



***Ethnoarchaeology among the Maasai: Subsistence
and Faunal Remains in Northern Tanzania***

Robert M. Cermak
Albion College

*The pastoral Maasai of Northern Tanzania and Southern Kenya have traditionally held a diet built exclusively upon the remains of their livestock, predominantly goats/sheep (*Ovis*) and cattle (*Bos*). However, the restrictions placed upon this lifestyle by the encroachment of outside interests in Maasai land have threatened the ideal pastoralist strategy of subsistence in recent decades. This study utilized both ethnographic methods to examine how the Maasai process food animals today and archaeological methods to collect and analyze faunal remains at an abandoned boma in order to observe how such processes translate into the archeological record. The ritual of orpul, or ceremonial slaughter of livestock, remains the chief means of processing and consuming meat products among the Maasai. The nearly universal reliance upon livestock as the source of meat has also remained consistent throughout the last three to four decades.*

Introduction

The Maasai of Northern Tanzania and Southern Kenya have traditionally held a strictly pastoral diet built around the meat of domesticated livestock, predominantly goats/sheep (members of taxon *Ovis*) and cattle (taxon *Bos*). Arhem states, "In a natural environment which abounds in wild-life and which, in parts, is excellently suited for intensive agriculture, the pastoral Maasai attempts to subsist on a diet solely consisting of the milk, meat, and blood of their domestic stock" (Arhem, 1989: 1). However, with the rapidly rising population of east Africa and the reduction of pastoral lands due to tourism and conservation, the Maasai have increasingly needed to compromise on their dietary ideals in recent years. For instance, "today maize porridge [ugali] forms an increasingly important part of the pastoral diet" (Arhem, 1989: 1). Such changes in subsistence strategies have always been an important topic of study in archaeology, and are especially pressing in the case of the Maasai, since their long standing method of carcass disarticulation and meat consumption is likely to disappear in coming years as their pastoral lifestyle becomes even more restricted. As such, my study seeks to

document both the contemporary means of meat processing and consumption among the Maasai, and to then compare the results to the archaeological records going back several decades in order to see how these traditional Maasai practices translate into an archaeological context.

This was first attempted by participation in a contemporary orpul ceremony, or ritual slaughter. According to Arhem, “the staple of Maasai diet, meat (inkiri)... is typically eaten in connection with public rituals and is always shared in a communal meal” (Arhem, 1989: 4). Participation in such a ritual and meal provided insight into the means of meat processing and consumption among today’s Maasai in Northern Tanzania. Next, to observe how the remains from these practices translate into an archaeological context, an archaeological survey of faunal remains (animal bones) was conducted at an abandoned Maasai boma. A boma is the traditional unit of community structure among the Maasai. Each boma typically houses an extended family along with that family’s livestock. Bomas are roughly circular in shape, surrounded by a rough fence of thorny acacia branches broken by up to four gates. The interior of a boma is occupied by one or more animal pens and the Maasai’s houses, built from mud/manure and acacia. My site, Boma 4 in Oltukai, Tanzania, was occupied for roughly thirty years prior to its abandonment four years ago and features its own small orpul site. My study provides a lens for examining carcass processing and meat consumption among the Maasai that extends from the present day back more than three decades in Northern Tanzania.

This study was strongly influenced by the ethnoarchaeological work of Chase on the meat distribution system in Punjab, India (Chase, 2005) and Burford, Biochem, Rafiki and Ngila’s study on orpul and its use as a holistic, community system of healthcare among the Maasai (Burford, Biochem, Rafiki, and Ngila, 2001). Chase’s work applied similar methods to gather similar data, but in a setting geographically and culturally distant from my own. The study by Burford, Biochem, Rafiki, and Ngila examined the same Maasai institution, orpul, but focused predominantly on the medicinal nature of the local plant elements in the ritual, rather than, “the most noticeable feature of the ritual - the consumption of vast quantities of meat” (Burford, Biochem, Rafiki, and Ngila, 2001: 547).

Methods

This study required methodologies drawn from both archaeology and cultural anthropology, especially ethnography, and applied methods differently at two sites.

Participant observation, what John Thiels describes as, “the fine art of extended and attentive hanging out” (Thiels, 2012: 1), was utilized during my two days, October 8 and 9, 2012, spent in the Maasai community of Engikaret, Tanzania, located just north of Mt. Meru. In Engikaret I spent time in Maasai bomas, gathered medicinal plants, beaded, danced, and participated in an orpul ceremony with the local Maasai, gathering most of my ethnographic data on orpul, pastoralism and bomas at that time. Especially important was the orpul

ceremony, in which one goat was suffocated and eaten, where I was able to observe a Maasai faunal assemblage being made and how the animal was disarticulated and cooked.

The vast majority of my research, a four week period spanning late October and early November of 2012, was conducted at the site of an abandoned boma in the Maasai community of Oltukai, Tanzania, located between Tarangire National Park and Lake Manyara near the town of Olasiti. To find my dig site, which was the fourth abandoned boma I prospected in the area, I was guided by my key informant, a local elder. He showed me what was to become my dig site, identified where the site structures once stood, and answered my questions on the background of the site during multiple interviews. He estimated the former maximum population of the boma to include two men, seven women and upwards of thirty children. My informant signed an informed consent document and received a gift of sugar and tea at the end of my field work.

Next, I mapped out my site, which I named Boma 4, located just east of a contemporary boma in Oltukai which in turn was near a campground called Lake View Camp Manyara. Boma 4 had three sections, the most recent and westward of these being the inhabited boma. The most eastern and oldest section, which I called the old section, was my dig site and was the section mapped and surveyed. The old section was occupied for approximately thirty years and was abandoned four years ago. Between the old section and the contemporary boma was an area that was abandoned at the same time as the old section, but was occupied more briefly, which I called the transition section. There remains the disintegrating roof of a house in the transition section.

The old section was sparsely over grown with thorny acacia shrubs. It was bounded to the southwest and northeast by two gates, forty-two meters apart, between which I ran a transect line. I consistently used the southwestern gate (SW Gate) as a reference, or datum, point for the remainder of my research. There was one house (H1) and an animal pen (AP) to the southeast of the transect line, and two houses (H2 & H3) and a small Orpul site (OP) to the northwest of the transect line. The animal pen had two gates, one on the southeast side for goats/sheep (GG) and one on the northwest side for cattle (CG). The Orpul contained a tree (TR) to the east of center. While mapping I relied on a compass, a 30m tape measurer, flagging tape, a 30m rope, a field notebook to record measurements, and graph paper for mapping.

I conducted a surface survey for faunal remains at Boma 4. My survey method was what Hester, Shafer and Feder described as a *pedestrian* or *foot survey*, where the researcher “walk[s] over the surface of a region and visually inspect[s] that surface for the constituents of archaeological sites” (Hester, Shafer, and Feder, 2009: 54). Specifically, I carried out a *transect survey*, in which “crew members... arrange themselves in what is called a transect (a linear survey unit) across the landscape and simply walk over the region to be investigated” (Hester, Shafer, and Feder, 2009: 54). I established forty survey lines across Boma 4. Twenty of these lines ran southeast from the transect line and were recorded as G1:SE through G20:SE. The other twenty

ran northwest from the transect line and were recorded as G1:NW through G20:NW. The survey lines were spaced at two meter intervals along the transect line starting from the southwest gate. The faunal remains found (mostly bones) were collected, labeled (BS_ for SE lines and BN_ for NW lines), plotted on Map 2 and taken back to camp for analysis. The surface survey was conducted using a 30m tape measure, flagging tape and a sharpie for labeling, a basket and bags for bone collection, and a field notebook for recording data. Non-diagnostic bone fragments were neither collected nor plotted, but their frequency on each survey line was recorded. The focus on only whole or diagnostic remains classifies my surface survey as what Rootenberg calls “partial sampling,” in which “only identifiable pieces are saved and the rest are discarded” (Rootenberg, 1964: 185). My survey also led me to identify two recent man-made features, a rock pile and a pit, which were then marked on the map.

Further, I began the digging portion of my research in order to develop a site history of Boma 4. To do so, I established six shovel test pits (P1 through P6) spaced every ten-by-fourteen meters across the site. According to Hester, Shafer, and Feder shovel test pits are “usually between 25 and 100cm on a side, though 50cm seems to be the most common... The pits are shovel dug, with the soil matrix ordinarily dry-screened...” (Hester, Shafer, and Feder, 2009: 57). My test pits were circular with a 40cm diameter and were dug in 10cm intervals. For five of the six pits I stopped digging once I stopped seeing faunal remains (goat/sheep and/or cattle bones) coming out, usually reaching depths of only 10cm or 20cm. The pit that produced the most material, P1, was taken down to 1m to look for signs of previous site occupations. The soil at Boma 4 was generally very rocky, making digging a difficult and time-consuming process. The materials used for the digging process were a shovel and trowel, flagging tape and a sharpie for labeling, a tape measure, a colander/strainer for sifting, and a basket for collection. All faunal materials from the shovel test pits, including non-diagnostic bone fragments, were bagged, labeled by pit and level, and taken back to camp for analysis. Faunal materials coming from the deeper levels of P1 were of a different nature, being mostly small gastropod shells and fossilized bone fragments.

Finally, to analyze the data, I used two books, *Atlas of Animal Bones* (1972) by Elisabeth Schmid and *A Guide to Post-cranial Bones of East African Animals* (1985) by Rikki Walker, for identifying the bones by taxon and element. I also noted whether a bone was fragmented, fossilized and/or showed signs of human processing, for instance cut or chop marks. For goat/sheep and cattle I determined the minimum number of individuals (MNI) at the site. The MNI “count for a given assemblage or taxon is typically defined as the greatest number of individuals represented by duplication of elements” (Hester, Shafer, and Feder, 2009: 311).

Results

In Engikaret, the orpul (site not, ritual) was adjacent to one of the local bomas which I toured. In the center of the circular site, roughly 4m in di-

ameter, was a tree which, despite the dry season, had a canopy of green foliage. The site was bounded by a semi-impermeable wall of live acacia shrubs and featured two fire pits. The ceremony was attended by twelve Maasai warriors and elders (all men), four of whom were involved with processing the goat, and twenty American college students, including myself. The goat, that day's subject of celebration, was held down by two individuals, myself and another student, while a Maasai warrior suffocated the animal with a knee on the throat. The animal was then laid on a mattress of green fronds for processing with a small machete-like blade.

First, the goat was skinned, beginning with the posterior-ventral torso. The skin was peeled away up the neck to the cranium and down the legs to the proximal ends of the metapodials, but was left attached to the spine. Next, the feet, from the metapodials on down, were cut from the goat. The skin of the feet was left on, the phalanges were split, and the feet were roasted directly on the coals of one of the two fires. Then, fat was removed from the torso and upper legs, one side at a time. The ribs on one side were then cut from the sternum, but left attached to the spine. Next, the organs were removed from the body cavity, the stomach and intestines were emptied of their contents, and most of the organs, along with the fat, were cooked in the stew simmering on the second of the two fires. However, the kidney was eaten raw and the liver was roasted whole. Then, the ribs that were detached from the sternum were cut from the spine and roasted over the fire. The front limbs, on the same side, were also cut away by detaching the scapula from the spine, and then roasted. This same treatment was then applied to the ribs and front limbs on the other side of the animal. Next, the goat's pelvis was split and the back limbs were roasted over the fire. Lastly, the sternum and cervical vertebrae were cut from both the spine and the cranium to be roasted. After the meal, the bones that had been stripped of meat were left as they lay, but the bones still bearing meat were taken back to the adjacent boma and were later discarded outside of the boma so as not to attract predators or scavengers.

At Boma 4, a total of one-hundred forty-five faunal remains were recovered and analyzed. This figure does not include the one-hundred seventy-one non-diagnostic bone fragments from the surface survey that were noted, but were neither mapped nor analyzed. The detailed analysis for the surface survey remains is displayed in Table 1 and the shovel test pit analysis is located in Table 2.

There were one-hundred remains recovered during the surface survey. Of these, forty-two (42%) were goat/sheep bones, fifty-six (56%) were cattle bones, one (1%) was the ventral half of a tortoise shell and one (1%) was non-diagnostic. More than half, fifty-one (51%), of the surface survey bones bore either cut marks or chop marks—sure signs of human processing/butchery. None of the remains, however, were in any way burned, as if they had been cooked over an open flame. The concentration of remains on the surface was highest in the southwestern half of the site, especially in the vicinity of site structures (houses, animal pen, and orpul). On the southeastern side of the transect line, goat/sheep bones accounted for 48% of the remains, cattle bones

accounted for 51%, and a single non-diagnostic bone fragment accounted for 1%. On the northwestern side, goat/sheep bones accounted for 22% of the remains, cattle bones accounted for 74%, and a tortoise shell accounted for 4%.



Surface Survey Bones. From left to right and from top to bottom: Cow scapula, cow mandible, goat/sheep scapula, goat/sheep mandible, fused cow vertebrae and tortoise shell.

There were forty-five faunal remains found in the shovel test pits. Of these, three (7%) were goat/sheep bones, two (4%) were cow bones, twenty-one (47%) were non-diagnostic bone fragments and nineteen (42%) were shells or shell fragments. Of the non-diagnostic bone fragments, three (7%) were fossilized. None of the cattle or goat/sheep bones were found at a depth greater than 10cm and none had cut or chop marks. All of the shells, predominantly gastropod, were in P1 at depths greater than 40cm and all of the fossilized fragments were at depths greater than 60cm. Once fossilized pieces of bones began to appear, no more non-fossilized fragments were encountered in P1.



Gastropod Shell. From P1 level 70-80 cm. With hand for scale.

At Boma 4, excluding the non-diagnostic fragments noted during the surface survey, there were forty-five goat/sheep bones (31% of the assemblage), fifty-eight cattle bones (40%), twenty-two non-diagnostic bone fragments (15%), nineteen shells/shell fragments (13%), and one piece of tortoise shell (1%). Bones with cut and/or chop marks numbered fifty-one (35%). The minimum number of individuals (MNI) was three for both goats/sheep and cattle at Boma 4.

Stone tools predating the Maasai, generally not collected as they were beyond the scope of the study, were observed at every level of P1 and on the surface of the site. A random sampling of lithic artifacts was collected from depths between 40cm and 70cm below the surface of P1. After preliminary analysis this lithic assemblage was observed to be composed of cores, flakes, scrapers, ochre and blades. The relative age(s) of the tools was not determined.

Discussion

Boma 4, while a nearly ideal site in terms of size and structures (houses, animal pen, orpul) for the purposes of my study, did present some readily identifiable sources of error. First, Boma 4 was actually located atop a low ridge. This ridge ran southwest to northeast, in the direction of the transect line, and dropped off about a meter in elevation to both the southeast, where the change was more pronounced, and the northwest, where the difference in elevation occurred more gradually. So the *surface* of test pits one, two, five and six was really up to one meter lower than the *surface* along the transect line, where P3 and P4 were positioned. Also, the site was littered with approximately fist-size stones, mostly chert and quartz, which were used by my key informant. He prospected for the stones in the man-made pit, broke them into gravel to be sold as building material in the shade of the orpul site tree and then stacked them on the man-made rock pile. This continuing human activity at Boma 4 meant that I was unable to conduct the surface survey over the locations of the pit and rock pile; the layer of loose stones scattered over the surface of the orpul site may have skewed my surface survey data there as well.

Furthermore, Dominguez-Rodrigo (1999) warns against the exclusive use of skeletal part profiles, what I refer to as element and taxon on my tables, in zooarchaeology. He explains that,

Recent studies on bone accumulations and bone modifications by humans and carnivores have made the use of skeletal part profiles of limited value for zooarchaeological purposes. Equifinality (different processes with the same end-products) is very common, and renders this type of analysis ambiguous if used as a referential framework. Some alternative methods (studies of bone surface modifications) seem to be more adequate for taphonomic analyses (Dominguez-Rodrigo, 1999: 15).

While this may imply a limited utility for some of my data, the attention given to cut marks, chop marks and bite marks (the latter appearing only on BN9) on the faunal remains incorporates bone surface modification data into the study, limiting ambiguity.

The orpul ritual is defined by Burford, Biochem, Rafiki, and Ngila as a ceremony in which “young Maasai warriors spent time at a remote forest site, consuming meat together with medicinal plants” (Burford, Biochem, Rafiki, and Ngila, 2001: 547). My participation in the Engikaretorpul, along with what Olendese told me about the orpul location at Boma 4, seemed to instead describe a fairly regular, male dominated ritual conducted within the community which incorporated various community members including elders and those ailing from conditions such as malaria, pregnancy, and advanced age. Only one animal was slaughtered during the span of a single morning at the Engikaretorpul, rather than “as many as three cattle and nine goats... for a single retreat lasting several weeks” (Burford, Biochem, Rafiki, and Ngila, 2001: 547). So, the term orpul, as used in this study, refers to a broader set of rituals among the Maasai, characterized by the communal slaughter and consumption of one or more domesticated livestock animals.

The Maasai occupation layer at the Old Section of Boma 4, represented by the surface survey material and the material from the first 10cm of the shovel test pits, was dominated by the non-fossilized bones of livestock animals (goats/sheep and cattle), as was to be expected at a Maasai Boma. The bones of cattle and goats/sheep accounted for all of the diagnostic faunal remains from the surface, with the exception of the tortoise shell (BN1), and from the first 10cm under the surface. The vast majority of the surface survey remains (97%) came from the southwestern most three-quarters of the site, the same portion that encompasses all of the sites structures. This association of living area and food remains, inferred from the 51% of surface remains that bore cut marks, chop marks or both, corroborates the verbal reconstruction of the site recollected to me by my informant. Also, the proportion of goat/sheep bone was highest on the southeast half of the site and the proportion of cattle bones was highest on the northwest side. This is telling as the gate meant for goats (GG) was on the southeast side of the animal pen and the cattle gate (CG) was on the northwest side.

The shovel test pit sequence indicated Maasai occupation, extending back 34 years, according to my informant, was represented only up to depths of 10 cm below the surface. In test pit one (P1) there was a layer sterile of faunal remains up to 40cm, indicating an absence of pastoralism at the site. The appearance of gastropod shells at 40cm and of highly fragmented pieces of fossilized bone at 60cm suggests a wetter environment at the Boma 4 site sometime in the relatively distant past. It could be hazarded that the shores of Lake Man-yara, today several kilometers to the north, might have encroached toward the current location of Boma 4 over one or more intervals in the past.

Several questions arose over the course of this study which call for further research at the Boma 4 site. First, additional ethnoarchaeology could

be done with the Maasai at the transition section of Boma 4, which is unoccupied and has yet to be surveyed. Also, further work should be done on the paleoenvironment of Boma 4, especially at depths of 40cm and greater, and on the lithic assemblage at the site in order to understand potential past occupations of the area. These latter two aims might best be achieved by establishing a full two-by-one meter archaeological trench at the Boma 4 site.

Acknowledgments

I would like to thank Titus LuombaOmbori, Lucas Kadelya, Emanuel Kessy and Laura Heggs for their help with the archeological portions of my research. I would also like to acknowledge my translator Peter, my key informant, and the residents of Engikaret, Tanzania for helping me gather my ethnographic data. Lastly, thank you to my Program Director Molly Margaretten and Professor Bradley Chase for your continuing assistance and advice throughout the research process.

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Tables and Figures

Table 1

<u>Bone</u>	<u>Taxon</u>	<u>Element</u>	<u>Diagnostics</u>	<u>Condition</u>	<u>Cut/Chop Marks</u>
BS1	Bos	Vertebrae	N/a	Whole	No
BS2	Bos	Tooth	N/a	Whole	No
BS3	Ovis	Rib	Proximal	Frag	No
BS4	Ovis	Rib	N/a	Frag	No
BS5	Bos	Rib	Proximal	Frag	No
BS6	Ovis	Scapula	N/a	Frag	No
BS7	Ovis	Scapula	N/a	Frag	No
BS8	Ovis	Scapula	N/a	Frag	Yes
BS9	Bos	Scapula	N/a	Frag	No
BS10	Bos	Mandible	Left, w/ teeth	Whole	Yes
BS11	Bos	Mandible	Right, w/o teeth	Whole	Yes
BS12	Ovis	Mandible	Right, w/o teeth	Whole	Yes
BS13	Bos	Vertebrae	N/a	Frag	No
BS14	Bos	Rib	N/a	Frag	Yes
BS15	Ovis	Vertebrae	N/a	Frag	No
BS16	Bos	Rib	N/a	Frag	No
BS17	Bos	Rib	N/a	Frag	No
BS18	Bos	Rib	N/a	Frag	No
BS19	Ovis	Vertebrae	N/a	Whole	No
BS20	Ovis	Humerus	Proximal	Frag	Yes
BS21	Ovis	Skull	N/a	Frag	No
BS22	Ovis	Vertebrae	N/a	Whole	Yes
BS23	Bos	Rib	Proximal	Frag	Yes
BS24	Ovis	Humerus	Proximal	Frag	Yes
BS25	Bos	Rib	N/a	Frag	Yes

BS26	Bos	Rib	N/a	Frag	Yes
BS27	Ovis	Femur	Proximal, Left	Frag	No
BS28	Ovis	Metapodial	Distal	Frag	No
BS29	Ovis	Scapula	N/a	Frag	Yes
BS30	Ovis	Radius	Distal	Frag	Yes
BS31	Ovis	Mandible	Left, w/ teeth	Whole	No
BS32	Ovis	Humerus	Proximal	Frag	Yes
BS33	Bos	Scapula	N/a	Frag	Yes
BS34	Bos	Scapula	N/a	Frag	Yes
BS35	Ovis	Tibia	Proximal	Frag	Yes
BS36	Bos	Rib	Proximal	Frag	Yes
BS37	Bos	Rib	N/a	Frag	Yes
BS38	Ovis	Mandible	Left, w/o teeth	Whole	Yes
BS39	Non- diagnostic	N/a	N/a	Frag	No
BS40	Ovis	Tooth	N/a	Whole	No
BS41	Bos	Jaw	W/teeth	Frag	No
BS42	Bos	Rib	N/a	Frag	Yes
BS43	Bos	Rib	N/a	Frag	Yes
BS44	Ovis	Scapula	N/a	Frag	Yes
BS45	Bos	Mandible	W/tooth	Frag	No
BS46	Bos	Phalange	N/a	Whole	Yes
BS47	Bos	Rib	N/a	Frag	Yes
BS48	Ovis	Scapula	N/a	Frag	No
BS49	Bos	Rib	Proximal	Frag	Yes
BS50	Ovis	Rib	N/a	Frag	No

BS51	Bos	Mandible	Right, w/o teeth	Whole	Yes
BS52	Ovis	Tibia	Proximal	Frag	Yes
BS53	Ovis	Rib	N/a	Frag	Yes
BS54	Ovis	Rib	N/a	Frag	No
BS55	Bos	Mandible	W/tooth	Frag	No
BS56	Ovis	Humerus	Proximal	Frag	Yes
BS57	Bos	Rib	N/a	Frag	No
BS58	Bos	Mandible	Left, w/o teeth	Whole	Yes
BS59	Ovis	Metapodial	Distal	Frag	No
BS60	Bos	Vertebrae	2 fused	Whole	No
BS61	Bos	Tooth	N/a	Whole	No
BS62	Ovis	Scapula	N/a	Frag	Yes
BS63	Ovis	Metapodial	Proximal	Frag	Yes
BS64	Ovis	Mandible	Right, w/ tooth	Whole	No
BS65	Ovis	Rib	N/a	Frag	No
BS66	Ovis	Pelvis	N/a	Whole	Yes
BS67	Bos	Mandible	Right, w/o teeth	Frag	Yes
BS68	Ovis	Tibia	Proximal	Frag	Yes
BS69	Ovis	Scapula	N/a	Frag	Yes
BS70	Bos	Femur	Proximal	Frag	No
BS71	Bos	Vertebrae	N/a	Whole	No
BS72	Bos	Rib	N/a	Whole	Yes
BS73	Bos	Tooth	N/a	Whole	No
BS74	Bos	Scapula	N/a	Frag	No
BS75	Ovis	Humerus	Proximal	Frag	Yes
BS76	Bos	Ulna	Right	Whole	Yes
BS77	Bos	Radius	N/a	Whole	No
BN1	Tor-toise	Shell	Ventral	Half	No
BN2	Bos	Rib	Proximal	Frag	No
BN3	Bos	Scapula	N/a	Frag	Yes
BN4	Bos	Rib	N/a	Frag	Yes
BN5	Bos	Rib	N/a	Frag	No
BN6	Bos	Jaw	Left, w/ teeth	Whole	No
BN7	Bos	Metapodial	Distal	Frag	Yes

Table 2

<u>Pit</u>	<u>Level (cm)</u>	<u>Taxon</u>	<u>Element</u>	<u>Diagnostic</u>	<u>Condition</u>	<u>Cut/Chop Marks</u>	<u>Number</u>
P1	0 to 10	Bos	Rib	N/a	Frag	No	1
		Ovis	Rib	N/a	Frag	No	2
		Bos	Tooth	N/a	Whole	No	1
		Non-diagnostic	Tooth	N/a	Frag	No	3
		Non-diagnostic	Bone (?)	N/a	Frag	No	4
	10 to 20	N/a	N/a	N/a	N/a	N/a	0
	20 to 30	N/a	N/a	N/a	N/a	N/a	0
	30 to 40	Non-diagnostic	Bone (?)	N/a	Frag	No	1
	40 to 50	Non-diagnostic	Bone (?)	N/a	Frag	No	1
		Gastropod	Shell	Small	Whole	No	2
	50 to 60	Non-diagnostic	Bone (?)	N/a	Frag	No	2
	60 to 70	Non-diagnostic	Bone (?)	N/a	Fossil, frag	No	2
		Gastropod	Shell	Small	Frag	No	3
	70 to 80	Non-diagnostic	Bone (?)	N/a	Fossil, frag	No	1
		Gastropod	Shell	Small	Whole	No	2
		Gastropod	Shell	Small	Frag	No	1

	80 to 90	Gastropod	Shell	Small	Whole	No	1
		Gastropod	Shell	Small	Frag	No	2
		Gastropod (?)	Shell	Large	Frag	No	3
	90 to 100	Gastropod	Shell	Small	Whole	No	1
		Gastropod	Shell	Small	Frag	No	3
		Gastropod (?)	Shell	Large	Frag	No	1
P3	0 to 10	Non- diagnostic	Bone (?)	N/a	F	No	7
	20 to 30	N/a	N/a	N/a	N/a	N/a	0
P4	0 to 10	Ovis	Verte- brae	N/a	Frag	No	1
	20 to 30	N/a	N/a	N/a	N/a	N/a	0