INTRODUCTION

Excavations at the site of Pievina (Tuscany, Italy) were conducted under the direction of Kim Bowes, Mariela Ghisleni, and Emanuele Vaccaro (under the auspices of Cornell University and Università di Grosetto) in 2009. The focus was to examine remains of smaller-scale settlements, presumably those related to peasant (or at least less-elite) occupation. The area underwent periods of development, modification, and decay broadly divided into two temporal brackets:

Period 1: Republican/Imperial
Period 2: Late Antique (c. 5th century AD)

Faunal remains were routinely collected from all areas of the site throughout excavation. Their analysis is vital to the reconstruction of animal use over time and space at Pievina. How did animals factor into life at the site? And how did this change temporally? The entire collection of bones retrieved is discussed in this preliminary analysis, under the following objectives:

(1) Examine chronological changes in faunal resources at the site, divided roughly into two phases, as noted above (Republican/Imperial and Late Antique). This chronological distinction is necessarily broad, for the purposes of this preliminary report. As phase divisions become more distinct, greater temporal precision will be available, allowing for more detailed assessment of individual periods. The Late Antique phase is marked by several sub-phases with episodes of disuse, re-occupation, and redevelopment, but these are difficult to evaluate reliably due to the small sample sizes of faunal materials from individual sub-phases.

(2) Assess the spatial distribution of bones at the site to refine our picture of depositional, functional, and behavioral variation among different contexts at Pievina.

(3) Compare results from the site with faunal data from neighboring archaeological sites (chiefly those contained within an approximately 100 km radius from
Pievina) to outline broader regional patterns of animal use in central Etruria, roughly, over time. Although Pievina produced almost no bones from distinctly Etruscan levels, several faunal samples from Etruscan sites in the region are used to determine the degree of continuity or change in animal resources at Pievina. In other words, do zooarchaeological patterns in the Roman and Late Antique contexts at Pievina reflect longer-term trends initiated in early Etruscan times, or are these phenomena unique to individual time frames, being shaped more by social, economic, and environmental factors of those periods in question?

RECOVERY, TAPHONOMY AND NATURE OF THE DEPOSITS

Although zooarchaeological studies certainly help in assessing past animal use, reconstructions depend upon the available samples analyzed and the circumstances of their deposition, preservation, and retrieval. Over 1000 pieces of bone were recovered from Pievina, but in uneven quantities, spatially and temporally. Most derive from Late Antique contexts (92.5%), a notable amount of which (7.7% by total count, 15.7% by NISP count) was collected from an organic-rich context (1006), presumably some type of rubbish pit, contemporary with a Late Antique destruction/burial phase at the site. Overall, however, the bulk of the remains collected represent somewhat more peripheral waste, such as the miscellaneous bits of trash overlooked or pushed aside during cleaning of floors or clearing of areas, or the haphazard rubbish that might accumulate in spots during episodes of construction, destruction, or abandonment. While such deposits may be less directly tied to habitation phases, collectively this material still reflects trash discard patterns for people at the site or in the general area, patterns that in turn are assumed to correspond to available animal resources and products from individual time phases under consideration. As such, the remains are valuable for general zooarchaeological reconstructions along both spatial and temporal lines.

Taphonomic agents such as carnivores, wind, water, erosion, slope wash, sunlight, soil acidity, and so forth represent a second biasing factor on zooarchaeological deposits. Their impact at Pievina must be addressed for reliable temporal and spatial comparisons. Most bone specimens collected from the site rank in “fair” condition (assuming a scale of excellent-good-fair-poor). Chiefly scraps, rather than complete bones, many pieces are brittle and exhibit post-depositional fracture lines and breakage resulting from the mechanical, chemical, and structural pressures of burial in, and exposure to, the hard-packed, dry, silty-clay sediments and soils covering much of the area. Juvenile long bones are poorly represented, although relatively more teeth from younger animals were recovered, presumably a factor of differential preservation (i.e., teeth survive better than bones, regardless of the age of the animals). Isolated teeth, extracted post-depositionally from mandibles and maxillae, were plentiful, accounting for approximately 75% of all teeth identified, regardless of period. Moreover, teeth themselves comprise 29.6% of the NISP component for the Republican/Imperial phase, and 50.7% of the NISP component for the Late Antique phase. Such statistics align neatly with figures from many other Roman sites in Italy, reflecting fairly even taphonomic effects across assemblages. High counts among the ‘long bone’ categories in UNID counts (over two-thirds of UNID bones tallied derive from this category, see Fig. 2) further testify to augmented post-depositional breakage and destruction of bones. Overall, the bulk of the bones retrieved
include the more durable elements, or parts of elements, a concern to bear in mind in
interpreting faunal patterns, especially skeletal-part frequencies and age profiles.

The impact of other taphonomic factors on the Pievina zooarchaeological material
appears negligible, compared to the damage from natural deposition and soil agents.
Carnivore and rodent gnawing are infrequently attested (0% and 4.5% by NISP2 counts
for Republican/Imperial and Late Antique contexts, respectively). Burning is not
significantly displayed; less than 0.5% of the bones recovered is charred or calcined
(even those in connection with the kiln). Water polishing and abrasion through trampling
are also negligible. The near lack of evidence left by surface taphonomic agents on any of
the bones from the site suggests that most of the faunal materials were deposited and
subsequently buried over relatively short periods of time. Recall again that most of these
pieces are the odd bits of trash. Although some waste was discarded in middens near
households (e.g., on the far side of walls, in the case of context 1006 from Late Antique
times), it appears that the bulk of the rubbish that would accumulate during occupation
phases at the site was removed to outside areas. One possibility is that waste materials
were eventually scattered over agricultural fields as a form of fertilization. Waste any
also have been routinely discarded in other areas, such as ravines or pits outside of the
site. Given the low frequency of charred and calcined bone, it appears that waste bone
was not commonly burnt or used as a supplemental fuel source, such as in kiln firings.

Overall, taphonomic conditions among contexts that produced any significant
quantities of bone, regardless of their location or level across the site, appear uniform. As
such, an argument may be forwarded that relative temporal and spatial comparisons can
be made reliably without undue taphonomic biases affecting results.

Finally, although faunal materials were chiefly collected by hand during
excavation (exceptions including 1030, 1037, 1006, and 2003, parts of which were dry
sieved with a 5mm mesh), vigilance was exercised to reduce retrieval biases favoring
larger, obvious specimens. Consequently, it is assumed that recovery biases have not
markedly skewed the faunal sample, as least in terms of the relative contributions of the
chief domesticates—cattle, sheep/goats, and pigs—to discourage drafting patterns of past
animal use from the available material.

METHODOLOGY

Faunal materials from the 2009 campaigns at Pievina were examined during June
2010. All identifiable pieces that could be recorded to element and species/taxonomic
level were catalogued. Ribs, vertebrae, and miscellaneous long bone and cranial
fragments that could not be identified securely to species were grouped according to size
categories (e.g., large = cattle-sized; medium = ovicaprid and pig-sized) and counted as
the ‘UNID’ portion of the faunal sample. NISP (=Number of Identified Specimens)
tallies included individual teeth within mandibles and maxillae. MNI (=Minimum
Number of Individuals) calculations factored in the ages groups of fetal, juvenile,
subadult, and adult in assessing figures. Epiphyseal fusion parameters follow Silver
(1969); dental wear stages correspond to the schemes devised by Grant (1982), for cattle

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1 The term “ovicaprid” encompasses both sheep and goats, and is used interchangeably with “sheep/goat”
in this report. The two taxa are often grouped together in zooarchaeological analyses because of their
similar osteology.

**PART 1: TEMPORAL ANALYSIS WITHIN THE SITE**

**Quantification**

In total, 1016 animal bones were collected during excavations at Pievina, with 319 (31.4%) comprising the NISP component (Fig. 1), and the remaining 697 (68.6%), here referred to as the UNID (=unidentified) component, classified within broader skeletal-part and animal-size categories only (Fig. 2).

Figures 1 and 2 demonstrate several points. First, sample sizes vary significantly among phases. Imperial period deposits account for less than 7.5% of the entire assemblage. By comparison, Late Antique deposits comprise about 92.5% of total faunal counts. The higher accumulation of faunal waste among the latter period is not unexpected, given its dominance archaeologically and architecturally at the site. This is also the phase where midden-like structures were excavated, as well as a time of greater structural activity (with more episodes of repair and reconstruction, it seems). Waste may have been tolerated more under these conditions of change. Such a pattern tends to occur across ancient sites in general: phases of repair, maintenance, and reconstruction, themselves sometimes preceded by periods of decay, destruction, and decline, or at least ill repair, tend also to be times when rubbish accumulates more quickly and regularly. Practical reasons certainly play a role as well. Late Antique settlement and activity, at many sites, lies directly above earlier phases, a chronological progression that can severely damage or destroy underlying deposits. Nevertheless, an interesting aspect to explore further is the impact of cultural factors on waste deposition. Were Late Antique occupants “messier” or more tolerant of rubbish accumulation within their vicinity than Republican/Imperial inhabitants? How much recycling of rural trash occurred, and did this vary over time? Were peasants more apt to waste less, or recycle more? These questions address interesting hypotheses to explore in future research.

A second point from inspection of Figures 1 and 2 is that mammalian bones preponderate across phases, totally 97.5% of the entire NISP sample and over 99% of UNID counts. It is uncertain to what degree marked taphonomic destruction has had an impact on values for avian bones and obliterated remains of fish, or if their infrequency denotes their very low dietary and economic contribution. Comparable data from neighbouring sites (Appendix 1) show similar trends. According to NISP data for Pievina, the mammalian category itself is comprised, predominantly (91.5%), by bones of the three principally consumed domesticates: cattle, ovicaprids, and pigs. Non-consumed domesticates (i.e., dogs, equids) figure very infrequently, across both periods. Consumable wild animals, including wild boar, red deer, roe deer, and hare, are also rare, but more plentiful during the Republican/Imperial phase at the site than during subsequent Late Antique times, a pattern consistent across a number of sites in the area as well. Wild animals appear to be more important among Imperial contexts in Tuscany, but still contribute to dietary and economic resources throughout time, and across a range of site types it seems. Lastly, avian bones identified at Pievina are all from domestic fowl; however, in extremely low quantities overall (0.5% of bones overall are avian). This is consistent across both phases at the site.
A final point concerning the data in Figures 1 and 2 is that the basic patterns of
taxonomic abundance shown in the NISP counts (Fig. 1) are paralleled in UNID tallies
(Fig. 2). UNID bones from avian and small-mammal sources are very infrequent, with the
bulk deriving from medium-sized (i.e., probably ovicaprid and pig) and large-sized (i.e.,
probably cattle) mammals.

While cattle, ovicaprids, and pigs dominate faunal counts from Pievina, their
contributions vary chronologically. Figure 3 records their relative frequency across time,
calculated using NISP and MNI values.

Regardless of quantifier, the patterns are basically similar. Cattle and ovicaprid
frequencies increase from Republican/Imperial levels through Late Antiquity (moving
from 13% to around 22%, and from 27% to 43%, respectively, of principal domesticate
NISP counts). The increase in these taxa comes at the expense of pigs, which decline in
frequency from around 61% to 35% over the same period.

Cattle (Bos taurus)

Cattle were principally maintained as plough and traction animals across much of
the ancient Mediterranean. Cattle likely still performed these duties throughout Late
Antiquity at Pievina but their inflated values during this period (see, Fig. 3) oppose
general trends of cattle frequency decreases when compared to rural villa sites of the
same time frame in the area (Appendix 1). Why such a contradiction? One option is that
this represents a local phenomenon, with cattle husbandry paralleling or even eclipsing
the scale shown for pigs and ovicaprids during Late Antique times in the Pievina region.
While possible, this scenario seems unlikely, given that the hillier, and in some cases
forested, landscape around the site, and in central Italy generally, is better suited for
ovicaprid and pig husbandry. Moreover, market demands for pork tend to keep pig NISP
and MNI values relatively high across antiquity, especially in heavily populated central
Italy. More probably, the elevated values of cattle in Late Antique contexts at Pievina
relate to smaller-scale agricultural and animal husbandry operations being practiced in
this region at this time. Frequency values among the principal domesticates highlight
greater aspects of mixed farming and animal husbandry (i.e., keeping a few animals of
each type) than they do any concentration on rearing any one taxon in particular. Such a
pattern correlates more with farmer self-sufficiency than to augmented specialization, and
could imply less connection, at least as regards consumption of meat and other animal
products, to any greater market or production venture. In other words, the pattern of
increased cattle frequencies for Late Antique Pievina may be more a factor of less
specialization in sheep/goat and pig husbandry (in turn artificially augmenting
comparative values for cattle) than in any expansion of cattle herding and breeding
operations in the area. Still, it is important to note here that no consistent pattern marks
all sites—great variation exists even among sites that are relatively close spatially,
culturally or economically.

Age data for cattle, tabulated on the basis of epiphyseal fusion and dental eruption
and wear patterns, are insufficient for sound conclusions, but nevertheless record a
predominance of adults across periods. This pattern is somewhat expected, since adult
cattle were generally exploited for work purposes and consumed at older ages. Still, the
presence sub-adult cattle bones from Late Antique times suggests that at least some cattle

were consumed for veal, and could be culled from a small herd, or cow-and-calf familial unit, without jeopardizing its vitality. The presence of younger cattle in these Late Antique contexts also helps support the hypothesis of smaller-scale husbandry and mixed farming operations taking place at the site during this time. There appears to be some local effort to raise and maintain some cattle on site, or at least in the area, and over a longer-term period, than to drive larger herds through the region in any sort of transhumant or migratory effort.

Figure 4 displays the frequency of four categories of skeletal parts for the principal domesticates, calculated on the basis of NISP and MNE\(^3\) counts. Insufficient samples hamper their assessment for Republican/Imperial contexts. As regards Late Antique levels, the high representation of the ‘head’ category across all taxa and phases is somewhat expected considering that many individual elements are subsumed in this category, and that teeth (the most abundant element in this category) survive well and are often readily identifiable to species. Nevertheless, despite small sample sizes for the Late Antique contexts as well, representative bones from both cranial and post-cranial skeletal sections of cattle are generally found during both Republican/Imperial and Late Antique phases. It would seem that at least some whole cattle were slaughtered and butchered in the vicinity of the site during Late Antique times, with carcass parts then distributed locally for consumption. There appears to be no (or very little) import or export of beef cuts to, or from, the area during this time. Such a finding would, in turn, add support to the hypothesis that animal husbandry operations at the site, during Late Antiquity, were relatively small-scale in operation, with greater farmer self-sufficiency in this regard.

Determining the type of cattle used at the site and any size changes in such breeds over time is problematic. Overall, few cattle bones yielded useful results that could help estimate size and shape parameters of living individuals. The few measurements obtainable for the Late Antique cattle bones tend to fall below averages for cattle of a similar time frame in central Italy.\(^4\) Although still within acceptable ranges for comparable cattle in the area, Pievina representatives appear slightly smaller than normal. This may mean several things. First, although sex determination of the Pievina cattle bones was inconclusive, these could represent cows of the local breed of cattle. Females tend to fall within lower size ranges. Second, and probably more likely (and not in opposition to the point one above), this may simply be a substandard local Etrurian/Latium breed of cattle (male, female, or castrate). Finally, the smaller size range for these bones may be indicative of a separate breed, possibly the Campanian variety or the smaller of the two Umbrian varieties as described in the ancient texts (Col. 6.1.1-3), either of which was noted as being beneficial for ploughing lighter soils. No cattle bones, however, exhibited any noticeable pathological signs, such as osteoarthritis, that might help substantiate work stress, although it must be emphasized that well-maintained, and healthy working animals need not show such osteological traces of strain. Nevertheless, conclusions about breeds must await more metric data from future zooarchaeological samples in the area.

\(^3\) MNE (minimum number of elements) has been calculated in this case as an elemental-MNI count. Essentially the highest MNI count for any of the subcategories of bones within each of the four skeletal part groups was taken as the MNE for that group.

\(^4\) Comparative data from MacKinnon 2004.
Cattle are relatively expensive animals to maintain, in relation to ovicaprids and pigs, for example. In the case of oxen, a peasant farmer would have to weigh the factors associated with providing sufficient fodder to keep his team of oxen, against the need to feed himself and his family with the resources from his land. Several options are available to cope with this dilemma. First, the farmer could use animals with smaller appetites than a typical ox to pull the plough (e.g., a cow, smaller-sized breeds of cattle, a donkey or mule). The sex of the Pievina cattle cannot be determined from gross morphometric analyses at this time (DNA assessments may help), so it is unknown if cows, as opposed to oxen or bulls were kept at the site. The diminished size of the cattle bones recovered from Pievina may support the option of raising a smaller breed. Again, however, further testing is required here to verify breed relationships. As will be discussed later in this report, few equid bones were retrieved from Pievina. Presumably then, the option to replace plough cattle with donkeys or mules was not commonly practiced in this region. Comparisons with other sites in this area show similar trends. On the basis of available zooarchaeological evidence, equids do not appear to have contributed chiefly as plough animals during antiquity in Tuscany.

Another option for coping with the high costs associated with owning and maintaining plough oxen during Roman times is to share, rent, hire, or lease such animals. The ancient texts attest to such practices. The degree to which this was practiced at Pievina is unknown; however, it certainly provides an economical advantage to any peasant farmer. The option to share, rent, hire, or lease may have gone beyond plough oxen for Roman peasant farmers to involve a variety of material and services. This represents a potential avenue to explore in future research.

Sheep/goats (*Ovis aries/Capra hircus*)

The NISP and MNI patterns for sheep/goat from Pievina (Fig. 3) conform somewhat to overall trends in central Italy (comparative data in Appendix 1). First, like most other sites in the area, sheep largely outnumber goats (6 goats to 21 sheep, for Late Antique times – an NISP count for elements that could be identified to either animal). Most probably this relates to cultural demands for wool, and the ease with which flocks of sheep, as opposed to goats or mixed herds of both, could be managed during antiquity.

A trend to increased sheep/goat frequencies from Republican/Imperial times to Late Antiquity, at Pievina, further conforms to general patterns for many sites (especially rural ones) in Tuscany (and more generally, Italy) over the same period. Explanations for the general increase in sheep/goat values for central Italy stress factors such as a decline in urban demands for pork (thus decreasing pig NISP values, and indirectly increasing those for ovicaprids), coupled with a shift towards decentralized, small, pastoral operations, as the Roman Empire experienced economic and social conflicts. It is important to stress here that augmented sheep/goat values during Late Antiquity likely do not signify ovicaprid specialization on a grand scale, such as might be implied in the case of increased pig values during Roman times correlating with a market-driven push for many farmstead to specialize in pork production, sometimes at the expense of herding and raising other animals at their farms. The nature of this decentralized, small, pastoral landscape during Late Antiquity in many parts of Italy lends supports to arguments made

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5 MacKinnon 2004, 96
6 King 1999, 173.
earlier in this report that Late Antique settlement at Pievina operated along a smaller-scale as regards animal husbandry schemes. This is somewhat consistent with patterns that developed in earlier phases at the site. In other words, Late Antiquity was not a period to dramatically change husbandry schemes at Pievina.\[?\] Consistency was probably more the key here. Options to enlarge animal husbandry operations, or to develop a greater specialization in any one taxon were presumably not available, or simply of no concern for the peasant farmers, more content on following the status quo (within reason) than to shift dramatically to pursue broadly different patterns. The resulting impression is one of maintenance of mixed farming and self-sufficiency ventures, more akin to small peasant-style operations than to any large-scale, specialized, market-driven animal husbandry process.

There are always complications in estimating the scale of pastoralism from zooarchaeological remains. Generally recovered bones of consumable taxa represent dietary waste; they give a more direct measure of what people ate. Zooarchaeologists, in turn, use these data to reconstruct, somewhat indirectly, husbandry patterns. Caution must be exercised in this process since consumption patterns need not always correlate neatly with overall production and husbandry schemes. In the case of ovicaprid husbandry, several herding options are available: (1) year-round keeping of animals at a farmstead, or within a localized area; (2) transhumance over short distances; (3) transhumance over long distances. Transhumance may be normal or reverse, depending on when and where animals are moved, and what may be considered their “home” base. Moreover, any of these methods can incorporate small to large herds, although long-distance transhumance tends to involve larger flocks of animals.

How were the Pievina sheep/goats herded? No clear answer arises, on the basis of current evidence, but two points can be forwarded. First, as indicated above, the predominance of sheep, across all periods, suggests the keeping of some flocks (and possibly larger ones), as sheep herd more readily in this regard than do goats. Moreover, this highlights a strong cultural demand for wool. Second, aging patterns derived from epiphyseal fusion and dental wear data indicate an imbalance of adult to sub-adult sheep/goats (4 to 1 ratio) among Late Antique phases at the site (insufficient age data are available for the earlier context). The adult bias here suggests that farmers maintained the bulk of their sheep and goats to maturity, to exploit them more for secondary products (wool, hair, milk) than for meat. How this fits into herding schemes is problematic. Given patterns of smaller-scale husbandry operations and agricultural self-sufficiency that occur in the assessment of other taxa from the site (e.g., cattle and pigs), a case can be made for similar operations in sheep and goat husbandry. Consequently, it is suggested that a higher proportion of farmers and herders kept animals in the local area around Pievina, throughout the year, to maximize control over age categories and culling operations. This is not to say that no flocks underwent transhumance in this area of Italy during antiquity, but that that transhumance was not the sole means of shepherding. If only transhumant herds of sheep and goat passed through Pievina along their seasonal rounds, ages would tend to cluster in limited 12-month brackets. This is not the case for the site, especially during Republican/Imperial times (albeit, age data are minimal for this phase); however, it is possible that more Late Antique ovicaprids were herded as larger transhumant flocks, given the predominance of adults in their corresponding zooarchaeological samples. Still, an abundance of adults is commonly expected among ovicaprids, across many sites.
(Roman or otherwise) given the importance of exploiting their renewable secondary resources, such as milk and wool. A predominance of adults in the zooarchaeological sample, therefore, may be more related to these aspects than as a direct correlate of herding strategies, such as transhumance.

Available metric data are limited, but nevertheless provide some clues about size parameters among the Pievina sheep/goats. Available measurements fall within established ranges for animals of that time period in central Italy. Size variation in Late Antique ovicaprids is minimal, a finding that may suggest breed conformity, but these findings are based upon a very small sample of long-bone shaft width measurements, arguably not the best indicator of size variations in animals. Regardless of their size, most sheep and goats appear healthy, as suggested by the general lack of any visible pathological signs on the bones, aside from various states of calculus deposition on the teeth, and a couple cases of uneven wear in the teeth, both fairly common conditions seen among both modern and ancient grazing animals.

Lastly, skeletal part data for sheep and goats show fairly consistent patterns through time and across categories (Fig. 4). The impression is that following slaughter, generally the entire ovicaprid carcass was butchered and consumed (or otherwise utilized) locally, with the waste from all operations subsequently disposed of at the site. Few (if any) of the sheep/goat carcass parts appear to have been imported or exported from the area during these periods. Such a pattern adds further supports to arguments for self-sufficiency and small-scale animal husbandry schemes in operation at the site, especially during Late Antique times.

**Pigs** (*Sus domesticus* also, *Sus scrofa* dom.)

Unlike cattle and ovicaprids, pigs produce no important secondary products, such as traction, milk or wool; they are normally kept exclusively for their meat. Pigs are prolific breeders, and can be easily managed, finding pannage throughout the year under most conditions. High NISP and MNI values for pigs (Fig. 3), relative to other taxa, among Imperial period levels at Pievina attest to the importance of pork in the diet of the Roman occupants. This pattern, moreover, conforms well to that shown among neighbouring sites of similar time frame (Appendix 1), and indeed among contexts in broader Roman Italy overall. The decline in the frequency of pigs at Pievina between Republican/Imperial and Late Antique times, however, counters the trend for other sites in the region, most of which still record relatively high of this taxon during Late Antiquity. It is important to note those Late Antique sites, in central Italy, with elevated values for pigs, relative to other taxa, are predominantly rural villas of rather elite status, which may have capitalized for still somewhat strong urban demands for pork as this time, even as the rural landscape decentralized and pastoralism became more important among areas of central Italy. If urban markets still required pigs, farmers in central Italy could take advantage of this by augmenting pork production. Late Antique Pievina does not appear to have subscribed to this pattern, a scheme arguably more accessible to wealthier, larger-scale, rural, animal husbandry operations, such as what seems to be the case for the villa at Settefinestre. Rather, the patterns shown for Late Antique Pievina accord more with peasant (or at least non-elite) husbandry operations that stressed self-

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7 Data from MacKinnon 2004.
8 For more comparative data for Italy, see MacKinnon 2004.
sufficiency, and which followed common trends among smaller households and farmsteads at this time towards ovicaprid pastoralism and mixed farming operations, as opposed to any marked specialization of a particular commodity or animal.

While, on average, pigs seem to contribute less to Late Antique life at Pievina than do other consumable domesticates, they still factored in the diet, and appear to have been culled in a similar fashion across time. Age data record a fairly balanced mix of juvenile, sub-adult and adult individuals for most periods. This mix implies local production and consumption, and probably maintenance on site, or in the general area, year-round. Generally, across all age brackets, these pigs appear to have been in good health.

Reconstructing pig husbandry schemes for Pievina are complicated. 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). Crop resources, however, would require human control to sow, harvest, and store, as needed, but more importantly, any fodder crops would demand arable land that might otherwise be valuable for other agricultural pursuits. Sufficient local woodland resources existed in the Pievina area to feed pigs, whose diet could be supplemented with other products, such as household waste, crop stubble and gleanings, and other materials year-round, without the need of more controlled feeding regimes or fodder crop access as might occur under pig-sty operations. There are no structural indications at Pievina that expressly conform to pig sties, but sties have been recorded at the villa of Settefinestre. Without sties, however, evidence suggests that they were maintained in a more casual setting, and probably within smaller herds. Certainly individual pigs or even small groups of pigs could have been kept within the settlement to feed off scraps and litter, as recommended by Pliny (NH 8.77.206). Still, as mixed farming and herding operations seem best to characterize the site, systems to maintain pigs in the ancient landscape around Pievina likely operated alongside both agricultural regimes and sheep and goat pastoralism. Ovicaprid and pig husbandry schemes need not be in competition with one another, if resources such as pasture, crop gleanings, and scrub- and forest-land were managed properly, with seasonal, compatible schedules of animals feeding upon different materials at different times of the year.

Pig sex ratios, calculated on the basis of numbers of the sexually dimorphic canine tooth, remain fairly balanced across temporal phases at Pievina (9 females to 10 males for Late Antique times, on the basis of NISP counts; 1:1 ratio on the basis of MNI counts for the same time period). If this pattern is indicative of pig husbandry schemes for the site, it appears that both sows and boars were allowed to reach full weight, with less control exerted to maximize their breeding potential, or to fulfill culinary preferences for suckling and juvenile pigs, by means of preferentially slaughtering surplus young males. Sex patterns, in conjunction with age patterns, therefore, suggest no specialization in pig breeding and marketing. Overall, these seem to be animals that were kept in a somewhat casual manner, for local use, as opposed to those subjected to strict parameters to capitalize on mass marketing of pork or brood stock. The patterns exhibited,
consequently, are more consistent with smaller-scale husbandry operations, as might characterize a self-sufficient peasant farmstead.

Available measurements for the Pievina pig bones are limited, but values compare favorably with ranges for animals from other sites in central Italy. Overall, metric values for pigs show no significant changes over time at the site, suggestive both of breed, and breeding, consistency.

Finally, although parts from the entire pig skeleton are represented within each temporal phase at Pievina, indicative of waste from all stages in the slaughter-butchery-consumption-disposal process across all time periods at the site, samples are clearly skewed towards the ‘head’ category (Fig. 4). This is common across many zooarchaeological deposits with pigs, and in part may be a factor of recovery and taphonomic biases, owing to factors such as the large number of individual elements in the pig cranium and dentition, the structure of some parts, and the durability of teeth. When the bias of mandibular incisors and canines is removed from skeletal part category assessments (these counts skew figures for the “head” category in the Pievina faunal dataset, and are artificially high compared to counts for other teeth), representation across pig skeletal part categories becomes more balanced, and suggestive of whole animals being killed, slaughtered, processed and consumed, locally, with rubbish from all steps discarded in the site vicinity as well. Again, such a pattern accords with operational self-sufficiency. This is a farmstead wherein the occupants practiced mixed farming and smaller-scale animal husbandry ventures with efforts primarily directed to maintaining their livelihood and feeding themselves, as opposed to broader economic or market-driven initiatives or specializations. Why so many more pig mandibular incisors and canines than other pig teeth and bones appear in the Late Antique samples examined here is unknown; it may be a factor of differential preservation or taphonomy (e.g., these teeth tend to fall out easily—they are single-rooted), among other possibilities.

**Domestic Fowl (Gallus gallus)**

Domestic fowl bones were relatively infrequent finds at Pievina, ranging between a high of 3.7% of NISP counts in Republican/Imperial contexts, to a low of about 0.7% during Late Antiquity (Fig 1). This rather small input implies an insignificant dietary contribution, a trend which might seem odd for a peasant household—many of which keep some manner of domestic fowl as a fairly easy and economical foodstuff. Still, although low overall, these statistics parallel average domestic fowl NISP frequencies of 5-10% for Roman Italy, generally, and neighboring sites around Pievina, more specifically (see Appendix 1). A mix of ages, and samplings from various parts of the domestic fowl skeleton suggest localized production and consumption. Presumably, most derive from small groups of free-range fowl (perhaps no more than a dozen birds), as might commonly be kept in a yard or coop. These birds could supply eggs and meat as required by site occupants. Metric data accord with average ranges for other domestic fowl from ancient sites in Italy. Overall, zooarchaeological data from Pievina suggest that domestic fowl figured as a small, locally-produced, supplemental meat at the site, throughout its occupation.

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10 Comparative data derive from MacKinnon 2004.
**Dog (Canis familiaris)**

Two scattered dog (Canis familiaris) elements were recovered: one from Republican/Imperial contexts, and one from Late Antique levels (Fig. 1). Both are from adult individuals, of medium stature, estimated at 50-70 cm at the withers—a common size range represented in Etruscan, Roman, and Medieval zooarchaeological assemblages in Italy.\(^\text{12}\)

While dog remains are infrequent in the Pievina faunal sample, evidence for carnivore gnawing on other bones in the assemblage provides indirect proof of their existence at the site. Scattered examples of carnivore-gnawed bones were noted many contexts across the site. If one assumes that any dogs permitted inside the site area were responsible for gnaw marks on the faunal trash, then it stands to reason that there must have been some keeping of domestic dogs within the area (or at least tolerance for outside dogs to rummage through waste).

**Equids (Equus sp.)**

Equid bones are also scarce in the Pievina sample (Fig. 1). This is not surprising considering that horses, donkeys, and mules were not normally consumed in antiquity. Most were reserved for riding, hauling, and transport purposes, and upon death were typically buried as entire carcasses, and probably in pits outside of settlement areas, given their bulky dimensions. Equid remains recovered from Pievina are restricted to Late Antique contexts, and consist of 2 teeth, part of a mandible and a metacarpal fragment, all adults in age. Size estimates place these elements within the donkey category, as opposed to horse or mule.

The scarcity of equid bones from the Pievina sample may not solely be a factor of non-consumption or burial elsewhere. More probably, many peasant households in antiquity did not own or keep equids, given the expenses in maintaining these animals. Renting and leasing equids as needed, for any work around the farm, provided an economical solution for many who could otherwise not afford horses, donkeys or mules of their own.

**Wild Animals (Red Deer, Roe Deer, Wild Boar, Hare, Badger, Tortoise)**

Although bones from assorted wild animals were noted across both temporal phases, and are spread across various areas at the site, overall their contribution to the diet and economy at Pievina appears minimal, regardless of time period. When only consumable taxa are considered, wild animals register their largest NISP frequencies during Republican/Imperial times (7.4%), but drop to a paltry 1% during Late Antiquity (Fig. 1). Neither of these values is exceptional, when placed in perspective. Game animals, including deer, hare, and wild boar, never seem to comprise key elements of the overall Roman diet.\(^\text{13}\) Other sites near Pievina similarly record low NISP values for wild animals, especially during Late Antiquity (Appendix 1).\(^\text{14}\) All the taxa noted (including

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\(^{12}\) De Grossi Mazzorin and Tagliacozzo 2000.

\(^{13}\) MacKinnon 2004, 212-15.

\(^{14}\) The rural villa at Settefinestre forms an exception. Hunted game are plentiful, and the site shows evidence of a possible game preserve, as well as antler handicraft operations (King 1985). This elite
deer, boar, hare, badger, and tortoise) are native to the area; each could have been hunted, trapped or otherwise acquired, locally. It is difficult to assess their contribution, as no animal is represented by more than a few scattered skeletal elements—wild boar nearly exclusively by teeth (which themselves preserve well). Nevertheless, on the basis of current evidence, it appears that hunting was inconsequential to the diets of the occupants at Pievina. There seems to be no need to supplement the diet with hunting (as might occur in wealthier Roman households, where hunting was seen as an elite sporting activity), nor a necessity to hunt to provide meat for the diet (as might be argued in the case of those destitute, hungry and forced to hunt). Overall, it seems that at Pievina meat could be obtained readily from local domesticates, which in turn diminished any requirements to hunt, be this for sport or necessity. The role of hunting, however, in any culture, must be set against the availability of game as measured through environmental reconstructions. The area around Pievina was probably more forested in antiquity than it is today, but the degree to which such forests were populated with wild animals, both today and in the past, requires further investigation. I suspect that game were available (and perhaps plentiful) in the Pievina area should occupants in antiquity have chosen to pursue them, be this for sport, diet, or otherwise.

**Butchery Patterns**

Available butchery data for Pievina conform to relatively standardized procedures noted among Roman sites in general.\(^\text{15}\) Cattle, ovicaprids, and pigs all record some butchered bones. Cleavers were used more regularly to disjoint and section carcass parts (e.g., cuts at articular ends of bones, such as the distal humerus/proximal ulna joint, at the shoulder, in the pelvis area, and around the ankle joint), while knives assisted in filleting meat from the bone (e.g., removal of tongue and jowl muscles) and in more delicate operations, such as hide removal (e.g., phalanges). There is enough variability in terms of cut and chop placement, depth, and frequency to discredit that butchery was the exclusive domain of skilled professionals; some level of household, or at least smaller-scale, operations existed. Even at this level, however, butchery procedures were standardized enough to indicate that whomever did the job had at least a rudimentary knowledge of skeletal anatomy. The chops are not purely random hacks, but are concentrated at the joints, where disarticulation is easiest. Overall, the butchery process and technology did not change significantly over time at Pievina. In some measure, this relates to the fact that there is little room for dramatic variation in carcass butchery and dismemberment—it follows a fairly standard procedure—so one might expect uniformity over time, especially in pre-industrial and un-mechanized cultures using only cleaver, knives, and choppers in the process.

There is no evidence of the use of saws in animal butchery and processing at Pievina, across all periods. Saws were not normally used in Roman carcass processing, but tend to be employed in the removal of horns and in the initial preparation of long bone elements for bone-working. Available horn cores from Pievina indicate that they had been chopped, rather than sawn (a process that can sometimes shatter the horn, and is not recommended if that material is to be worked, subsequently). Evidence for bone

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example contrasts with the arguably “lower-class,” working-farm assemblages of faunal remains deriving from Pievina.

\(^{15}\) MacKinnon 2004, 162-84.
working is inconclusive at Pievina. It is unknown if smaller-scale bone handicraft operations existed at the site (such as an individual widdling). In any event, the lack of evidence for saws in bone processing and horn removal, suggests if such procedures did occur, they were not organized on any grand level—a hobby more than a business, perhaps.

Lastly, there is no conclusive zooarchaeological evidence to determine methods of meat preservation, storage, and cooking at Pievina. Only a few examples of burnt bones were noted from the entire sample, but these are scattered randomly across Late Antique contexts at the site. Filleted cuts of meat could be roasted and leave no, or few, traces on the bones themselves. Boiling might have been the common method of cooking large cuts of meat (with bones attached); it also helps tenderize the meat, which could make tough cuts from older animals more palatable. Boiling as a method of cooking meat might have been preferred overall, especially if inhabitants favored soups and broths, and wished to extract fat and marrow from bones. Finally, a fair number of spirally fractured long bones from cattle, ovicaprids, and pigs are noted in the Pievina sample. The condition is generally associated with smashing fresh bones, to extract the marrow within. The presence of this condition on a relatively sizeable number of bones lends support to hypothesis of local butchery and consumption. Overall, it seems that the occupants at Pievina maintained some manner of self-sufficiency in all aspects of animal production and consumption. Animals seem to have been raised and herded, for the most part, locally; consumption was also a local phenomenon, with livestock slaughtered, butchered, processed and consumed locally as well. There appears to be little connection of the site to larger marketing schemes, specialized butchery, or trade and transport in animals or animal products. Available faunal data suggest small-scale, mixed husbandry ventures, presumably operated under the domain of a working-class/peasant household.

**PART 2: SPATIAL ANALYSIS WITHIN THE SITE**

As noted earlier, while a temporal analysis of faunal remains helps determine broad changes in the role of animals over time, such a procedure tends to combine contemporary deposits of similar time brackets, no matter their location at a site, and examine these as temporal units. This can sometimes homogenize or mask differences among individual contexts of the same date. To examine spatial patterning in bone deposits from Pievina, various contexts have been separated into area and temporal-phase groups. The collection under review here represents only a sample of available assemblages that produced larger deposits of bones.

**Republican/Imperial**

2003 – *kiln*

The kiln deposit was essentially “clean” of faunal materials, producing only 5 NISP specimens, none of which was burnt. The impression from this is that bone waste was not routinely burnt in the kiln; however, this does not take into account rather thorough clearing of any kiln debris while operational. Fuel sources in general, however, need greater investigation in this respect.

1510, 1530 – *misc. waste from “hearth” and possible “granary”*
Aside from the fact that only one bone from the “hearth” was charred/calcined, there is nothing remarkably special about these deposits. Each contains a mix of bones from cattle, ovicaprids, and pigs, with elements from various parts of the skeleton in each case. Several elements are butchered, the bulk deriving from pig, an indication perhaps of their dietary importance during this phase. Most of the pieces recovered from these two contexts however are rather inconspicuous bits of trash as might accumulate naturally in unswept surfaces. None bears any trace of carnivore gnawing, perhaps indicating some protection from dogs, possibly through a rather speedy burial. [either NOT hearth, or totally cleaned and reused for casual rubbish accumulation]

**Late Antiquity**

**1538 and 1031 – organic-rich deposits (possibly middens)**

The 30 NISP bones recovered from these two deposits produced the following: 20% cattle, 53% sheep/goat, 27% pig. While these figures correspond to overall trends for Late Antique taxa for the site, the quantity of bone retrieved from these deposits is not significant to suggest that this location was a principal dumping spot for animal bone waste. The pieces of bone found within this deposit, although noticeably larger on average, and more conspicuous than the scraps from 1510, 1530, and 2003 (above), are still rather small. Certainly this was not an area where waste from the entire stages of animal slaughter and butchery accumulated. Given the proximity of these organic-rich deposits (abutting to the outside edges of the “house” walls), it is suggested that they contain more household waste, such as table scraps and vegetable waste (with the odd bone piece as well – among other rubbish). Paleobotanical data may help determine why this deposit appears more “organic” (presumably, humic and greasy in texture, and darker in colour) than other deposits. The organic nature of it appears not to have been a factor of substantial bone waste (although this does not preclude the notion of meat off the bone being deposited here).

**1018, 1019 and 1030 – Late Antique layers that covered collapse**

These deposits (43 NISP bones in total) are marked by a low frequency of cattle (16.3%), with higher values for sheep/goat (39.5%) and especially pig (44.4%). Moreover, there is a surprising abundance of wild animal remain in this deposit, as well the only 2 domestic fowl bones from Late Antique deposits. Materials are smaller, inconspicuous items, for the most part—general waste in this respect. The higher frequency of wild animal bones within these deposits is puzzling. It may relate to some squatting activity in and around the site, wherein wild taxa were perhaps processed for consumption, or at least deposited at some time during this phase. Alternatively, this material might be somewhat re-deposited waste (from earlier levels). High values for pig, combined with the presence of domestic fowl and a wild taxa in these deposits appear more in line with what one might expect of Imperial Roman assemblages than for general trends in Late Antiquity; however, proportions are not outside of the range displayed for Late Antique levels overall. [c.f. high imperial coins from this level; AND higher levels of residual ceramics – early imperial NA amphorae, spello amphorae, etc.]

**1006 – “rubbish pit” deposit covering the Late Antique house**
The 45 NISP bones from this deposit produced the following: 35.6% cattle, 48.9% sheep/goat, 15.6% pig. This deposit corresponds with the latest phase for the site. Compared to other assemblages it is relatively abundant in cattle remains, contains a higher percentage of carnivore gnawed pieces, and harbours a fair collection of larger, more conspicuous bone pieces. The impression is this sample represents a haphazard collection of waste, drawn from a swift deposition of relatively mixed debris, related to a range of animal processing activities. In other words, it seems to be a hastily accumulated mixed bag of junk! [supports notion of brief periods of successive occupation and abandonment?]

PART 3: BROADER COMPARISONS WITH SITES IN THE ETRURIAN REGION

Some comments have already been forwarded about how faunal patterns from Pievina correspond to those for the Etrurian region more broadly, throughout the ages. In sum, available data suggest that, regardless of temporal phase, occupants at Pievina maintained some manner of self-sufficiency in all aspects of animal production and consumption. Animals seem to have been raised and herded, for the most part, in the region; consumption was also a local phenomenon, with livestock slaughtered, butchered, processed and consumed locally as well. There appears to be little connection of the site to larger marketing schemes, specialized butchery, or extensive trade and transport in animals or animal products. Available faunal data suggest small-scale, mixed husbandry ventures, presumably operated under the domain of a working-class/peasant household. Domestic cattle, ovicaprids, and pigs form the basis of husbandry operations—all were probably kept, and possibly herded, on a small-scale. Some may have moved as part of localized transhumant operations, but it seems the bulk were maintained locally, or at least regionally (and year-round), as part of small, farming operations. Fowling provided some supplemental resources for the diet, but hunting was minimal, and certainly not an activity conducted of necessity or desperation to provide meat to the diet. Pigs were more important during Republican/Imperial times at the site, a common aspect of Roman diets and identity throughout Italy overall for this period. As demand for pork declines into Late Antiquity (brought about predominantly by diminishing urban demand), pig NISP values at Pievina decrease [doesn’t this suggest connection to market forces then?]. Ovicaprid husbandry takes a stronger hold at this time. Sheep/goat NISP figures rise during Late Antiquity, coupled with a shift towards decentralized, small, pastoral operations, as the Roman Empire experienced economic and social conflicts. In large measure, general faunal patterns for Pievina fit trends that affect Italy and the larger Roman world during antiquity. Pievina, arguably, is a smaller-scale site, presumably populated by peasants, or at least non-elite, occupants. The fact that the general faunal trends that affect larger sites, both urban and rural, as well as elite sites (again both urban and rural) are also displayed at Pievina attests, to some degree, the commonality of sites. Trends seem to affect all manner of sites, with no site (rich or poor, large or small) immune to these effects. Nevertheless, the degree to which sites were affected by events and trends in the larger Roman world was not uniform. Pievina, it seems, perhaps due to its smaller-size and general program of self-sufficiency (as regards animal husbandry operations, and not necessarily self-sufficiency in all economic or cultural activities) appears somewhat cushioned and consequently able to continue with past husbandry
operations, schemes or dietary patterns, without marked change. Yes, aspects of diet and husbandry change over time at Pievina, and some of these changes correspond to trends shown in the larger Roman diet and economy, but available faunal data suggest that these aspects were, in part, muted at the site, compared to other sites, especially wealthier villa sites and urban locales.\[can you supply some numbers to back this up? i.e. species percentage changes here vs. elsewhere?\] The story of peasant life throughout Roman and Late Antique times in Italy, therefore, may be more a tale of consistency than dramatic change—at least as regards animal husbandry and diet.

To gauge how faunal trends at Pievina fit into the larger ancient context, it is necessary to make comparisons with other sites in the area. Comparative faunal data for sites around Pievina (in a broad 100 km swath) are listed in Appendix 1. Note that there are significant gaps, temporally and spatially in these comparative data. Few results are available for sites very near to Pievina, and little faunal data are currently available for Republican and Early Imperial deposits in the Tuscan region.

The wide range among NISP frequencies for cattle, sheep/goat, and pig, across the Etruscan and Republican sites listed in Appendix 1 makes it difficult to discern general trends for these periods. Cattle values, for example, go from a low of 10.3% to a high of 82.7%. Moreover, if all sites are considered, there is no significant increase or decrease in cattle frequencies through time, at least from the eighth to the third century BC. The data suggest great local variation in animal use and exploitation, contingent on factors such as the size of the site and its degree of urbanization, as well as the resource capability and restrictions of the landscape and environment. Larger settlements tend to record more elevated percentages for pigs, relative to other taxa, perhaps an indication of the value of pork in urban diets. A similar phenomenon occurs with Roman contexts; however, the data suggest that the trend to higher pig frequencies had initiated in Etruscan times, even if it is more pronounced during the Roman Imperial era in Italy. Social changes may have favored the progressive accumulation of domesticated animals during Etruscan times, with larger herds and flocks being kept. A surplus may have formed part of the personal wealth of the most affluent social classes.

A second general observation is that cattle tend to figure more prominently among Etruscan sites in central Italy than they do in subsequent Roman Republic and Imperial levels. Mean NISP frequencies for cattle hover around 30% for Etruscan sites (although there is great variation, as noted above), nearly twice the average value for Republican and Imperial contexts. It appears that relatively more cattle (compared to other domestic taxa, but probably not in terms of absolute numbers) were bred during Etruscan times than in Roman times. Reduced competition from other domesticates, more readily available feed (through fodder crops, greater pastures, etc.), and farming ventures where each individual farmer required his own team of oxen for ploughing (with perhaps less sharing or renting of plough oxen), as well as a greater proportion of Etruscan farmers and herders maintaining a small group, or even a herd of cattle, might all explain these higher values for cattle in Etruscan times.

Ovicaprids also register initially higher mean frequencies at Etruscan sites (c. 30-35%) dropping to slightly less (c. 25%) overall during Roman Imperial times. Again, there is local variation to these general patterns, with some sites, (e.g., Bolsena, Populonia) registering somewhat higher values for ovicaprids than average. A link among such sites to transhumance routes may be a factor in their elevated frequencies for sheep.
and goats. Transhumance has a long history of practice in central Italy, especially Etruria, from the Bronze Age up to the Middle Ages.16

Age profiles, too, for both cattle and ovicaprids from Etruscan contexts, show variation when compared to Imperial sites. Relatively more cattle are kept to older ages in Imperial contexts, presumably related to an increased reliance on them as work animals. Sheep and goats follow suit; the data show particular attention to the production of wool among Etruscan contexts, with more animals maintained to older ages.

Zooarchaeological samples from Roman Imperial sites show far more variation than Etruscan and Republican sites. Differences, in large part, are often a factor of the size, location, function, and socio-economic status of the sites in question. Relatively wealthier sites, such as the rural villas at Settefinestre, Ossaia, Le Colonne, Monte Gelato, and Lugnano register very high frequencies for pig—a testament to a “Romanized” diet. High frequencies of pigs are also represented among many suburban and urban contexts, in and around Rome, especially, at this time (e.g., Villa dei Quintili, as well as assemblages in Rome and Ostia). Rural villa assemblages (especially Settefinestre, Ossaia and Lugnano) often incorporate a range of wild animals, further solidifying the elite nature of the meat diets here. In many cases, younger animals predominate among these wealthier sites as well. Pievina mimics overall Roman Imperial patterns in registering a significant amount of pig bones, but unlike its elite counterparts, Pievina did not contain an abundance of younger animals or wild animals. It is clearly not high status in this regard.

The mansio site at Vacanas and the rural site at Tenuta di Vallerano require comment, as their faunal patterns may seem strange in relation to contemporary sites of similar size or function [M. S. Mario?? Laura Motta and N. Terrenato excavation near Volterra]. High frequencies of cattle at each of these sites is probably more a function of contexts excavated than of overall dietary patterns at these sites. The high number of horse bones coincident with cattle bones from the site of Tenuta di Vallerano lends support to the hypothesis that we are dealing with a deposit biased in favour of remains from work and transport animals than regular dietary waste. A similar situation may account for the artificially high values for cattle in Republican/Imperial levels at Vacanas.

While some of the faunal patterns displayed in Imperial contexts at Pievina (e.g., increased pig frequencies) have antecedents in those shown for earlier Etruscan and Republican sites in the region, there is far less zooarchaeological continuity across sites after Imperial times. Values for sheep/goat tend to rise, across the board, regardless of site type or location, presumably a result from a shift towards decentralized, small, pastoral operations, as the Roman Empire experienced economic and social conflicts Late Antiquity. Wealthier rural villas, such as Lugnano and Settefinestre, are able to continue, in part, previous “Romanized” dietary schemes, and capitalize better upon any existing Late Antique urban demands for meat, by augmenting production in marketable meats like pork. Consequently, these sites typically register higher pig values during Late Antique times than does Pievina. By contrast, Pievina appears to be affected more by the shift to pastoral operations, as sheep/goat values increase during this period at the site. However, as argued previously, it is unlikely that this shift had any dramatic overall effect on actual husbandry schemes and practices at the site. Pievina falls within a

somewhat different category. Faunal patterns indicate smaller-scale operations, which themselves are often less influenced by larger changes in husbandry schemes. On the one hand, a farm that specialized in pigs, and herded hundreds of them, will be more affected by cultural changes that inhibit these operations. On the other hand, a farm that does not specialize in any one animal or product certainly can buffer, to some respect, any external changes or demands placed upon any one aspect within this system. Diversity in husbandry operations at Pievina seems more likely. Put colloquially—“they don’t seem to have put all their eggs in one basket!” Consequently, they could “weather any storm” more effectively.

Excessively high cattle values for Late Antique levels at the site of Chianciano Terme require some clarification, as this pattern is markedly different from comparative sites for this time. The large pool or *vasca* (a principal feature excavated from this Roman “spa” site) is refashioned as a watering hole for animals and humans during Late Antiquity, and used this way until its final destruction in the fifth century AD. One possible reason for this is that the more cattle were drawn to the *vasca* and its neighboring fields, to drink and pasture. These animals may then have out competed (or at least outnumbered, relatively) other taxa for access to resources in this region, being permitted to do so, of course, by human choices in husbandry operations.

In sum, this analysis of zooarchaeological remains from Pievina highlights not only the value of detailed reconstructions of animal use at a single site, to gain a better appreciation of how resource exploitation, diet, and activity may vary over time and space in one spot, but also the importance of evaluating site-specific patterns in light of more general temporal trends exhibited across sites.

**POSTSCRIPT – Future Avenues of Research**
This investigation of zooarchaeological materials from Pievina sheds light on some aspects of animal use, diet and husbandry practices at the site over time. Simultaneously, it ushers in new avenues for investigation. Some general thoughts are listed in this postscript:

1) The notion of just how much, and in what manner, life changed in Late Antiquity requires more work. The Pievina faunal sample indicates that aspects of husbandry and diet did not change markedly as regards smaller-scale/peasant sites, while sites of different size/function/character, arguably ones of more elite status, seem to register more dramatic changes during this time. Does this set up a premise that smaller-scale/peasant sites are less affected by broader cultural changes…and if so, in what aspects of life do such traditions hold strong? Do pots change, but diets don’t?

2) The connection of the faunal materials with other lines of archaeological investigation—artifacts, architecture, geology—is an important avenue to pursue. Classical archaeology tends to separate and compartmentalize different aspects of architectural and artifactual investigation. This artificially separates materials and spaces from their original, integrated, living context. Certainly we can develop this more in the Pievina project and create reconstructions centered more around aspects of practical life in antiquity—in all their myriad complexity and
connectivity.[indeed! Attached is Toni’s geoarch report and Lele’s pot report will follow….] 

3) Movements and migrations of animals and humans (not to mention all categories of goods!) are critical issues to address in reconstructing life in antiquity. Bone isotopic work can assist in charting larger-scale movements of animals. Pastoralism has been explored through ancient texts, ethnography, and age/sex patterns from zooarchaeological assessments, but not without controversy. The trouble with each of these methods is that none can solve this mystery conclusively; their collective use provides no further solutions. Isotope work is proving helpful here, and present a possibly route to explore. One cannot achieve all answers, but implementing some of this work at Pievina may help set a precedent for other projects, and initiate work on building a database of isotopic results for use in future research.

REFERENCES


Fig. 1 – Pievina: NISP and MNI values by temporal phase

<table>
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<th></th>
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</thead>
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<td>MNI</td>
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</tr>
<tr>
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<td>1</td>
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<tr>
<td>Red deer (Cervus elaphus)</td>
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<td>Wild boar (Sus scrofa fer.)</td>
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<td>Hare (Lepus europaeus)</td>
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<td>Badger (Meles meles)</td>
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<tr>
<td>Tortoise (Testudo sp.)</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>27</strong></td>
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Fig. 2 – Pievina: UNID counts by temporal period

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<td>9</td>
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<tr>
<td><strong>AVIAN</strong></td>
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<tr>
<td><strong>TOTAL</strong></td>
<td>49</td>
<td>648</td>
</tr>
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</table>

Fig. 3 – Pievina: % NISP and MNI values by temporal phase for principal domestic meat taxa

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<th>Late Antiquity</th>
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</thead>
<tbody>
<tr>
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<td>NISP (n=23)</td>
<td>MNI (n=4)</td>
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<td>Sheep/goat (Ovis aries/Capra hircus)</td>
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<tr>
<td>Pig (Sus scrofa dom.)</td>
<td>60.9</td>
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</table>

Fig. 4 – Pievina: NISP and MNE frequency of skeletal part categories for cattle, sheep/goat, and pig for Late Antiquity period

<table>
<thead>
<tr>
<th></th>
<th>Cattle</th>
<th>Sheep/goat</th>
<th>Pig</th>
</tr>
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<tbody>
<tr>
<td>NISP</td>
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<td>2° ext.</td>
<td>head</td>
</tr>
<tr>
<td>MNE</td>
<td>1°</td>
<td>2° ext.</td>
<td>head</td>
</tr>
</tbody>
</table>

Sample sizes by phase (unid counts):
- Cattle: NISP=60, MNE=8
- Sheep/goat: NISP=115; MNE=13
- Pig: NISP=94; MNE=15

1° = primary cut (includes scapula, humerus, pelvis, femur)
2° = secondary cut (includes radius, ulna, tibia, fibula)
ext = limb extremities (includes metapodials, carpals, tarsals, phalanges)
head = cranium, mandible, all teeth
### Appendix 1: NISP values for sites – Tuscany and region - arranged by temporal periods

<table>
<thead>
<tr>
<th>Site</th>
<th>Site Type</th>
<th>Date (centuries)</th>
<th>NISP total (cattle + pig)</th>
<th>% cattle</th>
<th>% sheep/goat</th>
<th>% pig</th>
<th>NISP of other principal mammalian and avian taxa present</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ETRUSCAN</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>San Giovenale (spring-building)</td>
<td>small settlement</td>
<td>8-7 BC</td>
<td>280</td>
<td>62.1</td>
<td>15.7</td>
<td>22.1</td>
<td>3 equid, 16 dog</td>
<td>Sorrentino 1981</td>
</tr>
<tr>
<td>Ficana</td>
<td>small settlement</td>
<td>8-6 BC</td>
<td>691</td>
<td>37.6</td>
<td>32.6</td>
<td>29.8</td>
<td>na</td>
<td>De Grossi Mazzorin 1996</td>
</tr>
<tr>
<td>Acquarossa</td>
<td>settlement</td>
<td>7-6 BC</td>
<td>374</td>
<td>82.7</td>
<td>12.9</td>
<td>4.3</td>
<td>3 equid, 1 red deer, 2 auroch</td>
<td>Geywall 1982</td>
</tr>
<tr>
<td>Roselle</td>
<td>large settlement</td>
<td>6 BC</td>
<td>194</td>
<td>31.4</td>
<td>26.3</td>
<td>42.3</td>
<td>4 equid, 1 dog, 7 red deer</td>
<td>Corradi 1989</td>
</tr>
<tr>
<td>Cerveteri</td>
<td>large settlement</td>
<td>6-5 BC</td>
<td>472</td>
<td>37.0</td>
<td>34.3</td>
<td>28.6</td>
<td>4 equid, 16 dog, 3 red deer</td>
<td>Clark 1989</td>
</tr>
<tr>
<td>Tarquinia</td>
<td>urban settlement</td>
<td>6-5 BC</td>
<td>392</td>
<td>17.1</td>
<td>33.7</td>
<td>49.2</td>
<td>4 equid, 9 dog, 3 red deer, 1 roe deer, 2 hare</td>
<td>Bedini 1997</td>
</tr>
<tr>
<td>Montecatino</td>
<td>small settlement</td>
<td>6-5 BC</td>
<td>262</td>
<td>32.4</td>
<td>37.0</td>
<td>30.5</td>
<td>1 dog, 10 red deer, 2 roe deer, 5 boar, 1 hare</td>
<td>Ciampolini et al 1991</td>
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<tr>
<td>Capena</td>
<td>settlement</td>
<td>7-4 BC</td>
<td>185</td>
<td>33.0</td>
<td>38.9</td>
<td>28.1</td>
<td>2 horse, 42 dog, 12 hare</td>
<td>Salari 2005</td>
</tr>
<tr>
<td>Populonia</td>
<td>large settlement</td>
<td>3 BC</td>
<td>1988</td>
<td>10.3</td>
<td>43.0</td>
<td>46.7</td>
<td>1 equid, 9 roe deer, 2 boar, 12 hare, 7 domestic fowl, 16 other avian</td>
<td>De Grossi Mazzorin 1985</td>
</tr>
<tr>
<td>Tarquinia</td>
<td>large settlement</td>
<td>3-2 BC</td>
<td>85</td>
<td>27.1</td>
<td>31.7</td>
<td>41.2</td>
<td>2 dog, 2 roe deer</td>
<td>Bedini 1997</td>
</tr>
<tr>
<td>Volterra</td>
<td>rural</td>
<td>3-2 BC</td>
<td>40</td>
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<td>42.5</td>
<td>45.0</td>
<td>2 avian</td>
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<tr>
<td>Bolsena</td>
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<td>2 BC-1 AD</td>
<td>1093</td>
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<td>50.0</td>
<td>37.7</td>
<td>1 equid, 1 dog, 15 hare, 35 domestic fowl, 13 other avian</td>
<td>Tagliacozzo 1995</td>
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<td><strong>ROMAN IMPERIAL</strong></td>
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<tr>
<td>Pievina (NISP)</td>
<td>rural</td>
<td>1 BC-1 AD</td>
<td>23</td>
<td>13.0</td>
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<td>60.9</td>
<td>1 dog, 1 red deer, 1 hare, 1 domestic fowl</td>
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<tr>
<td>Chianciano Terme</td>
<td>settlement/spa</td>
<td>1-3 AD</td>
<td>25</td>
<td>16.0</td>
<td>32.0</td>
<td>50.0</td>
<td>1 bear, 2 domestic fowl</td>
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<tr>
<td>Monte Gelato</td>
<td>villa</td>
<td>1-2 AD</td>
<td>294</td>
<td>6.8</td>
<td>21.8</td>
<td>71.4</td>
<td>1 equid, 3 dog burials, 1 red deer, 28 domestic fowl, 27 other avian</td>
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<tr>
<td>Le Colleme</td>
<td>villa</td>
<td>1-2 AD</td>
<td>508</td>
<td>22.6</td>
<td>28.7</td>
<td>48.6</td>
<td>13 equid, 1 dog, 21 red deer, 3 fallow deer, 1 hare</td>
<td>King, n.d.</td>
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<tr>
<td>Settefinestre</td>
<td>villa</td>
<td>1-3 AD</td>
<td>2234</td>
<td>10.8</td>
<td>16.6</td>
<td>72.6</td>
<td>11 equid, 24 dog, 9 cat, 164 red deer, 5 roe deer, 3 fallow deer, 72 hare, 121 domestic fowl, 214 other avian</td>
<td>King 1985</td>
</tr>
<tr>
<td>Lugnano</td>
<td>villa</td>
<td>1-3 AD</td>
<td>21</td>
<td>14.3</td>
<td>23.8</td>
<td>61.9</td>
<td>1 equid, 18 red deer, 1 roe deer, 4 domestic fowl</td>
<td>MacKinnon 1999</td>
</tr>
<tr>
<td>Ossaia</td>
<td>villa</td>
<td>1-4 AD</td>
<td>1722</td>
<td>16.2</td>
<td>21.0</td>
<td>62.8</td>
<td>15 equid, 9 dog, 1 cat, 29 red deer, 18 roe deer, 1 fallow deer, 32 boar, 123 hare, 112 domestic fowl, 18 other avian</td>
<td>Bokonyi, n.d.</td>
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<tr>
<td>Vacanas (Valle di Baccano)</td>
<td>mansio</td>
<td>1-2 AD</td>
<td>117</td>
<td>41.9</td>
<td>44.4</td>
<td>13.7</td>
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<td>Cerilli 2005</td>
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<td>68.4</td>
<td>21.1</td>
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<tr>
<td>Tenente di Vallairano (near Rome)</td>
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<td>1-2 AD</td>
<td>231</td>
<td>50.2</td>
<td>35.9</td>
<td>13.9</td>
<td>174 horse, 49 dog, 4 red deer, 5 hare, 7 domestic fowl</td>
<td>Minniti 2005</td>
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<td>1-3 AD</td>
<td>65</td>
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<td>53.8</td>
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<td>Giovinazzo 1998</td>
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<td>Villa dei Quintili</td>
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<td>1-2 AD</td>
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<td>-</td>
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<td>De Grossi Mazzorin 1987</td>
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<td>Pievina (NISP)</td>
<td>rural</td>
<td>4-5 AD</td>
<td>269</td>
<td>22.3</td>
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<td>34.9</td>
<td>4 equid, 6 wild boar, 2 red deer, 1 roe deer?, 2 badger, 2 domestic fowl, 5 turrito</td>
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<tr>
<td>Chianciano Terme</td>
<td>watering hole</td>
<td>4-5 AD</td>
<td>178</td>
<td>44.4</td>
<td>29.8</td>
<td>25.8</td>
<td>5 equid, 2 dog, 2 cat, 2 boar, 1 fallow deer, 4 domestic fowl</td>
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</tr>
<tr>
<td>Settefinestre</td>
<td>villa</td>
<td>4 AD</td>
<td>751</td>
<td>16.8</td>
<td>30.2</td>
<td>53.0</td>
<td>16 equid, 25 dog, 76 red deer, 6 fallow deer, 6 hare, 13 domestic fowl, 7 other avian</td>
<td>King 1985</td>
</tr>
<tr>
<td>Monte Gelato</td>
<td>villa</td>
<td>4-5 AD</td>
<td>344</td>
<td>7.8</td>
<td>51.2</td>
<td>41.0</td>
<td>1 equid, 5 dog, 1 roe deer, 2 fallow deer, 23 domestic fowl, 4 other avian</td>
<td>King 1997</td>
</tr>
<tr>
<td>Filattiera (near Luni)</td>
<td>settlement</td>
<td>4-6 AD</td>
<td>95</td>
<td>4.2</td>
<td>47.4</td>
<td>47.4</td>
<td>1 equid</td>
<td>Giovinazzo 1998</td>
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<tr>
<td>Lugnano</td>
<td>villa</td>
<td>5 AD</td>
<td>27</td>
<td>11.1</td>
<td>22.2</td>
<td>66.7</td>
<td>3 equid, 7 dog, 1 hare, 17 domestic fowl</td>
<td>MacKinnon 1999</td>
</tr>
<tr>
<td><strong>ETRUSCAN</strong></td>
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