

Augmenting Faunal Quantification Procedures Through the Incorporation of Historical Documentary Evidence: An Investigation of Faunal Remains from Fort George

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Faunal analyses are now commonly included in historical archaeology reports. Many of the techniques used in these analyses are identical to those used in prehistoric faunal studies. However, these techniques are often inappropriate for faunal remains recovered from historic sites because historical documents exist that can be utilized to refine quantification procedures beyond the standard minimum number of individuals (MNI) and meat cut calculations. This paper demonstrates the usefulness of augmenting traditional quantification procedures through the incorporation of historical records and documents, using historic Fort George and Fort Malden as examples. Revised quantification procedures for cattle (based on quarters) and swine (based on stored barrels) are created and are compared to MNI calculations. This comparison indicates that meat weight calculations based on MNI units may misrepresent the actual amount of edible meat represented by the archaeological bone.

Introduction

The study of faunal remains in the reconstruction of historic subsistence practices has progressively gained popularity since Parmalee's (1960) initial investigation of the diet of military personnel stationed at Fort Loudoun. Although the adoption of faunal analysis in historical research has been slow since this inaugural work, significant methodological advances have occurred in historical zooarchaeological study. Specifically, crucial advances have occurred in the quantification of faunal remains, which, in turn, have aided in the determination of the economic importance of species represented in historic faunal samples (cf. Lyman 1977; Shultz and Gust 1983). The most popular quantification methods in historical zooarchaeology remain NISP (the number of identified specimens, MNI (the minimum number of individuals), biomass (based both on MNI and bone weight) and meat cut analysis. Specifically, the latter two have been instrumental in providing more accurate quantification of dietary importance, and have subsequently been used to address questions of socioeconomic variability. However, despite the usefulness of these procedures, further refinement of conventional quantification techniques is possible

through the use of documentary evidence.

As first recognized by Jolley (1983:68) "the capacity for advances in the field of zooarchaeology is greater for historic faunal studies than prehistoric faunal studies". This statement acknowledges that historical archaeology benefits from the existence of historical documents, which can be used in the resolution of problems arising from assemblage quantification, inferences about dietary importance, and interpretation. Historical documents often contain accounts of the subsistence practices of individuals that are the subject of archaeological scrutiny. These sources are numerous: from letters and personal accounts, inventories and ship manifests, to tenders, contracts and newspaper advertisements.

Traditionally, historical records have been utilized to aid in the interpretation of faunal remains *after* they have been excavated and analyzed (i.e., after the dietary importance of the species has already been quantified). In this respect, faunal analysis has been used to fill the gaps in the historical record and to test the validity of historical documents (Jolley 1983:69). Unfortunately, the *a priori* incorporation of historical documentation into analysis frameworks is rarely attempted.

However, refinements have occurred in histor-

ical zooarchaeology, using procedures borrowed directly from prehistoric studies. These techniques were based on concerns that traditional studies failed "to organize the data into units comparable to those used by butchers in the dissection of the carcass" (Schulz and Gust 1983:44). For example, Lyman (1977, 1987) was able to show that quantification of remains by butchery unit more accurately represented the importance of animal species in historic diets. However, such studies often infer the animal cuts directly from the faunal assemblage (e.g., Landon 1996:58; Schulz and Gust 1983:44). Historical documents are usually incorporated only after quantification is completed, often to corroborate the validity of the faunal analysis (e.g., Lyman 1977:73), or as a means for discussing variation in the archaeological assemblage (e.g., Lyman 1987:63-65). Moreover, it could be argued that the actual units of acquisition (those obtained by the consumer) might not have been the same as those units used to quantify the dietary importance of the faunal remains in these studies. For example, Schulz and Gust (1983) and Lyman (1987) used large beef cuts as the units of analysis to compare faunal remains from an historic hotel, saloon and general store, when it was more likely that smaller-serving sized cuts were actually purchased (Huelsbeck 1991:66).

The nature of historical archaeology dictates that different analytical frameworks are necessary for accurate historical zooarchaeological analysis. The quantification methods used in prehistoric zooarchaeology (and those used, for the most part, by historical zooarchaeologists) largely assume no prior knowledge of consumer behaviour with respect to acquisition units (portions of animals entering the system) and cut choice. Nevertheless, this information is, more often than not, known to the historical archaeologist. It would, therefore, be prudent to incorporate the information on acquisition units into the traditional analysis framework, *a priori*. When these data are included, it becomes clear that different units of analysis are often required to assign the most accurate estimation of the actual dietary importance to the historical faunal assemblages.

A few archaeologists have recognized these

facts. As Jolley (1983:69) pointed out, nearly 20 years ago, "these documentary items hold potential for establishing accurate meat yield calculations and determining whether the total meat yield or the butchering unit is the proper analytic tool." Similarly, Huelsbeck (1991:66), in a study of nineteenth century households, was able to demonstrate that the appropriate unit of measurement for assigning dietary importance was the same as that acquired initially by the consumer. Specifically, he was able to demonstrate that more traditional techniques greatly misrepresented the dietary importance of certain species (Huelsbeck 1991:71). Finally, Crass and Wallsmith (1992), although not explicit in their methodology, did justify their MNI-based quantification by using related documentary evidence.

Despite these cautionary works, recent studies by zooarchaeologists continue to use estimates based on traditional MNI, NISP, and bone weight (biomass) that are often quite unrelated to the consumer units likely to have been utilized at the historic site (e.g., Brown and Bowen 1998; Cheek 1998; Diehl et al. 1998; Landon 1996; Markell et al. 1995; Reitz 1994; Whittaker 1999).

This paper incorporates documentary evidence in the analysis of faunal remains from nineteenth century British military sites, using Fort George, in the Niagara Region, as a test case. By employing existing historical documents, emphasis is placed on determining accurate meat-yield calculations from domestic animals supplied to the forts in butchered and preserved condition, with particular attention to fresh butchered beef and salted pork. In addition, a treatment of the faunal material analyzed from Fort George is presented, representing a rare account of subsistence at a British fort in Canada. Following this analysis, the usefulness of the newly developed quantification techniques is demonstrated using a larger sample of pork and beef remains from Fort Malden (Fort Amherstburg), on the Detroit River.

Historical Background

Fort George is located on the western side of the mouth of the Niagara River, less than two kilometres

from Lake Ontario (Figure 1), on an indented bluff approximately 180 m from the water's edge (Wilson and Southwood 1976:9). It was constructed, in 1796, as a British administrative headquarters and counterpart to Fort Niagara, which had been recently abandoned by the British under the terms of Jay's Treaty (Coleman 1977:9). The fort was erected directly opposite American occupied Fort Niagara, which was located roughly 1,500 m away on the east bank of the Niagara River.

Fort George's major buildings, palisade, and fortification ditches were built in a three year period from 1796 to 1799, and underwent few modifications prior to 1812 (Desloges 1980:8-25). During this time, the fort was occupied by members of the 5th, 41st, 100th and 49th regiments of the British Army as well as by detachments of the Queen's Rangers, the Royal Artillery and the Royal Canadian Volunteers (Wilson and Southwood 1976:167). For the first 18 years of its existence, Fort George was used primarily as a depot for the western outposts of the Great Lakes (Desloges 1980:5), and was involved in no major military action. This soon changed, however, with the onset of American hostilities in 1812.

On June 18, 1812, the United States declared war on Great Britain. It was soon realized that should Fort George be required to defend itself

from attack (principally from Fort Niagara), it would need extensive repairs. Almost immediately, renovations were undertaken to reduce the scope and length of its defensive perimeter, to make the fort more secure from infantry assault (Desloges 1980:36). Throughout the summer of 1812, Fort George saw a build-up of military personnel, including members of the Six Nations, who were then allies of the British Empire. However, these reinforcements proved to be of little use against the artillery of Fort Niagara. By May 27, 1813, American hotshot had reduced virtually all of the structures within Fort George to ashes, and subsequently, the fort was abandoned (Wilson and Southwood 1976:17).

The Americans seized Fort George immediately after its abandonment and continued the renovations begun months earlier by the British. It is not known exactly what the Americans did to the defences, but they clearly strengthened the palisade and earthworks (Coleman 1977:35). After spending a miserable spring, summer, and fall at the fort, under constant fear of British attack, the Americans abandoned Fort George on December 12, 1813. The British returned to the fort and again renovated the defences and earthworks, in preparation for renewed American hostilities. The feared battle never took place, however,

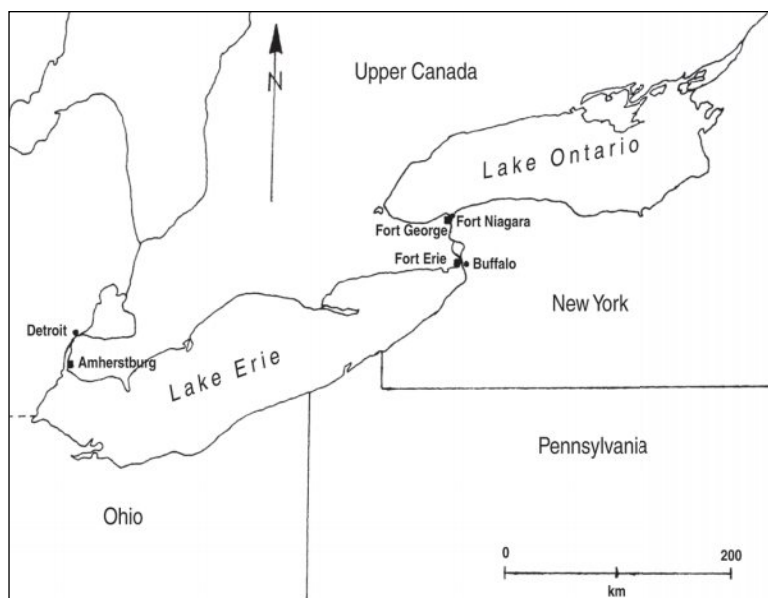


Figure 1. Map of study area, displaying the locations of Fort George and Fort Malden (Amherstburg). After Wilson and Southwood (1976).

and the fort saw no further action for the remainder of its operation. A garrison continued to be stationed at the fort until 1828, when it was abandoned in a state of absolute ruin.

Historical Accounts of Subsistence at British-Occupied Fort George

Descriptions of meat in the diet of the troops living at the fort appear principally in personal accounts (letters and diaries) and in advertisements appearing in local newspapers of the time. The *Upper Canada Gazette*, on Saturday, November 12, 1803, contains two advertisements calling for salted pork and fresh beef to supply military personnel stationed at the British Great Lakes outposts, including Fort George. Salted pork was to be delivered in barrels weighing 208 pounds net (94.5 kg), "and to be of first quality, properly packed in good and Sufficient casks" (*Upper Canada Gazette*, November 12, 1803).

According to other contemporary sources, salt pork was the dietary staple of the men stationed at the fort. Each man was to receive one pound of pork daily, in addition to a pound of flour, four ounces of rice and some butter (La Rochefoucauld-Liancourt 1917:54). However, pork was sometimes supplemented by fresh beef when available (Wilson and Southwood 1974:123). Beef was to be supplied to the fort by the quarter and was presumably fresh (*Upper Canada Gazette*, November 12, 1803).

Very few sources mention the contribution of domestic birds to the diet of the men and women of the fort. It is expected that domestic birds such as chickens and geese were readily available from the farms and towns surrounding the fort. In fact, it is entirely possible that these birds were raised at the fort itself, however, it should be stressed that no contemporary reference to the consumption of domestic fowl at Fort George has been found. However, Elizabeth Simcoe (1965), in an account of her stay in Niagara in the late 1790s, describes the collection and consumption of wild birds as a common practice by men and women at Fort George. According to Mrs. Simcoe (1965:111), passenger pigeons were

often hunted in the fall and spring during their migration. As she described, "the flights of wild pigeons in the spring and autumn are a surprising sight...the air is sometimes darkened with them" (1965:111). Similarly, this informative document indicates that fish were collected from the Niagara River to augment the basic diet of the troops. Mrs. Simcoe (1965:62) writes that both sturgeon and white fish were actively netted in the shallow waters of the Niagara.

A basic model of the meat contribution to the subsistence of the troops stationed at Fort George can be created from these various sources. One would expect the basic meat diet of the personnel at the fort to consist of salted pork, augmented occasionally by fresh beef. The hunting and collection of wild game birds and fish in the region directly surrounding the fort further supplemented this fare. However, it is not known how important the latter resources were in the diet of the men at the fort.

Archaeological Contexts

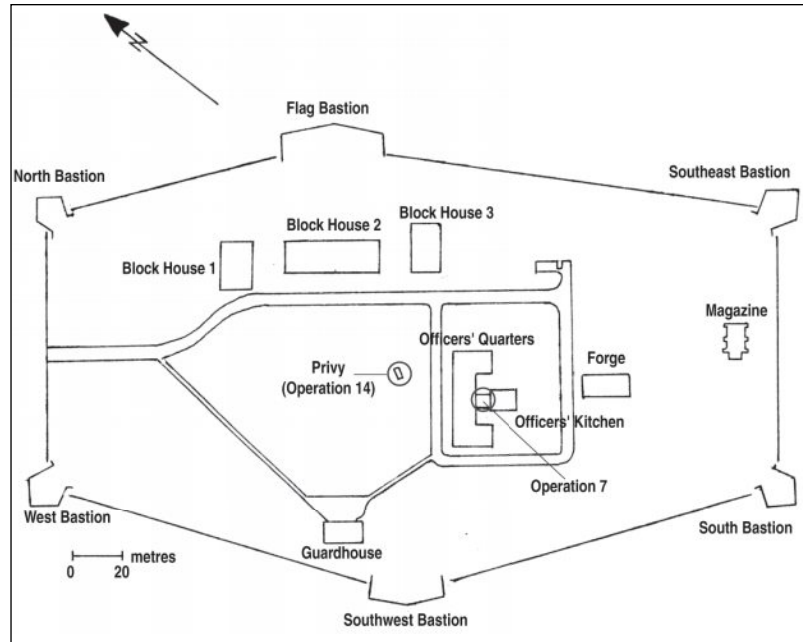
During the summers of 1973 and 1974, Fort George was extensively excavated under the supervision of John P. Wilson as part of an archaeological assessment prescribed by the National Historic Parks Archaeological Research Section (Wilson and Southwood 1976:12). Wilson and Southwood (1976:13) state that excavation of the site was accomplished using shovels, picks and trowels. Excavated soils were not screened, but, as indicated by the sample studied in this report, very small fragments (less than 0.5 cm) were often recovered.

In total, material from 11 different contexts were analyzed and are discussed in this paper. Attention was devoted to two specific areas – Operation 7 (near the Officer's Quarters and Kitchen) and Operation 14 (the remains of a privy feature). The locations of these areas within the fort are indicated in Figure 2.

The Officer's Quarters and Kitchen

All of the analyzed units from Operation 7 were removed from sub-operation D, which was located against the north wall of the Officer's Kitchen

Figure 2. Map of Fort George, displaying the locations of the officer's quarters (Operation 7) and the privy (Operation 14). After Wilson and Southwood (1976).



(Figure 2). The operation is actually a complex of pit features, each of which was individually excavated and interpreted by Wilson and Southwood (1976).

The most interesting feature in the operation, a shallow rectangular pit feature (19H7D4), yielded an extraordinary artifact assemblage, including green-edged pearlware and creamware, the remains of 17 free-blown dark green wine bottles, glass stemware fragments, glass tumbler fragments (accounting for at least ten complete vessels), and other artifacts described as tableware. Wilson and Southwood note that the ceramics show little evidence of use-wear. Wilson dated the assemblage to before the War of 1812, possibly from the 1790s (Wilson and Southwood 1976).

The other features in Operation 7 were less interesting than feature 19H7D4. Two pits (19H7D3 and 19H7D5) were interpreted by the excavators as trash pits, due to their proximity to the Officer's Kitchen and based on the type of refuse recovered. Unit 19H7D3 was a deep rectangular pit with sloping sides and a flat bottom, some 93 cm wide by 237 cm long. It may have originally been intended for use as a latrine pit, but perhaps was abandoned because of its prox-

imity to the kitchen. It was then used as a refuse pit, for items such as broken cups and other meal-related garbage. Although large, the pit was relatively sterile and contained very few faunal remains. Wilson and Southwood contend that this is the result of backfilling of sterile soil before large accumulations of refuse could be deposited. Based on the artifact assemblage removed from the pit, the excavator has dated the feature to the early nineteenth century, possibly before the War of 1812 (Wilson and Southwood 1976:65). The second pit, described as the "pit with insloping sides", is represented by contexts 19H7D5 and 7D8. The pit was approximately 240 cm by 300 cm in area, with gently sloping sides and a flat bottom. The excavator contends that there may have been a wooden cover consisting of planks or boards spanning this pit. The artifact assemblage is consistent with kitchen and table refuse, and indicates that it was constructed prior to the outbreak of war in 1812 (Wilson and Southwood 1976:66-67).

The Privy

Operation 14 is associated with the excavation of a masonry foundation located directly east of the Officer's Quarters (Figure 2). The foundation

was constructed from random coarse rubble composed of dolomitic limestone adhering to a lime and sand mortar. The feature measured some 2.40 m by 3.99 m in size and occurred at approximately 39 cm below ground level. Wilson and Southwood (1976:91) have interpreted the structure as the remains of an abandoned privy, based on historic references and stratigraphic and artifactual evidence. The feature has been dated to post-1814 (but before the abandonment of the fort), based on the artifactual remains recovered.

The excavation of the feature was divided into two sub-operations denoted A and B. Sub-operation A occurred around the structure's exterior boundaries, while sub-operation B occurred within the structure's foundation. Three contexts were analyzed from the exterior of the privy (19H14A1; 19H14A2; 19H14A4). Two contexts were analyzed from the interior of the foundation (19H14B7; 19H14B8).

Results of the Faunal Analysis

Of the 1,032 bone fragments analyzed in this project, 500 (48 percent) were identified to the family level or lower and 532 were unidentifiable fragments. The results presented here are an extension of a faunal analysis completed as part of the faunal archaeo-osteology course at the University of Toronto; the small sample size is a direct reflection of the course requirements. However, the sample size does not necessarily diminish the validity of the faunal findings. The faunal assemblages from the contexts described above were analyzed in their entirety, and great effort was expended ensuring that all possible elements were identified. As these assemblages are associated with discrete features, the analysis should provide a relatively unbiased account of the subsistence behaviours that produced those discrete contexts.

In total, 19 species of fish, mammals and birds were identified in the sample from Fort George. The preservation of the organic material was excellent, and, in some ways, accounts for the high proportion of positive identifications made on the material. Fortunately, only three percent

of the analyzed bones showed evidence of excavation trauma in the form of fresh breaks or other abrasions, despite the majority of excavation being completed with shovels.

The Shallow Rectangular Feature (19H7D4)

In total, three species of mammal, three species of fish and six species of bird were identified in this unit. Mammalian identifications include a domestic swine (*Sus scrofa*), a domestic sheep (*Ovis aries*), and a domestic cat (*Felis catus*). The bird bones represent seven individuals, including two domestic chickens (*Gallus gallus*), a black duck or mallard duck (*Anas* sp.), a domestic goose (*Anser anser*), a bobwhite quail (*Colinus virginianus*), a passenger pigeon (*Ecopistes migratorius*) and a small song-bird (family *Passeriformes*). The fish bones recovered from the feature represent three species: a large walleye or sauger (*Stizostedion* sp.), a white perch or white bass (*Morone* sp.) and a freshwater drum (*Aplodinatus grunniens*). Table 1 lists the NISP (Number of Identified Specimens) and the MNI (Minimum Number of Individuals) calculated from the analyzed bones. For all units, MNIs were calculated using the "matching" procedure (cf. Reitz and Wing 1999:195), which, while more labour intensive, provides more accurate MNI estimates than the standard "siding" procedure.

Operation 7 (19H7D)

Faunal remains recovered from Operation 7, Sub-operation D were quite different from those removed from 19H7D4. Of note here is the greater importance of mammals in these proveniences. The identified mammal bones represent four individuals, including a domestic cow (*Bos taurus*), a domestic pig, a domestic sheep and a domestic goat (*Capra hircus*). Bird remains are more closely similar those found in 19H7D4. Two bobwhite quails were identified, along with one black duck or mallard duck (*Anas* sp.), a domestic goose, a passenger pigeon, and an eastern meadowlark (*Sturnella magna*). Fish remains identified include one walleye (*Stizostedion canadense*) and one perch-like fish (family *Percidae*). As well, this context contained the

only reptilian remains found, those of a rather large snake (family *Colubridae*). Table 1 summarizes these identifications.

The Privy (19H14)

The faunal remains recovered from the privy contexts show a greater diversity of mammals. The privy provides the only remains of an economically important non-domesticated mammal in the entire analyzed sample, that of a white-tailed deer (*Odocoileus virginianus*). As well, the remains of at least two domestic cattle, one domestic sheep, one domestic pig, and one domestic cat were identified. Bird remains include a black duck or mallard duck, a positively identified mallard duck (*Anas platyrhynchos*), a domestic goose, a passenger pigeon, and a bobwhite quail. Fish remains include only one identified individual, a large lake sturgeon (*Acipenser flavescens*).

Refining Quantification Procedures Through the Incorporation of Historical Documents

It is particularly difficult to estimate the dietary importance of domestic species consumed at fort sites using traditional meat weight computations because, according to historical sources, meat entered the forts in a butchered and packaged format, rather than as live or whole animals. In a traditional faunal analysis framework, meat weight calculations would be computed by determining the MNI of a particular species represented by the faunal remains, and multiplying this number by an average live weight per specimen, which in turn is adjusted by a constant to approximate the total edible meat weight. However, in this instance, records exist indicating that a traditional quantification of meat weights based on MNI calculations would misrepresent the actual dietary importance of cattle and swine in the diet of the men and women who lived at the fort. In particular, information on the butchery and storage practices involved with the preparation and consumption of meat provides the opportunity to refine these calculations in an attempt to more accurately estimate the meat contribution indicated by the remains.

Cattle

In both features near the Officer's Quarters and those around the Privy, cattle bones represent a large proportion of the identified remains. The problem with determining dressed meat weights based on MNI calculations at Fort George is that historical documents indicate that beef was supplied to the fort not as live animals but by the butchered quarter. The *Upper Canada Gazette*, in the Saturday, November 12, 1803 edition included an advertisement for fresh beef from local merchants to be delivered by the quarter (Figure 3).

There is some evidence in the form of butchery marks on the cattle remains to support the information from the *Gazette*. Most cattle vertebral fragments identified were butchered down the midline with a large, obviously heavy, cleaver. Furthermore, butchery marks indicate that first lumbar vertebrae were often cut transversely across the anterior end, in addition to the midline dissection, while the remaining lumbar vertebrae did not indicate this pattern. Both of these patterns are consistent with butchery by the quarter. Based on this evidence, and the documentary sources, it is clearly preferable when calculating the percentage of meat weight from cattle at Fort George to determine not the minimum number of whole individuals, but the minimum number of quarters accounted for by the faunal remains. For both Operation 7 and Operation 14, the domestic cow remains were pooled and analyzed by all elements to determine the minimum number of quarters represented in each sample (Table 1). Front quarters were expected to include thoracic vertebrae and ribs, and all other anterior bones, while hindquarters were expected to include the lumbar vertebrae and all posterior limbs (cf. Lyman 1977). It is expected that few metatarsals, metacarpals, and phalanges would occur in the sample, as quartered remains should have the lower extremities removed below the carpal and tarsal joints (carpals and tarsals are therefore likely to be included in the sample). As well, head bones are not expected to contribute to the faunal sample, as these were likely removed in the original butchery process.

Table 1. Frequencies of represented species from Fort George.

| | 19H7D4 | | | OPERATION 7 | | | OPERATION 14 | | | | | |
|-------------------------------|--------|-----|------------------------|-----------------|------|-----|---|------------------|------|-----|--|------------------|
| | NISP | MNI | Revised Quantification | EdibleMeat (kg) | NISP | MNI | Revised Quantification | Edible Meat (kg) | NISP | MNI | Revised Quantification | Edible Meat (kg) |
| Mammalia | | | | | | | | | | | | |
| <i>Bos taurus</i> | — | — | n/a | — | 33 | 1 | 1 right front quarter, 1 left front quarter, 1 right hind quarter, 1 left hind quarter | 181 | 145 | 2 | 2 left front quarters, 2 right front quarters, 1 left hind quarter, 1 right hind quarter, 1 Prime Grade barrel | 277.82 |
| <i>Sus scrofa</i> | 1 | 1 | 1 Prime Grade barrel | 54 | 9 | 1 | 1 Prime Grade barrel | 54 | 19 | 1 | 1 Prime Grade barrel | 54 |
| <i>Ovis aries</i> | 3 | 1 | n/a | 12.5 | 9 | 1 | n/a | 12.5 | 3 | 1 | n/a | 12.5 |
| <i>Felis canis</i> | 55 | 1 | not economically imp. | — | — | — | n/a | — | 1 | 1 | not economically imp. | — |
| <i>Capra hircus</i> | — | — | n/a | — | 1 | 1 | n/a | 12.5 | — | — | n/a | — |
| <i>Odocoileus virginianus</i> | — | — | n/a | — | — | — | n/a | — | 1 | 1 | n/a | — |
| Aves | | | | | | | | | | | | |
| <i>Anas</i> (sp.) | 1 | 1 | n/a | 0.70 | 4 | 1 | n/a | 0.70 | 4 | 1 | n/a | 0.70 |
| <i>Gallus gallus</i> | 45 | 2 | n/a | 0.952 | — | — | n/a | — | — | — | n/a | — |
| <i>Anas platyrhynchos</i> | — | — | n/a | — | — | — | n/a | — | 2 | 1 | n/a | 0.70 |
| <i>Anser anser</i> | 4 | 1 | n/a | 1.89 | 1 | 1 | n/a | 1.89 | 2 | 1 | n/a | 1.89 |
| <i>Colinus virginianus</i> | 1 | 1 | n/a | 0.208 | 8 | 2 | n/a | 0.417 | 1 | 1 | n/a | 0.208 |
| <i>Ecopistes migratorius</i> | 1 | 1 | n/a | 0.208 | 3 | 1 | n/a | 0.208 | 1 | 1 | n/a | 0.208 |
| Passeriformes | 1 | 1 | not economically imp. | — | — | — | n/a | — | — | — | n/a | — |
| <i>Sturnella magna</i> | — | — | n/a | — | 17 | 1 | not economically imp. | — | — | — | n/a | — |
| Osteichthyes | | | | | | | | | | | | |
| <i>Apolodinus grummiens</i> | 1 | 1 | n/a | 1.351 | — | — | n/a | — | — | — | n/a | — |
| <i>Morone</i> sp. | 23 | 1 | n/a | 0.367 | — | — | n/a | — | — | — | n/a | — |
| <i>Stizostedion canadense</i> | — | — | n/a | — | 5 | 1 | n/a | 1.929 | — | — | n/a | — |
| <i>Stizostedion</i> sp. | 8 | 1 | n/a | 1.929 | — | — | n/a | — | — | — | n/a | — |
| <i>Acipenser flavescens</i> | — | — | n/a | — | — | — | n/a | — | 3 | 1 | n/a | 24.9 |
| Percidae | — | — | n/a | — | 10 | 1 | n/a | 0.367 | — | — | n/a | — |
| Reptilia | | | | | | | | | | | | |
| <i>Colubridae</i> sp. | — | — | n/a | — | 56 | 1 | not economically imp. | — | — | — | n/a | — |

Figure 3. Transcription of an advertisement calling for salted pork and fresh beef to supply the Great Lakes outposts in the November 12th, 1803 edition of the Upper Canada Gazette.

PUBLIC NOTICE:

THE Agent for Purchases will enter into immediate engagements with such person as may be desirous of furnishing a supply of PORK at *Kingston, York, Fort George, Fort Chippawa, Fort Erie, And Amherstburg*, for use of his Majesty's Forces in Upper Canada; each Barrel to contain two hundred and eight pounds nett, and to be of first quality, properly packed in good and sufficient Casks, warranted to keep sound and good for twelve months, after the delivery to the King's Stores, which delivery must be made one or before the 1st day of May, 1804.

Payments will be made by the Agent of the Purchases, on producing the receipts of the Commissary, certified by the Officer Commanding, in quadruplicate, of the quantity delivered into the King's Magazines at either of the aforementioned Depots, by Bills on the Deputy Paymaster General at *Quebec*. The Accounts to be made up agreeable to the form heretofore transmitted to the Commissary at each Post, and the Purchaser's Signature to be attested by two subscribing witnesses.

*Agent for Purchases Office,
York, 10th Nov, 1803.*
JOHN MCGILL
Agent for Purchases

*Agent for Purchases Office,
York, 10th November, 1803*

NOTICE is hereby given to such person or persons who may be willing to supply fresh BEEF of good quality to the Troops stationed at *Kingston, York, Fort George, Fort Chippawa, Fort Erie and Amherstburg*, for the months of October, November and December, 1804, January and February, 1805, to deliver in their Proportions, with the name of their Security, to the Agent of the Purchases at *York*, on or before the first day of March next, specifying the months for which they propose to furnish the same, and the lowest price.

The Beef will be received by the Commissary at each Post, by the Quarter, and immediately paid by him in Specie, or by Bills on *Quebec* at the option of the Contractor. Security will be required for the due performance of the Contract.

JOHN MCGILL, Agent for Purchases.

Table 2 displays the element distribution of *Bos taurus* remains identified from the faunal sample. In most respects, the distribution reflects the quartering model discussed above. Metapodials are absent, while there is only one phalanx bone present. This is consistent with

butchery by the quarter. However, the comparatively large number of skull and mandible fragments is puzzling, as these were not expected to be included with dressed beef quarters. While the remains represent only one complete skull, their presence suggests the possibility that the butchers

| | NISP | MNE Right | MNE Left | MNE Total | MAU | %MAU |
|----------------|------|-----------|----------|-----------|------|------|
| Skull | 18 | – | – | 1 | 1 | 40 |
| Mandible | 13 | 1 | 1 | 2 | 1 | 40 |
| Cervical Vert. | 18 | – | – | 7 | 1 | 40 |
| Thoracic Vert. | 25 | – | – | 6 | 0.46 | 18.4 |
| Lumbar Vert. | 17 | – | – | 5 | 0.83 | 33.2 |
| Sacrum | 1 | – | – | 1 | 1 | 40 |
| Innominate | 7 | 1 | 2 | 3 | 1.5 | 60 |
| Rib | 32 | 8 | 5 | 13 | 0.5 | 20 |
| Scapula | 18 | 1 | 1 | 2 | 1 | 40 |
| Humerus | 11 | 2 | 3 | 5 | 2.5 | 100 |
| Radius | 4 | 1 | 2 | 3 | 1.5 | 60 |
| Ulna | – | – | – | – | – | – |
| Carpal | 3 | – | 3 | 3 | 0.25 | 10 |
| Metacarpal | – | – | – | – | – | – |
| Femur | 3 | – | 2 | 2 | 1 | 40 |
| Patella | – | – | – | – | – | – |
| Tibia | 4 | 1 | 1 | 2 | 1 | 40 |
| Tarsal | 3 | 1 | 2 | 3 | 0.3 | 12 |
| Metatarsal | – | – | – | – | – | – |
| Phalanx | 1 | – | 1 | 1 | 0.04 | 1.6 |

Table 2. *Fort George Bos taurus (domestic cow) element distribution: all analyzed contexts.*

who supplied the fort included cranial material with the butchered carcasses. However, butchery marks on the skull remains suggest that they were not butchered in any standardized fashion. It is possible that these remains are the result of occasional animals entering the system “on the hoof.” Nevertheless, the element distributions are at least partially consistent with the model suggested by the historical documents, and therefore quantification will follow a method consistent with dressed beef quarters.

Usable meat weights for quarters were calculated by dividing the known average dressed meat weight of a cow by four, and then adjusting this calculation by two constants – one to account for the percentage of edible meat available from a cattle carcass and one to account for differences in weight between the front and rear quarters. The average cow of 1795 weighed approximately 362 kg (Fussell 1929). Reitz and Scarry (1985:70) state that the edible dressed meat available from an adult cow was about 50 percent of the total body weight. Therefore, the average edible meat available by the quarter from cattle is about 45.25 kg ($362\text{kg}/4 \times 0.50$). Further, front quarters average seven percent more total weight than rear quarters (data gathered from modern butchers in Toronto, Ontario). In sum, front quarters, in general, would account for 48.41 kg, while rear quarters would account for approximately 42.09 kg of usable meat.

Swine

Determining the economic importance of domestic swine in the diet of the individuals stationed at Fort George has posed many problems. Like the cattle remains, calculating meat weights for the pig remains by using MNI calculations could prove misleading. There is direct documentary evidence that the pork supplied to the fort was delivered not as live animals but butchered and preserved in barrels (*Upper Canada Gazette*, November 12, 1803). This creates serious problems for the archaeologist. First, did salted pork contain bones at all (cf. Wilson and Southwood 1976:124)? Second, if so, is it possible to determine the average number of

bones present in a barrel of salted pork? Finally, what proportion of the gross weight of a barrel actually consisted of edible meat?

In a roughly contemporary essay on the topic of pork slaughtering and packaging, William Moore (1820) described the complete process of preparing pork for preservation in barrels. Apparently, salted pork could be purchased in three grades: mess, prime, and cargo. Barrels could be purchased in full (208 pounds) or by the half (108 pounds). To judge from the November 1803 *Upper Canada Gazette* advertisement, Fort George accepted only full barrels.

At no time in his essay does Moore state that bones should not be included in the barrels. In fact, he implies that only bones inconvenient in the packaging process, such as canine portions of the jaws (i.e., tusks and anterior mandible), should be removed (Moore 1820:10). Moore goes on to describe the contents of a full barrel of pork for each grade:

Mess Pork to consist of the rib pieces of good fat Hogs only...Prime Pork to consist of the next best pieces, with not more than three shoulders in one barrel, which shall contain no legs [hocks], nor more than twenty pounds of head...and the third quality of pork shall be denominated CARGO PORK, in which there shall not be more in one barrel than four shoulders without the legs as aforesaid and not more than two heads [Moore 1820:7-8].

The November 1803 *Upper Canada Gazette* advertisement indicates that only pork of the “first quality” was purchased. This suggests that that cargo pork (the lowest grade) would not have been purchased. The *Upper Canada Gazette* dated June 30, 1804, includes an advertisement indicating that “Prime” grade pork was desired for purchase for the Great Lakes Outposts. Moore (1820:8) states that Prime and Cargo pork were to be sectioned into portions varying between four and 12 pounds; obviously, this leaves leeway in possible butchery practices. However, Moore also describes the general contents of a Prime grade barrel:

Accordingly, Prime Pork may consist (after the selection of Mess pieces [ribs]) from large Hogs of three shoulders, twenty pounds of head, and

every other part of the Hog to make up the quality or weight. So, also, Hogs one and one half to the barrel will inspect as lawful prime... Prime Pork 'shall contain no legs'; and accordingly the law is complied with, when cut handsomely above the knee and gambrel joints [Moore 1820:9]

Based on this research, an approach has been chosen that takes into account the amount of meat represented by a "prime grade" barrel when calculating the economic importance of pork at Fort George. It appears that the remains of approximately three sides of pork (less rib portions) were included in one full (208 pound) prime barrel; as Moore (1820:9) states: "Hogs one and one half to the barrel will inspect as lawful prime...." It is therefore presumed that the remains of a prime grade barrel should represent all anatomical bone elements. However, rib portions should be underrepresented in the remains. Nevertheless, it is expected that proximal rib portions may be included in the remains, as these are often left attached to thoracic vertebrae when rib cuts are removed. In addition, as hocks were to be removed during the butchery process, carpals, tarsals, metacarpals, metatarsals and phalanges should be underrepresented. Although Moore specifically states that "hocks" were not to be included in the product, it is not unusual to expect that merchants may have padded their barrels with an occasional pig's foot. In fact,

Wilson and Southwood (1976:124) note that this was a perennial problem for the commissary.

In practice, calculating a "prime grade barrel" from the faunal remains involved carefully comparing all *Sus scrofa* elements to determine the number of sides accounted by all remains. Thus, for example, two right proximal tibial fragments and one left distal tibial fragment would account for three sides of pork, and thus one prime grade barrel (note also that by using MNI, this would account for two *whole* animals). As a matter of course, head and foot remains were treated similarly. Thus, one prime grade barrel was expected to include bones accounting for approximately one and one half pig's heads, sectioned sagittally (although in reality "twenty pounds of head" may account for only one butchered head). Although also likely an overestimation, the remains of no more than six pig's feet were expected to account for one prime grade barrel.

Although the number of identified pork remains from the Fort George sample are small, they do not contradict these accounts (Table 3). There is evidence that cranial bones were present in the Fort George faunal sample, and, occasionally, a rib fragment was identified (posterior ribs are included in short loin cuts, which include the lumbar vertebrae [Lyman 1977]). However, as predicted by the model, the %MAU calculations clearly display that ribs are underrepresented in the sample. This distribution at least indicates

| | NISP | MNE Right | MNE Left | Total MNE | MAU | %MAU |
|----------------|------|-----------|----------|-----------|------|------|
| Skull | 3 | — | — | 1 | 1 | 100 |
| Mandible | 1 | 1 | — | 1 | 0.5 | 50 |
| Cervical Vert. | 2 | — | — | 2 | 0.28 | 28 |
| Thoracic Vert. | 2 | — | — | 1 | 0.14 | 14 |
| Lumbar Vert. | — | — | — | — | — | — |
| Innominate | 3 | 1 | 1 | 2 | 1 | 100 |
| Rib | 3 | 2 | — | 2 | 0.07 | 7 |
| Scapula | — | — | — | — | — | — |
| Humerus | — | — | — | — | — | — |
| Radius | — | — | — | — | — | — |
| Ulna | — | — | — | — | — | — |
| Carpal | 4 | 4 | — | 4 | 0.25 | 25 |
| Metacarpal | 4 | 4 | — | 4 | 0.5 | 50 |
| Femur | — | — | — | — | — | — |
| Patella | — | — | — | — | — | — |
| Tibia | 2 | — | 1 | 1 | 0.5 | 50 |
| Tarsal | — | — | — | — | — | — |
| Metatarsal | — | — | — | — | — | — |
| Phalanx | 5 | 2 | 3 | 5 | 0.1 | 10 |

Table 3. Fort George *Sus scrofa* (domestic pig) element distribution: all analyzed contexts.

that the highest grade pork was not purchased; the presence of head, vertebrae and limb bones precludes mess grade pork. This distribution suggests that the pig remains are the result of the purchase of prime grade pork. It is interesting to note that a relatively large number of manus and pes elements of swine were identified in the Fort George faunal sample (Table 3). This suggests that pig's feet were indeed included in the salted pork.

Moore (1820:7) states that each barrel was to contain exactly 200 pounds (90.9 kg) of pork (the barrel itself weighing eight pounds). The known edible meat derived from a hog is approximately 60 percent of the live weight (Reitz and Scarry 1985:70). Therefore, one prime grade barrel could be expected to contribute approximately 54 kg of edible meat to the diet of the Fort George personnel (90.9 kg x 0.60), or approximately twice the amount of meat from an average dressed hog of the time (for a discussion of historic pork, see Reitz and Scarry [1985:70]).

Discussion

To reiterate, this paper represents an attempt to construct new quantification procedures that may be useful in determining subsistence strategies at British fort sites in the Great Lakes region. As such, the analysis should be viewed as an exercise meant to prove a point; that refinement in quantification procedures at historic sites is possible. However, the documentary evidence used to develop these procedures is temporally limited, covering at most, three years in the 25 year history of Fort George. While it is assumed that these advertisements are generally applicable for the span of time that the fort was occupied (i.e., that the fort continued to furnish its troops with salted pork and beef by the quarter), it is at least possible that occasionally live animals, fresh pork, or salted beef did enter Fort George (although no documents have been found supporting these arguments). This does not, however, invalidate the refined quantification procedures. With documentary evidence indicating that the majority of beef and pork did enter the fort in specific, well-defined consumer units, would these units not represent the most prudent

method of quantifying the animal remains? It should be noted that all quantification techniques, including the new procedures developed here, merely provide estimates of the actual meat contribution indicated by the remains. Nevertheless, when studying broad subsistence strategies at historic sites, the most cautious (and possibly more accurate) method would be to base those estimates on consumer units with a *known* relationship to the material being analyzed, not units that have, in effect, an *unknown* relationship to that material.

Other Species

The cattle and swine remains from Fort George represent a unique case, and therefore special consideration has been made in calculating the economic importance (in meat weights) derived from these bones. Edible meat weights for other identified species, particularly the wild bird and fish species, were calculated in the standard manner, since there is evidence to indicate that they entered the fort as whole animals. To produce meat weight values, the typical live weight of the average animal is multiplied by a constant (representing the percentage of edible meat per individual), which in turn, is multiplied by the MNI value to produce an amount of meat represented by the bone sample. The average weight per individual, the constants used to calculate the edible meat weights, and references to these are presented in Table 4.

Economic Inferences

Table 5 displays the percentage distribution of edible meat weight of species identified from the analyzed contexts. It is clear that the distribution of the 19H7D4 faunal material approximates the model for Fort George subsistence derived from the historical documents; that is, domestic swine account for a majority (approximately 73 percent) of meat consumed in this context. As expected, freshwater fish, available locally, supplemented the diet to a fair extent; they account for five percent of the meat diet. Domestic fowl account for four percent of the edible meat weight, which, again, is not unexpected.

Table 4. Meat weight calculations for species identified at Fort George.

| | Weight Per Individual (kg) | Source | Constant | Source | Edible Meat Weight (kg) |
|-------------------------------|----------------------------|--|----------|-------------------------|-------------------------|
| Mammalia | | | | | |
| <i>Ovis aries</i> | 25 | Lab specimen before dissection | | | |
| <i>Capra hircus</i> | 25 | Lab specimen before dissection | 0.5 | Reitz and Scarry (1985) | 12.5 |
| <i>Odocoileus virginianus</i> | 50 | Reitz and Scarry (1985) | 0.5 | Reitz and Scarry (1985) | 25 |
| Aves | | | | | |
| <i>Gallus gallus</i> | 0.68 | Reitz and Scarry (1985) | 0.7 | White (1953) | 0.47 |
| <i>Anas</i> sp. | 1 | Friesen and Arnold (1995) | 0.7 | White (1953) | 0.7 |
| <i>Anas platyrhynchos</i> | 1 | Friesen and Arnold (1995) | 0.7 | White (1953) | 0.7 |
| <i>Anser anser</i> | 1 | cf. <i>Branta canadensis</i> live weight (Friesen and Arnold 1995) | 0.7 | White (1953) | 1.89 |
| <i>Colinus virginianus</i> | 0.2982 | cf. <i>E. migratorius</i> of same size | 0.7 | White (1953) | 0.2086 |
| <i>Ectopistes migratorius</i> | 0.2982 | Shroger (1955) | 0.7 | White (1953) | 0.2086 |
| Osteichthyes | | | | | |
| <i>Acipenser flavescens</i> | 24.9 | Lab specimen before dissection | 0.85 | Wing and Brown (1979) | 21.165 |
| <i>Apolodnatus grunniens</i> | 1.59 | Lab specimen before dissection | 0.85 | Wing and Brown (1979) | 1.3515 |
| <i>Morone</i> sp. | 0.4324 | Lab specimen before dissection | 0.85 | Wing and Brown (1979) | 0.3675 |
| Percidae | 0.4324 | Lab specimen before dissection | 0.85 | Wing and Brown (1979) | 0.3675 |
| <i>Stizostedion canadense</i> | 2.27 | Lab specimen before dissection | 0.85 | Wing and Brown (1979) | 1.9295 |

Table 5. Economic importance of faunal remains from Fort George.

| | 19H7D4 | | Operation 7 | | Operation 14 | |
|-------------------------------|------------------|---------|------------------|---------|------------------|---------|
| | Edible Meat (kg) | % Total | Edible Meat (kg) | % Total | Edible Meat (kg) | % Total |
| Mammalia | | | | | | |
| <i>Bos taurus</i> | – | – | 181 | 68.1 | 277.82 | 69.8 |
| <i>Sus scrofa</i> | 54 | 72.8 | 54 | 20.3 | 54 | 13.5 |
| <i>Ovis aries</i> | 12.5 | 16.8 | 12.5 | 4.7 | 12.5 | 3.1 |
| <i>Capra hircus</i> | – | – | 12.5 | 4.7 | – | – |
| <i>Odocoileus virginianus</i> | – | – | – | – | 25 | 6.2 |
| Aves | | | | | | |
| <i>Anas</i> (sp.) | 0.70 | 1.0 | 0.70 | 0.3 | 0.70 | 0.2 |
| <i>Gallus gallus</i> | 0.952 | 1.2 | – | – | – | – |
| <i>Anas platyrhynchos</i> | – | – | – | – | 0.70 | 0.2 |
| <i>Anser anser</i> | 1.89 | 2.5 | 1.89 | 0.7 | 1.89 | 0.5 |
| <i>Colinus virginianus</i> | 0.208 | 0.3 | 0.42 | 0.2 | 0.208 | 0.1 |
| <i>Ectopistes migratorius</i> | 0.208 | 0.3 | 0.208 | 0.1 | 0.208 | 0.1 |
| Osteichthyes | | | | | | |
| <i>Apoloinatus grunniens</i> | 1.31 | 1.8 | – | – | – | – |
| <i>Morone</i> sp. | 0.37 | 0.5 | – | – | – | – |
| <i>Stizostedion canadense</i> | – | – | 1.93 | 0.7 | – | – |
| <i>Stizostedion</i> sp. | 1.93 | 2.6 | – | – | – | – |
| <i>Acipenser flavescens</i> | – | – | – | – | 24.9 | 6.2 |
| Percidae | – | – | 0.36 | 0.1 | – | – |
| TOTAL | 74.1 | 99.8 | 265.87 | 99.9 | 397.926 | 99.9 |

However, there are some deviations from the model suggested by the historical sources. Most notably, domestic sheep account for 17 percent of the total meat weight calculated from this context. Sheep are not mentioned in any of the historical references. However it is likely that sheep would have been available for purchase by the soldiers or officers of the fort from the farms and towns surrounding the outpost. The bones of

wild game birds (pigeon, duck and quail) indicate that the men took advantage of the natural resources surrounding the fort to relieve the monotony of their daily ration, as suggested by the contemporary sources.

The distribution of faunal remains in Operation 7 provides a surprising contrast to that displayed by 19H7D4. One would expect that contexts so closely associated would display

similar remains. Of note in this operation is the great importance of fresh beef in the diet; it represents 68 percent of the total edible meat weight represented by the bones in this context. This is a striking difference from the model presented above. It was inferred from historical documents that fresh beef was used only as a supplement in the diet of the men at Fort George. The faunal assemblage suggests this was not always the case; rather, in at least some cases, the soldiers at Fort George must have relied much more heavily on beef than on pork. Due to the great importance of beef in this context, the proportional representation of other species in the diet is greatly reduced. Birds (both domestic and wild) account for only one percent of the diet, and fish account for an even smaller fraction.

With two exceptions, the percentage distribution of edible meat weight by species from Operation 14, the privy, is very similar to that determined for Operation 7. Again, beef provides the majority of meat in the diet at 70 percent, followed by salted pork at 14 percent. Domestic and wild birds again account for a very small proportion of the diet at only one percent. In Operation 14, however, the only appearance of a wild mammal in the entire sample occurs. White-tailed deer accounts for six percent of the meat represented by the privy faunal remains. Deer would certainly have been available in the area surrounding Fort George. In fact, the Fort George Commons, the area cleared from forest directly surrounding the fort, would have provided an ideal environment for deer to thrive. Clearly, the soldiers took advantage of the opportunity to vary their diet by hunting wild game.

Finally the importance of fish in the privy context is noteworthy. Lake sturgeon contributed six percent of the meat represented by the bones in this context. It is likely that fish contributed throughout the spring, summer, and fall when this resource was available. Historical sources indicate that fishing was a routine activity for the soldiers at Fort George. As Mrs. Simcoe recorded, "the 5th Regiment have caught 100 sturgeon and 600 whitefish a day in Nets." (Simcoe 1965:92).

As mentioned earlier, feature 19H7D4 contained a unique artifact assemblage and an

unusual distribution of faunal remains. Cattle remains are non-existent in the sample, and it contains evidence of a relatively greater reliance (nine percent) on hunted and captured wild game. There may be two reasons for this difference. First, Wilson and Southwood (1976:68) contend that the shallow rectangular pit (19H7D4) was created and filled much earlier than any other feature in 19H7D. If this pit were utilized prior to the decision to purchase fresh beef as a supplement to the normal pork ration, then it would not be surprising that pork constitutes such a large portion of the meat diet. If the other contexts were created after the decision to purchase fresh beef, then they would be expected to contain evidence of beef use. Second, the artifacts associated with this pit are believed to be the remains of banquet activity (Wilson and Southwood 1976:68). Historical documents from the period indicate that the preferred bill of fare at a banquet often included wild game and locally available fish (Coffin 1864:122). If this pit were indeed used to dispose of banquet trash, then a higher proportion of wild game would be expected. As a final note, since the pit is associated closely with both the Officers' Quarters and Kitchen, one would believe it might reflect differential subsistence between the officers and enlisted men. However, as the artifactual remains indicate this feature was the result of festivity, it cannot be taken as an accurate reflection of the Officers' daily rations.

The fact that the distributions of edible meat in Operations 7 and 14 are similar is encouraging. When taking into account the small sample size (500 bones), and the fact that the two proveniences are not associated spatially (Figure 2), their similar meat distributions promotes confidence that sound inferences can be made about Fort George based on the two samples. Generally, the pattern displayed by Table 5 is of heavy reliance on beef (68-70 percent), supplemented by pork (13-20 percent). Other domestic mammals of importance include domestic sheep or goat (up to five percent in some contexts). These data indicate birds, both domestic and wild, were relatively unimportant to the diet of the Fort George personnel. The only major

discrepancy between the two samples occurs in the privy context with the appearance of deer (six percent) and evidence for a greater reliance on fish (five percent). As stated earlier, we know that fish was of some importance to the diet of the fort's personnel from historical records. Using this evidence, and by comparing the privy sample to 19H7D4, five percent is probably a fair estimation of the importance of fish in the diet. Wild deer would most likely have been hunted as the opportunity arose, but likely would not have been of great importance in the diet of the men at the fort.

Comparing MNI and Quarter/Barrel Quantification Techniques

Despite the careful consideration given to quantifying the true importance of cattle and hog in the diet of Fort George personnel, the limited faunal sample analyzed does not adequately display the usefulness of the technique. The difference in meat weight calculations between the MNI-based calculations and those presented here are not pronounced due to the small sample size. However, some trends appear when the two techniques are displayed side by side (Table 6).

For cattle, calculating the meat weight by quarters has resulted in a decreased estimate of the amount of consumable flesh, as displayed by Operation 14. In other words, calculating the meat weight from MNI calculations resulted in an *overestimation* of the amount of edible meat (by 84.2 kg), and thus the inferred economic importance, of cattle, when compared to the quarters method of quantification. Conversely, using barrel units to quantify the pig remains resulted in the opposite effect. In both contexts (Operations 7 and 14), using MNI-based meat weight calculations resulted in an underestimation of the amount of edible meat provided by

swine, when compared to the barrels method of quantification. This, however, was likely the result of the low MNIs (MNI=1) calculated. If these MNIs were increased, it is probable that they would overrepresent the amount of meat weight represented by the faunal remains.

The trends apparent in the sample analyzed from Fort George would likely be more pronounced if the sample size were increased. While it was not possible to analyze more Fort George material before completing this preliminary study, analyzed remains from other British Great Lakes outposts could be used to demonstrate the usefulness of the quantification techniques developed here. Historic Fort Malden (also called Fort Amherstburg) is located at the southern end of the Detroit River (Figure 1), on the Canadian side of the border. Its structural history is very similar to Fort George; it too was built in 1796, after the abandonment of a British fort (Fort Lernoult) ceded to the Americans under the Jay's Treaty. The Fort was involved in the War of 1812, and, like Fort George, was burned during this period. After the war, and throughout the early to middle nineteenth century, the fort was used primarily as a supply depot for the western frontier (Doroszenko 1980).

Faunal remains from Fort Malden can confidently be subjected to the same zooarchaeological scrutiny as those from Fort George. The historical advertisements on which the cattle and swine quantification procedures are based refer not only to Fort George but also to Fort Amherstburg (Malden), as well as to Fort Chippewa and Fort Erie (*Upper Canada Gazette*, November 12, 1803).

Fort Malden was excavated, in 1979, under the supervision of John Dewhirst and Peter Lane, under the auspices of Parks Canada. Excavations centred around Operation 12, an enlisted men's privy, built in 1819-1820 and used until at least

Table 6. Comparison of MNI based meat weight calculations and the revised quantification techniques for Fort George (all contexts).

| | Operation 7 | | | Operation 14 | | |
|-------------------|-------------|----------------------------|---------------------------------------|--------------|----------------------------|---------------------------------------|
| | MNI | MNI Calculated Weight (kg) | Quarter/Barrel Calculated Weight (kg) | MNI | MNI Calculated Weight (kg) | Quarter/Barrel Calculated Weight (kg) |
| <i>Bos taurus</i> | 1 | 181 | 181 | 2 | 362 | 277.8 |
| <i>Sus Scrofa</i> | 1 | 37.8 | 54 | 1 | 37.8 | 54 |

1848, when records indicate a drain was installed at the building (Doroszenko 1980). Faunal material from the privy was analyzed by Dena Doroszenko (1980) and Christine Caroppo (1980), under the supervision of Dr. Howard Savage. For the purposes of this paper, their separate faunal analyses have been combined as a single sample, as the units excavated are from similar contexts associated with the privy.

Although the animal bones analyzed could not be obtained for study, the excellent faunal database compiled by Doroszenko and Caroppo has allowed a reconsideration of the sample for quantification in MNI units and barrel/quarter units for the swine and cattle remains. While not having access to the actual remains was not an ideal situation, the detailed descriptions of elements (including portions) provided by the researchers allowed for a precise quantification of MNIs based on the entire sample of elements from each species. Similarly, all sample elements were considered when quantifying barrel/quarter data from the sample. In total, 769 elements were analyzed in compiling this data, accounting for approximately 87 percent of the total identified sample. Meat weights based on MNI units for swine were calculated using the matching procedure. Fogel (1965:206) states that the average

weight of dressed hogs in the year 1860 was 63 kg. Retiz and Scarry (1985:70) indicate that the edible meat yield of a hog is approximately 60 percent of the live weight. Therefore, a typical hog of the period in question would have produced approximately 37.8 kg of edible flesh (63kg x 0.60 =37.8kg).

The element distribution for the cattle remains (Table 7) from Fort Malden is very similar to that from Fort George. Comparatively few metapodial or phalanx bones were discovered in the sample, as is expected with dressed meat quarters. The %MAU calculations indicate that phalanges and metapodials are among the most underrepresented element classes (at 6.4 percent and 14.3 percent, respectively). Again, however, a large number of head bones were identified, mirroring the pattern displayed at Fort George. It is not clear if this is "noise" caused by the occasional live animal that entered the fort (the presence of foot bones is explained by this as well). Perhaps, however, heads were included either with the beef quarters or were delivered separately, but as part of the purchase of a large number of quarters. Nevertheless, the element distributions, particularly the underrepresented metapodials and phalanges, indicate that despite the noise, the Quarters pattern is likely applicable.

| | NISP | MNE Right | MNE Left | MNE Total | MAU | %MAU |
|----------------|------|-----------|----------|-----------|------|------|
| Skull | 42 | — | — | 2 | 2 | 28.6 |
| Mandible | 13 | 1 | 3 | 4 | 2 | 28.6 |
| Cervical Vert. | 55 | — | — | 16 | 2.29 | 32.7 |
| Thoracic Vert. | 40 | — | — | 12 | 0.92 | 13.1 |
| Lumbar Vert. | 40 | — | — | 9 | 1.5 | 21.4 |
| Sacrum | 8 | — | — | 2 | 2 | 28.6 |
| Innominate | 21 | 4 | 2 | 6 | 3 | 42.9 |
| Rib | 231 | 8 | 7 | 23* | 0.88 | 12.6 |
| Scapula | 37 | 1 | 3 | 4 | 2 | 28.6 |
| Humerus | 17 | 1 | 3 | 4 | 2 | 28.6 |
| Radius | 19 | 4 | 3 | 7 | 3.5 | 50 |
| Ulna | 6 | 3 | 1 | 4 | 2 | 28.6 |
| Carpal | 20 | 8 | 7 | 17** | 1.41 | 20.1 |
| Metacarpal | 4 | — | 2 | 2 | 1 | 28.6 |
| Femur | 22 | 2 | 5 | 7 | 3.5 | 50 |
| Patella | — | — | — | — | — | — |
| Tibia | 42 | 10 | 4 | 14 | 7 | 100 |
| Fibula | 2 | 1 | 1 | 2 | 1 | 14.3 |
| Tarsal | 29 | 8 | 11 | 19 | 1.9 | 27.1 |
| Metatarsal | 3 | 1 | 1 | 2 | 1 | 14.3 |
| Phalanx | 13 | 6 | 5 | 11 | 0.45 | 6.4 |

*8 elements side unknown.

**2 elements side unknown.

Table 7. Fort Malden *Bos taurus* (domestic cow) element distribution: all analyzed contexts.

The element distribution of pork remains for the Fort Malden sample is displayed in Table 8. Again, few manus or pes bones were identified, which is consistent with the butchery patterns described in the historical documents. The only notable departure from the “prime barrel” model is the large number of rib fragments. However, the %MAU calculations indicate that ribs were underrepresented (16 percent) in comparison to the other elements. Furthermore, nearly half of these elements (19 specimens) were head and neck fragments which were cut or broken just after (distal to) the tubercle. This portion of ribs likely would have remained attached to thoracic vertebrae when removing ribs for use in “mess grade” pork. Again, the remaining ribs may be partially accounted for by posterior ribs (i.e., the thirteenth and fourteenth ribs), which are sometimes included when separating the short loin from the rib meat cuts.

Table 9 shows the recalculated MNI and barrel/quarter calculations from the excavated Fort Malden sample. These data provide striking evidence that traditional meat weight calculations based on MNI units result in very different estimates of the importance of swine and cattle remains from the revised quantification procedures. Specifically, in both cases, the MNI-based calculations resulted in the overestimation of the

economic importance of these species, in comparison to the revised procedures. For the pig remains, the MNI-based meat weights were more than twice those resulting from the barrel calculations. The meat weights calculated from MNI units for the cattle remains are 1.8 times as large as those calculated by the quarter, representing a difference of 839.78 kg of edible meat. The reason for this deficit can be seen in Table 9 – since there were ten rear right quarters, but only four front right quarters, MNI calculations (which in this instance estimated ten complete animals) overestimated the amount of beef represented.

Conclusions

When reconstructing historic subsistence, much may be gained by *explicitly* combining historical records with archaeological evidence. In this report, the faunal analysis has augmented the information from historical documents, to produce a more complete picture of subsistence at Fort George. In addition, the consideration of historical sources during the faunal analysis allowed for a revised quantification of the domestic mammal remains recovered from the fort. It is probable that these procedures better approximate the actual diet of the personnel of these forts, as they are based on historical docu-

| | NISP | MNE Right | MNE Left | MNE Total | MAU | %MAU |
|----------------|------|-----------|----------|-----------|------|------|
| Skull | 13 | – | – | 1 | 1 | 66.7 |
| Mandible | 12 | – | 2 | 2 | 1.5 | 100 |
| Cervical Vert. | 3 | – | – | 3 | 0.42 | 28 |
| Thoracic Vert. | 8 | – | – | 5 | 0.35 | 23.3 |
| Lumbar Vert. | 2 | – | – | 2 | 0.28 | 18.7 |
| Sacrum | 1 | – | – | 1 | 1 | 66.7 |
| Innominate | – | – | – | – | – | – |
| Rib | 41 | 3 | 6 | 9 | 0.32 | 21.3 |
| Scapula | 3 | 1 | 2 | 3 | 1.5 | 100 |
| Humerus | 1 | – | 1 | 1 | 0.5 | 33.3 |
| Radius | 3 | 1 | 2 | 3 | 1.5 | 100 |
| Ulna | 2 | – | 2 | 2 | 1 | 66.7 |
| Carpal | 2 | 1 | 1 | 2 | 0.13 | 8.7 |
| Metacarpal | – | – | – | – | – | – |
| Femur | 6 | – | 3 | 3 | 1.5 | 100 |
| Patella | – | – | – | – | – | – |
| Tibia | 5 | – | 3 | 3 | 1.5 | 100 |
| Fibula | 2 | – | 2 | 2 | 1 | 66.7 |
| Tarsal | 10 | 4 | 4 | 8 | 0.6 | 40 |
| Metatarsal | – | – | – | – | – | – |
| Phalanx | 3 | 1 | 2 | 3 | 0.06 | 4 |

Table 8. Fort Malden *Sus Scrofa* (domestic pig) element distribution: all analyzed contexts.

Table 9. Comparison of MNI based meat weight calculations and the revised quantification techniques for Fort Malden: all contexts.

| | | Fort Malden Sample (Operation 12) | | |
|-------------------|-----|---|-------------------------------|--|
| | MNI | Revised Quantification | MNI Calculated Weight (kg) | Quarter/Barrel Calculated Weight (kg) |
| <i>Bos taurus</i> | 10 | 4 right front quarters 3 left front quarters 10 right rear quarters, 5 left rear quarters. | 1810 | 970.22 |
| <i>Sus scrofa</i> | 3 | 1 barrel | 113.4 | 54 |

mentary evidence. It is also possible that these quantification procedures are generally applicable to British Great Lakes outposts of the nineteenth century; and they may also be applicable to British forts in other areas of Canada and, perhaps, to earlier British forts in America, where meat acquisition procedures were similar.

Evidence has been presented indicating that Fort George personnel ate more fresh meat than was originally assumed. Fresh beef was the dominant source of meat in their diet, not salted pork, as had originally been inferred from the historical documents. Wild game such as deer, duck, quail, and pigeon were added to the diet when available, likely a welcome source of variety in the menu. As well, fresh fish, such as walleye and sturgeon, provided as much as five percent of the meat consumed at the fort. This analysis depicts a British fort that relied not only on provisions provided by the military, but also on natural resources abundant in the vicinity, to augment the diet of its personnel.

The quantification procedures developed in this paper may more accurately reflect the consumer units that entered Fort George and Fort Malden. In fact, they demonstrate that, even with a small sample, quantifying the swine and cattle remains using traditional MNI units potentially overestimates the amount of edible meat represented, and thus, the economic importance, of those domestic animals. It is therefore clear that these standard quantification units should be carefully reviewed for their applicability when historical documents exist that detail the consumer units entering the system under investigation. Quantification procedures should be adapted to more closely reflect con-

sumer units when historical documents exist that describe these units.

The initial proponents of zooarchaeological study, in their fervour to provoke faunal studies from historic sites archaeologists, advocated the use of quantification techniques similar (or identical) to those used in prehistoric faunal analysis (e.g., Lyman 1977; Paramalee 1960). However, it is clear that historical archaeologists must be mindful that the procedures used in historic faunal analysis need not be the same as those used in prehistoric studies, particularly when historical documents exist describing butchery practices and consumer units acquired during the period in question. In fact, using prehistoric techniques in these situations may lead to the misrepresentation of the economic importance of species in the diet of those being studied.

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