Castelporziano: Preliminary Faunal Report

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Introduction and Methodology

Multidisciplinary archaeological research at the site of Castelporziano offers an important opportunity to document ancient life along the Laurentine shore south of Ostia. This report provides a preliminary analysis of the faunal material collected during the 1986-2002 excavations and survey work in the area of the ancient Roman *vicus*. At this stage, basic trends concerning aspects such as temporal changes in faunal resources, spatial distribution of animal bone waste, and use of animal and shell materials in dietary, economic and building capacities will be outlined. These preliminary results will be compared to data from other sites in Italy – both neighbouring ones in the Rome/Ostia vicinity, as well as those further removed. A final report, pending complete chronological and contextual information about the various contexts of deposition for these bones, will provide greater detail about temporal and spatial patterns shown in the zooarchaeological data and delve more deeply into the relationship of this site to others, both in and outside of Italy.

The Castelporziano faunal materials were principally retrieved by hand during excavation; sieving was no extensively employed. Consequently, the possibility of recovery bias favouring the bones of larger mammals must be considered in interpretations (Barker 1975; Payne 1975). The excavators, however, were very vigilant in retrieval and collected many bone pieces, both large and very tiny ones; thus I would argue that recovery biases have not significantly skewed the sample and its cultural interpretations. The sample was examined during June 2002, at the site, where the materials are also currently stored. All identifiable pieces that could be recorded to species level were catalogued. Ribs and vertebrae were not identified to species, but grouped according to size categories (e.g., large=cattle size; medium=ovicaprid and pig size), and tallied as the 'UNID' portion of the faunal sample. Taphonomic, age, sex, butchery, and metric information [using the system of von den Driesch (1976)] were recorded where possible. Bone weights were logged for individual contexts.

The taxa were counted using NISP (number of identifiable specimens) and MNI (minimum number of individuals). The NISP method employed counted individual teeth within mandibles or maxillae. Thus, a mandible fragment with 3 teeth in it provides an NISP count of "4" (i.e., 3 teeth, plus mandible piece itself, equals a total of "4"). The MNI method took into account age categories.

Spatially, the *vicus* at Castelporziano is divided into a number of regions as outlined and mapped in the excavation handbook. The bulk of the faunal materials collected derived from Trench S & SA, and from excavations within buildings X and Y. Much smaller collections were excavated from the remaining areas.

Although a complete and detailed chronology for the site is currently under construction, available data suggest that most of faunal deposits can be grouped into one of five phases, which I have identified here:

Phase 1: Republic – 1st c. BC (Augustan)

Phase 2: Early Imperial – early 1st c. AD (Tiberian)
Phase 3: Imperial – 1st to 3rd c. AD
Phase 4: Late antiquity – late 3rd to 4th c. AD
Phase 5: Post antiquity (includes: modern, unstratified, disturbed)

These phases are recognized in this report as a guide to documenting broad temporal trends in the faunal data. As the chronology is revised with the analysis of all artifactual and structural data, so shall the conclusions drafted in this preliminary report concerning temporal changes in faunal material be modified.

Table 1 provides a summary of the bone NISP, shell NISP and UNID bone counts for each of the phases. Phase 3 clearly dominates, representing close to 75% of all the bone and shell recovered from the entire site. The other samples are relatively small, with the exception of phase 5; however, this phase is of limited importance in reconstructing dietary and economic patterns because of its unstratified and disturbed nature. Although each phase will be discussed below, I shall concentrate on materials from phase 3.

Table 1: Summary of Faunal Counts

	Animal Bone NISP	**%**	**Shell NISP**	**%**	**Animal Bone UNID**	**%**
PHASE						
1	36	1.7	11	0.3	20	0.8
2	65	3.0	198	4.8	84	3.2
3	1642	76.8	3162	77.3	1931	74.2
4	138	6.5	82	2.0	267	10.2
5	256	12.0	639	15.6	302	11.6
TOTAL	**2137**		**4092**		**2604**	

Table 2 lists the total weight of the NISP bone and shell by phase and trench. Again, they highlight the predominance of phase 3 levels, here representing 78% of the total NISP bone weight and 68% of the total shell weight. Whereas nearly twice as many shells than bones were identified in NISP counts (Table 1), NISP bone significantly outweighs its shell counterpart (c. 70% bone to c 30% shell, by weight).

Table 2: NISP Bone and Shell Weights (g) by Phase and Trench

	A	B	C	D	F	H	M	P,Q,R	S-ext	S,SA	T	X,Y	**ALL**
BONE													
Phase 1				445									**445**
Phase 2				455				100	945				**1500**
Phase 3				345				880	610	21205	270	12485	**35795**
Phase 4								40	40		510	1590	**2180**
Phase 5	75		100			25	1015*			4720	245	250	**5415**
												Total	***45355***
SHELL													
Phase 1				350									**350**
Phase 2				2930	80			10	100				**3120**
Phase 3				1525				115	160	6500	220	4520	**13040**
Phase 4						30			10		140	465	**645**
Phase 5	5		345			50	60*			1465	110	50	**2025**
												Total	***19180***
TOTAL													**64515**

* indicates redeposited ancient material – not included in total counts

Quantification and Phase Comparisons

Several animal taxa were identified from the Castleporziano samples. NISP values for these, as grouped by the 5 temporal phases outlined above, are provided in the following tables. Tables for the UNID portion of each temporal phase are also included. A complete list of scientific and common names for each taxon is provided at the end of this report.

Phase 1: Republic – 1st c. BC (Augustan)

Table 3: Phase 1 Bone NISP

	A	B	C	D	F	H	M	P,Q,R	S-ext	S,SA	T	X,Y	**ALL**
Cattle				1									**1**
Sheep/goat				16									**16**
Pig				15									**15**
Chicken				3									**3**
Hare				1									**1**
TOTAL				**36**									**36**

Table 4: Phase 1 Shell NISP

	A	B	C	D	F	H	M	P,Q,R	S-ext	S,SA	T	X,Y	**ALL**
MARINE													
Ostrea				11									**11**
TOTAL				**11**									**11**

Table 5: Phase 1 UNID Bone

	A	B	C	D	F	H	M	P,Q,R	S-ext	S,SA	T	X,Y	**ALL**
MEDIUM													
Rib				10									**10**
Long bone				7									**7**
Vertebrae													
Scapula				1									**1**
Pelvis													
Cranium													
Other													
LARGE													
Rib													
Long bone				1									**1**
Vertebrae													
Other													
AVIAN				1									**1**
MISC.													
TOTAL				**20**									**20**

The phase 1 faunal sample is the smallest of all temporal periods recognized at the site. It is also somewhat problematic since it derives exclusively from lower levels of the fill of the fountain D1b, located at the N end of avenue D. Pottery in association was among the earliest of that dated at the site, but the condition of the bone and shell pieces themselves suggests that these lowest levels of the fountain fill were not secure; they could have been mixed with subsequent levels to some degree. Some elements exhibited charring, from pre-depositional burning. Others had mineral concretions on their surface, presumably from contact with unsolidified mortar. Still, others showed evidence of root etching and carnivore gnawing, both indications that they had rested exposed initially on the surface, and then buried within the topsoil before being deposited into the fountain. A few were relatively free of any taphonomic markings, perhaps indicative of a more recent burial. These eclectic taphonomic conditions certainly suggest a mixed and disturbed deposit, which, when coupled with the small sample size, limits the potential of this earliest faunal collection from the site.

Pig and sheep/goat predominate the NISP count for this earliest phase. Several dental and cranial elements comprise the sheep and goat sample, while pig is represented from a more diversified collection of cranial and post-cranial elements. Age data indicate a mix of adult and immature specimens for each taxon. Isolated remains of largely adult domestic fowl, cattle and hare complete the list of identified pieces. The UNID portion of the sample mimics the NISP count in terms of a predominance of medium-sized animals. Moreover, the abundance of rib and long bone fragments in this count suggests that at least some whole animals (the case being strongest for pigs) were brought in whole to the site, and subsequently slaughtered, processed, consumed and disposed of within the area. The few butchery marks exhibited on these remains are in accordance with standard disarticulation, gutting and defleshing procedures for animals. Chop marks on the proximal end of the ulna of pig served to disarticulate this animal at its knee joint, while knife marks along the shaft of domestic fowl tibiotarsi and hare scapula presumably resulted from deep cutting to remove meat from these bones.

Certainly, this sample is too small and too disturbed to draft definitive conclusions about the economic and dietary state of Castelporziano during the Republic. Nevertheless, the adundance of ovicaprid and pig (with slight predominance of the former over the latter), coupled with the inclusion of domestic fowl, cattle and hare, accords with typical faunal patterns for Republican Italy, especially among sites in central Italy (MacKinnon 2004). Although I would argue that sheep and goat pastoralism never attained the scale or magnitude in this area as it might have in more environmentally conducive regions of Italy, such as the south and interior mountains, I suspect pastoral operations in and around Castelporziano dwindled significantly throughout the 2nd and 1st centuries BC as the area became increasingly urbanized. Consequently, the contribution of sheep and goats to the economy and diet was altered accordingly, as pigs became more commonplace.

Considering the proximity of the site to the Mediterranean Sea, it is surprising that relatively few shells were identified in the Republican levels of fountain D1b. The 11 oyster shells catalogued are similar in size and preservation condition to ones retrieved from subsequent Imperial contexts in this fountain, which supports theories about depositional mixing. All of the oysters from this fountain (regardless of temporal level) were exceptionally large in comparison to others found at the site. I would argue this relates to a deliberate action to harvest, display, or somehow collect/curate oysters for the occupants. However, I suggest this did not occur at the site until Imperial times

Phase 2: Early Imperial – early 1st c. AD (Tiberian)

Table 6: Phase 2 Bone NISP

	A	B	C	D	F	H	M	P,Q,R	S-ext	S,SA	T	X,Y	**ALL**
Cattle				1					1				**2**
Sheep/goat				5					16				**21**
Pig				9				5	16				**30**
Equid									3				**3**
Canid				1									**1**
Chicken				1									**1**
Deer									1				**1**
Hare									1				**1**
Tortoise				5									**5**
TOTAL				**22**				**5**	**38**				**65**

Table 7: Phase 2 Shell NISP

	A	B	C	D	F	H	M	P,Q,R	S-ext	S,SA	T	X,Y	ALL
MARINE													
Ostrea				158				1	1				**160**
Cardium				1				1					**2**
Donax				25									**25**
Glycymeris				1					3				**4**
Murex				1									**1**
Mytilus				3									**3**
Turitella				1									**1**
Tonna				2									**2**
TOTAL				**192**				**2**	**4**				**198**

Table 8: Phase 2 UNID Bone

	A	B	C	D	F	H	M	P,Q,R	S-ext	S,SA	T	X,Y	**ALL**
MEDIUM													
Rib				5				1	12				**18**
Long bone				20				2	19				**41**
Vertebrae				1					2			1	**4**
Scapula				1					2				**3**
Pelvis				1					2				**3**
Cranium									2				**2**
Other													
LARGE													
Rib				6					2				**8**
Long bone								1	2				**3**
Vertebrae													
Other				1									**1**
AVIAN				1									**1**
MISC.													
TOTAL				**36**				**4**	**43**				**84**

The Imperial Period is divided into two phases for the purposes of this report. The first phase distinguishes early 1st century AD remains, generally coincident with the reign of Tiberius; the latter phase is a more encompassing bracket of 1st to 3rd century AD material. Although there is some overlap between these two phases, and one could argue they be combined, their separation here helps in deciphering temporal shifts in the animal diet and economy between what might be considered the “early” and “established” phases of *vicus* occupation.

Spatially, faunal material dated to phase 2 is represented at three areas of the site; however, none of these samples is significantly large. Moreover, each derives from an area where subsequent phase 3 deposits are plentiful, so there is a possibility of disturbance and contamination, especially from 2nd and 3rd century materials. The fountain, D1b, saw continued deposition of debris at this time, while scattered deposits accumulated in areas P,Q,R, and S. Trench S, a road abutting the Via Severiana, north of the main *vicus* excavations, is significant faunally, since this region accumulated midden deposits during the Imperial period.

Little can be concluded about the animal diet and economy of the early Imperial *vicus* at Castelporizano from the bones recovered. Collectively from the three areas, pigs predominate, followed by ovicaprids, and much smaller numbers of cattle, equids, dogs, domestic fowl, deer and hare. Five tortoise shell fragments were also found in the fountain, D1b, but these do not derive from a consumed individual, and might be intrusive. Isolated teeth comprise the dog and equid samples, which may also be intrusive to some degree from subsequent levels. The higher frequency of pig, compared to other domestic animals, coincides with a similar increase in the contribution of pork to the Roman diet during Imperial times, throughout Italy. I suspect farmers and herders who supplied the site with meat modified their own patterns to cater to the augmented demand for pork. Again, however, the elemental, age and butchery data indicate that collections of young and mature pigs were herded, or otherwise transported, to the *vicus* as relatively whole animals (as opposed to butchered parts), where they seem to have been slaughtered, processed and consumed within the site. The butchery procedure appears to have been performed using similar tools and in a similar manner to Republican models. In other words, there is continuity between these two phases, and no evidence to suggest that butchery operations changed dramatically in scale or method from the 1st century BC to the 1st century AD.

Taphonomic data support the disturbed nature of these phase 2 faunal samples. The bones recovered from the fountain, D1b, exhibited a wide range of taphonomic markings (e.g., exposure, carnivore gnawing, sun-bleaching, root etching, soil staining, mortar concretions) distributed unequally among elements. It seems that this bone material was collected, probably rather haphazardly, perhaps from a variety of areas around the site, before it was deposited or otherwise came to accumulate in the fountain. Certainly, some of it lay exposed on the surface; however, it is difficult to tell if these materials were deposited in the fountain within a short span of time (as perhaps during a cleaning event, or as part of a need to fill the fountain quickly), or if they accumulated over the course of many years or decades. This latter hypothesis is supported further by the collection of sea shells from phase 2 levels in the fountain (excluding oysters, which I shall discuss separately below). Most of these small cockle and wedge shells were sun-bleached, eroded and otherwise exposed, indicating that they sat dead on the beach for some time, prior to their deposition in the fountain.

A similar need to provide fill quickly might explain the taphonomic condition of bones collected from Trench S. Mixed taphonomic conditions prevail in this deposit as well, thereby suggesting that rubbish, which had originally accumulated at different contexts either in or around the area, was eventually deposited in Trench S. Many of these bones were also flecked with mortar concretions, which lends support to the hypothesis that this material may have accumulated as fill in the early stages of road or building construction, perhaps to level uneven surfaces quickly and efficiently.

Returning to the fountain deposit, D1b, there is one unique find. By far the most abundant taxon, by frequency and weight, in the phase 2 (and phase 3) levels of this feature is the oyster (*Ostrea edulis*). Moreover, the oysters from this context are amongst the largest of all oysters identified at the site, as well as the most densely concentrated from all deposits. There is deliberate human activity involved, be this in harvesting these exceptionally large oysters from the sea and storing them, or at least depositing their shells after consumption, in the fountain. The possibility also exists that the fountain was used as an oyster cultivation pool; however, in this case, the fountain would need to be maintained with a continuous source of sea water, as marine oysters cannot survive in fresh water and, moreover, require periodic flushing of stagnant waters to remove faeces accumulation on the bottom surface of the fountain.

Despite the number of marine shells discovered at Roman sites in Italy, there are only a few references to marine molluscs in the classical texts. Pliny, the Elder, is the sole Latin author to consider the topic in any depth. He somewhat superficially describes the great variety of shapes and sizes of shellfish, before detailing the importance of the two most economically productive marine molluscs: oysters and murex.

According to Pliny (*NH* 32.21.59-60), oysters survive in both marine and freshwater habitats, but the largest individuals grow best in shallower waters that receive much light. They vary in colour: red in Spain, tawny in Illyricum, and black in Circeii (Plin., *NH* 32.21.60). Regardless of region, the prized individuals were compact, not greasy, thick, meaty, without fringed edges, and taken from hard bottom surfaces, rather than muddy or sandy bottoms (Plin., *NH* 32.21.60). Such features could describe the large oysters found in the Castelporziano fountain.

Oysters provided two resources to the Romans. Pearls were collected or purchased and ostentatiously displayed. Those from the Indian Ocean and around Arabia on the Persian Gulf were specially prized (Plin. *NH* 9.54) and probably imported at great expense (note: there are no imported species from the Casteloporzino sample). Oysters were also eaten during the Roman period. Again, it appears this practice was generally reserved for the wealthy. Pliny (*NH* 32.21.59) notes that oysters had long been considered a prize delicacy. Ausonius, writing in the 4th century AD (*Ep*. 5.18-24) lists resort regions in and near the Mediterranean, which produced quality oysters. In addition, he records that oysters were famed throughout the lavish feasts of high-born prodigals (*Ep*. 5.1) and the delight of world-wandering elite (*Ep*. 5.41). Apicius lists three gourmet recipes involving oysters (4.2.31, 9.6, 9.9), as well as a special cumin sauce for all kinds of shellfish (9.7).

There is evidence that oysters were cultivated in specialized ponds or *ostriaria* during the Roman period. According to Pliny (*NH* 9.79), these were first invented by Sergius Orata on the Gulf of Baiae, near Naples, during the 1st century BC; however, Roman authors contribute little about the methods involved. Pliny mentions nothing on this topic, while Ausonius (*Ep*. 5.30) rather casually notes that oysters may have been attached to stakes (Yonge 1960: 149). Horace (*Sat*. 2.4.33), Ovid (*Fasti* 6.174), and Juvenal (4.142) provide further reference, but without details.

The best evidence for oyster cultivation comes from the drawings of *ostriaria* on Roman glass vases. These were originally figured in Coste (1861) and later described in more detail by Günther (1897). Both depict panoramic views of buildings and structures along the coast of Baiae, which include *ostriaria*. The oysters appear to have been cultivated by suspending them in loosely twisted ropes known as *pergolari*, the oysters being pushed between the strands. These ropes were then hung from other ropes or wooden support poles stretched horizontally between upright stakes driven into the bottom (Yonge 1960: 150). From an overhead view, the structure would appear to assume a grid pattern.

Although no structural remains survive in the archaeological data to prove *ostriaria* existed along the coast at the site of Castelporizano during antiquity, the large accumulations of shells recovered from the site, and especially those found in the fountain, confirm that oysters were collected in some manner. The uniform size and shape of the examples from the fountain would suggest that these individuals were of similar age and grew under similar surroundings, conditions that could be easily met if these oysters were carefully cultivated and harvested in *ostriaria*, as opposed to randomly collected from a less-controlled natural population growing in the sea. The wooden poles and stakes used in *ostriaria* construction could be easily driven into the coastal sand bars just offshore. It is unknown how rocky the coastal shelf was during antiquity (it is currently quite sandy) so there may have been limited habitats for oysters unless *ostriaria* were constructed. Given the structural modifications required to maintain a population of oysters in the fountain for any extended period of time, it seems unlikely that the fountain was used as a cultivation pool. However, it is plausible that the fountain was used to store oysters for a short period of time, perhaps while they awaited inspection and sale. True, fresh water will eventually kill marine oysters, but it also helps preserve them. Cool-packed oysters can keep for up to a week and the constant flow of cool water in the fountain may have aided their preservation.

Phase 3: Imperial – 1st to 3rd c. AD

Table 9: Phase 3 Bone NISP

	A	B	C	D	F	H	M	P,Q,R	S-ext	S,SA	T	X,Y	**ALL**
Cattle								4	1	66		62	**133**
Sheep/goat				4				15	2	249		72	**342**
Pig				37				59	19	554	16	367	**1052**
Equid									1	12	2	2	**17**
Canid										12			**12**
Gallus				2					5	22		12	**41**
Deer					5				1				**6**
Boar												1	**1**
Hare												1	**1**
Rodent										1	1		**2**
Goose										2			**2**
Passerine										1			**1**
Tortoise				1					1	14	1	8	**25**

Toad								1					**1**
Fish										2			**2**
Human										3			**3**
TOTAL				**44**	**5**			**79**	**30**	**939**	**20**	**525**	**1642**

Table 10: Phase 3 Shells NISP

	A	B	C	D	F	H	M	P,Q,R	S-ext	S,SA	T	X,Y	ALL
MARINE													
Ostrea				101	1	2		12	10	312	10	291	**739**
Cardium				2				1		26	1	5	**35**
Donax				3		2		5	55	1812	12	233	**2122**
Glycymeris				2				1		49	5	6	**63**
Murex				1					2	12	1	4	**20**
Mytilus				1					2	2		5	**10**
Turitella										10		10	**20**
Tonna										5			**5**
Nassarius						2			1	10		1	**14**
Aporrhais								1	2	10		1	**14**
Cerithium								1		4			**5**
Pecten								1		1		1	**3**
Cassidaria								1	1	17		7	**26**
Natica									1	9		6	**16**
Venus										43			**43**
Spondylus										1			**1**
LAND													
Eobania										4		1	**5**
Helix										8		1	**9**
Helicella										3		2	**5**
Hexaplex										3		1	**4**
Rumina										3			**3**
TOTAL				**110**	**1**	**6**		**23**	**74**	**2344**	**29**	**575**	**3162**

Table 11: Phase 3 UNID Bone

	A	B	C	D	F	H	M	P,Q,R	S-ext	S,SA	T	X,Y	ALL
MEDIUM													
Rib				7				8	18	376	3	129	**541**
Long bone				9				17	31	460	14	277	**808**
Vertebrae				2				1	1	97		22	**123**
Scapula								3	1	56		33	**93**
Pelvis									1	27		21	**49**
Cranium				1				1		41	2	36	**81**
Other									2	14		4	**20**
LARGE													
Rib								4		41	1	37	**83**
Long bone								2	3	30		23	**58**
Vertebrae										9		11	**20**
Other									1	7		22	**30**
AVIAN										5	2	5	**12**
MISC.								2		3	1	7	**13**
TOTAL				**19**				**38**	**58**	**1166**	**23**	**627**	**1931**

The bulk of the faunal material from Castelporziano derives from phase 3 contexts (1st to 3rd c. AD). Overall, this phase accounts for 76.8% of the total NISP figure, 77.3% of the shell count, and 74.2% of the total UNID portion. As outlined in the table, Trenches S, SA and S-ext, combined, provide the most material, followed by Trench X & Y. The remaining trenches produced relatively insignificant amounts of faunal material for this phase, with the exception of the oyster shells recovered from the fountain, D1b, discussed above.

Excavation of Trench T, in avenue D, between the fountain and adjacent corner of building C, produced a small collection of faunal material dating to phase 3. Pig cranial and dental elements predominated this sample, with a mix of both sexes and both adult and immature individuals represented – proportions typical of many Imperial sites in Italy. The sample also produced two equid teeth, most likely from a horse, given their size and morphology. A small collection of medium-sized mammalian long bone and rib fragments rounds out this sample. Taphonomic conditions for Trench T are quite variable, with examples of mineral leaching from exposure in acidic soils, concrete deposition from contact with hardening mortar, root and fungal etching, and sun bleaching, especially among the shell component of this sample. While the faunal remains from Trench T are likely scattered and redeposited trash, considering the context (i.e., avenue D, a main street at the site) it is surprising that relatively little material was recovered, especially given the density of settlement in the area and the traditional use of streets for trash disposal. The data suggest that avenue D was properly maintained during antiquity, with rubbish removal from the central core of the *vicus*. In fact, with the exception of Trench X & Y, the quantity of bones and shells recovered from any one area or context within the *vicus* is never of the intensity to suggest that massive quantities of rubbish accumulated over long periods of time in designated midden areas within the site. A similar situation of a relative lack of faunal material within an urban context is noted elsewhere, such as Pompeii, leading Ciaraldi and Richardson (2000: 79) to suggest that a system of rubbish removal operated in the city, at least in collecting waste from wealthier households (which is the chief context for zooarchaeological samples from Pompeii at this time). Presumably, much of this material from Pompeii was eventually discarded outside the city walls, and a similar scenario is suggested for Castelporziano. Here, too, garbage was routinely removed from inhabited areas within the *vicus* and deposited elsewhere. The bulk of this seems to have ended up as middens on the opposite (i.e., north-eastern) side of the Via Severiana, a condition which in turn suggests that there was limited occupation in this region. The stench from these garbage dumps would be quelled to some degree by offshore breezes, which would carry smells away from the *vicus*.

Little faunal material also derived from phase 3 deposits in Trenches P,Q,R, located on the eastern side of the Forum. These trenches were associated with statue bases in this area. Similar to the material in Trench T, dental elements of pigs and sheep predominated these samples, not surprising considering teeth are among the most durable of skeletal elements. Taphonomic conditions were similarly mixed, indicating that Trench P,Q,R material probably represented scattered and isolated pieces of trash originally from various contexts that eventually came to be deposited in this area. Carnivore-gnawed and sun-bleached examples indicate that parts of this rubbish had, at some time, rested on the surface, exposed to the elements. Once buried, however, it seems that this material was subjected to some of the harshest acidic soil conditions of contexts examined in this report. These materials exhibited a high degree of acid leaching and root etching, which would indicate a heightened level of organic activity in this area as opposed to others contexts examined. Such conditions might also account for the low frequency of shells in Trenches P,Q,R; they either dissolved more readily under acidic soil conditions, or fewer were deposited in this region initially, thus limiting the input of calcium carbonate to the soil (making it more basic).

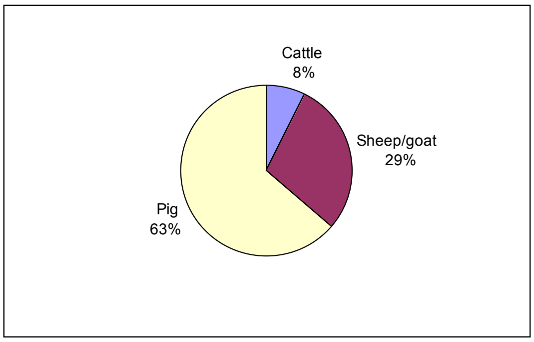
As noted earlier, the bulk of the material from phase 3 came from Trench S & SA, and Trench X & Y. Trench S & SA, given its location and extent, is most likely one of the main middens for the *vicus*. While the material from Trench X & Y is also debris of some sort, since it is located in association with structures and roads within the *vicus*, it is less likely to be midden material on the same scale as that from Trench S & SA. Rather, I suspect it represents shorter duration and more purposeful deposition than the long-term accumulative nature of the midden from Trench S & SA. This could be debris deliberately strewn to quickly fill a pit or depression during construction, or to help level a street surface. Still, although the action might be more purposeful and goal oriented to some degree, it appears that the actual faunal debris used in Trench X & Y was similar in many respects to the midden material from Trench S & SA. Both deposits exhibited mixed taphonomic conditions, with examples of eroded, root-etched, carnivore-gnawed, sun-bleached, soil-stained, concrete affixed, as well as fairly cleanly preserved faunal pieces. It is possible that midden material from Trench S & SA was reused for construction and filling purposes in Trench X & Y. Given that few bones were collected from other contexts within the *vicus*, it seems unlikely that an internal, urban midden existed within the *vicus*. Trash seems to have been routinely and systematically dumped outside of the *vicus*, most likely in the midden of Trench S & SA across the Via Severiana. This seems logical as well, given that any substantial internal midden would generate unpopular sights and smells within the *vicus*. However, this does not imply that rubbish from this midden on the far side of the Via Severiana was not re-used within the *vicus* as required for construction, landscaping, and road work. Material from Trench S & SA showed more signs of carnivore gnawing than all other contexts at the site, which suggests that this trash here lay exposed (or only lightly buried) for longer periods of time at this midden than elsewhere at the site, where any significant accumulation or re-used portion of trash was covered fairly quickly. Faunal material from Trench X & Y, however, had a slightly smaller degree of carnivore gnawing and exposure, and a higher degree of elements with mortar concretions, which might indicate that it was exposed to one set of taphonomic conditions as it lay in the midden, but then experienced a different set in its redeposited position in Trench X & Y.

Aside from slight taphonomic differences between the deposits from Trench S & SA, and Trench X & Y, how similar are these two samples?

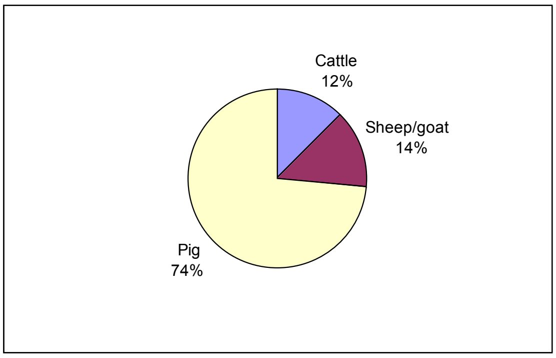
Principal Domestic Animals: Cattle, Sheep/goats, Pigs

Figures 1 and 2: **NISP frequencies:**

Trench S & SA (N=869)

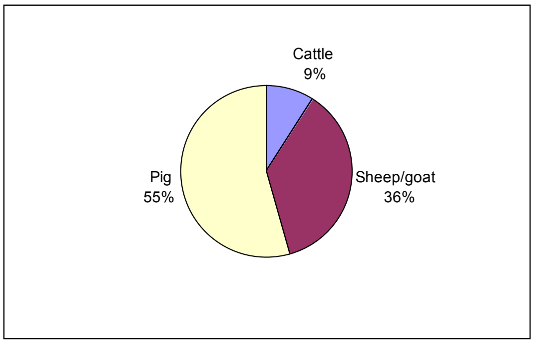


Trench X & Y (N=501)

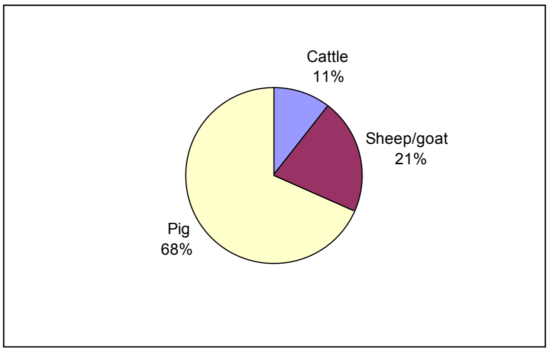


Figures 3 and 4**: MNI frequencies:**

Trench S & SA (N=33)



Trench X & Y (N=19)



Figs. 1-4 present the sample sizes and NISP and MNI frequencies for the chief domestic mammals from Trenches S & SA and X & Y. Although frequency values vary slightly between the two contexts and between the two quantifiers (NISP and MNI), the general trend is the same: pigs predominate, followed by sheep/goat and cattle. The statistics are very similar to other Imperial period urban sites in central Italy, including Ostia, Rome, Capua, Naples, and Pompeii (MacKinnon 2004), and support the importance of pork in the Roman diet during the Empire. The frequency of pig at Castelporziano, however, is quite high among smaller urban centers (i.e., *vici*) of comparable size throughout Italy (such as Forum Novum). In fact, the value is more akin to those for larger *municipia* and full-fledged cities, especially those in central Italy as noted above. Two factors may have contributed to this high incidence of pigs, among a relatively small, urbanized site such as the *vicus* at Castelporziano. Both factors, however, are linked, so it difficult to determine the impact of each individually on the frequency of pork. First, pork was an important meat among the Roman elite, so the high incidence at Castelporziano likely indicates a relatively wealthy clientele, on average, at the site. This can be confirmed by the rich nature of the site in general and the significance of the area as a wealthy seaside retreat during antiquity. Second, pigs may predominate if husbandry operations in the region were geared towards pork production (and thus, pigs were simply easy to obtain). The ancient agricultural writers discuss husbandry schemes and principles used to exploit the full potential of pigs. At one level, a pig or small group of pigs can be kept around the farm to feed off scraps and litter (Plin. *NH* 8.77.206). Alternatively, large-scale breeding operations to supply the market demand for pork can be practiced. The agronomists, particularly Varro (2.4.8-19) and Columella (7.9.1-4), devote considerable attention to the latter, which can potentially bring much profit to the farmer. This market-oriented scheme seems to be what is driving husbandry operations in the heavily populated region around Rome. Few rural sites in Latium and neighbouring regions of Italy produced zooarchaeological data for comparison, but what are available from villa farm sites such as Settefinestre, Via Gabina, and Quintili indicate their highest frequencies of pork during the Empire, which might suggest that these rural complexes capitalized on pig production at this time. I suspect rural farms around Castelporziano opted for similar schemes. These farms could provide the *vicus* and the seaside villas with pigs, but, depending on the scale of business, probably directed most of their husbandry operations for much larger markets, such as those in Rome. I doubt the *vicus* would go unattended should market conditions shift in favour of Rome, since the providing farms and pastures where probably owned, to some degree, by elites or their friends residing in or around the *vicus* at Castelporziano. Certainly the sphere of influence by the wealthy in this area was widespread.

Although pigs can feed on practically anything, their most convenient feeding-grounds are woods with oaks, beeches, and other deciduous trees (Col. 7.9.6). If forests are sparse, pigs can be fed on fodder crops, fruits, roots, barley, beans, grains, or other plant materials (Varro, *Rust*. 2.1.17, 2.4.6; Col. 7.9.7-9). The latter resources, however, would require human control to sow, harvest and store, as needed. Moreover, they would demand arable land that might otherwise be valuable for other agricultural pursuits. While there were certainly natural forests in the suburban hinterland outside of Rome, the bulk of these lie in the hillier regions to the east and south-east of the city (cf. Plin. *Ep*. 2.17). Pigs may have been herded in these forests, but there is currently little zooarchaeological data to clarify their role. Relatively less forested land exists in the lowland areas of the Tiber Valley and along the Mediterranean coast, although patches existed in the diversified landscape around the site of Castelporiziano (Plin. *Ep*. 2.17). Moreover, I suspect much of the natural woodland of these regions was cut to provide lumber and fuel for the growing population in this area. Pliny, the Younger (*Ep*. 2.17) comments that the neighbouring forests afford an abundant supply of fuel for his Laurentine villa. In areas where natural forests may have been scarce, farmers could still exploit the urban demand for wood by planting trees on their land or giving over some areas to plantations. To some degree these planted forests could provide resources for pigs, but I suspect suburban farms could afford to feed pig agricultural crops and other plant materials, given the profit attained from livestock sales. A pig's diet affects the taste of the pork itself, a fact the noted by the ancient sources (Varro, *Rust*. 2.4.3; Plin. *NH* 8.209).

Several other lines of evidence suggest that Castelporziano was supplied with pigs from the productive suburban region of Rome. First, nearly half of the sample by pig MNI count (by teeth) from Trench S & SA derives from individuals younger than 12 months. A similar count yields a smaller value (about one-third) for younger pigs in Trench X & Y. Epiphyseal fusion data for both trenches, however, confirm a high frequency of immature pigs. Although young pigs generally outnumber older individuals among most Roman sites in Italy, the Castelporziano totals are more in line with those from elite urban deposits, in terms of the exceptionally high frequency of piglets. Pig sex ratios show that males outnumber females in both trenches, comprising between 63% (by NISP) to 78% (by MNI) of the assemblage. Again, these figures are comparable to urban sites in central Italy (MacKinnon 2004: 143-145). Correlating the age and sex data indicates a preference for younger males pigs. This fits into schemes of pork production as outlined in the ancient texts (Col. 7.9.3-4) wherein pigs were bred intensively, and sometimes twice a year, to produce a surplus of sucklings for the market. Males were slaughtered preferentially over females, which in turn would be kept in higher numbers as brood stock. Sucklings cannot be herded or carted over great distances without much expense, so it seems that local farms would be in the best position to provide Castelporziano with its significant supply of piglets.

A second indication that Castelporziano received pigs from the suburban region of Rome is provided by metric data on the size of these animals. Sample sizes are small in many cases, but mean values for the majority of measurements for pig elements from Castelporziano are larger than their equivalents for Imperial-period sites in central Italy, which in turn are generally bigger than mean values for all regions of Italy. I have outlined elsewhere (MacKinnon 2001; 2004: 148) that zooarchaeological, literary and artistic data support the existence of at least two breeds of pigs in Roman Italy. The larger, more rotund variety appears most often in the zooarchaeological record at sites in central Italy during the Imperial period, and it also seems to predominate at Castelporziano. When measurement categories are compared, the most significant differences between the Castelporziano examples and the means for Imperial-period central Italy arise in bone breadths or widths, with the Castelporziano pigs having wider bones, particularly at the articular ends of the leg bones. Bones develop wider articular surfaces at joint margins to adapt to the stress of increased weight; thus it is possible that these were larger, fatter pigs. Metric data are generally only collected for mature skeletal elements; therefore, this analysis applies directly to the adult portion of the Casteloporziano pig sample. If, however, the assumption can be made that this adult pool represents the same stock from which piglets were chosen to provide the site, then it would apply to pigs of all ages. Large, fat pigs were preferred at the site.

Figs. 5-8 provide data on the frequency of skeletal parts for Trenches S & SA, and X & Y. By comparing the frequency of bones associated with each of these cuts, one can obtain an idea of the relative completeness of the carcasses represented. A marked preponderance of extremity bones, for example, may indicate the absence of whole carcasses in the deposit. Figures must be examined in relation to varying taphonomic and recovery biases, however.

Figure 5: Trench S & SA:(Phase 3): Frequency of Skeletal Parts by NISP count

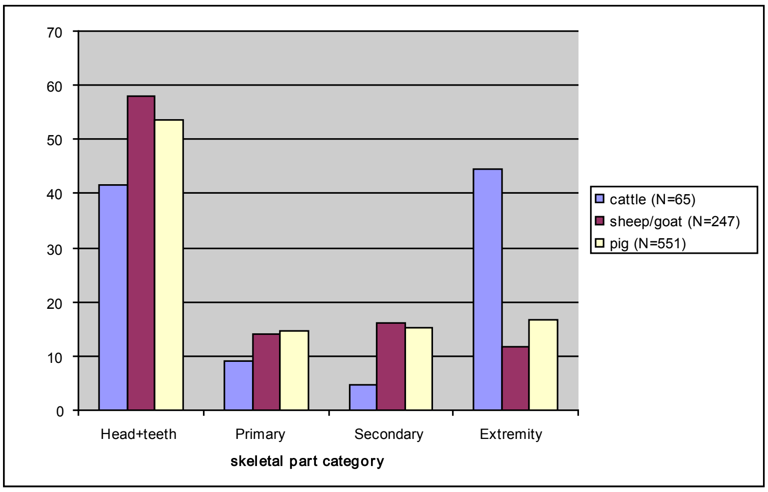


Figure 6: Trench S & SA:(Phase 3): Frequency of Skeletal Parts by MNI count

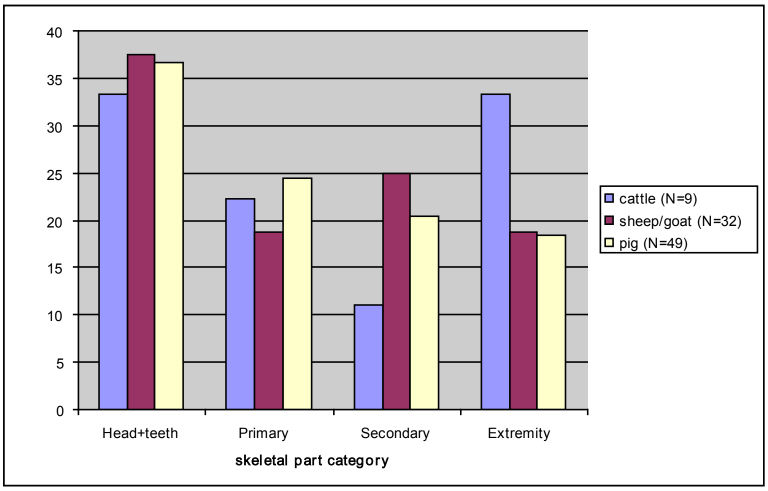


Figure 7: Trench X & Y: (Phase 3): Frequency of Skeletal Parts by NISP count

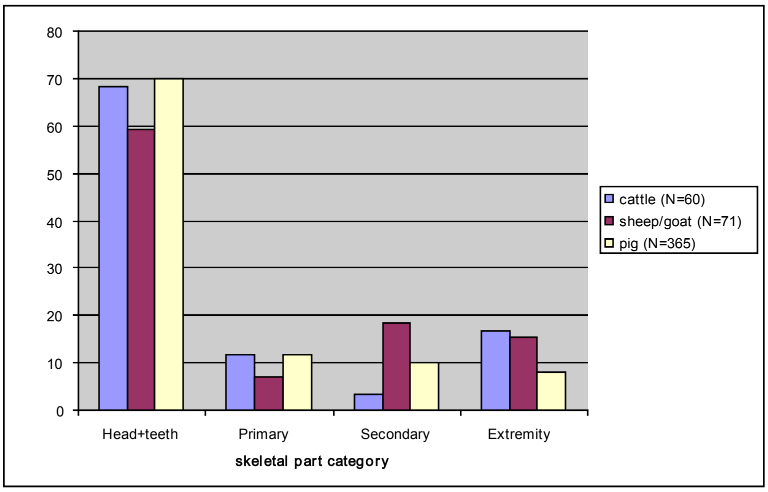
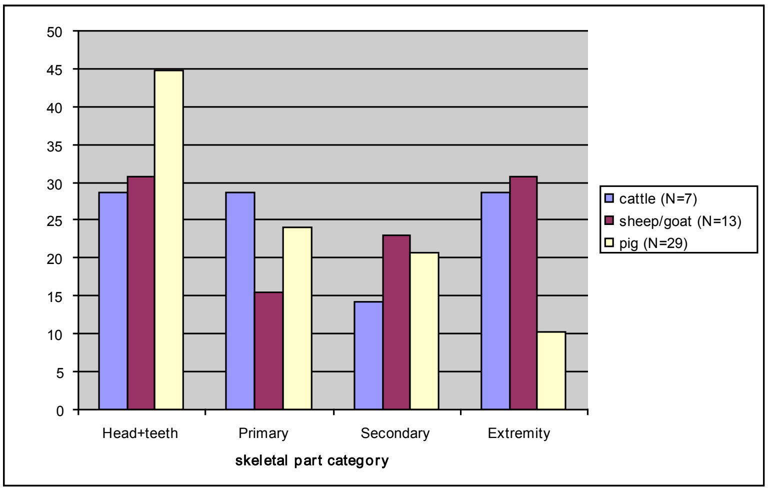


Figure 8: Trench X & Y: (Phase 3): Frequency of Skeletal Parts by MNI count



In all cases, regardless of quantifier, values for the head + teeth category predominate. This is expected given that teeth survive well in the archaeological record, and are often more diagnostic to species than post-cranial elements. NISP figures for this category are more inflated than their MNI counterparts because there are more cranial and dental elements to count initially than among other skeletal parts. MNI values help to standardize for this bias.

Values for pigs vary between Trench S & SA and Trench X & Y. Far more cranial and dental elements from pigs were deposited in Trench X & Y, relative to other elements, than in Trench S & SA. Taphonomic reasons might be partially responsible for this distribution, if conditions acted to differentially destroy more post-cranial pieces of bone from Trench X & Y, than elsewhere at the site. However, it is also possible that more head and jaw portions of pigs were deliberately deposited here. This could arise if the occupants preferentially selected these pieces to fill this context, perhaps grabbing them more often as they collected rubbish from the area to deposit here. Given the high survivability of teeth they carry a higher probability of being retrieved in a random search of trash. It is also possible that Trench X & Y pig waste derives from differential slaughter and butchery operations. Perhaps this higher accumulation of cranial and dental elements represents waste from early stages of carcass dismemberment. Butchers may have discarded some unsold or disused heads in a localized dump (behind their shop?), rather than carry these to the main middens across the street. Better-quality primary and secondary cuts were then removed from the area, perhaps as bone-in cuts for markets, and then consumed and disposed of elsewhere at the site. A similar scenario might explain the relatively low levels of pig extremity parts in Trench X & Y, if these too were exported from the area (as salted or smoked trotters, perhaps). If this was the case, the whereabouts of these exported remains is unknown, since no other excavated context at the site produced a differentially large proportion of pig extremity bones.

The data for pig parts from Trench S & SA suggest another outcome. Although the head+teeth category still predominates regardless of quantifier, the difference among the skeletal part categories is less pronounced, especially when MNI values are compared, and suggests that the remains from all parts of the pig were eventually discarded in this midden. This finding supports the argument that the *vicus* was supplied with whole pigs, as opposed to cuts of pork. This being the case, it is suggested that the *vicus* was a locus for the slaughter and butchery of pigs, rather than these animals being processed outside of the *vicus* and cuts of meat being transported in. If parts were imported to the *vicus*, I would suspect the values for tastier primary and secondary cuts to be much higher. Of course, this does not imply that whole pigs were always purchased by consumers, but rather that all categories of cuts were made available, with little import or export of additional cuts from any category. Presumably wealthier households at the site consumed choicer cuts of meat, whereas poorer households made due with relatively inferior portions. The point is that there seems to be little extra import of quality cuts for elite consumers, although it is impossible to judge to what extent de-boned portions of meat (fresh or preserved) were imported to the *vicus*, on the basis of available zooarchaeological data. While cuts of pork may have been distributed and consumed by different clientele at the *vicus*, it appears that the midden at Trench S & SA received waste from occupants of all socio-economic levels; that is, there appears to be no specialized section where higher-quality or lower-quality faunal waste was discarded. The midden is generally homogenous in this respect.

It is unlikely that pigs were kept within the *vicus*. Although there are cases where pigs act as urban garbage disposals to some degree, roaming through the streets feeding off of scraps and waste, I suspect few, if any, assumed these duties at Castelporziano. There is limited space to contain such pigs within the courtyards and confines of the domestic complexes excavated, although a few backyard pigs may have been kept at the villas along the shore. Small herds could have been maintained within the immediate vicinity of the *vicus*, but it seems more probable that the *vicus* was supplied with pigs raised on larger farms within the suburban region of Rome. These pigs were then herded on the hoof to the *vicus* where they seem to be slaughtered and butchered locally, cuts distributed to the occupants, with the subsequent waste from all procedures largely ending up in a communal rubbish heap.

Sheep and goats are the second most common animal taxon in phase 3 deposits, but, when their frequency values are compared, they are nearly twice as abundant in

Trench S & SA than Trench X & Y (Table 9). This is not the only difference for this taxon where these two Trenches are concerned. Regarding those skeletal elements that could be distinguished as either sheep or goat (the osteological morphology of these two taxa is similar; only a few elements have diagnostic markers), c. 85% were sheep in Trench S & SA, while approximately 43% were sheep from Trench X & Y. Age data were also markedly dissimilar between the two trenches. A balance of adult and immature ovicaprids was noted in Trench S & SA, but adults outnumbered juveniles by a ratio of 3 to 1 in Trench X & Y. Sex could only be determined from a few astragali bones from Trench S & SA, all of which derived from males. Although the two trenches varied among ovicaprid species and sex statistics, they showed similarities in terms of skeletal part representation. Ovicaprid head and dental elements predominated at each context, but no skeletal part category registered a substantially high or low value to suggest that the *vicus* was provided with cuts of ovicaprid meat, over the import of whole animals. The situation seems very similar to that for pigs. It appears whole sheep and goats were herded or otherwise transported to the *vicus*, where they were slaughtered, butchered, consumed, and the waste disposed of at the *vicus*. The slight predominance of the ovicaprid head+teeth category over the others for this taxon is probably due to taphonomic biases than to processes of differential deposition of skeletal parts, or any import or export of certain cuts of meat. The higher frequency for extremity parts in Trench X & Y, as compared to Trench S & SA might present an exception to this scenario, where one might suggest that relatively more lower parts of ovicaprid legs were brought into the *vicus* (as might happen in the case of importing a unfinished sheep or goat hide which retains these extremity bones), or that the remaining skeletal parts were exported or disposed of in a different part of the site. However, upon closer inspection I would argue that this is not the case. The extremity category from Trench X & Y is dominated by ovicaprid metatarsal bones. These survive well in the archaeological record and could be more readily collected among a random sample of sheep and goat waste if a portion of that was brought into the *vicus* to fill Trench X & Y. I have argued above that waste from the main midden at the *vicus*, presumably that associated with Trenches S & SA, may have been redeposited into Trench X & Y, so it is entirely likely that this Trench would show a more skewed representation of skeletal parts.

The redeposition hypothesis outlined above might also explain the age and taxonomic variation between the two trenches. Trench X & Y contained significantly more adult sheep/goat, pig and cattle bones than Trench S & SA. Again, it is possible that in any collection of waste for re-use, one might gather, to some degree, a relatively random sample of bone pieces from all skeletal parts, as might occur in a large-scale shoveling of rubbish, but then individual pieces could also be chosen as supplemental waste. The latter category would more likely include the larger, better-preserved, and most visible skeletal elements, such as ovicaprid metapodials and pig and cattle jaws and dentition.

The variation in sheep and goat ratios between the two trenches might also be explained by this redeposition scenario. The smaller sample of speciated sheep and goat bones from Trench X & Y contains far more horn cores than its equivalent from Trench S & SA. These fairly large elements would be relatively obvious to anyone, and could have been consciously collected for redeposition.

The alternate hypothesis that Trench X & Y represents waste from a lower class diet cannot be discounted fully. Such a diet might be characterized by low values for primary cuts of meat, with high records for those sections associated with poorer-quality meat, such as the limb extremities, and/ or sections typically deemed slaughter and butchery waste, such as the head. It would also show inflated values for adults and fewer bones from younger individuals. Yet, this hypothesis does not seem likely, given the mixed taphonomic nature of this deposit. The faunal materials from Trench X & Y seem best to represent redeposited waste from the main midden across the Via Severiana, which was brought back to the *vicus* for construction and fill purposes. Waste in the midden at Trench S & SA seems relatively homogeneous, with no designated “poor” section or “elite” section. Nevertheless, without significant middens that relate to specific residences inside the *vicus*, it is difficult to determine social status of selected areas. The *vicus* population seems to be fairly affluent if one examines the size and wealth of the structures uncovered, but there would certainly be a sizeable population of slaves residing in the *vicus* as well. Presumably slaves did not have the same diet as the elite; however, I would argue that they probably had some meat on occasion. Given that whole animals were being consumed in the *vicus*, it is possible that slaves were provided with cheap cuts of meat periodically.

What does the proportion of ovicaprid bones at Castelporziano tell us about sheep and goat pastoralism in the area? If the averaged ovicaprid values for Trench S & SA are taken as most indicative of the contribution of sheep and goat to the diet and economy of Castelporziano, one arrives at a figure of c. 25-30% of domestic livestock. This value is consistent with the mean values for urban and settlement sites in central Italy during the Imperial period, and indicates that Castelporziano is typical of the average, alimentary contribution of ovicaprids to urban diets in the area. What is different about Castelporziano, however, is the relatively high proportion of sheep and the larger concentration of lambs, compared to other urban sites in central Italy. The percentage of sheep at Castelporziano (using the 85% figure from Trench S & SA) is higher than the average for all urban and settlement sites in Italy, as well as among all sites in central Italy, and among all Imperial sites in Italy (MacKinnon 2004: 104-105). The proportion of lamb bones is also higher than national averages for similar archaeological sites in Italy.

With the exception perhaps of the Samnite hills, central Italy was not renowned territory for sheep and goat pastoralism during antiquity. The best-quality wool came from sheep raised at higher altitudes, in areas that receive low rainfall (White 1970: 301), which is why pastoralism flourished in southern Italy and in mountainous regions further north. Moreover, the drier eastern side of Italy is a better zone for pastoralism than the western side. Sheep and goats do contribute varying amounts of meat to lowland urban sites in the central Italy, but it is unknown to what degree these animals were herded locally in small flocks, and so could be connected to husbandry schemes from the zone just outside the city (Rome as the case here for Castelporziano). Some animals could have been imported from southern or northern Italy, perhaps integrated into large-scale transhumant operations.

Available metric data provide mixed clues about the origin of the sheep and goats at Castelporziano. Most measurements are comparable, if not slightly larger, on average, to those from other Roman sites in the lowland areas in or around Rome (e.g., sites of Rome, Ostia, Settefinestre, Via Gabina, Lugnano, Monte Gelato). These figures, in turn, tend to be greater than those from sites in more mountainous regions of central Italy (e.g, Campochiaro, San Giacomo, Matrice) (MacKinnon 2004: 123). This accords with references in the ancient texts stating that sheep raised in mountainous areas are smaller than their lowland equivalents (Col. 7.2.3). Consequently, the argument can be put forward that Castelporziano was chiefly, if not exclusively, supplied with sheep from neighbouring farms, as opposed to those involved in any large-scale, long-distance transhumant operations, migrating through the region from upland regions of northern or southern Italy. The lowland areas around Rome did not lie along any main, long-distance transhumant route, but smaller flocks surely did traverse through the region as part of small-scale, short-distance movements. Some shepherds who summer their flocks in the Cicolano mountains, to the immediate west and north-west of Rome, are documented to move them to the plains around Rome, especially the Pontine plain south of Rome, during the winter months, a journey of about 120-150 km (Barker 1990: 116; Barker and Grant 1991). This practice is rooted in antiquity as well. Pliny, the Younger (*Ep*. 2.17) makes reference to flocks of sheep and herds of horses and cattle that pasture during the winter in the lowlands near Castelporziano. Nevertheless, this is a much smaller distance than the 300+ km routes taken by some flocks, who traveled seasonally from southern Italy to regions such as the Samnite, Reatine, and Sabine hills in central Italy (Varro *Rust*. 2.1.16-17, 2.2.9-10, 2.9.6, 2.10.11, 3.17.9). Of course, not all sheep and goats make transhumant journeys. Some may have been stalled at small local farms within or at least quite near to the uplands; however, given the costs of providing shelter and fodder for several months this was probably an option available only to very small herds. On the other end, big lowland estates might also have kept flocks of sheep year-round on their estates, principally to manure the arable land, and were willing to rent out land to transhumant flocks as well for the same purpose (Barker 1989: 13).

There are complications in estimating the scale of pastoralism, which is essentially a rural activity, from the contribution of sheep and goat meat in the urban diet, since the latter is strongly influenced by gustatory preferences, which need not tie directly to the ease of acquiring foodstuffs from the local region. As urban wealth increases, so does the opportunity to import meat and animals from distant areas. Still, I suspect in large part the meat consumed at Castelporziano was acquired from animals herded nearby, probably within a 100-200 km radius. This could then include “manure flocks” residing year-round on large lowland estates in the Roman Campagna, as well as those that moved into the lowland regions from the neighbouring Cicolano mountains during the winter months (cf. Plin. *Ep*. 2.17). Several facts help support this argument. First, the size of the animals is in line with other sheep and goats from sites in this area, perhaps indicating common localized breeds, as opposed to breeds from southern or northern regions. Second, at around 25% of the consumable domestic animal NISP and MNI counts, the frequency of ovicaprids at Castelporziano is similar to other urban and settlement sites in central Italy, especially Rome and Ostia. It seems unlikely that Castelporziano was provided with ovicaprids acquired under circumstances other than those that supplied these two cities. Presumably, sheep and goat meat came customarily from flocks herded in the area, as opposed to those that traversed over long distances from either southern or northern Italy. Third, the bones of lambs and kids constitute nearly half of the ovicaprid sample (from Trench S & SA). Young animals, such as these, could not travel on foot over great distances (and could only be carted such distances at great expense), so their presence might indicate convenient acquisition from nearby farmers and herders, who either kept their flocks on the farm annually or only herded them over short distances and never too far from the farm. It is also possible, however, that these represent lowland-residing transhumant flocks. As part of an annual transhumant journey, flocks typically spend the summer months in upland pastures and the winter months in the lowlands. In this manner they are away from the fertile lowland plains during the growing season, and thus do not compete directly with them for land at this time. Mating, shearing, birthing, milking and slaughtering would all fit appropriately into the transhumant schedule. According to the texts, lambs were best born in the winter months, which would probably coincide with time spent on lowland and coastal plains (Col. 7.3.12; Varro, *Rust.* 2.1.19, 2.2.14; Plin. *NH* 8.72.187). Those lambs that were destined to be killed would probably be slaughtered at the winter grazing-grounds, since there would be little point in taking any but the eldest and strongest of them on the journey to the summer mountain pastures. Surplus lambs could be sold to the town butcher, as Columella (7.3.13) suggests, and with some convenience considering that most of the larger Roman towns were located in these lowland and coastal areas. Some ewes could be milked, especially those that had given birth early in the season at the lowland pasture and had had their lambs removed right away.

In an annual transhumant scheme (be this over short or long distances), shearing usually coincided with the time spent at winter, lowland pastures (Frayn 1984: 142). It is unlikely that the fleece was transported any great distance; consequently, shearing was probably scheduled when the flock was near a market (Frayn 1984: 142). At this time, surplus lambs could also be sold at market and the flock inspected (White 1970: 305). In southern and central Italy, we would expect an April shearing. “By the second century B.C., the increasing urbanization of Italy had created markets for the produce of flocks, especially wool, and a discussion by Cato of contracts to lease out winter grazing shows that by the mid-second century B.C. quite complex institutions were being developed to accommodate increasing specialization in the pastoral economy” (Barker 1989: 13).

The supply of sheep and goats to Rome and its hinterland was probably driven first by the demand for wool, and secondarily by the need for other resources such as milk, cheese, meat and leather provided by the flocks. While Castelporziano likely received most of its sheep and goats either from local farms which maintained year-round flocks, or from those that traveled short-distance transhumant routes from the Cicolano Mountains and Samnite hills to the west of Rome, these numbers could certainly be supplemented with individuals from long-distance transhumant flocks that were brought to the area near Rome in winter months, as needed, in what would effectively be their last journey. If this was the case, it is likely that these supplemental ovicaprids were killed after a final shearing and lambing (for any ewes). These lambs were probably also slaughtered for meat shortly afterwards as well. None would then return to its distant summer transhumant zone. It might also help trim the herd with part being sent to slaughter at market, raising of some lambs in those following few months for market (can have greater control over these lambs) and more attention and care in birthing.

What manner of pastoralism the sheep and goats that stocked Castelporziano practiced is difficult to determine from the options presented above. Metric data suggest that they were chiefly local breeds, which by default probably derived from flocks kept year-round on large estate in the lowlands and/or those that were wintering in the lowlands while as part of their short-distant transhumant schemes which saw them summering in the Cicolano and Samnite hills to the west and north-west of Rome. Detailed aging and sexing analyses of the bones might provide some clues as to which of these two options predominated. If deaths are concentrated as distinct annual clusters (i.e., 1-3 months, 13-16 months, 25-28 months, etc.), with a clear divisions of the sexes (youngest category overwhelmingly male, oldest age groups largely female) it would indicate that wintering transhumant flocks were probably supplying the bulk of the meat. Alternatively, if no clear age brackets or sex divisions register one might argue for provisioning of non-transhumant sheep and goats from neighbouring farms as required by the shifting daily or weekly demands of the *vicus*. While ovicaprid aging data are limited for the Castelporizino sample, no distinct peaks seem to occur which might correspond to strict patterns of birthing and slaughtering within a three to four month winter period. Moreover, the data do not allow one to correlate age and sex in any detail, especially for younger individuals. Rams outnumber ewes, but this reflects solely the adult population and derives from a very small sample size. On the basis of these results, one could argue that the site was provided chiefly with non-transhumant sheep and goats from neighbouring farms. Nevertheless, understanding the dilemma of pastoralism in Roman Italy and its impact on providing sheep and goats to Castelporziano requires much more detailed research that incorporates many lines of evidence. Specifically, more excavation of rural and suburban sites in the area outside of Rome is necessary to determine their role in animal herding operations. I would expect evidence for stall, pens, corrals and other enclosures in these areas if indeed flocks were brought in annually for shearing, birthing and slaughter (although admittedly, many of these structures might not leave archaeological traces). Such confines could also be used year-round to keep smaller flocks of sheep and goats for year-round exploitation of their resources.

Cattle register approximately 8% of the domestic and consumable NISP sample from Trench S & SA, and 12% of the same count for Trench X & Y. Cattle frequencies on the basis of MNI counts are also low for each context, although there is less of a difference between the two trenches when MNI frequencies are compared (Table 9). The overall mean of all these values is about 10%, a figure comparable to the frequency of cattle at neighbouring sites such as Ostia, Capua, Pompeii, and Rome. Castelporziano is thus like most other urbanized Roman sites in central Italy in terms of the dietary and economic contribution of cattle. It should be appreciated, however, that the average cow, oxen or bull yields 6-8 times the meat of an average sheep, and about 4 times that from the average pig, so one must interpret NISP and MNI frequency values with this caveat in mind to get a better appreciation of meat weights. Adjusting the statistics to suit this discrepancy yields a situation for Castelporziano where sheep contribute c. 12% of the total domestic mammalian meat, cattle c. 33%, and pigs c. 55%. Pork is still the most important meat consumed at Castelporziano, but beef and veal make a significant contribution as well.

The isolated fragments of cattle bones and teeth collected from all but Trench S & SA and Trench X & Y provide few clues to help reconstruct the role of this species. All of these pieces derive from adults, and are identified as very durable elements such as teeth or bones of the lower foot, all of which are commonly retrieved cattle fragments on many Roman sites. A minimum of 3 or 4 individuals is represented in Trench S & SA: 2 or 3 adults (all older than 4 years of age) and 1 younger individual (about 2 years of age). Trench X & Y yielded remains from at least one old cow or ox (over 6-

8 years of age judging by the amount of wear on the teeth) and a younger individual (under 2 years of age). Most of the elements recovered were not ideal for determining the sex of the cattle; however the length and breadth measures from a metatarsal bone from Trench SA lie within the range for cows, while two other metacarpal bones from the same context are over 10 cm wider at their proximal ends, which accords with dimensions for oxen or possibly bulls. An example of a metatarsal bone from Trench X & Y seems to fit best as cow, but no secure oxen or bull remains could be identified from this context. Overall, it seems that cows outnumber oxen and bulls, perhaps in the order of 2 or 3, to 1. A withers height estimate of 120-130 cm for the complete metatarsal bone from Trench SA, approximates the mean value for cattle heights among other sites in central Italy (MacKinnon 2004: 85), and I would expect the cattle consumed at Castelporziano were local breeds, perhaps the Etrurian or Latium varieties mentioned by Columella (6.1.1-3), as opposed to an imported Alpine or Ligurian breed (which are generally smaller in size).

Comparing the skeletal part data for cattle (Figs. 5-8) reveals a predominance of elements from the head+teeth category, according to NISP values. This is particularly marked for Trench X & Y, where cranial and dental pieces account for about 68% of the cattle NISP sample. In Trench S & SA, the values for the extremity and the head+teeth category are fairly equal at around 42%, on the basis of NISP counts. Cattle extremity bones are poorly represented in Trench X & Y NISP figures, however. Values of primary and secondary cuts are extremely low for both contexts when NISP statistics are compared. They increase in frequency when MNI counts are calculated, but are still under-represented, especially in Trench S & SA.

The predominance of the head+teeth category for cattle is certainly influenced by the high durability of teeth and the fact that many of these were retrieved as isolated pieces, removed from the maxilla or mandible. There are simply more skeletal elements to count within this category, as compared to primary and secondary cuts for instance. This is not uncommon among many Roman sites in Italy. A similar argument applies to the extremity category, which also produces high NISP counts for cattle. Still, the presence of all parts of the cattle skeleton, in both Trenches at Castelporziano, indicates that whole animals were herded into the *vicus*. The balancing among skeletal part categories observed when MNI frequencies are calculated, coupled with the presence of rib, vertebrae and additional long-bone fragments of larger mammals (presumably cattle, but these skeletal part categories are not readily diagnostic to species; see Table 11) suggests that this is the case. Nevertheless, there are still slightly fewer rib, vertebrae, and primary and secondary cuts of cattle within these deposits than might be explained on the basis of differential taphonomic destruction or recovery biases. Moreover, the NISP frequencies for primary and secondary cuts are quite low compared to other urbanized sites such as Ostia, Rome, and Pompeii (MacKinnon 2004: 234-235). It appears that while whole cattle were likely brought to the *vicus* for slaughter and butchery, some of the better cuts of beef from the central part of the animals (including its upper legs) were removed elsewhere. Perhaps these more expensive cuts were purchased by the villa owners along the coast, and disposed of in separate rubbish heaps on these premises. A similar explanation might rationalize why rib and vertebrae counts for medium-sized mammals are also smaller than expected at the site (see Table 11).

The possibility exists that the inflated frequency values for cattle head+teeth and extremity categories represents an import of unfinished cattle hides to Castelporziano. Cattle hides may have been delivered to tanneries with the head and lower extremity bones still intact; thus, there would be a net-increase in these bones at the site, assuming tanning took place in the area. Tanners would eventually remove these bones in the final stages of preparing the hides. In some cases, these bones provided extra weight on the front and back to stretch a draped hide. While this may have happened, it is unlikely to have occurred on any grand scale at Castelporziano. Excavations revealed no structures that were modified to serve as tanning or fulling tanks (although any basin could serve in a pinch). If such an enterprise existed, however, it would probably be located outside the *vicus*, and downwind from it as well, considering the unpleasant smells associated with the process. The *vicus* seems too small to create a demand for any commercial tanning venture of this sort. Moreover, if more cattle hides were brought in for tanning, I would expect more evidence for bone handicrafts, given that cattle metapodial bones (a typical waste bone to the butcher or tanner) are ideal for bone working. Two worked-bone preparatory pieces (a flattened plank-like fragment, and an unfinished needle or pin) provide the only examples of the initial stages of bone handicraft operations at the site.

Although the proportion of cattle at Castelporziano is similar to other Roman urban sites, their mean age of slaughter is younger than the national average. It seems likely, therefore, that the site was provided with cattle from neighbouring farms, and perhaps from herds pasturing in the area. The lack of any seasonal or annual patterning within the age data for the Castelporziano cattle lends further support that these individuals do not derive from an annual cull, as might occur if cattle are herded from longer distances specifically for market slaughter. They also appear to be in good health, which suggests they were taken care of, and not subjected to work stresses such as pulling the plough or hauling carts or wagons. Cattle were most conveniently pastured in lush grasslands near the coast during the winter and brought to wooded country in low-lying hills in the summer (Varro, *Rust*. 2.5.11; Col. 6.22.2). Ovid (*Fast*. 5.639-40), Pliny the Younger (*Ep*. 2.17), and Propertius (4.9.14) praise the rich pastures just outside of Rome. The point is that the occupants at Castelporziano could afford younger cattle, even calves, and not be provided solely with the occasional elderly work oxen no longer useful for traction on the farm and consequently slaughtered for its meat. Only those who kept herds of cattle could afford to market younger individuals on any grand scale and not jeopardize the vitality of the herd. Cattle were expensive to maintain and require ample pasturage; however, the aggregate demand for beef and veal within cities, such as Rome and Ostia, may have made it economical for some Romans to practice ranching in the neighbouring plains outside these regions. There may also have been a dairying component to these herds, given that cows outnumber oxen and bulls among the Castelporziano faunal remains. Cow's milk was not the primary milk source in Roman Italy (ovicaprid milk held sway), but it was important in manufacturing cheese (however, again cheese from sheep and goat milk predominated). Pliny, the Younger (*Ep*. 2.17) comments that his Laurentine villa rivals some larger inland farms in milk exploitation, notably from cattle, who come from the neighbouring meadows in great numbers when they seek shade or water.

Butchery and cooking

I have outlined above that the bulk of the domestic mammalian meat consumed in the *vicus* came from cattle, sheep, goats and pigs which were herded, or otherwise transported to the site and slaughtered and butchered on, or near the premises. What do the butchery marks on the bones tell us about these processes at Castelporziano? First, there is no faunal evidence to confirm the method of slaughter. Normally, an animal's throat is slit, allowing it to bleed to death. Second, the cleaver appears to be the tool of choice in carcass dismemberment. Saws were only used to remove horn cores (two examples of this in sheep), and this is expected since the butcher does not wish to shatter or mangle the horn given that it can be sold or worked. Third, both medium-sized (e.g., pig and sheep/goat) and large-sized (e.g., cattle) carcasses were disarticulated in a similar manner. Legs were distarticulated by chopping at the joints, such as between the distal humerus/proximal radius margin, or the distal end of the tibia. Midshaft chops were extremely rare. A number of bisected vertebrae from both size groups (large and medium), suggests that many animals were split down their backbone into right and left halves. Although this involves force and effort, it is beneficial since it facilitates removal of internal organs and cleaning of the central cavity. It also provides stability and balance for further work on the carcass, be it placed on a table or hanging. Some of the larger vertebrae (presumably from cattle) had also been chopped transversely as well as bisected. This would help parcel the spine into smaller units for sale or further butchery. Lastly, more attention was paid to butchering pigs' heads and jaws, than those of cattle or ovicaprids. Several cranial elements showed that some pigs' heads were bisected, which did not seem to be practiced in the case of the other animals. There were also a number of examples of bisected pig jawbones (split at the proximal end, where the right and left halves meet) as well as evidence for the removal of the tongue (cut marks inside the jaw), jowl muscle (chop marks on the body, hinge and gonial angle of the mandible), and marrow extraction (chop and crush marks on the buccal, or cheek, surface below the teeth to expose the marrow cavity).

Overall, the butchery data for Castelporziano conform to those for most Roman sites in Italy, in terms of tool kit, methodology and placement of cuts. Perhaps one difference is the greater attention placed on butchering pig jaws, a practice that does not occur regularly among Roman sites in Italy; however, it tend to be more common among urban sites in central Italy. The butchers at Castelporziano, therefore, seem to be skilled individuals, with a sound knowledge of skeletal anatomy. I expect most occupants of the site purchased meat cuts, as opposed to whole animals which they may have slaughtered and butchered themselves. The frequency and positioning of cuts on the bones seem too standardized to suggest household butchery of whole animals, where one might anticipate much greater variability in cut depth, placement and number.

Finally, there is no conclusive evidence from the animal bones to determine methods of meat preservation and storage at Castelporziano. Much of the meat may have been consumed fresh, with animals brought into the *vicus* as demanded. Salted and smoked cuts would have been imported as well; however, these escape the zooarchaeological record. Cooking too, is a difficult aspect to reconstruct from solely the animal bone evidence. There are examples of burnt bones in the sample, but never enough to suggest that roasting of whole animals or at least bone-in cuts of meat predominated. Filleted cuts of meat, on the other hand, could be roasted and leave no traces on the bones themselves. Boiling might have been the common method of cooking large cuts of meat (with bones attached). It might have been preferred overall, especially if inhabitants favoured soups and broths, and wished to collect the fat that floated to the top of the pot for other recipes or purposes. Boiling also helps tenderize the meat, which could make tough cuts from older cattle and ovicaprids more palatable.

Minor Domestic Animals: Dogs, Cats and Equids

Dog bones are rare overall at Castelporziano. A couple of insignificant and isolated dog's teeth were noted from phase 2 and 4 contexts, while the remains at least three domestic dogs were recovered from phase 3 deposits. The latter group derives exclusively from the midden at Trench S & SA. The sample of twelve elements from this phase 3 context is small, but consists of enough scattered elements from all parts of the dog skeleton to infer that whole individuals were interred originally, even though no undisturbed, complete dog burials were excavated. Presumably, mixing, breakage, taphonomic destruction, and recovery biases resulted in the absence of the remaining elements. One dog was younger than 6 months in age, but this individual is only represented by a single element (a metacarpal). Available measurements of this bone suggest this dog was a medium-sized breed. A second individual is represented by a larger suite of skeletal elements, but from an young adult dog, roughly between 16 and 18 months old, on the basis of a calcaneum bone with its recently fused epiphysis. It too was a medium-sized breed, and could have been of the same breed as the younger individual. A third adult dog is represented by a single femur bone from an individual older than 18 months. This element exhibits a pathological condition in the form of an ossified tendon running along the central section of the bone. Measurements of this element also place it within the parameters of a medium-sized breed of dog.

Dogs were not normally consumed during Roman times, and this appears to be the case at Castelporziano, since none of the dog bones showed any signs of butchery. Those dogs represented from the faunal remains were likely pets or guard dogs, but they may also have assisted in hunting and tracking prey or rounding up stock. Their discard on a midden heap is not uncommon among Roman archaeological sites; however, examples of more ceremonial burials have been recorded as well. This manner of disposal might vary depending on the sentimental value of the dog, with cherished house pets receiving more careful burials, while guard and work dogs received more unceremonial burials. The fairly young ages at which these Castelporziano dogs died might not have left enough time to solidify any strong bond with its owner, which might have led to a more careful burial, perhaps in a different location. The possibility also exists that these were stray dogs. There are certainly enough examples of carnivore-gnawed bones from the site to indicate that dogs had access to midden wastes.

As is the case with dogs, equid bones are also not particularly plentiful among the Castelporziano faunal samples; however, the occupants at Castelporziano certainly recruited horses, donkeys and mules as riding, draft and pack animals. Scattered and isolated teeth were recovered from several contexts throughout the site, such as Trench T, but the bulk derives from the midden at Trench S & SA. Teeth dominate this assemblage as well, and there may have been mixing of levels considering that the collection of equid teeth from phase 5 levels in this Trench are comparable in size and taphonomic condition to those retrieved from phase 3 and 4 levels here. A minimum of three individuals exists, but none is represented by what could be considered a complete burial. Rather, the more durable elements (e.g., teeth, distal limb elements, carpals, and phalanges) seem to survive. Moreover, no elements are butchered to suggest consumption or dismemberment for ease of burial. The teeth fall into several size categories, which might be indicative of large and small equine divisions, possibly horses, mules and donkeys, in descending order. This is corroborated by the presence of three left radius bones, whose distal breadth measurements also fall into three size categories. A complete metacarpal bone measured 234 mm in length, which is the equivalent of a withers height of approximately 144 cm — a fairly medium-sized horse by today's standards. All of the equid bones and teeth recovered come from adults. Dental eruption and epiphyseal fusion data indicate that these individuals are older than 4 years, but the teeth are not markedly worn to suggest an elderly age. I would estimate each was around 8-10 years of age.

The poor representation of equids at Castelporziano, as among many Roman sites in Italy, may simply be the result of their minor importance as meat-producing animals. Equids were not normally eaten in Roman Italy, so they would be uncommon finds in middens. Horse graves are noted among ancient sites, while in some cases equids may have been cremated at death (Ruscillo 1993). Either of these possibilities may be true for Castelporziano. Another factor may have been the limited space within the *vicus* to stall and maintain horses, donkeys and mules. Equids would have been used for transport and other duties as required in the *vicus*, but then stalled at one of the neighbouring suburban villas outside of these working hours. Horses are expensive animals to maintain, and elite villa owners could have capitalized on their demand by renting or leasing their stock as required.

The lack of cat bones from the site is not unexpected for Roman antiquity, but seems to contradict the current status in Italy where stray cats abound. Generally, cats were not maintained as pets during Roman times, but rather served important functions to catch mice and rodents, especially around a farmstead. They had a more limited role within urban contexts in this respect. The near absence of mouse and rodent bones from Castelporziano might indicate good sanitary conditions within the *vicus*, and consequently, a limited role for cats. Certainly some were around the *vicus*, but cats are fairly solitary animals and are known to prefer quiet and isolated areas such as forests and fields in which to die. This might help further explain why no cat bones were recovered from the site.

Domestic Fowl and Geese

Domestic fowl bones are infrequent finds in phase 3 deposits, as they are throughout all time periods at the site, rarely accounting for more than 2-3% of NISP totals. The domestic fowl assemblages in both Trench S & SA and Trench X & Y are dominated by leg and wing bones, which is not surprising since these rank among the most durable of avian elements, and frequently outnumber other bones from the bird skeleton. These also tend to be the bones that are often removed as part of carcass dressing process, although no butchery marks are noted on these Castelporziano examples. In a situation where domestic fowl were reared as a free-range flock, able to exercise and forage somewhat freely, the tendons of the wing and lower hind limb harden and become tough (Eastham 2002: 177). Consequently, these bones are often removed, prior to sale. There are slight differences between the two contexts where domestic fowl bones are concerned, however. Trench X & Y contains a greater proportion of chicken axial parts, including elements such as the synsacrum (the lower back) and the coracoid (near the breastbone), which might indicate that relatively more whole birds were discarded here, as opposed to Trench S & SA, which received more waste parts from the leg and wing.

It is difficult to determine how exactly the *vicus* was supplied with domestic fowl. What is apparent from the skeletal part data, coupled with the high proportion of adult birds noted from the fusion data, and the imbalance in the sex ratio in favour of roosters and capons over hens, is that these were probably free-range fowl. This would not exclude fowl that rummaged freely in a courtyard or back lot within the *vicus*, however. The point is that is it eliminates fowl raised under more restricted and controlled settings such as a henhouse or chicken coop. Some inhabitants of the *vicus* may have raised a few chickens on their premises, but I would argue that the bulk derives from birds imported to the *vicus* from neighbouring farms. These farms exported older male birds (i.e., presumably the castrated males, or capons over roosters, although these two are difficult to distinguish on the basis of available osteological data) to the *vicus*, probably maintaining a larger proportion of hens at the farm for eggs, which in turn also could have been marketed in the *vicus*. The farmyard flock seems to be a fully mixed version, providing eggs and meat as required. The absence of bones from the head and neck of domestic fowl, among deposits at Castelporziano, might indicate that most animals were slaughtered away from the *vicus*, presumably at the neighbouring farms and then transported to the site as partially dressed carcasses. Further butchery seems to have occurred at the *vicus*, where wings and lower legs were removed (hence the larger proportion of these in Trenches X & Y and S & SA), with the remaining dressed bird, or chopped cuts distributed to the people. The faunal evidence is short on how these birds were cooked; however, one chicken femur bone had been charred, a mark that might suggest roasting.

Estimating the contribution of domestic fowl to the Roman diet, on the basis of recovered faunal remains is complicated. Their frequency values vary tremendously among sites in Italy, although in most cases they never account for more than 25% of the total animal NISP count. Urban sites in central Italy report values as low as c. 1% among some contexts in Ostia and Pompeii, to c. 8% at late antique deposits from the Schola Praeconum in Rome. Rural and suburban sites tend to have higher frequencies of domestic fowl, averaging in the order of 10-15%, but again individual sites can vary greatly due to recovery and taphonomic biases. Bird bones tend to disintegrate more rapidly than mammalian bones and may be harder to retrieve given their smaller sizes and reduced durability. It is no surprise that sites reporting high frequencies of domestic fowl bones tend also to be those that used fine screens in faunal recovery. Given that the frequency of domestic fowl at Castelporziano is comparable to neighbouring urban centers, particularly Ostia, it seems likely that the site was provided with chickens in a similar manner, and that overall, chickens did not form a significant part of the meat diet of Roman cities, at least those in central Italy. Their contribution tends to remain fairly consistent throughout the temporal periods noted here at Castelporziano, although sample sizes are very small for all but period 3. I would suggest that domestic fowl figured as a stable supplemental meat at the site, throughout its occupation. Rural farmers certainly maintained a supply of chickens, but it seems that more of these birds were eventually consumed on the farm than were exported to cities or *vici*, such as Castelporziano.

Two goose bones were found in Trench S & SA; a humerus and a furculum (wish-bone), the remains of which must have been a rare treat to those living at the time. Although these fragments could provide no useful measurements, the size is similar to a female greylag, which makes it probably a domestically reared specimen. Wild geese only pass through Italy during the winter months, and then only in small numbers. Presumably, this goose was raised on neighbouring farms, in a similar manner to the domestic fowl discussed above. Geese had been reared for fresh and conserved meat as well as the rich *foie gras* from very early times in Italy.

Wild Animals

The lack of wild animal bones from the Castelporziano faunal collection is puzzling. First, this seems in stark contrast to the current ecological conditions of the region – a forested hunting park, full of deer, wild boar, hare and other game. Second, wild animals were important to Roman dietary ostentation, which one might expect to be prevalent given the wealthy nature of the site and its surroundings. Venison is specifically linked to wealthier diets, wild hare was also an expensive delicacy, and wild boar is often mentioned in the context of luxury feasting, according to the ancient texts. Thus, we might expect these three taxa at many sites that show signs of wealthier occupation. Castelporziano is no exception in this regard. However, red deer, hare and a possible wild boar are each only represented by single elements from combined phase 3 contexts, and overall account for less than 0.2% of NISP totals. Furthermore, none of these pieces is butchered, which might help confirm their dietary contribution. A roe deer mandible with several deciduous teeth was recovered from the tank fill in Trench F, but it too appears unbutchered. Moreover, it is possible that this piece is a modern contaminant to this deposit, given its good taphonomic condition. The same is also likely for a single sparrow bone recovered from Trench S & SA. No other wild bird species were identified from the samples.

Despite the frequent connection of wild animals and dietary wealth, as outlined in the ancient texts, zooarchaeological data indicate minimal contribution of these resources. Wild animals comprise less than 10% of the NISP counts at the vast majority of Roman sites in Italy (MacKinnon 2004: 190), and in many cases their bones are absent, although one has to be cautious of the biases of small sample sizes in these comparisons. The very low frequency of wild animal bones at Castelporziano is, in fact, not atypical of other urban sites in central Italy during Imperial times. Similar values are noted for the sites such as Ostia, Capua, and Cosa, with only slightly higher, but still relatively insignificant frequencies noted for Rome (MacKinnon 2004: 228-29). Although domestic animals tend to predominate over wild ones among practically all Roman zooarchaeological assemblages in Italy, there are some differences between rural and urban areas, as well as some changes over time. The data for central Italy support the hypothesis that wild meat formed a greater part of the rural diet than the urban diet. They also suggest that wild meat was eaten relatively more during Imperial times than during the Republic or Late Antiquity. It would seem that dietary wealth, as displayed in the frequency of wild meat consumed did increase during the Empire, most noticeably in central Italy, but this was concentrated chiefly at rural sites. The sites of Settefinestre, Lugnano, and San Giacomo provide good examples of this phenomenon. They are also sites situated in important game-producing regions of Italy, such as the Tuscan hills and interior Apennine mountains as mentioned in the ancient texts (Plin. *Ep*. 5.6). Martial (4.66) further remarks that countrymen had much easier access to wild resources, which could be obtained without cost. By contrast, the area around Rome is not singled out as an important game area, although certainly some wild animals inhabited the forests in this region. Still, I suspect most of the game in the Roman hinterland was hunted to extinction, and the forested managed as convenient sources of lumber and timber, as the population of this region grew during Republican and Imperial times. The aggregate demand for wild animals among the urban elite could be met to some degree by *pastio villicata*, the rearing of special animals for 'both pleasure and profit' (Varro, *Rust*. 3.3.1); however, these would also be expensive ventures to operate in the hinterland area of Rome given the tracts of otherwise prime land required to establish such wild game preserves. Whereas the demand for wild animals may have been high among the elite in Roman cities, it might not have been met conveniently on a practical level, thus the low levels among urban zooarchaeological assemblages. There was some access, however. The ancient texts note that wild animals could be purchased at urban markets (Juv. 6.38-40), but they were costly meats, and considering the numerous references to the prestigious nature of hunting in antiquity, it is also possible that such purchased wild game carried less social significance. Martial (*Ep*. 3.47, 3.58, 12.48) scolds his hosts for purchasing meat and game at the urban market, rather than collecting and hunting these from their own estates.

The paucity of wild game at Castelporziano does not appear to be related to an impoverished clientele at the site, given the nature of the rest of the faunal sample, which includes notable quantities of relatively expensive meats such as lamb and suckling-pig. Surely, if the occupants could afford these meats, they could afford to feast on wild game if they desired. I suspect the situation centers on the ease of supply, which, as noted above was probably not facilitated, at least not in the case of providing the *vicus*. It would be interesting to compare the *vicus* faunal deposits with those from the Roman villas along the coast. If the villas registered higher frequencies of wild animals, arguments could be made for dietary elitism – the villas distinguishing themselves from the *vicus*. Where these villas acquired these game animals, however, would be harder to determine, but I would argue that the principal source was not purchase through the *vicus* markets. Had wild game been regularly available to provide for these villas, more would be expected in the *vicus* samples, beyond the paltry 0.2% levels recorded. Rather, I would argue that these villas were provided with wild game through circuits that by-passed the urban market, such as direct shipment from rural estates, perhaps ones that were managed by the villa owner himself, or his circle of friends.

Fish

Fish bones comprise even less of the total faunal sample from Castelporziano than do bones from wild animals. Overall they account for approximately 0.1% of NISP bone totals (i.e., totals excluding shells) for phases 3, 4 and 5. Their remains are fairly evenly distributed between Trench S & SA, and Trench X & Y. The sample consists chiefly of fish vertebrae, which tend to dominate most fish faunal samples. Lack of diagnostic features on these vertebrae inhibited their classification to species level; however, judging by their size, four of the five vertebrae derived from individuals about 30-40 cm in length, while the remaining vertebrae (from phase 5 contexts) came from a small shark or ray, under 60 cm.

These extremely low values for fish stand in stark contrast to the very high frequency of marine shells recovered from the site, as well as to the apparent importance of seafood in Italy today. It is also puzzling since there are more bones in the fish skeleton than in the mammalian or avian skeleton; thus, the odds are skewed towards counting one of them. Certainly, the *vicus* occupants exploited aquatic resources, so why do the faunal data not reflect this to a larger degree? Fish bones are particularly sensitive to recovery, sampling and taphonomic biases. Although, care was exercised in retrieving all faunal materials, no matter how small, during excavation at Casteloporziano, fish remains are still likely to be under-represented, unless flotation techniques are employed, which was not the case at the site. Richardson (1995: 27) found that fish bones and scales dominated the assemblage of faunal materials recovered from excavations at the House of the Vestals (VI.1.7) in Pompeii, but flotation was commonly practiced at this site. Predicting how much fish material was missed at Castelporizano is complicated, however, since fish bone is also very fragile and disintegrates easily in the soil, especially under acidic conditions.

While fish probably made a greater contribution to the diet and economy of Castelporziano than the faunal data would suggest, their role might not be as significant as one might assume. Recovery, taphonomic and sampling biases are key to deciphering the contribution of fish, but in the case of the midden deposit in Trench S & SA, I would argue that extreme taphonomic conditions cannot be argued as a principal cause of fish bone destruction, had more fish bone been deposited originally at the site. It is possible that fish were deposited in a separate midden, but this seems unlikely given the mixed nature of the trash in Trench S & SA. Gallant (1985: 40) argues that the Mediterranean is really a poor area for fishing, and that “the cultures of antiquity were trying to exploit a scarce, sporadic, erratic and periodic resource base with probably the most inefficient technology: not exactly the most secure foundation on which to base an ‘industry’.” He concludes that fishing was in important means to provide food, which could off-set periodic fluctuations of crop yields. In other words, it was a secondary resource to grain and meat in the diet. The degree to which Gallant’s argument, which is mainly based on an ancient Greek context, can be applied to the case of the Imperial Roman Tyrennhian coast is difficult to determine, but it seems probable. First, with the exception of the House of the Vestals site from Pompeii, fish are rare among all Roman sites in Italy, including those along, or very near to the coast, where access to them would presumably be facilitated. Fish remains account for 0.7% of the total NISP bone sample from the Casa die Jove e Ganimede (Ostia), 1.4% from the Casa dei Postumi (Pompeii), 1.2% from the Casa dei Ganimede (Pompeii), 1.9% from Rome, Meta Sudans, 1.6% from Rome, Caput Africae, and 0.5% from Rome, Aqua Marcia (MacKinnon 2004: 54-55). None of values is far from the 0.8% figure for the percentage of fish in the modern diet of Italy, calculated by Rao (1962: 239); in fact those above the 0.8% figure might indicate a wealthier diet, given that fish was generally an expensive food in antiquity (at least if one was buying this from a market, as would likely be the case for the sites above). Even a fisherman, using primitive technology, could not subsist solely upon the results of his catch, which would only provide him with half his daily caloric needs (Gallant 1985: 31), and this value would be reduced significantly in the case where the fisherman’s catch must provide for his family as well, not to mention provisioning the local market.

A second point relates to the insecurities of fishing in antiquity. The main methods for catching fish include trident and line, weirs and traps, various types of hooks and line, and various types of nets (Gallant 1985: 13). All methods are mentioned in the ancient texts. The first three methods all have low levels of potential productivity, and vary in the degree of effort involved (Gallant 1985: 13-16). The use of nets is the only technique capable of producing a sizeable catch at one time; however, it could be labour intensive depending on the size and weight of the net. Gallant (1985: 23-24) concludes that:

> most of the techniques employed were shore based, small scale, time consuming, labour intensive, and capable of producing, on average, no more than a few kilos of fish per day, enough to supplement the daily diet of the fisherman and his family. The potential productivity of net fishing would have been severely restricted by the fact that it was a completely shore based technology. This point must be stressed. Every description of net fishing clearly indicates that the nets operated from shore; conversely, every account of fishing in deep, open water states that hook and line or trident were used.

Of course, the potential of the method relies on the amount of fish available, which seems to have dwindled during antiquity. Juvenal (*Sat.* 5. 92-98) complains that the Tyrrenhian coast is over-fished, which has led to much smaller yields of immature fish in his day. Pliny, the Younger (*Ep*. 2.17) comments that the Laurentine coast does not produce the more costly sorts of fish (but is plentiful in terms of sole and prawns). Moreover, annual and seasonal fluctuations in fish migrations and numbers would add a further component of variability and unpredictability to the equation. The overall implications are that fishing was not easy or secure during antiquity. Consequently, the low levels of fish remains at Castelporziano might not be as atypical as expected.

Marine Shells

An immense quantity of marine shells was recovered from phase 3 levels at Castelporziano, with Trench S & SA producing the vast majority of these. While a large sample of marine shells might be expected for an archaeological site located on the coast, at over 4000 specimens and nearly 20 kg, the collection of marine shells from Castelporziano is, as far as I am aware, the largest retrieved and analyzed for a Roman site in Italy. Available comparative samples from Ostia (c. 450 shells from the Casa dei Jove e Ganimede excavations), and Pompeii (c. 1000 from Casa dei Postumi) are much smaller. Isolated examples and/or relatively small collections are discussed in several other faunal reports for Roman sites in Italy, but fewer than 100 specimens comprise most of these samples (e.g., sites of Settefinestre, Otranto, San Giacomo, Rome Schola Praeconum). Unfortunately, shells have not always been collected systematically during excavations, so there is a limited database to study.

Both marine gastropods and bivalves are represented in the Castelporziano sample, but no freshwater species. Some were collected from the sea by human agents, presumably for food, while others were incorporated into the site stratigraphy under natural circumstances given their presence in beach dunes, coastal sand bars and other geological features. Centuries of activity have consequently mixed much of this beach sand (with its shells) inland from the coast. The shoreline itself has shifted over the ages as well, due to factors such as changing tides, wave action, tectonic plate movement, flooding, drought, and other geological and environmental agents. Lower water levels have expanded the current shoreline so the area of sand and beach currently visible would have been underwater during Roman times. Originally, the *vicus* was located right on the coast.

It is difficult to separate which shells were collected and which formed part of the disturbed sandy geological context for the site. With the exception of oysters (*Ostrea edulis*), mussels (*Mytilus* sp.) and murex (*Murex* sp.) all of the remaining species generally inhabit soft sandy bottoms, most within shallow waters. These sandy-bottom varieties therefore would be more likely candidates for intrusion onto the site, especially if beach sands were brought in for construction or filling purposes. This is not to say that these were not harvested for food during antiquity. They are all edible; many are still sold today in Italian markets, although a few, such as *Glycymeris* are disparaged as food in more recent times (Robinson 2002: 310), while small gastropods, such as *Cerithium*, *Turitella*, and *Aporrhais* might not be worth the effort. Some of the more uncommon varieties represented in Table 10, may be marine debris collected by accident with food species.

The case for oyster cultivation has already been presented. Certainly oysters were collected and eaten during Imperial times at the site. The fountain, D1b, seems to continue as a storage pond or cache for oysters during phase 3, while waste shells of consumed oysters were discarded in the midden at Trench S & SA, as well as in the rubbish deposited in the area of Trench X & Y. When shell totals are compared, relatively more oyster shells were collected from contexts within the *vicus* (e.g., Trenches D and X & Y) than across the street in the midden. In part, this might be due to a lack of desire to transport somewhat bulky collections of oysters shells the extra distance to the midden, across the Via Severiana, on the edge of the *vicus*.

Wedge shells (*Donax* sp.) are most abundant in the midden deposit at Trench S & SA. This common bivalve grows up to 40 cm long and is found buried in sand at depths of 10 to 15 cm. It would have been easily collected in antiquity, and its predominance supports its value. However, as a small shell, it would not yield much meat.

The remaining shell species were of minor significance to the diet and economy at the sites. If not deposited via geological agents, each was probably either indirectly caught while collecting a more important and plentiful species such as *Donax*, or causally picked up while at the beach. *Glycymeris*, *Cardium* and *Venus* are common types of cockle shells, and have been used for decorative purposes, such as lining fountains and nymphaea, although these examples bear no direct signs of being used in this way at Castelporziano. Cockles also tend to be the typical shells collected during a stroll along the beach. *Cassidaria* and *Tonna galea*, both marine gastropods, can grow up to 15 cm, so they too might be readily picked up while at the beach. *Aporrhais* have a distinctive shape, where the body whorl of the adults is drawn out into several conspicuous point, like a bird's foot, hence its common name, Pelican's Foot Shell. It too might have been selected while on the beach. Although the murex species can yield a purple dye, far too few murex shells were recovered to imply that they were being used for dyeing at Castelporziano. They too, were probably collected along the beach.

Finally, a note should be made about incorporating beach sands into construction purposes at the site. If volumes of sand were brought in to level, fill or otherwise cover an area then any embedded shells within that sand would be incorporated into the new context. It is possible that sand was periodically dumped onto the midden at Trench S & SA, perhaps to mask odours or keep pest animals away. Similar practices might also have occurred within the *vicus*, perhaps where Trench X & Y is concerned.

Land Snails

Several varieties of land snails were collected from phase 3 levels in Trench S & SA and Trench X & Y. These include species that survive best in open country conditions (e.g., *Rumina decollata*), as well as those that inhabit more catholic environments, such as forests, fields, gardens, thickets, steppes and seaside dunes (e.g., *Eobania vermiculata*, *Helicella* sp., *Hexaplex* sp., *Helix* sp.). All are native to the Mediterranean and common in the area of Castelporziano today. The sample is too small to help reconstruct ancient environmental conditions with any precision; however, the general mix of open country and catholic varieties might suggest that the area was less forested in ancient times than it is today. This might also help explain the low frequency of wild animals in the faunal sample, if indeed forests were less plentiful in Roman times than today. The absence of damp- and shade-loving varieties of snails from Trench S & SA suggests that the midden in association was located in an area that received ample exposure from the sun. It was not shaded by vegetation while in use. The greater proportion of sun-bleached snail shells from this locality provides corroborating evidence of an exposed context. Material in Trench X & Y accumulated under relatively similar conditions, but lacks open country snail species during phase 3, which might indicate slightly protected and cooler conditions as afforded by walls and vegetation within the *vicus*. Snail sample sizes are very small, however, so conclusions are tentative. Although excavators were vigilant to recover all faunal remains, many snails, especially small varieties were likely missed during excavation since contexts were not fined-screened. Acidic soils might account for the lack of snails among the remaining Trenches at the site. Certainly the high concentration of bones in Trench S & SA and Trench X & Y promoted the survival of snails in these contexts by encouraging more basic soil conditions.

There is no clear evidence that snails were eaten at Castelporziano during any period. *Helix* sp. varieties are edible and used locally for food today in Italy, but far too few of these were recovered among the deposits at the site. Although each shell was not measured, a visual inspection reveals that individuals of the same species occur in a variety of sizes and presumably represent fairly natural populations. There is no evidence for a preponderance of adult snails or oversized individuals of a particular species, which might indicate some degree of deliberate selection by means of cultural intervention. In addition, there are no obvious signs of specialized utensils, containers, or other artifacts that might have been used for storing or serving snails. Still, although there are no definite indications that snails were consumed at Castelporziano, the possibility of the inhabitants eating escargot cannot be rejected. The *vicus* shows many signs of wealth, and if so the occupants probably tried to add as much variety to their diet as possible. Snails, all of which are available around the site, would have been an excellent and economical commodity in this respect. In light of their very small numbers, however, escargots cannot have formed any significant part of the diet. In terms of protein sources, meat from domestic animals was certainly easier to obtain than its nutritional equivalent in collected snails. Moreover, the fact that edible varieties of snails, such as *Helix* sp. occur in relatively small numbers at the site lends support to the argument that these snails were not collected during times of economic hardship, otherwise one might expect many more snail shells.

Comparing the frequency of land snails at Castelporziano to other Roman site in Italy is fraught with difficulties, especially since standards of recovery vary tremendously among sites. Snails were not consistently retrieved or reported among sites, and taphonomic conditions vary among contexts, so there is often no measure of survival rates for individual species. Castelporziano is not unlike other Roman urban sites throughout Italy in registering a very low value of land snails, especially when these are compared with rural sites, which generally register more than twice the average frequency of snails than their urban counterparts. One might expect more snails at rural sites, but the frequency of land snails at Castelporziano lies at the lower end of averages for urban sites (e.g., Ostia, Pompeii). In part, this might be due to stricter systems of waste disposal and cleanliness within the *vicus* during its occupation. Natural populations of snails might not have had the opportunity to flourish to any extent within the *vicus*. Some may have been drawn to the midden deposits that accumulated across the Via Severiana, and, as mentioned above their survival might have been augmented by the more basic soil conditions here, but conditions here were still not ideal for snail populations to flourish.

Phase 4: Late antiquity – late 3^rd^ to 4^th^ c. AD

Table 12: Phase 4 Bone NISP

	A	B	C	D	F	H	M	P,Q,R	S-ext	S,SA	T	X,Y	**ALL**
Cattle											3	3	**6**
Sheep/goat						10					1	4	**15**
Pig						22					21	53	**96**
Equid						1						2	**3**
Canid						1						1	**2**
Gallus											1	5	**6**
Deer												2	**2**
Tortoise												6	**6**
Fish									1			1	**2**
TOTAL						**34**			**1**		**26**	**77**	**138**

Table 13: Phase 4 Shells NISP

	A	B	C	D	F	H	M	P,Q,R	S-ext	S,SA	T	X,Y	**ALL**
MARINE													
Ostrea						13			1			9	**23**
Donax						18			4			6	**28**
Glycymeris						8					1	2	**11**
Murex						1					8	1	**10**
Nassarius						2			1			1	**4**
Aporrhais											1		**1**
Venus						1							**1**
LAND													
Helicella						2							**2**
Eobania												1	**1**
Rumina												1	**1**
TOTAL						**45**			**6**		**10**	**21**	**82**

Table 14: Phase 4 UNID Bone

	A	B	C	D	F	H	M	P,Q,R	S-ext	S,SA	T	X,Y	**ALL**

MEDIUM													
Rib						15			4		9	24	**52**
Long bone						31			5		26	90	**152**
Vertebrae						2					2	4	**8**
Scapula						2					3	6	**11**
Pelvis						4						1	**5**
Cranium						3						10	**13**
Other						1						1	**2**
LARGE													
Rib											3	3	**6**
Long bone									6			2	**8**
Vertebrae											1	1	**2**
Other													
AVIAN											1	7	**8**
MISC.													
TOTAL						**58**			**15**		**45**	**149**	**267**

The biggest change, in terms of zooarchaeological materials, that seems to have occurred at Castelporziano during the later phase of its occupation (3rd and 4th centuries AD) is a shift in rubbish deposition. The midden revealed in Trench S & SA seems to have gone out of use. Presumably another midden was created, but its whereabouts currently remains unknown. There are architectural and structural changes to the site during this time, such as the possible subdivision of some buildings into smaller apartments (e.g., block F), and previously private properties and residences being converted into public spaces and workshops (e.g., block C). Faunal materials accumulated within the *vicus* at this time, but the samples collected from Trenches T, H, and X & Y are too small to provide good data. Little can be concluded about other animal taxa, but pigs seem to continue as the mainstay of the meat diet during phase 4. All parts of the pig skeleton are represented, indicating whole animals were brought in and butchered on site, with a general mix of young and mature ages, and a fairly equal balance of male and females. Again, it is suggested that the site was provided with pigs from the local area. Continuity seems to be maintained in this respect.

Why so little animal bone waste dates to phase 4 is unknown. As mentioned above, a new, as yet undiscovered midden might exist for late antique occupation at the site. Another possibility might relate to a declining population in the *vicus*, or a shift in residential patterns. While the *vicus* may have been operating to some extent, perhaps as a commercial center or work area, perhaps fewer people actually lived there, and the bulk of their domestic waste accumulated elsewhere. It might also be that a poorer population in the *vicus* could actually afford meat. Finally, another possibility is that activity shifted away from the *vicus* to the neighbouring villas, which may have assumed greater roles as domainal markets and productive centers during late antiquity. Insecurities in the Roman economy at this time might have caused abandonment of some regions, as well as a more insular, self-sufficient mode of thinking for others. There were certainly pockets of economic prosperity during late antiquity in Italy, but Castelporziano might not have flourished to the extent of other areas, or as it did during Imperial times at the site.

Phase 5: Post antiquity (includes: modern, unstratified, disturbed)

Table 15: Phase 5 Bone NISP

	A	B	C	D	F	H	M	P,Q,R	S-ext	S,SA	T	X,Y	**ALL**

Cattle		1					3			6			**10**
Sheep/goat	1		4				9			33		8	**55**
Pig		2	1	5			51			54		28	**141**
Equid							1			25			**26**
Canid										1			**1**
Gallus							3			2			**5**
Deer							2			2			**4**
Boar												1	**1**
Hare							1						**1**
Rodent	1						1						**2**
Passerine										1			**1**
Tortoise							4					2	**6**
Fish												1	**1**
Human		1										1	**2**
TOTAL	**2**	**4**	**5**	**5**			**75**			**124**		**41**	**256**

Table 16: Phase 5 Shells NISP

	A	B	C	D	F	H	M	P,Q,R	S-ext	S,SA	T	X,Y	**ALL**
MARINE													
Ostrea		2	21				7			78		2	**110**
Cardium		1								3		2	**6**
Donax		1	5				2			291		154	**453**
Glycymeris		1	1							13		14	**29**
Murex							1			1			**2**
Mytilus			1									1	**2**
Turitella										2		1	**3**
Tonna										4			**4**
Nassarius										4			**4**
Aporrhais							1						**1**
Natica										1			**1**
Venus										5		4	**9**
Monodonta										1			**1**
LAND													
Eobania										4		4	**8**
Helix												2	**2**
Helicella												1	**1**
Hexaplex		1											**1**
Rumina							1					1	**2**
TOTAL		**6**	**28**				**12**			**407**		**186**	**639**

Table 17: Phase 5 UNID Bone

	A	B	C	D	F	H	M	P,Q,R	S-ext	S,SA	T	X,Y	**ALL**
MEDIUM													
Rib	1						20	1		30		4	**56**
Long bone	8		7			5	70			49	9	24	**172**
Vertebrae						1	4			4	4	2	**15**
Scapula							4			4		1	**9**
Pelvis							1				1	1	**3**
Cranium							5			1	1	4	**11**
Other										1			**1**
LARGE													
Rib	1							1		2			**4**
Long bone			1				7			4	3	9	**24**
Vertebrae							1	1					**2**
Other													
AVIAN	1												**1**
MISC.										4			**4**

TOTAL	**11**		**8**			**6**	**112**	**3**		**99**	**18**	**45**	**302**

I shall only briefly consider the faunal materials from phase 5, given that these derive from unstratified, contaminated, modern and/or disturbed contexts. Taphonomic conditions tend to corroborate a modern date for a number of these bones, which exhibit recent root and fungal decay. Of all the contexts, phase 5 deposits also show the greatest range of taphonomic markers, indicating depositional mixing and contamination. Moreover, many shells still maintain their vivid colouring, indicative of a modern data as well. Samples are too small to draw conclusions about post-antique operations in the area, but available data suggest that the contribution of animals to the diet and economy did not change markedly. Pigs, cattle and ovicaprids were still consumed, and marine shellfish collected. The sample from Trench M probably consists of redeposited ancient material, collected during the transfer of a spoil heap created from earlier excavations at the site. The predominance of pig in this deposit confirms the central importance of pork to the Roman Imperial diet of Castelporziano.

Summary and Conclusions

Zooarchaeological examination of the Castelporziano materials provides a detailed glimpse into the role of animals in the diet and economy of the site, especially during the Imperial period. Pigs contributed the bulk of the meat to the diet, followed by cattle and ovicaprids, domestic fowl. Wild animals and fish were rare; however, shellfish (especially oysters) were relatively common. The site was stocked with animals obtained from neighbouring farms, throughout the year, as well with individuals from transhumant herds of cattle and ovicaprids that spent the winter months in lowland pastures near the site. All seem to be local breeds, or at least ones native to central Italy, as opposed to imported varieties from southern of northern Italy. Most animals were herded to the site live, where they were subsequently slaughtered, butchered, consumed and disposed of at that site. The bulk of the rubbish accumulated in a communal midden heap located on the far side of the Via Severiana, just outside the limits of the *vicus*. Some of this rubbish may have been redeposited in other contexts over the site, as required for construction, fill and landscaping purposes. Overall, however, most of the site was kept clean of faunal rubbish. The high proportion of younger animals in the zooarchaeological sample indicates a relatively wealthy diet at the site, compared to neighbouring urban centers such as Rome and Ostia, but overall the contribution of the main domestic species of animals is similar to averaged patterns for Roman urban sites in central Italy during the Imperial period. Further wealth might be indicated by the substantial quantity of oysters recovered, some of which may have been deliberately cultivated by the site occupants.

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Appendix 1: Scientific and Common Names of Animal and Shell Taxa Recovered at Castelporziano

Mammals
Bos taurus – Cattle
Ovicaprids*: Ovis aries* – Sheep; *Capra hircus* – Goat
Sus scrofa – Domestic Pig
Equids: *Equus caballus* – Horse; *Equus asinus* – Donkey; Mule – donkey x horse
Canids: *Canis familiaris* – Domestic dog
Felis catus – Domestic cat
Deer: *Cervus elaphus* – Red Deer
Lepus europaeus – Hare
Sus scrofa fer. – Wild Boar

Birds
Gallus gallus – Chicken, Domestic Fowl
Anser anser – Domesticated Goose

Terrestrial Gastropods
Eobania vermiculata (Müller)
Helix sp.
Helicella sp.
Hexaplex sp.
Rumina decollata (Linnaeus)

Marine Gastropods
Monodonto cf. *turbinata* (von Born) – Toothed Winkle or Thick Topshell
Turitella sp. – Tower Shell
Aporrhais pes-pelecani (Linnaeus) – Pelican's Foot Shell
Cerithium sp. - Cerith
Tonna galea (Linnaeus) – Giant Tun Shell
Natica alderi (Forbes) – Common Necklace Shell
Cassidaria sp. – Helmet Shell
Murex (=Bolinus) brandaris (Linnaeus) - Murex
Nassarius sp. – Dog Whelk

Marine Bivalves
Glycymeris glycymeris (Linnaeus) – Dog Cockle
Mytilus sp. – Mussel
Pecten jacobaeus (Linnaeus) – Fan Shell Scallop
Spondylus gaederopus (Linnaeus) – Spiny or Thorny Oyster
Ostrea edulis (Linnaeus) – Common European Oyster
Cardium (=Cerastoderma) edule (Linnaeus) – Common Cockle
Venus sp. – Venus
Donax sp. – Wedge Shell