, chicken, cheese, vegetables, cake, butter, condensed milk, sugar, spices, and other appreciated items. Soldiers would often write home with a list of needed items, only to be ordered to move out before the box of goods arrived. Usually, by the time they got back to camp any perishable items in the box had gone bad (Billings 1993).

In spite of the rations, hunger, indigestion, occasional food poisoning, and regular bouts of diarrhea as a result of tainted food, most Union soldiers adapted to that which they could not change. With respect to food, the men tolerated it, made use of the available resources, swallowed it, and hoped for the best.

Concluding Remarks

Faunal remains uncovered in the archaeological record can provide critical information on the relative dietary importance of each species, butchering practices, animal husbandry techniques, and the specific cuts of meat that were eaten. They are limited, however, in interpretations of social, economic, and cultural patterns of a site. Specifically, the bones do not always provide data on the subsistence system's social and economic relationships or a household's status or ethnic origin. Documentary sources are needed along with the archaeological bones to analyze how the production, distribution, and consumption of food is directly related to the cultural, social, and economic conditions of the site (Bowen 1990b).

The City Point site is no exception since both the archaeological bones and historical documents are needed in the interpretation of the Union sub-

Type	City Point		New Bern		Stafford Camp		Camp Nelson		Folly Island		Ft. Pillow Fort		Ft. Pillow Barracks	
	N	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
Cattle	92	21.4	34	73.9	28	84.8	8	22.2	516	77.0	78	65.0	51	87.9
Pig	303	70.6	7	15.2	5	15.2	12	33.3	150	22.4	42	35.0	6	10.3
Sheep/Goat	30	6.9	0	0.0	0	0.0	5	13.9	3	0.4	0	0.0	0	0.0
Chicken	4	0.9	3	6.5	0	0.0	4	11.1	0	0.0	0	0.0	1	1.7
Turkey	0	0.0	0	0.0	0	0.0	2	5.6	1	0.1	0	0.0	0	0.0
Cat	0	0.0	2	4.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Rabbit	0	0.0	0	0.0	0	0.0	5	13.9	0	0.0	0	0.0	0	0.0
Total	429	100.0	46	100.0	33	100.0	36	100.0	670	100.0	120	100.0	58	100.0

Table B-12. Comparison of faunal remains between City Point and other Union sites.

sistence patterns. Both sources provide independent information, often with different perspectives on the same subject. While the faunal record can show the specific animals and elements that were eaten, the historical documents are needed to provide an outline of the military provisioning system and the means soldiers used to supplement their rations. Since previous sections of this appendix have already discussed independently from each other the archaeological bone from City Point and the historical accounts, the following paragraphs will integrate both sources of data on the diet of the Union Army. By looking at the faunal material from City Point and other Union sites in conjunction with the historical data, the biases of each source will be revealed and questions can be raised for future comparative analysis.

As a comparison to what has been found at other Union sites the breakdown of species from City Point was compared to faunal assemblages from New Bern, North Carolina; Stafford, Virginia; Camp Nelson, Kentucky; Folly Island, South Carolina; and Fort Pillow, Tennessee. The Hay House located in New Bern, North Carolina is believed to have served as a home for Union Officers during the Civil War. Camp Nelson served as a Union headquarters from 1863 to 1866, where because of its strategic location on a major transportation route it housed a major quartermaster depot, recruitment center, and hospital. Fort Pillow was a Union fortification and encampment occupied by several regiments from 1862 to 1864. Finally, Folly Island and the Stafford site are both encampments occupied for only one winter by several infantry regiments (Andrews 2000; McBride 1994).

One difference between the faunal remains from City Point, Camp Nelson, and New Bern and the other Union faunal assemblages is the diversity of species (Table B-12). While the Stafford encampment, Folly Island, and Fort Pillow assemblages were predominately cow and pig remains, City Point, Camp Nelson, and the New Bern sites also included remains from sheep/goat, chicken, turkey, and rabbit. This difference between the assemblages may be a reflection of Camp Nelson's and City Point's location and status as Union Headquarters complexes. For example, both sites were well-established military locations that housed many officers as well as civilians. They were located along major transportation routes, allowing supplies to be easily brought in. Since these were more permanent facilities than temporary camps, the selection and availability of meat may have been more diverse. On the other hand, the Stafford encampment, Folly Island, and Fort Pillow were all located in more isolated and hostile areas and had a much shorter occupation (McBride 1994).

Another major difference between City Point and the other Union assemblages is the contrasting percentages of cattle and pig remains. As Table B-12 shows, all of the assemblages, with the exception of City Point, have cattle remains accounting for 65.0–

87.9% of the identified food remains. City Point, on the other hand, has cattle bones only making up 21.4% of the total identified remains. Unfortunately though, these percentages do not accurately access the role beef played in the diet of the Union troops since the percentages only indicate the number of cattle bones identified. Biomass calculations, however, do represent the proportion of beef in the diet. Although biomass percentages were not available for Camp Nelson, Folly Island, or Ft. Pillow, they were available for the other Union sites. The Stafford faunal assemblage had beef accounting for 64.8% of the total diet, while the New Bern biomass calculations show cattle making up 72.4% of the diet (Andrews 2000, 2002). Although City Point had fewer cattle bones then the other Union assemblages, the biomass percentages are similar showing that beef made up around 65% of the soldier's diet.

When the number of pig bones from the City Point assemblage is compared to the other Union sites there is another obvious difference. While the other assemblages show pig bones making up 10–35% of the identified remains, at least 73% of the identified remains from the City Point assemblages come from pigs. This high percentage of identifiable pig bones is partially due to the high number of foot bones that were present in the assemblage. Foot bones, which are dense and durable, account for 53% of the identified pig remains from the City Point assemblages. Conceivably, the occupants who utilized the City Point site were eating more pig feet than their Union counterparts at other locations. Pickled pigs feet and souse, which is made with pig feet and pig ears, were common recipes in the years leading up to and during the Civil War (Child 1844).

Another contributing factor for the high number of identified pig remains in the City Point assemblage may be related to the low percentages of unidentifiable bones. In the New Bern material 89% of the bones were unidentifiable, while in the Stafford encampment 98% of the bones were unidentifiable. The City Point assemblages show only 65% of the bone from the Upper Fill were unidentifiable and only 44% of the bones from the Lower Fill were unidentifiable. The bones from City Point were not as highly fragmented as the bones from Stafford and New Bern, suggesting that there may have been differences in butchering and cooking practices that occurred at the sites. For example, when salt pork arrived in camp, it may have come butchered in large sections, including pieces of bone, and packaged into barrels of salt. Before it was cooked or issued to the men, it would have been butchered even further to make smaller, equal rations for individual consumption. When the men received their portion they typically fried the meat and broken the remaining bone into even smaller pieces. These fragments of bone, too small to identify to species, could have then be used in stews or to flavor their beans, particularly if rations were in short supply. Since rations were readily accessible at City Point, soldiers may not have had the need to butcher pig bones into small pieces for stew.

In addition to the differences in the number of identified pig bones and the number of unidentifiable remains, it is not surprising that there are also differences in the pig biomass percentages. For example, the biomass percentages from the Stafford and New Bern sites show pig contributing approximately 1% to the overall diet, while in the City Point assemblages pigs make up approximately 25% of the diet. Again, the higher biomass percentage for the City Point bones is in part due to the high number of pig foot bones present in the assemblage and the low percentages of unidentifiable remains. While the City Point assemblage suggests that pork played a greater role in the soldier's diet there than compared to other Union camps, it still does not reflect the historical accounts from the Civil War that imply salt pork was the main meat ration for the troops. If this is the case then why does the archaeological evidence indicate that beef at the Union sites was more important in the soldier's diet?

The lack of pig bones in the archaeological record of military sites is not limited to those dating only to the Civil War. In his examination of faunal material from Fort Ligonier, a British Army relay station during the French and Indian War, John Guilday also encountered a small percentage of pig bones in the archaeological record although the historical documents suggested salt pork was the principal ration of the British troops. He concluded the salt pork was probably butchered, boned, salted elsewhere and carried to the fort in this prepared form, leaving little or no archaeologically recoverable trace. The small amount of pig bones identified from Fort Ligonier were interpreted as the remains of fresh pork since the historical records suggested it was occasionally provided to the troops (Guilday 1970).

The exact process of salting pork was not mentioned in any of the Civil War histories used for this report, but traditionally pork prepared at home was salted with the bone still attached. Although it is a possibility that pork was salted and barreled without the bone, this would have been a time consuming and expensive procedure. As mentioned earlier, a more convincing explanation for the lack of identifiable pig bones is probably the result of butchering and culinary practices that left the bones too fragmented to identify to species.

Cattle would have also been butchered but due to the large size of the bones, the remains would have to have been butchered into very small fragments to make them unidentifiable. In the City Point assemblage there are only 48 unidentifiable large mammal bones from the Lower Fill and none from the Upper Fill. Also, since the historical documents have indicated cattle was often slaughtered in or near the camps to provide fresh beef, there are more chances of finding cattle remains, both waste and meaty elements, in the areas of the camp since it would have served as the primary butchering area. Pork, on the other hand, would have typically been slaughtered elsewhere leaving the camps as the secondary butchering site.

One final observation of the cattle remains from City Point is the size of the butchered bones. Many of the butchered bones are very large suggesting that the cuts of meat were quite substantial. In an attempt to determine the quality of these cuts, the butchered cattle bones from City Point were first compared to the butchered remains of cattle from the Stafford and New Bern assemblages. Then using retail values of beef from the late nineteenth century, the cuts of meat were ranked from the most costly to the least costly (Schulz and Gust 1983). The only bones not included in this analysis were butchered thoracic bones since, depending on their location, these vertebrae could be part of either a chuck or a rib cut. The City Point cattle remains included nine butchered thoracic bones, while the New Bern assemblage had two.

As Table B-13 shows when late nineteenth-century retail values are examined at least 87% of the butchered cattle bones from City Point were from the top six cuts of beef. In comparison, 55% of the butchered cattle bones from New Bern and only 41% from Stafford were from the top six cuts of

Meat Cut	City Point		Stafford		New Bern	
	No.	%	No.	%	No.	%
Short Loin	9	27.2	5	41.6	4	22.2
Rib	6	18.1	0	0.0	1	5.5
Sirloin	5	15.1	0	0.0	2	11.1
Round	4	12.1	0	0.0	0	0.0
Rump	3	9.0	0	0.0	3	16.6
Short Rib	2	6.0	0	0.0	0	0.0
Arm	0	0.0	2	16.6	4	22.2
Chuck	4	12.1	0	0.0	0	0.0
Plate	0	0.0	0	0.0	0	0.0
Foreshank	0	0.0	0	0.0	0	0.0
Neck	0	0.0	0	0.0	4	22.2
Hindshank	0	0.0	5	41.6	0	0.0
Total	33	100.0	12	100.0	18	100.0

Table B-13. Comparison of butchered adult cattle bone, by meat cut ranked from the most costly to the least costly.

beef. The type of cuts and the size of the butchered cattle bones suggests that the occupants who utilized the pit at City Point were eating high quality cuts of beef. Perhaps they were officers were given the better cuts of beef or even enlisted men who had connections with a butcher. In either case, since large herds of cattle were being maintained in the area, the occupants at City Point would have had access to fresh beef probably on a daily basis.

As this report indicates, accurately accessing the rations issued to the Union Army while located at City Point is difficult to determine using only the archaeological record. Historical accounts are needed in conjunction with the archaeological bone to help reconstruct subsistence patterns. This report has begun this process by looking together at the two sources of information in an attempt to better understand the economic, social, and cultural implications that affected military rations and how soldiers supplemented their diet. As some questions were answered, many more questions were raised and further research is needed both in the historical record and the archaeological record. Specifically, analysis of more faunal assemblages excavated from City Point would help to further reconstruct the dietary patterns of soldiers who readily had access to rations, both preserved and fresh. Future analysis of City Point faunal assemblages might also reveal potential differences in the diets of officers versus enlisted soldiers. Finally, more comparisons to the complete faunal data from other Union sites including Camp Nelson, Folly Island, and Fort Pillow, is needed to better determine the role of beef versus pork in the diet of the Union soldier.

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Age of Fusion - 0 to 12 Months		
Bone and Epiphysis	*Fused*	*Not Fused*
Scapula	1	0
Innominate	1	0
Humerus - distal	0	0
Radius - proximal	0	0
Second phalange - proximal	2	2
	4	2
Percent of Age Range	66.7%	33.3%

Age of Fusion - 12 to 24 Months		
Bone and Epiphysis	*Fused*	*Not Fused*
Metacarpal	0	2
First phalange - proximal	0	0
Tibia - distal	0	2
	0	4
Percent of Age Range	0.0%	100.0%

Age of Fusion - 24 to 36 Months		
Bone and Epiphysis	*Fused*	*Not Fused*
Calcaneus	0	1
Metatarsal	0	0
Fibula - distal	0	0
	0	1
Percent of Age Range	0.0%	100.0%

Age of Fusion - 36 to 42 Months		
Bone and Epiphysis	*Fused*	*Not Fused*
Humerus - proximal	0	0
Radius - distal	0	0
Ulna - proximal	0	0
Ulna - distal	0	0
Femur - proximal	0	1
Femur - distal	1	1
Tibia - proximal	1	4
Fibula - proximal	0	1
	2	7
Percent of Age Range	22.2%	77.8%

Source of Fusion Ages: Silver 1969; Chaplin 1970; Maltby 1979.

Table B-14. Feature 8, Upper Fill, age distribution based on epiphyseal fusion for *Sus scrofa* (domestic pig) (n=20).

Attachment B-1 (cont.). Age Distribution Data

Age of Fusion - 6 to 10 Months		
Bone and Epiphysis	*Fused*	*Not Fused*
Scapula	0	0
Innominate	2	0
Humerus - distal	0	0
Radius - proximal	0	0
	0	0
Percent of Age Range	100.0%	0.0%

Age of Fusion - 12 to 36 Months		
Bone and Epiphysis	*Fused*	*Not Fused*
Ulna - proximal	0	0
Ulna - distal	0	0
Metacarpal	0	0
Femur - proximal	0	0
Tibia - distal	0	0
Metatarsal	0	0
Metapodial	0	0
Calcaneus	0	0
First Phalange - proximal	0	0
Second Phalange - proximal	0	0
	0	0
Percent of Age Range	0.0%	0.0%

Age of Fusion - 36 to 42 Months		
Bone and Epiphysis	*Fused*	*Not Fused*
Humerus - proximal	0	0
Radius - distal	0	0
Femur - distal	0	0
Tibia - proximal	0	0
	0	0
Percent of Age Range	0.0%	0.0%

Source of Fusion Ages: Silver 1969; Chaplin 1970; Maltby 1979.

Table B-15. Feature 8, Upper Fill, age distribution based on epiphyseal fusion for *Ovis aries*/*Capra hircus* (domestic sheep or goat) (n=2).

AGE OF FUSION - 0 TO 12 MONTHS		
BONE AND EPIPHYSIS	*FUSED*	*NOT FUSED*
Scapula	0	1
Innominate	5	1
Humerus - distal	0	0
Radius - proximal	0	0
Second phalange - proximal	22	7
	27	9
Percent of Age Range	75.0%	25.0%

AGE OF FUSION - 12 TO 24 MONTHS		
BONE AND EPIPHYSIS	*FUSED*	*NOT FUSED*
Metacarpal	2	5
First phalange - proximal	0	0
Tibia - distal	1	4
	3	9
Percent of Age Range	25.0%	75.0%

AGE OF FUSION - 24 TO 36 MONTHS		
BONE AND EPIPHYSIS	*FUSED*	*NOT FUSED*
Calcaneus	0	5
Metatarsal	2	12
Fibula - distal	0	0
	2	17
Percent of Age Range	10.5%	89.5%

AGE OF FUSION - 36 TO 42 MONTHS		
BONE AND EPIPHYSIS	*FUSED*	*NOT FUSED*
Humerus - proximal	0	1
Radius - distal	0	1
Ulna - proximal	0	1
Ulna - distal	0	0
Femur - proximal	0	5
Femur - distal	1	7
Tibia - proximal	0	6
Fibula - proximal	0	3
	1	24
Percent of Age Range	4.0%	96.0%

Source of Fusion Ages: Silver 1969; Chaplin 1970; Maltby 1979.

Table B-16. Feature 8, Lower Fill, age distribution based on epiphyseal fusion for *Sus scrofa* (domestic pig) (n=92).=

Age of Fusion - 0 to 12 Months		
Bone and Epiphysis	*Fused*	*Not Fused*
Humerus - proximal	0	1
Scapula	2	0
Innominate	2	2
	4	2
Percent of Age Range	66.7%	33.3%

Age of Fusion - 12 to 24 Months		
Bone and Epiphysis	*Fused*	*Not Fused*
Humerus - distal	0	0
Radius - proximal	0	0
First Phalange - proximal	0	0
Second Phalange - proximal	0	0
	0	0
Percent of Age Range	0.0%	0.0%

Age of Fusion - 24 to 36 Months		
Bone and Epiphysis	*Fused*	*Not Fused*
Metacarpal	0	0
Tibia - distal	0	0
Metatarsal	0	0
Metapodial	0	0
	0	0
Percent of Age Range	0.0%	0.0%

Age of Fusion - 36 to 48 Months		
Bone and Epiphysis	*Fused*	*Not Fused*
Humerus - proximal	0	0
Ulna - proximal	0	0
Ulna - distal	0	0
Radius - distal	0	0
Femur - proximal	0	0
Femur - distal	0	0
Tibia - proximal	0	1
Calcaneus	0	0
	0	1
Percent of Age Range	0.0%	100.0%

Source of Fusion Ages: Silver 1969; Chaplin 1970; Maltby 1979.

Table B-17. Feature 8, Lower Fill, age distribution based on epiphyseal fusion for *Bos taurus* (domestic cattle) (n=7).

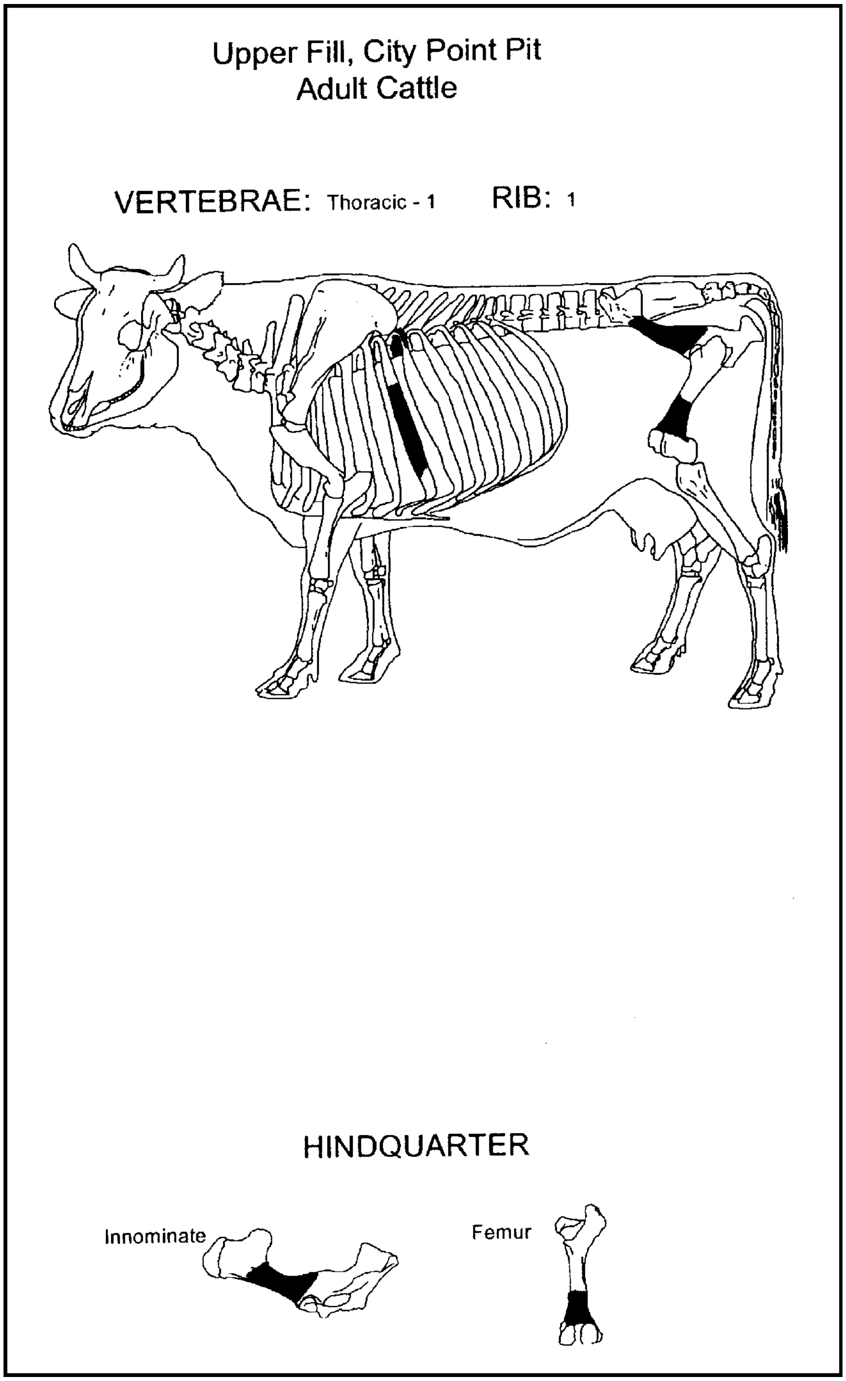
AGE OF FUSION - 6 TO 10 MONTHS		
BONE AND EPIPHYSIS	*FUSED*	*NOT FUSED*
Scapula	0	0
Innominate	1	0
Humerus - distal	0	0
Radius - proximal	0	0
	1	0
Percent of Age Range	100.0%	0.0%

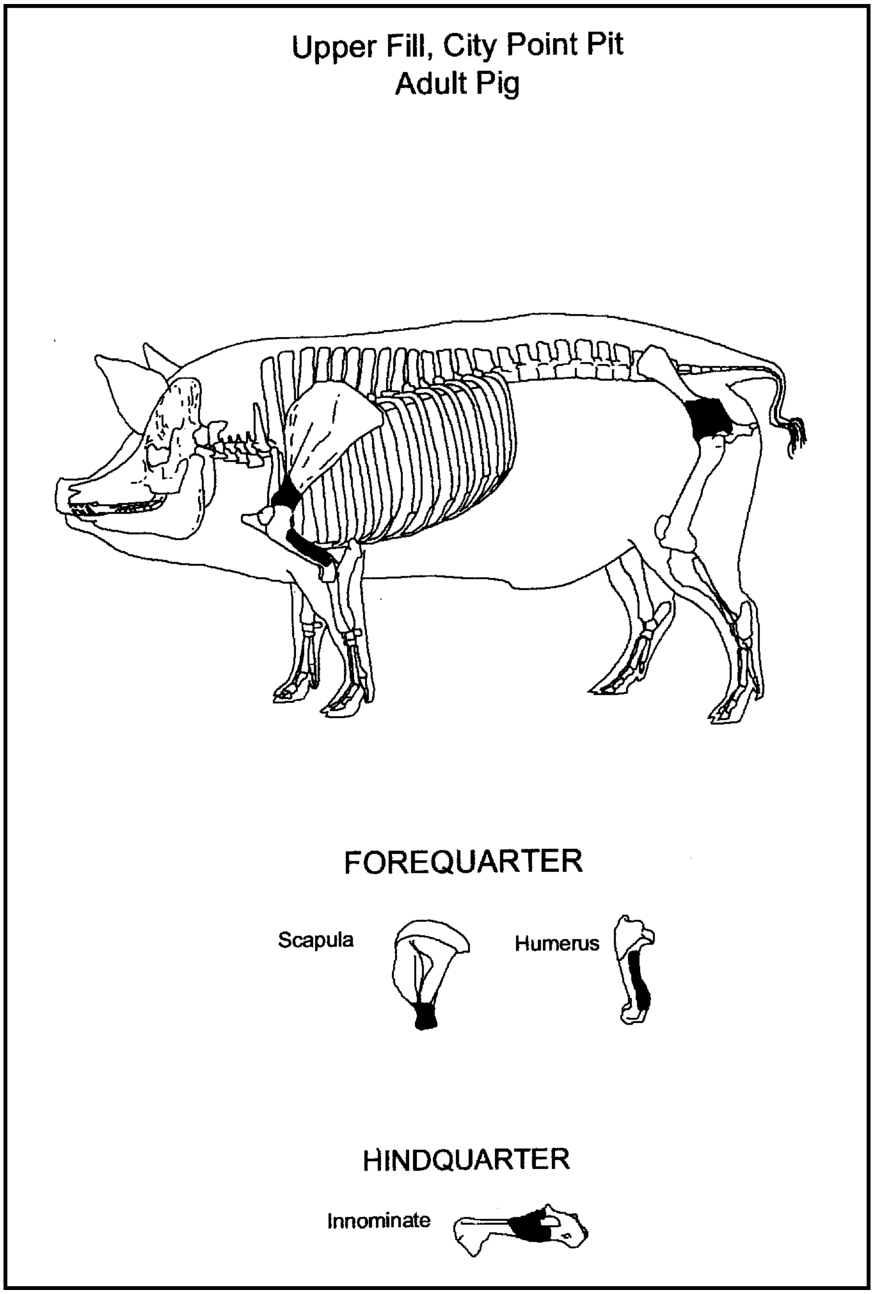
AGE OF FUSION - 12 TO 36 MONTHS		
BONE AND EPIPHYSIS	*FUSED*	*NOT FUSED*
Ulna - proximal	0	0
Ulna - distal	0	0
Metacarpal	1	0
Femur - proximal	0	1
Tibia - distal	2	0
Metatarsal	2	0
Metapodial	0	0
Calcaneus	2	0
First Phalange - proximal	0	0
Second Phalange - proximal	1	0
	8	1
Percent of Age Range	88.9%	11.1%

AGE OF FUSION - 36 TO 42 MONTHS		
BONE AND EPIPHYSIS	*FUSED*	*NOT FUSED*
Humerus - proximal	0	0
Radius - distal	0	2
Femur - distal	0	0
Tibia - proximal	0	1
	0	3
Percent of Age Range	0.0%	100.0%

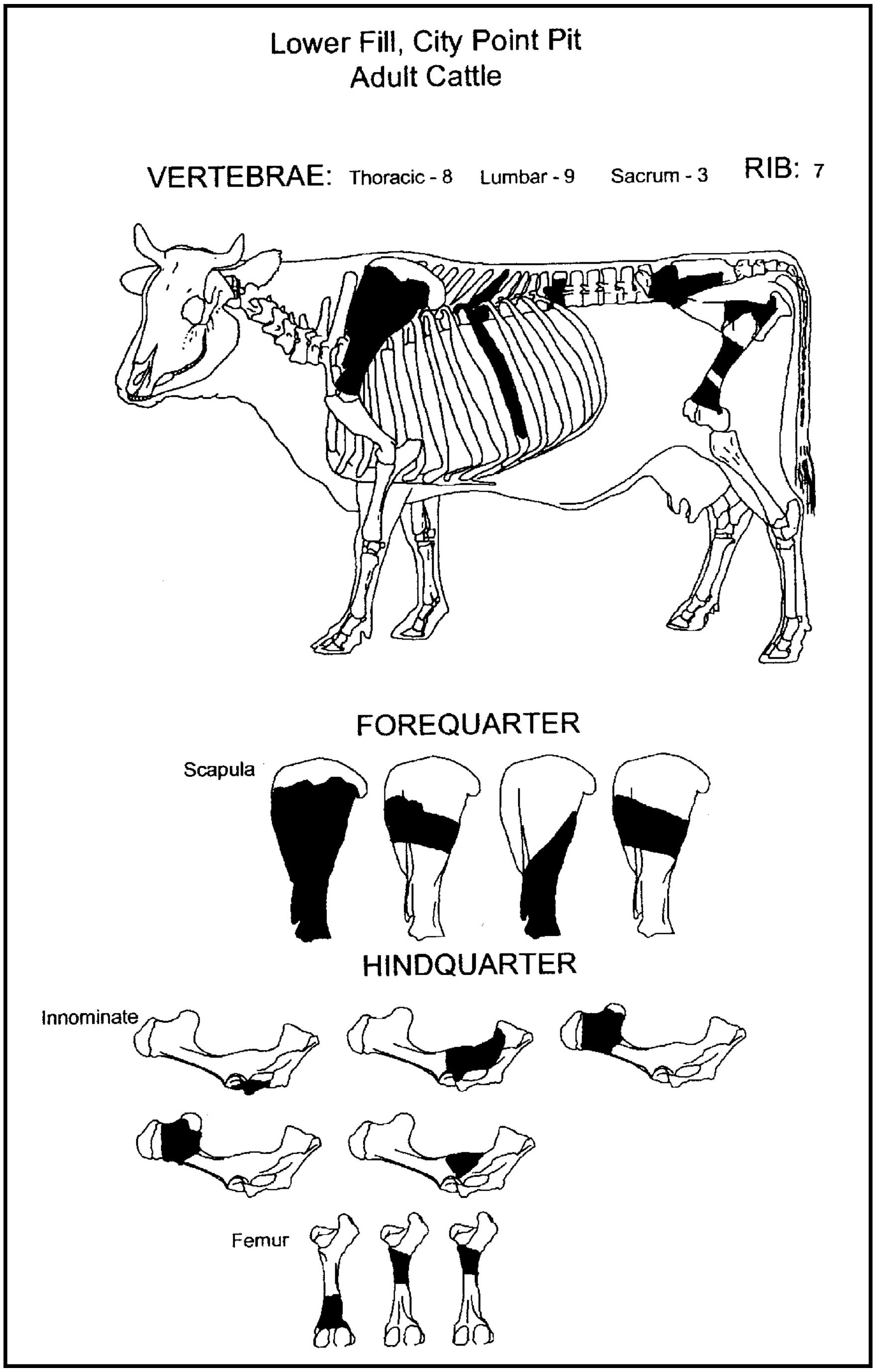
Source of Fusion Ages: Silver 1969; Chaplin 1970; Maltby 1979.

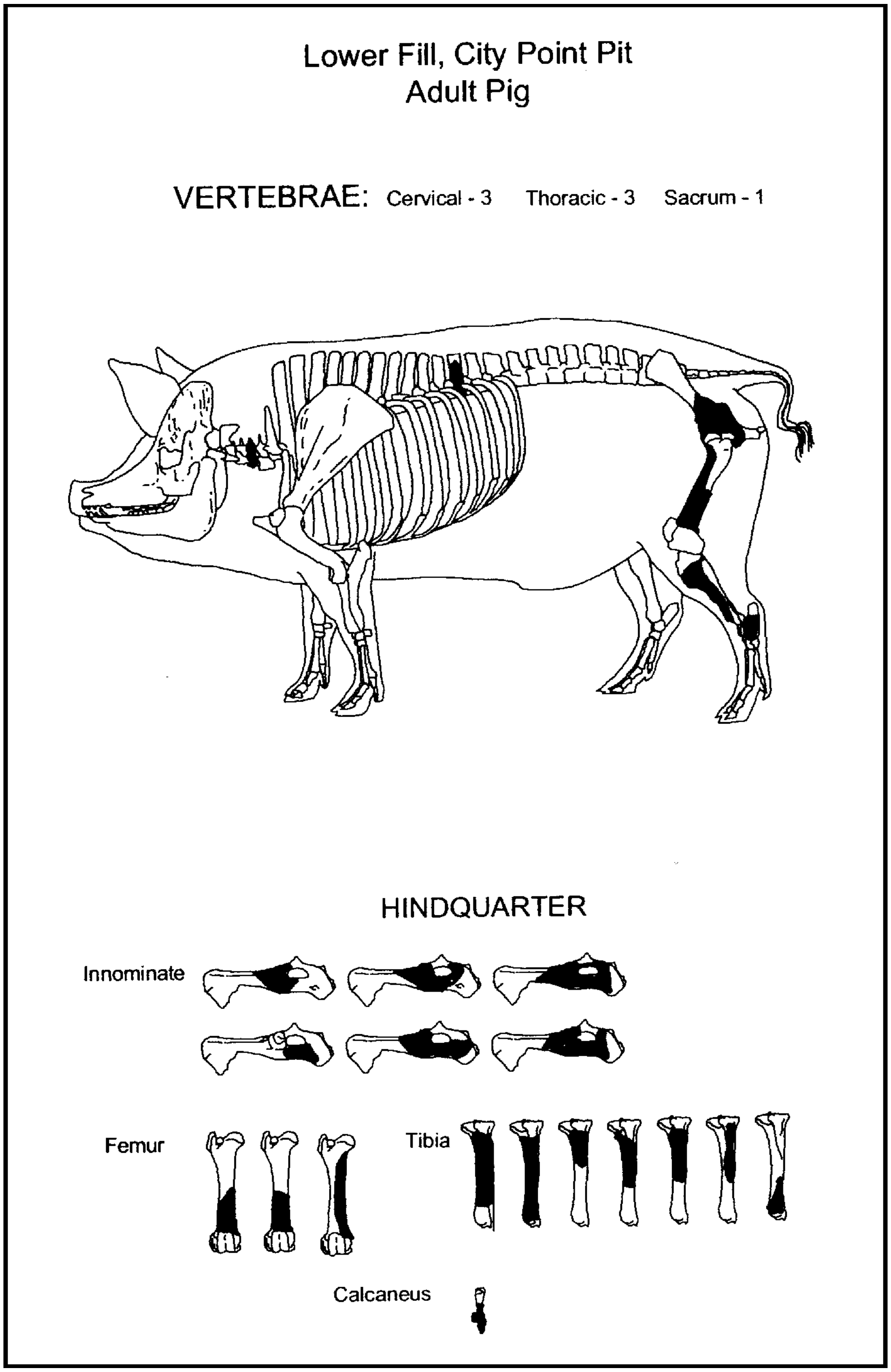
Table B-18. Feature 8, Lower Fill, age distribution based on epiphyseal fusion for *Ovis aries/Capra hircus* (domestic sheep or goat) (n=13).

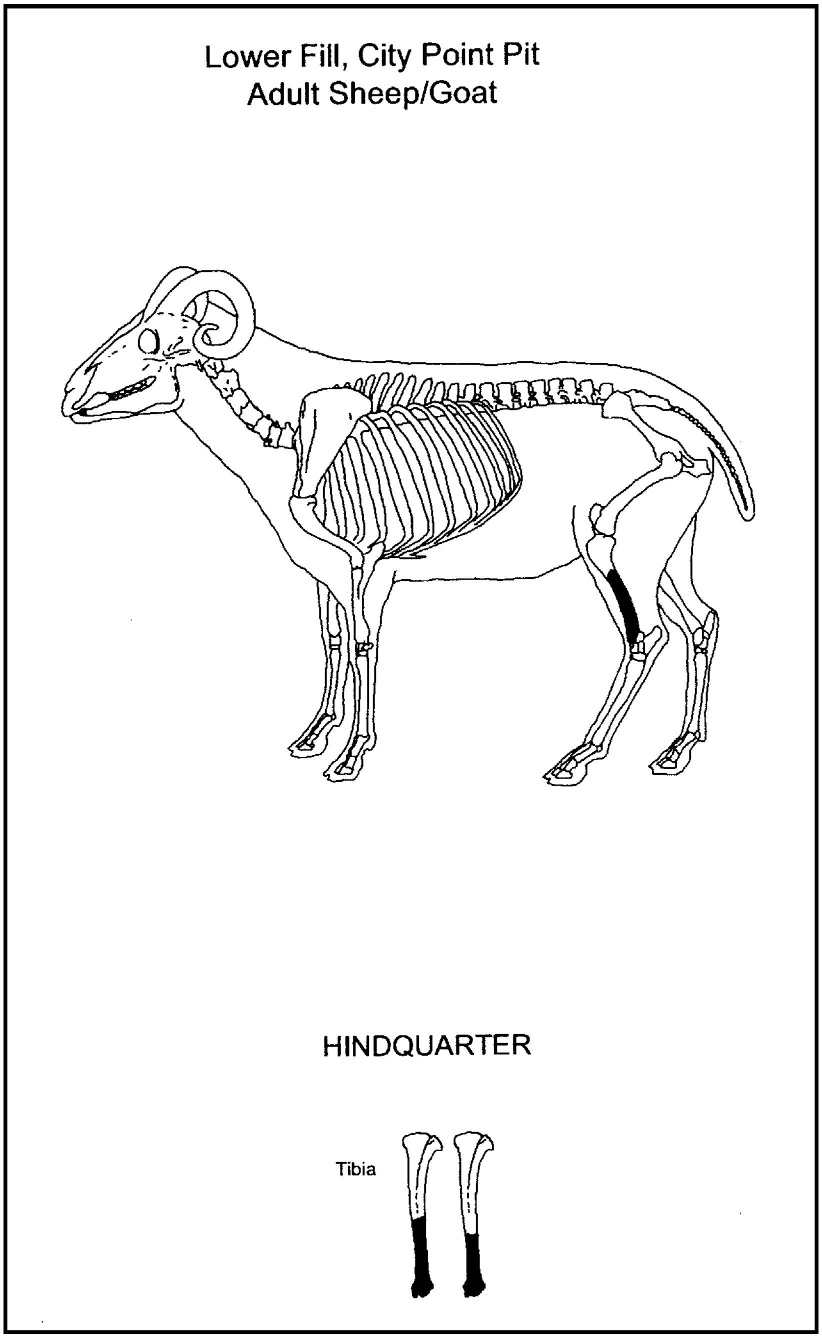

Upper Fill, City Point Pit
Adult Cattle
VERTEBRAE: Thoracic - 1
RIB: 1
HINDQUARTER
Innominate
Femur


Upper Fill, City Point Pit
Adult Pig
FOREQUARTER
Scapula
Humerus
HINDQUARTER
Innominate

Attachment B-2 (cont.). Butchering Charts




Lower Fill, City Point Pit
Adult Pig
VERTEBRAE: Cervical - 3 Thoracic - 3 Sacrum - 1
HINDQUARTER
Innominate
Femur
Tibia
Calcaneus


Lower Fill, City Point Pit
Adult Sheep/Goat
HINDQUARTER
Tibia

Attachment B-3. Bone Measurements

Key to Bone Measurements

Scapula

SLC – Smallest Length of Neck of Scapula
GLP – Greatest Length of the Glenoid Process
LG – Length of the Glenoid Cavity
BG – Breadth of the Glenoid Cavity

Humerus

SD – Smallest Breadth of the Diaphysis

Innominate

LA – Length of the Acetabulum Including the Lip
LAR – Length of the Acetabulum on the Rim (only measured in horses and pigs)

Femur

SD – Smallest Breadth of the Diaphysis

Tibia

SD – Smallest Breadth of the Diaphysis
Bd – Greatest Breadth of the Distal End

Astragalus

GLl – Greatest Length of the Lateral Half
GLm – Greatest Length of the Medial Half
Dl – Greatest Depth of the Lateral Half
Bd – Greatest Breadth of the Distal End

Calcaneous

GL – Greatest Length
GB – Greatest Breadth

Metapodials

GL – Greatest Length
LeP – Length Excepting the Plantar Projection
Bp – Greatest Breadth of the Proximal End
B – Breadth in the Middle of the Diaphysis
Bd- Greatest Breadth of the Distal End

Phalanx I

GL – Greatest Length
GLpe – Greatest Length of the Peripheral Half (only measured in Cows and Pigs)
Bp – Greatest Breadth of the Proximal End
SD – Smallest Breadth of the Diaphysis
Bd – Greatest Breadth of the Distal End

Attachment B-3 (cont.). Bone Measurements

UB No.	ER#	Taxon	Element	Description	Measurement (mm)
401	F8IIIEH	*Bos taurus*	Scapula	SLC	72.7
				GLP	91.7
				LG	76.1
				BG	64.2
403	F8IIIEH	*Bos taurus*	Scapula	SLC	77.5
				GLP	94.9
				LG	74.0
				BG	58.8
27	F8UF	*Bos taurus*	Humerus	SD	45.4
62	F8LF	*Bos taurus*	Femur	SD	58.4
407	F8LF	*Bos taurus*	Femur	SD	53.2
39	F8UF	*Sus scrofa*	Scapula	SLC	25.0
				GLP	37.2
				LG	30.2
				BG	27.8
235	F8IIIEH	*Sus scrofa*	Scapula	SLC	26.5
12	F8UF	*Sus scrofa*	Femur	Bd	46.9
13	F8UF	*Sus scrofa*	Femur	SD	21.2
58	F8IIIEH	*Sus scrofa*	Femur	SD	24.9
219	F8IIaEH	*Sus scrofa*	Femur	SD	20.5
385	F8IIIEH	*Sus scrofa*	Femur	SD	21.8
388	F8IIIEH	*Sus scrofa*	Femur	SD	22.7
19	F8UF	*Sus scrofa*	Innominate	LA	40.1
				LAR	27.2
237	F8IIIEH	*Sus scrofa*	Innominate	LA	38.2
				LAR	32.0
240	F8IIIEH	*Sus scrofa*	Innominate	LA	40.0
				LAR	34.2
241	F8IIIEH	*Sus scrofa*	Innominate	LA	42.6
				LAR	32.7
481	F8IVEH	*Sus scrofa*	Innominate	LA	39.9
				LAR	32.7
371	F8IIIEH	*Sus scrofa*	Tibia	SD	21.2
373	F8IIIEH	*Sus scrofa*	Tibia	SD	22.6
153	F8LF	*Sus scrofa*	Astragalus	GLl	41.2
				GLm	37.3
				Dl	21.9
				Bd	23.6

Attachment B-3 (cont.). Bone Measurements

UB No.	ER#	Taxon	Element	Description	Measurement (mm)
154	F8LF	*Sus scrofa*	Astragalus	GLl	39.2
				GLm	35.4
				Dl	23.5
				Bd	22.5
311	F8IIIEH	*Sus scrofa*	Astragalus	GLl	41.5
				GLm	40.0
				Dl	20.8
				Bd	24.9
331	F8IIIEH	*Sus scrofa*	Metapodial	GL	79.4
				LeP	77.5
				Bp	15.0
				B	13.7
				Bd	15.2
342	F8IIIEH	*Sus scrofa*	Metapodial	GL	64.5
				LeP	62.7
				Bp	17.7
				B	14.0
				Bd	15.5
163	F8LF	*Sus scrofa*	Phalanx 1	GLpe	35.9
				Bp	16.5
				SD	13.9
				Bd	14.0
171	F8LF	*Sus scrofa*	Phalanx 1	GLpe	33.9
				Bp	14.9
				SD	12.4
				Bd	12.5
245	F8IIIEH	*Sus scrofa*	Phalanx 1	GLpe	34.6
				Bp	17.3
				SD	13.4
				Bd	15.5
246	F8IIIEH	*Sus scrofa*	Phalanx 1	GLpe	36.0
				Bp	17.1
				SD	14.4
				Bd	15.5
312	F8IIIEH	*Sus scrofa*	Phalanx 1	GLpe	20.0
				Bp	16.3
				SD	13.4
				Bd	16.2
32	F8UF	*Sus scrofa*	Phalanx 2	GL	19.2
				Bp	17.3
				SD	15.3
				Bd	15.6

UB No.	ER#	Taxon	Element	Description	Measurement (mm)
132	F8LF	*Sus scrofa*	Phalanx 2	GL	24.2
				Bp	17.4
				SD	15.2
				Bd	14.8
				Bp	20.0
				SD	17.3
				Bd	17.1
175	F8LF	*Sus scrofa*	Phalanx 2	GL	22.9
				Bp	15.4
				SD	12.8
				Bd	12.6
183	F8LF	*Sus scrofa*	Phalanx 2	GL	20.6
				Bp	15.6
				SD	13.3
				Bd	12.4
188	F8LF	*Sus scrofa*	Phalanx 2	GL	21.8
				Bp	14.6
				SD	12.3
				Bd	11.3
195	F8LF	*Sus scrofa*	Phalanx 2	GL	20.6
				Bp	16.2
				SD	13.6
				Bd	14.8
199	F8LF	*Sus scrofa*	Phalanx 2	GL	21.4
				Bp	13.7
				SD	12.2
				Bd	11.6
244	F8IIIEH	*Sus scrofa*	Phalanx 2	GL	23.1
				Bp	16.1
				SD	14.2
				Bd	13.8
251	F8IIIEH	*Sus scrofa*	Phalanx 2	GL	22.6
				Bp	16.9
				SD	14.0
				Bd	14.1
264	F8IIIEH	*Sus scrofa*	Phalanx 2	GL	19.9
				Bp	16.7
				SD	14.2
				Bd	15.2
270	F8IIIEH	*Sus scrofa*	Phalanx 2	GL	23.2
				Bp	16.2
				SD	13.4
				Bd	13.5

Attachment B-3 (cont.). Bone Measurements

UB No.	ER#	Taxon	Element	Description	Measurement (mm)
272	F8IIIEH	*Sus scrofa*	Phalanx 2	GL	19.8
				Bp	16.6
				SD	14.3
				Bd	14.0
315	F8IIIEH	*Sus scrofa*	Phalanx 2	GL	23.1
				Bp	16.9
				SD	14.6
				Bd	14.0
393	F8IIIEH	*Ovis/Capra*	Tibia	Bd	15.9
				SD	15.1
394	F8IIIEH	*Ovis/Capra*	Tibia	Bd	27.8
				SD	15.3
390	F8IIIEH	*Ovis/Capra*	Metatarsal	Bp	20.4
392	F8IIIEH	*Ovis/Capra*	Metatarsal	Bp	19.5
390	F8IIIEH	*Ovis/Capra*	Metacarpal	Bp	21.4
374	F8IIIEH	*Ovis/Capra*	Astragalus	GLl	29.4
				GLm	28.7
				Dl	29.3
				Bd	18.4
387	F8IIIEH	*Ovis/Capra*	Astragalus	GLl	30.1
				GLm	28.0
				Dl	29.7
				Bd	19.3
386	F8IIIEH	*Ovis/Capra*	Calcaneous	GL	57.8
				GB	15.8
375	F8IIIEH	*Ovis/Capra*	Phalanx 1	GL	34.7
				Bp	12.3
				SD	9.6
				Bd	10.7
378	F8IIIEH	*Ovis/Capra*	Astragalus	GL	35.2
				Bp	10.5
				SD	19.5
				Bd	10.6

Attachment B-4. List of Identified Bones by Context

UB No.	Taxon	Sym	Element	Qty	Wgt (g)
Context: F8IEH					
505	Class Mammalia		Indeterminate	8	3.4
503	Class Mammalia II		Vertebra	4	8.2
504	Class Mammalia II		Limb bone	7	6.7
208	Sus scrofa	R	Astragalus	1	2.8
209	cf Bos taurus	I	Rib	1	8.0
Context: F8IIEH					
502	Class Mammalia		Indeterminate	20	5.8
500	Class Mammalia II		Limb bone	5	8.2
501	Class Mammalia II		Limb bone	3	1.4
215	Sus scrofa	I	Molar	1	0.7
314	cf Sus scrofa	R	Lumbar vertebra	1	3.1
212	Sus scrofa	L	Fourth tarsal	1	1.5
211	Sus scrofa	L	Central tarsal	1	1.7
213	Bos taurus	I	Rib	1	56.6
Context: F8IIIAEH					
218	cf Sus scrofa	A	Vertebra	1	1.0
217	cf Sus scrofa	R	Sacrum	1	20.7
219	Sus scrofa	L	Femur	1	30.8
Context: F8IIIEH					
414	Gallus gallus	A	Sternum or sternabrae	1	0.4
397	Gallus gallus	L	Humerus	1	2.0
415	Gallus gallus	L	Ulna	1	0.6
398	Gallus gallus	R	Femur	1	0.9
532	Class Mammalia		Indeterminate	116	68.5
525	Class Mammalia I		Vertebra	15	58.8
523	Class Mammalia I		Rib	9	28.2
527	Class Mammalia I		Rib	1	8.6
528	Class Mammalia I		Limb bone	1	18.9
529	Class Mammalia I		Limb bone	3	15.1
526	Class Mammalia II		Vertebra	9	11.1
530	Class Mammalia II		Vertebra	20	37.7
524	Class Mammalia II		Rib	6	7.9
531	Class Mammalia II		Limb bone	6	7.1
232	Sus scrofa	A	Cervical vertebra	1	3.3
226	Sus scrofa	A	Cervical vertebra	1	3.3
280	Sus scrofa	A	Cervical vertebra	1	2.0
283	Sus scrofa	A	Cervical vertebra	1	2.7
224	Sus scrofa	A	Cervical vertebra	1	13.1
233	Sus scrofa	A	Cervical vertebra	1	20.2
284	Sus scrofa	A	Cervical vertebra	1	3.2
281	cf Sus scrofa	A	Cervical vertebra	1	1.0
222	Sus scrofa	A	Cervical vertebra	1	7.6
285	Sus scrofa	A	Thoracic vertebra	1	4.2

UB No.	Taxon	Sym	Element	Qty	Wgt (g)
Context: F8IIIEH (cont.)					
225	Sus scrofa	A	Thoracic vertebra	1	6.7
223	Sus scrofa	A	Thoracic vertebra	1	10.6
296	Sus scrofa	A	Thoracic vertebra	1	5.3
297	Sus scrofa	A	Thoracic vertebra	1	4.5
292	cf Sus scrofa	I	Rib	1	6.7
289	cf Sus scrofa	I	Rib	1	2.1
229	cf Sus scrofa	I	Rib	1	4.9
227	cf Sus scrofa	I	Rib	1	5.5
300	cf Sus scrofa	I	Rib	1	2.0
299	cf Sus scrofa	I	Rib	1	4.7
237	Sus scrofa	L	Innominate	1	20.7
238	Sus scrofa	L	Innominate	1	10.7
282	cf Sus scrofa	L	Innominate	1	2.2
240	Sus scrofa	R	Innominate	1	43.0
241	Sus scrofa	R	Innominate	1	32.7
239	Sus scrofa	R	Innominate	1	26.3
236	Sus scrofa	I	Scapula	1	5.9
235	Sus scrofa	L	Scapula	1	16.6
234	Sus scrofa	L	Scapula	1	4.9
242	cf Sus scrofa	R	Scapula	1	2.0
221	Sus scrofa	R	Scapula	1	4.7
395	Sus scrofa	R	Humerus	1	12.0
328	Sus scrofa	R	Metacarpal II	1	2.1
325	Sus scrofa	L	Metacarpal III	1	4.2
342	Sus scrofa	R	Metacarpal III	1	8.3
332	Sus scrofa	R	Metacarpal IV	1	5.6
326	Sus scrofa	R	Metacarpal V	1	2.2
388	Sus scrofa	R	Femur	1	16.0
370	Sus scrofa	R	Femur	1	12.3
385	Sus scrofa	R	Femur	1	21.9
384	Sus scrofa	R	Femur	1	24.3
231	cf Sus scrofa	R	Femur	1	3.7
391	Sus scrofa	R	Femur	1	9.4
373	Sus scrofa	R	Tibia	1	65.4
420	Sus scrofa	R	Tibia	1	7.2
371	Sus scrofa	R	Tibia	1	38.6
350	Sus scrofa	R	Tibia	1	10.9
369	Sus scrofa	R	Tibia	1	18.7
417	Sus scrofa	R	Tibia	1	7.4
396	Sus scrofa	R	Tibia	1	3.8
421	Sus scrofa	R	Tibia	1	4.9
372	Sus scrofa	R	Tibia	1	6.0
356	Sus scrofa	I	Fibula	1	0.8
308	Sus scrofa	R	Fibula	1	2.9

UB No.	Taxon	Sym	Element	Qty	Wgt (g)
Context: F8IIIEH (cont.)					
304	Sus scrofa	R	Fibula	1	2.5
303	Sus scrofa	R	Fibula	1	1.0
316	Sus scrofa	R	Fibula	1	1.5
262	Sus scrofa	R	Fibula	1	1.1
341	Sus scrofa	I	Tarsal	1	6.3
327	Sus scrofa	I	Tarsal	1	1.0
359	Sus scrofa	L	Third tarsal	1	1.2
358	Sus scrofa	L	Third tarsal	1	1.0
357	Sus scrofa	L	Third tarsal	1	0.8
363	Sus scrofa	R	Fourth tarsal	1	3.6
366	Sus scrofa	R	Fourth tarsal	1	4.0
364	Sus scrofa	R	Fourth tarsal	1	3.7
310	Sus scrofa	R	Calcaneus	1	10.8
314	Sus scrofa	R	Calcaneus	1	8.4
347	Sus scrofa	R	Calcaneus	1	6.6
309	Sus scrofa	R	Calcaneus	1	4.0
269	Sus scrofa	R	Calcaneus	1	1.5
311	Sus scrofa	R	Astragalus	1	9.5
248	Sus scrofa	R	Astragalus	1	8.7
250	Sus scrofa	R	Astragalus	1	6.5
365	Sus scrofa	R	Central tarsal	1	3.4
360	Sus scrofa	R	Central tarsal	1	2.6
367	Sus scrofa	R	Central tarsal	1	2.2
322	Sus scrofa	R	Metatarsal II	1	0.2
320	Sus scrofa	R	Metatarsal III	1	5.1
340	Sus scrofa	R	Metatarsal III	1	7.6
336	Sus scrofa	R	Metatarsal III	1	3.8
330	Sus scrofa	R	Metatarsal III	1	4.1
333	Sus scrofa	R	Metatarsal IV	1	2.3
331	Sus scrofa	R	Metatarsal IV	1	9.4
343	Sus scrofa	R	Metatarsal IV	1	6.7
345	Sus scrofa	R	Metatarsal IV	1	5.8
337	Sus scrofa	R	Metatarsal V	1	2.7
324	Sus scrofa	I	Metapodial	1	1.8
335	Sus scrofa	I	Metapodial	1	1.3
338	Sus scrofa	I	Metapodial	1	1.5
334	Sus scrofa	I	Metapodial	1	1.3
321	Sus scrofa	I	Metapodial	1	0.5
339	Sus scrofa	R	Metapodial	1	1.7
329	Sus scrofa	R	Metapodial	1	2.0
347	cf Sus scrofa	I	Carpal or tarsal	1	0.6
307	Sus scrofa	I	First phalanx	1	3.4
245	Sus scrofa	I	First phalanx	1	3.6
265	Sus scrofa	I	First phalanx	1	1.8

UB No.	Taxon	Sym	Element	Qty	Wgt (g)
Context: F8IIIEH (cont.)					
312	Sus scrofa	I	First phalanx	1	3.8
246	Sus scrofa	I	First phalanx	1	4.4
305	Sus scrofa	I	First phalanx	1	2.2
268	Sus scrofa	I	First phalanx	1	1.2
306	Sus scrofa	I	First phalanx	1	3.3
271	Sus scrofa	I	First phalanx	1	2.7
323	Sus scrofa	I	First phalanx	1	1.3
259	Sus scrofa	I	First phalanx	1	0.9
257	Sus scrofa	I	First phalanx	1	0.8
258	Sus scrofa	I	First phalanx	1	1.3
263	Sus scrofa	I	First phalanx	1	0.7
344	Sus scrofa	I	First phalanx	1	0.4
255	Sus scrofa	I	First phalanx	1	0.7
260	Sus scrofa	I	First phalanx	1	0.8
315	Sus scrofa	I	Second phalanx	1	2.2
251	Sus scrofa	I	Second phalanx	1	2.6
270	Sus scrofa	I	Second phalanx	1	2.3
244	Sus scrofa	I	Second phalanx	1	2.4
272	Sus scrofa	I	Second phalanx	1	2.0
264	Sus scrofa	I	Second phalanx	1	2.3
317	Sus scrofa	I	Second phalanx	1	1.1
273	Sus scrofa	I	Second phalanx	1	1.5
243	Sus scrofa	I	Second phalanx	1	1.2
346	Sus scrofa	I	Second phalanx	1	0.2
318	Sus scrofa	I	Second phalanx	1	0.3
319	Sus scrofa	I	Third phalanx	1	0.4
313	Sus scrofa	I	Third phalanx	1	1.5
266	Sus scrofa	I	Third phalanx	1	2.1
274	Sus scrofa	I	Third phalanx	1	1.6
256	Sus scrofa	I	Third phalanx	1	0.9
349	Sus scrofa	I	Third phalanx	1	0.5
411	cf Bos taurus	A	Vertebra	1	5.4
461	cf Bos taurus	A	Vertebra	1	2.0
290	cf Bos taurus	A	Vertebra	1	3.0
293	cf Bos taurus	A	Vertebra	1	1.9
291	cf Bos taurus	A	Vertebra	1	3.2
278	cf Bos taurus	A	Vertebra	1	1.2
426	Bos taurus	A	Thoracic vertebra	1	22.1
431	Bos taurus	A	Thoracic vertebra	1	13.9
460	Bos taurus	A	Thoracic vertebra	1	36.4
410	Bos taurus	A	Thoracic vertebra	1	39.4
434	Bos taurus	A	Thoracic vertebra	1	23.6
409	Bos taurus	A	Thoracic vertebra	1	5.7
438	Bos taurus	A	Thoracic vertebra	1	26.9

Attachment B-4 (cont.). List of Identified Bones by Context

UB No.	Taxon	Sym	Element	Qty	Wgt (g)
427	Bos taurus	A	Thoracic vertebra	1	19.8
458	cf Bos taurus	A	Thoracic vertebra	1	3.0
428	cf Bos taurus	A	Thoracic vertebra	1	4.1
430	Bos taurus	A	Lumbar vertebra	1	132.8
433	Bos taurus	A	Lumbar vertebra	1	105.3
423	Bos taurus	A	Lumbar vertebra	1	17.9
413	Bos taurus	A	Lumbar vertebra	1	16.1
424	cf Bos taurus	A	Lumbar vertebra	1	14.8
432	Bos taurus	A	Sacrum	1	59.3
429	Bos taurus	A	Sacrum	1	156.1
412	Bos taurus	A	Sacrum	1	15.8
302	Bos taurus	I	Rib	1	2.1
267	Bos taurus	I	Rib	1	1.9
444	Bos taurus	I	Rib	1	47.3
448	Bos taurus	I	Rib	1	19.7
443	cf Bos taurus	I	Rib	1	26.8
440	cf Bos taurus	I	Rib	1	34.7
230	Bos taurus	I	Rib	1	6.1
368	cf Bos taurus	I	Rib	1	3.4
441	Bos taurus	L	Rib	1	51.2
450	Bos taurus	L	Rib	1	52.6
439	Bos taurus	R	Rib	1	47.5
442	Bos taurus	R	Rib	1	44.8
446	Bos taurus	R	Rib	1	32.9
445	Bos taurus	R	Rib	1	63.8
301	Bos taurus	R	Rib	1	2.7
261	Bos taurus	R	Rib	1	1.3
406	Bos taurus	I	Innominate	1	41.9
355	Bos taurus	I	Innominate	1	9.2
400	Bos taurus	L	Innominate	1	44.4
425	Bos taurus	L	Innominate	1	44.5
405	Bos taurus	R	Innominate	1	199.7
404	Bos taurus	R	Innominate	1	286.4
459	Bos taurus	R	Innominate	1	27.6
399	Bos taurus	R	Scapula	1	352.1
402	Bos taurus	R	Scapula	1	249.8
401	Bos taurus	R	Scapula	1	332.3
408	Bos taurus	L	Fused carpal 2 + 3	1	41.6
407	Bos taurus	R	Femur	1	177.1
352	cf Bos taurus	I	Tibia	1	6.4
361	Ovis aries/Capra hircus	L	Fused carpal 2 + 3	1	2.0
362	Ovis aries/Capra hircus	R	Fused carpal 2 + 3	1	2.2
383	Ovis aries/Capra hircus	L	Main metacarpal	1	2.6
380	Ovis aries/Capra hircus	R	Main metacarpal	1	3.6
394	Ovis aries/Capra hircus	L	Tibia	1	22.8

UB No.	Taxon	Sym	Element	Qty	Wgt (g)
354	Ovis aries/Capra hircus	R	Tibia	1	3.1
393	Ovis aries/Capra hircus	R	Tibia	1	17.1
386	Ovis aries/Capra hircus	L	Calcaneus	1	4.8
379	Ovis aries/Capra hircus	R	Calcaneus	1	4.6
387	Ovis aries/Capra hircus	L	Astragalus	1	4.2
374	Ovis aries/Capra hircus	R	Astragalus	1	5.0
390	Ovis aries/Capra hircus	L	Main metatarsal	1	9.3
389	Ovis aries/Capra hircus	L	Main metatarsal	1	4.4
392	Ovis aries/Capra hircus	R	Main metatarsal	1	7.5
377	Ovis aries/Capra hircus	R	Main metatarsal	1	5.6
382	Ovis aries/Capra hircus	I	Metapodial	1	3.0
348	Ovis aries/Capra hircus	I	Carpal or tarsal	1	0.4
378	Ovis aries/Capra hircus	I	First phalanx	1	1.8
375	Ovis aries/Capra hircus	I	First phalanx	1	1.8
376	Ovis aries/Capra hircus	I	First phalanx	1	1.7
381	Ovis aries/Capra hircus	I	Second phalanx	1	0.8
Context: F8IVEH					
507	Class Mammalia II		Vertebra	5	3.4
506	Class Mammalia II		Rib	2	3.7
492	cf Sus scrofa	A	Thoracic vertebra	1	1.3
476	cf Sus scrofa	I	Rib	1	5.3
471	Sus scrofa	R	Innominate	1	19.6
479	Sus scrofa	R	Innominate	1	4.0
480	Sus scrofa	R	Femur	1	21.0
478	Sus scrofa	R	Femur	1	4.2
477	Sus scrofa	R	Femur	1	3.4
486	Sus scrofa	R	Femur	1	1.8
475	cf Sus scrofa	R	Femur	1	4.4
484	Sus scrofa	R	Metatarsal II	1	1.5
487	Sus scrofa	L	Metatarsal III	1	4.2
482	Sus scrofa	L	Metatarsal III	1	1.2
472	Sus scrofa	I	First phalanx	1	2.4
489	Sus scrofa	I	First phalanx	1	0.9
490	Sus scrofa	I	Second phalanx	1	1.2
488	Sus scrofa	I	Second phalanx	1	1.0
491	Sus scrofa	I	Third phalanx	1	1.0
473	cf Bos taurus	I	Vertebra	1	3.9
483	cf Bos taurus	I	Vertebra	1	4.4
474	cf Bos taurus	I	Vertebra	1	5.8
470	Bos taurus	A	Thoracic vertebra	1	77.1
485	Bos taurus	A	Thoracic vertebra	1	52.9
471	cf Bos taurus	I	Rib	1	18.5
Context: F8LF					
520	Class Mammalia		Indeterminate	50	29.8
516	Class Mammalia I		Vertebra	13	35.2

UB No.	Taxon	Sym	Element	Qty	Wgt (g)
Context: F8LF (cont.)					
515	Class Mammalia I		Rib	5	14.7
518	Class Mammalia I		Limb bone	1	6.2
517	Class Mammalia II		Vertebra	10	10.0
514	Class Mammalia II		Rib	12	9.3
522	Class Mammalia II		Rib	1	0.5
519	Class Mammalia II		Limb bone	7	9.1
521	Class Mammalia II		Limb bone	7	3.9
117	cf Sus scrofa	A	Cervical vertebra	1	2.5
118	cf Sus scrofa	A	Thoracic vertebra	1	2.1
64	Sus scrofa	R	Ulna	1	23.8
107	Sus scrofa	L	Radius	1	3.0
152	Sus scrofa	L	Second carpal	1	1.9
145	Sus scrofa	L	Third carpal	1	2.6
148	Sus scrofa	R	Third carpal	1	2.2
121	Sus scrofa	I	Fused carpal 2 + 3	1	4.6
140	Sus scrofa	L	Radial carpal	1	0.9
147	Sus scrofa	R	Radial carpal	1	2.5
141	Sus scrofa	R	Ulnar carpal	1	1.9
144	Sus scrofa	L	Intermediate carpal	1	2.0
159	Sus scrofa	L	Intermediate carpal	1	2.7
158	Sus scrofa	R	Intermediate carpal	1	2.8
63	Sus scrofa	L	Metacarpal III	1	8.0
65	Sus scrofa	L	Metacarpal III	1	5.4
78	Sus scrofa	L	Metacarpal III	1	4.8
81	Sus scrofa	L	Metacarpal III	1	3.3
60	Sus scrofa	L	Metacarpal IV	1	5.0
71	Sus scrofa	L	Metacarpal IV	1	3.4
54	Sus scrofa	L	Metacarpal IV	1	5.5
90	Sus scrofa	I	Femur	1	5.7
95	Sus scrofa	L	Femur	1	20.6
91	Sus scrofa	L	Femur	1	5.4
104	Sus scrofa	R	Femur	1	6.3
50	Sus scrofa	R	Femur	1	34.9
111	Sus scrofa	I	Tibia	1	0.9
99	Sus scrofa	L	Tibia	1	4.6
115	Sus scrofa	L	Tibia	1	3.4
93	Sus scrofa	L	Tibia	1	4.7
109	Sus scrofa	L	Tibia	1	2.9
135	Sus scrofa	I	Fibula	1	0.4
161	Sus scrofa	L	Fibula	1	2.0
136	Sus scrofa	L	Fibula	1	0.5
151	cf Sus scrofa	I	Patella	1	4.1
142	Sus scrofa	L	Third tarsal	1	1.1
143	Sus scrofa	L	Fourth tarsal	1	2.5

UB No.	Taxon	Sym	Element	Qty	Wgt (g)
Context: F8LF (cont.)					
155	Sus scrofa	L	Calcaneus	1	8.0
157	Sus scrofa	L	Calcaneus	1	7.4
146	Sus scrofa	L	Calcaneus	1	1.1
153	Sus scrofa	L	Astragalus	1	9.5
154	Sus scrofa	L	Astragalus	1	7.2
150	Sus scrofa	L	Central tarsal	1	2.5
156	Sus scrofa	L	Central tarsal	1	3.2
55	Sus scrofa	L	Metatarsal III	1	6.6
56	Sus scrofa	L	Metatarsal III	1	9.0
68	Sus scrofa	R	Metatarsal III	1	4.9
77	Sus scrofa	L	Metatarsal IV	1	2.3
69	Sus scrofa	L	Metatarsal IV	1	3.4
73	Sus scrofa	L	Metatarsal IV	1	2.8
72	Sus scrofa	L	Metatarsal IV	1	4.3
57	Sus scrofa	L	Metatarsal IV	1	3.5
85	Sus scrofa	I	Metapodial	1	1.7
84	Sus scrofa	I	Metapodial	1	1.5
82	Sus scrofa	I	Metapodial	1	1.4
83	Sus scrofa	I	Metapodial	1	1.7
59	Sus scrofa	I	Metapodial	1	1.2
66	Sus scrofa	I	Metapodial	1	2.2
70	Sus scrofa	I	Metapodial	1	1.2
74	Sus scrofa	I	Metapodial	1	1.0
79	Sus scrofa	I	Metapodial	1	0.9
75	Sus scrofa	I	Metapodial	1	2.2
125	Sus scrofa	I	Metapodial	1	0.4
67	Sus scrofa	I	Metapodial	1	0.5
128	Sus scrofa	I	Metapodial	1	0.8
58	Sus scrofa	L	Metapodial	1	1.9
80	Sus scrofa	L	Metapodial	1	2.3
76	Sus scrofa	L	Metapodial	1	1.9
149	Sus scrofa	I	Carpal or tarsal	1	2.1
137	cf Sus scrofa	I	Carpal or tarsal	1	0.9
134	cf Sus scrofa	I	Carpal or tarsal	1	0.5
163	Sus scrofa	I	First phalanx	1	3.1
176	Sus scrofa	I	First phalanx	1	3.1
177	Sus scrofa	I	First phalanx	1	3.0
129	Sus scrofa	I	First phalanx	1	1.9
171	Sus scrofa	I	First phalanx	1	3.3
166	Sus scrofa	I	First phalanx	1	2.6
180	Sus scrofa	I	First phalanx	1	2.9
165	Sus scrofa	I	First phalanx	1	2.2
181	Sus scrofa	I	First phalanx	1	1.5
167	Sus scrofa	I	First phalanx	1	1.6

UB No.	Taxon	Sym	Element	Qty	Wgt (g)
Context: F8LF (cont.)					
130	Sus scrofa	I	First phalanx	1	1.2
173	Sus scrofa	I	First phalanx	1	2.3
174	Sus scrofa	I	First phalanx	1	0.8
187	Sus scrofa	I	First phalanx	1	0.8
190	Sus scrofa	I	First phalanx	1	1.3
170	Sus scrofa	I	First phalanx	1	1.0
178	Sus scrofa	I	First phalanx	1	1.4
194	Sus scrofa	I	First phalanx	1	0.6
124	Sus scrofa	I	First phalanx	1	0.3
185	Sus scrofa	I	First phalanx	1	0.7
193	Sus scrofa	I	First phalanx	1	0.4
184	Sus scrofa	I	First phalanx	1	0.7
201	Sus scrofa	I	First phalanx	1	0.6
162	Sus scrofa	I	First phalanx	1	0.9
160	Sus scrofa	I	First phalanx	1	0.5
188	Sus scrofa	I	Second phalanx	1	1.9
195	Sus scrofa	I	Second phalanx	1	1.8
175	Sus scrofa	I	Second phalanx	1	1.9
164	Sus scrofa	I	Second phalanx	1	3.3
132	Sus scrofa	I	Second phalanx	1	3.1
179	Sus scrofa	I	Second phalanx	1	1.8
199	Sus scrofa	I	Second phalanx	1	1.3
183	Sus scrofa	I	Second phalanx	1	1.8
197	Sus scrofa	I	Second phalanx	1	1.4
191	Sus scrofa	I	Second phalanx	1	0.5
203	Sus scrofa	I	Second phalanx	1	0.6
205	Sus scrofa	I	Second phalanx	1	0.4
202	Sus scrofa	I	Second phalanx	1	0.2
126	Sus scrofa	I	Second phalanx	1	0.3
98	Sus scrofa	I	Second phalanx	1	0.3
200	Sus scrofa	I	Second phalanx	1	0.4
189	Sus scrofa	I	Third phalanx	1	1.3
169	Sus scrofa	I	Third phalanx	1	1.4
186	Sus scrofa	I	Third phalanx	1	0.4
168	Sus scrofa	I	Third phalanx	1	1.8
196	Sus scrofa	I	Third phalanx	1	1.4
192	Sus scrofa	I	Third phalanx	1	0.9
172	Sus scrofa	I	Third phalanx	1	0.7
198	Sus scrofa	I	Third phalanx	1	0.9
182	Sus scrofa	I	Third phalanx	1	0.4
101	cf Bos taurus	A	Vertebra	1	5.2
127	cf Bos taurus	A	Cervical vertebra	1	12.4
49	Bos taurus	A	Thoracic vertebra	1	31.0
86	Bos taurus	A	Lumbar vertebra	1	35.4

UB No.	Taxon	Sym	Element	Qty	Wgt (g)
Context: F8LF (cont.)					
97	Bos taurus	A	Lumbar vertebra	1	16.5
122	cf Bos taurus	A	Lumbar vertebra	1	10.9
100	Bos taurus	A	Lumbar vertebra	1	15.1
89	Bos taurus	A	Sacrum	1	121.7
61	Bos taurus	A	Sacrum	1	48.1
46	Bos taurus	I	Rib	1	106.5
52	cf Bos taurus	I	Rib	1	31.3
47	Bos taurus	R	Innominate	1	266.5
87	Bos taurus	R	Innominate	1	50.6
88	Bos taurus	R	Scapula	1	151.8
62	Bos taurus	R	Femur	1	124.2
51	Bos taurus	R	Femur	1	110.1
92	Ovis aries/Capra hircus	L	Innominate	1	10.7
165	Ovis aries/Capra hircus	R	Radius	1	2.5
103	Ovis aries/Capra hircus	R	Radius	1	3.8
108	cf Ovis aries/Capra hircus	L	Femur	1	2.7
114	cf Ovis aries/Capra hircus	I	Metapodial	1	4.3
138	Ovis aries/Capra hircus	I	Carpal or tarsal	1	0.9
139	Ovis aries/Capra hircus	I	Carpal or tarsal	1	0.9
Context: F8UF					
513	Class Mammalia		Indeterminate	32	20.7
509	Class Mammalia II		Vertebra	4	5.5
510	Class Mammalia II		Rib	3	2.3
511	Class Mammalia II		Limb bone	6	8.5
512	Class Mammalia II		Limb bone	6	1.8
30	Sus scrofa	I	Vertebra	1	0.5
19	Sus scrofa	L	Innominate	1	15.8
39	Sus scrofa	L	Scapula	1	12.7
21	cf Sus scrofa	R	Humerus	1	15.7
40	Sus scrofa	R	Radius	1	4.8
18	Sus scrofa	L	Metacarpal IV	1	8.0
17	Sus scrofa	R	Metacarpal V	1	1.8
29	Sus scrofa	L	Femur	1	3.2
12	Sus scrofa	R	Femur	1	27.8
22	Sus scrofa	R	Femur	1	5.4
13	Sus scrofa	L	Tibia	1	53.6
14	Sus scrofa	L	Tibia	1	15.2
15	Sus scrofa	L	Tibia	1	6.4
34	Sus scrofa	L	Tibia	1	1.1
1	Sus scrofa	R	Tibia	1	35.3
11	Sus scrofa	R	Tibia	1	7.3
31	Sus scrofa	I	Fibula	1	1.0
28	Sus scrofa	I	Patella	1	5.1
35	Sus scrofa	L	Fourth tarsal	1	3.8

Attachment B-4 (cont.). List of Identified Bones by Context

UB No.	Taxon	Sym	Element	Qty	Wgt (g)
Context: F8UF (cont.)					
7	Sus scrofa	I	Calcaneus	1	1.1
6	Sus scrofa	L	Metatarsal IV	1	3.9
5	Sus scrofa	I	Metapodial	1	1.9
3	Sus scrofa	I	Metapodial	1	1.9
32	Sus scrofa	I	Second phalanx	1	2.7
36	Sus scrofa	I	Second phalanx	1	1.3
9	Sus scrofa	I	Second phalanx	1	1.1
37	Sus scrofa	I	Second phalanx	1	0.4
20	Sus scrofa	I	Third phalanx	1	1.3
23	Bos taurus	A	Vertebra	1	3.2
16	Bos taurus	A	Thoracic vertebra	1	22.2
24	Bos taurus	A	Thoracic vertebra	1	12.7
102	Bos taurus	A	Lumbar vertebra	1	10.1
123	cf Bos taurus	A	Sacrum	1	4.5
508	Bos taurus	Rib	6	33.8	
10	Bos taurus	I	Rib	1	20.1
4	Bos taurus	I	Rib	1	1.7
8	Bos taurus	R	Innominate	1	213.3
27	Bos taurus	R	Femur	1	321.3
25	Ovis aries/Capra hircus	L	Innominate	1	5.9
26	Ovis aries/Capra hircus	L	Innominate	1	1.4