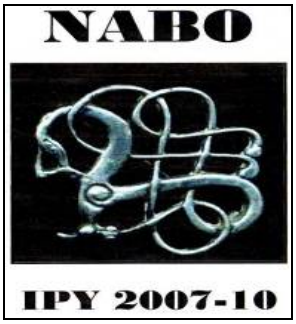

Preliminary Assessment of the faunal remains from the 2007 Midden Excavation in Eyri, Westfjords

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Summary

In 2007 area G of the Eyri site in Ísafjörður, NW Iceland was object of a midden assessment undertaken by the Archaeological Institute of Iceland. The midden mound in area G is associated with the farm mound at Eyri in downtown Ísafjörður. The farm mound was previously trenched for occupational layers in 2003 and 2004 (Taylor et al 2005), yielding an assortment of animal remains that were analyzed in 2005 (Krivogorskaya & McGovern 2005). Upon coring the midden mound to define its edges, assess its depth, and sample its contents, a large trench (15 m^2) was opened up to allow for open area excavation (Lucas 2003). Members of FSÍ and CUNY New York collaborated on the midden assessment. The 2007 midden excavation yielded a generous amount of animal bones, domestic and wild. Bone preservation ranges from good to excellent and the large fish proportion is slightly more varied than witnessed from roughly contemporaneous faunal collections (i.e. Harrison et al 2007, Hambrecht 2006). All the bone materials discussed in this preliminary report were from one context (1045). The total weight of this context's archaeofauna was more than 11 kg. This archaeofauna can be placed into the early modern period; it very likely stems from the 19th century, the last century of Eyri farm occupation, as was discussed in the excavation report for the test trenching at the Eyri farm mound (Taylor et al 2005).

This NORSEC Bone report uses zooarchaeological data from the analyzed faunal remains gathered during the 2007 midden excavation of the 19th century layers of a deeply stratified midden mound associated with the Eyri farm mound that may contain occupational deposits spanning a time from early modern to early medieval times. All the contexts in area G were either sieved or sampled in bulk for further analysis.

Laboratory Methods: The faunal analysis was carried out primarily at the Hunter College Bioarchaeology Laboratory, and to some extent at the Brooklyn College Zooarchaeology laboratory which is better equipped for fish bone analysis. Analysis was undertaken predominantly by CUNY PhD student Ramona Harrison, under the direction of Dr. Thomas McGovern (director of Hunter Bioarchaeology Lab) and Dr. Sophia Perdikaris (director of Brooklyn College Zooarchaeology Lab). Help in analyzing and recording was provided by several CUNY graduate students (PhD. and Masters Program), under constant supervision of R. Harrison who was also responsible for the digital record.
All measurements are based on von den Driesch (1976) unless noted otherwise, measurements taken with digital calipers to the mm. As is usual for the analysis of Icelandic bone materials, the NABONE recording package (version 8 2003) was template for data recording and manipulation (for more detailed information on NABONE, please contact nabo@voicenet.com).

Overview of Species Present

A Total Number of Fragments, or **TNF**, of 6,835 were counted, yielding a Number of Identified Species, or **NISP**, of 5,329. The overall preservation of context **1045** was very good; this is demonstrated by the relatively few unidentifiable elements than could not be included into the NISP category. Some of the bones were affected by taphonomic attrition (Lyman 1996), i.e. post-depositional deterioration factors leading to the break down of faunal materials. These deterioration factors were mainly exhibited in light erosion or exfoliation of some of the bones.

The species present include domestic cattle, sheep, horse, pig, seal, whale, walrus, rat, bird, and fish as well as mollusk remains (Perdikaris et al 2000). At 81 %, the **Fish** category is the most abundant, with ca. 30 % of the fish elements analyzed to family, in this case almost 95 % gadid (cod family). The identified gadidae were predominantly Cod, followed by a substantial amount of Ling and then Haddock, with occasional Saithe remains. The non-gadids were ray fishes, flat fishes, and Atlantic wolf fish.
From the gadid skeletal element distribution data, a pattern of fish management emerges, strongly suggesting the presence of prepared (headless) haddock. In contrast, the cod, ling, and total gadid skeletal element distribution indicate an elevated presence of cranial elements vs. axial elements. This could mean that cod and ling were prepared on-site to be consumed elsewhere. It is also possible that the fish heads were remains of on-site consumption. More analysis of the midden deposits as well as more data gathered from the farm mound could provide better information on the site's fish management. No fresh water fishes were found in the collection.

Despite a slightly lower number of elements in comparison with the mollusk category, the **Domestic mammal** remains can be safely placed into the second largest identified category with a NISP of 392. Cattle elements only make up about 12 percent of the domesticates, the majority of domestic animal bones (NISP of 343) was assigned to Caprines (Sheep/Goat).The only identifiable caprines were in fact sheep (NISP 13) with no discernible goat remains. The one horse bone analyzed from (1045) is a premolar. In 18th century Iceland it was not at all fashion to eat horse meat, unless for lack of any other food (Sveinsson 1962).
The **Mollusk** category is very numerous, but the NISP of 428 mollusk fragments are not all indicative of individual shells. Despite the somewhat inflated number, there were a good amount of whole valve portions and about half of all shell fragments came in a size large enough to account for at least half of a valve, or shell element. Clams constitute 96% of this category.

The **Bird** remains could be assigned to predominantly Auk family, with 61 % comprised by Uria species (Murre/Guillemot).
The one walrus element found in the collection is likely part of a maxilla. One rat mandible was also found in (1045). There were no dog, fox, or pig elements found from this unit.

Butchery patterns are dominated by chop marks (figure 11), many of the bones are also knife-cut and some long bones split. Bi-perforation was only found in two caprine (Sheep/Goat) metapodials. One of the chopping marks was found on a gadid vomer element (part of skull).
There were several bone fragments, mostly long bones that seemed to have polished surfaces. It is not obvious in most of these elements that the polish could be from handling of the bone (fig 9); one thought is that cooking may have altered the bone exteriors.

Overview of Species Present

Table 1 presents the Eyri 2007 archaeofauna as a Total Count and also the Percentage of the NISP. **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. **UNI** or unidentifiable bone fragments simply indicate the existing degree of erosion.

NISP Table Eyri 07 Area G Taxon	NISP	% of NISP
Domestic Mammals		
Cow (*Bos Taurus* L.)	84	1,58
Horse *(Equus caballus* dom L.)	1	0,02
Sheep (*Ovis aries* dom L)	13	0,24
Caprine	330	6,19
total Caprine	343	6,44
total Domestic	392	7,36
Seals		
Harbour Seal (*Phoca vitulina*)	1	0,02
Harp Seal (*Phoca groenlandica*)	2	0,04
Seal species	57	1,07
total Seal	60	1,13

Cetacea		
Small whale/porpoise	1	0,02
total Cetacea	1	0,02
Other Mammals		
Walrus (*Odobenus rosmarus*)	1	0,02
Rat (Rattus sp.)	1	0,02
total Other Mammals	2	0,04
Birds		
Auk family (*Alcidae* sp.)	15	0,28
Duck family (*Anatidae* sp.)	1	0,02
Eider duck (*Somateria molissima*)	1	0,02
Guillemot family (*Uria* sp.)	30	0,56
Razorbill (*Alca torda*)	4	0,08
Bird species indeterminate	77	1,44
total Bird species	128	2,40
Fish		
Cod (*Gadus morhua*)	238	4,47
Haddock (*Melanogrammus aeglefinus*)	93	1,75
Common Ling (Molva molva)	119	2,23
Saithe (*Pollachius virens*)	9	0,17
Gadid sp	604	11,33
Flat fishes (*Pleuronectiformes*)	15	0,28
Ray fishes (*Rajidae*)	30	0,56
Wolfish (*Anarchichas lupus*)	18	0,34
total Fish species identified	1126	21,13
Fish species indeterminate	3193	59,92
Total Fish species	4319	81,05
Mollusca		
Common Periwinkle (*Littorina lit*.)	1	0,02
Clam (*Mya* sp.)	54	1,01
Common Whelk (*Buccinum undatum*)	1	
Molluska Species	372	6,98
total Mollusca Species	428	8,03

total NISP	5329	100,00
Large Terrestr. Mammal	61	
Medium Terrestr. Mammal	596	
Unidentified Mammal Frag.	826	
Unidentified Marine Mammal	23	
total TNF	6835	

Table 1 – The Eyri 07 archaeofauna

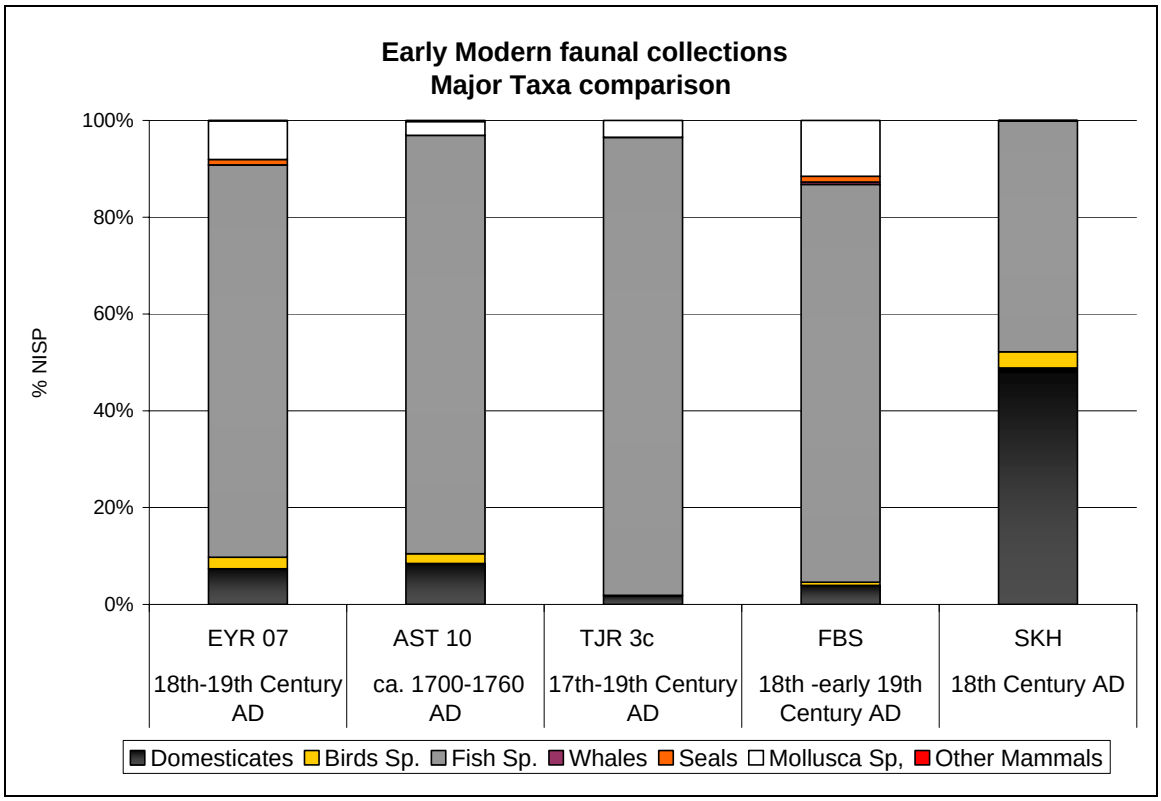

Figure 1 - Comparison of Early Modern Icelandic faunal collections.

Figure 1 demonstrates the abundance of fish remains found in all but one of the early modern archaeofaunal collections used for the graph: the coastal farm at Eyri (EYR 07) in Isafjörður, Aðalstræti 10 (AST 10), a household site in 18th century downtown Reykjavík, midden deposits from neighboring Tjarnargata (TJR 3c) (Perdikaris et al

2000, Pálsdóttir *in press*), the farm at Finnbogastaðir in the Westfjords that had fishing rights attached to it (Edvardsson et al 2004), the very high status southern episcopal farm at Skálholt (SKH) (Hambrecht 2008), Arnessyslá. The Tjarnargata midden may contain deposits from several households and local shops and factories (Perdikaris et al 2000), thus differing from the other comparative collections that are all associated with single farmsteads or households.
While Eyri and Aðalstræti 10 Domesticates, Birds, and Fish distributions are quite similar, the relatively high amount of mollusks makes Finnbogastaðir farm faunal distribution percentage a very close match to the Eyri midden context (1045).

Domestic Mammals

Table 2 presents the relative percentage of the Eyri domestic mammals from context (1045). The total ratio of cattle vs. caprine bone is 1:7; very different from SKH's 1:1 ratio (Hambrecht data from access database 2008), but similar to the one from AST 10 that lists 1 cow per 8 caprines (Harrison et al 2008).

Eyri 07 Area G Major Domesticates	NISP	% of NISP
Bos taurus – Cattle	48	12,24
Equus caballus dom - Horse	1	0,26
Ovis aries dom – Sheep	13	3,32
Caprine - Sheep/Goat indet.	330	84,18
Total	392	100

Table 2 – Major Domesticate Mammal Categories

Figure 2 shows the various collections from the same Early Medieval sites described earlier. As with the overall species distribution, the Finnbogastaðir and Aðalstræti 10 early modern faunal data is similar in domesticate proportions to the one from Eyri 07 with exception of the presence of pig skeletal remains at Aðalstræti 10. It is possible that the two archaeofaunas from the Westfjords show a difference of domestic animal husbandry in the NW of Iceland vs. the S of Iceland in the early modern period.

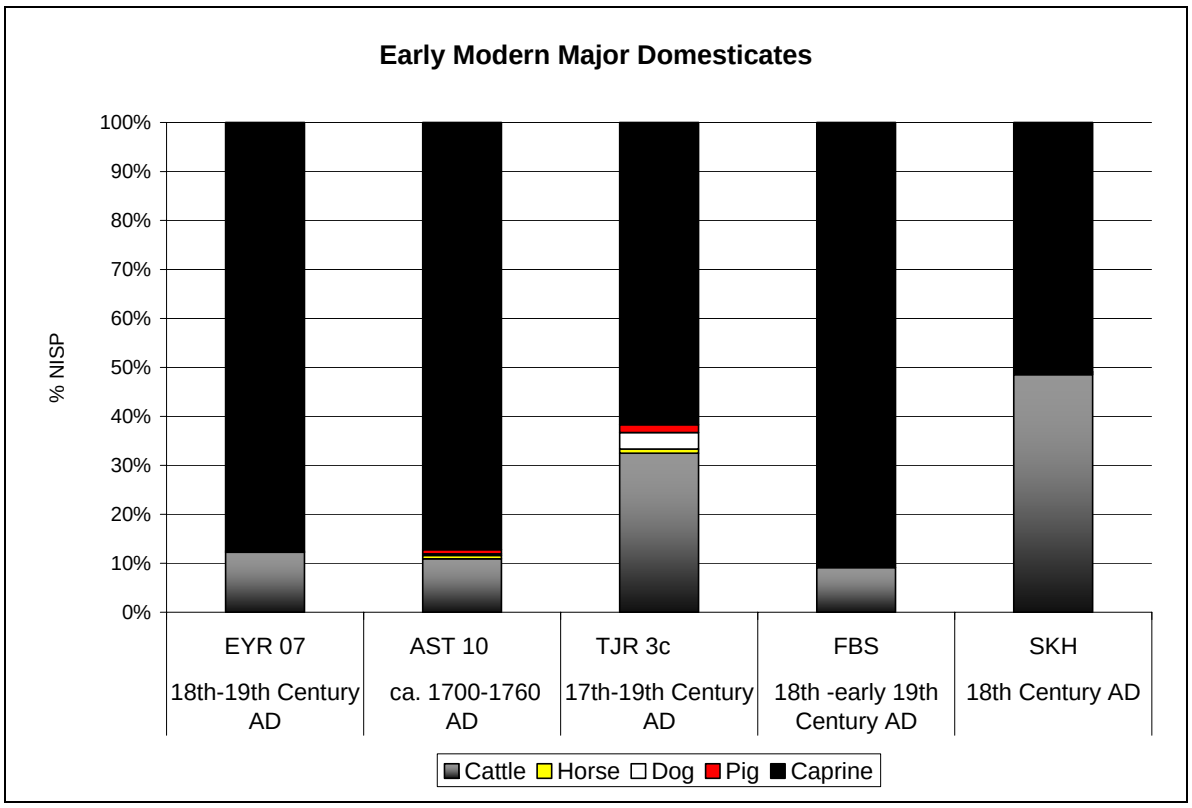

Figure 2 – Comparison of Early Modern Icelandic Archaeofauna

Cattle

The small number of bovid remains (48 NISP) does not really allow for reconstructive analysis of the animals' age at time of death, often indicative of the domesticate husbandry in place. About 27 % of the bovid category is elements assigned to neonatal age, suggesting the "dairy profile" normally found on Icelandic sites of all periods. Element distribution analysis for cattle bones will have to await processing of a larger sample size to provide valid results.

Caprines

The low numbers of analyzed Sheep/Goat Mandibular elements from context (1045) do not allow for tooth eruption analysis. There were a number of elements that could be utilized for long bone fusion assessments (Reitz and Wing, 1999), although the very limited number of long bone fragments with fusion indicators prevents a really dependable statement about on-site management of caprines.

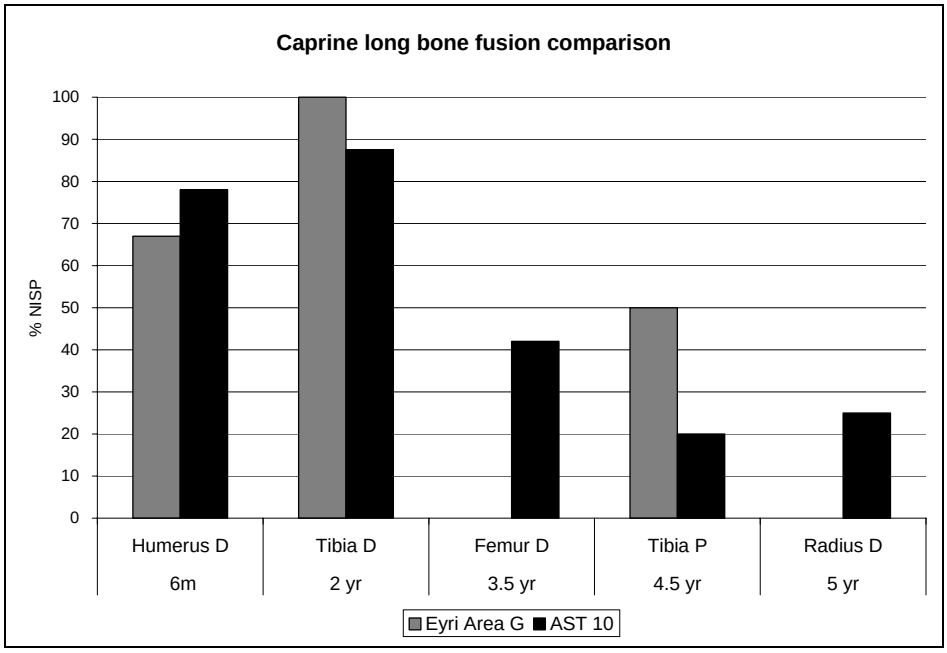

Figure 3 – Caprine long bone fusion comparison

Figure 3 displays a comparison of caprine long bone fusion patterns from Aðalstræti 10 and Eyri area G. At Aðalstræti, most caprines seem to survive past their 2nd year, with some sheep/goats reaching a relatively old age of 5 years. It seems that AST gets provisioned with relatively older mature animals, maybe some very old and no longer of use in dairy or wool production and thus sold for meat value (Harrison et al, 2008).
Aðalstræti further seems be supplied with cuts of mutton rather than raising its own sheep or goats. The caprine long bones from Eyri analyzed to date indicate that Sheep/Goats were culled between 2 and 3 ½ years or between 4½ and 5 years of age. More long bone data is necessary to make a more definite statement on the Eyri caprines' age at death.

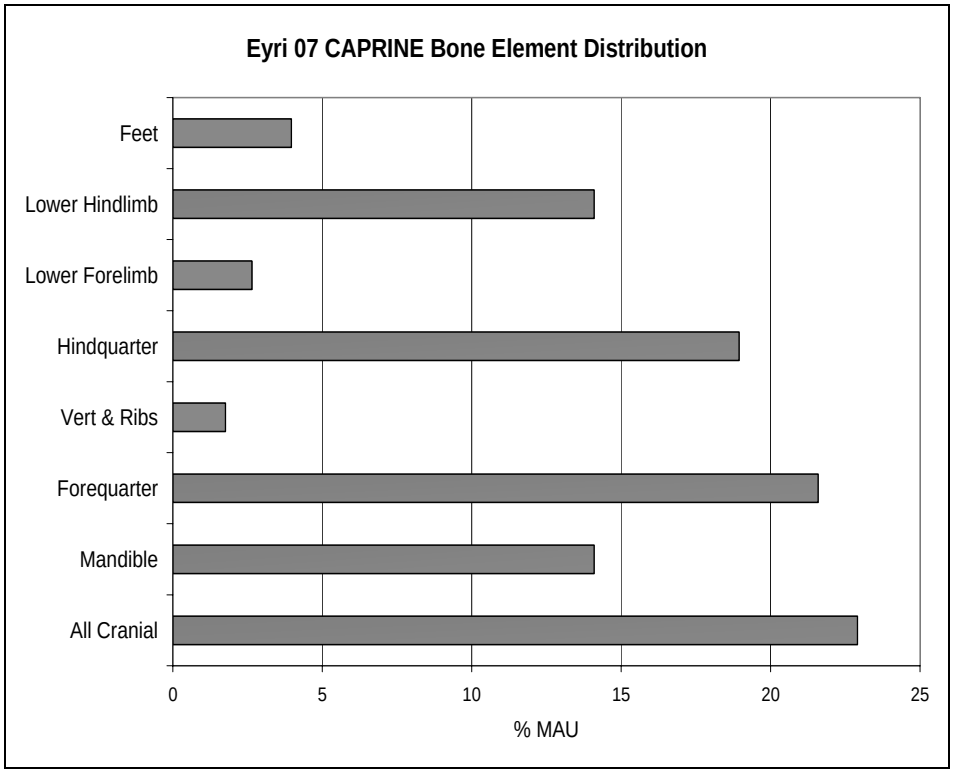

Figure 4 – Caprine Bone Element Distribution pattern

The caprine skeletal elements in context (1045) more or less represent whole animals, with limbs and cranial elements all well represented. This probably means that the farm's stock was used for consumption and that butchery and consumption probably took place on site. A relatively low amount of vertebral and rib elements is due to the same analytical methods applied as for these specific bovid skeletal elements. These elements were placed in the MTM category to prevent confusion with other medium-sized terrestrial mammals such as pig, large dog, deer (Nabone 8, 2003).

Horse

The one horse bone analyzed from context (1045) was a premolar and probably does not reflect horse meat consumption at early modern Eyri.

Pigs

The Eyri midden has not revealed any pig elements to date, but further analysis will show whether this species was present at the farm. Pigs were very rarely kept in early modern Iceland, but a few pig bones from what may be imported hams do appear in some contexts in other early modern sites (Perdikaris et al. 2000).

Dogs

No dog bones from the Eyri 07 archaeofauna have been recovered, but dog presence is apparent from the 25 elements displaying chewing marks. About 88 % of the chewing was done by dog canines on ribs, skull fragments, and long bones. There seems to be no preference in species or elements for the dogs; the gnaw marks are found on bones from all analyzed taxa.

Wild Mammals

The few wild mammals from Eyri area G so far are all marine mammals and one rat species. The identifiable marine mammals were largely analyzed as seal species. Seal meat may have been very important in the west and north in early modern Iceland (Kristjánsson, 1981:315, figure no. 157). The only seal elements that enable species identification were three mandibles (fig. 5); one was from a Harbour seal and two from the ice-riding Harp seal, not indigenous but sometime visitor to Iceland. One maxillary element was analyzed to be from walrus, but no ivory extraction could be demonstrated. The small cetacean rib, possibly a porpoise, shows chopping and knife marks and was very likely part of a meal. One rat mandible has not been identified to species level

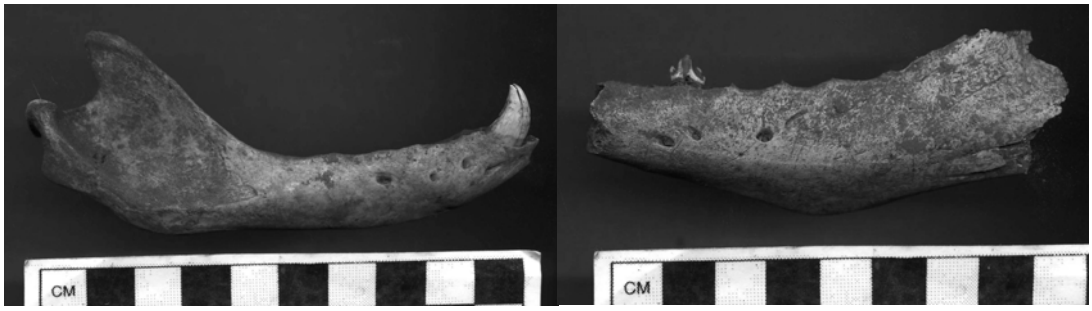

Figure 5 – Left: right mandible of a Harbour Seal (Phoca vitulina. Right: left mandible of Harp Seal (Phoca groenlandica.)

Birds

Of the 128 bird bone elements found at Eyri, 51 could be assigned either to family or species level. Table three lists the bird remains according to larger groups that indicate similar environments or behavior.

Eyri 07 Bird species					
	Scientific Names	English Common Names			
Sea Birds			NISP	% of total	% of family
	Auks (Alcidae)				
	Alcidae species	Auk Family	15	29	31
	Alca torda	Razorbill	4	8	8
	Uria species	Murre/Guillemot	30	59	61
	total Alcidae		49	96	100
	Other waterfowl				
	Anas species	Duck Family	1	2	50
	Somateria molissima	Eider Duck	1	2	50
	total identified bird species		51	100	100

Table 3 – Breakdown of Eyri 07 Bird species

The bird category is made up mostly of elements belonging to the auk family. Since Murre (*Uria lomvia*) and Guillemot (*Uria aalge*) can be distinguished on only a few elements the bones of these two species are lumped into an Uria sp. category here, and many of the fragments in the Auk family category are also probably from these two species. Auks clearly dominate the avian part of this archaeofauna, with a few duck bones suggesting occasional hunting of other species.

Mollusks

The 56 speciated mollusks at Eyri are mostly clams (Mya species), as well as one Common Periwinkle snail (*Littorina littorae*) and one Common Whelk (*Buccinum undatum*). While many mollusks were fragmented, the 428 shell fragments without doubt

indicate their importance as proportion of Eyri faunal remains. It remains unclear if these shell fragments should be seen as human food refuse, bait preparation, or a combination.

Fish

Eyri 07 Fish				
Scientific Names	***English Common Names***	NISP Count	% all ID Fish	% of Family
Gadus morhua	Atlantic cod	238	21,14	51,85
Pollachius virens	Saithe	9	0,80	1,96
Melanogramus aeglefinus	Haddock	93	8,26	20,26
Molva molva	Common Ling	119	10,57	25,93
Gadidae, sp. Indet.	Gadid family	604	53,64	
Rajidae	Ray fishes	30		
Pleuronectidae sp.	Flat fishes	15	1,33	
Anarchichas lupus	Wolfish	18	1,60	

Table 4 –Eyri 07 Fish analyzed to family or species level

With a total number of 4,319, fish bone elements make up the largest animal group in the Eyri 2007 collection. This large number of fish elements fragmented beyond speciation could be partially caused by the use of fish hammers (Harrison, 2006) suggests consumption of a large amount of dried fish products as well as fresh caught fish (Perdikaris & McGovern, 2003). The total number of fish bone that could be identified to family or species level is 1,126. Although the majority of the analyzed Eyri fish were gadidae, some ray fishes, flat fishes, and elements of wolf fish (*Anarchichas lupus*) add more variety. No salmonids or other fish family were present in the archaeofauna. The Eyri 07 gadids are dominated by Atlantic Cod (*Gadus morhua*) and Common Ling (*Molva molva*), with Haddock (*Melanogrammus aeglefinus*) a close third. The Haddock skeletal remains indicate consumption rather than preparation of this particular species (see fig. 6 and 7), whereas the Cod, Ling, and total Gadid skeletal distribution patterns imply at least on-site processing of fresh fish. There is not yet enough of a distinct pattern to indicate that the area G gadids were used for commercial preparation, but further analysis may shed better light on the issue.

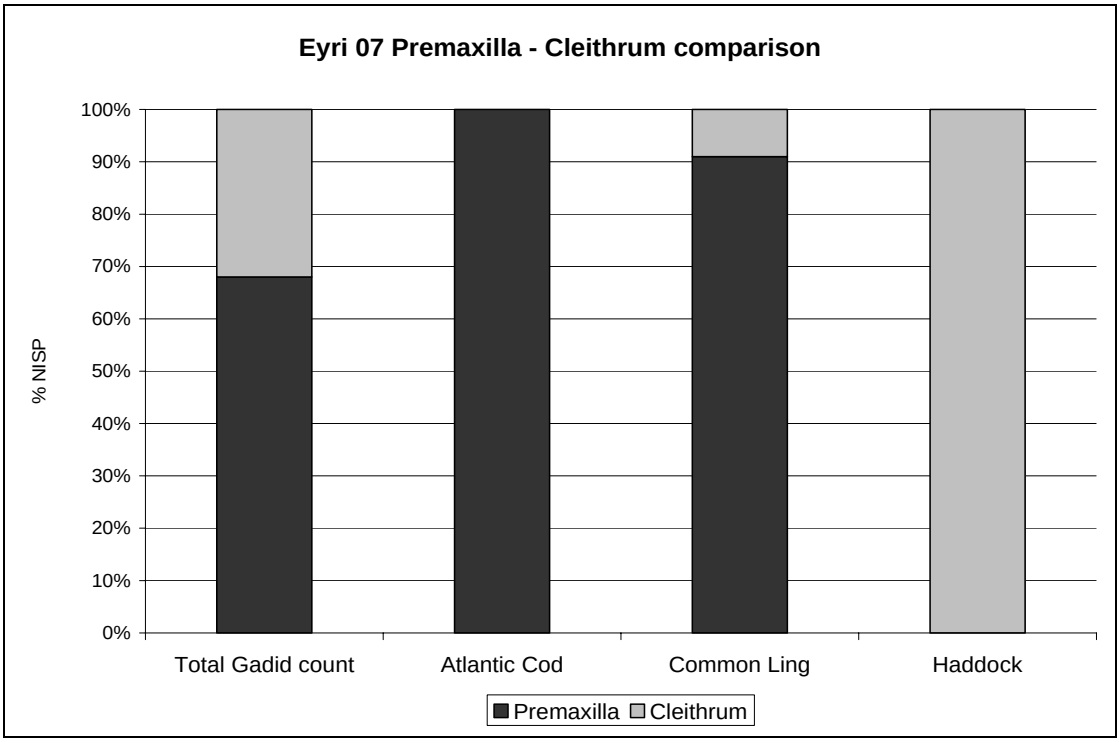

Figure 5 – Eyri 07, Premaxilla vs. Cleithrum ratios.

Figure 5 displays the presence or absence of two fish body parts that are quite dense, equally identifiable to species level and which are normally associated with portions of the fish usually discarded near the landing point (heads with premaxillae) or left in fish bodies prepared for later consumption by drying or salting (cliethra). These two elements (found in equal proportions in a whole fish) are thus good proxies for the proportionate presence of skeletal regions and have been used to reconstruct fish processing and consumption (Krivogorskaya, 2005). The Premaxilla is an element found in the skull region and is often associated with discarded remains of fish processing. The Cleithrum is found in the pectoral region, the area in the fish skeleton that connects the head with the body (or tail). For these two elements to be successful as proxy indicators, they have to be found in numbers high enough to represent commercial production or consumption signatures (Perdikaris, 1999).

The Eyri 07 Premaxilla vs. Cleithrum ratios for the lumped total gadid and Haddock categories differ from the cod and ling categories: less than 10% of Cleithrum elements were found in the ling collection, while there were no cleithra present among the cod remains. The haddock cleithra on the other hand made up 100% of these two comparative elements, while the total gadid graph may be most accurately displaying the presence of cleithra as at least 30% across this fish family: Haddock cleithra are very thick and thus much more durable and also easier to distinguish from those of other gadids. Preservation

may be a factor that renders the cod and ling cleithra less discernable and thus they may lumped into the gadid category rather than analyzed to exact species level due to a relatively high potential for incorrect analysis of smaller, often less distinctive skeletal fragments. The graph below (figure 6) shows gadid skeletal element distributions grouped into various fish body regions.

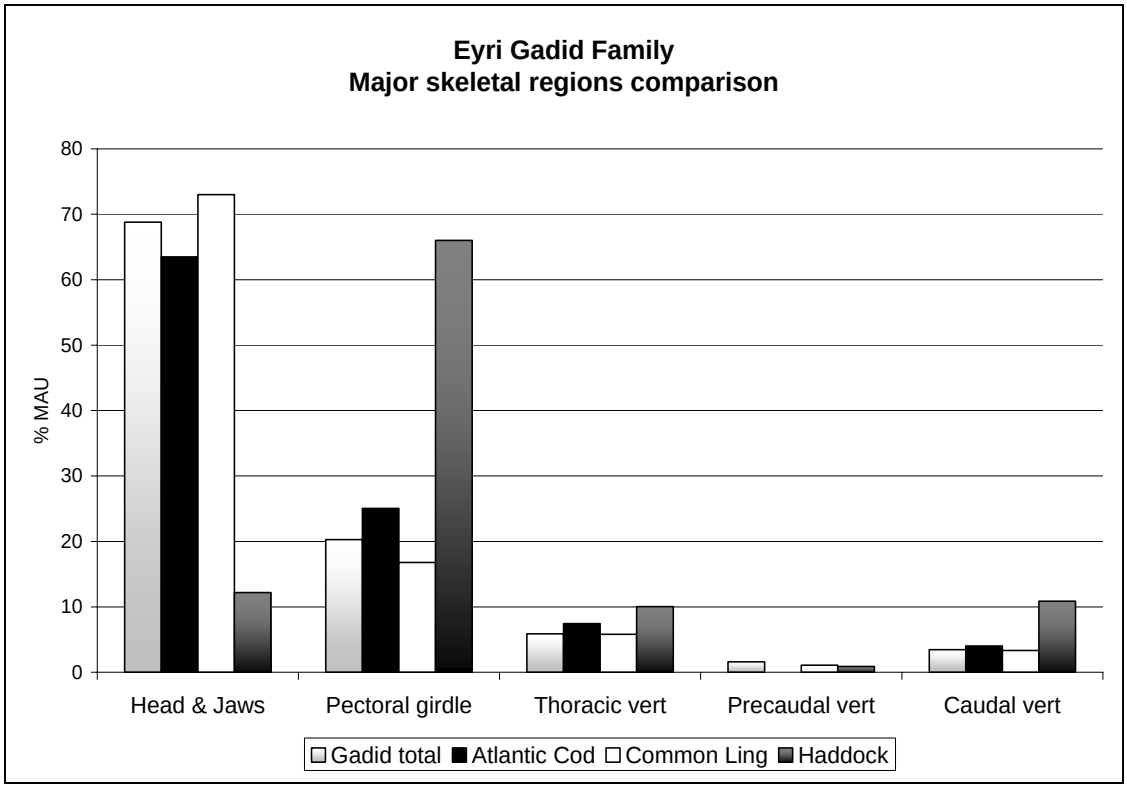

Figure 7 – Eyri Gadid Family, comparison of major fish skeletal regions

While the Haddock elements seem to support the premaxilla: cleithrum ratio suggested in Figure 6, the all gadid category distribution pattern slightly differs from the one indicated by just Premaxilla vs. Cleithrum elements. This overall skeletal element distribution pattern serves to emphasize a major difference between Haddock bone deposition and that of Cod or Ling. While the Cod & Ling pattern appears to represent significant processing for export (missing bodies), the Haddock skeletal element pattern appears to represent on site consumption of some fresh caught and many preserved Haddock. This pattern may reflect a widespread Icelandic pattern of consuming fresh or preserved Haddock locally while exporting processed cod. The ling elements, more than any of the others analyzed to fish species or family seem to indicate on-site fish butchery (for more information on early modern ling fisheries see Poulssen et al 2007). As already

mentioned, large sample sizes and a wider excavation area are desirable for a fuller assessment of commercial / subsistence fish processing at the farm.

Butchery and processing

Figure 8 indicates that ore than 60 % of the butchered animal bones were chopped. About 24 percent of the elements in the butchery category showed knife marks, while about 5 percent of the elements that fall into this category showed knife and chopping marks. The knife marks on the bones are consumption indicators rather than butchery evidence. The few bones displaying bi-perforation are caprine metapodials and were perforated for marrow consumption. Making a small hole into the top and bottom of the long allows for further working of the still complete bone after marrow has been sucked out of it (Bigelow, 1995). Most of the split bones were also metapodials that were used for marrow consumption, but not in the traditional Icelandic way (see Harrison 2006 for discussion).

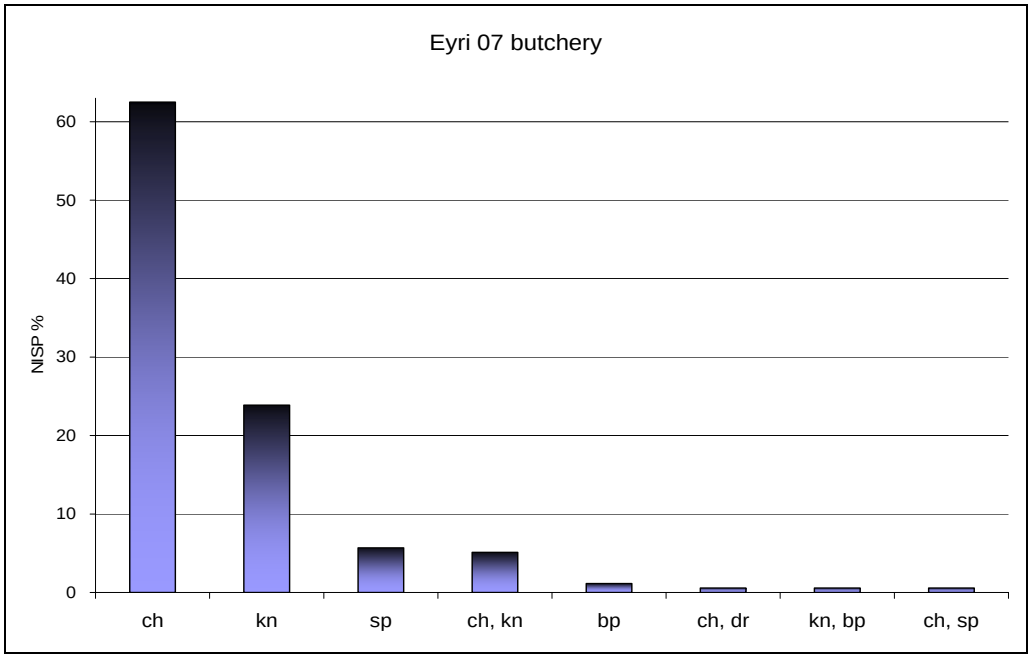

Figure 8 – Butchery marks

Table 5 displays the burnt bone portion of the archaeofauna. Almost 99 % of the faunal remains were not burnt. The white burnt bones are the ones that are reduced to calcine only, white all the organic parts of the body gone. Often, a good portion of midden remains displays this calcination, as indicator of garbage disposal through fire (Edvardsson, 2005). Since there is very little burnt bone in the Eyri 07, the methods of food refuse disposal were different from earlier sites.

Table 5	*Eyri 07 Burnt Bones*	
Burning level	***Count***	***% burnt***
Not Burnt	***6,758***	***98,87***
Burnt – black	***27***	***0,40***
Scorched	***12***	***0,18***
Burnt – white	***38***	***0,56***

Table 5 – Burnt Bones vs. non-burnt bones

Sixteen bone fragments were noted for their very smooth bone surfaces. On thought is that these elements are from very old animals. Alternatively, certain cooking methods could have altered the exterior bone surface. Some were potentially pre-form artifacts, but others could not be determined as such.

Figure 9 – Radius with very smooth areas

Conclusions

Since this is a report of the zooarchaeological analysis of only the largest context [1045] of the 2007 Eyri Midden (Area G) excavation, any conclusions drawn must be seen as preliminary. The large number of well preserved faunal remains can tell us that the midden mound was indeed associated with a working farm, and not a specialized fishing station or trading post (see Krivogorskaya & McGovern 2005). Some species and skeletal elements were clearly associated with food consumption activities, such as the caprine metapodials that were split or drilled, or the very young cattle bones that may indicate a milking economy in place at Eyri farm.

The fish and bird species analyzed from Eyri indicate local consumption, and the few elements of walrus and harp seals may be climate indicators reflecting recurring sea ice or just chance visitors to the Icelandic Westfjords. The pattern of fish species and

element distribution is suggestive of a mix of commercial production and local subsistence consumption, but more work is needed in this area. Continued excavation and analysis of faunal deposits from the Eyri midden can allow for more secure conclusions about the farm's economic and consumption patterns and also about potential changes of animal management and farming as well as fishing strategies over time. Further excavation can unearth the deeper and presumably older layers that will shed light on earlier periods of farming activities at Eyri farm and may enable and enhance a more regionally focused Isafjörður/Vestfirðir study on exchange and consumption strategies over time.

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