Interim Report of Animal Bones from the 2002 Excavations at Gásir, Eyjafjörður, N Iceland DRAFT

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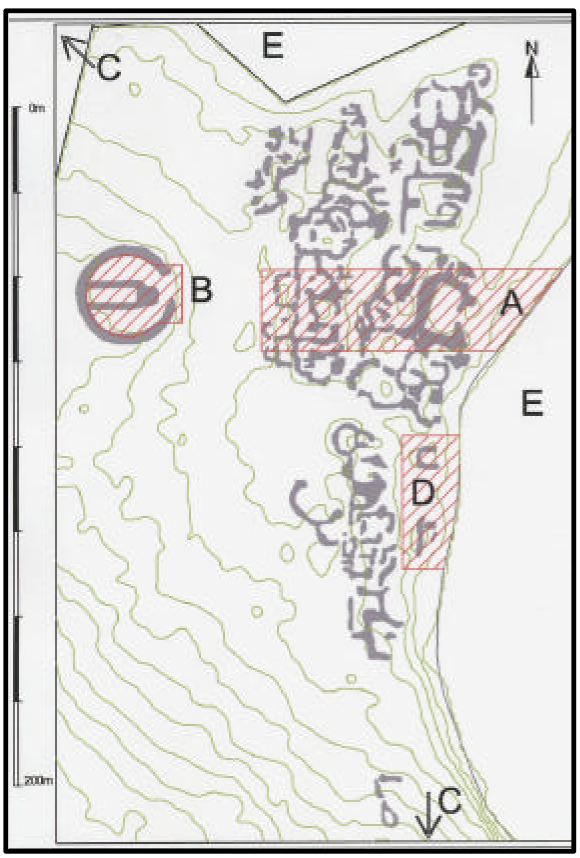
Executive Summary

Archaeological excavations carried out in the summer of 2002 at the site of Gásir in Eyjafjörður near the modern city of Akureyri directed by Howell Roberts of *Fornleifastofnun Islan*ds (Archaeological Institute Iceland, FSl) for *Minjasafnið á Akureyri* (Akureyri Museum) produced a substantial number of animal bones, whose initial analysis is reported here. Analysis has been carried out by Dr.s Jim Woollett and Tom McGovern at the CUNY Northern Science & Education Center laboratories as part of the North Atlantic Biocultural Organization cooperative effort, with funding from the UK Leverhulme Trust. The 2002 excavations were part of a larger scale long term effort to investigate the remains of the early trading center at Gásir and to place the site in a regional and historical perspective. Investigations will continue at the site, and this report is thus only a working paper to be updated and replaced as more material becomes available for study. The total animal bone collection (archaeofauna) analyzed from the 2002 season comprised 2,101 fragments, of which 848 could be assigned to a taxon. Approximately a third of these bones came from the redeposited backdirt of the 1907 Bruun and Jónsson excavation, and the many remaining *in situ* contexts freshly excavated in 2002 do not include substantial midden deposits immediately producing sample sizes suitable for full scale zooarchaeological quantification. However, even at this stage the collection as a whole has a number of special characteristics that warrant discussion and comparison with other Icelandic archaeofauna and suggest several potentially productive directions for further research.

The species present include domestic cattle, sheep, goat, horse, and pig as well as seal, whale, bird and fish remains. Domestic mammal bones make up the great majority of the archaeofauna (ca 75%) with fish the next most common taxa (ca 23%). Cattle bones are particularly common (in both redeposited and *in situ* contexts) and include mature and juvenile individuals but few of the newborn calves normally found on farm sites and associated with dairy production. The high percentage of cattle bone is similar to very high status late medieval sites in S Iceland (Víðey, Bessastaðir), but the dominance of domestic mammal bone is extremely unusual. Dog gnawing is visible on bones, though no dog remains are included in the current collection. The skeletal elements of the domestic stock include all parts of the body, with meat rich upper limb bones well represented. Butchery patterns include typical late medieval Icelandic patterns, except for a puzzling shortage of characteristic biperforated sheep metapodials. Further research questions center on the nature of provisioning of the site, context-specific bone associations and activity areas, bone and horn craftworking, and possible indicators of multiethnic foodways.

The Excavation :

The 2002 archaeofauna analyzed at the NORSEC laboratories in the spring of 2003 came from excavations directed by Howell Roberts in July and August 2002 (Roberts 2002a, 2003). The site has long been famous as an early trading center for N Iceland and a possible proto-urban precursor of the modern city of Akureyri (11 km to the S). The site is on a small peninsula on the western shore of the fjord, now surrounded by salt marshes sheltered by a sand bar. A large number of apparently sub-rectangular structures are visible on the surface, and the ruins of a church with circular churchyard dyke are on a ridge overlooking the embayment. The site was partially excavated in 1907 by Daniel Bruun and Finnur Jónsson, and some small trial trenches were dug in 1986 by Margrét Hermanns-Auðardóttir and Bjarni F. Eínarsson. The large scale open area excavation by the FSI team in 2002 followed earlier small scale re-excavation of Bruun's units and a comprehensive program of mapping and geophysical survey in 1999-2001. The current investigation is sponsored by the Akureyri Museum and is aimed at improving understanding of the chronology and use of the site and at developing a heritage site of public interest.



Bone materials analyzed derived from 85 contexts from the main excavation unit A (see figure 1 location map from Howell 2003 p 8). They derived from both the spoil of Bruun's 1907 excavation (context 001) and from 84 *in situ* contexts freshly excavated in 2002. As fully described in Roberts (2002a,b, 2003), the crew cleared the backfilled 1907 spoil (which contained many fire cracked stones as well as animal bones) from the complex of structures and features in the eastern portion of area A. Sunken feature structures, stone pavements, hearths and two possible industrial pits (one possibly associated with sulfur refinement) were among the contexts documented by the 2002 excavation team. Bone (burnt and unburnt) was encountered in most of the contexts excavated, in varying amount and degree of weathering, though overall bone preservation was good to moderate. All material appears to post-date an AD 1300 tephra, and should be broadly late medieval in date. All *in situ* deposits were sieved through 4 mm mesh while some of the redeposited fill was hand collected.

Figure 2 presents the distribution of bone fragments across the contexts excavated (TNF= total number of fragments= both identified and unidentified fragments.

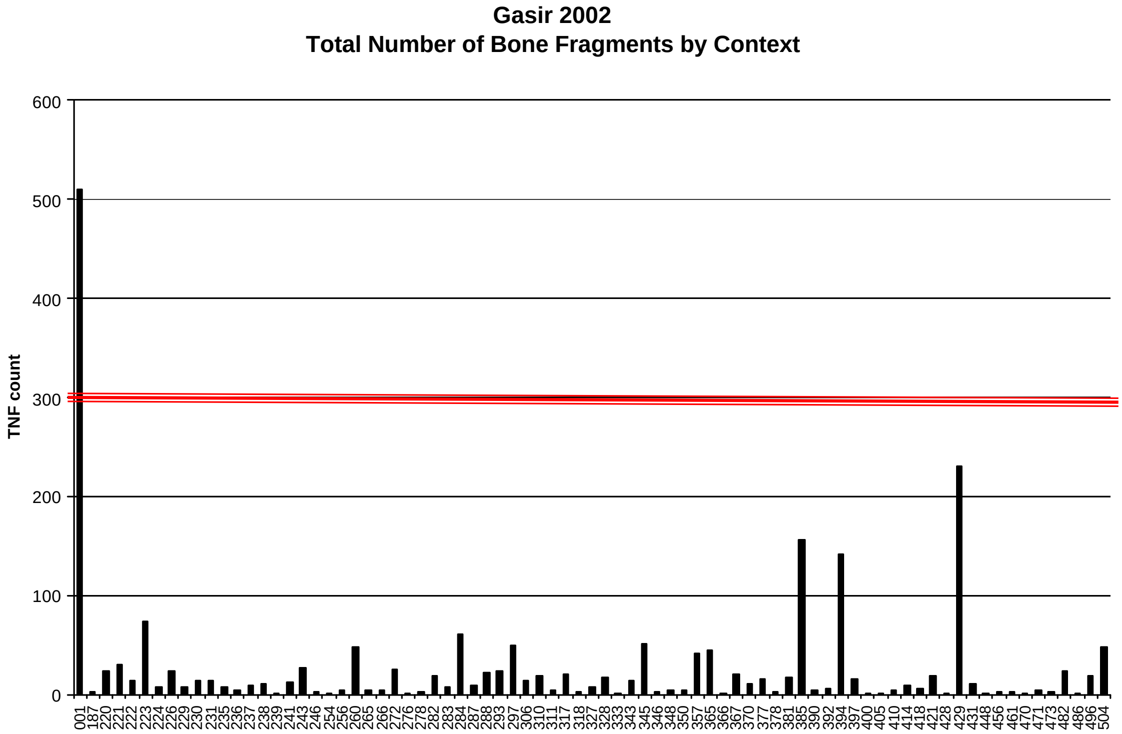


Figure 2

As the graph indicates, the majority of the bones recovered in 2002 came from context 001, the spoil of the 1907 excavation. The *in situ* contexts produced a highly variable number of bone fragments (none to over 200) but none of these freshly excavated contexts produced the minimum 300 mammal bone NISP (number of identified fragments = bones identified to a useful taxonomic level) threshold for full quantification recommended by the NABO Zooarchaeology Working Group (red line in figure 2). At present, our analysis is limited by sample size but we anticipate that sample size will increase in later years, especially if bone-rich midden deposits are encountered. This report thus is very much a first look at the Gásir bone collection, and most observations offered in this report should be treated as first impressions subject to correction by further research.

However, the current collection has a number of interesting features that are not typical of Icelandic later medieval archaeofauna, and with the *caveats* above in mind, it is certainly worth exploring the 2002 material further, if only to identify areas for further work. It is normally good practice to keep separate bone materials from different floor areas and activity zones, to separate floor deposits from midden deposits, and to segregate *in situ* contexts from redeposited contexts. In this report we will deliberately violate these sound principles in the interest of providing a working first view of the Gásir archaeofauna as a whole. Appendix table A1 presents all bone fragments broken down by context and the full MS Access database (NABONE format) and the MS Excel spreadsheets used in this report are included in the CDR data archive in the back cover (or available from nabo@voicenet.com).

Overview of Species Present

Table 1 presents the 2002 Gásir archaeofauna aggregated into unstratified fill (001), all *in situ* contexts and the total 2002 archaeofauna. NISP (number of identified specimens) refers to all fragments that could be identified to a useful level, TNF is a count of all bone fragments (identifiable or not), MTM is “medium terrestrial mammal” (sheep-dog-pig sized), LTM is “large terrestrial mammal” (cattle-horse sized), UNIM or unidentified mammal are small fragments that cannot be identified beyond this broad category. No dog bones are present in the collection, but characteristic canine tooth marks are present on a number of bone fragments in the collection.

Sheep and goat are difficult to reliably separate on many elements, and it is usual to present a large “Caprine” category that includes both species (equivalent of “ovicaprid” or “O/C” of other authors) and to use this category for inter-species comparisons. Seals are also difficult to distinguish on most bones, though it is often possible to separate small seals (harbor, harp, ringed seal: in Iceland most likely to be *Phoca vitulina* the harbor or common seal) from large seals (hooded, bearded, and gray seals: only gray seals *Halichoerus gryphus* are common in Icelandic waters). Whale (cetacean) bone is usually hard to identify to species and harder to quantify (whalebone was used for many craft purposes and it is seldom clear if fragments relate to diet or industry). However it is sometimes possible to separate great whales (baleen and sperm) from smaller toothed whales and porpoise (small cetacean), and both are present in the 2002 archaeofauna. Birds and fish have not yet been identified to taxon, this work is underway and will appear in the next interim report.

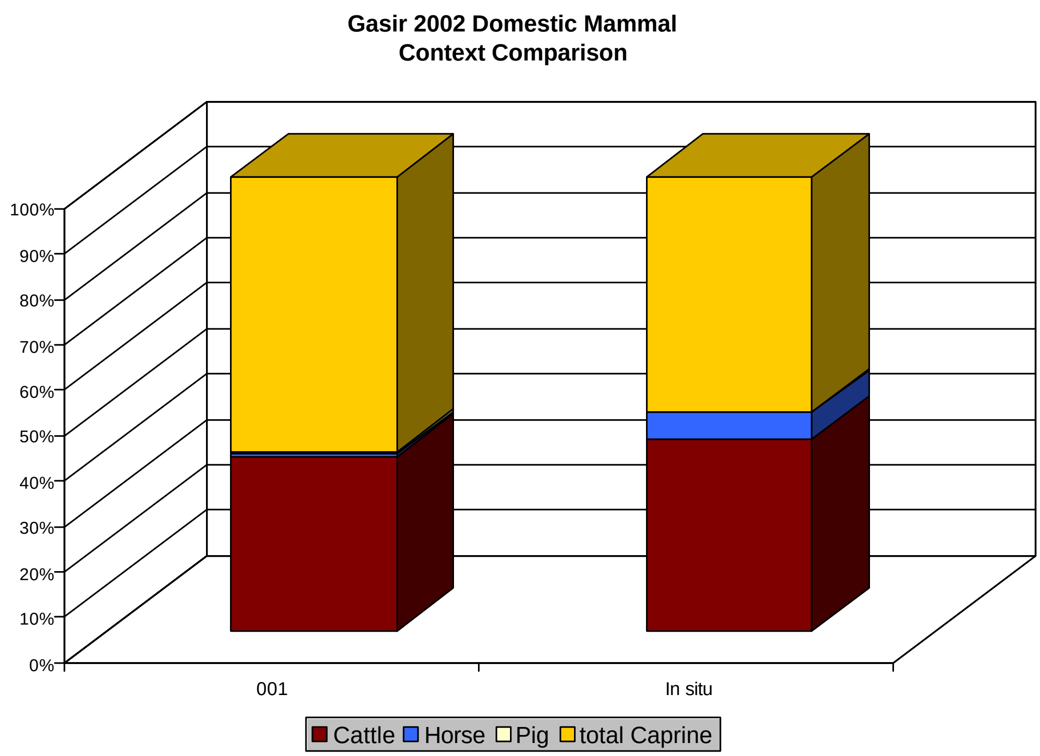
As usual the major difference between sieved and hand collected archaeofauna is in the far higher proportion of birds and fish in the former (and higher proportion of small unidentifiable fragments), though many small fragments (2 cm and smaller) were recovered in all contexts and the standard of recovery seems very high overall.

Table 1 Gasir 2002	Aggregated Fragment Count		
	Context		
Taxon	*001*	*In situ*	*total*
Cattle (*Bos taurus dom* L)	86	169	255
Horse (*Equus cab. dom* L.)	1	23	24
Pig (*Sus scrofa dom* L.)	1	1	2
Dog (*Canis fam*. L)	present	present	0
Goat (*Capra hircus dom* L)		2	2
Sheep (*Ovis aries dom* L)	23	22	45
Caprine	113	183	296
total Caprine	136	207	343
total Domestic	224	400	624
			0
Small seal	1	3	4
Seal species		5	5
total Seal	1	8	9
			0
Small Cetacean		1	1
Large Cetacean	1		1
			0
Bird	9	14	23
			0
Fish	17	173	190
			0
total NISP	252	596	848
Large Terrestr. Mammal	42	146	188
Medium Terrestr. Mammal	116	369	485
Unidentified Mammal Frag.	100	480	580
total TNF	510	1591	2101

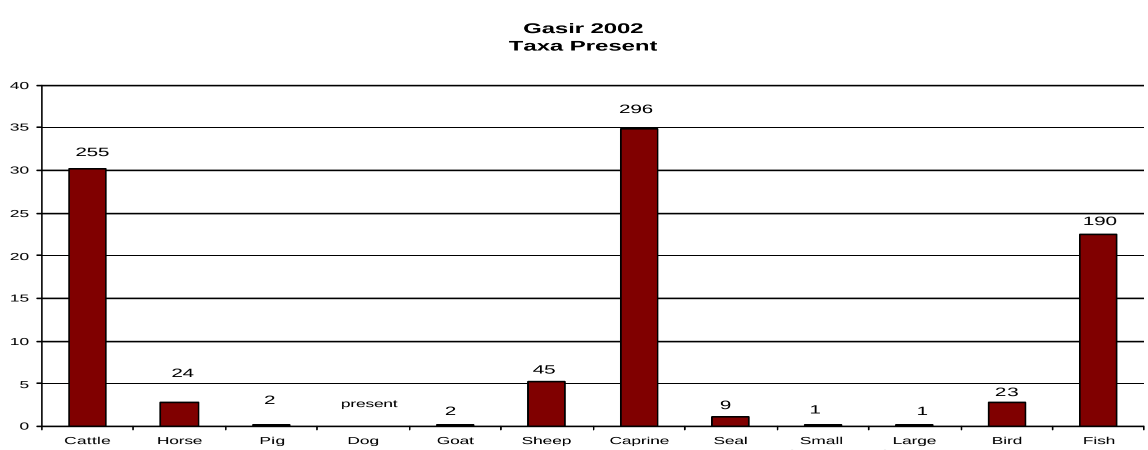
Table 2 presents the relative % of the domestic mammals for both unstratified and *in situ* contexts, both dominated by caprines (mainly sheep) and cattle.

Table 2 Gasir 2002	Relative %	
Domestic Mammals		
Taxon	001	In situ
Cattle	38.39	42.25
Horse	0.45	5.75
Pig	0.45	0.25
total Caprine	60.71	51.75

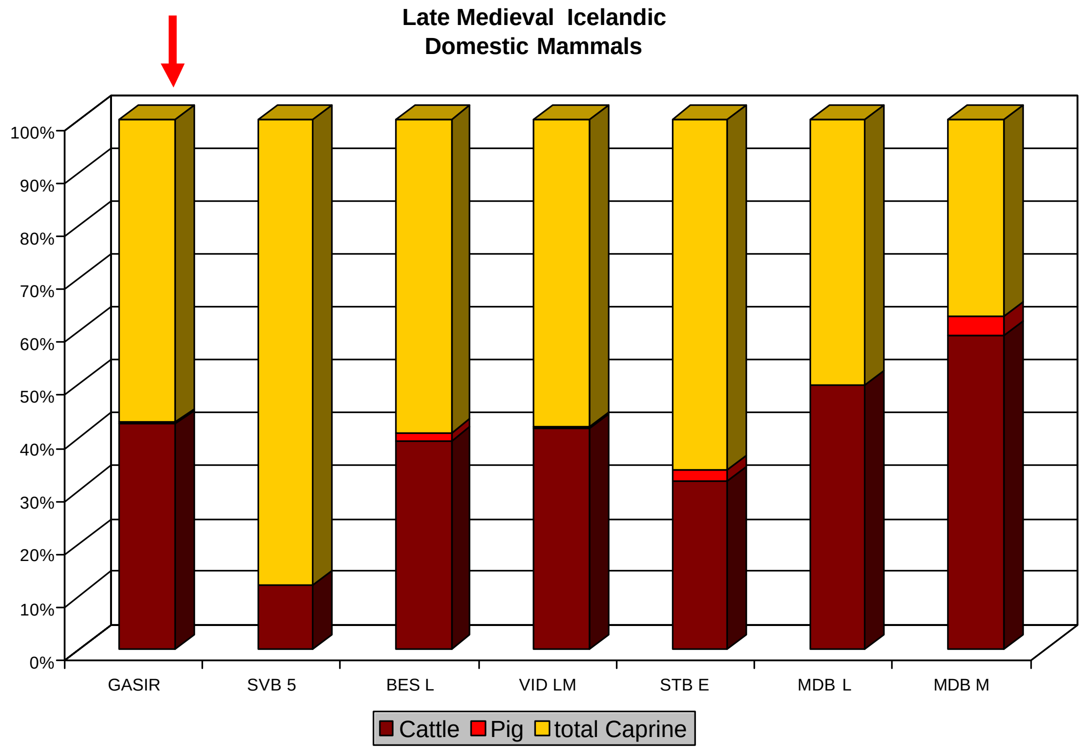
Figure 3 presents these relative proportions for the two contexts, illustrating the counter-attritional pattern of slightly more cattle bones in the *in situ* layers than in the backfill (larger mammal bones tend to survive better than smaller). The horse bone is almost entirely from one *in situ* context (220), and probably does not reflect a contribution to human diet.



The close similarity of these two aggregated collections suggests that the excavators were correct in identifying the fill of 001 as 1907 backdirt, and for the rest of our analysis we will effectively re-unite these 1907 samples with the 2002 *in situ* material for a broad look at patterning within this area of the site. Figure 4 presents a general overview of this complete collection as it now stands.

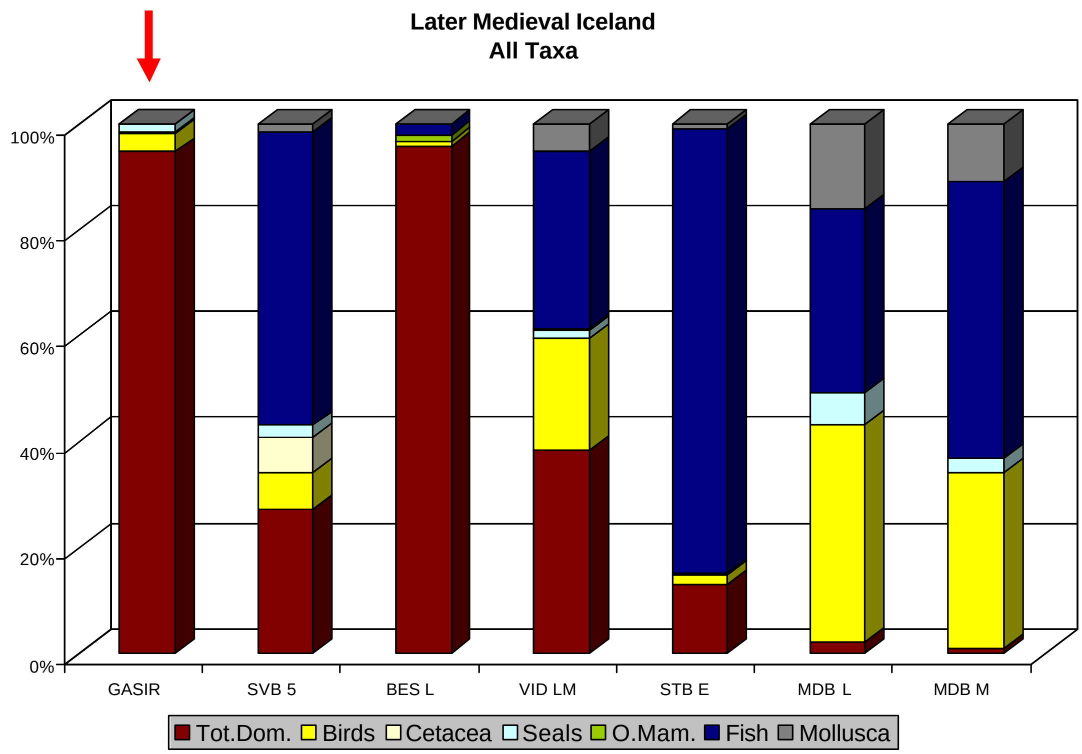


A clear trend in all contexts is an abundance of cattle bone (almost all contexts have at least a few fragments) with a ratio of 1.4 caprine bones per 1 cattle bone. This high ratio of cattle to caprines can be compared to other late medieval (14^{th}-early 16^{th} c) Icelandic archaeofauna (figure 5).



In figure 5 Gásir is compared to a roughly contemporary collections from Svalbarð in the NE (SVB 5, medium-high status farm with church), the elite manor at Bessastaðir (BES L) near Reykjavík, the monastery on Víðey in Reykjavík (VID LM), a middle ranking S coastal farm Storaborg (STB E) and two phases of a midden deposit associated with a small farm Miðbaer on the island of Flatey in Breidafjorð in the NW (Amundsen in press). The high cattle percentages for this small farm on Flatey are somewhat deceptive, as they reflect the extremely limited pasturage available on the island and a clear decision to use most available pasture for cattle raising (thus the graph actually reflects fewer sheep rather than more cattle). In general, higher percentages of cattle on most late medieval sites reflect availability of high quality pasture, high social status, or both. Leaving the Miðbaer collection aside, the closest matches with the 2002 Gásir domestic mammal pattern is in fact with the very high status manors of Bessastaðir and Víðey in the SW.

Figure 6 makes use of the same comparative archaeofauna to present the larger picture of the whole collection, comparing wild species and domesticates.

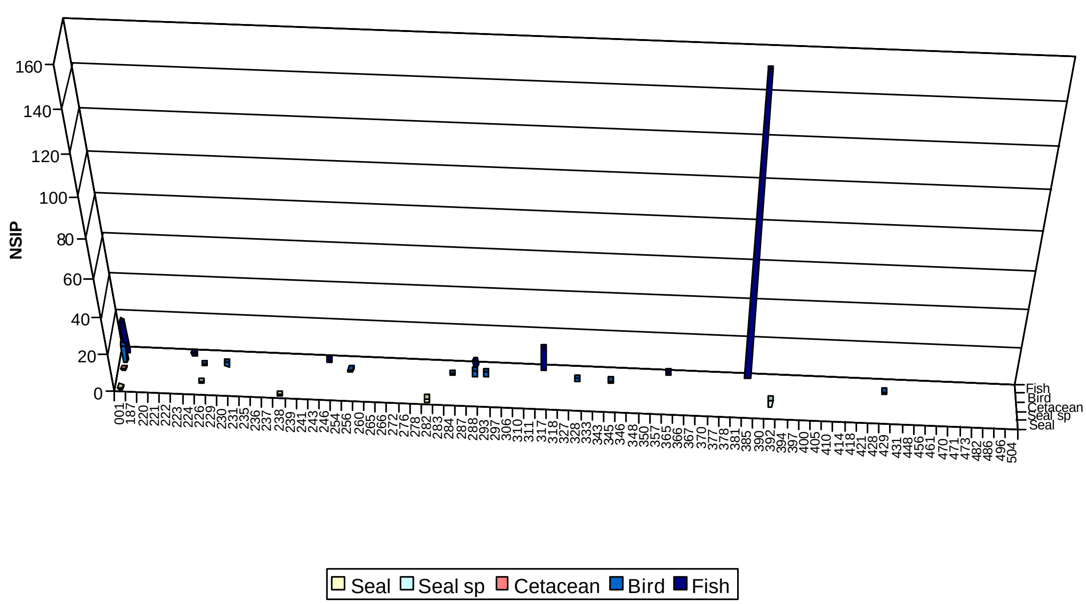


This broader picture serves to illustrate the variety of subsistence strategies playing out in different parts of Iceland in the later Middle Ages. In most sites marine fish (cod family) have a greatly enhanced role, and wild birds clearly play a significant role on both large and small farms in the broad embayments of the NW and SW. This figure also makes the actual situation of the small Miðbaer farm on Flatey clearer. This was not a cattle-rich magnate manor, instead this domesticate- poor household was probably subsisting as much as maritime hunter-fishers as farmers by the later Middle Ages. In this comparison, only Bessastaðir and Gásir 2002 show such a predominance of domestic mammals. In the case of Bessastaðir highly variable conditions of bone preservation may be artificially reducing the fish component, but this explanation does not seem likely for Gásir. The 2002 collection overall does not closely resemble the archaeofauna of a small or even upper middle ranking farm, and its closest parallels are with very high status sites.

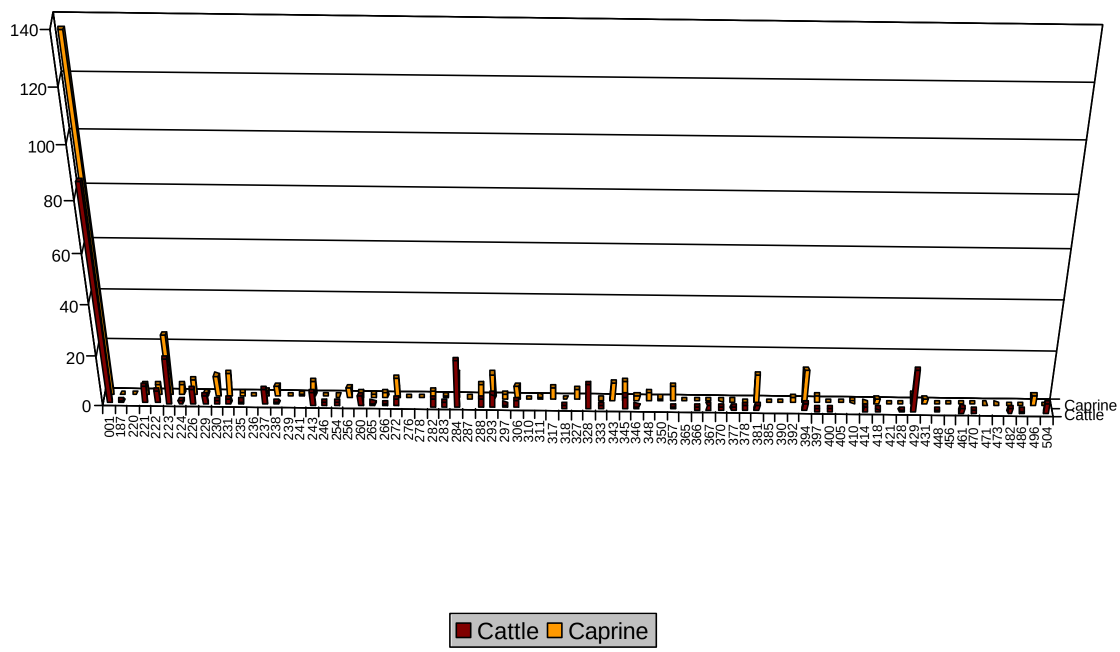
Spatial Species Distribution

The distribution of different species and different skeletal elements across different contexts has potentially far more significance in the interpretation of floors, hearths, and industrial deposits than the distribution of body parts in most midden deposits. Since middens tend to collect refuse from a wide range of activities and from different original points of deposition around a site, they tend to blur together the many activities taking place in the course of the year and to conflate and homogenize the many activities associated with animal and human bone modification (slaughter, dismemberment, meat preservation, cooking, consumption, craft use, children's' play, dog gnawing). For general economic reconstruction, this homogenization is a positive factor. If sample size and excavation units are large enough midden deposits regularly produce the best overall view of economic organization on a site and provide the best basis for inter-site comparison. Smaller concentrations of bone more directly associated with primary deposition (single butchery event, single meal, small store of meat, bone or horn working) can greatly contribute to functional interpretation of rooms and features, but are far more likely to skew an overall economic picture. For example, nearly all the fish recovered *in situ* in 2002 came from two contexts (381, 311). Had these not been selected for excavation, the present archaeofauna's summary graphs would look quite different. Figures 7 and 8 contrast the distribution of rare taxa (sea mammals, birds) and highly concentrated taxa (fish) with more ubiquitous taxa (cattle and caprines). Why are some species' bones present in nearly all contexts, while others are not? What associations between species, body part, artifacts, floor micromorphology can be established?

Distribution of Rare & Concentrated Taxa



Distribution of Common Taxa



While we cannot yet effectively address these questions at Gásir, as work progresses our opportunities will expand. One area for continued close cooperation between excavators and zooarchaeologists will be in the documentation and analysis of these small, but behaviorally significant concentrations of particular species' bones on floors and activity areas.

Body Part Representation

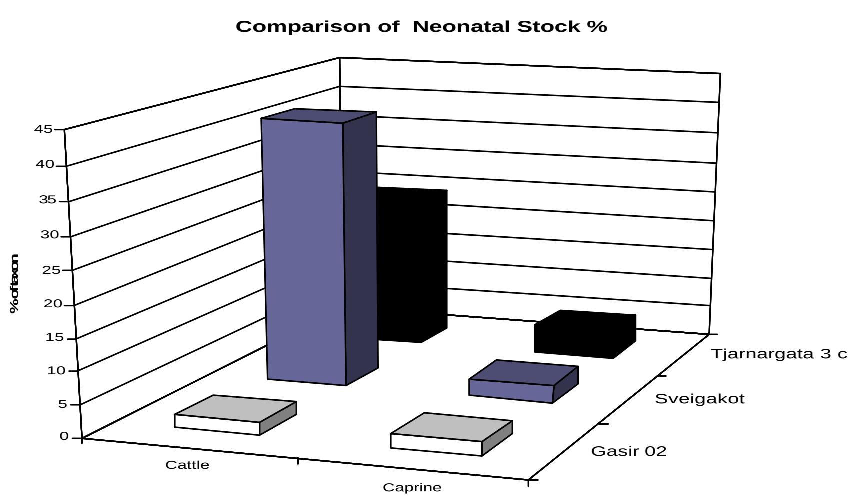
It is not yet productive to carry out a full scale analysis of the distribution of body parts of major species across the site, but this is also an area for significant expansion as sample sizes increase. Most domestic mammals are simply too large to consume at once in a single spot, and the way carcasses are dismembered and body elements distributed across a site area has long been a major interest of zooarchaeologists (especially those dealing with urban collections see Dobney et al _____, Maltby ______, O'Connor ______). Status, seasonality, nutrition, and the culturally determined packet of behaviors described as "foodways" (Deetz ___,   ) are all reflected in the distribution of bone fragments in primary depositional contexts (as well as the applied chaos theory of the interaction of children and dogs). Issues of status and access to preferred cuts of meat have also been subject of extensive zooarchaeological discussion (Crabtree 1990, ________). In the case of Gásir, skeletal element distribution of the major domesticates (cattle and sheep) can track meat and marrow-rich elements, butchery waste, and potential craft materials in ways that should help answer key questions of room and activity area use.

At present a few qualitative observations can be made about body part representation in the current sample:

- Bones from the entire skeleton of cattle and caprines are present in the collection- it is not made up entirely of either low meat value or high meat value elements.
- Bones from the meat rich upper limbs (humeri, femora) *are* particularly abundant in the current collection, both in the identified categories (sheep, cattle) and in the broader LTM and MTM categories. At present it is not possible to estimate if these upper limb bones are in fact over-represented relative to other body parts, but they are certainly abundant. The current sample cannot be interpreted as only butchery waste or a concentration of meat poor elements.

Age at Death

While sample size (and the current shortage of mammalian tooth rows) again limits a full discussion of ages of animals represented, we can observe the presence of both fully mature and juvenile individuals in the most common cattle and caprine groups. Most striking thus far is the shortage of bones of new born (neonatal, strictly birth to 3 months old) calves and lambs at Gásir. Most Icelandic archaeofauna contain substantial numbers of neonatal calf bones (typically 25-40% of all cattle bones) generated as part of a dairy economy (Halstead _____), and many include significant numbers of very young lamb bones as well. Figure 9 compares the percent neonatal cattle and sheep bones from Gásir with the late



9th-11th c archaeofauna from Sveigakot in Mývatnssveit and the early modern (mainly 18th -19th c) archaeofauna from the Tjarnargata 3 c midden generated by a rapidly urbanizing downtown Reykjavik (McGovern et al 2001, Perdikaris et al.

2001). While neither of these comparative sites are contemporary, Sveigakot's archaeofauna is in many respects typical of a N Icelandic individual farm, while the Tjarnagata 3c collection represents our only current urban (or urbanizing) Icelandic archaeofauna. While a few neonates are present at Gásir, it would appear that the site was even less directly attached to normal dairy farming activity than the Tjarnargata 3 c area (which bordered several working farms in the early modern period).

Tooth eruption and wear are favored approaches to establishing age of death of mammals and a substantial literature on this subject exists (for review see Hillson 1994). This analysis follows widespread N Atlantic practice in using the scoring system (a-o with advancing wear) of Grant (1982) for recording tooth eruption and wear (see Enghoff 2003 for clear application & discussion). In this very small sample of jaws, one sheep and one goat retain the deciduous premolar dp4, shed early in the second year of life. The wear stage of the sheep jaw (l, f, d) would conventionally be interpreted as approximately 11-13 months old. Two loose caprine dp4 at h and g conventionally indicate 8-9 month age. The four sheep jaws with erupted third adult molar (M3) are all adults whose conventional age assessment ranges from ca 2 years (b, c) to 4-8 years (g). The cattle jaws come from young animals in the 5-15 month old range (dp4 at j and k)- not fully mature but well grown juveniles. In addition, some loose cattle teeth include two third molars at j and c (conventionally 6-8 years old and 2-3 years old respectively) indicating the presence of fully adult cattle as well. The single horse mandible has the third molar in wear, indicating a mature adult. Fusion of long bones is another source of aging data, but tends to require a large sample size to overcome attritional effects of butchery and age dependent bone density, and is probably best left to a later report. Current fusion evidence supports the impression given by the dental evidence suggesting the presence of large juveniles and adult animals but not many very young or extremely old individuals.

Table 3 Gásir 2002
Mandibular Eruption and Wear

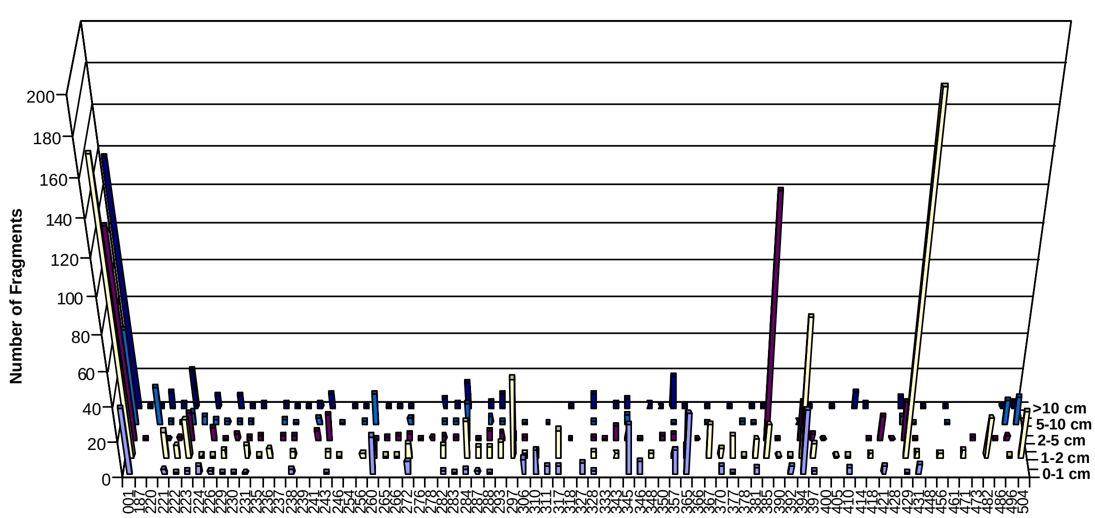
tooth	dp4	P4	M1	M2	M3
Sheep	l		f	d	unerupted
Sheep	missing		g	b	broken
Sheep		missing	g	e	b
Sheep		missing	missing	missing	c
Sheep		g	h	g	e
Sheep		j	m	g	g
Goat	g		f	b	unerupted
Cattle	j		g	missing	
Cattle	j		g	d	
Cattle	k		g	e	

Taphonomic Signatures

Taphonomy refers to the many processes affecting bone from the time it ceases to be part of a living animal until it appears (usually in fragmentary form) on a laboratory table for analysis. Zooarchaeologists regularly attempt to reconstruct taphonomic histories of particular deposits, and all are aware of the many ways in which differential bone destruction can affect the archaeological record. Taphonomic indicators (usually fragmentation, animal gnawing, weathering, burning, butchery marks) have also been used to identify different depostional contexts and to aid in the interpretation of features. The standard NABONE zooarchaeological recording package includes a number of tools for investigating taphonomic "signatures" of different sorts, and these will become more effective as sample size increases.

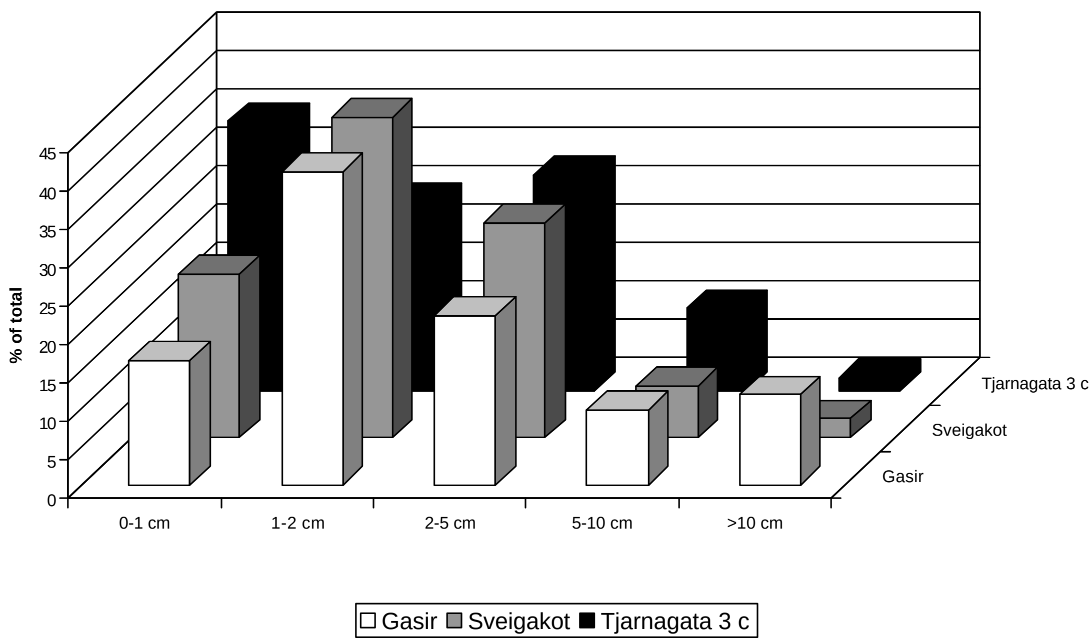
Fragmentation: Figure 10 presents bone fragmentation by context for the 2002 Gásir archaeofauna, dividing bone fragments into five size ranges (up to 1 cm maximum length, 1-2 cm, 2-5 cm, 5-10 cm, and over 10 cm). Note that some contexts include a range of bone fragment sizes (eg. 394) while others are dominated by one size class (eg.385, 429). Fragmentation results from burning, trampling, the production of bone grease, and exposure to freeze thaw cycles by exposure on open surfaces.

Gasir 2002
Fragmentation by Context



As figure 11 indicates, the overall distribution of fragment sizes in the Gásir 2002 collection is not grossly different from that of the two comparative sites (Sveigakot and Tjarnargata 3c), but the strongest similarity is with the farm site Sveigakot rather than the early modern urbanizing context. The higher proportion of very large bone fragments (mainly cattle long bones) is an interesting trend, but as many of these large fragments currently come from the unstratified fill (001) context it is probably unwise to read too much into this pattern at present.

Comparison of Bone Fragment Size



Burning: In most Icelandic archaeofauna, burnt bone is a common occurrence. It is often associated with fire cracked stones, ash, and charcoal and appears to be often deposited during hearth cleaning. As in other parts of the medieval world, it appears to have been common practice to toss bones into open fires to dispose of them and add slightly to the heat produced by the fire. Hearth ash was often used to sweeten dirt flooring and byres, absorb moisture, and reduce mud in high traffic areas. Burnt bone is thus associated with hearths and industrial uses of fire, but may also be found spread on floors as well as deposited in middens. Strongly burnt bone is very fragile and usually breaks into small unidentifiable pieces. Bone fragments are scored as white burned (calcined, very strongly heated), blackened (less completely combusted) and scorched (lightly burnt in a few places). Figure 12 presents the white and black burnt bone by context for the Gásir 2002 collection. Note that while most bone recovered was unburnt, some contexts are dominated by white burnt bone.

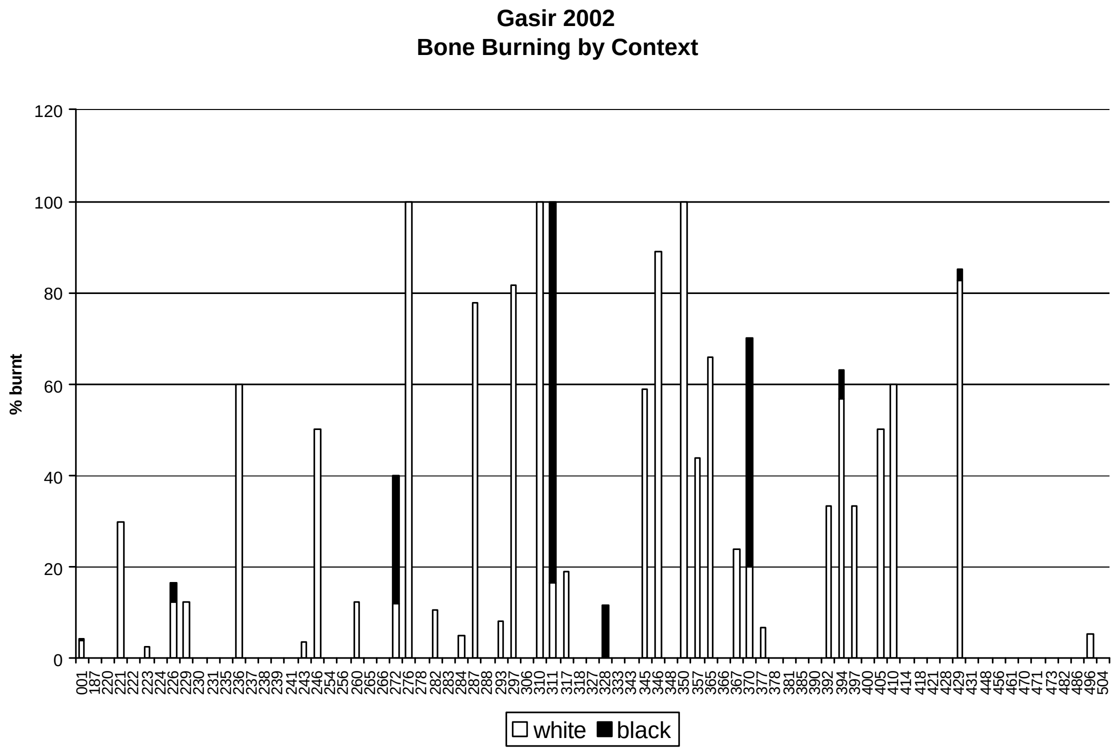
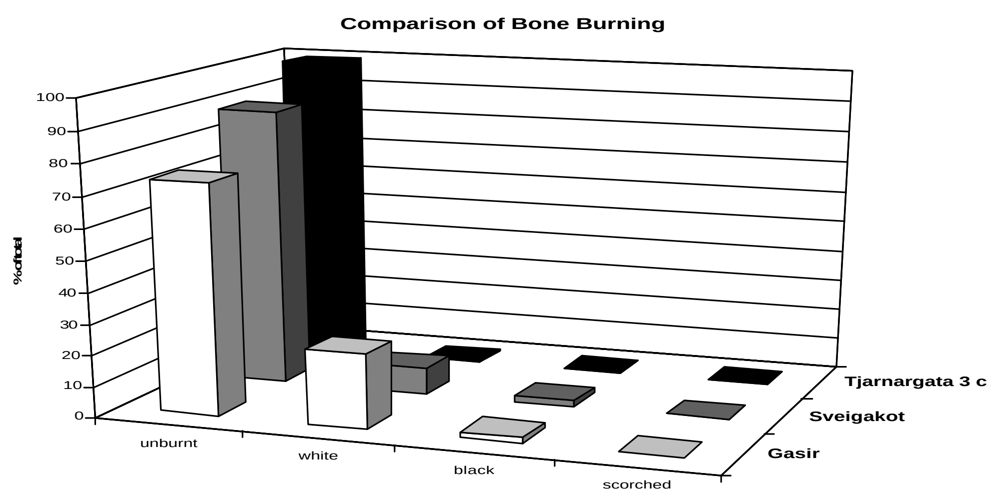
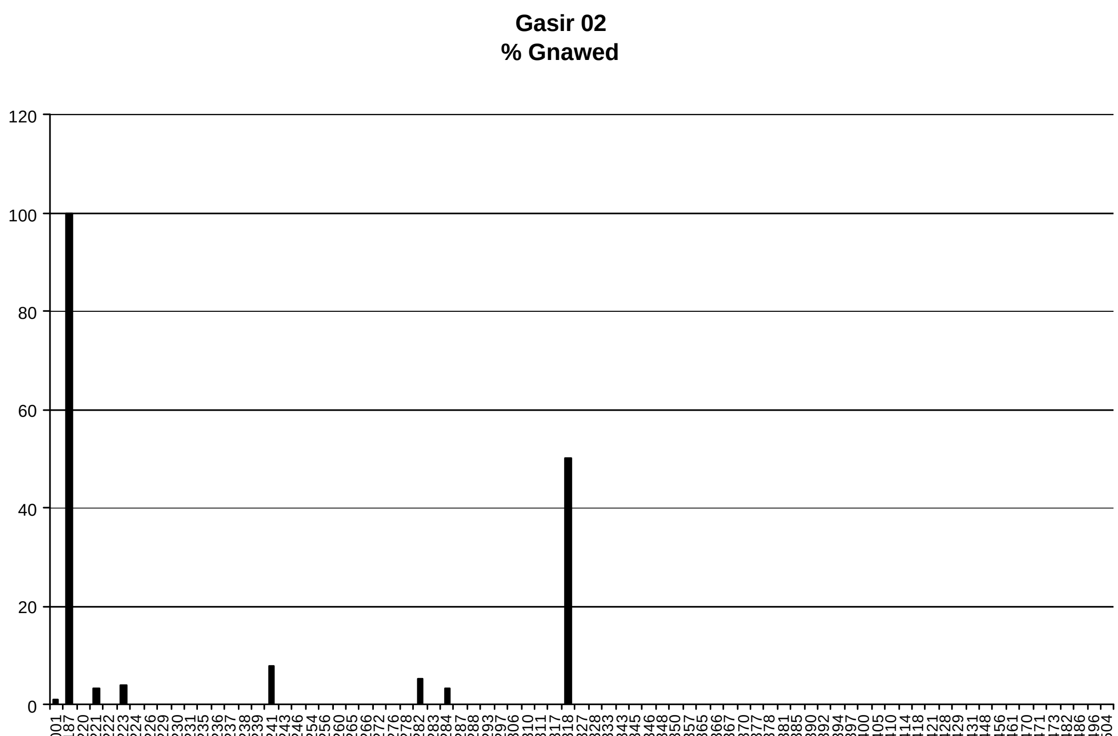


Figure 13 provides a comparison of the Gásir 2002 archaeofauna burning with Sveigakot and Tjarnargata 3c collections. The main contrast here is the near-absence of white calcined bone from the urbanizing collection- it appears that



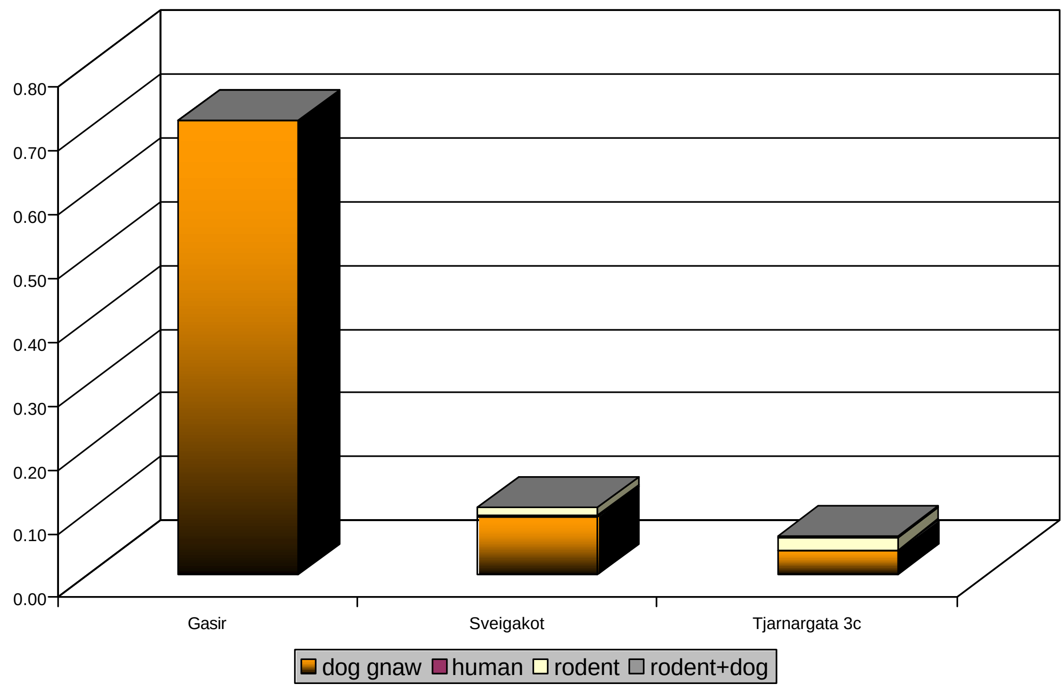
hearth cleaning debris was not deposited in this area. At present, the Gásir archaeofauna appears very rich in white burned bone, but this may reflect concentrations in a few contexts.

Gnawing: tooth marks of carnivores (almost certainly dogs in the Icelandic context), rodents, and occasionally humans are regularly found on bones in North Atlantic archaeofauna. Archaeofauna from Norse Greenland are by far the most gnawed, with up to 30 % of bones on some sites showing carnivore tooth marks (McGovern 1985). Icelandic bone collections are far less heavily marked by gnawing, though some bones from urbanizing Reykjavik show dog and rodent gnawing on the same bones (suggesting a multi-tiered scavenging hierarchy, Perdikaris et al 2001). The Gásir 2002 collection does show carnivore (presumably dog) gnawing, and the distribution by context is shown in figure 14.



Note that while few bones are gnawed, some contexts have a high percentage of gnawing. Did dogs have access to some areas but not others? Are some species' bones (and some skeletal elements) more likely than others to show gnaw marks? Figure 15 presents a comparison of gnawing frequency between Gásir 2002, Sveigakot, and Tjarnargata 3c. While the low numbers involved at present suggest some caution in interpretation, it can certainly be noted that dogs were a feature of life at medieval Gásir, and any heritage reconstructions should include canine occupants as well as humans.

Comparison of Gnawing Marks



Butchery Marks: Many bone elements show marks left by metal tools, and these reflect multiple and often overlapping patterns of damage left by the reduction of a whole slaughtered animal into dismembered cuts (rib racks, limbs, crania) which would be treated differently as they were cooked fresh or prepared for storage (usually by smoking or pickling) and then the marks left by meal preparation and consumption by diners. Medieval dining commonly involved the use of belt knives and the breaking of marrow bones at table, so many cut marks that accumulated on bone fragments were inflicted by diners as well as cooks and butchers. A complete study of butchery practices is a later project for the Gásir analysis, but some observations can be made at this point (Table 4).

Table 4	Gasir 2002			Butchery Marks			
Taxon	Chopping	Split	Biperf.	Drilled	Sliced	Impact	Multiple
Cattle	17	13			8	8	6
Sheep		7	1				
Caprine	2	28		4	4	10	2
Small Cetacean	1						
Medium Ter. Mam.		1			1		
Large Ter. Mam.	2				4		3

Chopping blows (from axe or cleaver) are usually associated with primary dismemberment, while slice marks from knife cuts are more likely to be associated with dining or cooking of meals. Impact fractures, splitting, and biperforation are all associated the extraction of bone marrow (usually by diners, sometimes by cooks). Biperforation (piercing both ends of a metapodial bone with a knife twist) is a specialized marrow extraction technique limited to the Northern Isles of Britain, parts of mainland Scotland, Faeroe (where it was rare) and medieval Iceland (see Bigelow 1984 for discussion). This technique (still practiced in rural Iceland) allows very efficient marrow extraction from caprine lower leg bones and retains these usefully shaped "cannon" bones intact for craft work and tool use (and by early modern times became associated with popular verses and magical implications). The technique leaves very distinctive zooarchaeological traces and was nearly universal all over Iceland by AD 1300. However it was not a technique known to the Viking Age Nordic colonizers as it has not been documented in Iceland prior to ca AD 1100, nor did it spread to Norse Greenland where the technique appears to have remained unknown down to the end of the settlements ca AD 1450-1500. It is also very rare or absent from Norwegian, German, or English collections of any time period. Outside the N Scotland-Faeroe-Iceland region, the older form of marrow extraction by splitting the caprine metapodial lengthwise (thus destroying its usefulness as a tool and often adding bone splinters to the marrow) remained the universal foodway.

Table 5 presents just the butchery data for caprine metapodials from the 2002 Gásir collection (including drilling to err on the safe side), documenting the overwhelming use of splitting rather than biperforation in marrow extraction. In an Icelandic farm site of the 14th-15th century one would expect to see these proportions reversed.

Table 5

Caprine Metapodials	NISP
Split	18
Biperforated or Drilled	4

Conclusions and Further Work

The 2002 archaeofauna from Gásir serves to demonstrate its considerable potential for zooarchaeological research in Iceland, and suggests a number of areas where zooarchaeology may usefully contribute to a better understanding of this complex site. While the current sample is but a beginning, we are already able to lay out some areas for productive further collaboration and to propose some broader questions for general consideration.

As noted above, close integration of the animal bone data (element representation, species present, taphonomic signatures) with the excavation program can aid in the interpretation of specific features and in some cases may aid in establishing sequences of use and abandonment. Fortunately modern software makes such contextual integration straightforward, and this will certainly increase as the project moves ahead.

Beyond the basic archaeological issues associated with indiviual contexts and phases, zooarchaeology can contribute to some of the larger questions concerning the role of Gásir in Iceland's history.

- **Provisioning**: How was the settlement at Gásir provided with food? As the site is not primarily a farm or fishing station, it needed to be supplied from outside sources. From historical data we can hypothesize many sources of supply, from dried fish to dairy produce- but the current bone sample suggests that cattle and sheep meat played a major role in provisioning the settlement. While it is unclear at the moment if cuts of meat were imported to Gásir, it is now certain that at least some animals were brought to the site whole and probably slaughtered nearby. The current lack of calf and lamb bones suggests that the settlement did not in fact constitute a normal dairy-oriented, wool producing late medieval Icelandic farm.
- **Integration with Rural Economy**: What impact did the specialized settlement at Gásir have on the rural economy of the surrounding area? How did the presence of relatively wealthy consumers affect the economic decision making of local farmers of different wealth and rank? Thus far the archaeofauna does not suggest that the site was being entirely provisioned with cast off by-products of the normal farming economy (very young animals and very old ones) but with older juvenile and young adult cattle and sheep. Further investigation of age profiles of animals brought to Gásir will be important, and the sampling of a contemporary farm midden in the same distirict would provide important comparative information.
- **Ethnicity and Foodways**: In many respects the Gásir archaeofauna is very atypical for late medieval Iceland: cattle consumption comparable to rich manors in the SW but without the strong marine component so evident in most later medieval Icelandic sites (though the presence of seal, whale, and fish bone is significant). In the details of butchery and consumption of animals are messages about foodways and ethnicity: does the butchery pattern of sheep at Gásir reflect the dining habits of native Icelandic or foreign consumers?
- **Seasonality**: If enough different seasonal indicators can be collected, it should be possible to contribute to discussions of seasonal vrs year round occupation. While the current sample is small, we may wonder if the shortage of new born calves and lambs (almost exclusively born in May) reflects an arrival of most of the occupants later in the summer?

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