A very good paper

A PRELIMINARY STATEMENT ON FAUNAL REMAINS FROM THE 17th CENTURY DE LEON SITE:

St. Augustine, Florida

Prepared for

Zooarcheology

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INTRODUCTION

The Josef de Leon site (SA 26-1) was partially excavated during the spring and summer of 1976 by the Florida State University Archeological Field School under direction of Dr. Kathleen A. Deagan. The site is located south of the plaza in the old section of St. Augustine, Florida and is bordered on the north-east and northwest by Marine Street and Bravo Street, respectively. Six 3m X 3m squares and one 1.5 m^2 test pit were excavated during the two field seasons (Figure 1). The proportion of the site that these excavations encompassed is not known as the actual extent of the site is as yet undetermined.

Artifactual remains indicate a long occupation period commencing perhaps as early as 1650 and continuing through the 20th century, although the terminal date of 1824 marks the end of the period that is of interest to Colonial archeologists. This time span covers those periods referred to as "First Spanish", "British", and "Second Spanish". The primary interest of this report and the excavation research is in the earliest occupation. Theresa Singleton of the University of Florida is currently preparing her Masters Thesis on a description of the cultural assemblage associated with 17th century Spanish St. Augustine habitation. The de Leon site is the first excavated site dating to the early settlement of St. Augustine. The large percentage (33%) of St. Johns series ceramics suggests earliest occupation from ca. 1650 to 1673 (Bostwick n.d. MS). San Marcos "utilitarian" wares, which appear in the St. Augustine assemblage in relatively large amounts ca. 1680, comprise 15% of the

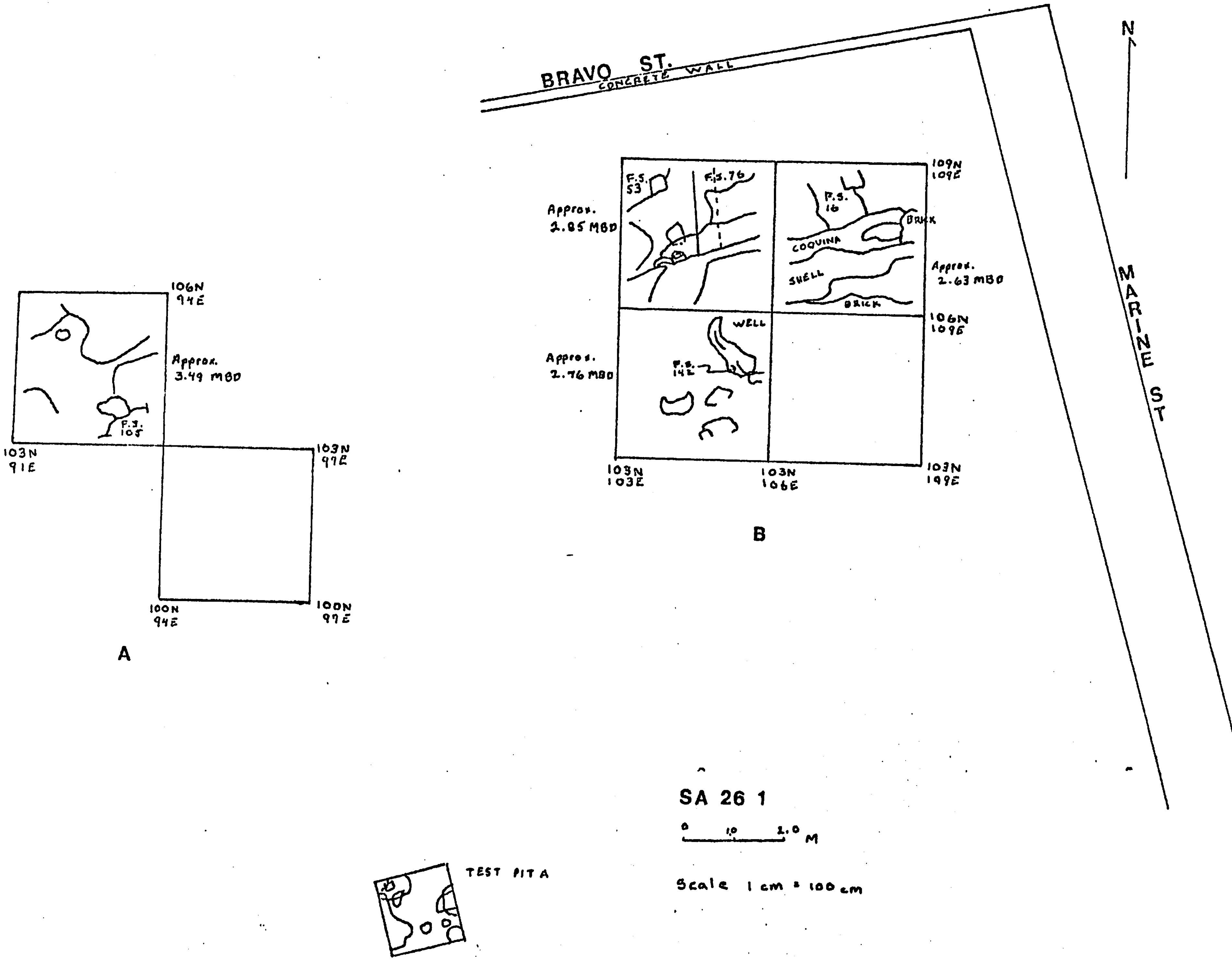

Figure 1. Excavation Pland and Location of Some of Analyzed Proveniences.

ceramics at the de Leon site. Although tight dating of the 17th century component has not yet been established it is safe to propose occupation during the latter half of the 1600's. South's Mean Ceramic Date Formula applied to the recovered ceramics indicate that an associated well and well-pit date from construction ca.1600-1673 to filling between 1673-1690 (Kruger n.d. MS). Faunal analysis of the well material was performed by Kathy Johnson of the University of Florida (n.d. MS) and will not be discussed herein as the raw data is not presently available. It is hypothesized that during the 17th century the area included in Excavation Group B was the "backyard" location and the house was located in the vicinity of Excavation Group A. During the 18th century occupation these roles were reversed (Singleton, Personal Communication). What appears in the archeological record, then, is a complicated plan of non-architectural and architectural features.

Documentary data concerning the 18th century Lorenzo Josef de Leon habitation is relatively abundant. De Leon, a well-off criollo, was of influential family both by birth and by marriage (he was married three times). In 1664 he was Treasurer of St. Augustine, a prestigious position, and as Captain of the Mounted Dragoons drew a salary of 1080 pesos yearly. He owned two stone houses, together totaled at 700 pesos, a savana plantation, and untold number of slaves. The de Leon house occupying the lot on Marine Street was built after 1702 and sold to Jesse Fish in 1763 when the British acquired St. Augustine (Perry n.d. MS). Whether or not de Leon actually lived in this house is unknown.

The history of the 17th century occupation is unknown and reflects the scarcity of information, at least that which is translated, concerning lifeways in early St. Augustine. As partial compensation, a brief characterization of what is known about this time period will be presented with particular regard to notations concerning food and dietary conditions. In 1593 there were approximately 120 palmetto houses along the mud streets of St. Augustine. Population was estimated as 625 persons, 225 of which were military personnel (Arnade 1959:8). The early years are represented as being times of starvation, frustration, poverty, and siege. People complained of poor land, encroaching sea waters, mosquito-infested marshes, and never enough food. In view of this, relocation of the Spanish capitol on more productive land was seriously considered and an inquiry was held under auspices of the Crown in 1602. The question of food production and establishing self-sufficiency appeared to have been of major importance in consideration of the move. Saez, a witness at the inquiry, reported he had seen and eaten corn, beans, pumpkins, lettuce, onions, radishes, garlic, greens, oranges, peaches, and pomegranates, but that these were never abundant and did not satisfy the demands of the garrison. Meat was extremely scarce and most of it imported (from Cuba). For substantial meat most inhabitants relied on fish. Domingo Gutierrez Utrera indicated that food was a problem which worried him greatly; meat was provided only by hunting with an "alcabuz" and the results were "miserable" (Ibid"30,37). In contrast, Governor Canzo, whose own interests were admittedly at stake, pointed up the improvements in food production which had been brought about by his hand. In 1597, when he took office, he had started construction of a market and had built a horse-mill for milling flour. He had ordered presidio soldiers to cultivate fields for corn, beans, pumpkins, and other vegetables and gave them free time to prepare fields for themselves and their families (Ibid:9,74). One wonders if his orders did not also concern animal husbandry. By 1600 there was a fish market, 120 houses and shops (Tepaske 1964:5). In 1602, at the inquiry, Canzo stated that every family owned four to ten cows and complained that many of the animals roamed the mud streets of the city (Arnade 1959:9). There are, then, two slightly conflicting points of view and Canzo appears to have been the only person praising the improvements in Augustinian agriculture.

The situation in 1696, as viewed by Jonathan Dickinson, does not seem to have been much altered. The male population was approximately 300 belonging to the government and many were employed as sentinels. Houses were "not very thick", being interspersed with large orchards of oranges, lemons, figs, pome-citrons, limes, and peaches. These houses were mostly old buildings and less than half were occupied (Andrews and Andrews 1975:62-63). Dickinson reported that all supply of bread, clothing, and money came from Havana and Porto Bello via the mechanism of the "situado", the royal provision of goods to St. Augustine. In 1696 it had been three years since a vessel had been seen from "anywhere" yet in the governor's house they were served chocolate for breakfast (Ibid:61). The disruption of the situado arrival had long plagued St. Augustine, augmenting the problem created by agriculturally non-productive soil. During the late 17th century and early 18th century these disruptions became more severe as British privateering and encroachment intensified. Often when the situado, which provided poor quality food anyway, did arrive food goods were spoiled: flour was wormy and pork was rancid (Tepaske 1964:79). In 1712 when the situado was seized by the British, inhabitants were forced to eat horses, dogs, cats, and rats. This type of situation fostered the practice of smuggling in food and other goods from Charleston. Among goods sent in 1733 were grain, cattle feed, pork, lead, candle wax, and candle wicks (Ibid:83,95). The fact that many foods including feed, meat, and flour were being brought in suggests the inefficiency of the market economy and horse mill.

The plight of the people resorted to eating rats and cats, the poor hunting, and lack of fresh meat are intriguing when considered in light of the growing cattle industry. Unfortunately, little or nothing has been discovered, or made available, concerning other livestock pursuits. It is through Arnade's work that most is known about the apparent prosperity of St. Augustine. As early as 1650 cattle ranching had begun as a commercial enterprise and after 1680 there are more and more references to the cattle ranches. Between 1680-1687 Governor Marqués Cabrera built a slaughterhouse in St. Augustine. Prior to this many of the cattle destined for the capitol were being smuggled out of Florida and being sold in Cuba. Circa 1700, Governor Zúñiga inaugerated a system whereby each rancher was assigned certain days of the year on which to bring his cattle to the capitol and an apparent flat tax of 10% was imposed, payable in cattle. Tax roles for 1698-1699 indiacte 25 cattle ranchers living in St. Augustine, along the St. Johns, on La Chua near present-day Gainesville, and at present-day Palatka. Coupled with the smaller number of ranchers of Apalache, a total of 223 head of cattle were paid to the government (Arnade 1965:9). What became of these cattle after they reached the slaughterhouse is unknown: did they become publicly available or restricted to certain individuals? The continued dependence of the general populace on the situado may imply that continued smuggling, external marketing, and benefits reaped by an elite few might have been important forces in keeping St. Augustine at a low subsistence level. The other alternative is that official reports of impoverished and starvation existance had other purposes aside from relating the truth. These questions may approachable through archeological investigation of cultural and faunal remains, indications of material wealth and consumable plentitude or lack thereof.

On such a promising note it may disappoint the reader to learn that such investigations will not be carried out in this report. Due to lack of comparative faunal material from other 17th century sites the report will largely be descriptive. Also it should be regarded as a preliminary statement as the total excavated material from SA 26-1 has not yet been analyzed and the representativeness of the proveniences discussed within are not guarantee. One should also not be mislead by the figures, numerous tables, and precise percentages. They are presented merely to provide some basis for discussion and tabulation of results thus far computed. There is always a danger of false accuracy and it seems that in zooarcheology, particularly when dealing with calculations of edible meat, this is a serious problem.

There are two current theories, which broadly cover all possibilities, as to the expected nature of subsistence in early St. Augustine. One, based on documentary research being carried out by Amy Bushnell on the Menendez family, is that food supplies were more constant and largely based on domesticated animal species as compared to later First Spanish Period occupation when British privateering and interference with the situado created hard times in terms of food supplies (Singleton, Personnel Communication). This implies, however, that domestic animals were not being raised in St. Augustine, but were being imported either as live animals brought in with new settlers, or as meat, either salted or dried, being brought in the situado. The second theory is that early settlers, being primarily military personnel, relied on hunting wild game species and fishing for the major part of their meat diet. This is suggested by other documentary evidence as presented earlier. Although plants were obviously important (consider the numerous citations of orchards and fields of vegetables) and possibly contributed the bulk of the diet, they will not be considered here.

As time was limited and the analysis incomplete and the statement of formal hypotheses should be tested with statistical substabtiation, I propose to these two approaches in fairly broad terms, that is, without formal hypothesis formulation or elaborate statistical tests. In order to characterize early St. Augustine subsistence patterns the proportions of domestic vs. wild species represented will be presented with regard to usable meat, percentage MNI (minimum number of individuals) by each category (wild vs. domestic), class, and species. A brief presentation of butchering and food preparation-disposal patterns will also be presented. Another paper (Smith n.d. MS) will deal with procurement techniques and environmental zones which were exploited.

EXCAVATION AND INTERPRETATION METHODOLOGY

As mentioned previously, six 3m X 3m squares and one 1.5m X 1.5m test pit (Test Pit A) were excavated. The latter and square (abbreviated to Sq.) 106N 106E were excavated in 10 cm and 15 cm levels. Zone II colonial midden was removed in 15 cm intervals. All levels, with the exception of overburden, were water-screened through 1/4" mesh hardware cloth. Material was bagged according to provenience and nature (i.e. faunal material was bagged separately). Feature forms, maps, photographs, and notes were kept. Excavation was controlled horizontally by imposition of a grid system based on magnetic North and vertical control was maintained through establishment of an arbitrary datum plane. All depth measurements presented herein are given as Meters Below Datum (MBD). Faunal material was transported to the Florida State Museum (FSM) Zooarcheological laboratory and will remain there until analysis is completed whereupon it will be returned to the Historic St. Augustine Preservation Board. Catalogue cards were made for each identifiable or unidentifiable constituent and temporary identification numbers were assigned to each. At the present time these numbers run from 26-1-001 to 26-1-132 and 26-1-200 to 26-1-260. Cards included information on elements present, MNI, bone weight, and evidence of butchering and/or carbonization, and pathology.

Bone preservation was extremely good as evidence by the abundance of small fish bones in the sample, many of which were complete. Fragmentation appeared to be unrestricted to any particular class and was and was extensive, although it may have been more a matter of food preparation and disposal than preservation. Evidence of rodent or carnivore gnawing was not, however, present.

Thirteen of the 38 proveniences have been analyzed. Six of these were designated as features and an additional five were "areas" or "pits", which are also considered features (Singleton, Personal Communication). While these units are important as closed contexts the non-representativeness cannot be stressed enough.

Elements were identified to genus and species whenever possible. Identification was made through use of the comparative collection at the FSM zooarcheology laboratory. There were instances where an element could be distinguished from all other species within a provenience but could not be identified below order or class. In these cases, MNI were assigned but the individual was not used in calculation of usable meat except in table 5 where edible meat was calculated for class. Identification of sex was not made as those elements necessary to do so were absent except in the case of <u>Gallus gallus</u> where the presence of medullary bone provided good indication of female. Age determination was calculated for pig, deer, and two of the six rabbits based on epiphyseal fusion, tooth eruption, and/or tooth wear.

DISCUSSION

A total of 30 different animals were identified to family or better and 186 minimum number of individuals were calculated according to methods described in Ziegler (1973). Particularly among the mammals it was difficult to identify all individuals. As the site is historic,deer and pig were known to be present, and goat or sheep might have been present, it was often impossible to identify an element beyond being Artiodactyl. The fragmentary nature of many of the bones further complicated the matter and it is probable that many of the bones identified as medium or large mammal belonged to either the deer or pig. There was also a partial atlas which was too large for any of the above, smaller than a full-grown cow although more closely resembling one, which could only be assigned to the Large Mammal category. Table 1 presents raw data in terms of MNI, bone weight, and number of fragments for all categories of the thirteen proveniences. In some cases fish scales and other numerous small fragments were only weighed and not counted therefore fragment percentage based on total counted num ber is less accurate that that based on fragment weight. A relatively small proportion, about 9% of the total weight, was not identifiable beyond the classification of "bone".

From Table 1 it can be seen that fish, both bony and cartilagenous, comprised the largest category based on MNI (roughly two-thirds) but represented less than half the total weight. Mammals, on the otherhand, which represent only 11% MNI comprise over over half the total weight. This is to be expected as mammal bones, while less numerous, are larger and heavier than fish bones. It is facts such as this that make use of bone weight for comparison and calculation of usable meat the preferable of the two methods. In those cases where percent total bone weight is given as "0.0" it is not meant to imply that the bones themselves did not weigh anything, simply than their contribution to the total bone weight of the sample was negligible at an accuracy of 1/10 gram. Summarizing the table, Gopher tortoise contributed the largest portion of the turtle bone both in numbers and weight. Domestic pig provided the greatest mammal weight and deer roughly half as much while the six rabbits

Table 1. Classification of Animals Represented at SA - 26-1.

Classification	MNI	% MNI	Weight (grams)	% Weight	Fragments	% Fragments
Gopherus polyphemus	7	3.8	76.1	3.7	126	4.8
Malaclemys terrapin	2	1.1	3.2	0.2	3	0.1
Chelonia, immature	2	1.1	2.2	0.1	5	0.2
UID* Chelonia	1	0.5	4.9	0.2	17	0.6
Agkistrodon piscivorous	1	0.5	1.4	0.1	2	0.1
Natrix sp.	1	0.5	0.1	0.0	1	0.04
REPTILE, TOTAL	14	7.5	93.5	4.6	163	6.2
Rana sp.	1	0.5	0.5	0.0	1	0.04
Anura cf. Bufo sp.	4	2.2	0.8	0.0	11	0.4
AMPHIBIAN, TOTAL	5	2.7	1.3	0.1	12	0.5
Sylvilagus sp.	6	3.2	17.8	0.9	34	1.3
Felis catus	1	0.5	3.4	0.2	1	0.04
Sus scrofa	5	2.7	396.8	19.6	46	1.7
Odocoileus virginianus	3	1.6	161.6	8.0	25	1.0
Small mammal cf. Rodentia	1	0.5	0.1	0.0	1	0.04
Small Artiodactyl	1	0.5	1.1	0.1	3	0.1
Artiodactyl	2	1.1	23.6	1.2	3	0.1
Small mammal	-	-	6.2	0.3	18	0.7
Medium-Large Mammal	3	1.6	548.2	27.0	348	13.3
MAMMAL, TOTAL	22	11.8	1186.3	58.5	480	18.3

Table 1. Continued

Classification	MNI	%MNI	Weight (grams)	% Weight	Fragments	% Fragments
Meleagris gallapavo	1	0.5	14.3	0.7	4	0.2
Gallus gallus	9	4.8	53.8	2.7	89	3.4
Small Wading Bird	2	1.1	0.5	0.0	2	0.1
Small Bird	-	-	1.1	0.1	2	0.1
UID Aves	-	-	25.6	1.3	97	3.7
AVES, TOTAL	12	6.5	103.7	5.1	190	7.3
Carcharhinus leucs	3	1.6	1.1	0.1	4	0.1
C. milberti	6	3.2	7.5	0.2	7	0.3
Galeocerdo cuvieri	1	0.5	0.3	0.0	1	0.04
Sphyrna morkorran	1	0.5	0.7	0.0	1	0.04
S. zygaena	2	1.1	1.1	0.1	2	0.1
Carcharhinidae	2	1.1	0.2	0.0	2	0.1
UID Chondrichthyes	2	1.1	0.8	0.0	2	0.1
CHONDRICHTHYES, TOTAL	17	9.1	11.7	0.5	18	0.7
Centropomus sp.	1	0.5	2.8	0.2	3	0.1
Carangidae	1	0.5	3.3	0.2	2	0.1
Archosargus probatocephalus	12	6.4	22.6	1.1	110	4.2 Sheep head
Menticirrhus sp.	1	0.5	0.6	0.0	1	0.04
Micropogon sp.	6	3.2	3.6	0.2	17	0.6
Cynoscion sp.	4	2.1	1.2	0.2	5	0.2
Pogonias cromis	8	4.3	10.6	0.5	30	1.1
Sciaenops ocellatus	10	5.4	45.0	2.2	40	1.5

Table 1. Continued

Classification	MNI	%MNI	Weight (grams)	% Weight	Fragments	% Fragments
Paralichthyes sp.	1	0.5	0.4	0.0	4	0.1
Mugil sp. (cf. M. cephalus)	36	19.4	27.9	1.4	251	9.6 mullet
Arius felis	27	14.5	51.6	2.5	154	5.9
Bagre marinus	4	2.1	4.8	0.2	19	0.7
Ictalurus sp.	5	2.7	4.3	0.2	14	5.3
UID Sciaenidae	-	-	96.1	4.7	478	18.3 drum
Ariidae	-	-	1.6	0.1	11	0.4
UID Osteichthyes	-	-	332.2	16.4	625	23.9
OSTEICHTHYES, TOTAL	99	53.2	629.9	31.1	1746	66.7
FISH, TOTAL	116	62.4	641.6	31.7	1764	67.4
UID Bone	-	-	186.2	9.2	-	-
Total	186	100	2026.4	100	2616	100

*UID is abbreviated for "unidentified" as used in this paper.

added less than 1% weight. Domestic chicken made up less than 3% total bone weight and other birds contributed significantly less. Sharks were represented by one, at most two, vertebrae per individual and I must admit some hesitancy in including them in computations of usable meat. Although it is probable that St. Augustinians did eat shark there is always the possibility that the vertebrae represent incidental inclusions, brought in in sand, coquina, or were used as fertilizer. Likewise, snake may have been eaten but it is just as possible that they were killed in the vicinity and simply discarded or fed to pets. For this reason I felt even less secure in including snakes in computations of edible meat and did not do so. Their contribution would have been small in any event and even when included in the total reptile usable meat calculation, the class as a whole contributed provided only about 5%. The same can be said concerning the possible Bufo sp., of course, but their was the possibility that they were frogs and frogs can be caught and eaten and are often treated thus today. In raw numbers, mullet, sea catfish, sheepshead, and various drums made up the bulk of the bony fish, in that order of descendence. The snook, possible jack, three drum, and one catfish were fairly large but the majority of the fish were small and estimated weight for the latter would be from one to ten pounds live weight. The lack of data for comparative specimens made estimation of usable meat extremely difficult for the majority of the fish.

Tables 2 and 3 present a description of proveniences analyzed and breakdown of faunal classes represented in each, respectively. At this time nothing can be inferred concerning differential deposition of faunal remains either through time or across space. With completion of the analysis this can be discussed more lucidly. At this time it does appear that some features contain certain species and exclude others: F.S.#25,33,36,and 103 contained no

Table 2. Description of Analyzed Proveniences (SA 26-1).

F.S. #	Name	Upper and Lower Limits (MBD - Meters Below Datum)		Description
16	Feature 3 Square 106N 106E	Top: 2.07	Bottom: 2.65	Heavy concentration of oyster shell, bone, and ceramics with a thin layer (4 cm) of light grey clay overlying it. Approximately 1m X 1m.
25	Area E Square 106N 106E	Top: 2.22	Bottom: 2.31	Heavy concentration bone and oyster shell. Dark grey sand in SE quadrant.
33	Area O Square 106N 106E	Top: 2.25	Bottom: 2.49	Orange and grey mottled soil adjacent to north edge of Feature 4. Approx. SE quadrant.
36	Pit Q Test Pit A	Top: 2.92	Bottom: 3.08	Dark grey shell-flecked soil in NW quadrant. Circular shape.
50	Level 6 (75-90 cm) Square 106N 106E	Top: 2.39	Bottom: 2.52	
53	Feature 7 Square 106N 103E	Top: 2.12	Bottom: 2.85	Brown soil with heavy concentration of whole shell.
58	Area D Square 106N 103E	Top: 2.28	Bottom: 2.48	Dark grey, shell-flecked soil believed to underlie Feature 6.
60	Feature 6 Square 106N 103E	Top: 2.20	Bottom: 2.47	Dark grey sandy soil with heavy concentration of shell and bone.
76	Feature 10 Square 106N 103E	Top: 2.31	Bottom: 2.65	Grey-brown shell-flecked soil extending along N and W sides of quadrant in the leached zone matrix.

Table 2. Continued

103	Pit E Square 103N 91E	Top: 2.30	Bottom: 2.45	Dark grey coquina-flecked brown mottled soil
105	Feature 15 Square 103N 91E	Top: 2.30	Bottom: 2.49	Semi-circular pit with dark grey charcoal and shell-flecked soil. Possible fire pit.
132	Zone II Level II Square 103N 103E	Top: 2.24	Bottom: 2.42	
142	Feature 23 Square 103N 103E	Top: 2.62	Bottom: 2.76	Light brown whole shell-flecked sand along NE corner of square.

Table 3. Comparison of Faunal Remains Between Proveniences and Percentages of Each Class Represented within Each.

F.S.#	MNI	Weight (grms)	Domesticates MNI	Domesticates Weight (grms)	Fish MNI	Fish Weight (grms)	Mammal MNI	Mammal Weight (grms)	Bird MNI	Bird Weight (grms)	Reptile MNI	Reptile Weight (grms)	Amphibian MNI	Amphibian Weight (grms)
25	4 (2.1)*	13.7 (0.6)	0 -	0 -	3 (2.6)	9.7 (1.5)	0 -	0 -	0 -	0 -	1 (7.1)	1.8 (1.9)	0 -	0 -
16	16 (8.6)	139.2 (6.5)	3 (21.4)	9.5 (2.0)	11 (9.5)	36.9 (5.8)	2 (9.0)	86.7 (7.3)	2 (16.7)	4.4 (4.2)	1 (7.1)	4.1 (4.2)	0 -	0 -
33	3 (1.6)	4.4 (0.2)	0 -	0 -	2 (1.7)	2.2 (0.3)	0 -	0 -	0 -	0 -	1 (7.1)	1.4 (1.5)	0 -	0 -
36	2 (1.1)	2.8 (0.1)	0 -	0 -	1 (0.9)	1.9 (0.3)	0 -	0 -	0 -	0 -	1 (7.1)	0.9 (1.0)	0 -	0 -
50	14 (7.5)	110.3 (5.1)	2 (14.3)	24.1 (5.2)	7 (6.0)	28.8 (4.5)	2 (9.0)	53.0 (4.5)	2 (16.7)	20.9 (20.1)	2 (14.2)	4.8 (5.1)	1 (20.0)	0.5 (37.6)
53	19 (10.2)	49.6 (2.3)	1 (7.1)	2.6 (0.6)	16 (13.8)	38.3 (6.0)	2 (9.0)	7.8 (0.7)	1 (8.3)	4.3 (4.2)	0 -	0 -	1 (20.0)	0.05 (3.8)
58	2 (1.1)	26.1 (1.3)	0 -	0 -	- -	9.4 (1.5)	1 (4.5)	17.4 (1.5)	0 -	0 -	1 (7.1)	0.4 (0.4)	0 -	0 -
60	46 (24.7)	507.7 (23.7)	4 (28.6)	85.6 (18.3)	34 (29.3)	128.0 (19.9)	4 (18.2)	237.2 (20.0)	5 (41.7)	35.2 (33.9)	2 (14.2)	35.2 (37.7)	1 (20.0)	0.5 (37.6)
76	13 (7.0)	71.7 (3.3)	0 -	0 -	10 (8.6)	24.5 (3.8)	1 (4.5)	21.7 (1.8)	0 -	0 -	1 (7.1)	15.8 (16.9)	1 (20.0)	0.1 (7.5)
103	- -	1.8 (0.1)	0 -	0 -	- -	1.8 (0.3)	0 -	0 -	0 -	0 -	0 -	0 -	0 -	0 -

Table 3. Continued

F.S.#	MNI	Weight (grms)	Domesticates MNI	Domesticates Weight (grms)	Fish MNI	Fish Weight (grms)	Mammal MNI	Mammal Weight (grms)	Bird MNI	Bird Weight (grms)	Reptile MNI	Reptile Weight (grms)	Amphibian MNI	Amphibian Weight (grms)
105	25 (13.4)	746.4 (34.8)	2 (14.3)	204.3 (43.7)	18 (15.5)	226.7 (35.3)	4 (18.2)	492.2 (41.5)	1 (8.3)	13.2 (12.7)	2 (14.2)	3.1 (1.1)	0 -	0 -
132	33 (17.7)	410.9 (49.1)	2 (14.3)	124.4 (26.6)	26 (22.4)	88.6 (13.8)	3 (13.6)	221.1 (18.6)	1 (8.3)	12.3 (11.9)	2 (14.2)	21.1 (22.6)	1 (20.0)	0.2 (15.0)
142	9 (4.8)	58.7 (2.7)	1 (7.1)	17.4 (3.7)	6 (5.2)	15.2 (2.4)	1 (4.5)	31.4 (2.6)	- -	0.4 (0.3)	1 (7.1)	4.9 (5.2)	0	0
Total	186	2145.3	15	467.8										

% Domesticate of Faunal MNI 8.8%

% Domesticate Weight of Faunal Weight 29.7

* Number in parentheses indicates percentage that above number is of total category. Percentages of Fish, Mammal, Bird, Reptile, and Amphibian are calculated based on total MNI or weight of those categories in the sample.

mammal bone; F.S.# 59 and 76 contained mammal bone but no domesticated mammal (pig) or other domesticates (chicken). All proveniences contained some fish.

The primary purpose of this report is to investigate the contribution of domestic vs. wild fauna to the protein diet. To do so at this stage one must assume that the thirteen proveniences represent the total faunal assemblage from the site. Since they were not randomly selected and the whole site has not been excavated this assumption will be accepted tentatively simply because failing to do so will ~~will~~ terminate this report. On the basis of documented lack of meat, "miserable" hunting and reliance on fish, one would expect to find fish contributing the bulk of the usable meat. As Table 4 and 5 indicate this is not the case. Great difficulty was encountered in attempting to make usable meat calculations comparable between classes. Scaling bone weight to total body weight then converting to usable meat weight could only be accomplished for mammals and fish because no formulas have been computed for other classes. Use of conversion from MNI was hindered where estimation of size could not be made with any degree of certainty. Correction of apparent usable meat (from bone weight) to a more accurate representation was performed for all classes except fish using estimated number of identifiable elements from Ziegler (1973:19). This was done by multiplying usable meat by:

$$\frac{\text{estimated \# bones X MNI}}{\text{\# bones recovered}}.$$

This corrected for absence of elements which would underestimate usable meat. The derived figures were not used for comparison, however, since estimated number of identifiable fish elements have not been worked out. Other conversion factors utilized included:

Fish: .80 X total body weight(g) → edible meat(g) Cleland 1966:138
Turtle: .20 X total body weight → edible meat
Domestic
Cat: .5 X total body weight → edible meat Ziegler 1973:30

Table 4. Usable Meat From Faunal Remains at SA 26-1 (Thirteen Proveniences Only). Does Not Include Snakes.

Classification	MNI	Weight (grms)	Total Body Weight* (grams)	Usable Meat (MNI)	Usable Meat (Bone Weight) grams	Usable Meat (Bone Weight, Corrected) grams
Gopherus polyphemus	7	76.1		13347.6**	380.5 (3.1% total)	972.4
Malaclemys terrapin	2	3.2		1574.4**	157.5 (1.3%)	567.0
CHELONIA, TOTAL	9	79.3		14921.0	538.0 (4.4%)	1539.4
Rana sp.	1	0.5		5.0**	8.3 (.07%)	141.7
Anura cf. *Bufo sp.*	4	0.8		96.0**	13.8 (.1%)	85.3
AMPHIBIA, TOTAL	5	1.3		101.0	22.1 (.2%)	227.0
Gallus gallus	9	53.8		5670.0	839.3 (6.9%)	2206.7
Meleagris gallapavo	1	14.3		3520.0	223.1 (1.9)	2230.8
AVES, TOTAL	10	68.1		9180.0	1062.3 (8.8%)	4437.5
Sylvilagus sp.	6	17.8	297.3	787.5	148.6 (1.2%)	1862.5
Felis catus	1	3.4	55.3	2270.0**	27.7 (0.2%)	3711.8
Sus scrofa	5	396.8	6886.9	201273.5**	4820.8 (39.9%)	52400.3
Odocoileus virginianus	3	161.6	2771.5	9534.0**	1385.7 (11.5%)	16628.4
MAMMAL, TOTAL	15	579.6	--	213865.0	6382.9 (52.9%)	74603.0

Table 4. Continued

Classification	MNI	Weight (grms)	Total Body Weight (grms)	Usable Meat (MNI)	Usable Meat (Bone Weight) grms	Usable Meat (Bone Weight, Corrected) grms
Carcharhinus leucus	3	1.1	87.7	-	70.2 (0.6%)	
C. milberti	6	7.5	281.3	-	225.0 (1.9%)	
Galeocerdo cuvieri	1	0.3	38.1	-	30.5 (0.3%)	
Carcharhinidae	2	0.2	29.6	-	23.7 (0.2%)	
Sphyrna morkorran	1	0.7	64.5	-	51.6 (0.4%)	
S. zygaena	2	1.1	85.3	-	68.2 (0.6%)	
UID Chondrichthyes	2	0.7	67.3	-	53.8 (0.5%)	
Centropomus sp.	1	2.8	152.3		121.8 (1.0%)	
Carangidae	1	3.3	168.6	4500.0	134.9 (1.1%)	
Archosargus probatocephalus	12	22.6	555.6	43200.0	444.5 (3.7%)	
Menticirrhus sp.	1	0.6	58.6	1450.5	46.9 (0.4%)	
Micropogon sp.	6	3.7	179.5	2700.0	143.6 (1.2%)	
Cynoscion sp.	4	1.2	89.1	3513.8	71.3 (0.1%)	
Pogonias cromis	8	10.6	347.7	+	278.2 (2.3%)	
Sciaenops ocellatus	10	45.0	852.7	+	682.1 (5.7%)	

Table 4. Continued

Classification	MNI	Weight (grms)	Total Body Weight (grms)	Usable Meat (MNI) grms	Usable Meat (Bone Weight) grms	Usable Meat (Bone Weight, Corrected) grms
Paralichthyes sp.	1	0.5	49.0	544.8**	39.2 (0.3%)	
Mugil cf. *M. cephalus*	36	27.9	634.2	19612.0**	507.4 (4.2%)	
Arius felis	27	51.6	928.6	19440.0	742.8 (6.2%)	
Bagre marinus	4	4.8	212.7	3600.0	170.2 (1.4%)	
Ictalurus sp.	5	4.3	197.6	3600.0	158.0 (1.3%)	
FISH, TOTAL	116	641.6			4063.9 (33.7%)	
TOTAL IDENTIFIABLE FAUNA	186	1582.7			12069.2	

* Calculated from scaling method. Mammals: $\log y = 1.0133(\log x) + 1.2049$

Fish: $\log y = 0.6203(\log x) + 1.9053$, where y=body weight in grams and x=skeletal weight in grams.

Conversions were then made from body weight to usable meat using White (1953), Reed (1963), Ziegler (1973) and Cleland (1966).

** Adapted from Cumbaa (1975).

† No calculation of MNI weight was attempted as no information was available for the sizes of species present. They were all fairly small, except for two, and comparative specimens of comparable size had no data.

Bird:	.70 X total body weight ⟶ edible meat	Zeigler 1973:30
Rabbit:	.50 X total body weight ⟶ edible meat	White 1953:397
Deer:	.50 X total body weight ⟶ edible meat	"
Pig:	.70 X total body weight ⟶ edible meat	Reed 1963:215

Cleland's conversion factors are for freshwater fish and turtle and may not be comparable for marine and terrestial species, respectively. However it is possible that they are close enough for the rough estimates necessitated by any conversion. Gallus galls was estimated to have a live weight of about two pounds. This was arrived at through comparison with laboratory specimens. The bones were generally slightly longer and noticeably thinner than small, "supermarket" chickens. Usable fish meat calculated from MNI was judged qualitatively by comparing lab specimens with known ranges of fish size (using Perlmutter's Guide to Marine Fishes, 1961).

Table 5 indicates that mammals as a class provided the bulk of the usable meat, almost three-quarters. Fish provided the next largest amount; birds, reptiles, and amphibians provided decreasing amounts. Of the total usable meat, domestic animals - pig and chicken - contributed almost half. The one turkey was not included in the domestic category as it occurs wild and is not known to have been domesticated at St. Augustine. Even without turkey, the domestic category made the single greatest contribution to the usable meat represented by the thirteen proveniences studied.

A cursory glance at Table 6 reveals that almost all parts of the skeleton were represented at the site. Virtually all elements that would be expected from on-site butchering were located for all classes of fauna with the exception of the shark, snake, turkey, and cat. I would have expected more snake and shark vertebrae to be present although they may have been widely scattered or eaten by carnivores depending on method of deposition, which I believe, is not

Table 5. Usable Meat Calculated from Bone Weights of all Identifiable Classes.

Class	MNI	Weight (grms)	Edible Meat	% Edible Meat
Reptilia	14	93.5	1557.8	5.4
Amphibia	5	1.3	22.2	0.1
Mammalia	22	1186.3	20891.5	72.9
Aves	12	103.7	1728.3	6.0
Pisces	116	641.6	4432.3	15.5
TOTAL			28632.2	

Usable Meat From Domestic Sources (Gallus gallus and Sus scrofa):

Sus scrofa	39.9% usable meat
Gallus gallus	6.9% usable meat
Total	46.8% of total usable meat

Table 6. Skeletal Elements Represented in the Faunal Remains at SA 26-1.

	Incisor	Canine	Premolar	Molar	Dentary	Maxillary	Premaxillary	Cranium	Atlas	Vertebrae	Pectoral Girdle	Ribs	Forelimb	Manus	Pelvis	Hindlimb	Pes	Metapodial	Phalanges	Carapace	Plastron	Spines	Spine Supports	Grinding Plates	Otolith
<u>Gopherus polyphemus</u>											x		x			x				x	x				
<u>Malaclemys terrapin</u>																				x					
<u>Agkistrodon piscivorous</u>										x															
<u>Natrix</u> <u>sp.</u>										x															
<u>Rana</u> <u>sp.</u>											x														
Anura cf. <u>Bufo</u> <u>sp.</u>											x		x		x	x									
<u>Meleagris gallapavo</u>													x												
<u>Gallus</u> <u>gallus</u>					x					x	x	x	x	x		x	x								
<u>Sylvilagus</u> <u>sp.</u>	x			x	x				x	x			x			x	x								
<u>Felis</u> <u>catus</u>															x										
<u>Sus</u> <u>scrofa</u>	x	x	x	x	x	x		x		x	?	?	x	x		x		x	x						

Table 6. Continued

	Incisor	Canine	Premolar	Molar	Dentary	Maxillary	Premaxillary	Cranium	Atlas	Vertebrae	Pectoral Girdle	Ribs	Forelimb	Manus	Pelvis	Hindlimb	Pes	Metapodial	Phalanges	Carapace	Plastron	Spines	Spine Supports	Grinding Plates	Otolith
Odocoileus virginianus				x						x			x	x			x	x							
Carcharhinus leucus										x															
C. milberti										x															
Galeocerdo cuvieri										x															
Sphyrna morkorran										x															
S. zygaena										x															
Centropomus sp.										x (caudal fin)															
Carangidae								x														x			
Archosargus probatocephalus					x	x	x	x	x	x	x														
Menticirrhus sp.																								x	
Micropogon sp.					x			x	x		x													x	x

Table 6. Continued

	Incisor	Canine	Premolar	Molar	Dentary	Maxillary	Premaxillary	Cranium	Atlas	Vertebrae	Pectoral Girdle	Ribs	Forelimb	Manus	Pelvis	Hindlimb	Pes	Metapodial	Phalanges	Carapace	Plastron	Spines	Spine Supports	Grinding Plates	Otolith
Cynoscion sp.								x	x	x															
Pogonias cromis					x	x	x	x		?	x													x	
Sciaonops ocellatu					x	x	x	x		?	x													x	x
Paralichthyes sp.					x			x		x															
Mugil cf. *cephalus*								x		x	x														
Arius felis					x			x		x	x											x	x		x
Bagre marinus								x														x			
Ictalurus sp.					x			x			x											x			

well-known.

Table 7 presents elements used for age determination of pig, deer, and rabbit. The deer were all mature individuals and only two of the six rabbits could be classified as immature. Four of the five pigs could be classified as being less than two years old on the basis of epiphyseal fusion and tooth eruption patterns.

Of the four classes which showed evidence of human (?) alteration roughly 5% of the mammals (percentage based on number of fragments) showed butchering or burning indications, 2% of the birds, 4% of the turtle, and only 1/2% of the fish.

CONCLUSIONS

The proportion of usable meat derived from the fourteen domesticated animals was almost half indicating that, at least in this sample as analyzed thus far, domestic fauna provided the bulk of the protein contribution to the diet. The fish, although numerous, were relatively small. This, coupled with the overwhelming number of cranial fragments, may indicate that they served as supplemt to the meat diet. This is a brash statement and there is no necessary correlation. Whether or not fish were obtained from a market or not is indeterminable. It is known that by 1600 a fish market was established. Cumbaa (1975:183)hypothesized that, following Spanish peninsular custom, market fish would be gutted and beheaded previous to sale therefore cranial elements would not be present in sites which obtained most of their fish from a market and such fish might be larger than those obtained from inland waterway-estuarine fishing. Analysis of 18th century St. Augustine sites indicates that cranial elements are very rarely recovered and in this case it is not due to less proficient excavation techniques. It may be, then, that fish at the de Leon

Table 7. Indications of Age for *Sus scrofa*, *Odocoileus virginianus*, and *Sylvilagus sp.*

*Sus scrofa**		Modern	Late 18th Century
F.S. 50	third molar unworn	17-22 mons.	3 years
	phalanx with unfused epiphysis	< 2 years	
F.S. 60	VI right metacarpal, epiphysis unfused	< 2 years	
	distal epiphysis femur, unfused	< 3.5 years	
F.S.105	P_3 P_2 P_1 C	at least 1 year	2 years
	M_2 and M_3 unerrupted	7-13 mons.	
	unfused distal epiphysis, femur	< 3.5 years	
	unfused distal metapodial epiphysis	< 2 years	
	unfused epiphyses, proximal phalanges	< 2 years	
F.S. 132	fused proximal head, femur	3.5 years	
	unfused proximal epiphysis, tibia	< 3.5 years	
	unfused distal epiphysis, metapodial	< 2 years	
	unerupted upper P2	< 16 mons.	2 years
Odocoileus virginianus			
F.S. 16	tooth wear	< 3 years	
F.S. 60	tooth wear	6-6.5 years	
F.S. 105	longbone and metapodial epiphyses, fused	mature	
Sylvilagus sp.			
F.S. 53	2 centra unfused	immature ?	
F.S. 50	unfused proximal epiphysis, tibia	immature	

* Based on Silver (1963:252-253).

Table 8. Summary of Bone Alteration (Butchering and Burning) of Faunal Remains at GA 26-1.

Classification	F.S.#	Element	Description	% total # of Fragments/Class or species
Sus scrofa	60	femur	knife or cleaver cuts	2.1
	105	metapodial	cleaver fracture; split longtitudinally	2.1
		lumbar vertebra	knife cuts	2.1
			Total	6.3
UID Large Mammal		innominate	knife or cleaver cuts	0.3
	50	ribs	" " " "	0.6
	16	epiphysis	carbonized	0.3
		fragments	knife cuts	1.4
		carpal	knife cuts; split longtitudinally	0.3
	105	ribs	knife cuts; carbonized	0.6
			Total	3.8
Artiodactyl	105	ilium	cleaver	33.3
Sylvilagus sp.	60	femur	knife cuts; spiral fracture	2.9
		tibia	" "	2.9
			Total	5.8
UID Small Mammal	60	?	calcined	5.6
UID Mammal	60	long bone	cleaver cut	0.3
	132	ilium ?	knife or cleaver cut	0.3
		fragments	carbonized, heated	5.4
				6.0
Total Mammal				5.2
Gallus gallus	16	ulna	knife cuts	1.1
UID Bird	60	long bone	" "	1.0
	132	humerus, head	carbonized	1.0
	142	long bone	partially carbonized	1.0
Total Bird				2.1

site were the results of household activity. It may also be possible that economic position of the household had some influence on the kinds of fish utilized. To my own knowledge, selling fresh fish whole (with heads but gutted) is a common practice in Caribbean markets. Perhaps cleaned, beheaded fish were purchased by households of greater economic wealth and smaller, whole fish were sold more cheaply and therefore purchased by lower income families. The households that Cumbaa discussed were all medium to upper status and income families.

Similar to the fish, cranial, podial, vertebral, and girdle elements were represented for mammals, birds, and turtle. This indicates on-site butchering of all these classes and argues against meat purchased already prepared. It also suggests that fresh meat, as opposed to dried or salted imported meat, was obtainable but since the rate of deposition is not known fresh meat may indeed have been scarce and a considerable luxury. The uniformity of the age of pig at slaughtering indicates that some form of animal husbandry was in practice although it is ludicrous to assume that 17th century people were ignorant of them. Domestic animals raised for meat are usually slaughtered prior to reaching maturity as with increasing age the cost of keeping the animal increases over the benefits reaped from eating it. However the fact that the pigs were apparently killed on a uniform schedule suggests that they were being raised for that purpose. There is, however, little else one can garner from a pig without slaughtering it while chickens can produce eggs and cows can provide milk products. Ten percent of the chicken elements contained medullary bone. This begins to form during the breeding season and acts as a mineral reserve for producing eggs. Domestic birds can retain medullary bone for several months after eggs have been laid but its presence usually indicates spring-summer activity (Rick MS). Medullary bone was found

Table 8. Continued

Classification	F.S.#	Element	Description	% total of Fragments/Class or Species
Gopherus polyphemus	60	scapula	knife cuts	0.8
		neurals & other carapace	Cut corners	4.0
	76	carapace	cut corners	1.6
Total Chelonia				4.4
Arius felis	50	spine shaft, skull fragment	carbonized	1.3
	60	pectoral spine	knife cut	0.7
	132	" "	" "	0.7
Mugil cf. *cephalus*	53	vertebrae	carbonized	0.4
Carcharhinus milberti	76	vertebrae	cut through ?	5.6
UID Fish	76	"	carbonized	0.2
	132	"	"	0.2
Total Fish				0.5

in the femur, scapula, coracoids, ulna, and tibiatarsus. One of the small, unidentified bird long bone fragments also contained medullary bone. No recognizable male chicken (rooster) bones were encountered. Chickens may have been kept for egg laying but they also were used for meat and slaughtered during their laying season. This may indicate that the desire for meat was greater than the desire for eggs although in times of low food supply a relatively steady supply of egg protein would be preferable to the short-lived satisfaction of meat. It seems doubtful to propose that the chickens may have been past their laying prime as several of the bones were literally choked with medullary bone. In addition, chicken, pig and deer were all found in at least one feature and chicken was associated with pig in other features suggesting that eating meat was more the practice than the exception. One interesting piece of information concerns pathology. A proximal chicken phalanx which had been broken and healed was recovered. What this indicates about the care of chickens is not certain.

Inferences regarding food preparation are difficult to make without obvious indications. It has been suggested (Cumbaa 1975) that the majority of meat was used in stews or soups but there is no definite exposition on recognizing bones that have been thus altered by heavy boiling. Perhaps the best evidence for this practice is the fragmentary nature of the faunal material. It is obvious that bones, particularly evident of long bones, were intentionally fractured, possibly to obtain the marrow but more likely to release the fat and oils. Fracturing longbones is facilitated after they have been boiled and the meat removed although characteristic "soft-fracturing" and splintering or crumbling were not observed. The relatively slight amount of carbonization, and it was not of the nature that one would expect from roasting over a fire, seems to preclude the suggestion that meat was prepared in this manner.

Animal bone which had been subjected to fire was very fragmented and its appearance did not suggest that it was a result of food preparation but rather food disposal. The outstanding example, 19 fragments from F.S.#132, indicate that the bones were probably swept or tossed into a fire. They all exhibited various degrees of carbonization. One large, flat fragment was burned only on one edge, on the outer surface. It resembled something which was in contact with a burning or smoldering coal for a brief period of time, or was placed simply at the edge of a fire and did not feel the full brunt of the heat. Several other fragments were fire-hardened, one was calcined, and the rest differentially burned. Fragments of bone showed greater carbonization of the medullary bone than out the compact, outer bone, further strengthening the proposition that the bone was burned in disposal. Since a relatively small proportion of the total number of fragments exhibited burning it appears that this method was not common and was more incidental. It may be a situation of "Oye, vamós a tirar esos huésos en el fuego."

REFERENCES CITED

Andrews, E.W. and C.M. Andrews
1975 <u>Jonathan Dickinson's Journal</u>. Valentine Books, Southeastern Printing Company, Inc.

Arnade, C.W.
1959 Florida on trial:1593-1602. <u>University of Miami Hispanic America Studies Number 16</u>, University of Miami Press.

1965 Cattle raising in Spanish Florida. <u>St. Augustine Historical Society Publication</u> #21. Reprinted from <u>Agricultural History</u> 35(3), July 1961.

Bostwick, J.A.
n.d. Aboriginal ceramics in pre-18th century colonial St. Augustine, Florida: the de Leon site. MS, Department of Anthropology, Florida State University, Tallahassee.

Cleland, C.E.
1966 The prehistoric animal ecology and ethnozoology of the Upper Great Lakes Region. <u>Museum of Anthropology, University of Michigan, Anthropological Papers</u> No.29

Cumbaa, S.L.
1975 Patterns of resource use and cross-cultural dietary change in the Spanish colonial period. Unpublished Ph.D. dissertation. University of Florida.

Johnson, Kathryn
n.d. Untitled MS of analysis of well and well-pit faunal remains from the de Leon site. University of Florida.

Kruger
n.d. Cited in Johnson M.S. Analysis of ceramics from well at de Leon site. Florida State University.

Perlmutter, A.
1961 <u>Guide to Marine Fishes</u>. Bramhall Press, New York.

Perry, L.
n.d. A comparison of affluency of SA-26-1 and SA-7-4. MS. Department of Anthropology, Florida State University, Tallahassee.

Reed, C.A.
1963 Osteo-archaeology. In <u>Science in Archaeology</u>, D. Brothwell and E. Higgs (eds.), pp.204-216. Basic Books, New York.

Rick, A.M.
n.d. Bird medullary bone: a seasonal dating technique for faunal analysts. Paper presented at the Eighth Canadian Archaeological Association Meeting, Thunder Bay, Ontario. March 6-9, 1975.

Smith, R.L.
n.d. A geographical analysis of selected aspects of the zooarcheology of the de Leon site, SA 26-1. MS. University of Florida.

Silver, I.A.
1963 The ageing of domestic animals. In Science in Archaeology, D. Brothwell and E. Higgs (eds.), pp.250-268. Basic Books, New York.

Tepaske, J.J.
1964 The Governorship of Spanish Florida 1700-1763. Duke University Press.

White, T.
1953 A method of calculating the dietary percentage of various food animals utilized by aboriginal peoples. American Antiquity 18(4):396-398.

Ziegler, A.C.
1973 Inferences from prehistoric faunal remains. An Addison-Wesley Module in Anthropology No. 43.