

ANIMAL REMAINS FROM LATE MEDIEVAL CAPALBIACCIO: A PRELIMINARY ASSESSMENT OF THE STOCK ECONOMY

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The results of the analysis of the animal remains recovered from Building J and Building M at the Capalbiaccio, Italy, site are presented. Capalbiaccio was a fortified hilltop town located in southern Tuscany which was occupied from the thirteenth to the fifteenth centuries. Residents of the town raised domestic stock and occasionally supplemented their diet with wild game. The faunal assemblages from both buildings are dominated by sheep/goat, pigs, and cattle, but the relative proportions of these groups differ at the two buildings. In Building J, which appears to be a residence, pigs dominate, but decrease through time as sheep/goat becomes more common. This suggests a small shift in stock raising or consumption practices during the later part of occupation of the town. In the area known as Building M, the dense deposit of faunal refuse is dominated by sheep/goat, rather than pigs, and the area appears to have been used as a garbage dump by residents of the town until it was abandoned. Mortality profiles for domestic stock suggest sheep/goat and cattle were primarily raised for their secondary products, such as milk, wool, or labor, rather than for meat.

Key words: animal bones, meat consumption, Medieval Italy, stock economy, zooarchaeology

The site of Capalbiaccio is located on a prominent hilltop in southern Tuscany, approximately 140 km northwest of Rome. It lies 4.5 km inland from the coast, just southeast of the modern town of Orbetello and the ancient Roman colony of Cosa. Its elevated location (231 m) provides a panoramic view of the surrounding countryside, including the coastal plain and valleys leading into the interior.

Capalbiaccio was a fortified medieval hilltop town like so many that still remain in the area today, but it now stands deserted, likely abandoned sometime during the fifteenth century (Dyson 1978, 1979, 1984). The medieval occupation of the site was probably part of the widespread process of *incastellamento* in Italy, the shift from dispersed Roman settlements located on the plains to nucleated hilltop villages (Barker 1995; Dyson 1984). Written sources suggest Capalbiaccio (referred to as Tricosto in medieval documents) may have played an important role in the area as competing states tried to gain control of the coastal Maremma (Dyson 1979).

The site is impressive and well preserved. An oval defense wall surrounds the abandoned town, enclosing an oblong area roughly 180 m long by 94 m wide (Dyson 1984). The interior of the town is subdivided by a transverse wall that intersects a structure, most likely the church of St. Frediano, which served the community (Dyson 1978). Dyson (1979, 1981) believes the outside

defense wall was only constructed during the later part of the occupation of the town, perhaps as a response to civil insecurity, and that it was never finished. The southern section of the site, which comprises approximately one-fourth of the area of the town, has virtually no architectural features, but the northern part contains many fragmentary foundations and standing walls.

Portions of the site were excavated during three field seasons in 1976, 1978, and 1980 under the direction of Dr. Stephen Dyson, then of Wesleyan University (now of SUNY Buffalo). These excavations were aimed at delineating the nature of the defensive walls and providing evidence for the reconstruction of the occupation history of the town. Trenches were placed in and around several of the buildings, which prior to excavation had been given letter designations. These excavations revealed a complicated occupation history, with medieval levels at the top underlain by a hard-packed layer of red earth (*terra rossa*). In two buildings, deeper stratified deposits also revealed evidence of pre-Roman occupation (Dyson 1979, 1981), but those remains will be reported elsewhere.

During excavation, levels were designated by Roman numerals from top to bottom, so that Level I represents the most recent occupation. Pottery and coins recovered at the site during excavation indicate that Capalbiaccio was occupied from the late thirteenth to the early fifteenth centuries, a time period generally referred to in Italy as the Late Medieval (Barker 1995; Hodges et al. 1995). Further study of the ceramics by Michelle

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Hobart of New York University will refine the medieval occupation chronology even further, so that more specific dates can be assigned to the levels that were defined during excavation.

Capalbiaccio was a small, rural town. Dyson (1981) envisions two main phases of medieval occupation. The first involved an open village community with a church, residences, other buildings, and a separate keep tower. Later, construction of the outside defensive wall was undertaken by military engineers, destroying some of the buildings in the process. According to documentary evidence, the council of Siena ordered the destruction of the town in 1417, although it was not totally abandoned until later in the fifteenth century (Dyson 1979, 1984).

Two buildings, designated Building J and Building M, were of particular interest and are the focus of the zooarchaeological analysis presented here. An analysis of the faunal remains excavated from each provides insights into the habitation history of the site, the economic workings of the town, and differences in the uses of the buildings. By examining the faunal remains from two different contexts, a preliminary picture of the medieval meat and stock economy of Capalbiaccio can be reconstructed. The zooarchaeological evidence can also be examined for changes through time, given the postulated two-phase medieval occupation of the town.

Results of zooarchaeological studies of faunal remains from medieval sites in Italy have contributed to elucidating several key issues regarding stock-rearing and herding practices in the area (for reviews see Baker and Clark 1993 and Clark 1987). Issues examined using faunal data from Capalbiaccio include the following:

- the range of animals used, both domestic and wild;
- the relative proportion of the main domestic stock animals;
- changes in stock-raising or stock-consumption practices through time;
- mortality profiles to assess uses of the major stock animals; and
- the overall role of stock-raising in relation to cereal crops, labor, and the production of meat, wool, milk, and other goods.

MATERIALS AND METHODS

The faunal remains were cleaned, cataloged, and organized in the field by Dr. Joanne Bowen, then of the American Indian Archaeological Institute (now of Colonial Williamsburg). Some were shipped back to the United States for identification using a comparative

collection, and some were analyzed in Italy at the Cosa Museum using reference manuals and comparative photographs. Without adequate non-mammalian comparative material, identification of avifauna, reptiles, and fish are preliminary; thus, the results presented here focus only on the domestic stock.

Each specimen was identified to taxon and body part, following common practice (see Reitz and Wing 1999). Age was initially assessed using four broad categories (neonate, juvenile, adult, and senile) based on epiphyseal fusion, bone size and condition, tooth eruption, and tooth wear. For domestic stock more specific ages were determined using epiphyseal fusion and eruption data given in Silver (1969) and tooth-wear patterns as outlined in Grant (1975). Each specimen was also examined for surficial modifications, including burning, butchery marks, gnaw marks, weathering, and pathologies. All attributes and identification data were coded and entered into a computer database (see Gifford and Crader 1977) for analysis.

The difficulty of distinguishing certain taxa in zooarchaeological samples, especially some domesticates, is well known (Reitz and Wing 1999). Sheep and goat bones, notable in this regard, were recorded as sheep/goat unless the distinction could be made following criteria outlined in Boessneck (1969) and Hildebrand (1955). Similarly, the distinction between domestic swine and wild boar is tenuous (Baker and Clark 1993), usually based on the larger size of the latter. Only if a suid specimen was extremely large was it designated wild boar. In the case of fragmentary pieces of crania, vertebrae, ribs, and long bone shafts, it was not possible to distinguish between caprines and suids. Rather than referring such specimens to the non-identifiable category, thus losing valuable body part information, these were designated as medium-sized artiodactyla, meaning sheep, goat, pig, or even small deer.

A similar situation pertains to distinguishing the larger ungulates: horse, donkey, cattle, and red deer. The distinction between horse and donkey is usually based on size, and when *Equus* specimens were very small they were designated as donkey (*Equus asinus*). Cattle (*Bos taurus*) can vary in size depending on whether a cow or ox is represented and, when fragmentary, bones from cattle, horse, and red deer cannot always be distinguished. Thus, the designation "large ungulate" was used for fragmentary pieces of crania, vertebrae, ribs, and long bone shafts that could belong to cattle, horse, or large deer.

Results are presented using number of identifiable specimens (NISP) and minimum number of individuals (MNI), despite the problems of using the latter for assemblages in medieval Italy involving a market economy (Baker and Clark 1993). The MNI was determined by taking into account the symmetry, age, and size of every skeletal element of each species. In order to assess the relative meat contribution of the three main domestic stock animals (sheep/goat, pigs, and cattle), meat weight conversions were applied to the data following Bedini (1995).

BUILDING J

This is one of the best preserved structures at Capalbiaccio, with an arched doorway and one wall rising to the second floor (Dyson 1978, 1979). It is a 10 x 6 m structure located along the northwestern part of the outside defense wall. In fact, it appears that the construction of the defense wall actually cut off the rear wall of the building, destroying its main drain (Dyson 1978, 1981). Excavations here revealed two distinct occupation periods: several levels of medieval occupation that were underlain in most places by the hard-packed *terra rossa* and, underneath these, evidence for a deep, stratified (60-70 cm) pre-Roman occupation (not discussed further here).

Several trenches were excavated inside the building, first along the north wall and along the eastern side where the doorway was located, then later in the southwest corner, so that virtually the entire interior of the dwelling was excavated. The upper levels contain considerable quantities of fourteenth- and fifteenth-century pottery and a few late medieval coins that clearly relate to the occupation of the building (Dyson 1979). The medieval deposits here have been designated into levels that span the time range from the late thirteenth to the early fifteenth centuries, with Level I (at the top) being near the end of the time range, and Level III (deeper) spanning the earlier part.

BUILDING M

The structure referred to as Building M at Capalbiaccio may not have been a building at all. It was excavated in 1978 as part of an extension of the excavation of a neighboring structure, Building H (Dyson 1979). A trench was extended into the open area east of Building H where only a few fragmentary architectural ruins were found. This open space may have been a garbage pit or dumping ground for the surrounding

buildings, as numerous faunal remains and a considerable amount of medieval pottery were recovered here. It is from this area of the site that several silver coins from Perugia dating to around 1470 were recovered, indicating that Capalbiaccio was occupied, perhaps only sporadically, into the late fifteenth century (Dyson 1979).

Excavations here revealed only medieval deposits, with no indication of earlier pre-Roman levels. Based on pottery and coins, the medieval occupation probably spans the time period from the late thirteenth to the late fifteenth centuries. Again, starting from the top, the deposits were designated beginning with Level I. Four levels were recognized based on changes in stratigraphy.

RESULTS

BUILDING J

A total of 1,568 bones were recovered in the medieval levels at Building J (Table 1). Far fewer remains were found in Level I (NISP = 98) compared to the two deeper levels (Level II, NISP = 818, and Level III, NISP = 652), suggesting less frequent use of the building near the time of abandonment of the town. Perhaps the structure was abandoned completely once the construction of the outside defensive wall destroyed its main drain.

Taphonomically, the bones bear evidence of modification, which helps contribute to understanding the depositional history of Building J and the living conditions inside the structure. Fifty-five specimens (3.5%) have been gnawed by carnivores, presumably dogs that were kept as pets by the inhabitants. Another ten bones (0.6%) bore gnaw marks from rodents, revealing their presence in the building with the inhabitants, an unsavory image that coincides with popular notions about living conditions during the Middle Ages. Most of the bones were very well-preserved, but some were pitted and crumbly and others were discolored, either with gray mottling or an orange stain.

Of the 1,568 bones recovered, 1,043 (66.5%) were deemed identifiable, while 525 (33.5%) were not. As noted previously, the identifiable specimens include bones that were identifiable to body part and *some* taxonomic level, even if the species could not be determined. Thus, Table 1 contains large quantities of bones identifiable only as "medium artiodactyl," which represent the fragmentary vertebrae, ribs, cranial pieces, and long bone shafts of sheep/goat/pigs that could not be further differentiated. Similarly, the "large ungulate" category includes bones of cattle/horse/red deer that could not be

Table 1. Faunal remains from Building J by NISP (number of identifiable specimens). Minimum number of individuals (MNI) given in parentheses.

	Level I		Level II		Level III		Total	
<i>Ovis aries</i> , sheep	0	-	3	(1)	2	(1)	5	(2)
<i>Capra hircus</i> , goat	5	(1)	0	-	1	(1)	6	(2)
Ovicaprine, sheep/goat	8	(1)	39	(4)	22	(2)	69	(7)
<i>Sus scrofa</i> , pig	10	(2)	57	(7)	53	(7)	120	(16)
Medium artiodactyl, sheep/goat/pig	34	-	264	-	230	-	528	-
<i>Bos taurus</i> , cattle	1	(1)	24	(2)	11	(2)	36	(5)
<i>Equus caballus</i> , horse	0	-	2	(1)	3	(1)	5	(2)
cf. <i>Equus asinus</i> , donkey	0	-	2	(1)	0	-	2	(1)
Large ungulate, cattle/horse/red deer	5	-	36	-	18	-	59	-
<i>Cervus dama</i> , fallow deer	6	(1)	6	(1)	7	(2)	19	(4)
<i>Cervus elaphus</i> , red deer	1	(1)	0	-	2	(1)	3	(2)
<i>Capreolus capreolus</i> , roe deer	3	(1)	0	-	2	(1)	5	(2)
Cervidae indet.	0	-	2	-	0	-	2	-
<i>Felis</i> sp., wild/domestic cat	0	-	3	(1)	1	(1)	4	(2)
<i>Lutra lutra</i> , otter	1	(1)	0	-	0	-	1	(1)
Medium-sized carnivore	0	-	8	(1)	11	(1)	19	(2)
Small carnivore	0	-	0	-	1	-	1	-
cf. <i>Lepus capensis</i> , brown hare	2	(1)	2	(1)	0	-	4	(2)
Rodentia indet.	0	-	2	(1)	1	(1)	3	(2)
Small mammal indet.	0	-	3	-	0	-	3	-
<i>Gallus gallus</i> , chicken	1	(1)	9	(1)	4	(1)	14	(3)
Bird indet.	0	-	19	(2)	3	(1)	22	(3)
cf. <i>Testudo</i> sp., tortoise	8	(1)	61	(2)	38	(1)	107	(4)
Fish indet.	0	-	1	(1)	5	(1)	6	(2)
Total identifiable (%)	85 (86.7)		543 (66.4)		415 (63.7)		1043 (66.5)	
Total non-identifiable (%)	13 (13.3)		275 (33.6)		237 (36.3)		525 (33.5)	
GRAND TOTAL	98		818		652		1568	

further identified. If these were eliminated from the "identifiable" category, then only 29.1% of the sample would be considered identifiable. However, the use of these taxonomic categories ensures that the presence of these fragmentary body parts is recorded rather than having to consider them as absent from the sample. There is a higher proportion of identifiable bone in Level I (86.7%) compared to the other levels, but this is probably due to the small sample size or abandonment of the building, so specimens were not broken up by trampling.

The list of species present at Building J includes the major domestic stock animals (sheep/goat, pigs, and cattle; 22.6% of the identifiable fauna), as well as horse, donkey, and chicken (Table 1). Wild animals include three species of deer (fallow, red, and roe), indicating that the inhabitants of Building J occasionally supplemented their

diet with wild game. Other smaller species are represented, including hare, small carnivores, wild or domestic cat, and several birds. One interesting find is the relatively large number of tortoise remains (107 specimens, 10.2% of the identifiable specimens). These are known from many other medieval sites in Italy (Barker 1973; Beck-Bossard 1981; Clark, pers. comm.; Tozzi 1981), and are probably well represented because the thick carapace and plastron pieces preserve well and are easily identifiable, even when fragmentary. In all levels, the tortoise remains are overwhelmingly comprised of carapace or plastron fragments (85 specimens, 79.4%), rather than other skeletal elements (22 specimens, 20.6%). This, and the MNI data, reveal that their actual numbers were very small, a fact also reported by Barker (1973) for the site of Tuscania. The paucity of bones belonging

to such small species as birds and fish, which are reported at other medieval sites, (e.g., see Bedini 1995; Jones 1992; Sutherland 1992) is undoubtedly due to excavation methods. While some deposits were screened using 6 mm mesh, others were not. This clearly affected the recovery of many of the smaller species.

The relative proportion of the three major domestic stock animals is one of the most interesting features of medieval Italian zooarchaeological studies (Baker and Clark 1993; Clark 1987). A variety of patterns has been found in medieval Italy, and these demonstrate that different stock-raising and consumption strategies were practiced in such different contexts as major urban centers, small towns, or rural elite sites (Baker and Clark 1993). Even within similar contexts, patterns have been shown to vary widely depending on ecological conditions, season, or politics. As noted earlier, Capalbiaccio is probably best considered a small town. The pattern of representation for the three major stock animals at Building J will be described and compared to that found at Building M and at other, similar medieval town sites in the region, particularly Tuscania (Barker 1973, 1978) and Tarquinia (Clark 1989, 2000).

For Building J at Capalbiaccio, there is a clear dominance of pigs over the other two categories of domestic herd animals, both in terms of number of identifiable specimens and minimum number of individuals (Table 2). For all levels combined, pigs comprise 50.8% of the recovered specimens, followed by sheep/goat (33.9%) and cattle (15.3%). The predominance of pigs over sheep/goat and cattle is a pattern seen at earlier sites in the area from Roman times onward (e.g., see Dyson 1981; King 1999) and at the earlier levels (late twelfth to mid-fourteenth centuries) of the nearby site of Tarquinia (Clark 1987), as well as at other medieval sites, such as Castello di Manzano (Bedini, 1995). The pattern differs from that shown at the later levels of Tarquinia and at the neighboring town of Tuscania, where sheep/goat predominate over pigs (Barker 1973, 1978; Clark 1989). However, a closer look at Building J data reveals that, although pigs dominate in the lowest two levels (Level II and Level III), there is a gradual decrease in their relative proportion through time, from 59.5% in Level III, to 46.3% in Level II, to 41.7% in Level I, where they are actually outnumbered by sheep/goat. This suggests a small shift in stock raising

Table 2. Relative proportion of the major domestic stock animals in the different levels at Building J and Building M by: (A) number of identifiable specimens (NISP) and (B) minimum number of individuals (MNI).

Building J	<u>Level I</u>		<u>Level II</u>		<u>Level III</u>		<u>Total</u>	
	NISP	%	NISP	%	NISP	%	NISP	%
(A)								
Sheep/goat	13	54.1	42	34.1	25	28.1	80	33.9
Pig	10	41.7	57	46.3	53	59.5	120	50.8
Cattle	1	4.1	24	19.5	11	12.3	36	15.3
(B)	MNI	%	MNI	%	MNI	%	MNI	%
Sheep/goat	2	40.0	5	35.7	4	30.8	11	32.4
Pig	2	40.0	7	50.0	7	53.8	16	50.0
Cattle	1	20.0	2	14.3	2	15.4	5	15.6

Building M	<u>Level I</u>		<u>Level II</u>		<u>Levels III & IV</u>		<u>Total</u>	
	NISP	%	NISP	%	NISP	%	NISP	%
(A)								
Sheep/goat	76	48.1	90	49.2	2	33.3	168	48.4
Pig	63	39.9	72	39.3	4	66.7	139	40.1
Cattle	19	12.0	21	11.5	0	0	40	11.5
(B)	MNI	%	MNI	%	MNI	%	MNI	%
Sheep/goat	9	42.9	9	50.0	1	25.0	19	44.2
Pig	9	42.9	6	33.3	3	75.0	18	41.9
Cattle	3	14.2	3	16.7	0	0	6	13.9

or consumption patterns during the later stages of occupation at Capalbiaccio, at least as revealed at Building J. This shift also occurs at Tarquinia, where pigs dominate in the lowest levels, but then decline through time and are outnumbered by sheep/goat in the later levels (Clark 1987, 1989).

Mortality data for pigs reveal that animals of all ages are represented. These include two piglets aged 3-6 weeks, one aged 3-12 months, three 12-16 months, four 17-22 months, four 24-36 months, and two very old individuals. Given that pigs were raised almost exclusively for meat, it is not surprising to find remains ranging from immature animals through very old adults. Young pork and suckling pig were probably highly desirable and, although animals of all ages are represented, half of the individuals were killed at around two years of age, probably a critical culling point when their maximum weight was reached (Cartledge et al. 1992). Among the pig remains are several specimens that, based on their very large size, may belong to wild boar. As noted earlier, it is difficult to distinguish wild boar but, if present, this indicates the inhabitants of Building J were supplementing their diet with wild game that included boar as well as deer.

Sheep/goat are not as prominent as pigs among the remains at Building J (33.9%, compared to 50.8% for pigs), and this may be an indication of their overall lesser role in the agricultural economy of the town. Given the grazing requirements of sheep/goats (compared to pigs) and considering the necessity of using arable land for farming, it may have been difficult to keep large flocks. Pigs could have been kept in sties and fed household scraps, or they could have simply roamed the hillside or town, happily grubbing away, and thus may have more easily fit into the overall agrarian pattern. It has been suggested that in some areas sheep/goat may have been raised only in the context of transhumance, with localized movement of flocks exploiting available grazing lands (Barker 1973, 1995; King 1999), but it is also possible that rural communities, such as Capalbiaccio, could have kept small flocks year round.

Mortality data are key for understanding whether stock animals, especially sheep/goat and cattle, were used primarily for meat or for other products, such as milk or wool, or for labor. Intensive meat production is generally characterized by a high number of subadults, whereas dairy production, exploitation for wool, or use for labor, are shown by a high number of adults (Clark 1987). The sheep/goat remains recovered from Building J

suggest multiple uses. Individuals over two or three years of age would be considered adults, and six of the 11 individuals represented fall into this age range, suggesting they were kept for milk or for wool. Of the other five individuals, one was only about six months old when it died, while the other four were 12 to 24 months old, suggesting their use as meat. At the nearby town of Tuscania, dominated by sheep/goat, the majority of the caprines died as adults, suggesting they were primarily raised for their wool and milk products (Barker 1973).

Among the three major stock animals, cattle rank third in importance by NISP (15.3%) and MNI (Table 2), although meat-weight conversions (see below and Table 3) suggest they were more important in the meat economy than the raw numbers indicate. Given the confines of the town and the hilltop setting of Capalbiaccio, large-scale cattle husbandry was probably impossible, although this region of Tuscany is known for its cattle production. Like sheep/goat, cattle would have competed for arable lands needed to grow crops for human consumption. Also, the small size of the sample at Building J precludes developing a clear picture of the role of cattle in the overall economy. Mortality data indicate the presence of only one younger animal, less than two years old when it died. The other four were all adults over three years old, suggesting they were kept for milking or labor, and then used as a source of beef only after they died, or were killed when their use for these other purposes declined. None of the cattle remains at Building J belonged to extremely large individuals, so the presence of oxen is not indicated here.

Given the interest in understanding the relative importance of the three major domestic stock animals at medieval sites, researchers have used various meat-weight conversions to try to estimate the amount of available meat that each would have contributed to the diet (e.g., see Barker 1973; Bedini 1995). Such studies are revealing, but should be viewed with caution, especially in the context of a market economy where whole carcasses may not have ever been present. Despite these problems, meat-weight conversions were determined for sheep/goat, pig, and cattle remains from Capalbiaccio (Table 3). At Building J, cattle contributed more meat to the diet (over 50%) than either pigs or sheep/goat. This means that, although the inhabitants of Building J favored pork over mutton and beef by numbers of animals, by meat-weight they ate more beef.

Cultural behaviors relating to processing animals for food or other products can be seen in surficial

Table 3. The quantity of meat supplied by the main domestic species at Building J and at Building M, all levels combined, according to: (A) the number of identifiable specimens (NISP) multiplied by constants, and (B) the minimum number of individuals (MNI) multiplied by constants. The constants used are as follows, after Bedini (1995), converted from pounds given in Barker (1973): 27kg for sheep/goat, 46kg for pigs, and 227kg for cattle.

Building J				
(A)	NISP	% NISP	total meat (kg)	% meat
Sheep/goat	80	33.9	915.3	13.6
Pig	120	50.8	2336.8	34.8
Cattle	36	15.3	3473.1	51.6
(B)	MNI			
Sheep/goat	11	34.4	928.8	13.7
Pig	16	50.0	2300.0	34.0
Cattle	5	15.6	3541.2	52.3

Building M				
(A)	NISP	% NISP	total meat (kg)	% meat
Sheep/goat	168	48.4	1306.8	22.5
Pig	139	40.1	1884.6	32.5
Cattle	40	11.5	2610.5	45.0
(B)	MNI			
Sheep/goat	19	44.2	1193.4	19.0
Pig	18	41.9	1927.4	30.7
Cattle	6	13.9	3155.3	50.3

modifications to the bones. In Building J, a total of 130 bones (8.3%) were burned, while 143 (9.1%) bore evidence of butchery marks. Four types of butchery marks were recorded: cuts (fine incised lines), chops (deeper, wedge-shaped marks), shears (where the bone exhibits a flat, planar face where it was hacked through), and saws (fine, parallel marks made by a back-and-forth motion through the bone). A detailed study of the butchery marks will be undertaken in the future to reveal more precise patterns of dismemberment and consumption. What is known at this time is that butchery marks are found on almost all body parts of domestic species, attesting to separating meat at joints, hacking through the vertebral column, and scraping meat off bones.

BUILDING M

Faunal remains are most numerous in Levels I and II, then taper off dramatically in the deeper deposits (Table 4). Indeed, over 95% of the fauna comes from Levels I and II combined. The quantity of specimens from Level

I (almost 40% of the specimens recovered) contrasts with the paucity of specimens found in Level I at Building J (only 6.3% of that assemblage). This difference in the quantity of bones in Level I at the two buildings suggests very different occupation histories and uses for the two areas, at least during the later phases of the occupation of Capalbiaccio. The area around Building M apparently continued to be used as a repository for bone refuse right up until the town was abandoned, whereas Building J may have fallen into disuse sometime earlier.

The trenches at Building M also covered a smaller excavated area than at Building J, but faunal remains were more numerous, suggesting a denser deposit and a different pattern of use. At Building M, three 1.5 x 1.5 m pits (6.75 m²) were excavated, yielding 2,285 faunal specimens. In contrast, almost 60 m² were excavated at Building J (an area eight times the size of M), yielding 1,568 specimens. Not only were there more bones recovered from Building M, but they were recovered from a much smaller area, suggesting a dense bone heap

Table 4. Faunal remains from Building M by number of identifiable specimens (NISP). Minimum number of individuals (MNI) given in parentheses.

	Level I	Level II	Level III	Level IV	Total
<i>Ovis aries</i> , sheep	6 (1)	0 -	0 -	0 -	6 (1)
<i>Capra hircus</i> , goat	6 (2)	16 (2)	0 -	0 -	22 (4)
Ovicaprine, sheep/goat	64 (6)	74 (7)	0 -	2 (1)	140 (14)
<i>Sus scrofa</i> , pig	63 (9)	72 (6)	3 (2)	1 (1)	139 (18)
Medium artiodactyl, sheep/goat/pig	170 -	373 -	27 -	9 (1)	579 (1)
<i>Bos taurus</i> , cattle	19 (3)	21 (3)	0 -	0 -	40 (6)
<i>Equus caballus</i> , horse	6 (2)	16 (3)	0 -	0 -	22 (5)
cf. <i>Equus asinus</i> , donkey	0 -	8 (1)	0 -	0 -	8 (1)
Large ungulate, cattle/horse/red deer	33 -	52 -	0 -	1 (1)	86 (1)
<i>Cervus dama</i> , fallow deer	16 (1)	8 (1)	0 -	0 -	24 (2)
<i>C. elaphus</i> , red deer	1 (1)	0 -	0 -	0 -	1 (1)
<i>Capreolus capreolus</i> , roe deer	10 (2)	0 -	0 -	0 -	10 (2)
Cervidae indet.	0 -	3 -	0 -	0 -	3 -
<i>Canis</i> sp., dog/wolf	1 (1)	3 (1)	0 -	0 -	4 (2)
cf. <i>Lepus capensis</i> , brown hare	1 (1)	1 (1)	0 -	0 -	2 (2)
cf. <i>Sciurus</i> sp., squirrel	2 (1)	1 (1)	0 -	0 -	3 (2)
cf. <i>Erinaceus europaeus</i> , hedgehog	1 (1)	0 -	0 -	0 -	1 (1)
Rodentia indet.	0 -	2 -	0 -	0 -	2 -
Medium-sized mammal indet.	3 -	28 -	2 (1)	0 -	33 (1)
Small mammal indet.	1 -	30 -	1 (1)	0 -	32 (1)
<i>Gallus gallus</i> , chicken	11 (1)	3 (1)	0 -	0 -	14 (2)
Bird indet.	8 (2)	18 (2)	1 (1)	0 -	27 (5)
cf. <i>Testudo</i> sp., tortoise	84 (1)	145 (1)	5 (1)	0 -	234 (3)
Fish indet.	1 (1)	4 (1)	1 (1)	0 -	6 (3)
Total identifiable (%)	507 (61.1)	878 (65.0)	40 (51.3)	13 (50.0)	1438 (62.9)
Total non-identifiable (%)	323 (38.9)	473 (35.0)	38 (48.7)	13 (50.0)	847 (37.1)
GRANDTOTAL	830	1351	78	26	2285

consistent with the notion that the Building M area served as a garbage dump rather than a dwelling.

There are interesting differences in the surficial modifications to the bones from Building M compared to those from Building J that also provide clues to the different functions and uses of the two areas. At Building M, as at Building J, 3.5% of the bones had carnivore gnaw marks (presumably from dogs). However, 44 bones (1.9%) also exhibit gnawing from rodents. Although this is a small percentage of the assemblage, it is three times as many as were found at Building J (0.6%), suggesting more rodent activity among the bone

refuse at Building M. This lends further support to the suggestion that the open space at Building M served as a refuse dump that could have been more easily frequented by rodents than would be true for the interior of a residence, as at Building J.

Cultural modifications to the bones also differ between Building J and Building M. Both areas had similar percentages of butchered specimens (9.9% at Building M compared to 9.1% at Building J). The types of butchery marks were also similar, including cuts, chops, shears, and saws in both assemblages. However, the relative proportion of burned bone differed

dramatically between the two areas. At Building M, only 1.5% of the assemblage (35 specimens) showed evidence of having been burned, whereas at Building J, 8.3% of the bones had been burned. This could relate to different cooking techniques being practiced in the two areas. Boiling or stewing meat in a pot would leave little evidence of burning, whereas roasting over an open flame might cause exposed bones to become scorched. More likely, however, these differences relate to housekeeping activities in Building J. One of the interesting issues in zooarchaeological studies concerns when and how specimens actually become burned. Ethnographic studies have revealed that a significant amount of burning occurs not during cooking, but rather during clean-up, when bone refuse from meals is swept into the fire. The higher proportion of burned bone at Building J may be from such activity, which would be absent in a garbage dump, as at Building M.

Of the 2,285 bone specimens recovered from the area known as Building M, 1,438 (62.9%) were identifiable to some level and 847 (37.1%) were non-identifiable (Table 4). These proportions are similar to those found at Building J (see Table 1), and do not change significantly throughout the various levels. Again, if those bones identified only as medium artiodactyl and large ungulate are removed from the sample of identifiable bones, then only 33.8 % would be considered identifiable.

The species represented are consistent with those found at Building J, again showing the predominance of the three major domestic stock animals (sheep/goat, pig, and cattle), which comprise 24.1% of the identifiable specimens. Horse, donkey, and chicken are present, along with a variety of other species including dog/wolf, hare, squirrel, and hedgehog. Deer specimens indicate that wild game sometimes supplemented the diet. Tortoise remains are common (234 specimens, 15.8% of the identifiable specimens), and again they are overwhelmingly dominated by carapace and plastron fragments (226 specimens, 95.6%) rather than other bones, so that few individuals are actually present.

The Building M assemblage differs from Building J in the relative proportions of the three major domestic stock animals (Table 2). Sheep/goat, rather than pigs, dominate numerically by number of specimens (48.4%) and by minimum number of individuals (44.2 %), but pigs are still well represented (NISP = 40.1%, MNI = 41.9%). Also, the relative proportions of the three major stock animals do not change through time as they do in Building J (disregarding the extremely small sample sizes

from the deeper Levels III and IV at Building M). One explanation is that the fauna in the upper levels at Building M represents the culmination of the trend toward more sheep/goat than pig that was revealed at Building J, so that here, by the later stages of occupation of the town, sheep/goat dominate the remains. This coincides with the general trend noted by Clark (1987:15) that sheep/goat attain their greatest importance in the late medieval period in Italy where they are "numerically dominant at a greater portion of sites than in the earlier periods." The predominance of sheep/goat over pigs is a pattern also seen at the nearby site of Tuscania (Barker 1973) and in the main levels at the neighboring town of Tarquinia (Clark 1989). At Tuscania, sheep/goat dominate overwhelmingly, as high as 87.6 % of the stock animals in one pit (Barker 1973), so that it appears that this neighboring town may have been involved in small-scale stock production.

The bigger question, however, is what is the meaning of either this shift (if it is a shift through time) or this difference (if it is simply a difference between the use of the two buildings at Capalbiaccio)? Clearly there are a number of complex factors that influence stock-raising choices, including geography, economy, environment, and politics. The documentary evidence for the region suggests a general increase in sheep/goat herding during this time (Barker 1978), and some researchers have suggested that this may signify a trend toward raising sheep for wool. Alternatively, the differences in the proportions of sheep/goat and pig in Building J and Building M may simply be due to variations in how these two spaces within the town were used.

Mortality data for sheep/goat indicate a clear predominance of adults over subadults, more so than at Building J, a pattern suggesting they were raised primarily for dairy products and wool, rather than meat. Of the 19 individuals represented, 14 were over 2½ years old when they died, four were 13-16 months old, and one was a newborn, 1-5 weeks old at death. The difference in the mortality profiles of sheep/goat at the two buildings probably relates to their different uses. Building J more clearly reflects multiple uses of an individual household, whereas Building M may reflect the important role of sheep/goat in dairy and wool production for the town. At Tuscania, the majority of the sheep/goats died when they were older than two years, suggesting there they were also raised primarily for products other than meat. This predominance of adult sheep/goats contrasts with the pattern found at the main levels at Tarquinia, where

most of the individuals were young when they died, thus suggesting they were killed for their meat (Clark 2000). Given its location and larger size, Tarquinia may have been involved in some kind of sheep/goat meat production, which was not the case for Capalbiaccio. It is possible that, for Capalbiaccio, small flocks of sheep/goats could have been kept around the town year round.

Pigs are again represented by individuals of all ages, from three piglets only 6 weeks old to, based on extremely worn teeth, two very old adults. The majority of animals (nine individuals) were 2 to 3 years old when they died, probably the optimum time for their meat weight. Among the pig remains is evidence for the presence of two wild boars, based on the extremely large size of some specimens, including a canine. This suggests the pork diet was supplemented with wild boar that was hunted.

Cattle are represented in the same kinds of low proportions that were found in Building J and at many other medieval Italian towns (Barker 1973; Clark 1987, 2000). Among the remains are several extremely large specimens, undoubtedly belonging to two adult oxen. The remaining four individuals include two cows under 2½ years old and two over 2½ years old. The small sample size again precludes fully understanding their role in the economy of the town, but multiple uses are suggested, including milk, beef, and labor.

Meat weight conversions were also determined for the major stock animals at Building M (Table 3). Again, although cattle are numerically less common than either sheep/goat or pig, they still contributed the most meat to the diet. Likewise, although pigs are less common than sheep/goat, by meat weight they contributed more to the diet. Thus, as at Building J, the residents in this part of the town consumed more beef than pork or mutton despite the numerical dominance of the smaller stock.

DISCUSSION

Capalbiaccio is an excellent site for studying a small medieval fortified community as it developed, since this was a time of important changes in community form in central Italy (Dyson 1979, 1984; Hodges et al. 1995). It provides evidence for how one town fit into the evolving nature of the Italian countryside. An examination of the faunal remains reveals the role of animal production and consumption in the overall economic system.

It is important to appreciate the complex and evolving nature of the medieval towns and countryside in Italy (Barker 1995; Caferro 1994; Epstein 1993). From the twelfth century onward, market economies based on

exchange and specialization developed, although other forms of distribution, including self-sufficiency, continued (Baker and Clark 1993). It is difficult to evaluate the relative autonomy of Capalbiaccio in the market economy. In this regard, Baker and Clark (1993) have cautioned zooarchaeologists working on medieval faunas from Italy to be mindful of the difference between consumption and production, and to consider the role of animals always in terms of the wider economic system of which they were only a part.

Like other towns, such as Tuscania and Tarquinia (Barker 1973, 1978; Clark 1989, 2000), in the area, the animal economy at Capalbiaccio was dominated by three types of stock: sheep/goat, pig, and cattle. Building J and Building M at the site provide two different glimpses into the animal consumption and production patterns in the town during the late thirteenth to early fifteenth centuries. Differences in the faunal remains recovered from each building show that these areas had different uses. Building J probably represents a residence that was abandoned during the later stages of occupation of the town, whereas Building M seems to be a dense refuse pile that was used by residents until the town was abandoned. In terms of the overall economy, it is not easy to reconstruct the mechanisms of production and supply. Certainly the faunal remains do not suggest any large-scale production of stock for market exchange. Rather, it seems more likely that the consumers of the animal products represented by the faunal remains were largely also the producers, and that no large-scale meat, dairy, or wool production was taking place in the town.

One issue deserving further exploration is whether the two-phase medieval occupation of the town envisioned by Dyson (1979, 1981, 1984) manifested itself in any changes in faunal exploitation patterns or stock-rearing practices. One such pattern is suggested: a gradual shift away from a predominance of pig toward more sheep/goat. This pattern is widespread in late medieval times in Italy, as more sheep/goats were being raised in connection with wool production. The predominance of pig in the earlier levels probably represents an important strategy for the town given that they are easy to raise compared to sheep/goat or cattle, all of which require grazing lands or fodder, and thus compete with cereal crops or for arable land where such crops could be grown.

The results presented here are a first attempt to describe some of the faunal remains from Capalbiaccio and to reconstruct the economic history of the town.

Their interpretation will benefit enormously from a detailed comparison with historical sources, as demonstrated by the work of Clark (1992, 2000), once the chronology of the levels is further refined. At that time it should be possible to get a clearer picture of animal production and consumption by the community. In addition, analysis of the faunal remains from other buildings at the site and further study, including butchery patterns, pathologies, and metrical analysis of the domesticates, will provide a fuller picture of the stock economy of the town as it evolved.

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Note: Although I knew of her work long before, I first met Liz Wing at the Seventh International Conference for Archaeozoology held in Konstanz, Germany, in 1994. She may not remember, but we walked through the streets of Konstanz together one evening talking about family and about Germany. My family (husband and two young sons) had accompanied me to the meetings and, at the same time, another family member was ill back in the United States. She befriended me with her kind words and comforting voice and told me that her mother was born in Germany. When asked to contribute to this volume, I decided to select some of my European work, since I first met her there where her family originated.

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