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### No Bones About It: Evaluating Faunal Evidence for Ancient Lifestyles at Tall Jalul, Jordan

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Honors Thesis

No Bones About It:  
Evaluating Faunal Evidence for Ancient Lifestyles at Tall Jalul, Jordan

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28 July, 2010

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**Abstract**

Analysis and characterization of faunal remains – those bones and bone fragments collected from archaeological sites – allows anthropologists and archaeologists to more completely reconstruct the ways in which ancient societies survived and interacted. As animals have invariably played an integral role in human society, providing transportation, draft, and a consistent food source, the study of their bones can elucidate the lifestyles and cultural practices of the people who raised and utilized them. Faunal remains for this project were collected and identified during the 2009 dig season at Tall Jalul in Jordan as part of the Madaba Plains Project. Further analysis of osteological and surface features allowed elucidation of the animals' species, age, gender, butchering methods, and pathologies. Initial inferences may be drawn from the preponderance of sheep and goat bones identified over other species; from these results it is plausible to posit that the ancient inhabitants of Tall Jalul may have embraced a pastoral existence, with agrarian activities and subsistence hunting supplementing this lifestyle.

## Background and Significance

The analysis of faunal remains from archaeological sites is essential to reconstructing a more complete understanding of ancient lifestyles, including socioeconomic and cultural environments. Animals have invariably played an integral role in human society, providing transportation, draft, and materials such as wool, hair, and skin; as well as a consistent food source in the form of eggs, milk and milk products, and meat. In identifying the major domestic animal species cultivated by ancient people groups, archaeologists and anthropologists can more completely reconstruct the lifestyles of such people. Thus faunal data may provide information about intensification of agriculture, food systems, and other human-animal interactions.

The goal of most zooarchaeological inquiries is to identify the main species exploited by ancient peoples, extrapolating information about humans and their relationship with animals from this data. For instance, a preponderance of sheep and goat remains found at an ancient occupational site may indicate a pastoral existence, whereas remains from predominantly large ungulates such as cattle and horses will suggest a more agrarian way of life. Likewise, nomadic peoples may be identified by consumption of many sheep and goats, as well as supplementary wild game hunting, which will introduce feral species into the sample. Other cultural inferences that can be drawn from faunal analysis include insight into religious practices, hunting, and trading between different regions. Because animals are most often utilized by humans for food, the analysis of faunal remains is often synonymous with the study of ancient cuisine.

Since food acquisition, preparation and consumption are not only essential to human survival but are closely tied with cultural practices and lifestyles, collection and analysis of faunal remains becomes an important tool to both archaeologists and anthropologists as they seek to reconstruct ancient environments. Marom, et al. explain:

The partaking of food, an essential and universal act, is nearly always enmeshed in a rich fabric of cultural meanings and codes. It also encapsulates information pertaining to the more mundane aspects of life: from where and whom, and in what manner, food items were obtained, and how they were treated prior to consumption and discard. (Marom, et al. 2009: 55)

Because they are collected in abundance at many archaeological sites in conjunction with identifiable potsherds and worked tools, faunal remains can be often interpreted in the context of their time period and used to give a clearer picture of ancient societies.

Bones are unique among food byproducts in that their durability allows them to retain identifiable characteristics after hundreds and thousands of years. Indeed, most of the bones collected for this project anatomically match those of modern species – allowing them to be identified with accuracy – although they differ greatly from their modern counterparts in size, density, and color. While size discrepancies are due to geographical species variations, other qualitative surface differences arise largely from the passage of time and the concurrent weathering of artifacts, including abrasion, burning, decomposition, fragmentation, scavenging by wild carnivores, and other factors. Despite these stressors, ancient bones retain identifying features indicative of the animals' species, and sometimes factors such as age and sex can also be determined morphologically.

The issue of size discrepancies between ancient and modern animal species mentioned above deserves greater treatment, as average bone sizes by species are a major

diagnostic feature in identification. For example, most of the sheep and goat bones collected in Central Jordan are much smaller than those of their Western counterparts, as evidenced by the comparative collection at the Horn Archaeological Institute and Museum, which features bones from Madaba Plains Projects as well as modern sheep and horse bones. Discrepancies will arise from the geographic and chronological separation between these ancient and modern groups, but other data could also be inferred from size variations. Perhaps ancient animals in the Near East were nutritionally deprived, due to environmental factors or the socioeconomic status of those peoples who raised them for consumption. It should be noted, however, that such conclusions may be flawed, since modern sheep and goats in Transjordan are consistently smaller than their Western equivalents, indicating that their small stature may simply be genetically determined and less influenced by environment and diet than we may assume. This discussion is pertinent simply because the first step in species identification in the field is bone size and density; large bones usually belong to larger ungulates like cattle and equids, while the smaller ungulate bones are usually sheep and goat derived.

Faunal remains can often reveal more than just what ancient peoples were eating; sometimes they bear testament to butchery and cooking methods, and bone assemblages within identifiable strata can give clues about food discard practices and the functional layout of domestic areas. In addition to data from the bone surfaces – burn and butcher marks, etc. – identification of nonnative species often reveals something about ancient socioeconomic status and trade relationships between communities. For example, fish bones identified at the inland site of Tall Jalul indicate some sort of trade relationship

between inland and coastal communities, as fish are not easily acquired in landlocked environments.

Other lifestyle indicators arise from bones of non-domesticated native species; that is, any animals that have not traditionally been raised for human consumption, transportation, draft, or by-product use. In our case, few such bones were found, but those that were – belonging to deer, snakes, small mammals (i.e. rabbits), birds, pigs and dogs – may indicate non-agricultural subsistence activities such as hunting. In the case of the latter three, domestication is possible, but there seems no methodological procedure for determining from the bones whether these animals were feral or raised by humans. It is conceivable that ancient inhabitants kept chickens, dogs, and pigs for food purposes, but their presence at the site could also be plausibly attributed to the hunting of feral birds, canids and boars. It is even possible that wild animals preyed upon the domesticated animals housed in residential areas, and their appearance along with the bones of food animals could be indicative of pest species elimination by humans. Another option is the accidental contamination of ancient domestic animal burials with these outsider species, perhaps at the time of their discard or long afterwards. Thus the presence of minority species should be treated with care, as no definite conclusions may be drawn from their infrequent appearance in bone samples from the site.

Since minority species give inconclusive results and effectively raise more questions than they answer, this project focuses mainly on the main domesticated species identified at Tall Jalul, and the implications of their presence and species ratios. The collected specimens represent only a small sampling of bones found at Tall Jalul, as they consist only



of those bones collected in Field D during the 2009 summer dig season. This sample seems representative of previous finds at the site, however, and it is on this basis that preliminary conclusions may be drawn from their analysis. The bones reported in this project include the following species:

<i>Ovis aries</i>	Sheep
<i>Capra hircus</i>	Goat
<i>Bos taurus</i>	Cattle
<i>Equus sp.</i>	Equid (horse/donkey)
<i>Canis sp.</i>	Dog
<i>Sus scrofa</i>	Pig
<i>Cervus elaphus</i>	Red Deer
<i>Ophisaurus apodus</i>	Snake
<i>Lepus</i>	Hare
<i>Aves</i>	Bird
<i>Testudo</i>	Turtle

**Table 1: Species Identified**

Note that although sheep and goats are listed separately here, no distinction was made between sheep and goat bones in this project, and they will heretofore be referred to as sheep/goat bones. Such a generalization has been made for both practical and functional reasons. First, no criteria have been established for distinguishing sheep and goat bones morphologically on the Madaba Plains Project, as the bones of the two species are osteologically very similar and recovered fragments often lack diagnostic features that allow a distinction to be made between the two. In Øystein LaBianca's introductory chapter to the 13<sup>th</sup> Hesban volume, detailing his early involvement with faunal remains on the Heshbon Expedition in 1971, a computer-generated report included as an example records sheep/goat bones as "*Capra hircus* or *Ovis aries*" (LaBianca 1995: 9:1). Oded Borowski also notes this convention in zooarchaeology: "The anatomical closeness between sheep and goats sometimes does not allow a precise identification of the species, and the results are presented as sheep/goat" (Borowski 1998: 59). This uniform treatment of sheep and

goat bones seems logical because modern inhabitants of the region, many of whom still herd small ungulates, make little distinction between the species in their daily care, herding, and consumption practices. Sheep and goats are often herded together, and both species provide milk, meat, fibers and skins for their owners. For all practical purposes, the sheep and the goat serve similar roles in modern Jordanian agriculture, and it is assumed that they were treated similarly in ancient environments.

Since the nature of this work is to identify animal roles in ancient society as they pertain to human lifestyle and practices, a brief discussion of both modern and ancient animal use in the region is germane. As previously mentioned, the main domestic animal species treated in this sample include a large majority of sheep/goats, with cattle, equids (horses and donkeys), and swine making up the rest. Borowski emphasizes the importance of ungulates in both ancient and modern Near Eastern societies:

Animal remains indicate that, during the Chalcolithic and Bronze Ages, the economy of the Near East was based on the breeding of four meat-producing ungulate species: sheep, goat, cattle, and pig. The same is true today, except where religious proscriptions or unsuitable environmental conditions prevent pig-keeping. (Borowski 1998: 29)

Indeed, modern ethnoarchaeological surveys (e.g. LaBianca 1974, 1976) and my personal observations while visiting the region indicate that ungulates, particularly caprovines, are integral to the subsistence of many individuals in the region. There seems to be a collective, unspoken cultural understanding of these animals' importance, as is evidenced by my own observance of Jordanian motorists who stop traffic in order to allow herds of sheep and goats to cross busy urban streets in downtown Madaba.

In 1974, Dr. Øystein LaBianca and assistant Douglas Fuller conducted a valuable ethnographic study of animal species at Hesban village during that year's dig season, subsequently reporting the observed animal hierarchy. As Hesban is geographically near Jalul and serves as a sister site through the Madaba Plains Project, regional similarities in attitudes toward animals will be assumed for the purposes of this analysis. Horses are owned primarily by the wealthy, and are rarely used for anything but sport; Douglas Fuller places them at the top of the animal hierarchy (LaBianca and Fuller 1974). As previously mentioned, sheep and goats enjoy a high status among the domestic species of the region, second only to the horse, as they produce a number of valuable byproducts. These include, but are not limited to, dairy products, hair and wool, skin, and meat, which is considered clean for human consumption. Cattle are considered less desirable than the ubiquitous sheep and goats, and are prized mainly for the market value of their dairy products, including milk, butter, and cheese. They may also be utilized for draft work. Chickens are exploited for their eggs and meat. Surprisingly, donkeys are considered less desirable even than chickens, which explains several incidents involving small Jordanian children riding a donkey at our site of Jalul, whipping the beast mercilessly in the midday heat. Donkeys are mainly used for transportation and draft. Dogs are not considered pets and are usually seen as scavenging pests rather than companions. Similar hierarchy and utilization of animal species in ancient Israel is noted by Borowski, with Israel's ancient economy being representative of many Near Eastern societies including the one in question here (Borowski 1998).

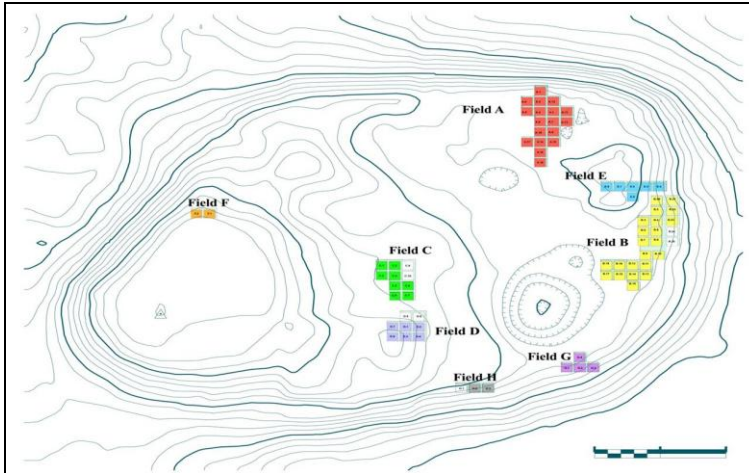
While it may seem overly hopeful to base assumptions about ancient human-animal relationships on modern observations, LaBianca insists that the major animal species utilized in the region has varied little since antiquity, except in the case of the pig. He suggests that archaeologists and anthropologists recognize “the present as being simply the latest phase in a succession of historical phases going back into antiquity” (LaBianca 1995: 31). Indeed, comparisons between animal use in antiquity and modernity suggest striking similarity in species breakdown.

## The Site and Field D

Tall Jalul is located 5 km east of the central Jordanian town of Madaba, in the region known as the Madaba Plain. The site is located on a distinctive flat-topped hill (the site takes its name from the Arabic word for hill, *tell*), an assumedly popular residence for ancient peoples, as it commands a clear view of the surrounding region and would have provided advantages in defense. At 18 acres, Jalul is the largest tell site in the central Jordan plateau. Aerial views of the site suggest the presence of ancient water systems, as evidenced by wide depressions in the tell surface, while other features indicate building remains (Yunker 2007). Excavations at Jalul began as part of the Madaba Plains Project in 1992 under the leadership of Drs. Randall Yunker and Dave Merling, with original interest in the site stemming from a hope that the site might prove to be biblical Heshbon (Numbers 21). Initial surveys collected surface sherds from the Early Bronze to the Late Iron Age, establishing Jalul as possessing a rich occupational history, regardless of its possible identity as biblical Heshbon. Yunker describes the dig team's early goals for Jalul:

By 1984...our research interests had evolved beyond the original historical geographical question of the location of Sihon's Heshbon (although that still remained of interest) and included more sophisticated questions about the evolving food systems of the region, as well as broader questions of socio-political evolution, rises in social complexity, and so on. (Yunker 2007: 129)

In the seasons that followed, seven fields – Fields A through H – were opened, with work continuing today in C, D, and G (see Figure 1). Materials representing occupational history dating from the Middle Bronze to the Persian periods have been recovered, with dating based primarily on the pottery identification system developed by William F. Albright (Albright 1926).



**Figure 1: Topographical map of Tall Jalul**, courtesy of Gary Christopherson, Jennifer Groves, Karen Borstad, Paul Ray, Bob Bates and Owen Chesnut. Field D is marked in blue, just east of the acropolis.

My participation in the summer 2009 dig as a member of Field D led to this project, with the bones collected in Field D during this season serving as the sample upon which I will base my analysis. Field D was opened in 1996, two seasons after excavation began at Jalul. In consultation with dig director Randy Younker, Field D Supervisor Jennifer Groves chose this area for her field based on aerial photos, which “showed indentations and probable wall lines that indicated a buried building,” which, she hoped, would fall “in an area that would represent the interior of the city” (J. Groves, personal communication, 2010). Although continued excavation has narrowed the distance between Field D and its neighboring field, D was originally isolated. Groves explains, “By choosing an area not in close proximity to previously excavated areas, I was also hoping to uncover a different settlement period [than Iron IIC/Persian] – or at least increase the chances of doing so”. To Groves’ disappointment, the majority of Field D has so far yielded mostly Iron IIC/Persian artifacts and pottery. Younker describes:

The most significant remains of the Iron IIC/Persian period were found in Field D where a large domestic structure with several rooms was uncovered. A considerable amount of pottery was found in the rooms. The roof had collapsed over several of the rooms and when the roof debris was removed numerous whole forms were found smashed on the floor. Several figurines were also found. (Younker 2007: 133)

Excavations continue in Field D, with the most recent season of activity in that field being the 2009 season. Since the field has been identified as an ancient residential complex – both the layout and artifacts, including basalt grinders, loom weights, saddle querns and other household items, identify it as such – and a good deal of faunal remains have been found there, it seems an ideal place to begin the work of characterizing human-animal interactions in the domestic setting.

## Methodology

The project began at Tall Jalul, with all bone fragments for the sample coming from Field D during the 2009 season (May – July). The bones collected represent six weeks of excavation in seven squares. These squares make up a Persian period residential complex, with rooms clearly delineated by rock walls, doorways and floor surfaces. Due to time limitations, not all of the bones collected in Field D have been analyzed in this report.

All faunal remains were collected by sifting through wire mesh, as were potsherds, seals, and other artifacts. Sifting was carried out by members of Field D, as well as hired local laborers working in the field. Bones were placed in paper bags and labeled with bone tags detailing find spot; square, locus, etc. Each bone bag was associated with a specific pottery pail, in order that the combined pottery, bone, soil, and installation information could be combined. By recording all bone bags and pottery pails together, complete locus information may be easily organized and retrieved. After collection in the field, bone bags were separated from their paired pottery pails and set aside for bone reading.

Pottery and bone reading sessions occurred each afternoon of the dig day, with all square supervisors laying their morning's finds out for professors and experts to identify. Pottery fragments were “read” – identified aloud by occupational time period based on diagnostic features – by professors and simultaneously recorded by square supervisors. Bones received similar treatment, with the bone reader – on the 2009 dig, this person was usually myself or Dr. Younker – counting bone fragments by species to give an initial count. All additional bone identification was carried out in the bone lab at the Horn Archaeological Institute.



All bones collected in the field were shipped from Madaba, Jordan to Berrien Springs, MI in packing crates, still in their original bone bags with bone identification tags intact. Cleaning of the bones involved soaking them in room temperature water for short periods, and gentle scrubbing with a stiff-bristle brush. They were then laid out, still organized by bone bag, and allowed to dry for approximately one week to eliminate any residual moisture. At this point, the bones underwent a more tedious bone reading process than in the field, beginning with an initial sorting to separate diagnostic bones from non-diagnostics. Because many of the faunal remains recovered from archaeological sites are fragmented due to weather conditions, time, and butchering practices, many fragments are unidentifiable. These include ribs, vertebrae, and those long bone fragments that do not contain epiphyseal ends (which are a key diagnostic feature of the long bones), as these are often unidentifiable by skeletal part and taxon. Ribs and vertebrae are grouped with the unidentifiable bones because these elements occur so frequently in the skeleton and can easily skew data which attempts to determine the minimum number of individuals represented.

The identification process continued with recording individual weights for each of the identifiable bones. Caliper measurements were taken as needed – usually to estimate whether the bones in question matched species size ranges in the literature – particularly for complete bones such as phalanges and astragali. The comparative collection at the Horn Archaeological Museum was utilized in further species identification, as initial bone readings had been conducted in a cursory manner and were sometimes inaccurate. Equally instrumental was Elisabeth Schmid's *Analysis of Animal Bones*, which is an authoritative

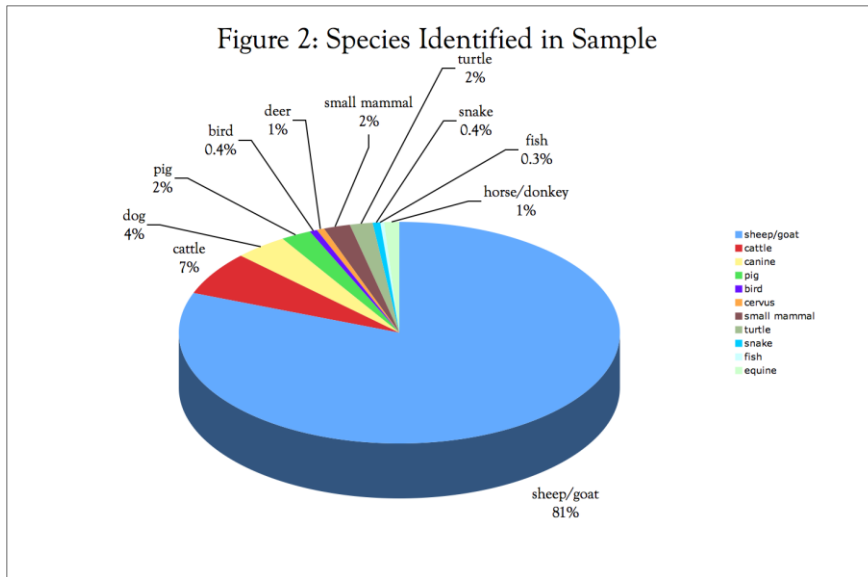
voice regarding faunal analysis in the Near East. Age charts and bone drawings included in this volume proved indispensable in both species verification and age determination, when applicable. All bone information – weight, element, species, condition, and age – was recorded first on final bone tags and then entered into an Excel spreadsheet. Unidentified bones were weighed together, with total gross weights recorded. All bones were then placed in gallon-sized Ziploc® bags with both their original and final bone tags.

## Results and Discussion

Before any results or final analyses are discussed, it is imperative that the reader understand the limitations of this project. Since it takes as its sample a very small number of bones – only a portion of one field’s total bones for a single season – this project will necessarily be proportionally flawed and any conclusions made based on these data are purely speculative. An evaluation of these data serves merely to give preliminary descriptions of the faunal remains collected in Field D during the 2009 dig season. In order to make more conclusive analyses about ancient human-animal interactions at Jalul, data from faunal remains collected over numerous seasons and across the entire site should be accumulated and analyzed.

Figure 2 represents the entire sample of 726 bones and bone fragments collected from Field D during the 2009 dig season. As has previously been discussed, Field D represents a Persian-period domestic complex, so the majority of the faunal remains identified from the field are assumed to have originated from domesticated animals that were raised and/or consumed by its human inhabitants. Those species that are not recognized as domesticated may represent hunting activities, scavenging, or post-depositional contamination by wild species. Species breakdown for the field is as follows: The large majority of the bones collected were sheep/goat derived. A total of 586 sheep/goat bones were collected, comprising 81% of the entire sample. The next most common species was cattle, whose numbers made up 7% of the sample. 4% of the bones were canine, owing largely to the fully articulated dog skeleton found in locus 3 of D1. This animal may have been a pet, as no other animal remains at Jalul have been afforded

separate burials. Other commonly domesticated animals for this region and time period are the pig and the equids (horses and donkeys), but their numbers were quite small. 16 pig bones were found, making up 2% of the total sample, with equine bones comprising just 1% of the sample. These numbers are small indeed, since wild species such as small mammals and turtles also each equaled 2% of the sample.



Faunal remains collected in Field D during the 2009 season have also been organized by square, with bones from Squares 1, 2, 3, 4, 7 and 8 making up the sample (Table 2). Excavation was also carried out in Square 10, but as only two scanty bone bags represent this area, it has not been considered in the table.

Square	Number of bones identified	Weight (identified bones), kg	Weight (unidentified bones), kg	Total Weight, kg
D.1	223	1.191	1.365	2.556
D.2	210	1.337	1.476	2.813
D.3	74	.528	.355	.883
D.4	85	.559	.706	1.265
D.7	49	.513	.300	.813
D.8	99	.905	.681	1.586

**Table 2: Bones recovered, by square**

Although organizing the bone data by square would perhaps yield useful comparisons between squares if all bone data for the season had been analyzed, this is not the case here and so only very tentative comparisons will be made. It should be noted that even if all squares' bone data was compiled and analyzed for one season, comparisons between squares might still be complicated by uncontrolled factors such as varying excavation rates and subsequent disparity in the raw amount of remains collected.

In her preliminary 2009 field report, field supervisor Jennifer Groves describes the courtyard area, which is made up of Squares 2 and 4. Although she notes that “no living surfaces or activity areas have yet been identified in the northern half of the courtyard”, a good percentage of the total faunal sample was collected here, and it has been suggested that this area may represent a dumpsite for the residential complex (Groves 2010: 14). This would explain the significant number of bones recovered from this area, as discarded food and other materials would have been collected in such a refuse area. Other areas of the complex should be compared for total bone count after all bones from Field D have

been recorded; such an exercise could give clues as to the function of various living areas, i.e. where the cooking took place, etc.

A common method in faunal analysis is identification of desirable and non-desirable types of meat. This is determined by both the part of the body the element in question once belonged to, as well as the age of the animal at death. By determining what types of meat – by body part and animal age – Persian period Jalul inhabitants were consuming, conclusions may be drawn about their socioeconomic status. For example, if these people primarily feasted on choice meat cuts from young animals, we may reasonably conclude that they had means and were living quite well. If their cuisine consisted largely of older animals or of less gourmet portions, whose meat is tougher and less palatable, we might interpret their socioeconomic status as less affluent.

Species	Element	Number (N)	Percent of N
Sheep/goat		586	
	Metapodium (metatarsal + metacarpal)	74	12.6
	Tibia	63	10.8
	Humerus	45	7.7
	Jaw (mandible + maxilla)	42	7.2
	Radius	40	6.8
Cattle		48	
	Metapodium (metatarsal + metacarpal)	7	14.6
	2 <sup>nd</sup> phalange	6	12.5
	Scapula	4	8.3
	Humerus	3	6.2

**Table 3: Most common elements for sheep/goat and cattle**

As Table 3 shows, the metapodia – metatarsals and metacarpals – are the most common element collected from both sheep/goats and cattle, making up 12.6 and 14.6

percent of each species' total number, respectively. The significance of these numbers from a human consumption standpoint is that the metapodia are found in the lower leg and are poor in meat. Phalanges are also low-meat, lower leg bones, and were also found in large proportion for cattle. Conversely, the radius, humerus, scapula and tibia are all meat-rich areas of the body, with these cuts of meat yielding the greatest amount of edible material. Marom and his colleagues title these meat-rich body parts as gourmet portions: "By gourmet portions we mean the meatier parts of the upper front and hind limbs and the flesh surrounding the vertebral column, which even today are sold in butcher shops for relatively high prices" (Marom, et al. 2009: 56). Since this project did not count vertebrae as "identifiable" bone elements, bones from the upper portions of the limbs will make up the gourmet cuts in this sample. Since both meat-rich and meat-poor elements were collected in large proportion, it is difficult to determine whether Jalul's Persian period inhabitants were either very affluent or living in squalor. The distribution of both portion types suggests that these people were neither rich nor poor, but lived at a level between these extremes.

In addition to identification of desirable meat portions by body part, animal age determinations based on faunal diagnostics can also tell us about the socioeconomic status of Jalul's ancient peoples. It is widely recognized that the meat of young animals is more tender than that of more mature individuals, and is therefore more desirable for human consumption (Borowski 1998; Daly 1969; Gilbert and Steinfeld 1977; Marom et al. 2009). An analysis of animal ages at death, therefore, could indicate whether the people raising these animals were utilizing them mainly for their byproducts (in which case we would

expect fewer young animals killed) or whether they were affluent enough to consume the meat of young, choice animals before these had produced offspring or byproducts. Reitz and Wing elucidate:

Age at death provides information on herd management practices such as the use of younger animals for food, selective seasonal slaughter patterns, or slaughter of old animals after their ability to provide byproducts or labor is diminished. Age classes of domestic animals may demonstrate that the species was produced and consumed at the site (wide range of ages present), imported (restricted age range), or largely raised for slaughter and consumption elsewhere (prime-aged animals missing). Reitz and Wing 1999: 179

For the purposes of this project, animal age analysis will only be conducted for the sheep/goat portion of the sample, as this was clearly the main species raised and butchered by Iron IIC/Persian Jalul inhabitants, and sample sizes for the other species are too small for accurate analysis to be carried out. Figure 3 takes as its sample the 46 sheep/goat bones and bone fragments for which an age approximation could be recorded; that is, only those long bones with unfused epiphyses. A more thorough study would compare this data with the number of bones featuring fused epiphyses, indicating mature animals (over the age of 36 months), as well as noting how many bones had fragmented in such a way that no epiphyses – fused or unfused – remained for analysis. Thus we would be looking at three classes of bones in our consideration of animal ages at death; unfortunately, only bones with unfused epiphyses or loose epiphyseal caps were analyzed for fuse age and recorded.

The age determination table in E. Schmid's *Atlas of Animal Bones* was used to ascertain animal ages (Schmid 1972: 75). The analysis of this information, including the layout of Figure 3, follows R. E. Chaplin's guidelines, as reproduced by Reitz and Wing (Chaplin 1971: 129-33; Reitz and Wing 1999: 182). First, animals were grouped into three



age classes: “Because each age class is usually represented by only a few specimens and fusion ranges overlap, Chaplin (1971: 129-33) recommends dividing the age groups into three based on the age at which fusion generally occurs: animals aged 10 months or less, those between 18 and 24 months, and those older than 36 months” (Reitz and Wing 1999: 182). The age class concept was used here, although modified to fit the data in this sample.

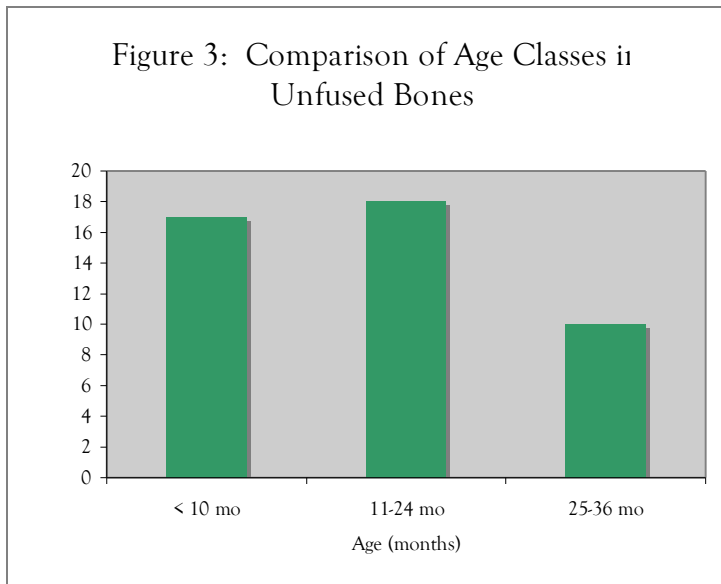


Figure 3 indicates that, although the largest proportion of the 46 bones recorded as under 36 months falls into the category for 11-24 months of age, the three categories are not significantly disparate. That is, no age class category is favored by a large majority of individuals. This may denote the broad range of animal ages indicative of sheep/goat production and consumption at the site. Such a conclusion could indicate that ancient Jalul inhabitants raised sheep and goats for their own use and consumption, rather than importing or exporting their animals as commodities to other communities. This meshes

nicely with the idea that these were nomadic peoples whose main source of meat and byproducts was their sheep and goat herds.

A number of noteworthy bones were collected that do not easily fit into any of the above considerations, so they will be mentioned here. The two small fish bones – both vertebrae – are clearly not native to the Central Plains of Jordan, and so must be assumed to have originated in a coastal community that exchanged commodities with Jalul's landlocked inhabitants. Three of the sheep/goat phalanges featured a strange, assumedly pathological condition that caused growth of extra irregular bone tissue on the normal bone surface. This may be due to inflammation or infection of the bones, although identification of the specific disease plaguing the animals would require analysis by an expert. It would be interesting to determine whether or not this pathological condition was the cause of the animal's death. Finally, traces of human treatment of the bones was observed in butcher marks, burning, and worked bones. Three bones showed butcher marks, while five had been burned. A bone spatula was also recorded, as was an astragalus that appeared to have been worked, with one side flattened in a distinctly unnatural way.

## Conclusion

While the relative limitations of this project have been recognized and discussed, it has merit in that it gives preliminary clues about the lifestyle of ancient Jalul inhabitants. Field D's Persian period domestic complex provides an ideal setting for the examination of human-animal interactions as they pertain to animal consumption and other lifestyle factors. The predominance of caprovine bones indicates a nomadic lifestyle for Persian period Jalul inhabitants, with cattle and pig consumption making up the majority of the remaining domestic food animal remains. Wild deer, bird, and small animal bones may indicate supplementary hunting practices, particularly in the case of the deer, as it is highly unlikely that these wild ungulates would otherwise make their way into the center of a domestic complex to add their bones to the domestic animal remains there.

The relatively even distribution of animal ages among sheep/goats is indicative of a system in which the animals were raised and slaughtered at the site. Thus the caprovines were used for all purposes, including the production of byproducts (milk, milk products, skins, hair/wool) and meat. Young sheep and goats were not slaughtered in large numbers because mature animals which could yield byproducts and offspring were needed, although some individuals under 36 months of age were slaughtered, possibly for feasts or religious ceremonies.

Cattle were probably used mainly for draft and/or transportation, as well as meat consumption. Because cattle remains made up only 7 percent of the sample, agrarian activities characteristic of sedentarization (e.g. planting and harvesting of crops) are assumed to have played a very small role in this largely nomadic population.

The overall picture of human activities in Field D's residential area of Persian period Jalul is a pastoral one, which is based largely on herding activities revolving around sheep and goats. Such a portrayal is congruent with other zooarchaeological reports on Iron Age peoples of the Near East (Borowski 1998; Gilbert and Steinfeld 1977; Marom et al. 2009). With continued analysis of Tall Jalul's faunal remains from previous seasons, the picture will become more complete.

## Bibliography

- Albright, W.F.  
 1926        The Jordan Valley in the Bronze Age. *Annual of the American Schools of Oriental Research VI (1924-25)*: 13-74.
- Baker, J. and Brothwell, D.  
 1980        *Animal Diseases in Archaeology*. London: Academic Press Inc.
- Borowski, Oded  
 1998        *Every Living Thing: Daily Use of Animals in Ancient Israel*. London: AltaMira Press.
- Chaplin, R. E.  
 1971        *The Study of Animal Bones from Archaeological Sites*. New York: Seminar Press. pp. 129-33.
- Daly, Patricia  
 1969        Approaches to Faunal Analysis in Archaeology. *American Antiquity*, 34: 146-153. JSTOR. Accessed June 7, 2010.
- Gilbert, Alan S. and Steinfeld, Paul  
 1977        Faunal Remains from Dinkha Tepe, Northwestern Iran. *Journal of Field Archaeology* 4: 329-351. JSTOR. Accessed June 7, 2010.
- Groves, Jennifer  
 2010        Field D: Domestic Complex. *Seminary Studies* 48: (12-24).  
 2010        e-mail message to the author, March 7, 2010.
- LaBianca, Aren S.  
 2005        Correlation Between Architectural Development and Food System Intensification. Unpublished Honors Thesis, Andrews University.
- LaBianca, Øystein S.  
 2007        Thinking Globally and also Locally: Anthropology, History and Archaeology in the Study of Jordan's Past. pp. 3-11 in *Crossing Jordan: North American Contributions to the Archaeology of Jordan*. eds. T. E. Levy, P.M.M. Daiau, R.W. Younker and M. Shaer. London: Equinox Publishing Ltd.
- LaBianca, Øystein S. and von den Driesch, Angela  
 1995        *Faunal Remains*. Hesban 13. Berrien Springs, MI: Andrews University Press
- Lyman, Lee R.

- 1979 Available Meat from Faunal Remains: A Consideration of Techniques. *American Antiquity* 44: 536-546. JSTOR. Accessed June 7, 2010.
- Marom, N., Raban-Gerstel, N., Mazar, A., Bar-Oz, G.  
2009 Backbone of Society: Evidence for Social and Economic Status of the Iron Age Population of Tel Rehov, Beth Shean Valley, Israel. *Bulletin of the American Schools of Oriental Research* 354: 55-72.
- von den Driesch, Angela  
1976 *A Guide to the Measurement of Animal Bones from Archaeological Sites*. Peabody Museum Bulletin 1. Cambridge: Publications Department, Peabody Museum, Harvard University.
- Reitz, Elizabeth J. and Wing, Elizabeth S.  
1999 *Zooarchaeology*. Cambridge Manuals in Archaeology. New York: Cambridge University Press.
- Schmid, Elisabeth  
1972 *Atlas of Animal Bones: For Prehistorians, Archaeologists and Quaternary Geologists*. New York: American Elsevier Publishing Co, Inc.
- Younker, Randall W.  
2007 Highlights from the Heights of Jalul. Pp. 129-135 in *Crossing Jordan: North American Contributions to the Archaeology of Jordan*. eds. T. E. Levy, P.M.M. Daiau, R.W. Younker and M. Shaer. London: Equinox Publishing Ltd.