

**FAUNAL ANALYSIS OF THE EARLY MODERN BISHOP'S
FARM AT SKÁLHOLT, ARNESSYSLA ICELAND**

By

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A dissertation submitted to the Graduate Faculty in Anthropology in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York.

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This manuscript has been read and accepted for the Graduate Faculty in Anthropology in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

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Abstract

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This dissertation presents the analysis of faunal material recovered from middens outside the main complex of the Bishop of Southern Iceland's Cathedral farm at Skálholt, Arnessysla, Iceland. Issues of diet, deposition patterns, as well as participation in larger trade and intellectual networks addressed. All of these issues are examined in order to investigate larger issues centered around the early modern Atlantic world. The Skálholt material is also compared with the larger body of existing early modern Icelandic archaeofaunal data in order to investigate issues of adaptation and resilience in the face of harsh climatic as well as social and economic conditions.

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Chapter 1 - Introduction

The archaeology of the early modern period in Iceland and especially the Skálholt project are uniquely positioned to help investigate the problem of modernity. Most scholars agree that after the discovery of the Americas and the later ‘revolutions’ (agricultural, scientific, military, ideological, commercial, and finally industrial) of the 16th through 19th century human societies across the globe developed into something dramatically different and created what Pomeranz (2001) has called “the great divergence” that for a time placed European societies and nations in a privileged global position (Marks 2007; Richards 2006; Abu-Lughod 1991). In Europe and the Americas these developments are seen as a dramatic break from the medieval period and are often given the generally undefined (at least in archaeological terms) label of modernity. Through the zooarchaeological analysis of middens excavated at the Bishop of Southern Iceland’s cathedral farm, Skálholt, this thesis will engage with the varying agendas of historical/post-medieval archaeology in the North Atlantic. Iceland and the site of Skálholt lack many of the elements of the classic historical archaeological narrative around modernity, i.e. sponsored colonization, culture contact with indigenous peoples, slavery, and urbanization (Orser 1996). Iceland was not colonized during the early modern period; it was an early medieval colony. There was no culture contact with any radically different indigenous society; Iceland was uninhabited when the first early medieval colonists arrived in the 9th century. Though there was slavery in the earliest settlement period there was no slave system involving large numbers of forcibly imported labor during the early modern period. There were strong links between and commonalities with the rest of the European and neo-European colonies throughout the

Atlantic world but it is hoped that investigating some of the larger themes of historical archaeology in the absence of many of the classic narratives might reveal more about the nature of modernity and the utility of the term itself.

Though historical work will be used to support the arguments of this thesis the primary arguments will be focused on the faunal assemblage. It is hoped that this will supply a good example of an investigation of the concept of modernity based primarily on the archaeological data. Historical archaeology has at its disposal large numbers of primary and secondary historical sources that complement the archaeological record yet this can be as much of a disadvantage to the discipline of archaeology as an advantage. Material culture, whether in the form of artifacts, animal bones or anthropogenic landscapes tell stories that documents cannot. This thesis will attempt to keep the zooarchaeology of the site at the center of discussion at all times and thus help the larger archaeological effort of examining human history through the non-literary sources available to us.

This thesis is based on the midden excavations that took place outside the central complex at Skálholt, Arnessylá, southern Iceland during the summer excavations from 2004 through 2006. Analysis from the central complex itself is still ongoing. This thesis is taking on questions of general economic patterning rather than room patterning, which will be addressed as part of the general site monograph. The great majority of this midden material also has the added advantage of having been excavated by the author so issues of taphonomy, phasing etc. can be addressed with great familiarity, while the phasing and analysis of the structural excavations is still underway. These middens produced large numbers of well preserved bones in well

phased stratigraphy. Total number of fragments (TNF) taken out of these middens was 50,928. The total number of identified specimens (NISP) was 6,232.

Structure of this Thesis

After this introduction there will be a discussion of the historical context of early modern Iceland. Environmental data as well as the historical context of Iceland in the early modern North Atlantic will be discussed. Skálholt's place in Iceland during the period will also be addressed as well as a number of theories centered on issues of resilience and survival in early modern Iceland.

Following the historical context chapter will be a discussion of three theoretical approaches used throughout the analysis of the midden materials. Historical archaeological theory as well as historical ecological and Atlantic History theory will be discussed towards their relevance and utility in relation to the zooarchaeological assemblages from Skálholt.

The data will then be presented by group with an initial discussion of phasing.

Following this section will be a discussion of the patterns revealed by the data. Issues of subsistence and the origin of these particular middens will be addressed. Signs of ideological and non-subsistence issues will be discussed, specifically a group of potentially unique cattle found in unit 454 that has generated a number of interesting questions.

Finally the data will be compared to a number of other early modern assemblages in Iceland.

The Site and the Excavation

Skálholt (see figure 1) was one of two Episcopal sees in Iceland from sometime in the late 11th to early 12th century to its dissolution in the late 18th century. It was one of the central places in Iceland in terms of culture and political power throughout its history. The recent excavations (2002-2007) lead by Gavin Lucas and Mjöll Snæsdóttir of Fornleifastofnun Islands (The Archaeological Institute of Iceland) concentrated on the central structures of the cathedral farm from the early 17th century to the early 20th century. The Episcopal see was moved to Reykjavik after being severely damaged by an earthquake in 1784. After this Skálholt remained inhabited but as a relatively prosperous farm instead of the major episcopal complex it had been before the earthquake. The bulk of the faunal materials recovered during excavation come from the period between the middle of the 17th century and 1784.

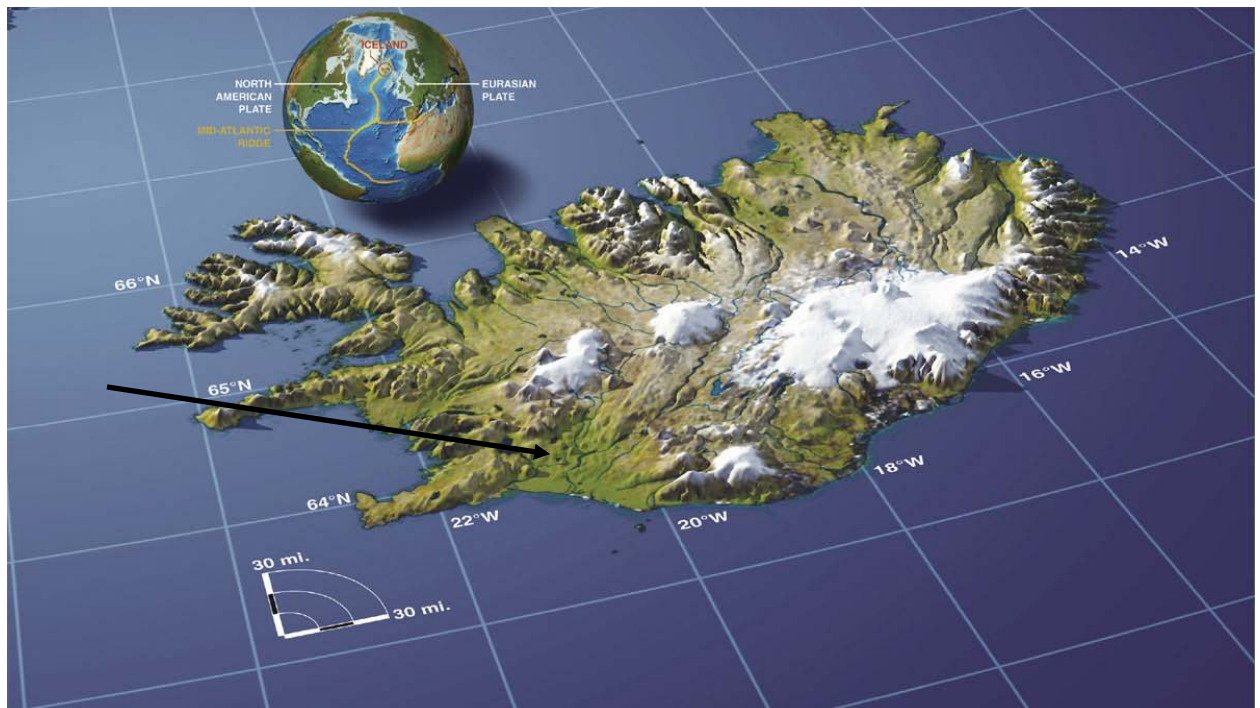


Figure 1 - Map of Iceland showing its location in the North Atlantic as well as the location of Skálholt.

Iceland was settled at the end of the 9th century. This settlement period is increasingly being understood as an intensive and rapid process that relatively quickly,

within a century, saw Norse, and some Celtic, settlers establishing farms along the coast as well as the arable parts of the interior of the island. Farming in Iceland from settlement to the present day was largely based on animal husbandry, and after the Settlement Period, was overwhelmingly concentrated on the raising of sheep and to a lesser extent cattle. Iceland was not a colony established, or even sponsored by a particular royal authority. It stayed independent until the year 1262 when, after a long and nasty civil war between rival Icelandic clans, the Norwegian King took control over the island. Iceland became a Danish possession in 1536 when the Danish government declared the Kingdom of Norway to be a Danish province. Before this it had been a separate kingdom whose crown was unified with Denmark, and for a time Sweden under the Union of Kalmar. The reformation arrived in Iceland when the Danish king Christian III declared himself and his kingdom to be Lutheran. The Bishop of Hólar in the north, resisted. This last Catholic bishop of Hólar was beheaded at Skálholt, where the Bishop had become Lutheran, along with his two sons. The early modern period was on the whole a very tough one for Iceland. Disease, economic stagnation, volcanic eruptions and earthquakes, cold and unpredictable weather conditions, even a few slaving raids by the Barbary States all contributed to a fair share of misery for Iceland from 1500 to 1800. The 19th century did see some economic liberalization, the beginnings of some large scale industrial fishing efforts and a slow increase in the population. Iceland gained rights of self-governance from Denmark in the early 20th century and paved the way for eventual independence from Denmark in 1944, while Denmark was still under German occupation. Since independence Iceland has grown at a remarkable pace becoming by the end of the 20th century a country with one of the

highest qualities of life on the planet. The current economic crisis has hit Iceland extremely hard but it remains an ultimately successful modern Scandinavian country with an excellent quality of life

Iceland during the early modern period and in fact for most of its history was a society made up for the most part of small farms with no cities or towns. There were seasonal trading posts on the coasts as well as seasonal fishing stations. Skálholt with its large complex containing the cathedral, the bishop's quarters and the extensive infrastructure associated with this, as well as a boy's school from at least the 16th century on was one of the largest population centers in Iceland until the founding of Reykjavik in the late 18th century. Skálholt was also in its own right a large and, again relative to Iceland, prosperous farm. The Bishopric of Skálholt owned a wide ranging network of farms throughout Iceland (though mostly in the southern district immediately around Skálholt). The Bishopric also had fishing stations as well as a variety of rights over different terrestrial and maritime resources throughout Iceland. Skálholt was one of the wealthiest places in early modern Iceland and its year round population was most likely above one hundred persons, which for Iceland at this time was unusually large.



Figure 2 - The 1587 map of Iceland published by Abraham Ortelius based on the map of Bishop Guðbrandur Þorláksson of Holár, Iceland.

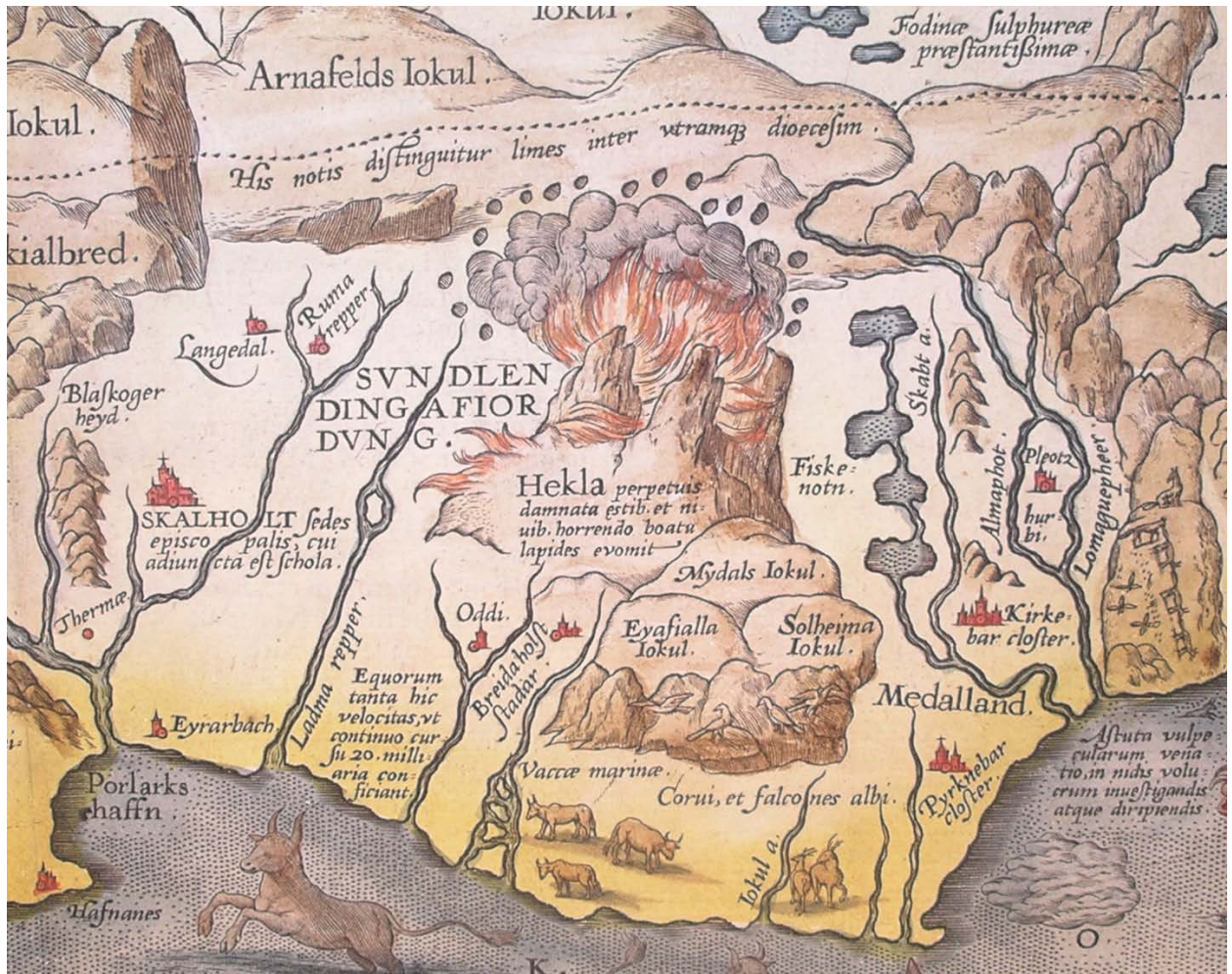


Figure 3 - Detail from the Ortelius map of Iceland showing Skálholt. Interestingly it is quite difficult to find a contemporary map of the whole of Iceland that shows the location of Skálholt.

Skálholt was an exceptional place in Iceland in terms of wealth, influence, and size. It is certainly not a site that can be used to try to understand the specific conditions of how the majority of Icelanders lived during the early modern period. On the other hand it does offer an excellent example of the conditions of a wealthy Icelandic settlement during this same period. This will be especially useful in comparison to other more humble and typical assemblages. The whole spectrum of wealth of early modern Iceland needs to be understood in order to understand any one part.

Contributions to Early Modern History and Archaeology

Historical Archaeology in Iceland has generally been neglected in favor of the more nationalistically potent Settlement and Commonwealth Periods. The ‘Viking Age’ in Iceland is also the founding settlement age for Iceland. Alongside the obvious allure of investigating the origins of the Icelandic nation through the examination of the Settlement Period there is also the powerful pull of the literary sources that though produced long after the Settlement Period, purport to tell the story of the settlement of Iceland. The lure of the investigation of national origins, a process familiar to all nations in the modern world, combined with the amount and quality of the medieval literary sources addressing this process have created a situation in which “the dominant image of archaeology in Iceland, held by both Icelanders and others, is surely its Viking past” (Gavin Lucas and Mjöll Snæsdóttir 2006).

Though the concentration has been largely on Settlement Period archaeology there has in fact been a significant amount of work done on the archaeology of the early modern period. The bulk of this work comes from contract projects, done without clear research frameworks, and are largely unpublished (Vésteinsson 2004). In terms of faunal analysis there is a small but growing body of faunal analysis reports (Hambrecht 2009). These will be used for comparative analysis later in this thesis.

This thesis will help improve the understanding of economic and social differentiation in early modern Iceland by applying comparative zooarchaeology to look at similarities and differences between sites of different status. Skálholt was one of the most high status sites in Iceland and its faunal assemblage will be compared to contemporary farms and fishing sites throughout Iceland.

Beyond this questions of survival and resilience in the face of climatic and other pressures will be addressed through the zooarchaeology of Skálholt. It is hoped that this thesis will advance the state of Environmental Archaeology within Historical Archaeology in Iceland and the North Atlantic world. The central question here is how can zooarchaeology, in this case the analysis of the middens of Skálholt, engage the agendas of historical/post-medieval archaeology in the North Atlantic and the larger world through the lense of environmental archaeology and human ecodynamics?

Chapter 2 – Laboratory and Field Methods

Laboratory Methods

Analysis of the Skálholt collection was carried out at the Brooklyn College and Hunter College (City University of New York) Zooarchaeology Laboratories and made use of extensive comparative skeletal collections at both laboratories and the holdings of the American Museum of Natural History. All fragments were identified as far as taxonomically possible (selected element approach not employed) but most mammal ribs, long bone shaft fragments, and vertebral fragments were assigned to “Large Terrestrial Mammal” (cattle-horse sized), “Medium terrestrial mammal” (sheep-goat-pig-large dog sized), “small terrestrial mammal” (small dog-fox sized) and “very small terrestrial mammal” (rodent sized) categories. Only elements positively identifiable as *Ovis aries* were assigned to the “sheep” category, with all other sheep/goat elements being assigned to a general “*caprine*” category potentially including both sheep and goats. Following NABO Zooarchaeology Working Group recommendations and the established traditions of North Atlantic zooarchaeology we have made a simple identified fragment count (NISP) the basis for most quantitative presentation. Measurements (Mitoyo digimatic digital caliper) of fish bones follow Wheeler & Jones (1989), mammal metrics follow Von Den Dreisch (1976) and mammal tooth eruption and wear recording follows Grant (1982). General presentation of domestic mammal age reconstruction follows Enghoff (2003). Digital records of all data collected were made following the 9th edition NABONE recording package (Microsoft Access database supplemented with specialized Excel spreadsheets, see discussion and downloadable version at www.nabohome.org) and all digital records (including archival element by

element bone records) and the bone samples are permanently curated at the National Museum of Iceland. CD R versions of all archived data are also available on request from nabo@voicenet.com.

Excavation Field Methods

The Skálholt excavation, including the midden excavations undertaken by the author, were all done through a single context excavation process. The specifics of excavation methodology can be seen in the FSI (Fornleifastofnun Islands – Institute of Archaeology Iceland) excavation handbook. This methodology is based on the Museum of London Archaeological Service single context excavation methodology.

All contexts that contained cultural material were sieved through 8mm mesh. Due to the fact that during some of the excavation seasons the author was working alone a time saving test was created in order to determine whether sieving of whole contexts was efficient and worth the time expended. If a context looked on observation to be sterile, containing no cultural material, then at least six five gallon buckets worth of dirt from this context was sieved. If these bucket samples produced no cultural material at all then the rest of the context was not sieved, though close attention was paid during excavation in order to see if cultural material appeared in some other portion of the context. Very few contexts from the midden deposits were treated this way, fewer than 10%.

All excavation documents and drawings are archived at the offices of FSI (Fornleifastofnun Islands).

Chapter 3 – Historical Background

Historical Background to 1550

Iceland is a mid-Atlantic island first settled in the late 9th century CE by Viking Age colonists from Scandinavia and the British isles. These communities were initially led by competing Nordic chieftains and rapidly occupied the most fertile areas with a mixed economy based upon stock raising, fishing, hunting of sea birds and sea mammals, and limited growing of barley in the most climatically favored areas (Simpson et al, 2002; McGovern & Perdikaris, 2007; Vesteinsson McGovern and Keller 2002). While early settlers made use of a wide range of resources, high status residences tended to be associated with the richest pasture plant communities, and this high quality grazing was largely reserved for cattle husbandry. Thus rich pastures and high percentages of cattle bones have become key archaeological markers of high status in Viking Age and medieval settlement systems across the North Atlantic (McGovern 1994, McGovern et al 1988, Amorosi et al 1997). By 930 CE, chiefly competition was regulated and a multi-tiered system of courts and assemblies was set up to adjudicate disputes and limit the impact of feuds and resource competition (Miller 1990; Byock 2001). Christianity was officially adopted ca 1000 CE, and by 1100 an increasingly well integrated parish system was established, headed by the bishop's seats at Hólar in the North and Skálholt in the South. Literacy and literature flourished in the 12th-14th centuries, producing the histories, annals, and sagas that have made Iceland a favorite of early medieval historians and literary scholars (Byock 2001; Vesteinsson 2000). This "Commonwealth Period" lasted down to the late 13th century when a period of escalating civil war among the greater Icelandic magnate families ended in eventual

submission to the Norwegian crown in 1262-64. Iceland was thereafter administered by a combination of royal officials and Icelandic magnates as a part of the Norwegian realm, which was combined with the Danish crown in 1397 following the heavy impacts of the Black Death and dynastic re-alignments that left Denmark the most powerful of the Scandinavian kingdoms (Helle 2003). The Kingdom of Norway was then formally absorbed by the Kingdom of Denmark in 1536. By late medieval times, Iceland had become something of an administrative backwater to a Danish royal administration increasingly focused upon the Baltic and North German political and economic arena. The political changes associated with the Reformation and an increasingly absolutist monarchy in Denmark hit Iceland hard. A short lived Catholic resistance movement led by the Bishop of Hólar was crushed and the rebel bishop was beheaded at Skálholt in 1550 (Nordstrom 2000). At the end of the medieval period, Iceland had become a marginalized colony of a somewhat disinterested early modern Danish monarchy that was to find itself increasingly committed to more profitable colonial ventures in the Caribbean, Greenland, West Africa, and South Asia (Randsborg 2001) and locked in escalating military competition with Sweden in the Baltic (Helle 2003).

Colonialism, Stagnation, Volcanoes, Famine, and Pestilence 1550-1800

During the 16th to the early 18th centuries Iceland remained almost entirely rural, without major towns or villages but with seasonal fishing and trading centers under elite control scattered along the coastline. Icelandic and royal managers lived on substantial country estates, while the great majority of the population remained small farmers increasingly reduced to tenancy with very short tenure (Vasey 1996). A survey in 1695 found that 96% of farms were occupied by tenants. By 1800 tenantry had fallen to only

90% (Larusson 1967). As late as 1829 only 15% of tenants had life tenure and many tenants held land for only one or two years through the 19th century (Uonsson 1988).

A trade monopoly granted to a consortium of major Danish merchant families (1602-1787) has been blamed for stagnation in both trade and fisheries and for aggravating the impacts of local food shortages (Gunnarsson 1983). Wool and dried cod stockfish were two of the highest volume items that generated income for Iceland, yet both were under heavy competition in international markets by the 17th century. Europe was getting much of its stockfish from the Newfoundland Banks by this period and wool production was climbing throughout Europe (Potter 2006; Braudel 1992). Prices were fixed by the monopoly for the goods traded in and out of Iceland, and direct contact with foreign traders was prohibited. It can be argued that the fixed prices of the monopoly might have created stability for the Icelandic producers and protected them from times of over-production, lower demand and lower prices. Yet the trade monopoly (which tended to set prices for Icelandic goods unrealistically low to generate a regular profit) also denied the Icelandic producer any chance of finding better prices for their goods through competitive markets, and many Icelanders traded illegally with foreign ships whenever they could (Gunnarsson 1983).

The cod fishing industry which was ultimately to provide the economic engine for the development of Iceland beginning in the late 19th century was also subject to internal and external pressures in the 17th-18th centuries. Powerful Icelandic landed elites concerned about the supply of cheap farm labor fought technological innovation in the industry as well as any concentration of the fishing industry into full-time fishing settlements (Gunnarsson 1983). Icelanders were forbidden to own decked fishing boats,

to trade at sea with the foreign merchants or fishermen, or to permanently reside in non-agricultural settlements such as the fishing villages which would come to dominate Icelandic settlement patterns by 1900. Courts in 18th century Iceland formally banned the use of worm bait and the use of lines with multiple hooks in an attempt to limit fishing productivity (Gunnarsson 1983:169). According to Gunnarsson and others Icelandic landed elites saw in the nascent fishing industry a threat to the pastoral rural society that sustained them, and saw the accumulation of wealth based on capital invested in large scale commercial fishing as a potential devaluation of the pasture-based sheep and cattle economy that marked status and authority since early medieval times (Gunnarsson 1983; Eggertsson 1998; Vasey 1996). At the most practical level the potential income produced by fishing was seen as a threat to low labor costs on the farms. The money created by a successful fishing industry must it was assumed denude the countryside of laborers making those remaining much more expensive. Another concern of the governing and wealthy elites was that with recurring sea ice and storminess (something that was all too familiar to Iceland in the early modern period) any part of the population that was completely committed to fishing would for long periods be unable to take to the sea and would have to be cared for by an already strained welfare system.

Many analyses of early modern Iceland argue that by the 18th century Iceland had many of the recurring core social and political problems associated with European mercantilist colonialism well documented in other parts of the world, with the attitudes and interests of the local elites contributing to an increasingly anachronistic emphasis upon farming and terrestrial resources. In the terms of resilience theorists (Gunderson &

Holling 2002) early modern Icelandic managers had established a tightly bound, closely connected, highly stabilized, and un-resilient set of social and economic relationships linking Icelanders to farms and farms to the health of pasture plant communities. As Holling and Gunderson put it (2002:45); “In the cases of extreme and growing rigidity, all systems become accidents waiting to happen.”

The sees of Hólar and Skálholt owned ocean going vessels and fishing fleets during the early modern period. It was not that the Bishop’s themselves did not want to generate wealth through fishing and overseas trade. They did not want Iceland as a whole to do so as this would lead to labor shortages, as laborers gravitated to coastal jobs and settlements, and economic hardship and a loss of social and political control. Upkeep of the social system they defended demanded an increasingly rigid structure that kept labor costs down and social change at a minimum (Eggertsson 2005). These fears regarding labor shortages become more understandable when the effects of climate, disease, and volcanism on early modern Iceland are examined.

Iceland’s geographical position at the edge of the oceanic convergence between polar and North Atlantic currents and the resulting vulnerability to the impacts of relatively small scale changes in climate provide powerful sources of environmental instability (Casely and A. J. Dugmore 2007a; AEJ Ogilvie 1997). Reduction in growing season and increased snow cover were particularly severe problems in the low-arctic northern quarters of Iceland, and the impact of summer drift ice was most felt in the northwest and northeast (Ogilvie and Jonsdottir 2000). Increases in storminess documented by both historical records and the sea-salt sodium proxy record of the GISP2 ice core record (Dugmore et al. 2007) impacted fishing and maritime trade.

Peaks in storminess are indicated by the sea salt sodium proxy in the mid – 17th century and in the first half of the 18th century (Dugmore et al. 2007)

As argued by Ogilvie and Jonsson (2001), it is not particularly useful to model a continuous little ice age as a time of consistently cold temperatures in the North Atlantic and continental Europe in the late medieval and early modern periods (Parker 1997; Ogilvie 2001). The long term proxy climate records of the GISP and GRIP ice cores (Meeker & Mayewski 2002), and available documentary data do indicate generally warmer and perhaps more stable conditions in the Viking Age and early Middle Ages than in the 14th-19th centuries, but variability on the decadal and inter-annual scale was extreme in both the supposed “medieval warm Period” and the “little ice age” (Ogilvie and Jónsson 2001). At a regional Icelandic scale the 17th and 18th centuries were not a time of monolithically cold climate conditions for Iceland, but did see considerable inter-annual and inter-decadal variability (Ogilvie 2001). In Iceland the 17th century was a period of generally cold conditions from the 1620’s to the early 1640’s. The period from the mid 1640’s to about 1660 was on the whole warmer and favorable to Icelandic fodder production. The end of the 17th century again felt colder temperatures and increased sea ice. While the first decade of the 18th century was relatively warm, it became somewhat colder in the next few decades and then grew increasingly colder in the middle of the century (Ogilvie 1992). Climate in the south was comparatively milder than the rest of the country during this period (Ogilvie 1986). The south of Iceland was hit by fewer extremes of weather than the north or the west, and was not as often affected by sea ice. Yet variability in the climate can be as destructive as a consistent climatic downturn (Dugmore et al 2007). Increases in inter-annual variability and the

difficulties encountered by any farmer attempting to foresee future seasons based upon a necessarily limited traditional knowledge base may have been the most problematic factors affecting Icelandic agricultural decision makers in the period (Casely and A. J. Dugmore 2007a; IA Simpson et al. 2001; Hambrecht 2009).

Iceland also was subjected to mass mortality from recurring smallpox epidemics, which killed as much as 26% of the population in 1707-1709, 7.2% in 1762-63 and 3.4% in 1785-87 (Steffensen 1977). Declining mortality levels may reflect the transition from a 'virgin ground' epidemic in the early 18th century to a more typically European pattern of endemic smallpox produced by more continual exposure (see Vasey 1996 for discussion). Sheep were hit with an epidemic later in the 18th century that was only put under control through the killing off of all sheep in affected districts (Lárusson 1967). Thus both human labor supplies and the source of marketable wool products were subject to unpredictable but drastic reductions due to disease in the same time period.

Iceland lies on the Atlantic crustal rift zone, which runs down the middle of the island. Because of this volcanic activity is fairly routine in Iceland and the early modern Period saw numerous eruptions of varying degrees of destructiveness. The worst was the catastrophic Lakagígur eruption in 1783-1784 and the "Famine of the Mist" that followed as fluorine gas spread over much of Iceland and killed the majority of the animal stock (Vasey 2002; Eggertsson 1998; Demarée Ogilvie and Zhang 1996). The resulting famine claimed as much as a third of the human population of Iceland by 1785. Adding to the woes of Skálholt in particular was the earthquake of 1784 that destroyed most of the bishop's manor complex.

Property and Tenancy

Skálholt, like Hólar in the north, owned numerous farms throughout Iceland. Each of these farms owed taxes as well as the *kúgildi*, basically by the early modern era a tax manifested through the leasing of animals by the property owner to its tenants who then had to pay back in kind, traditionally butter, though also with milk wool and meat.

Tithes were theoretically to be paid by the owner of the land in question, yet it was largely paid by the tenant who was then legally owed compensation for this by the land-owner, though in practice compensation was rare (Lárusson 1967)¹. Church owned land was exempt from the tithe, but instead generated land rent as well as animal lease products. The land rent was generally paid in kind, as there was little cash coinage in Iceland before the modern period. Kind could mean labor, animals or animal products themselves. Meat, wool and butter were all used for the payment of rent. Animal leasing (*kúgildi*) worked somewhat differently, and started out with at least partly benevolent intentions. The medieval Jónsbók law code stated that those who had more cattle than they needed should hire the surplus out at a reasonable price to those with few or no animals. As Lárusson states,

“This duty of the wealthy was carried out only too well. In a letter, written possibly in 1602, the bishop of Hólar diocese mentioned that the yield from the rented farms belonging to the monasteries and the farmers in Hólar diocese had deteriorated because they were now overburdened with hired cattle. A farm that earlier had 6 cow values now might have up to 12 or more, which meant that the tenant could not even raise his own lambs. Thus the conditions of the tenants gradually worsened.” (Lárusson 1967: 45)

¹ The tithe in Iceland was not the traditional 10% but a graduated tax between 1-2% of debt free capital for those above a certain level of wealth. This was divided into four parts going to local poor relief, the local church, the local priest, and the bishop. For a description of the tithe system see Lárusson 1967 37-41.

The Danish government attempted to alleviate this situation in the early 18th century by restricting the numbers of animals a landowner could lease to a tenant as well as by trying to enforce the previously ignored law that leased animals who died had to be replaced by the land owner and not by the tenant, though to little effect. The animal leases attached to rents by the early modern period had become in parts of Iceland another fixed tax, with payment based on a number of animals leased to a specific property whether they existed or not. The obligation of tenant farmers to raise cattle for the landowners, among whom Skálholt was one of the largest in the 17th and 18th centuries, gave them access to the secondary products these animals produced, such as milk and manure, but took up a very large amount of their own resources sustaining what was basically the landowners capital. It left little room for the development of the tenant's own capital (in the form of their own animals) thus keeping the tenantry unable to buy their own land and become independent landowners (Lárusson 1967; Eggertsson 1998).

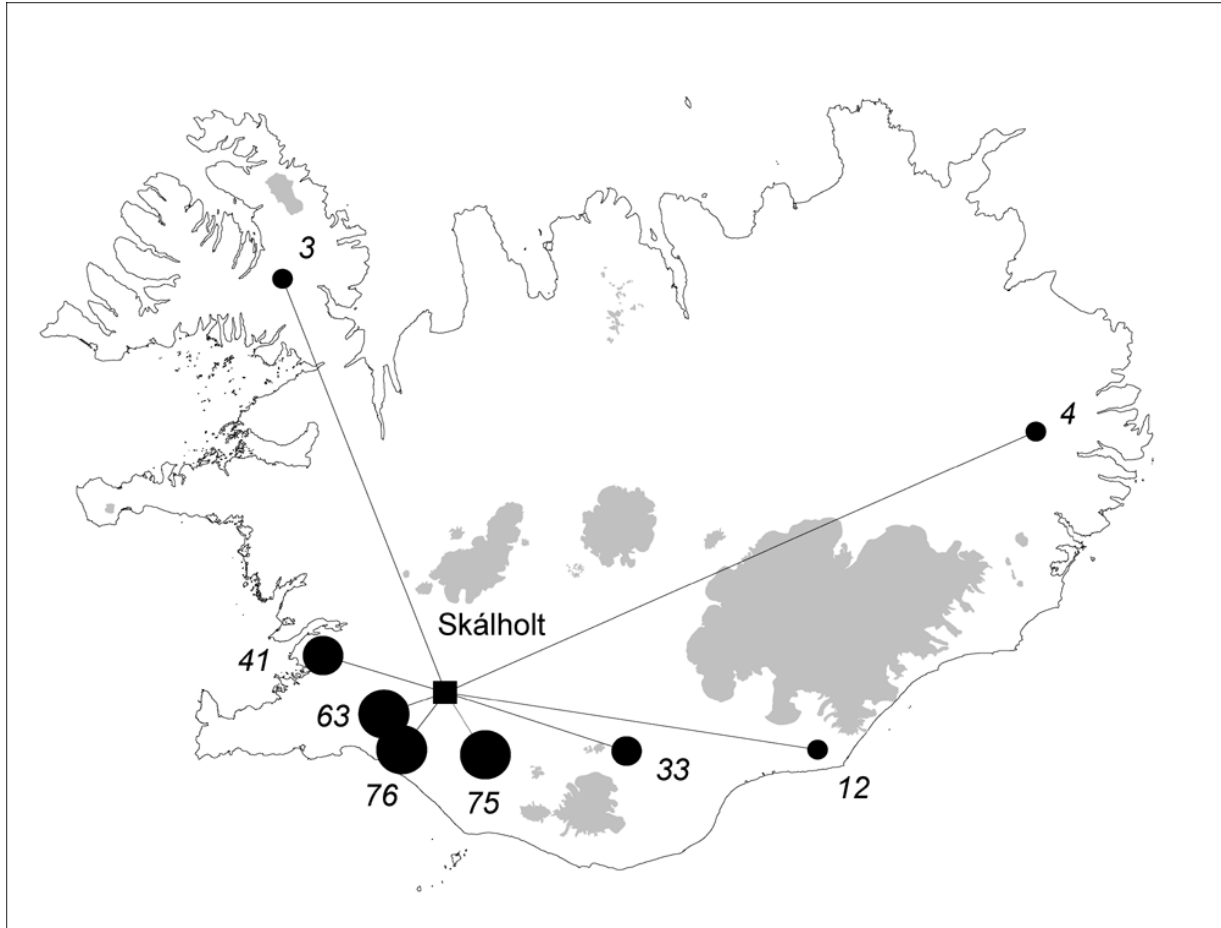


Figure 4 Distribution of properties owned by the Dioceses of Skálholt c.1700 (Grímsdóttir 2006)

In 1695 Skálholt owned roughly 30% of all the property in its diocese. In 1700 Skálholt owned 307 farms throughout Iceland. The great majority of these were in the southern districts of Iceland, but a few were farther out, such as 3 in the northwest fjords and 4 in the far eastern districts of Iceland (see figure 4). Along with the Crown, the Diocese of Hólar, and a variety of private owners, many of whom were absentee owners from Denmark, Skálholt was one of the largest landowners in Iceland. The state Lutheran Church owned roughly 30% of all property in Iceland by 1700. Within this portion the two Bishop's cathedral farms owned roughly 50% of the ecclesiastical land outright. Along with this church property the families who usually supplied the Bishops

at Skálholt and Hólar also owned large amounts of land privately (Lárusson 1967; Gunnarsson 1983). Their share of the wealth from their properties came about through land rent as well as animal leases. Skálholt of course also received a portion of the tithe from all other farms in its diocese.

It is probably significant that most of the landowners in Iceland in the 17th and 18th centuries saw a significant drop in the payments they received through land rents and animal leases. This was especially the case for the northern diocese of Hólar as well as well as many other districts throughout Iceland from 1500 through to the Jarðabók land register of 1702-1714. The total payments (both land rent and animal lease) for 58 farms owned by the Hólar diocese in 1710 was only 65% that of the same payments in 1569. The total payment for 280 farms owned by the Skálholt diocese in 1710 was 93% of those in 1580. In both cases the drop was consistent across time (Lárusson 1967: 49-52). This difference in income reduction could be a function of many variables, but chief among these must be the greater vulnerability of the Holar holdings to cooling climate and especially sea ice. In a context of generally declining return on wealth invested in farming, Skálholt seems to have been comparatively well buffered by the location of most of its holdings in the warmest part of the southern interior.

Hard Times- Controversial Causes

Life was certainly hard in early modern Iceland, even by the standards of contemporary rural Europe (Parker and Smith 1997), and most scholars would agree that Iceland was distinct in its particular brand of early modern misery. Icelandic society faced the environmental challenges of variable and cooling climate, unpredictable spikes in marine storminess, sea ice incursion, volcanism and epidemic disease as well

as the political and economic consequences of a mercantilist trade system. More controversy surrounds the reaction of Icelanders and Icelandic managers to these combined challenges. The question for many scholars has been not how Icelanders coped with brutally hard times but why was the societal and managerial response to these challenges so limited and apparently ineffectual? (Eggertsson 2000; Gunnarsson 1983; Hastrup 1990; Vasey 1996). This question becomes even more loaded when juxtaposed against the progress in food production seen in Britain and continental Europe during this same period (van Bath 1963; Overton 1996). Many scholars, such as Gisli Gunnarsson, posit intensified year round deep sea fishing as having been a clearly (in retrospect) realistic option to revitalize the Icelandic economy and provide subsistence buffering to the environmental shocks affecting pastures and farming. Fishing and preserving of fish for local and regional consumption had been part of the Icelandic economy since early settlement (Perdikaris and T. H. McGovern 2007; T. H. McGovern et al. 2006), and specialized winter seasonal fishing camps are documented archaeologically back to the mid-13th century (Amundsen et al 2005). Substantial amounts of fully commercial fishing had been carried out by English, Hanseatic, French, and Basque ships since the 15th century, and substantial consumer markets had long been developed in Europe and were also opening in the Caribbean sugar islands (Kurlansky 1999, Fagan 2006, Pope 2004) . Yet, until the end of the 18th century, legal and economic pressures kept the Icelandic fisheries from being more than a seasonal coastal subsistence industry (Palson and Durrenberger 1983; Gunnarsson 1983; Hastrup 1990). Edvardsson (2005) has argued that fisheries in the West Fjords of the NW peninsula were in fact more highly developed in early medieval times than in the

early modern period, and that the fishing effort had effectively declined during the 16th-17th centuries in much of Iceland. By the early modern period, Icelandic subsistence and market economy may have in fact been less diversified and more dependent upon pastures and domestic stock than in the Viking Age or early medieval period.

This failure to develop a fully commercial fish trade was paralleled by what many observers saw as an inability or unwillingness to improve the land and maintain farming production. Fences were not kept in repair, farmers stopped building barns to keep their winter fodder dry, and there was less fertilization through the amendment of manure and sea weed into the soil (Eggertsson 1998; Hastrup 1990; Simpson et al 2002).

The general malaise of early modern Iceland has been blamed on many culprits. The extreme structuralist argument made by anthropologist Kirsten Hastrup sees the Icelanders as having given up on early modern life in favor of a medieval *habitus* or mind-set that made it impossible for Icelanders to improve themselves, having become effectively prisoners of their own culture (Hastrup 1990, see Palsson 1996 for critique).

Others such as Gisli Gunnarsson have seen the problem as a primarily economic one centered on the Danish trade monopoly and a conflict between 'progressive' and 'conservative' elements in both the Danish Government and the Icelandic landowning class (Gunnarsson 1983). On one side there were progressive calls for longer land tenure and more official backing for the fishing and wool processing and manufactures. On the other a landed elite who only wanted the agricultural basis of Icelandic society supported at the expense of any alternative, 'progressive' improvements.

Thráinn Eggertsson has argued that the tenancy system created a zero-sum gaming situation in which the only way to accumulate capital was to engage in very risky stocking strategies that most often lead to poverty in a situation of low productivity coupled with high inter-annual variability in critical environmental variables (Eggertsson 1998).

Climate change has also been used as a primary culprit in the problems of early modern Iceland, though the historical ecological view of climate in Iceland has become increasingly nuanced and complex, stressing the role of decreasing predictability as much as a simple decline in temperatures (Ogilvie & Jonsson 2001; Ogilvie 2000 etc. Casely et al). Adaptive system modelers and resilience theorists who have developed the now-widespread four phase adaptive cycle model (r - exploitation, K- conservation, omega -release, alpha - reorganization; Holling & Gunderson 2002:34) for the integration of human and natural systems would certainly place early modern Iceland in the highly integrated but un-resilient uppermost loop of a K phase, where accumulated investments towards the elaboration of one path to social status and managerial control effectively suppress (for a time) alternate strategies that might add resilience to a system under stress.

There are also other perspectives on this problem that bring a different view to the late 17th century and 18th century political and economic situation in Iceland. Hrefna Róbertsdóttir (2008), among others, has argued that the perceived conflict between conservative and progressive elements in the 18th century is not nearly as extreme as presented by scholars such as Gunnarsson. The Danish Government did take an active role in trying to improve Icelandic conditions, through fact finding missions, legislative

means, and direct economic investment. This effort was still relatively unimportant in comparison to Danish efforts in the home provinces, the Duchy of Holstein, and Norway for example, but there were efforts starting in the late 17th century to integrate Iceland more closely into the Danish Imperial system. The monopoly system as well as the Privileged Icelandic Company, that attempted to create wool processing workshops in different parts of Iceland during the middle of the 18th century were examples of this (Gunnarsson 1983; Róbertsdóttir 2008). Gunnarsson and others, projecting, Róbertsdóttir argues, a basically 19th century attitude equating free market capitalism with progress onto the 17th and 18th centuries, argue that there were progressives on one side boosting improving activities in Iceland and conservative elements, generally elite Icelandic families, who successfully resisted any innovation. In simple terms, and as spelled out earlier in this chapter, the progressives advocated agricultural improvements as well as increased attention to the fishing industry. Conservative elements in this narrative supported a completely agricultural economic system with short tenancy and legal impediments to the most basic agricultural improvements (Eggertsson 1996; Gunnarsson 1983; Hastrup 1990; Dan Vasey 1996). Róbertsdóttir counters that the Danish Government and the Icelandic landowning class were both working from the same assumption of a rural based economy. There is an assumption behind much of the scholarship of this period that the building up of the Icelandic fishing industry was the natural solution to the problems of the early modern period. She goes so far as to see an assumption that this would have stimulated a free market centered around the trade in dried gadids between the Icelanders and the other economic players of the North Atlantic, ie. the Portuguese, the Basques, the Bretons and Normans, and

the English. Róbertsdóttir argues that the improving impulse never would have led to a free market based on dried fish products as this was not an idea that any of the parties involved was invested in. All improvements, whether through fishing or wool product manufacture were enacted in order to fit within and support the traditional economic framework of rural animal husbandry based farming (Róbertsdóttir 2008, 365-366). The so called progressive elements were in fact trying to support the same agrarian vision as the conservative elements.

Behind the economic issues, and for the early modern authorities completely intertwined with them, were social issues. One of the most contentious issues for this period were the legal efforts to restrict and control the laboring population of Iceland. These legal efforts were in part directed at restricting any population of roaming workers not contractually bound to a specific farm. Gunnarsson for instance, argued that these legal restrictions were intended to stop the growth of fishing settlements and towns that would have been outside the control of the rural elite (Gunnarsson 1983; Róbertsdóttir 2008, 367). Róbertsdóttir argues that this sort of legislation was intended to both economically and morally strengthen Iceland by forcing idle workers into more productive (in the 18th century mercantilist sense, or ‘cameralist’ as Róbertsdóttir proposes²) activities. This sort of legislation was certainly not unique to Iceland and had its origins in Denmark as well as the German States and elsewhere in Europe.

² Róbertsdóttir uses the term ‘Cameralism’ as opposed to ‘Mercantilism’ or ‘Enlightenment’. Her argument is a good one – basically that the Enlightenment is too vague a term, and Mercantilism is too narrow as it focuses solely on the economic realm. Cameralism encompasses the economic as well as moral or social aspects of 18th century Danish and German political thought thus reflecting more precisely the ideological substance of 18th century Danish and German economic/social policy (Róbertsdóttir 2008, 61-62).

Róbertsdóttir uses this as further proof that the Danish Government and the Icelandic elites were working from the same ideological foundations.

Yet there *were* examples of reformist proposals being stopped by Icelandic authorities. For example, proposals by the Danish Government as well as Icelandic officials that would have changed standard land leases to 20 years from 1 year tenancy were rejected by internal Icelandic authorities (Róbertsdóttir 2008, 154-155). Róbertsdóttir suggests that this might be because the Icelandic landed interests found it easier to control a population through short-term tenancy. If this is true then control was achieved through severely impeding the ability of Icelandic leasees to accumulate any capital or to improve the land owned by the land owner. If the household, the family, and the farm were the primary units of social and economic importance to Icelandic and Danish authorities, as Róbertsdóttir argues, this form of control could have done great violence to the most important part of the social framework that the early modern authorities were trying to uphold. In terms of a common effort to build up the rural agrarian economy such a move was clearly counter-productive, and it was seen as such by at least a portion of both the Danish and Icelandic elite. Clearly, as the example cited above shows, there at times were opposing sides in the efforts to change the early Icelandic economy. It is hard not to see ideological differences as being behind the refusal of some Icelandic authorities to countenance any change in the length of Icelandic leases. These different perspectives are certainly not all mutually exclusive, and all can benefit from the addition of new data sources.

The issues surrounding the 'hard times' of the early modern period in Iceland are still very much alive. Zooarchaeology can contribute in a number of ways which will be discussed in the following theory chapter.

Chapter 4 – Theoretical Approaches

Early Modern Archaeology of the North Atlantic

I see two strong possibilities for the development of a theoretical framework that can encompass a subject as vast as early modern North Atlantic archaeology. First there is the historical ecological/environmental archaeological approach. Second is the work of the Atlantic historians (Hambrecht and Arendt 2009).

There has been a great deal of substantial and productive work done in the environmental archaeology of the North Atlantic (T. H. McGovern, Vésteinsson, Fridriksson, M. Church, Lawson, I. Simpson, et al. 2007). It is often hard to ignore the environmental variables in this region and much of the archaeological effort in this region has worked explicitly within an environmental archaeological approach. The work within this region helps address a void pointed out by a number of scholars, namely the lack of environmental archaeological approaches in historical archaeology (Deagan 2008; Stephen A. Mrozowski 2006; Crumley 1994). A historical ecological approach to the archaeology of this region has had much success in the study of both the medieval European as well as the pre-Columbian western North Atlantic. This scholarship has demonstrated that such an approach has great potential for the highly inter-connected post-Columbian Atlantic world (Cronon 1983; Crosby 2004; T. H. McGovern, Vésteinsson, Fridriksson, M. Church, Lawson, I. Simpson, et al. 2007; James Woollett 2007). The potential in the North Atlantic in later time periods is that the high resolution climate proxy data (such as ice and sea cores and tephrochronology) becomes supplemented with the torrent of documents and the refinements in dating and distribution that comes with the huge increase in finds (esp. pottery) in the early

modern period. Later historical periods with richer data sets can allow for a historical ecological approach that is not environmentally deterministic, but fully recognizes the multiple interconnections between humans, the climate and environment in this critical period of rapid social and environmental change around the world. The interplay of mentalité, perception, class, fashion, technology, heritage, and chance on the conscious and accidental human manipulations of the natural world which certainly extend deep into prehistory can be particularly effectively investigated when documentary sources become common. The post-medieval world of the past five centuries was as impacted by climate change, volcanism, disease, and multi-scalar natural processes as any other portion of the Holocene, and the environmental records (especially high resolution records such as tree rings, varved deposits, and tephra) are particularly abundant and increasingly well studied for this period. Arguably the interactions between humans, climate, plants, animals, soils and landforms saw a dramatic increase in complexity in the post-Columbian world, and there is a growing recognition of the need for an expanded multi-disciplinary investigation of the human ecodynamics of modernity. Such an approach for this period has the potential to examine the interaction of human intention, cognition, and historical sequence on a scale of years and decades as well as centuries and millennia.

I hope to place the North Atlantic within the early modern history of the larger Atlantic region, which is often dominated by the middle Atlantic and Caribbean narratives (Hambrecht and Arendt 2009). Though often treated as supplemental in many discussions, the North Atlantic had a central and important role in the creation of the early modern Atlantic world. As Peter Pope's volume, Fish Into Wine (2004), so

effectively revealed, the cod fishing industry of Newfoundland was one of the earliest and most powerful (in both economic and cultural terms) spurs towards European expansion across the Atlantic. It was a dynamic region where traders, missionaries, farmers, fishermen, whalers, hunters, trappers, Europeans and Native Americans all interacted locally and within larger Oceanic relationships. It contained new colonies, such as Newfoundland, as well as old established early medieval colonies, such as Iceland. This framework offers a new arena to study the effects of the post-Columbian world that contains the classic 'haunts' of the archaeology of the modern world, but often within unique new contexts (Orser 1996).

This theoretical and methodological approach is influenced by the Atlantic historians from whom this thesis takes the idea that the North Atlantic region is within a larger Atlantic region that has economic and cultural unities but also a conceptual unity. The areas outlining the Atlantic Ocean contributed to the creation of an unique world that was instrumental in the formation of the early modern post-Columbian World and as such is closely connected to the development of modernity.

"There is thus a distinguished pedigree for identifying Atlantic history with 'early' modernity, before the onset of industrialization, mass democracy, the nation-state, and all the other classic defining features of full-fledged modernity whose origins both Adam Smith and Karl Marx associated with the European voyages of discovery and especially with 1492."(Armitage 2002)

"The idea of Atlantic history is an emerging formulation which reveals more clearly than we have seen before a transnational, multi-cultural reality that came into existence over a certain passage of years and has persisted. It helps one explain relationships that had not been observed before; it allows one to identify commonalities of experience in diverse circumstances; it isolates unique characteristics that become visible only in comparisons and contrasts; and it provides the outlines of a vast culture area distinctive in world history." (Bailyn 2002).

Atlantic history recognizes both the conceptual unity of the overall Atlantic region as well as the numerous distinct regions and cultures that it comprises. I think this is a particularly inspiring approach to North Atlantic post-medieval Archaeology that can supply a framework for discussion among the disparate regional and methodological approaches represented in this volume.

The Atlantic History school supplies a powerful transnational approach to the history of the Atlantic. Yet there is the possibility that by emphasizing the origins of modernity in the Atlantic world narratives can be created that are based in ideas of European exceptionalism. Atlantic history should not blindly follow Max Weber and reinforce the traditional narrative of the northern European protestant origins of modernity. Much recent scholarship, often with an environmental historical bent, has made it clear that many of the elements often presented as symptoms of early modernity such as credit markets, demand driven markets, agricultural intensification, and centralized production, were present in many other parts of the world other than Europe (Abu-Lughod 1991; Pomeranz 2001; Marks 2007; Richards 2006). This thesis will attempt to use Atlantic History where appropriate as a guide to making Icelandic history relevant to the larger processes going in the greater Atlantic world while being cognizant of the danger of any exceptionalist arguments.

Zooarchaeology and the Ecodynamics of Modernity in Iceland

The role of the environment and the methods of environmental archaeology are having a greater influence on the discipline of historical archaeology. This has not been the case since the birth of historical archaeology in the post-war period. The relationship of historical archaeology to environmental archaeology could, and often can still be

characterized by the statement made in James Deetz's *In Small Things Forgotten* (1977, 31) that as "human cultures have advanced technologically the influence of environmental and climatic forces on these cultures has diminished". Given the exponential growth of human technologies over the last five hundred years the influence of environmental and climatic forces was seen by many as minimal and not of great interest to historical archaeologists. Carole Crumley (1994) noted that while climate change and ecology regularly played a huge role in the explanatory discourse of prehistorians, as the density of documentary evidence increased the scholarly discourse shifted decisively away from environment. This thesis seeks to contribute to the growing number of historical archaeologists who are embracing methods and ideas generated by environmental archaeology as well as environmental history.

This pattern has certainly not been universal, and many historians who focus on the period between the 15th-19th centuries have skillfully incorporated climate change, human environmental impact, and the biological consequences of progressive waves of globalization into regional and global accounts of the past 500-800 years (Marks 2007; Richards 2006; Cronon 1983; Crosby 2004; Donald Worster 1998; Pomeranz 2001). Archaeologists have begun to engage with these integrative environmental historians and with the expanding "archaeology of global change" movement (Redman et al. 2004; McGlade 1995a; Fisher, Hill, and Feinman 2009). Donald Hardesty (2007) has argued forcefully for the integration of the industrial archaeology of the 19th century American west with wider investigations of global change and globalization, and recent work in Labrador (Woollett 2007) and Greenland (Oglivie et al in press) provides excellent examples of the effective integration of zooarchaeology, historical climatology, and the

rich documentary records of the past 700 years. A NSF-sponsored conference at Eagle Hill Maine on Global Long Term Human Ecodynamics (2009) featured a special session on the Ecodynamics of Modernity, which provided a spirited and active discussion of the most productive approaches to integrating historical archaeology with global change research and the better integration of history, natural science, and social science approaches (for conference summary see McGovern 2009 on www.nabohome.org).

Stephen Mrozowski was the Ecodynamics of Modernity session chair at the 2009 Eagle Hill meeting, and his paper *Environments of History* (2006) provides a particularly articulate plea for greater integration of environmental science and environmental archaeology into the discipline of historical archaeology. He argues that much of the agenda of historical archaeology to date has been influenced by a structuralist theoretical framework grounded in a dualist view of the world in which environment and culture are seen as separate and where the idea of culture often exists outside of environmental influence (as Deetz 1977). Mrozowski for one is trying to remedy the situation by arguing for a multi-dimensional view of the relationship between culture and the environment which acknowledges the complexity of their mutual influence on each other (as in a human ecodynamics approach McGlade (1995)). Mrozowski refers to a number of recent studies as examples of such an approach in historical archaeology (S. A. Mrozowski 1999). As he states,

“Although these studies have varied widely in scale and substance, most have been framed by one of three historical processes: colonization, urbanization, and industrialization.”(Stephen A. Mrozowski 2006, 25)

This thesis will thus make use of zooarchaeological and historical evidence to seek to further these cross-disciplinary ecodynamic approaches to the archaeology of

the recent past as part of a growing movement seeking to integrate the best of the old processual interest and capabilities in environmental analysis with the sophisticated use of history and concern for sequence and agency that characterizes the best post-processual work. It will make use of the post-medieval, historical zooarchaeological data from the sub-arctic country of Iceland to attempt to address some of the issues raised by Mrozowski. Yet it will attempt to do this in a context largely outside of the phenomenon mentioned above. It is hard, if not impossible, to fit early modern Iceland into any of the three historical processes mentioned in the passage by Mrozowski quoted above. Iceland was a colony, but an early medieval one, and by the early modern period had roughly 600 years of history already behind it. There was no human presence on Iceland before the colonization of the late 9th century³. Urbanization began in Iceland on a very small scale in the late 18th century in Reykjavik and zooarchaeological assemblages from late 18th and early 19th century Reykjavik will be discussed in the comparative chapter, but this urbanization was nowhere near the scale seen in the rest of the world during the early modern period. Industrialization is a similar case. Industrial development on the scale of the Industrial Revolution of the 19th century had no real effect on Iceland until the 20th century (Karlsson 2000). Instead of these historical processes this thesis will look at more specific processes often associated with the concept of modernity. These are commoditization and morphological changes in domestic animals that might reflect the influence of the Second Agricultural

³ Even if Irish monks had reached Iceland before the Vikings they left no archaeologically detectable remains that have been exposed to date.

Revolution⁴. The history and geographical context of Iceland make it an excellent place to study the early modern world outside of the more familiar haunts of historical archaeology; colonialism, imperialism, and industrialization. Icelandic archaeology demands that we look for other, possibly more universal symptoms of modernity. Just as Matthew Johnson has argued for looking at colonialism's effects on the landscapes of the colonizing power as a way to refine the examination of the early modern world (Johnson 2006), looking at the idea of modernity outside of the classic areas of investigation might suggest definitions of modernity that apply to wider swaths of early modern human history and also refine the definition of this concept that everyone can recognize but rarely adequately describe.

This is a work in progress and far more questions will be produced than answers. Zooarchaeology is only one tool to examine this relationship and it is certainly not a tool that should be used alone in this effort. Yet before multi-disciplinary efforts can be made the zooarchaeological data itself must be consolidated, analyzed and compared. This has begun to happen, and this thesis, following other publications by the author, will attempt to put these analyses in a larger historical context (Hambrecht 2009).

This thesis is following the lead of the growing body of environmental and specifically zooarchaeological work being done in Historical Archaeology. Only a few of these studies will be remarked upon here. Richard Thomas' article on zooarchaeology and the agricultural revolution used log ratio comparisons of the bone metrics of cattle, sheep, and pigs from a variety of early modern English archaeological sites (2005). This article looked at possible changes in the size of domestic animals and how these might

⁴ From here on I will use the term Agricultural Revolution instead of Second Agricultural Revolution.

or might not correlate with the Agricultural Revolution as defined by most historians. The data suggests that there might have been an increase in the size of English domestic animals but that this trend began after the 15th century, not in the 17th or 18th centuries as commonly assumed. In her 1999 article Joann Bowen examined the ecological dynamics behind the changes in cattle size in the early colonial Chesapeake (Bowen 1999). She examines changes in cattle size and argues that the early increase in their size can be explained by the Chesapeake landscape first encountered by European colonists. As this landscape became increasingly cultivated in a European fashion the size of the cattle decreased reflecting a more controlled and limited access to resources for the cattle. A recent article examined zooarchaeological remains from the early modern phases of the Finnish city of Tornio (Puputti 2008). This article sees a decrease in the presence of hunted wild animals and an increase in domesticates from the late 17th century through to 1800 as a reflection of the increasing commoditization of foodways in early modern Swedish/Finnish society. These are just a very few of the articles presenting work in which zooarchaeological analysis is contributing to studies of different aspects of the idea of modernity. This is happening within the larger phenomenon of environmental archaeological methods integrating into the efforts of historical and post-medieval archaeology. This thesis is inspired by all these efforts and by the papers just mentioned specifically.

Iceland is a very good place to engage in environmentally informed historical archaeology. In the Icelandic context there has been a large amount of work done examining the human ecodynamics from the settlement period through the medieval period. This body of work on earlier periods supplies a firm foundation from which to

make temporal comparisons as well as to look for methodological guidance (T. H. McGovern, Vésteinsson, Fridriksson, M. Church, Lawson, I.A. Simpson, et al. 2007).

Before going on the idea of modernity needs to be addressed. This thesis is written with the understanding that much of what we now define as modern, especially within historical archaeology has deep roots in history that go back far beyond the early modern period. Colonization, urbanization, large scale commodity markets and 'world systems' all have been present during many other historical periods and in many different parts of the globe. Many of the factors that came together to fuel the European expansion in the early modern period were present throughout Eurasia in the late medieval and early modern period (Abu-Lughod 1991; Pomeranz 2001; Marks 2007; Richards 2006). The 'European Miracle', if there was such a thing, was not due to any innate capacity for 'modernity' on the part of Europeans, it was a far more circumstantial process dependant on the conjuncture of a number of disparate conditions (Pomeranz 2001; Marks 2007). This thesis sees modernity as more of a process of intensification than as the development of anything truly novel. The level of intensification was, and is, something obviously new on the world stage but the engine of this intensification was fueled by older familiar processes, such as commoditization and colonization. The integration of the whole globe into this new 'modern' system was obviously novel in human history, but the processes behind this system were not. For the purposes of this thesis modernity is an issue of intensification and the ideological changes that allowed this and resulted from it.

Chapter 5 – Midden Excavation Strategy and Dating

Midden Excavation Strategy

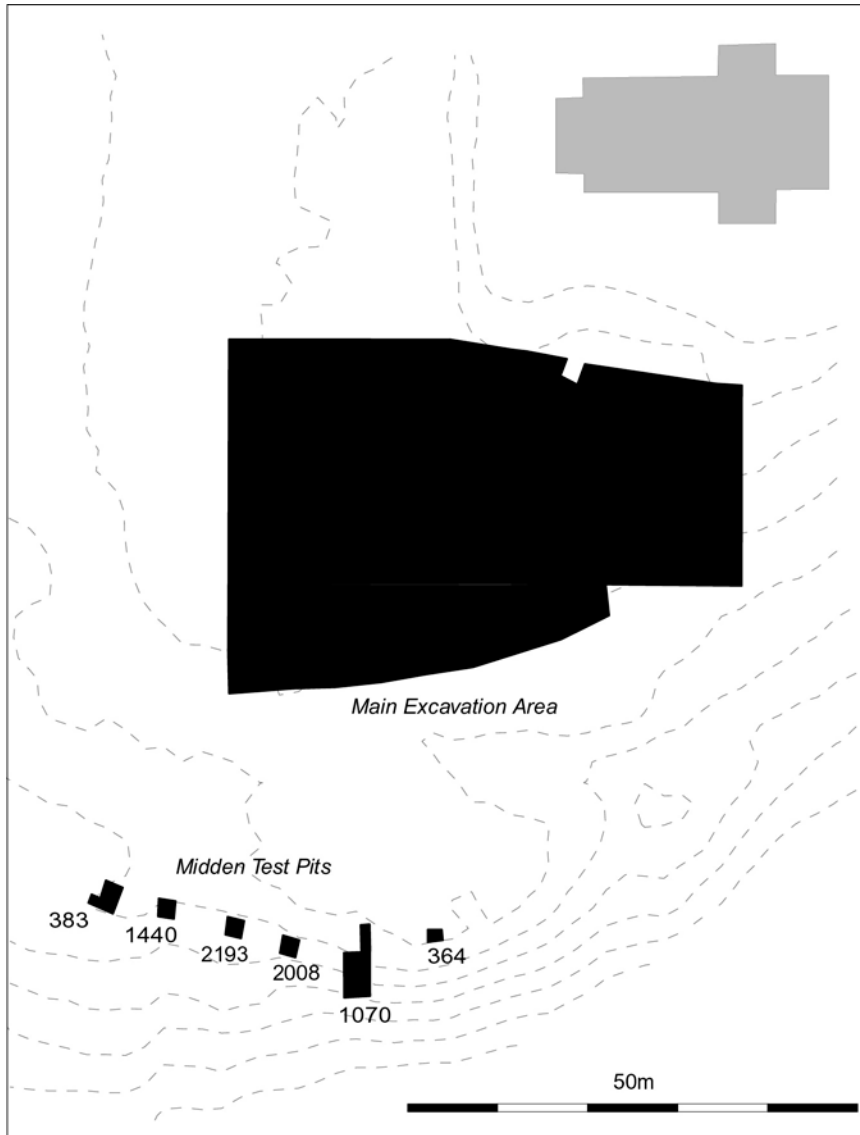


Figure 5 - Map showing the archaeological interventions at Skálholt from the 2004 to the 2007 seasons. The modern cathedral is shown in grey at the top of the map. The midden test pits that this thesis is based on are all on the break of the slope below the main excavation area.

A general rule of thumb generated out of collective observations over the last decades of midden excavations in the North Atlantic is that to find midden you need to start at the entrance to the structures that might have produced midden and walk a

short distance (5-10 meters) and there you will generally find the middens. The Scandinavian cultures in the North Atlantic generally deposited their trash close to their homes and often down the nearest slope. At Skálholt this reasoning was followed to good effect.

PLAN
DE SKÁLHOLT EN 1784
 PAR M. N. LOTTIN
d'après un manuscrit
communiqué par M. de l'imprimerie, sous le titre de Skálholt.

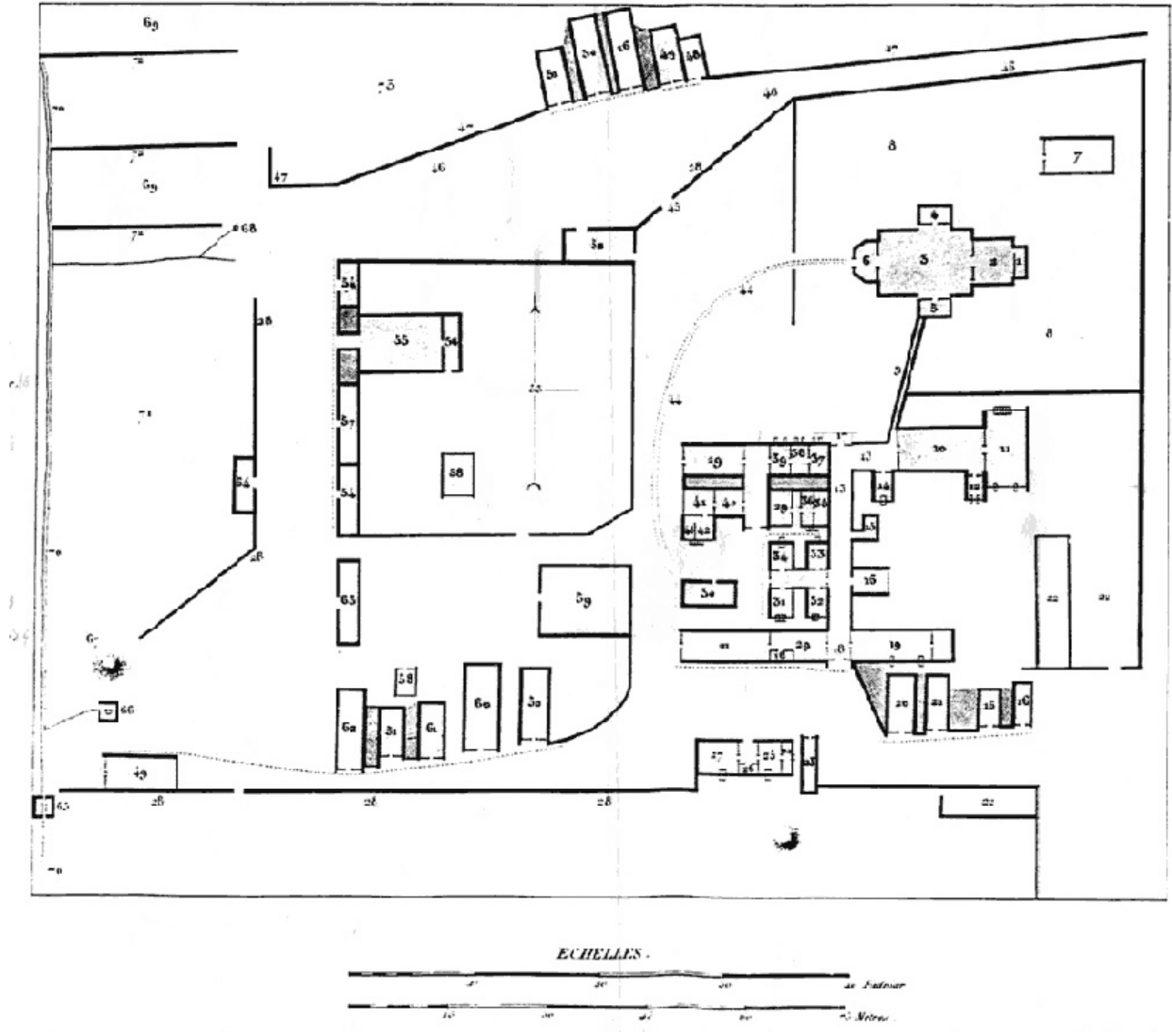


Figure 6 - 1784 plan of Skálholt. The main excavation area shown on the map of the archaeological interventions covers the area of the complex below the cathedral and that is connected to the same by a long passage (feature 3 on the map). The midden test pits would on this map be located below the wall (feature 28 on the map) at the bottom of the map. Traces of what were presumably this wall were found in a number of the test pits.

As figure 6 shows, there was a main entrance that emerged from the central corridor to the school and church structure. East of this entrance there are a number of sheds, one of which is described as a meat storage shed in the 1784 plan of Skálholt (feature 21 on the 1784 map). Beyond this is a wall that runs roughly north/south. This wall seems to run along the break of the slope that runs along a north/south line due east of the wall and the larger complex. The assumption behind the midden excavation strategy was that anyone leaving either the main complex through the door at the end of the main corridor with trash to dispose of, or from the sheds with trash from butchery activity would most likely walk the short distance to the wall and then throw the trash over the wall so that it fell down the slope. This was especially the case for groups 383, 1440, 2008, and 2193. All of these test trenches were put in so as to investigate the top of the break of the slope. Group 634 was put in to investigate the slope a bit further north where the slope goes from north/south to east/west. This spot seemed to be a potentially good place for midden deposition as the area forms a small knoll with a good view of the surrounding area and with slope running off of three sides. People do seem to be attracted to nice views and slopes, if they are available, when disposing of household trash. As the following data chapters make clear the strategy largely paid off.

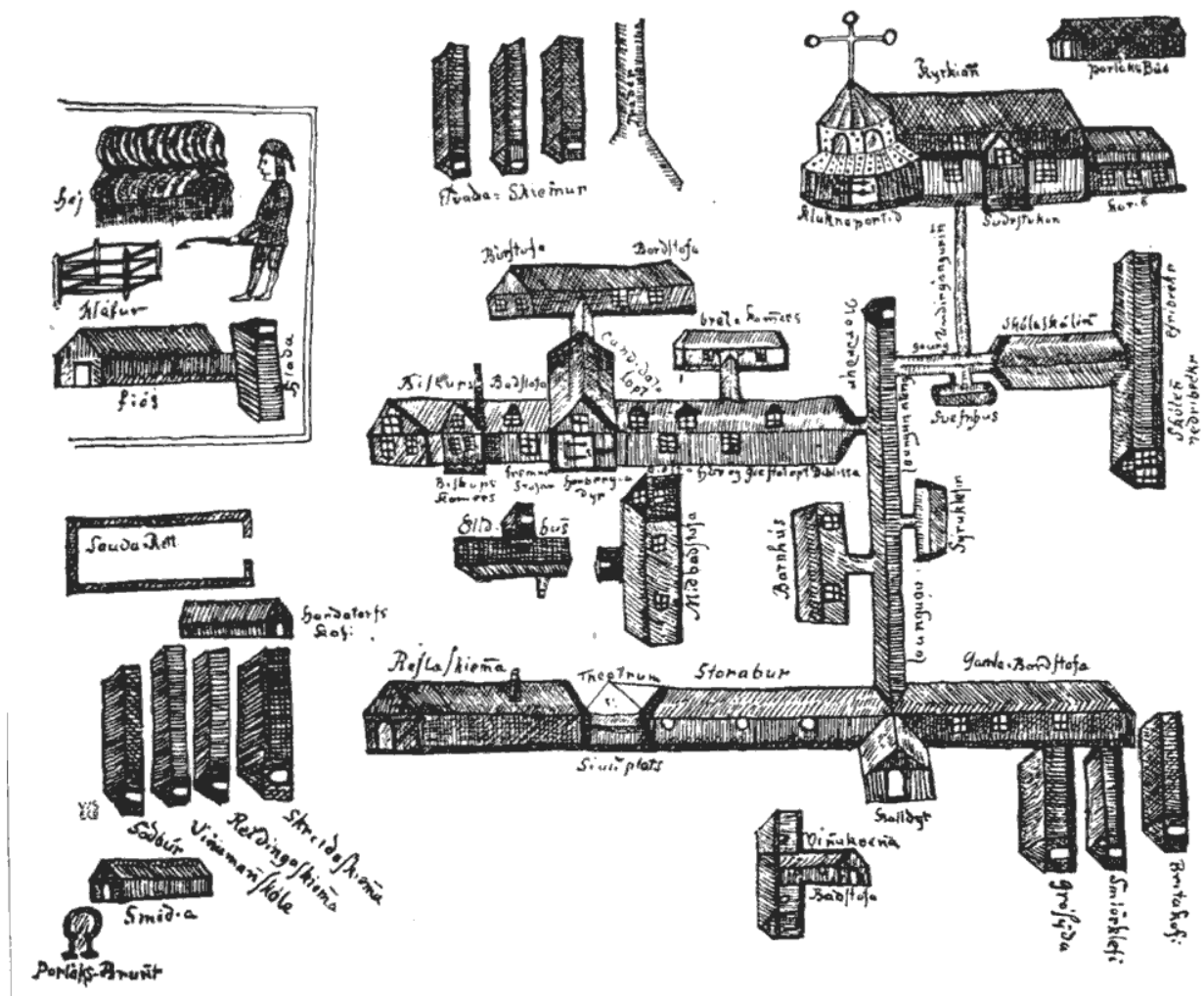


Figure 7 - An early 18th century map of the Skálholt complex. Once again you can see the main complex connected to the cathedral by a long passage. This was the main excavation area. The midden excavations took place, on this map, below the area of the map. A main entrance can be seen at the bottom of the main complex. Outside of it to the right are a number of store houses.

Dating the Middens

Artifacts and stratigraphy, when taken together, as well as the nature of the midden material recovered from these excavation groups reveal two dating ranges.

Groups 383, 1440, 2008, and 2193

Groups 383, 1440, 2008 and 2193 all show similar stratigraphic profiles, and most produced at least a few datable artifacts that give us a decent temporal range for the midden material found within them. All of the groups contained stones that were

either the product of wall collapse or, with the exception of group 2193, contained loosely dispersed stones at the same depth as the wall collapse in the other trenches . All the groups are in a loose line with the wall as it appears on the 18th century map.

The datable artifacts are covered in the specific data chapters. The main midden concentration, context 454 from group 383, was given a mid to late 17th century date primarily because of a pipe bowl with an identifiable maker's mark found in a context above this midden context that could be dated to 1635-1645. No clearly 18th century or more recent artifacts were found in or immediately on top of context 454. The other main midden concentration, context 1963, also contains no artifacts from the 18th century or later and also lies beneath a clear wall collapse episode at the same depth as that covering context 454. Context 1910 above context 1963 contained a token from either the 16th or 17th century. Group 2008 had no discrete midden concentration such as groups 383 and 1440. It did have a more even spread of faunal material throughout the stratigraphy of the trench. In this case all the material is early modern. Undatable tobacco pipe fragments were found throughout the contexts in this trench. Some pottery, all of which was undatable beyond the early modern range, though none of it was from the 18th century, was also found. A possibly 17th century copper coin, most likely a 1638 northern German thaler, was found in context 2104.

Group 2193 contained very few faunal materials or artifacts.

Stratigraphically all the trenches exhibited very similar dynamics, with the exception of Group 2193. The top quarter of the contexts were largely sterile and made up mostly of wind-blown deposits. Very few artifacts were found, and they were 19th century and early 20th century in origin. Below this the contexts contain much more

archaeological material and this dates to the early 18th century and mid to late 17th century. The bulk of the faunal material comes from contexts 454 and 1963. Both of these, given their similar locations in terms of depth as well as their location relative to the collapsed wall, and the artifacts found above them, date to the middle and late 17th centuries. The rest of the faunal material can be dated to a more general 17th-18th century range.

Group 634

As discussed in the data chapter for Group 634 datable artifacts, specifically pipe bowls with intact maker's marks found in the upper contexts as well as the bottom contexts supply a firm mid-18th century date for the midden material found in this group. There was also a 1650 Frederick III Danish coin found in context 1144.

Chapter 6 - Group 383

Throughout the North Atlantic Scandinavian cultural sphere, the usual domestic-mammal zooarchaeological assemblage reflects economies that concentrated on dairy production. Three elements make one unit within group 383, unit 454, unique within this North Atlantic context. The first is the overwhelming presence of cattle in the assemblage. No other known archaeofaunal context from Iceland or the North Atlantic region is so dominated by cattle. Not only is unit 454 clearly dominated by cattle but the total percentage of cattle in the archaeofauna so far analyzed from Skálholt is high, 57%. The second is a zooarchaeological profile indicating dedicated beef production, the first among non-modern archaeofauna from Iceland. Finally, the cattle represented by this assemblage show a curious lack of horns. Their lack of horns is from both animals that are naturally polled and animals that were polled when their horn buds were just emerging. This is, to date, a unique characteristic for archaeologically recovered cattle remains in Iceland. Any of these conditions alone in an Icelandic context in any period would be exceptional (McGovern, et al 2001). To find all three is remarkable and merits further consideration.

Group 383 (figure 5) was initially excavated by Dr. Jim Woollett, Matthew Brown, and Kate Krivogorskaya during June and July of 2003. Further excavation of this context was conducted by the author during June of 2004. The 2003 season was conducted as a midden sampling program, in conjunction with the FSI excavations of the 18th century phase of Skálholt. One context of group 383, context 454, proved to be an exceptionally dense and well preserved dump of animal bone. A total of 19,519 bone fragments were recovered from Context 454, representing roughly one third of the total

number of bone fragments recovered from the entire site from 2003 to 2005. The midden containing context 454 was, according to contemporary maps close to, and possibly associated with, a meat storage shed in which butchery activities presumably took place (see figures 6+7). Butchery related artifacts such as a piece of whale bone butcher block and a possible whale bone knife handle were found in context 454. It is also located alongside the edge of a roadway that ran through a complex of outbuildings south of the Bishop's residence. The midden was formed through a series of dumps of refuse, ash and fill over the wall by the edge of the road. Context 454 was the only context in this midden associated with quantities of well-preserved, whole animal bones. This midden was found directly below a collapsed wall that originally followed the break of a slope running roughly east/west a short distance, about 20 meters, south of the main complex and near one of its main entrances. It is an extremely dense midden deposit, with very little sediment present between the closely-packed and entangled bone fragments. Because the edges of adjacent, thin peat ash deposits interdigitate with it, context 454 seems to represent an accretion of multiple dumps occurring over a fairly short time period. The midden from context 454 will be presented as one body of data. The rest of the data from group 383 will be presented afterwards. The rest of the

data is minuscule relative to context 454 and cannot be dated with any precision.

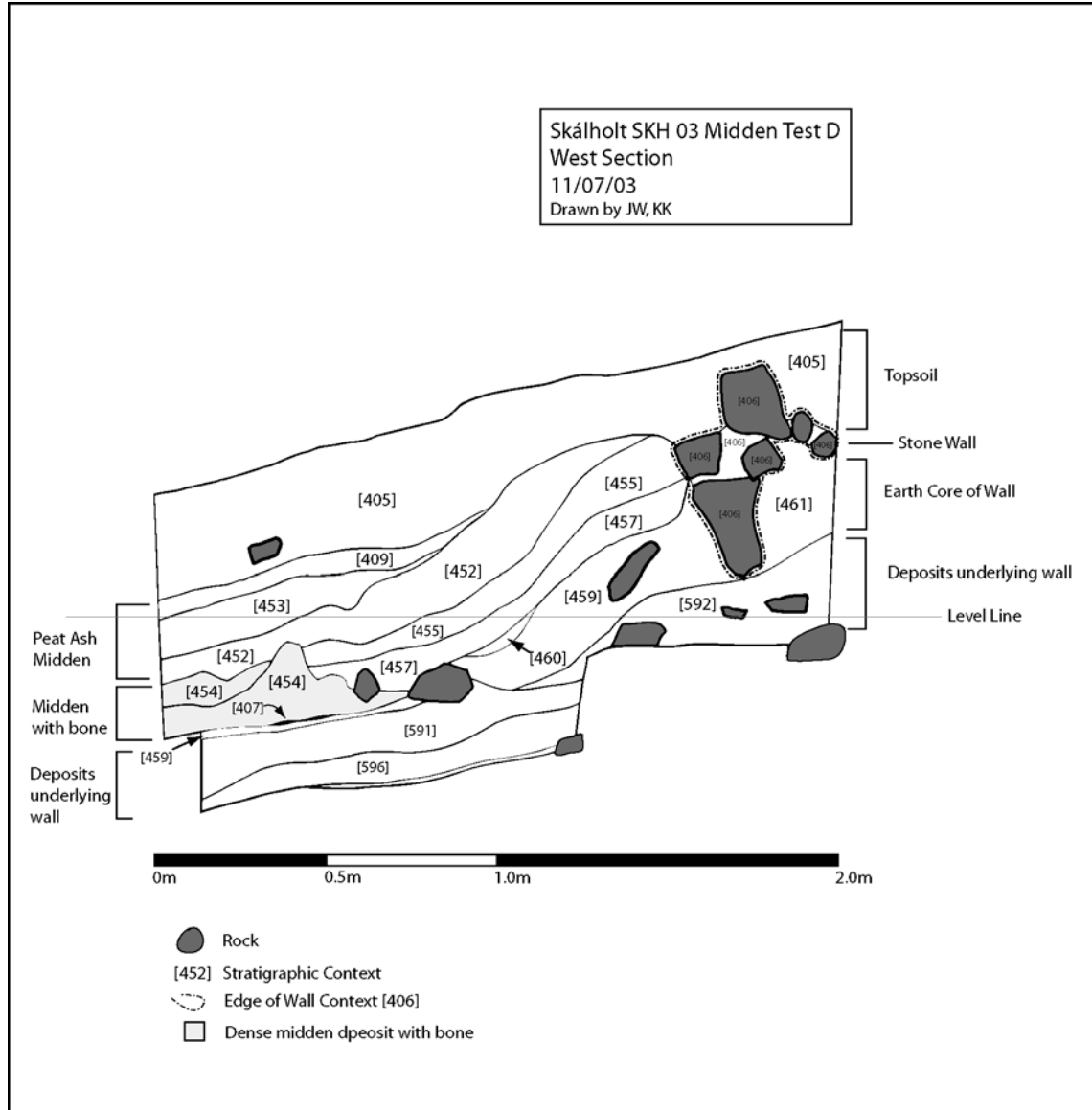


Figure 8 – Group 383 west section.

Dating/Phasing

Ceramics found within this group are not datable beyond a general early modern/late medieval period. No ceramics positively datable to the 18th century or more recent times were found. It is worth noting that a large number of datable ceramics from the 18th century have been found within the excavations of the residential areas. The

depth of the midden, over one meter, and finds found above and within the midden, such as a 17th century Dutch pipe bowl, and fragments of tin-glazed earthenware suggest a date within the seventeenth century. Unit 453 contained a Dutch pipe bowl with a rose stamp on the base of the heel. This has been dated to 1635-1645 giving a tpq of 1635 for this unit (Duco, personal communication). Another 17th century pipe bowl with maker's mark (TT around a rose under a crown) was found within unit 454. Three other 2X2 meter trenches were excavated 5 (group 1440), 10 (group 2193) and 15 (group 2008) meters east along the same slope as group 383 in June and July of 2006. They were all excavated down to a similar depth to that of group 383, a little over one meter. Group 1440 contained a 17th century Dutch pipe bowl as well as other artifacts typical of the 18th and 17th centuries such as stoneware and glazed and unglazed redwares. Group 1440 also contained a midden context below a collapsed wall at almost the exact same depth as that of group 383 and unit 454. This midden is very similar to that of unit 454 in that it is dominated by prime beef age cattle. Group 2193 contained little bone and the wall collapse did not appear but a single early 17th century pipe stem (with maker's mark) did appear in one of the middle layers. Group 2008 also contained an early seventeenth century Dutch pipe bowl, fragments of tin-glaze earthenware, and a most likely 1638 northern German thaler (Lucas, personal communication). The deepest unit in this group contained half of a naturally polled cattle skull. No late 18th century ceramics or other artifacts were found in any of these groups. The similarity of the stratigraphy of all these units, and the few but generally 17th century artifacts found give the midden from layer 454 a defensible mid 17th century date, though the 18th century cannot be completely ruled out.

No other finds of any sort from group 383 can be positively dated though all are characteristic of early modern Iceland.

The rest of the units in group 383 contained no diagnostic datable material. All we can say is that the units above unit 453 are later than 1635. Below unit 454 we have no way of dating. Regardless this group is overwhelmingly made up of the material from unit 454 and the rest of the unit produced very small amounts of material.

Context 454 was also sealed by the debris from a stone wall that collapsed sometime after the deposition of context 454. Contemporary maps and drawings suggest that this wall was still standing in the 18th century, perhaps up to the earthquake in 1784 (see figures 6 and 7).

Taphonomy

The cattle bones of Unit 454 show good representation across density and MGUI quartiles (figure 9). These bones then have survived well from deposition to excavation. There is relatively good distribution across each MGUI quartile indicating that bones of all densities survived from deposition to excavation. The cattle bones from this midden then are a satisfactory representation of the bones originally deposited.

Skalholt SU 454 Bos taurus Bone Density and MGUI Ranking Compared

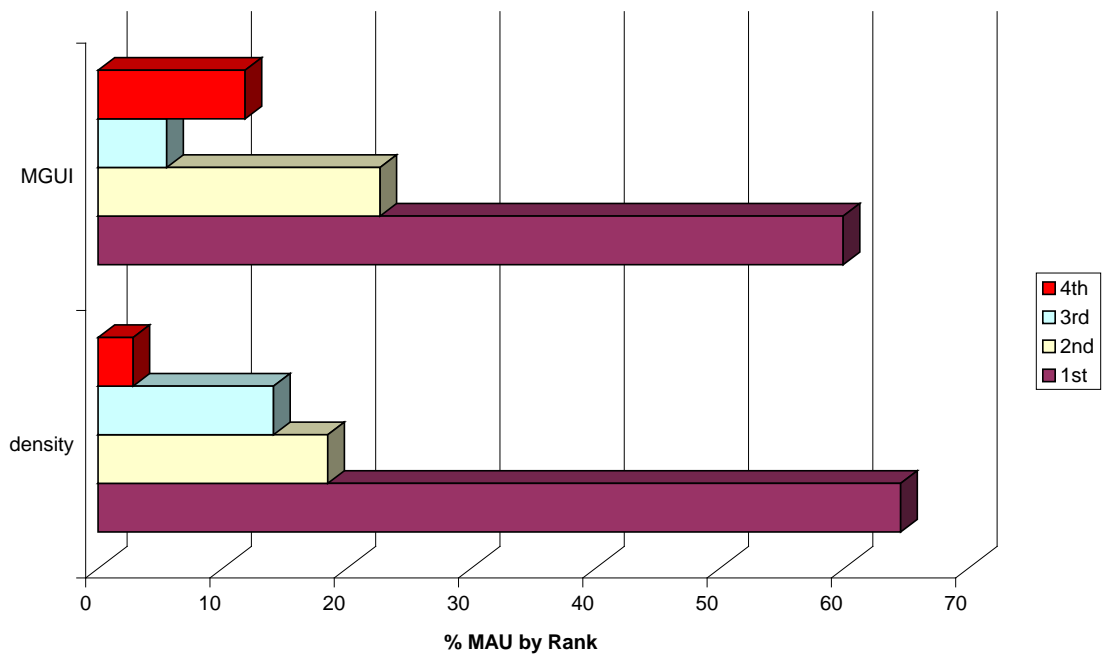


Figure 9 - Layer 454 cattle bone MGUI and bone density rankings.

Caprine bones from unit 454 are less well spread out. The denser bones predominate (figure 10). Yet these figures are still not those of a ravaged collection, meaning one that has not survived the processes between deposition and excavation, and do indicate that the caprine bones are a fair representation of the original dump.

Both of these charts show that the midden represented by unit 454 is a good representation of the original dump that created the midden. These bones are a good representation of the activities that resulted in the midden.

Skalholt SU 454 Caprine Bone Density and MGUI Ranking Compared

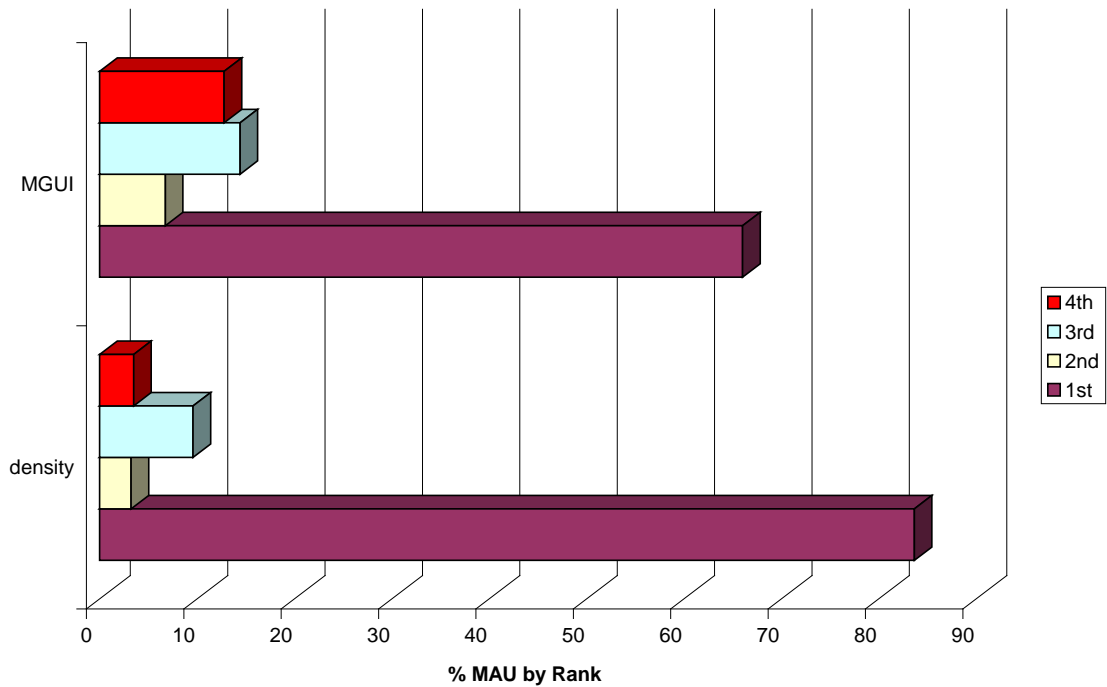


Figure 10 - Layer 454 caprine bone MGUI and density rankings.

Element distribution also reinforces this impression. Both cattle and sheep elements from across the animal are found (figures 11+12). Though the areas carrying less meat are underrepresented they are still there. This suggests a few things, but for the purposes of taphonomy it reinforces the view that we have very good preservation as elements from across the body survived, not only especially dense elements such as teeth.

Skalholt SU 454 Bos taurus Bone Element Distribution

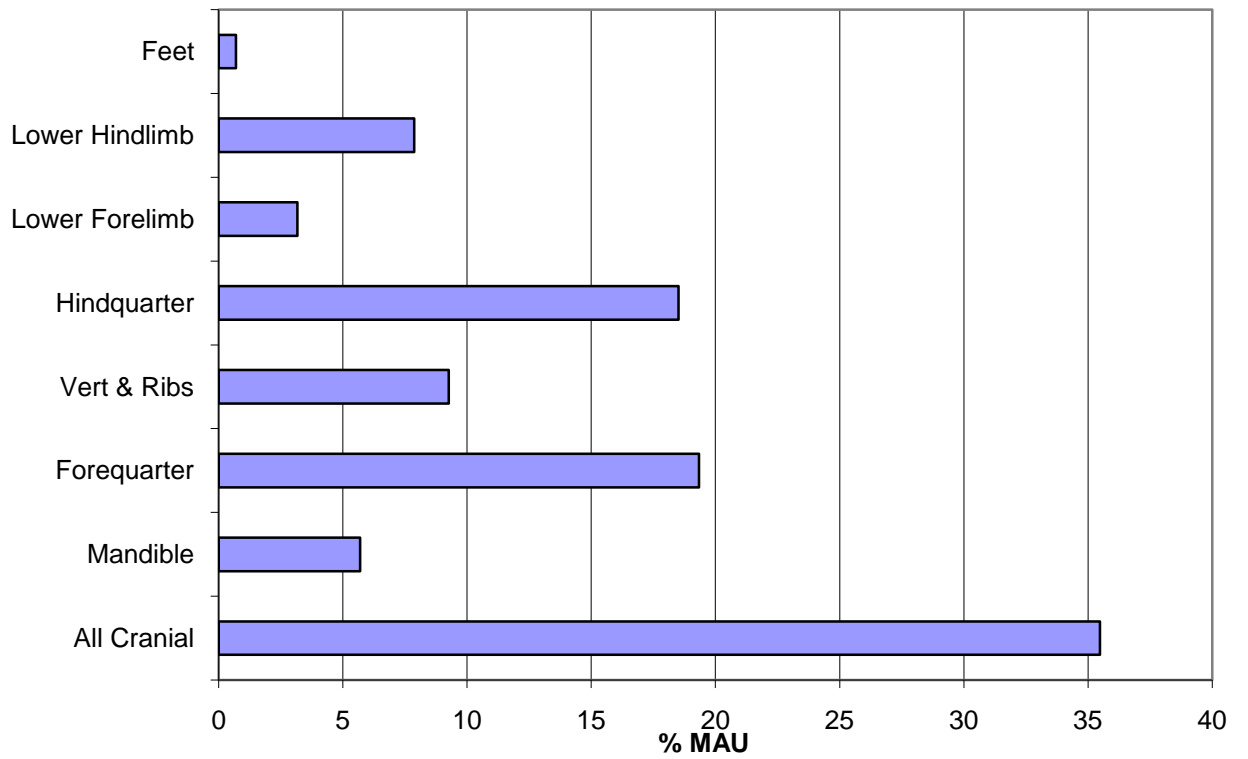


Figure 11 - Layer 454 cattle bone element distribution.

Skalholt SU 454 Caprine Bone Element Distribution

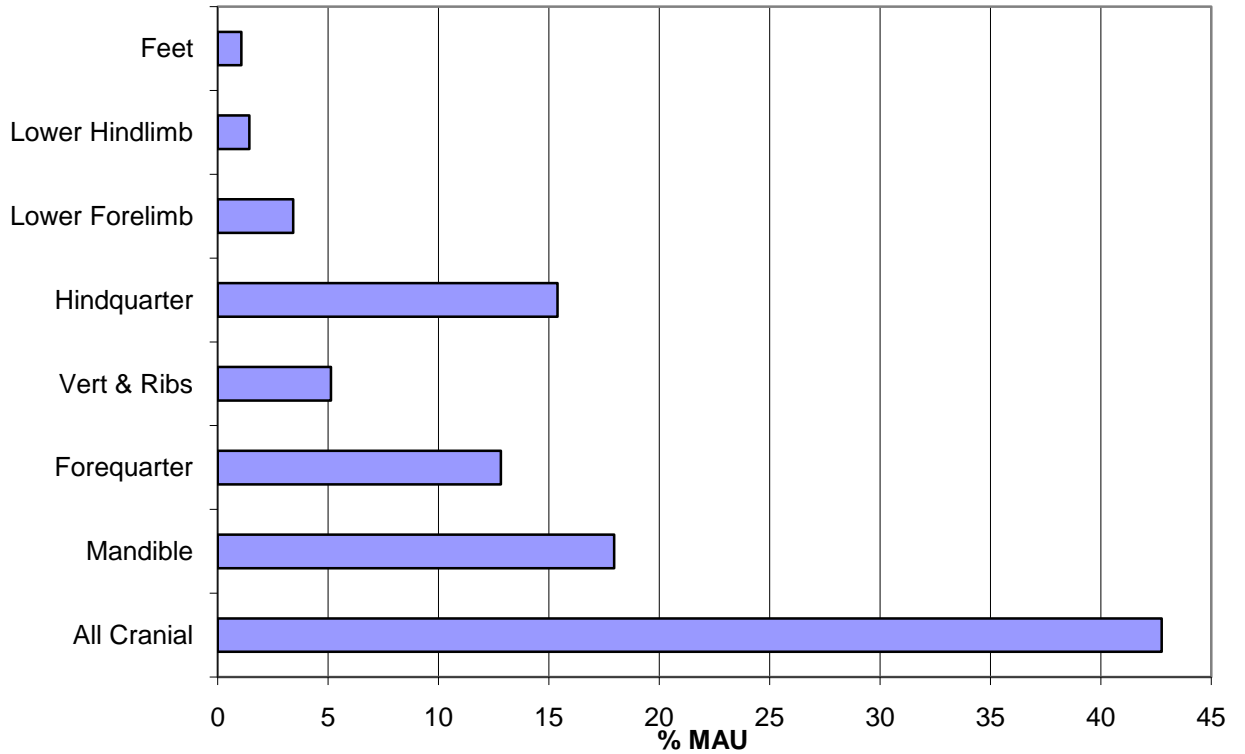


Figure 12 - Layer 454 caprine bone element distribution.

Overview of Species Present

Table 1 presents the number of identified specimens (NISP) 3242, and the less well identified categories of “Large Terrestrial Mammal” , “Medium Terrestrial Mammal” and “Small Terrestrial Mammal” and unidentified mammal bone fragments which contribute to the overall total number of fragments (TNF) of 19,519.

Table 1

<i>Layer 454 Overview of Species Present</i>	
Domestic Mammals	Count
<i>Cattle (Bos taurus)</i>	887
<i>Horse (Equus caballus)</i>	3
<i>Dog (Canis familiaris)</i>	present
<i>Sheep (Ovis aries)</i>	27
<i>Caprine (Sheep and Goat)</i>	118
<i>Total Caprines</i>	145
<i>total Domesticates</i>	1035
<i>Cetacea</i>	2
<i>Arctic Fox (Alopex lagopus)</i>	2
<i>Fish sp to be determined</i>	2203
	<i>NISP total</i>
	3242
<i>Large Terrestrial Mammal</i>	888
<i>Medium Terrestrial Mammal</i>	94
<i>Small Terrestrial Mammal</i>	1
<i>Unidentified mammal fragment</i>	15,294
	<i>TNF total</i>
	19,519

Horses are represented by a whole metatarsus, which may represent raw material for craft work rather than meat waste, though there is also a molar and a fragment of a horse scapula. Dogs are represented by tooth marks on bones, and were certainly present on site despite the absence of their remains from this context. The tooth marks could also have been made by Arctic Fox which is present in the context. Both of the cetacean bones are artifacts associated with butchery. One is a knife handle

and the other (a piece of whale vertebrae) was used as a chopping block. Birds are not present in the current sample.

Of the unidentifiable mammal bones, LTM (large terrestrial mammals) make up a similar majority in proportion to MTM (medium terrestrial mammals) and STM (small terrestrial mammal) as cattle to caprines in the NISP. Considering that equids are represented by only three elements, and that the proportions between bos versus other mammals and LTM versus MTM (medium terrestrial mammal and STM (small terrestrial mammal) are similar it might not be too risky to associate LTM with cattle.

Domestic Mammals

Table 2 presents the percentages of domestic mammals. Cattle dominate the domestic mammal assemblage; no other currently known archaeofauna from Iceland has such a high percentage of cattle bone. Caprines together make up less than 15% of the deposit.

Table 2

<i>Domestic Mammals</i>	<i>% NISP</i>
<i>Cattle (Bos taurus)</i>	85.00
<i>Horse (Equus caballus)</i>	0.30
<i>Dog (Canis familiaris)</i>	<i>present</i>
<i>Sheep (Ovis aries)</i>	4.00
<i>Caprine (Sheep and Goat)</i>	11.00
<i>Total Caprines</i>	15.00

Finding cattle at a high status site such as Skálholt is not out of the ordinary, but to find an assemblage so totally dominated by cattle is. In comparison, archaeofaunal

assemblages from the medieval farm sites of Sveigakot and Hofstaðir in the north of Iceland exhibit far higher numbers of caprines, with cattle routinely representing between 15-20% of the archaeofaunal assemblages in the early period after landnam, and then falling to 10-15% later in the early medieval period (McGovern et al 2001, Perdikaris et al 2004). The archaeofaunal assemblage from a lower ranking 18th century site in NW Iceland, Finnbogstaðir, has cattle making up roughly 10% of its assemblage (Edvarsson et al, 2004). Further comparative data is presented in chapter 16.

Mortality/Age Structure of Cattle

A number of approaches have been applied to archaeofaunal assemblages to determine the age at which animals were killed in an effort to reconstruct herding strategy (Payne 1974). The presence of newborn (neonatal) bones, tooth eruption and wear, and fusion state of long bones are all usually combined in an attempt to reconstruct the mortality profile (Enghoff 2003). The cattle in the context 454 collection are almost all adults or older juveniles (table 3). Neonatal bones are barely represented in this assemblage but normally make up 20-40% of most Icelandic farm collections from all periods.

Table 3

Adult/Juvenile and Neonatal Cattle Bones		
Cattle Bones	# of bones	
Adult + Juvenile	887	9.66
Neonatal	3	.34

Tooth eruption patterns observed on both maxillary and mandibular cattle tooth rows, table 3, indicate that the majority came from young adult animals.

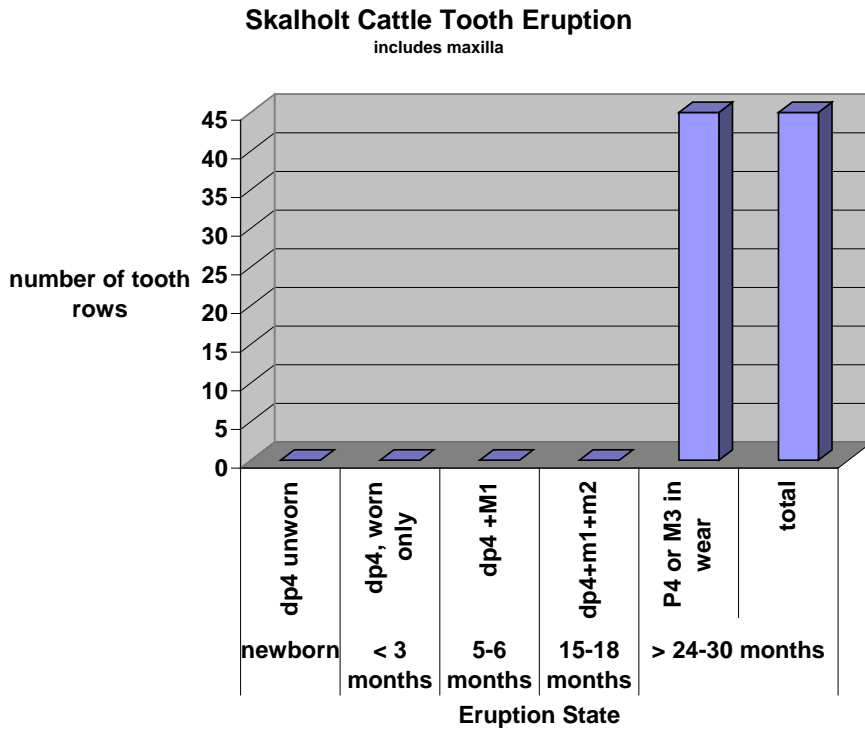


Figure 13 - Layer 454 cattle tooth eruption.

Figure 14 presents the wear state of the cattle maxillary third molar, erupting when the animal has become fully adult. The majority of these erupted third molars (M3) show very light to medium wear, suggesting that the majority of these animals were young adults rather than old dairy cattle reaching the end of their useful lifespan.

Cattle M3 Wear

* # of elements

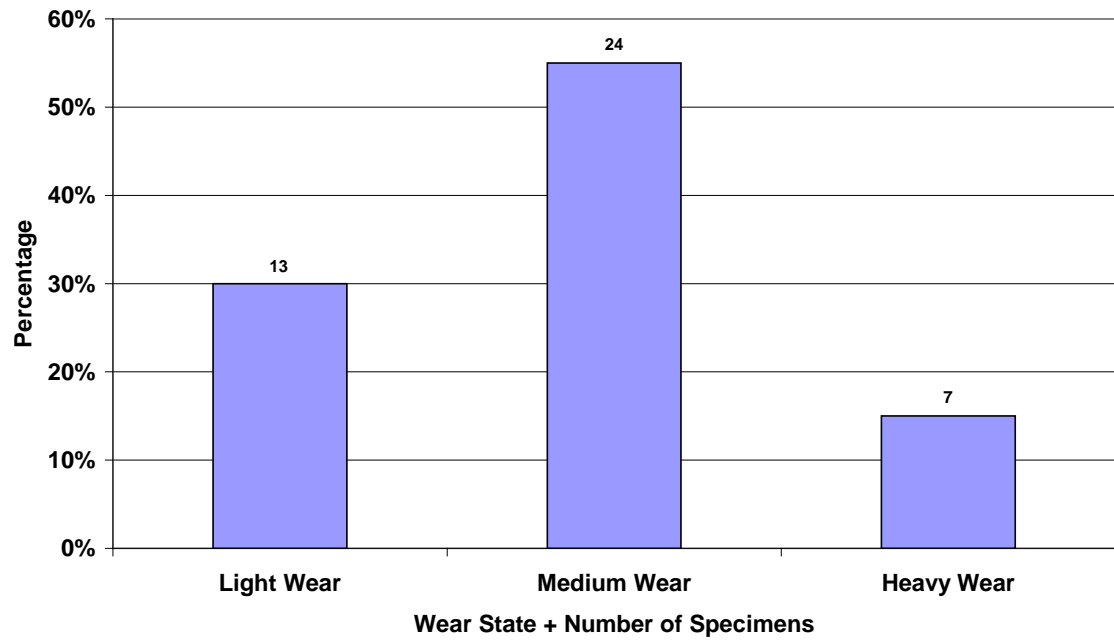


Figure 14 - Layer 454 cattle M3 wear.

Skalholt Cattle MWS - Context 454

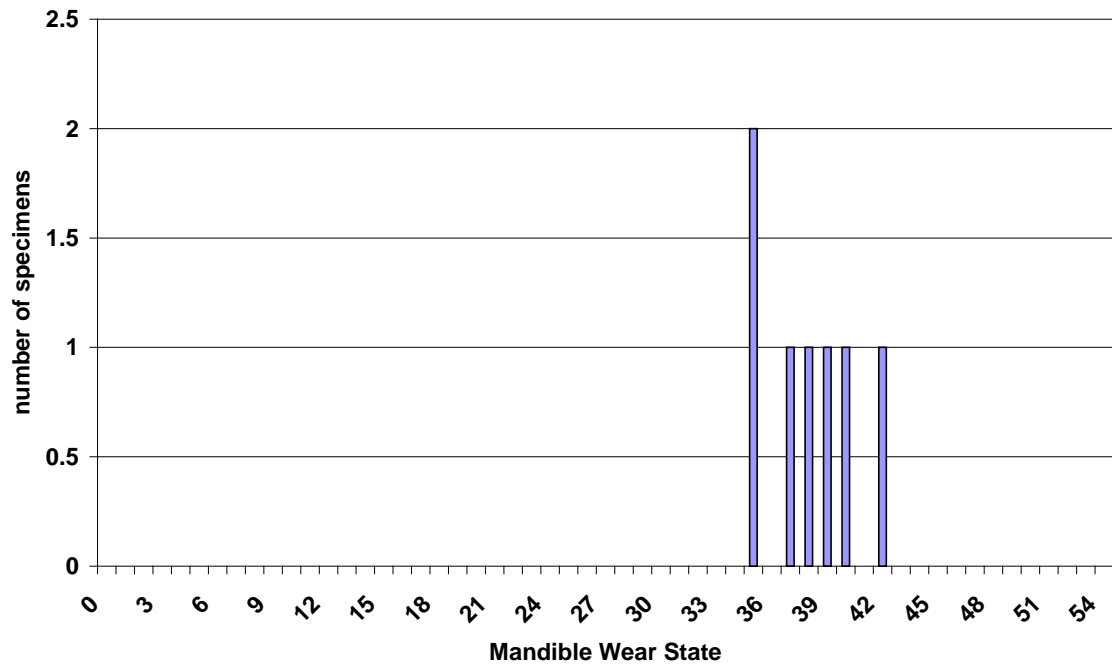


Figure 15 - Layer 454 cattle mandible wear state.

Figure 15 presents the mandibular wear state for the available cattle jaws, making use of the Grant (1982) method, age estimates relative to tooth eruption and wear from Grigson (1982). Light and medium wear account for roughly 84% of the sample of maxillary tooth rows (out of 44 samples). This strongly suggests that these cattle were slaughtered when they were three years old or older (Grigson, 1982). The significantly smaller number of M3 showing heavy wear suggests that there were few older animals, meaning older than 4-5 years, represented in this dump. The mandibular tooth rows tell a similar story, suggesting that the majority of the cattle represented by unit 454 lived until sometime after their third year. Due to the much larger sample size of maxillary tooth rows, the M3 maxillary tooth wear data should be emphasized over the mandibular tooth wear data, with its much smaller sample size (7 mandibular tooth rows). Also, dental wear is a relative indicator of age. Different levels of erosion and

pasture fertility can, for example, either inhibit or increase the levels of tooth wear in a cow. In order to lessen the “noise” from such possible variables the fusion state of selected long bones must be examined as well.

The fusion states of the cattle long bones reinforce the idea that these cattle lived beyond their third year, but not much longer than their fourth year (figure 16).

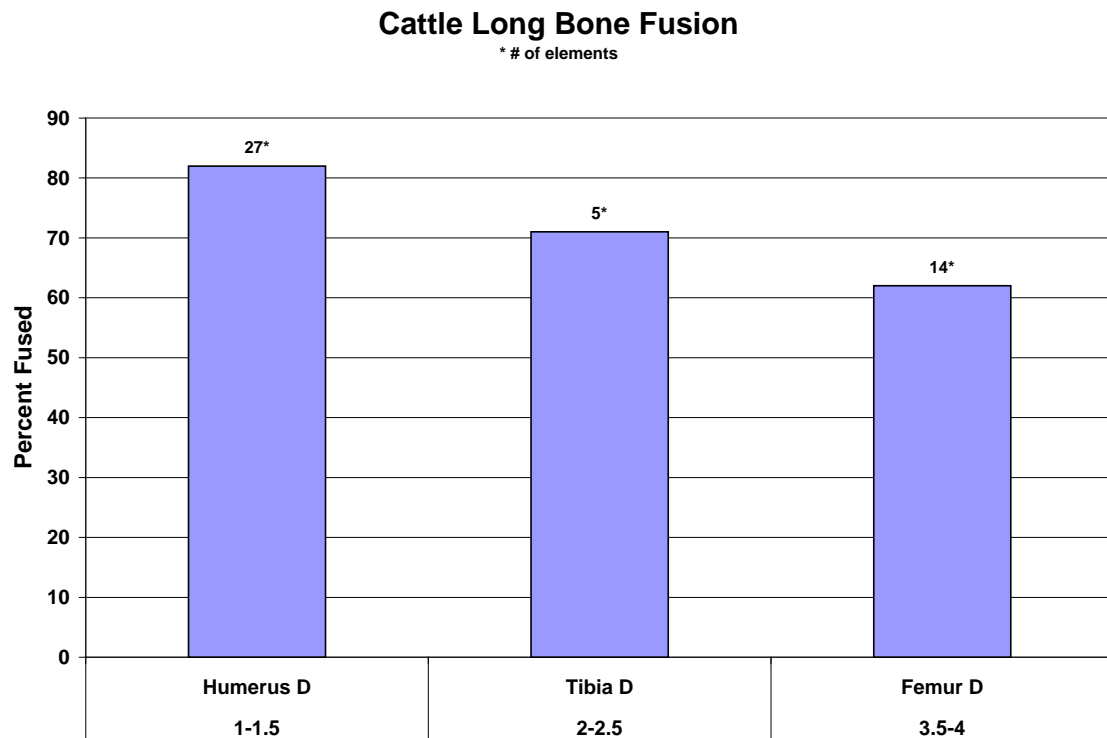


Figure 16 - Layer 454 cattle long bone fusion percentages.

As can be seen from the above chart 38% of the cattle in this assemblage had unfused distal femurs by the time they were slaughtered. This fusion does not happen until sometime in the second half of their third year of life. 62% of the distal femoral ends are fused. This is the largest proportion of unfused long bones in this sample. Coupled with the tooth wear data this reinforces the idea that this assemblage is the product of a meat producing sector of Skálholt’s economy. Slaughtering cattle in the second half of their third year would probably take them at or near the peak of their

growth curve, before they could become effective milk producers but near the point where further feeding produced little or no increase in carcass size (Payne 1974). Dedicating valuable fodder towards the raising of full sized cattle is a high status investment. In a zooarchaeological assemblage from dairy economies of less wealthy, though by no means poor farms in Iceland, one finds a large amount of bones from neonates and then again from older animals, past their prime (McGovern, 2003). The older cows represented in the assemblage, such as the 62% fused distal femoral ends, and possibly the heavier wear on the maxillary M3's, could be the culling of less productive dairy cattle. Yet the long bone fusion and tooth wear data together point towards a meat producing husbandry strategy. For the purposes of contrast, the following examples from the site of early medieval sites of Hofstaðir and Sveigakot illustrate the dairy pattern well.

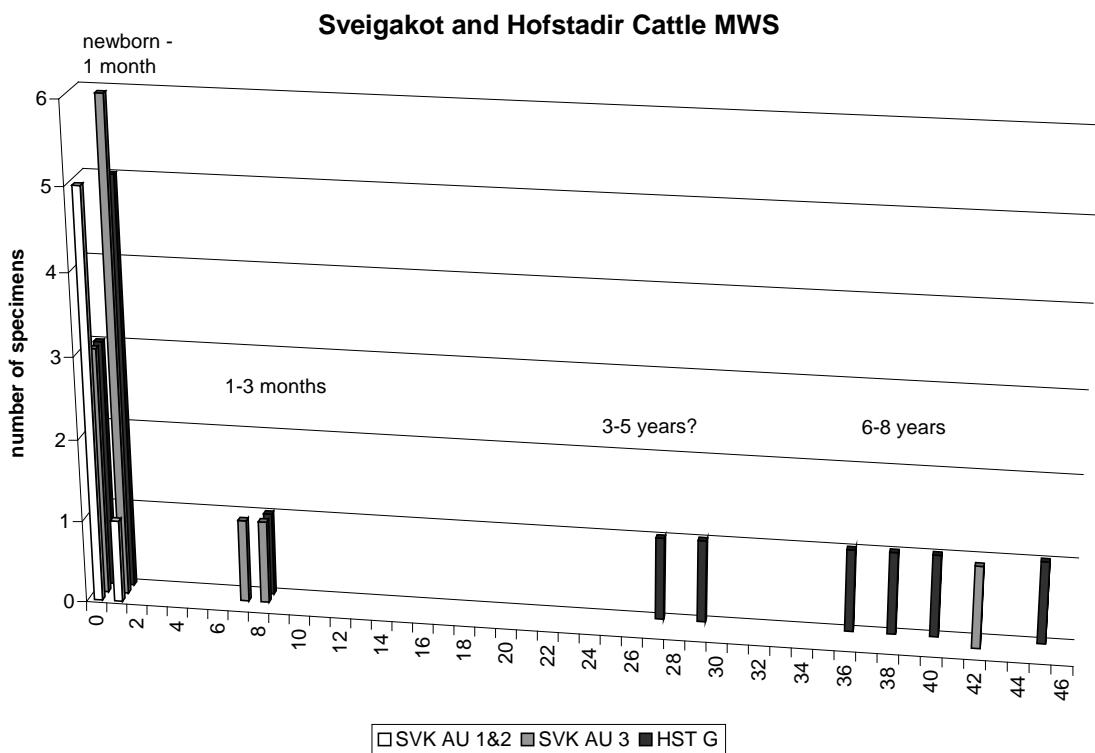


Figure 17 - cattle mandible wear states from Hofstaðir and Sveigakot, Iceland (McGovern 2003).

In both these cases we see large scale culling of young cattle soon after birth, reserving available grazing for the adult dairy cattle (and their mother's milk for human consumption). At Hofstaðir, a relatively high status site, it seems that a small number of cattle were allowed some time to grow for greater meat productivity. In both cases we also see evidence of very old cattle, which were presumably females slaughtered after they had exceeded their prime milking years. Further comparative data is presented in Chapter 16.

Mortality/Age Structure Caprines

Larger numbers of elements would be ideal for analysis but the complete lack of neonatal bones or deciduous teeth might indicate that these caprines were all mature animals. How many were old animals is hard to tell. Three of the mandibular and maxillary specimens show tooth wear indicative of older animals. The remaining two have tooth wear representative of mature animals.

The caprines of unit 454 are significant largely due to their small numbers relative to the cattle. As previously discussed caprines outnumber cattle in all other Icelandic archaeofaunal contexts. Other than their small numbers these caprines seem to be a combination of older and mature animals slaughtered for meat. The size of the complex at Skálholt made it one of the few early modern, or medieval, sites that would have had dedicated separate butchery buildings. The fact that this particular assemblage is so dominated by cattle bones is a curiosity that will be addressed in chapter 11.

Metrics

Metrics will be covered in chapter 12 following the data chapters.

Butchery

Out of a total of 887 cattle elements, 247 showed clear signs of butchery, 28% of the total. These butchered cattle elements show a range of different types of butchery.

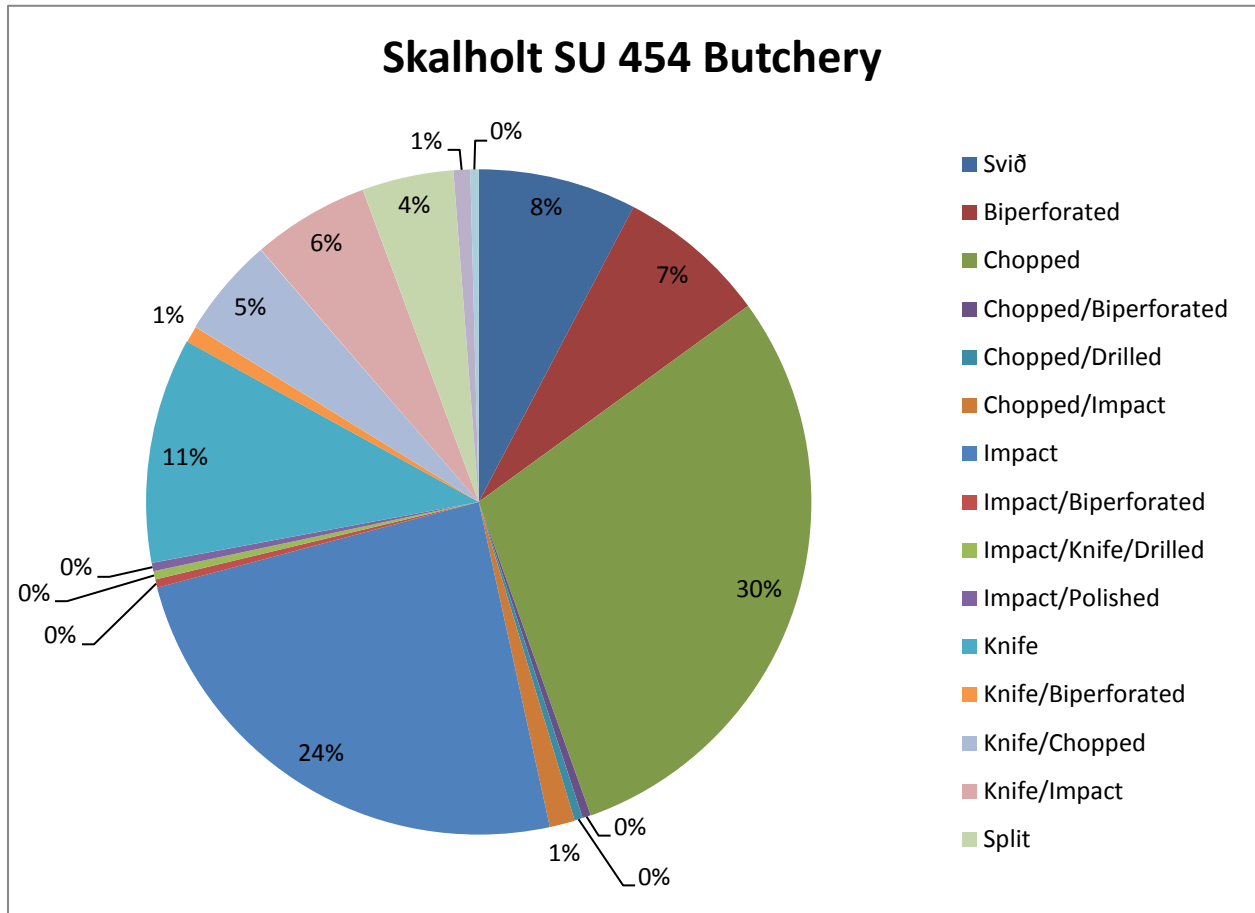


Figure 18 - Layer 454 butchery.

The wide variety of butchery practices, especially when the fact that very little burning or signs of cooking are apparent (next section), seem to reflect primary butchery activities, again most likely associated with the butchery shed located nearby. Chopping, and impact blows to release marrow from long bones are the two processes seen the most in the assemblage. Knife cuts, usually at the ends of the shafts of long bones, are also apparent. The lack of burning or cooking coloration along with the knife marks suggest that the large long bone fragments found in this assemblage had the

meat cut off of them. Of course, evidence of meals that involved meat on the bone would most likely be found in other middens. Midden trenches discussed in the following chapters might show evidence of more domestic waste. For context 454 though it is significant that at least some of the butchery activity taking place involved taking meat off of the bone. This might be an activity related to a cultural change similar to that described as 'Georgian' by Jim Deetz.

Burning

Out of a total of 19,519 fragments from unit 454 only 135 show any signs of burning.

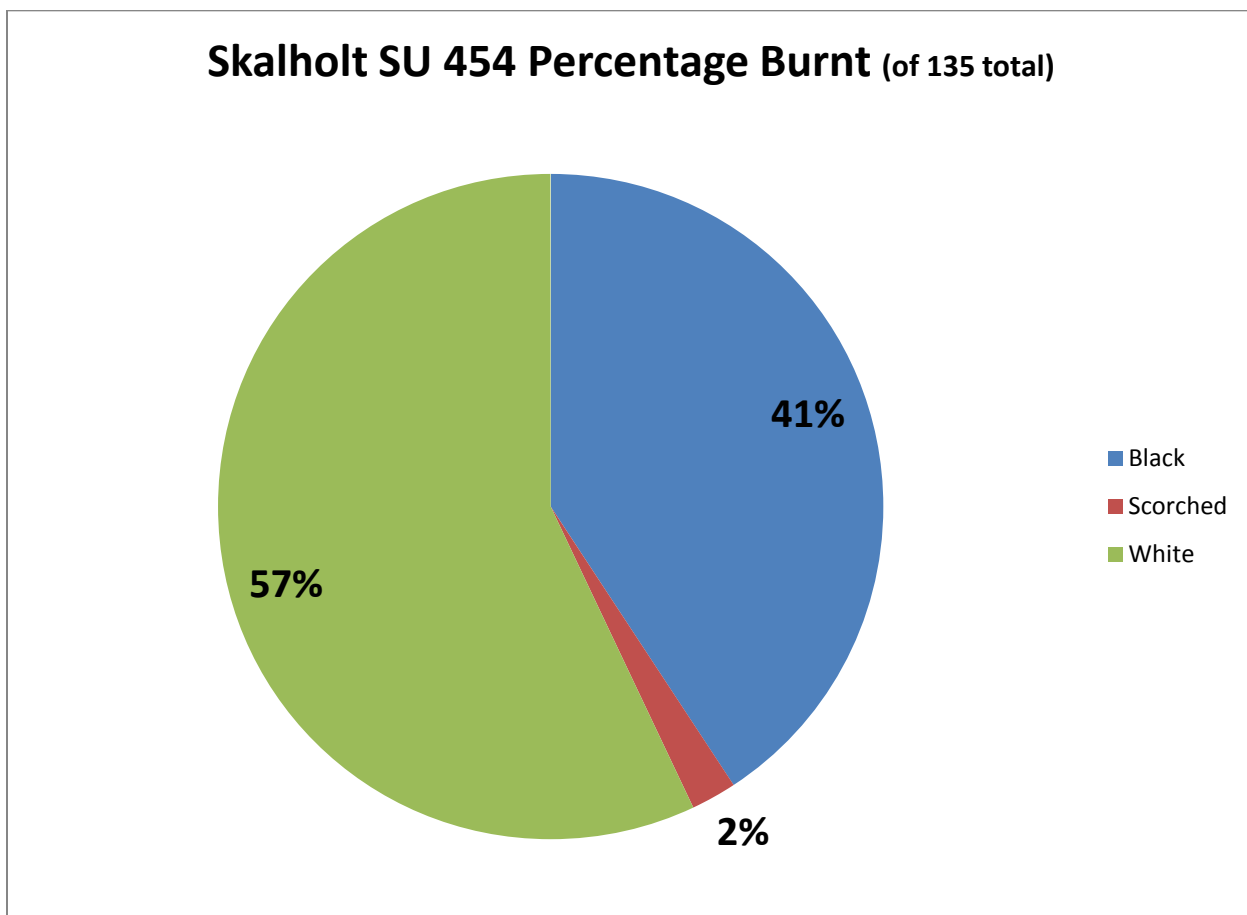


Figure 19 - Layer 454 burning.

This very small percentage of burnt fragments is roughly divided in half in terms of white versus black burning. The very small amount of scorching is mirrored throughout the midden deposits. The primary fuel used in most Icelandic contexts in the early modern period was peat. This produced, without a bellows, a fairly low heat relative to wood or coal. This is most likely explains the lack of scorching in most of the midden deposits. The very small amount of burnt bone relative to the rest of the context indicates that most of the material from this context came straight from a primary butchery situation. A number of other contexts within this group, which will be discussed later in this chapter, are largely made up of small burnt bone fragments, again mostly burnt either white or black. I am interpreting these contexts as domestic refuse, mainly sweepings from the main structure. This area outside of the structure clearly saw both primary butchery refuse, from the butchery shed that was located at the crest of the slope (see figure 6) as well as domestic refuse that would have been gathered within the main compound and then transported outside and thrown down slope. As discussed in the previous section it is interesting that a significant amount of the butchery activity involved taking meat off of the bone, as opposed to cooking meat still on the bone.

Fish

Table 4 - Layer 454 fish.

Fish	1232
Gadid species	52
Cod (<i>Gadus morhua</i>)	15
Haddock(<i>Melanogrammus aeglefinus</i>)	1

Relative to the whole assemblage produced by context 454 the fish are a very small portion of the whole. This midden was the product mainly of primary butchery

associated with the butcher's shed located nearby. Some domestic refuse made it into context 454, but relatively little compared to the bulk of the assemblage. The fish numbers are small, but they do reveal a fairly typical Icelandic assemblage completely dominated by gadids. What could suggest some differences with other early modern Icelandic sites is the fact that the NISP of this particular midden is largely dominated by cod.

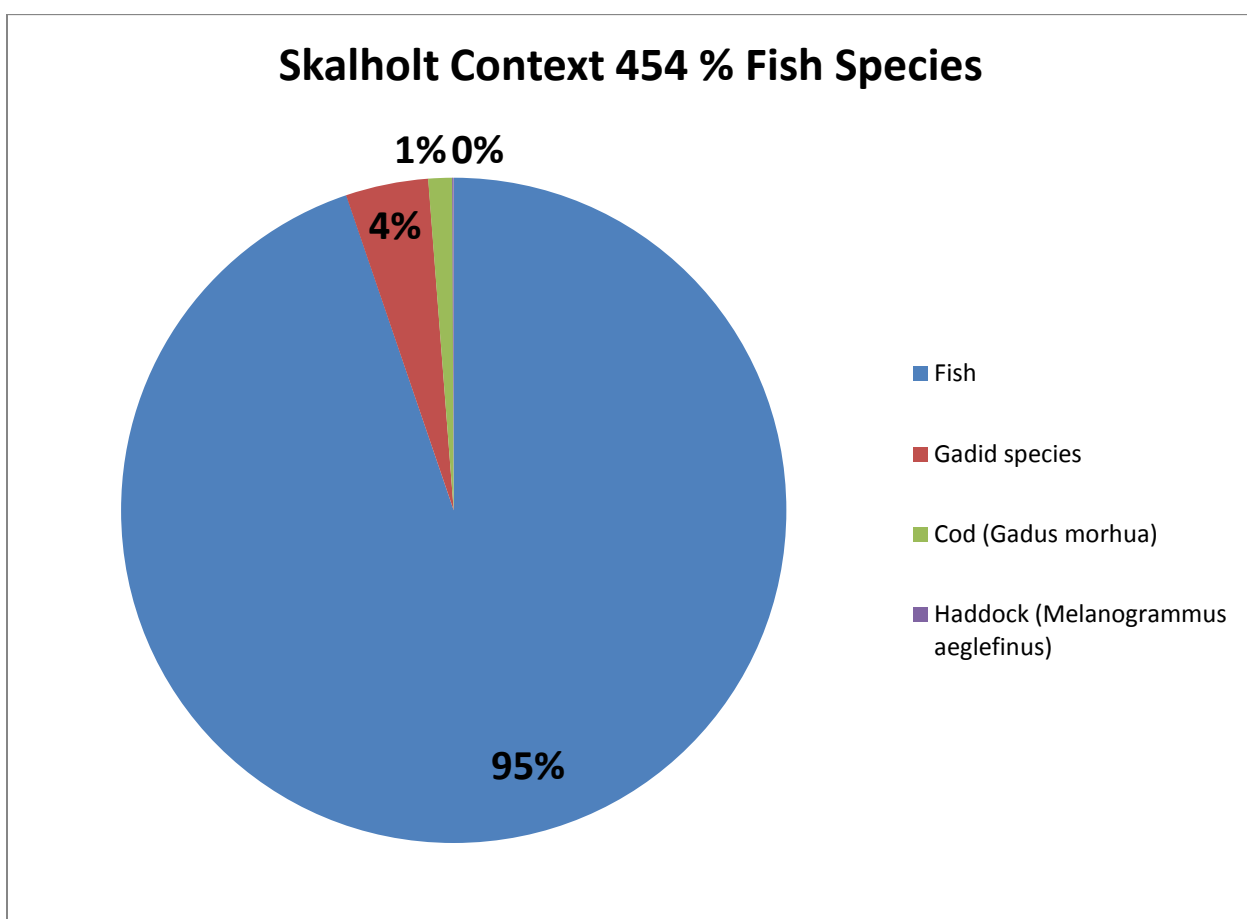


Figure 20 - Layer 454 percent fish by species.

At least some of the cod bones in this context seem to be the product of dried cod. Figure 21 shows the fairly significant dominance of axial elements of the cod skeleton as found in this context. This would suggest that at least some of these bones

are the product of dried cod consumption. The presence of at least some cranial elements on the other hand suggests some consumption of fresh cod at Skálholt, a sign of the relative wealth of the inhabitants of Skálholt.

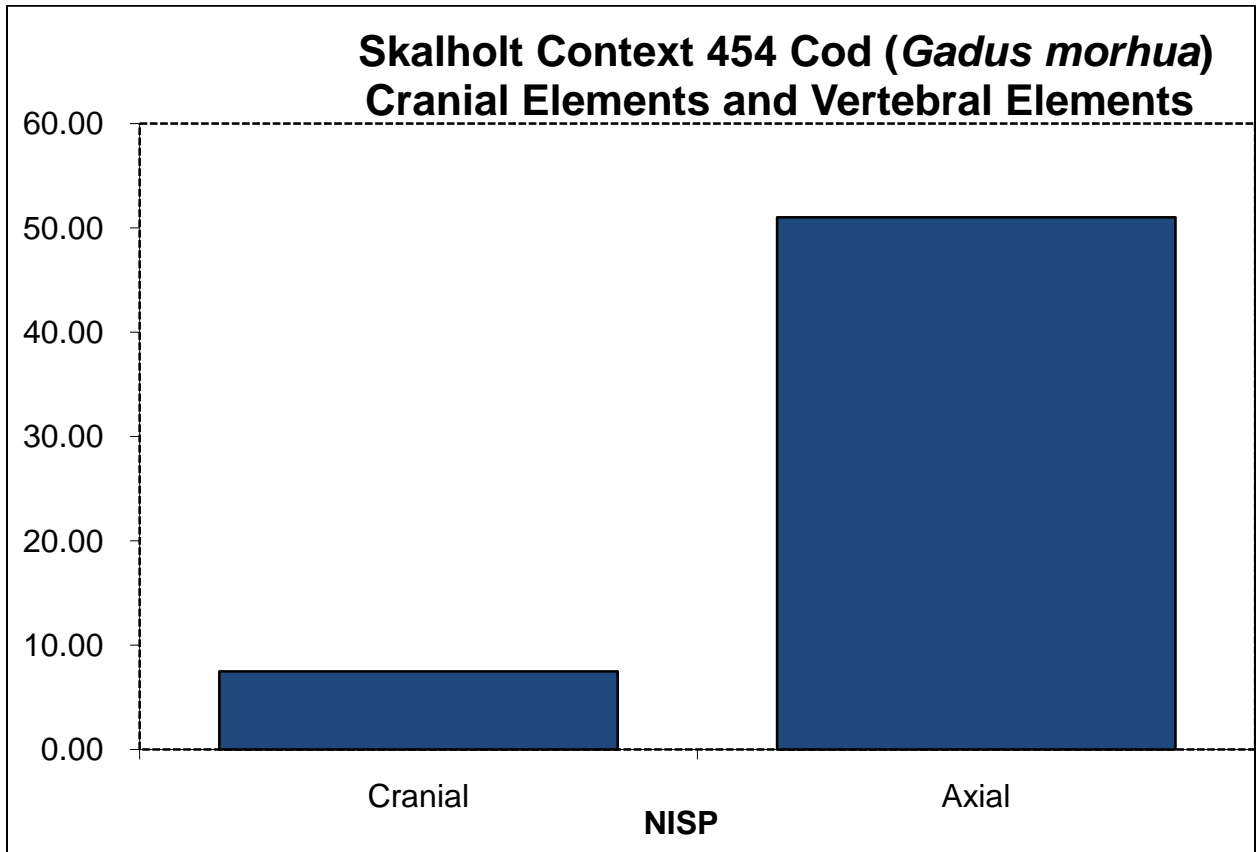


Figure 21 - Layer 454 percent cranial versus axial elements for cod (*Gadus morhua*).

Cetaceans and Arctic Fox

The two elements that are clearly from cetacean species are one large vertebral fragment from a large cetacean and one smaller element, possibly a rib, most likely from a medium sized cetacean, such as a porpoise or dolphin. Both of these elements are associated with the act of butchery itself and are most likely cast-off material from the butcher's shed. The vertebrae was used as a butcher's block, as can be seen by the large number of cleaver chop marks on the vertebrae. These chop marks are all seen on one side of the vertebrae and this piece is likely a butcher's block which became too

worn and was thrown away with other butchery waste. The other element has been worked and polished and was most likely the handle for a knife or a cleaver. Both elements reinforce the association of this midden with the butcher's shed seen on the 17th and 18th century maps of Skálholt (figures 6 + 7).

Throughout Icelandic history whalebone was a valuable craft material when it could be obtained. In a country basically devoid of trees, except for very small forests owned and managed by the country's landowners for charcoal production, whalebone was an excellent workable material for many of the same objects that would have been made of wood.

The two elements that were identifiable as coming from arctic fox most likely reflect the presence of scavenging foxes in the neighborhood of Skálholt. The two identifiable elements were one molar and one premolar.

The other units of group 383

Unit 459 lies directly below unit 454 while unit 453 lies directly above unit 454. Neither of these units produced large numbers of identifiable specimens yet their proportions do seem to mirror unit 454. Unit 459 has 83% cattle to 17% caprines. Although the total numbers are small this does compare favorably to the 85% cattle to 15% caprines in unit 454. Unit 453 has only two elements identifiable down to species level and both are cattle. The LTM elements are presumably cattle and the one MTM could likely be from a caprine. Again the numbers are very low but these proportions are similar to those of unit 454.

Table 5 - Species present for layers 453 and 459.

Species	453	459
Cattle (<i>Bos taurus</i>)	2	10
Caprines	0	2
Large Terrestrial Mammals	9	25
Medium Terrestrial Mammals	1	11
Unidentified Mammals	217	526

The fact that in both the adjacent units to 454 there are similar proportions of cattle to sheep reinforces the impression that the activities that created unit 454 were not catastrophic. These adjacent units push at least some of the characteristics of unit 454 in to the time before and after the deposition of unit 454. Without more and better faunal elements from adjacent units we cannot claim the existence of a beef economy like that of unit 454 but units 453 and 459 do give a hint that these activities might have preceded and continued after unit 454.

The following data is from all the contexts other than 454, including contexts 453 and 459. The data is presented in two groups, those contexts above context 454 and those below context 454. The NISP for all the contexts outside of context 454 are so small that they are not worth presenting alone. The contexts above 454 all lie on top off the wall debris that seals context 454. Those below 454 all lie either within the wall debris or below it.

The contexts above context 454 can be loosely dated to the last half of the 18th century and into the 19th century. This material could even have 20th century additions as well, though none of the contexts revealed any 20th century materials. Table 6 presents the NISP and TNF for the contexts above 454. These contexts were fairly ravaged, and a number of the contexts might have been domestic sweepings from the main complex.

Table 6 - Species present in layers 409, 452, 453, 455, 457.

Cattle (<i>Bos taurus</i>)	28
Caprines	4
Gadid	1
NISP	33
Medium Terrestrial Animal	10
Large Terrestrial Animal	13
Unidentified Mammal	676
TNF	732

Little can be said from such a small data set. Interestingly though the proportions are still similar to context 454 in that these contexts are dominated by cattle.

Table 7 - Species present in layers 459, 460, 461, 591, 592, and 296.

Cattle (<i>Bos taurus</i>)	23
Sheep (<i>Ovis aries</i>)	2
Caprine	18
Cod (<i>Gadus morhua</i>)	1
NISP	44
Unidentified Fish	3
Medium Terrestrial Mammal	19
Large Terrestrial Mammal	68
Unidentified Mammal	1157
TNF	1291

The contexts below 454 can only be provisionally dated to the first half of the 17th century or before. Again, cattle are seen in higher numbers than the standard Icelandic assemblage would normally reveal. Yet the proportion between cattle and caprines is not as dramatic as that of context 454 or the contexts above 454. These contexts were quite ravaged in taphonomic terms.

Both the contexts above and below 454 can be looked at for fragment size distribution and percentages and types of burning to help try to determine where these

deposits originated. Context 454 clearly comes from a primary butchery process. Often though Icelandic middens will be made up of large numbers of small, often less than 2cm square, bone fragments, many of which show signs of burning. The burning usually is either black or white calcined, in which most all of the organic material in the bones has disappeared. These types of middens are often associated with domestic cleaning, especially hearth sweepings. The assumption is that during and after a meal much of the leftover bone material would have been thrown into the hearth. This was an easy and hygienic way of disposing of organic waste material. Bone would also burn, contributing to the fuel for the fire. Hearth sweepings would pick up many smaller bone fragments that would have been exposed to multiple burning episodes and this would produce high percentages of white burnt calcined bone. In the following section the contexts from above and below are analyzed for both fragment size and evidence of burning.

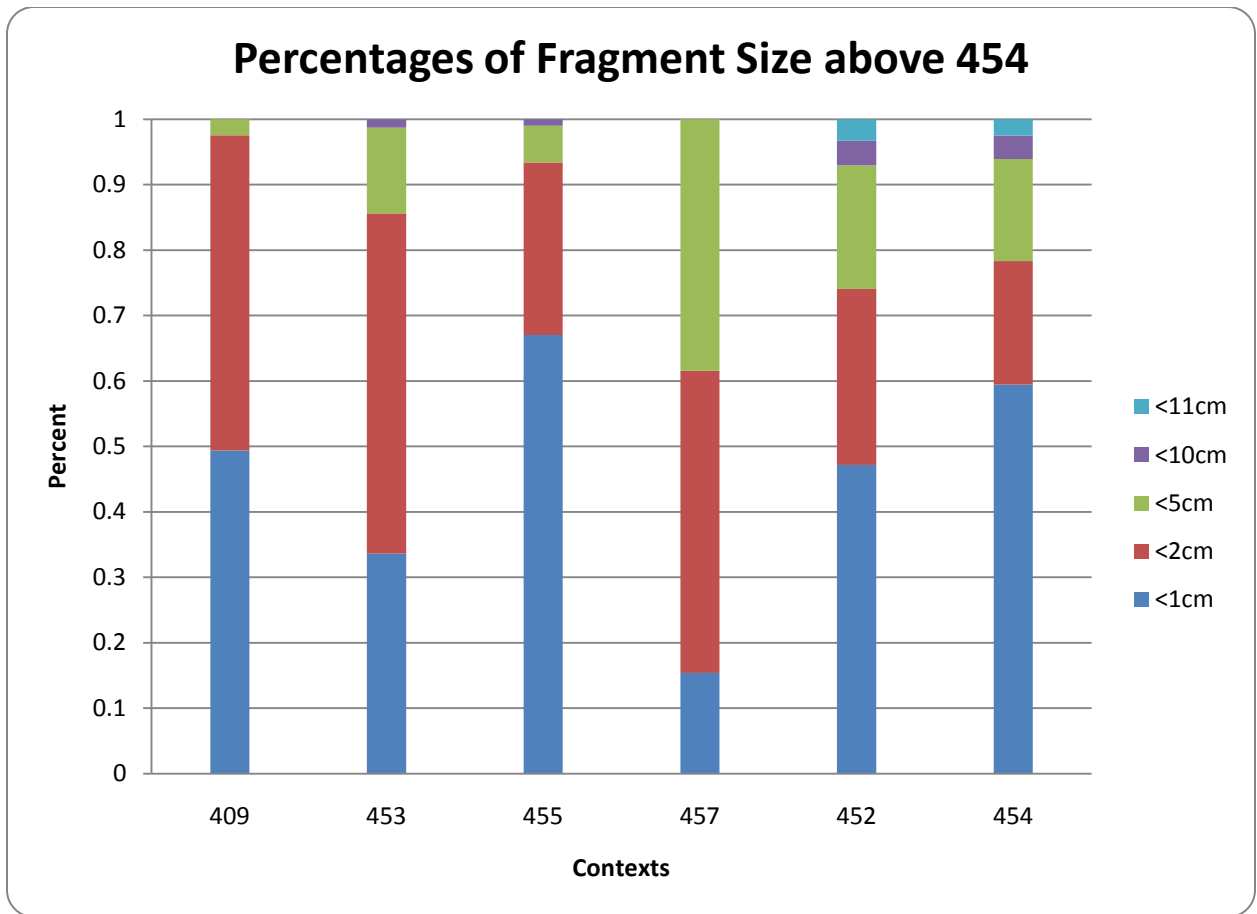


Figure 22 - percentage of fragment size for the layers above layer 454.

The percentages of fragment sizes in contexts 452, 453, and 455 all show a small percentage of larger surviving elements, between 5cm and 10cm, and in 452 a small number of elements above 11cm. 452 and 453 also show a relatively small percentage of burnt bone giving them a character similar to 454. The deposition of these layers would have been onto the very uneven and jagged surface of 454 and there would have been a fair amount of mixing at their interfaces. There is a high probability that this is what is being seen in these particular contexts. 409 is a rather sterile layer with very little bone material (see appendix). Context 457 on the other hand suggests itself as a possible domestic cleaning midden. The fact that the assemblage is almost completely made up of fragments smaller than 5cm and that these fragments are

mostly burnt white with a few burnt black suggests that this area was also used for the dumping of domestic waste from the larger Skálholt complex.

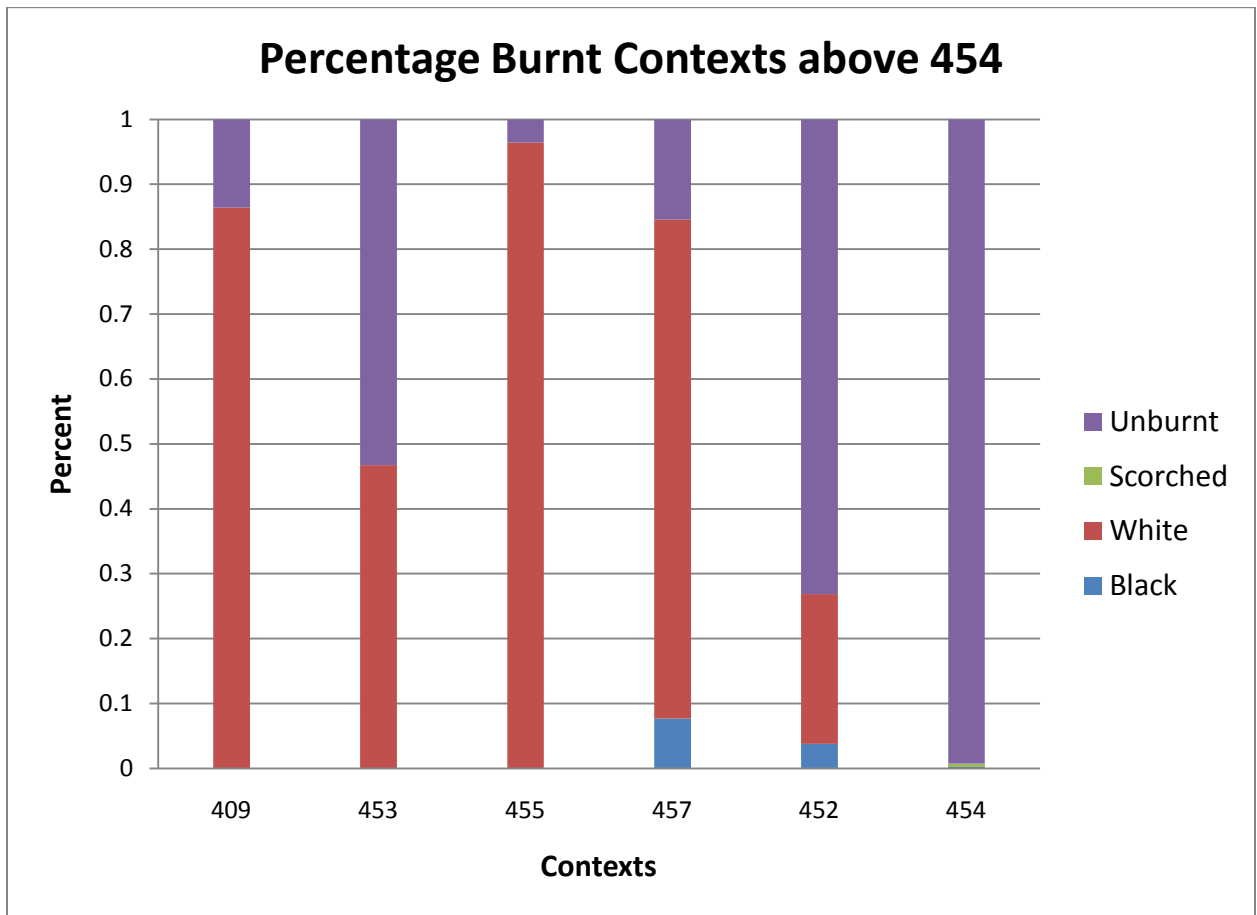


Figure 23 - Percentage of burnt fragments in the layers above layer 454.

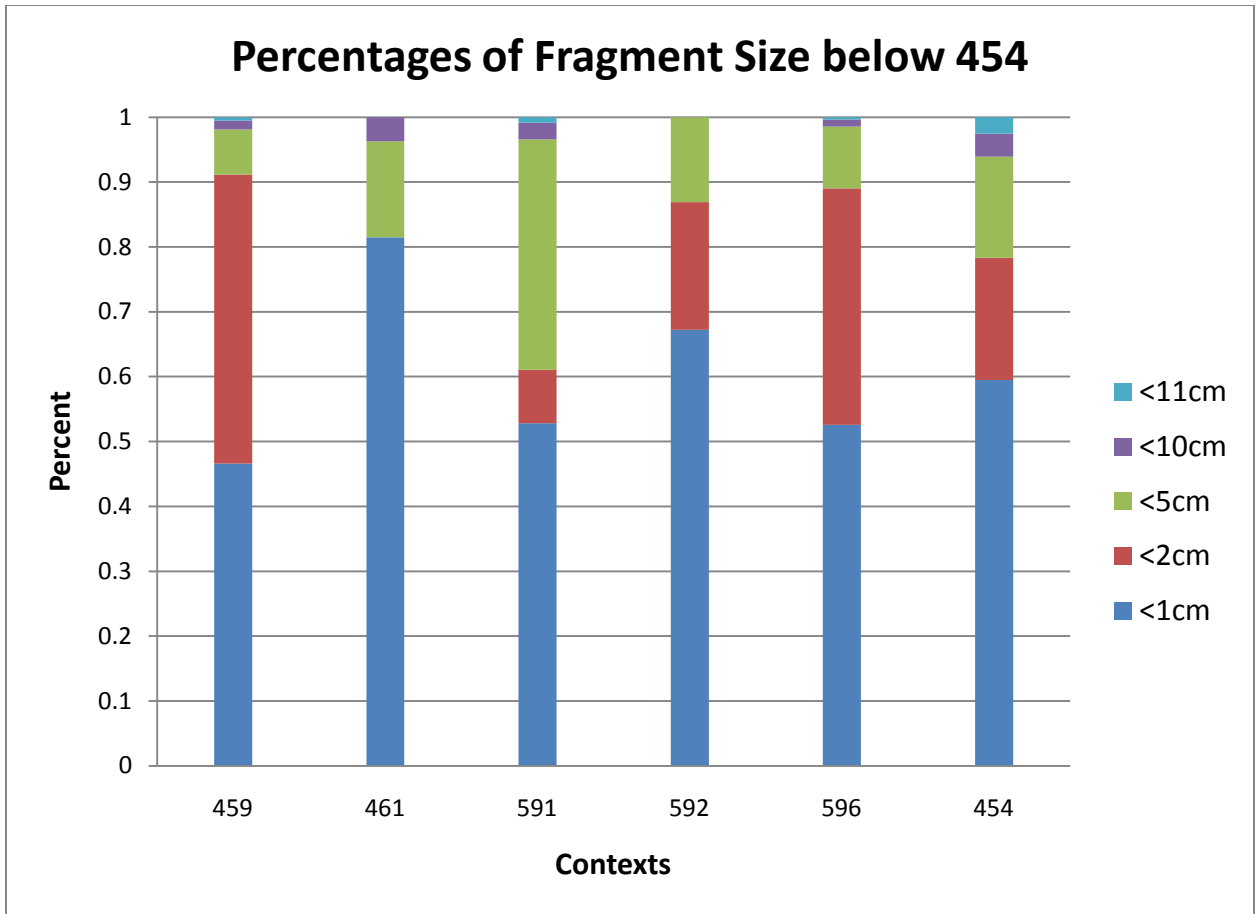


Figure 24 - Percentage of fragment size for the layers below layer 454.

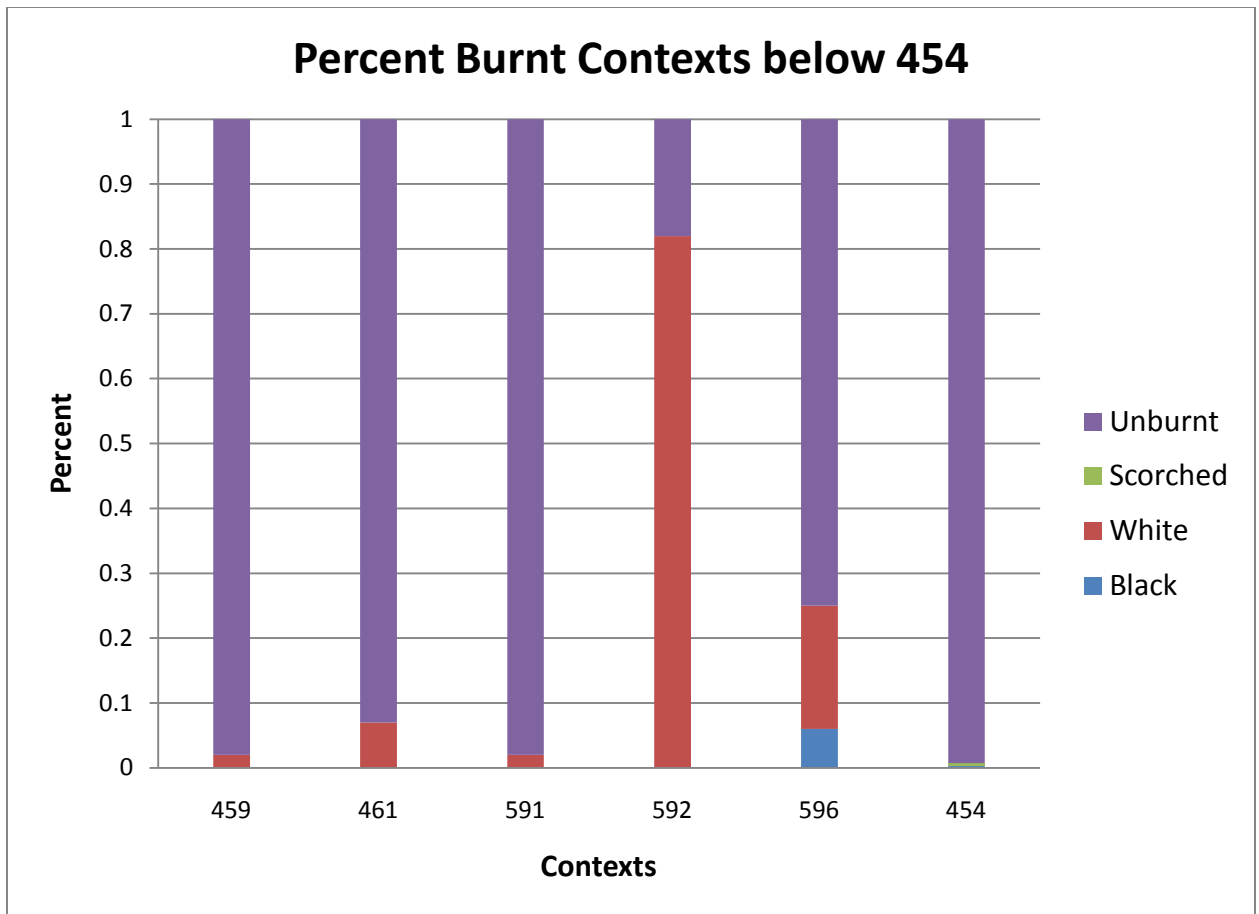


Figure 25 - Percentage of burn fragments for layers below layer 454.

Context 460 contained no bone material at all. Contexts 459 and 461 are closely associated with the debris from a stone wall that collapsed over contexts 454. Contexts 591, 592 and 596 are midden episodes below 454. Of these 592 and possibly 596 show signs of having been domestic waste dumps due to the presence of both large proportions of smaller fragments as well as large percentages of these fragments being burnt.

Discussion

The area of group 383, at the break of the slope by the main complex, had at least three major uses during the period under investigation. One was as fallow ground that was not often disturbed. The second would have been as an occasional dumping

ground for domestic waste, hearth sweepings for example. The third was as a dumping ground for the cattle butcher whose building was located nearby. The drop in total number of fragments, and by extension human activity in the area in the highest more recent contexts can be explained by the move of the Bishop's household and school to Reykjavik after the earthquake of 1785.

Chapter 7 - Group 1440

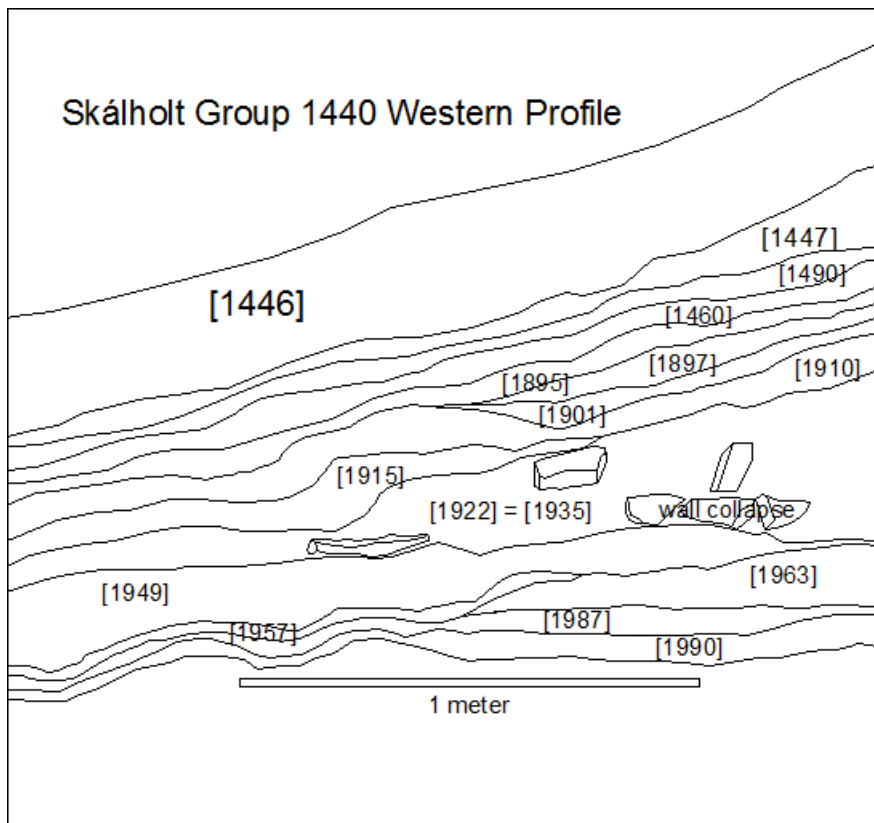


Figure 26

Group 1440, 5 meters north of group 383, contained a similar sequence of layers of peat ash, charcoal and midden as group 383. Group 1440 also exposed what looked like the remains of the same collapsed wall found in group 383. A scatter of wall collapse stones was found at a similar depth. There was a fair amount of midden material mixed within the fill of the stones from the collapsed wall as well as underneath these stones. Again this pattern fits that of group 383. Group 1440, as well as the rest of the midden test pits that were excavated on the break of the slope in line with group 383, seemed to be located somewhat further to the east of the collapsed wall relative to group 383. This would explain how in group 1440 the collapsed wall appears as a

scatter of stones rather than a solid layer of fallen stones. The rest of the groups do not seem to contain remains of the collapsed wall.

Dating/Phasing

Group 1440 did not produce any artifacts datable with any good resolution. No artifacts were found that clearly post-date the material in group 383, that is from the late 18th century or later. Considering that the collapsed wall appears in group 1440 it is safe to give group 1440 a dating range paralleling that of group 383. Specifically context [1963], which was a midden layer containing the great majority of all the bones would, according to the group 383 temporal scheme date to the second half of the 17th century or the first half of the 18th century. Context [1963] is in a similar position relative to both depth and the wall collapse to context [454]. The character of context [1963] also reflects that of context [454]. As the analysis of context [1963] makes clear, these two contexts are part of the same widespread midden. Please see the discussion in the general chapter on the excavations as well as the dating/phasing section of the group 383 chapter. The stratigraphy and artifacts of the other test pits that continued to the north also reinforce the idea of a similar dating scheme as group 383.

Taphonomy

Skálholt Group 1440 Bos taurus Bone Density and MGUI Ranking Compared

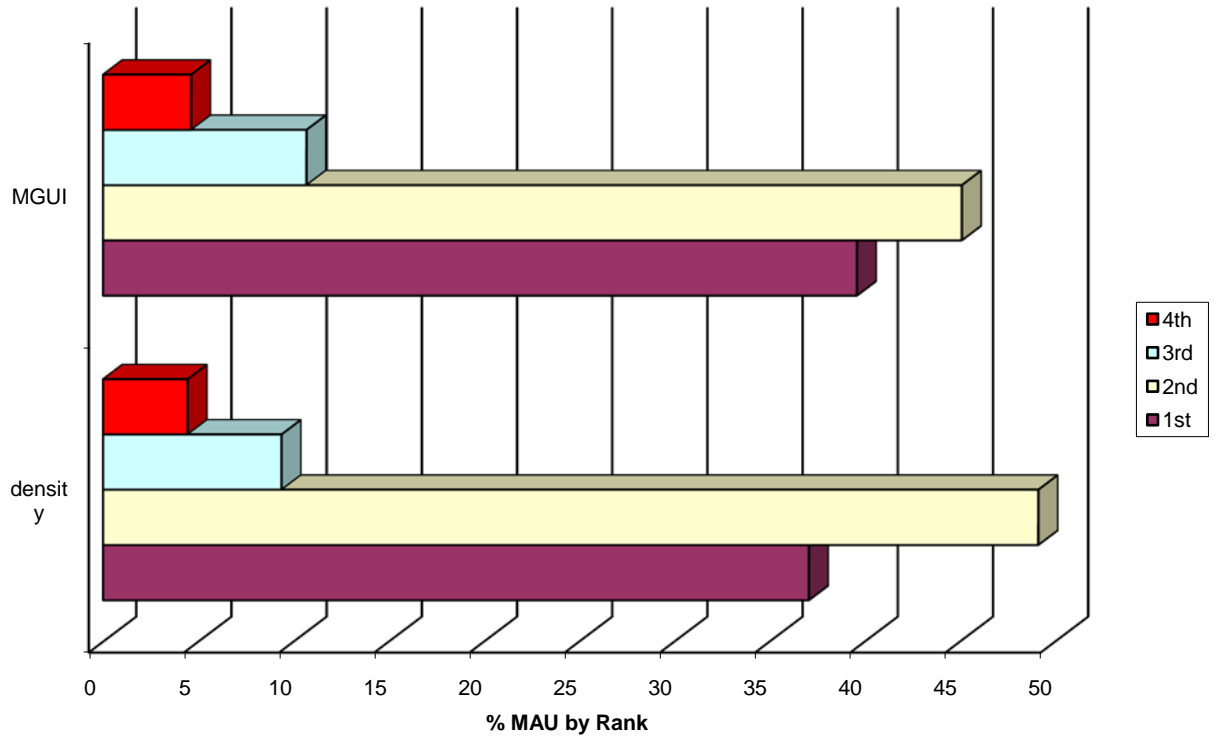


Figure 27

Skálholt Group 1440 Caprine Bone Density and MGUI Ranking Compared

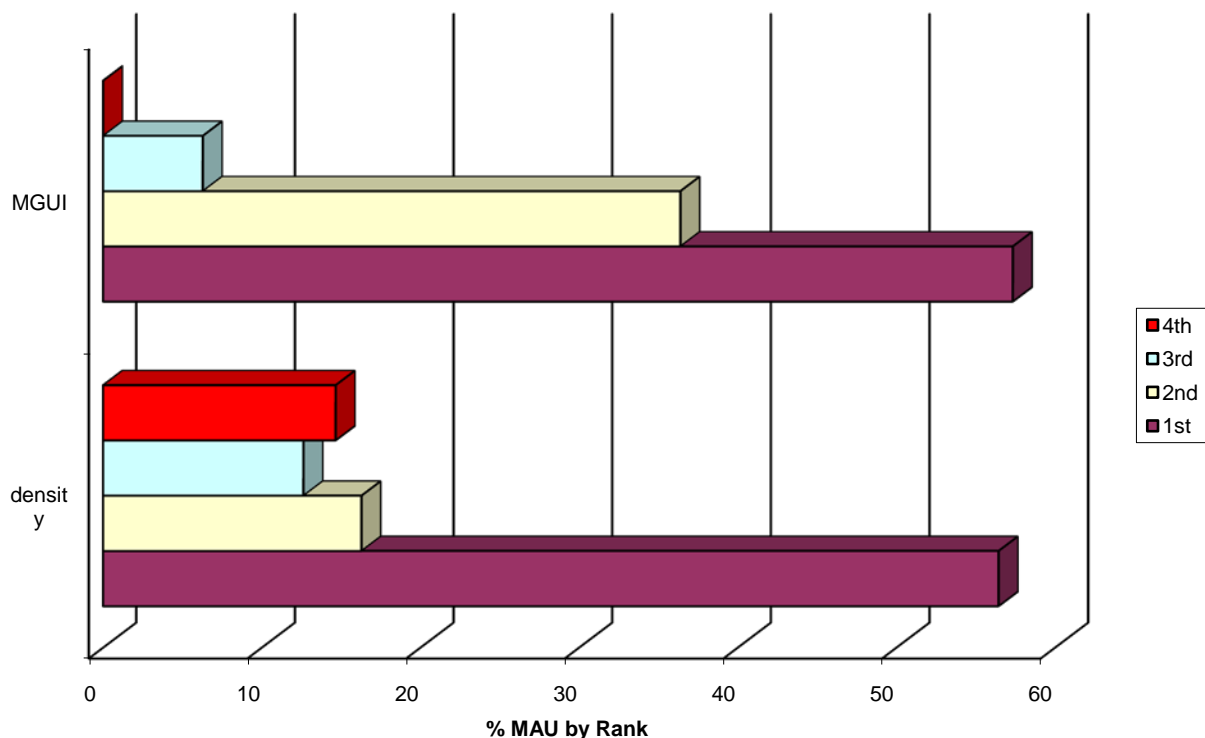


Figure 28

The taphonomic data from both cattle and caprines for group 1440 indicate that this assemblage shows fair to good survivability (figures 27 + 28). MGUI percentages show parts originating from the whole of a cattle carcass, while the caprine data shows good distribution as well, except for the 4th quartile, which represents low meat carrying parts such as the extremities of the legs. Density quartiles show a more even and consistent spread across cattle and caprines. Bones from every density quartile survived to excavation, indicating that conditions for survival were good.

Overview of Species Present

Table 8

Domesticates	NISP	%NISP
Cattle (<i>Bos Taurus</i>)	91	6%
Caprines	33	2%
Sheep (<i>Ovis aries</i>)	6	.3%
Pig (<i>Sus scrofa</i>)	2	.1%
Birds		
Gavi species	1	.1%
Fish		
Cod (<i>Gadus morhua</i>)	41	3%
Gadid family	59	4%
Salmonid	1	.1%
Fish	1268	84%
Cetacea		
Large Cetacean	2	.1%
Total NISP	1504	
Large Terrestrial Animal	221	
Medium Terrestrial Animal	57	
Unidentified Mammal Fragments	10095	
TNF (total number of fragments)	11877	

The spread of species found in group 1440 is very similar to those found in both groups 383 and 634. They are also of course similar to that of Icelandic middens in general except of course for the presence of such a large number of cattle.

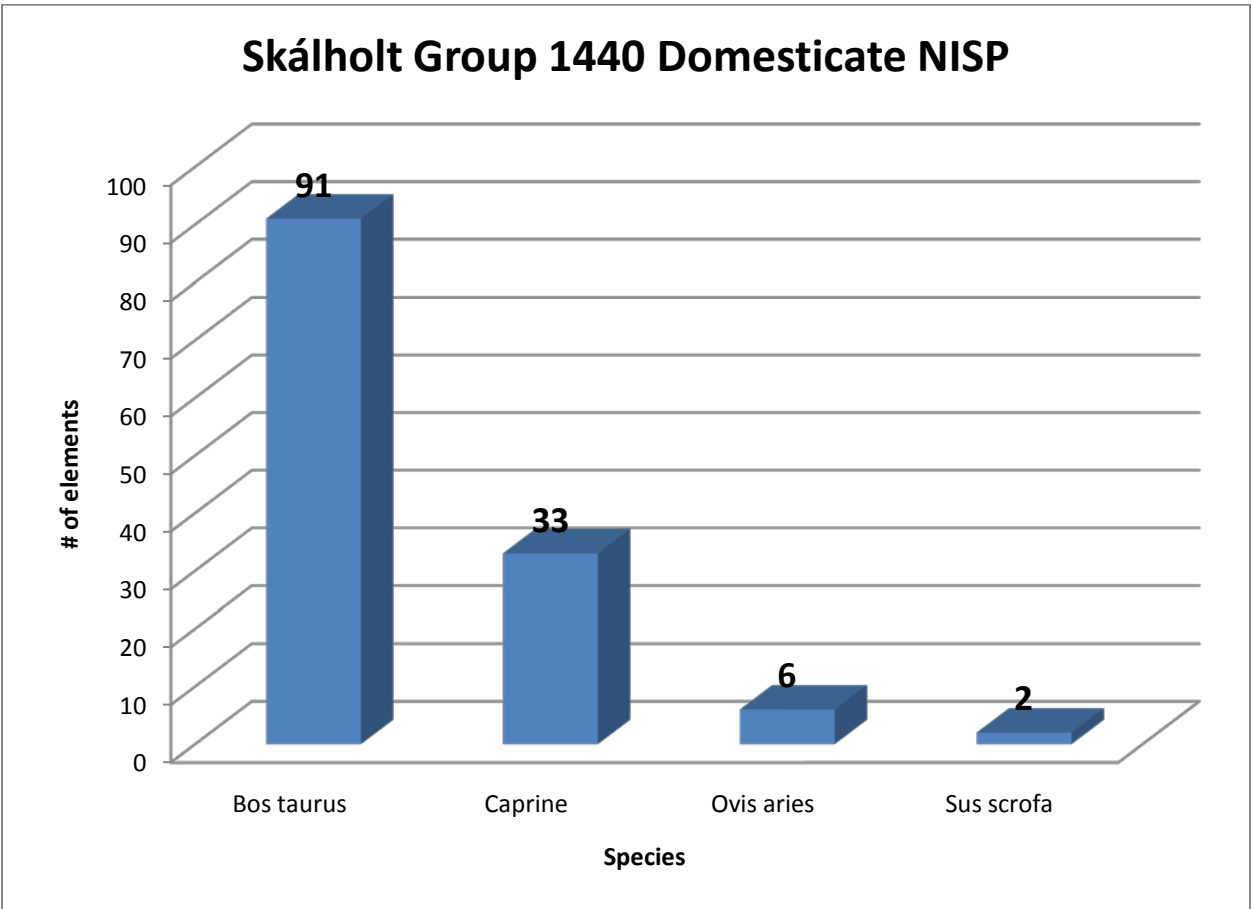


Figure 29

Though group 1440 produced far smaller numbers of elements relative to group 383 or group 634 the proportions of domesticates reflects a similar pattern to both, especially group 383. The overwhelming dominance of cattle bones again indicates that this area was a dumping area for butchery activity from the meat store shed shown on the early modern maps.

Table 9 – NISP for Group 1440. Only contexts that produced bone are shown.

	1490	1895	1897	1901	1907	1909	1910	1935	1963
Cattle (<i>Bos taurus</i>)	38	0	5	3	2	0	0	14	29
Caprines	3	2	1	0	7	1	3	4	12
Sheep (<i>Ovis aries</i>)	0	0	0	0	0	0	0	2	4
Cod (<i>Gadus morhua</i>)	0	0	0	0	0	0	0	0	41
Gadid family	0	0	0	0	0	0	0	0	59
Fish	0	0	0	0	0	0	0	0	1268
Large Terrestrial Animal	32	1	4	0	0	0	0	11	173
Medium Terrestrial Mammal	24	0	0	0	0	0	5	5	23
TNF	97	3	10	3	9	1	8	36	1605

The breakdown of NISP by context in table 9 reveals that the most productive layer in this group was context [1963]. This context lies almost directly below a number of stones that seem to be the outlying remains of the stone wall found in group 383 and that is shown on a number of contemporary drawings and prints (figures 6 + 7). The proportions of domesticates is similar to 383 and 634 in that cattle are dominant. Context [1935] was largely sterile except for some larger elements that were most likely part of the [1963] deposit and were mixed into [1935] directly on top.

Caprines

There were very few caprine elements recovered in group 1440. The bones recovered were not appropriate for ageing or metrics. Other than remarking on the

presence of caprine bones no further analysis can take place due to such small numbers.

Cattle

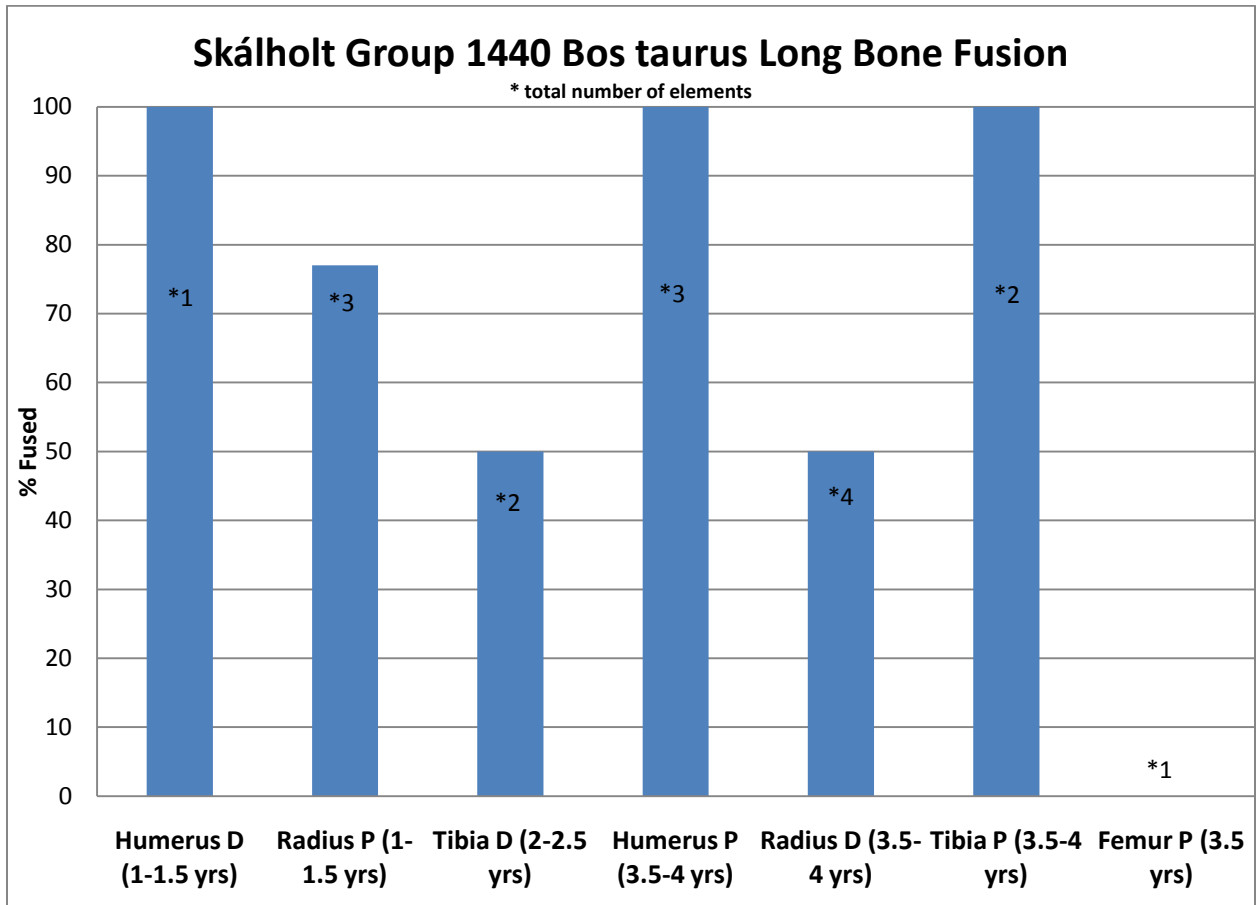


Figure 30

All but two of the cattle long bone elements that generated the fusion data represented in figure 30 came from contexts [1935] and [1963]. Of the two other elements, one, a fused distal tibia, came from context [1490] while the other was a fused proximal radius that came from context [1901]. These long bone fusion figures suggest that cattle of different ages were being processed. Cattle of prime beef age, between 3 and 5 years were being slaughtered as were a few that were even younger, though no neonatal cattle bones appear in this context at all.

The position of this context in terms of depth and relative to the wall collapse suggest that it is the same midden as context [454] from group 383. Figures 31 + 32 present element distribution as well as long bone fusion data from both contexts 454 and 1963. In both cases it needs to be remembered that the cattle NISP for each context are dramatically different. The cattle NISP for context [454] is 887 while that of context [1963] is 29.

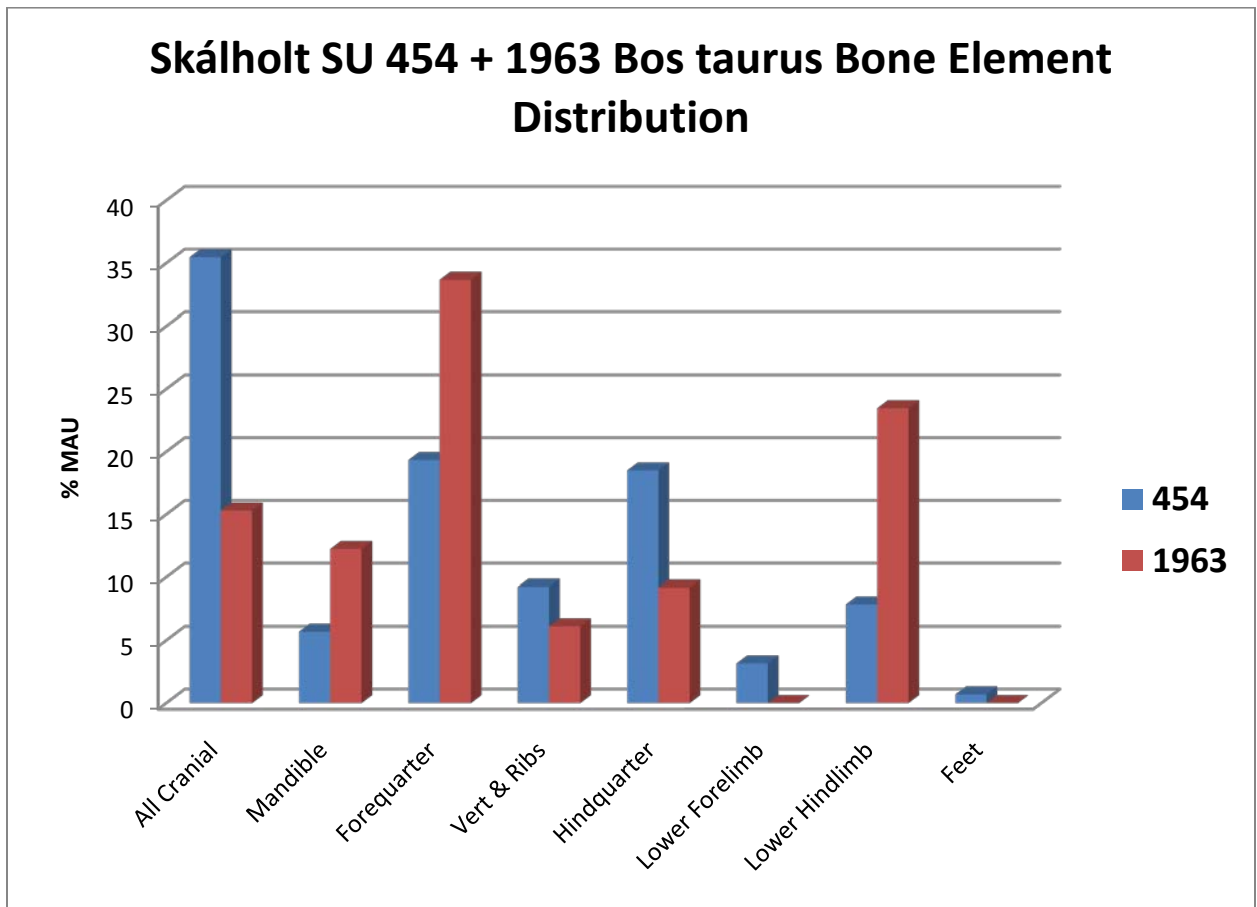


Figure 31

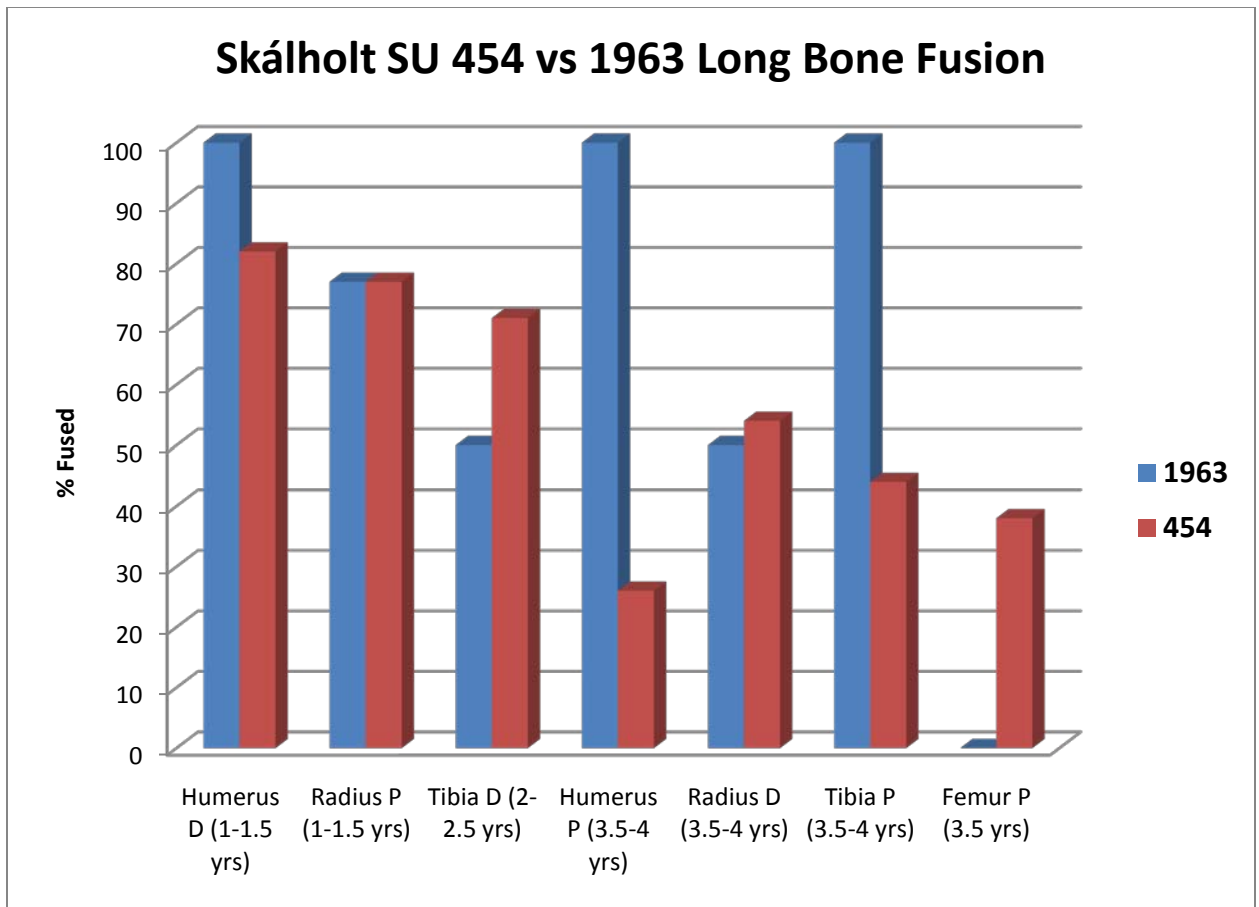


Figure 32

Given the differences in NISP the data presented is similar enough to support the contention that these two contexts come from the same midden. Given the high proportion of cattle to caprines and the complete lack of any neonatal elements from this context this seems even more apparent. If this is the case then the analysis of this context, and of course that of the whole group, parallels that of group 383.

Pigs

The two pig elements are a molar from [1490] and a first phalange from [1935]. Pigs largely disappear from Icelandic zooarchaeological assemblages after roughly 1200 C.E. They do make scarce appearances afterwards but these are very few and far between. One of these scarce appearances that is roughly contemporary with the

middens of Skálholt presented here are pig bones from late 18th century Reykjavik that seem to represent imported ham hocks. The pig elements from group 1440, a molar and a phalange, would not commonly be part of an imported preserved pig product. Rather they were likely the remains of pigs raised by or around Skálholt. This is an exceptional appearance again showing the relative wealth of the Skálholt complex as well as their ability to live beyond the standard climatic and farming conditions of early modern Iceland.

Wild Species

One of the two cetacea elements in context [1490] was a fragment of a butchers block, again similar to the cetacea finds in group 383, context [454]. The other piece is of indeterminate origin. This reinforces the impression that the deposits in this area were produced by the meat store shed.

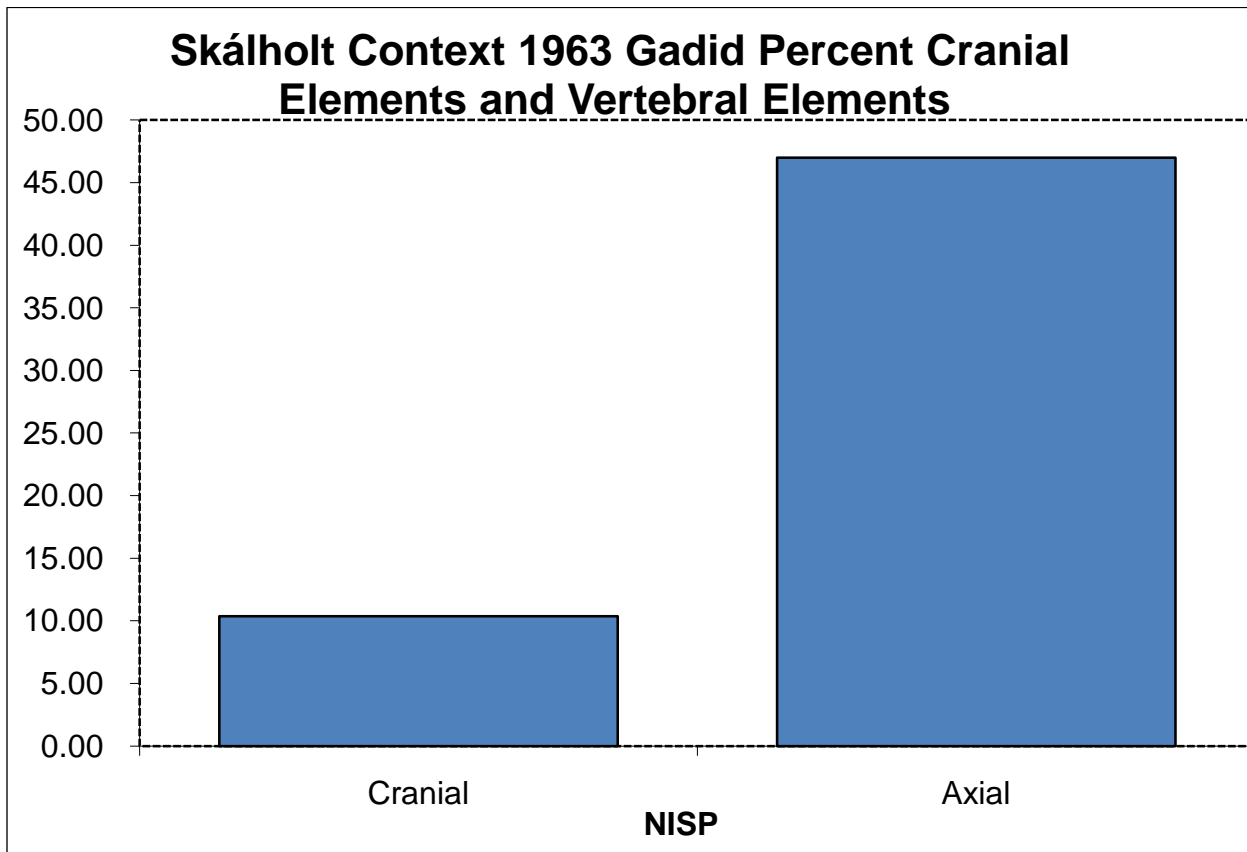
The single bone element from the Gavi family of birds was most likely the remains of a meal as the Icelandic gaviformes do not commonly nest or live in the area of Skálholt.

Fish

All of the fish elements in group 1440 came from context [1963]. Of those that were identifiable to species 41 were cod. Of those that were identifiable to family, one was a salmonid and 59 were identifiable to the gadid family. The rest of the elements were mostly rib fragments. The small number of cod and gadid bones indicate that at least some of the fish that eventually made it into this deposit were consumed fresh. The presence of the cranial bone strongly suggests this. Again this is similar to group

383, and specifically context [454] which had a very similar proportion of cranial versus axial elements (figure 33).

Figure 33



Discussion

Group 1440 parallels group 383 in terms of the assemblage produced. The only major differences in terms of species is the presence of horse and arctic fox in group 383 and the presence of pig and the gavi species bird in group 1440. Given the similarities between these two middens, especially between [454] and [1963], they will be discussed together as they will be in the later discussion chapters.

Chapter 8 – Group 2008

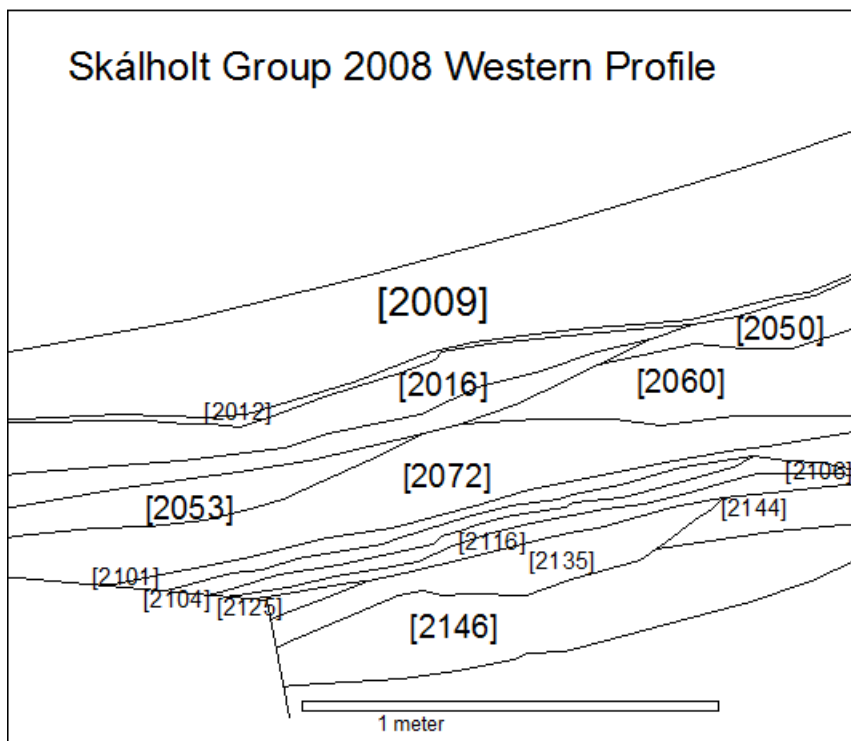


Figure 34

Group 2008 was not as productive as groups 383 and 1440 in terms of faunal material. It did not contain any one major midden concentration such as context 454 or context 1963 in group 1440. The spread of faunal material was more consistent across the stratigraphy of the trench. As can be seen in table 10 each context contained fairly similar numbers of bone from fairly similar proportions of animals.

Dating/Phasing

A heavily corroded, possibly 17th century copper coin was found in context 2104. Otherwise no precisely datable artifacts were found. Like all the other trenches in this line the top context, 2009, was sterile. Given its position in line with the other groups, and given the similar stratigraphy of this group with the other groups, as well as the

similar proportions of cattle to caprines and the general make up of this group relative to the other groups in the line at the break of the slope this group will be treated as a whole and dated to a very general early modern period, from the late 17th century through to the end of the 18th century when it seems that this area was no longer in use as a refuse disposal area.

Taphonomy

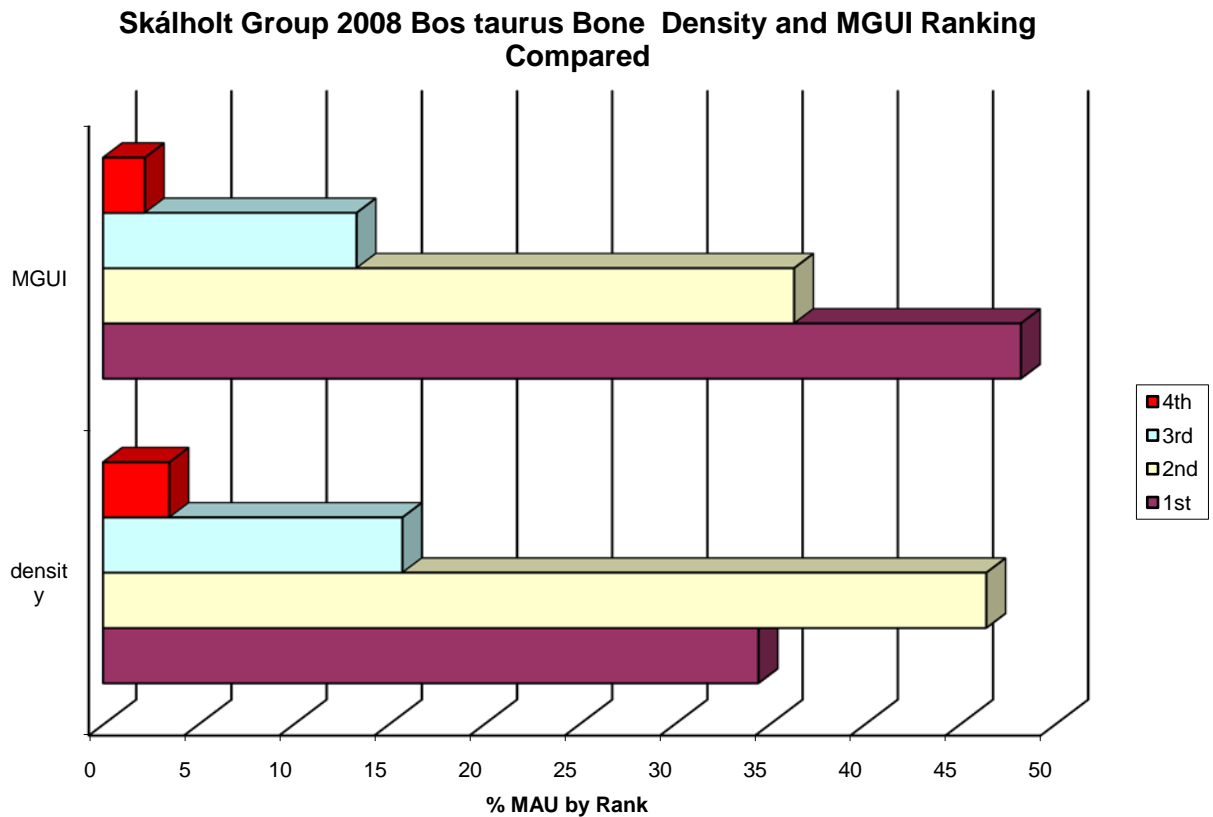


Figure 35

As figure 35 shows the cattle bones show decent survivability in terms of density and MGUI. There are elements from across the density spectrum represented in this assemblage. The same applies for MGUI, though in this case it is interesting that the second quartile shows the greatest percentage. This could be due to depositional processes. Considering the other assemblages presented here it seems likely that we

are seeing somewhat peripheral butchery waste being deposited here mixed with some domestic waste. Presumably some of the elements in the first quartile that are not represented here might have been deposited in another more domestic deposit.

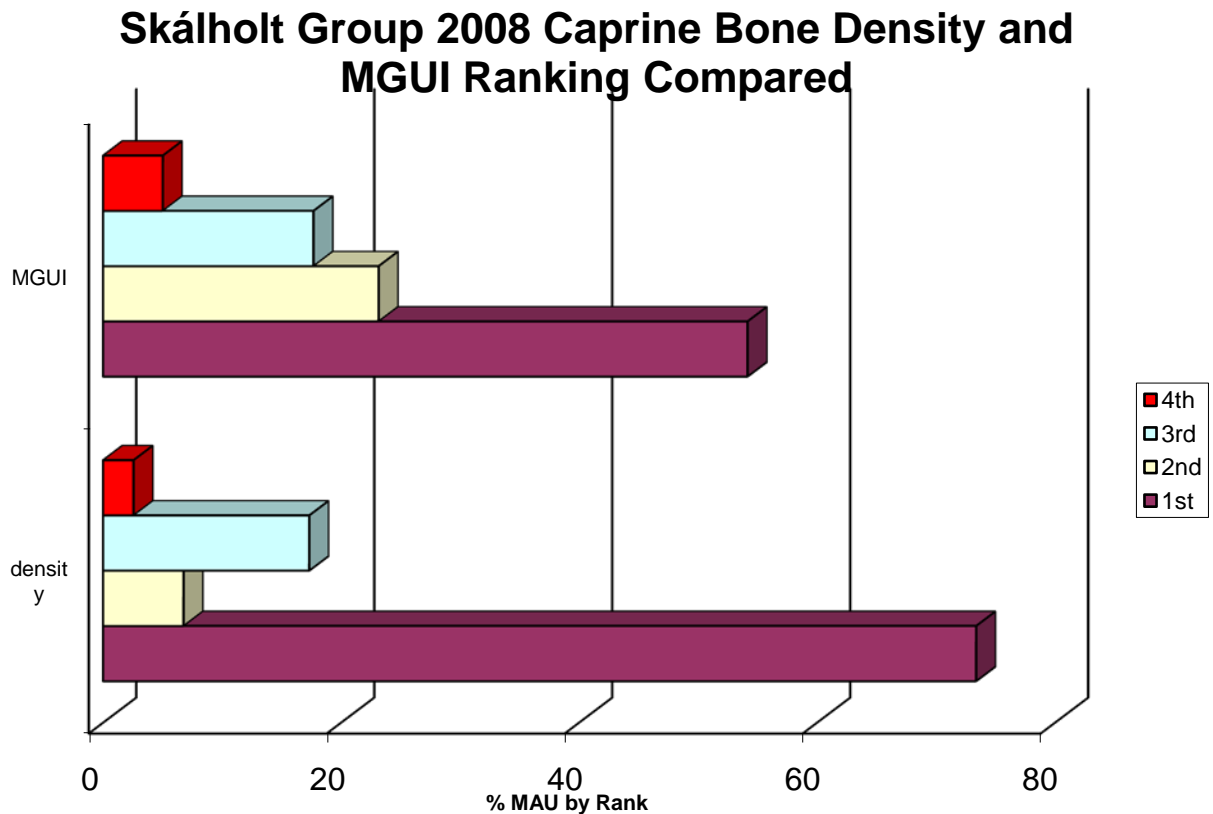


Figure 36

The caprine elements also show reasonable survivability in terms of density and MGUI. The density percentages are somewhat skewed towards the first quartile but the second quartile is apparent in significant numbers. The second and fourth quartiles, though represented in less numbers are both found in the assemblage and overall the caprine bones point to decent survivability.

Table 10

Domesticates	NISP	%NISP
Cattle (<i>Bos Taurus</i>)	122	57%
Horse (<i>Equus caballus</i>)		
Sheep (<i>Ovis aries</i>)	7	3%
Caprines	79	37%
Total Caprines	86	40%
Fish		
Cod (<i>Gadus morhua</i>)	5	2%
Haddock (<i>Melanogrammus aelgf.</i>)	1	.4%
Total NISP	214	
Large Terrestrial Animal	148	
Medium Terrestrial Animal	33	
Unidentified Mammal Fragments	4520	
Total Number of Fragments	4915	

Group 2008 produced smaller amounts of identifiable bone than either group 383, 634, or 1440. The total NISP was only 214. Much of this was fairly evenly distributed across the group. One context 2016 had a NISP of 50, slightly higher than most others but this difference is negligible (table 11).

Table 11

	2012	2016	2045	2048	2050	2053	2060	2072	2101	2102	2104	2123	2125	2143	2144	2146
Cattle (Bos Taurus)	5	32	9	5	0	2	4	2	19	2	15	2	5	7	2	11
Sheep (Ovis aries)	0	1	0	0	0	0	0	0	3	0	0	0	3	0	0	0
Caprines	0	17	17	6	0	0	0	12	11	3	1	1	2	3	3	3
Total Caprines	0	18	17	6	0	0	0	12	14	3	1	1	5	3	3	3
Fish																
Cod (Gadus morhua)	0	0	0	0	0	0	1	0	0	0	0	0	4	0	0	0
Haddock (<i>Melanogrammus aelg.</i>)	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Total NISP	5	50	27	11	0	2	5	14	33	5	16	3	14	10	5	14
Large Terrestrial Animal	1	43	9	3	4	1	6	10	26	2	13	0	7	6	5	12
Medium Terrestrial Animal	0	9	4	1	0	0	2	7	1	3	1	0	0	3	0	2
Unidentified Mammal Fragments	2	447	472	117	79	25	159	334	391	210	264	8	331	172	66	1453
Total Number of Fragments	8	549	514	132	83	28	172	365	451	220	294	11	352	191	76	1481

Table 11, presents the NISP by context. This illustrates the fairly consistent spread of elements across all contexts. Also notable is the lack of any wild species and the very small number of fish elements.

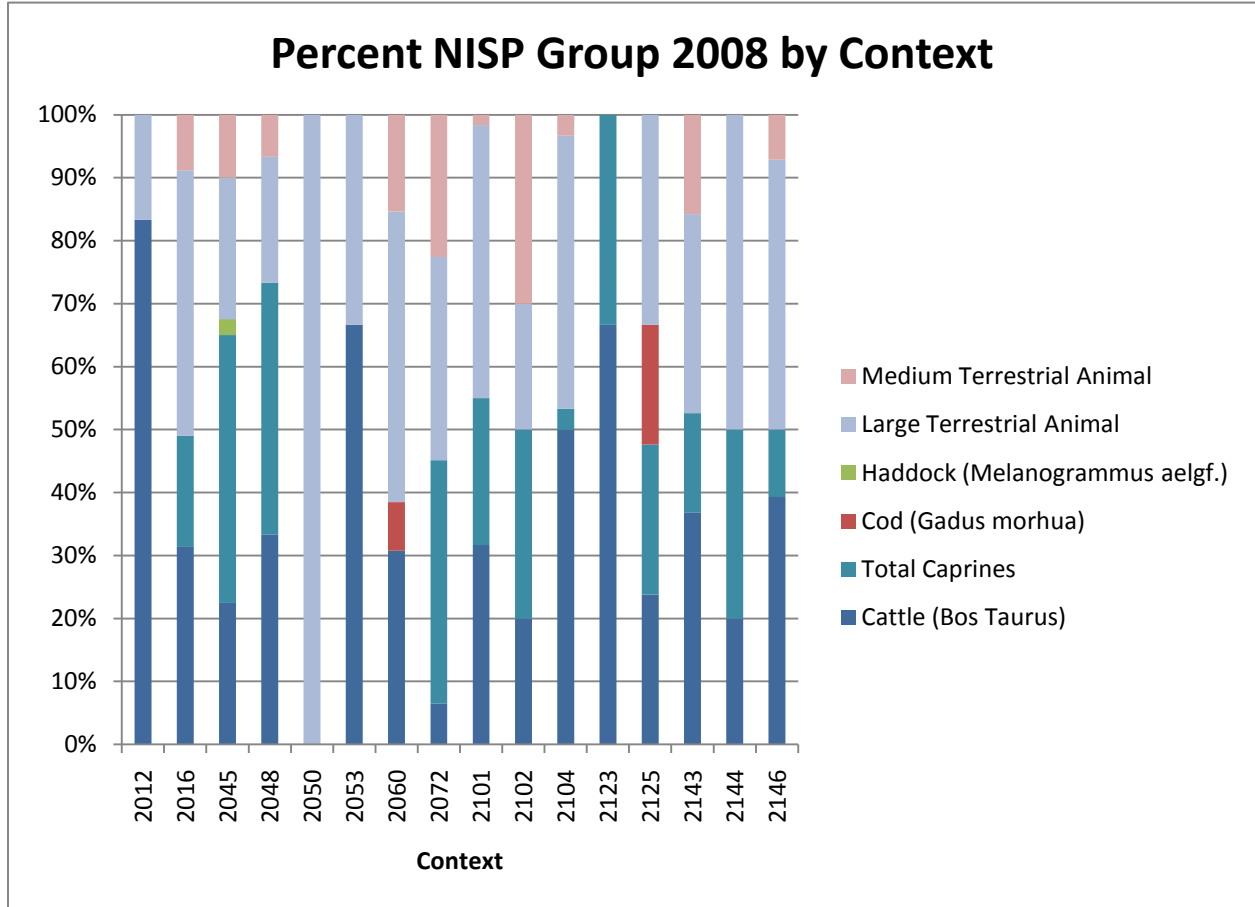


Figure 37

Figure 37 presents the percentages of species in each context. In almost every case, excepting context 2072 the percentage of cattle bones is either at the high end of the Icelandic historical norm or far beyond it, making a relationship with the midden layers in groups 383 and 1440 very likely. None of the contexts in this group represent a typical, relative to the state of zooarchaeological knowledge of Iceland from settlement through the early modern era, Icelandic midden assemblage. Once again, and very much like the other groups discussed, this particular assemblage, though small, reflects the specialization and unique dietary patterns of Skálholt relative to the rest of Iceland.

Age at Death

There were no ageable cattle elements found in this group.

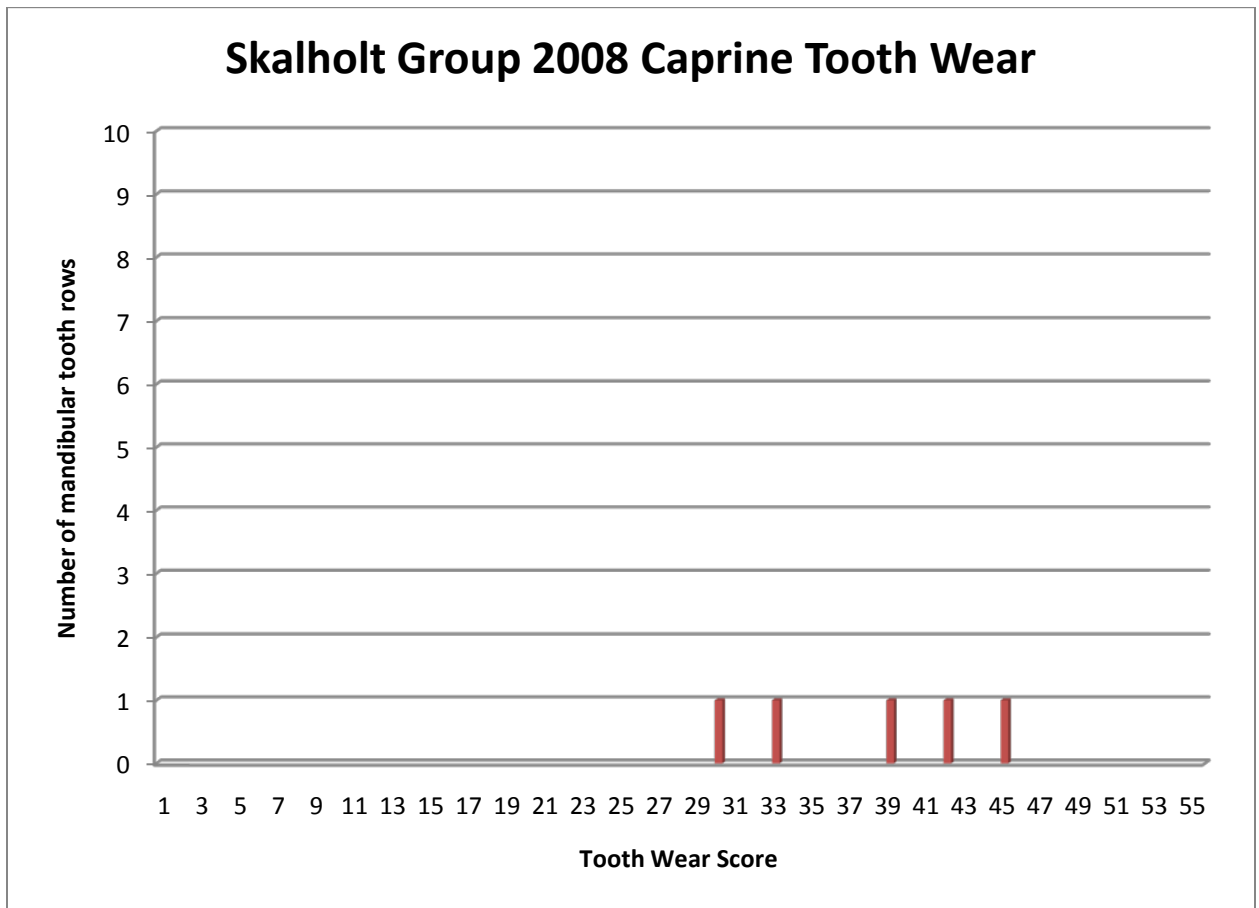


Figure 38

Only five caprine mandibular tooth rows were recovered from group 2008 (figure 38). This is a very small amount but their wear state is similar to those of group 634 in that they all fall within the range of animals between 3 and 6 years old. The caprines of group 2008 then might represent the consumption of mature mutton.

Chapter 9 – Group 2193

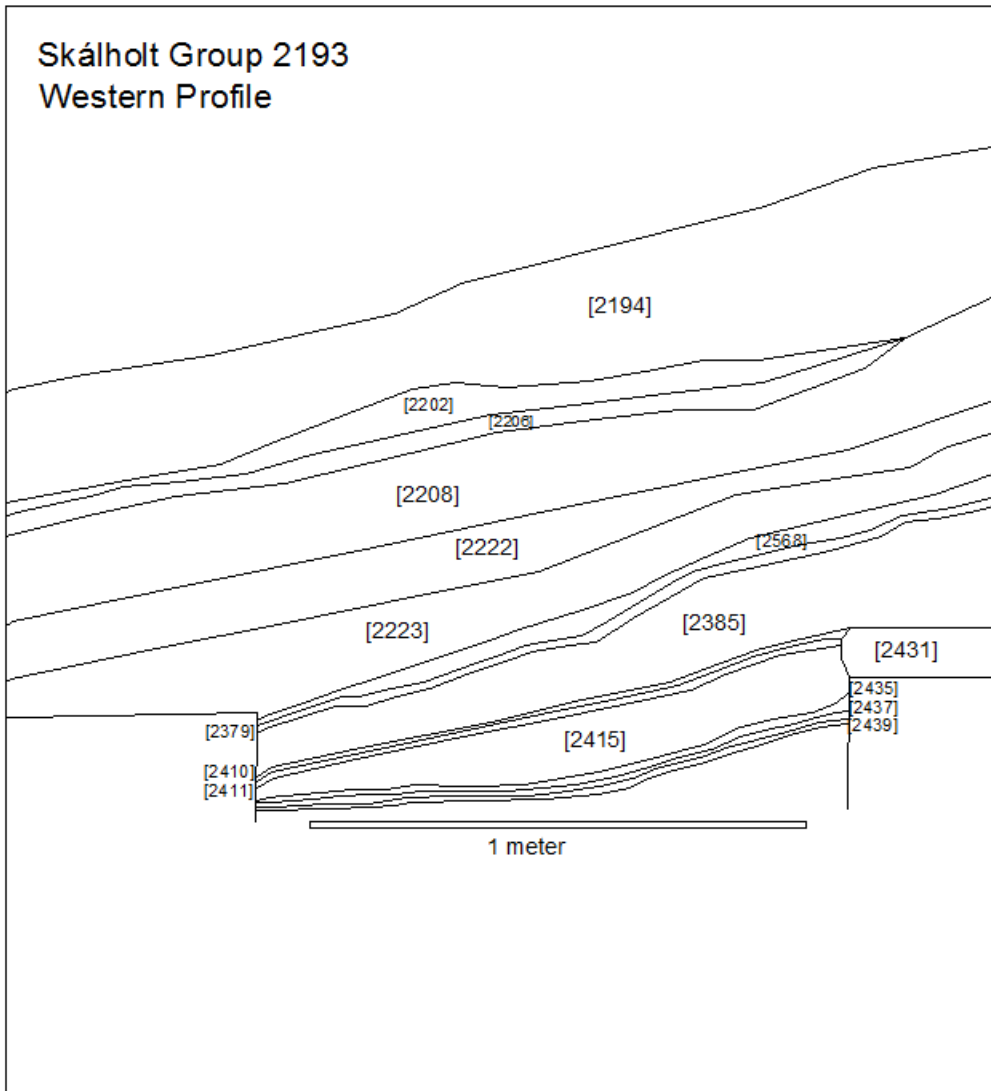


Figure 39

This group was very unproductive in terms of recovered bones. It is the third in the line of test trenches starting with group 383 and the absence of bone material suggests that this area was rarely used for deposition of refuse. The NISP in this group was very low at a total of 35, and 28 out of these 35 identifiable to species bone elements were tooth elements. This suggests that on top of the lower rates of deposition in the area there were also bad taphonomic conditions.

Table 12

Domesticates	NISP	%NISP
Cattle (<i>Bos taurus</i>)	19	54%
Horse (<i>Equus caballus</i>)		
Caprines	15	43%
Sheep (<i>Ovis aries</i>)	1	3%
Total Caprines	16	46%
Total NISP	35	
Large Terrestrial Animal	66	
Medium Terrestrial Animal	12	
Unidentified Mammal Fragments	1893	
Total Number of Fragments	2006	

The majority of the midden material recovered came from the lower contexts in this group. There are a number of stones, possibly wall collapse, that appear in this group at roughly the same depth as the wall collapse in the other groups. These lower contexts which produced the bulk of the midden material are located beneath these stones (see figure 39). Group 2193 then does seem to reflect a possibly similar depositional dynamic seen in the other test trenches that follow the break of the slope though at the periphery of the activity. Yet the nature of the contexts that contain the most fragments, all of which come from the bottom of the trench make group 2193 quite different from the other groups in this line.

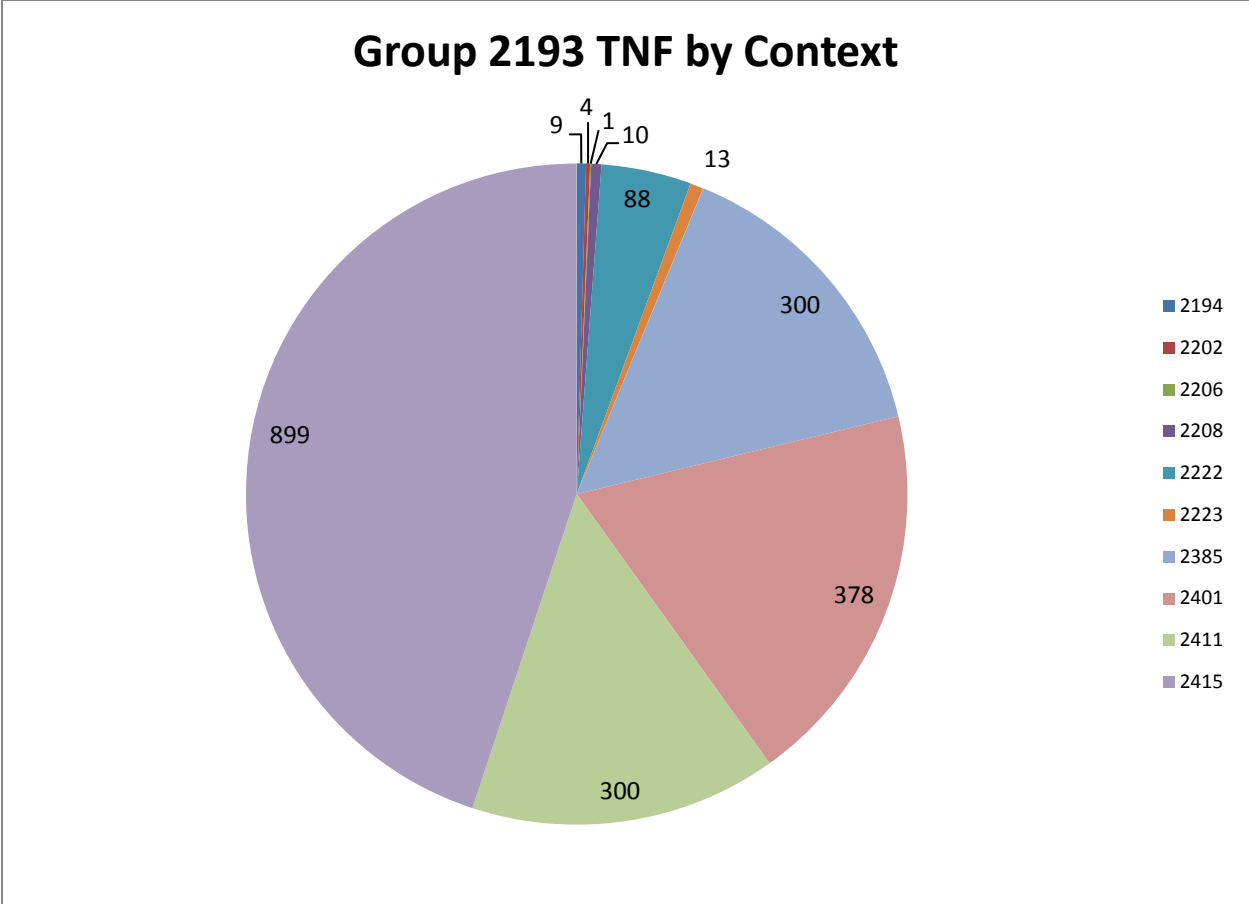


Figure 40

In terms of the types of refuse found in these contexts there are substantive differences, especially in terms of burning patterns. The units with the largest numbers of fragments also produced a relatively small percentage of the bone elements identifiable to species. Contexts 2385, 2401, 2411, and 2415 produced the majority of fragments (figure 40) yet these were almost all of a relatively small fragment size; all were under 5cm and most were under 2cm on their longest side. They also were all dominated by white burnt calcined bone fragments. This is definitely of a different character than the deposits in the other groups. This area at this depth seemed to be a place where hearth sweepings and trash from within the larger complex was dumped. The calcined fragments were most likely from the hearths within the complex. They were most likely the result of bones from meals being thrown into the fire after the meal. This could also be the result of cleaning of the kitchen floors and hearths. Ash was commonly used in Iceland as a dry and sterile material used to cover floors. This ash was compacted to form a relatively clean surface within many pre-modern structures. The calcined bone could be the product of cleaning these ash floors or even have been removed from the ash beforehand and then thrown away outside of the complex.

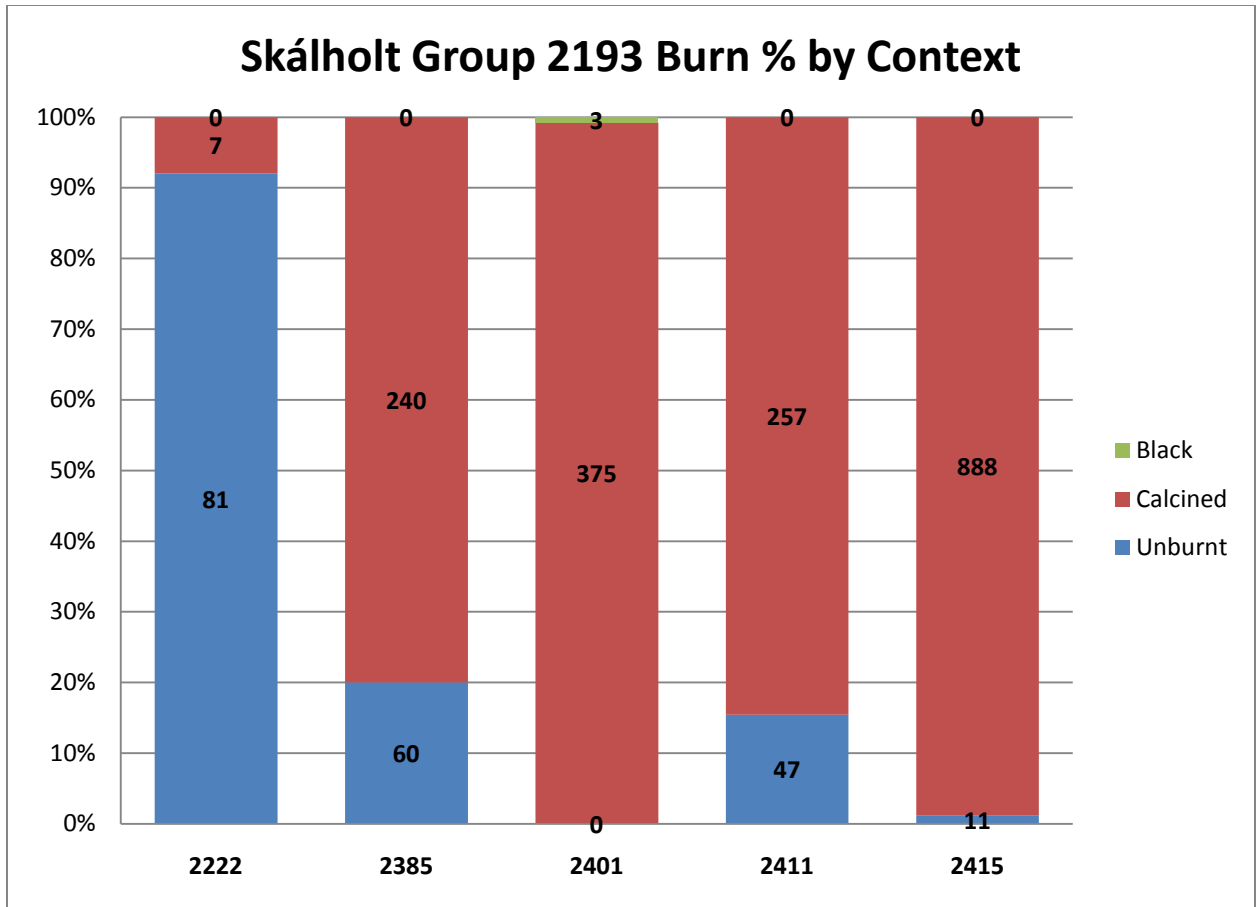


Figure 41

There is an interesting absence of fish in this trench. Other contexts, as well as the written works we have available on Skálholt, make it clear that large amounts of fish, both processed and fresh were consumed at the site. The absence of fish in this trench, as well as its relative lack in many of the other test trenches argues for a differentiated refuse disposal pattern across the site. One of the primary differences between Skálholt and other early modern or earlier archaeological sites in Iceland is the specialization found here in terms of deposition. Different buildings had different uses at the site, and obviously the midden investigations have tapped into refuse from both domestic cleaning and refuse from the meat shed as opposed to a midden representing a general dumping area for the whole complex.

One final point of interest is that the lowest context in this unit contained one well preserved half of a cattle skull. The skull was clearly from a naturally polled animal.

Chapter 10 - Group 634

Group 634 was a 3X5 meter trench oriented lengthwise north to south opened up on June 28th of 2004 by Birna Lárusdóttir (figure 5). It lies to the southeast of the main complex and its northern edge lies roughly one meter onto the plateau containing the complex while the rest of the southern portion lies on the south facing slope which descends at about 75. The idea behind excavating here was to expose a midden that might have been created by trash disposal over the break of the slope south of the Skálholt complex. The horizontal area at the north end of the trench was clearly stratified with layers of peat ash and charcoal. The slope stratigraphy was very complex with many intermixed lenses that were most likely the product of the same deposits that made up the horizontal northern section that had collapsed and dispersed down the slope. Because of the complexity of this stratigraphy it was decided to only record “main events” and not every lens found. The author excavated this trench further in 2005. Eventually as the slope got deeper the mixing became more extreme and the last units were fairly arbitrary on the slope section, excepting 1343, the last unit which was a clear intact charcoal layer. After unit 1343 the slope became too steep and the trench too deep for safe excavation and 1343 was a clear stratigraphic event with which to stop. 1343 also contained a pipe bowl, found in the bone bags after having been shipped to the Hunter College Bioarchaeology Lab, dating to 1726. It was then decided to cut a new trench extending north from the northeast meter of the original trench for 3 meters. This trench was brought down to the depth of the northern section of the original trench, roughly a meter. The stratigraphy of the new trench was a clear extension of the stratigraphy of the plateau section of the original trench. The idea behind the extension

was that some of the units in the plateau section of the original trench were relatively rich in bone and it was hoped that these same units would produce more artifacts further into the north. The extension trench was, on the whole bare of artifacts. Yet the whole of group 634 was fairly productive with a NISP of 1,237 and a TNF of 11,176. There were a significant amount of intact mandibular elements as well as long bone elements with intact ends for ageing.

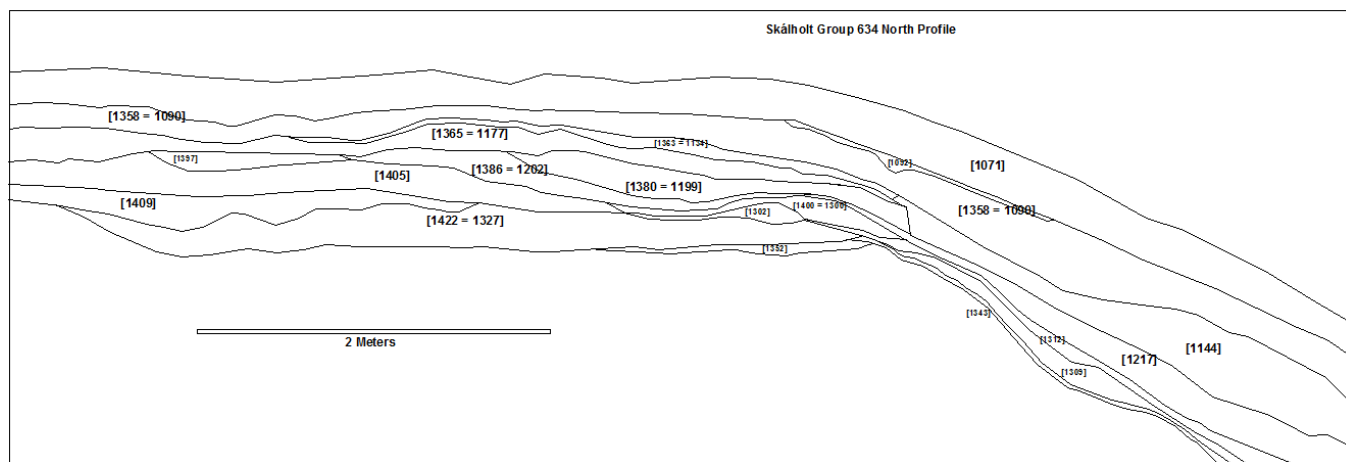


Figure 42 - Eastern profile of Group 634.

Dating/Phasing

Group 634 has been dated to the middle of the 18th century. The lowest unit in this group, unit 1343, a very thin but very clear charcoal layer, contained a Gouda pipe bowl with a “crowned L” maker’s mark, giving it a terminus post quem of 1726 (Duco 1982). Unit 1090, which was the second highest unit in this group, contained a pipe stem with the maker’s mark of a Danish pipe manufacturer from Christianshaven named Severin Ferslew. Severin Ferslew was only in production between the years of 1758 to 1764 giving unit 1090 a terminus post quem of 1758 (Ahlefeldt-Laurvig 1980). Unit 1090 also included two unmarked pipe bowls with shapes indicative of the early 18th century. Unit 1071 contained a fluted pipe bowl, possibly late 18th century Danish. Unit 1144

contained a 1650 Frederick III Danish coin. Throughout the group Chinese export porcelain was found in limited numbers as well as stonewares and earthenwares, though none were found that began production in the 19th century. The datable maker's marks produce a good time range that is not contradicted by any other finds in group 634. Due to the relatively tight resolution the assemblage from group 634 is presented as a whole.

Taphonomy

Bone preservation overall was fair. It varied throughout the trench, with the northern extension trench being particularly bad. On the slope of the original trench there was sporadically bad preservation. Yet on the whole there were high enough numbers of well preserved bone for solid ageing analysis to happen for both cattle and caprines.

Only 10% of the total caprine bones were recorded as loose teeth. In many of the slope units only caprine teeth were left, yet in most cases these teeth were themselves in good condition and had been deposited as whole intact mandibles. This was clear due to their compact tooth row layout upon exposure. Those teeth that were clearly deposited as whole mandibles were bagged separately and analyzed for tooth wear, though not for metrics. This fact skews the taphonomic indicators towards a sense of better survivability than there in fact was. Yet survivability on the whole was fair and the assemblage is a good one for analysis.

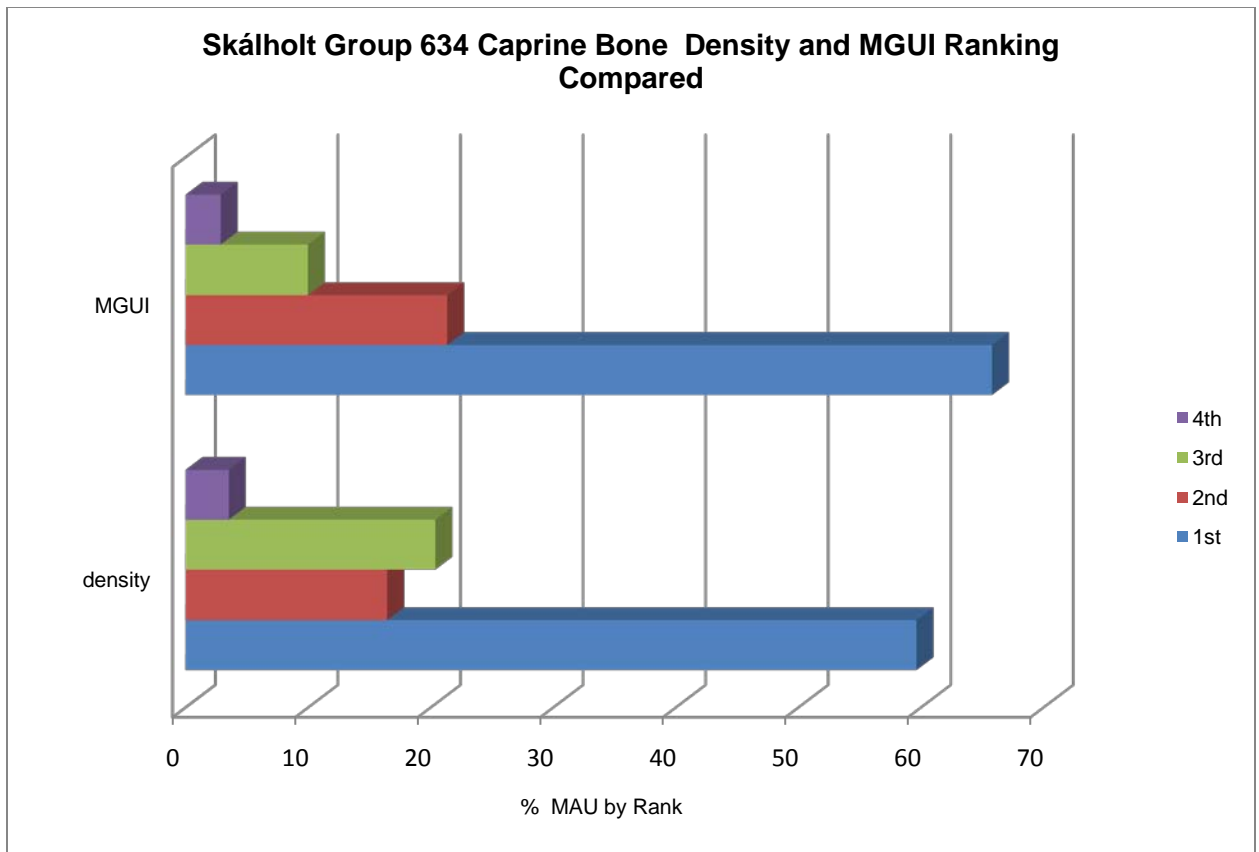


Figure 43

Caprine bone survivability as seen through the percent of survival by minimum animal unit (MAU) shows that bones from across the spectrum of density did survive to excavation. Percentages based simply on the density of bones that survived to excavation reinforce this. The least dense survived in the least numbers and the other density quartiles are present in significant proportions. Though in both cases the least dense quartiles survived in small number, the fact that any survived as well as that the 2nd and 3rd quartiles showed significant survival, reveals decent bone survival. Overall this indicates that though the rate of survival was not excellent it was good enough to use this assemblage for further analysis.

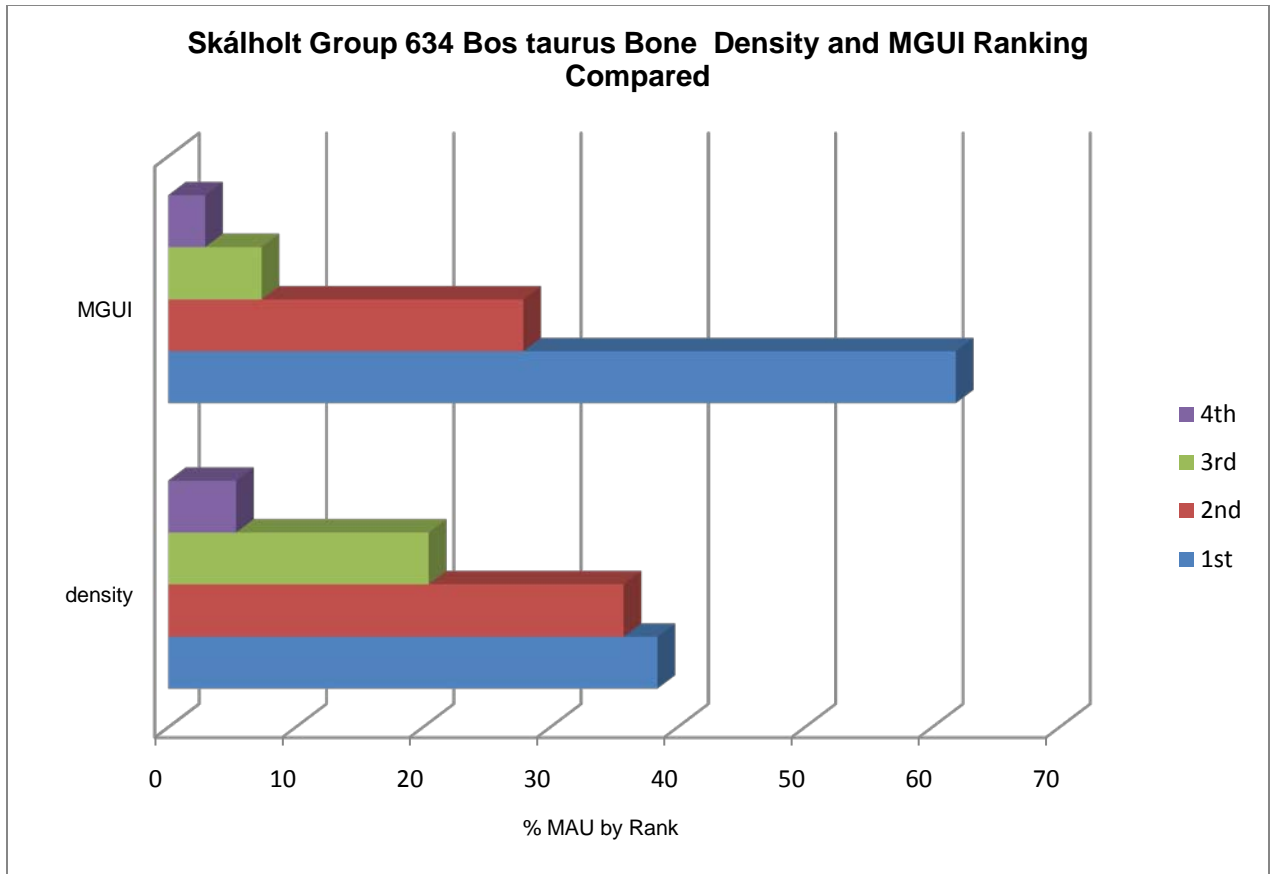


Figure 44

The cattle bone percentages of the same measure show better survivability than the caprines. Again the least dense survived in the least numbers but all quartiles are present and the 2nd and 3rd are not dramatically different than the first. The cattle bones indicate that this assemblage has not been ravaged beyond analytic usefulness and is a good reflection of the activities that formed it.

Table 13 - Group 634 overview of species present.

Domesticates	NISP	%NISP
Cattle (<i>Bos taurus dom. L.</i>)	270	22%
Horse (<i>Equus caballus dom. L.</i>)	2	.1%
Sheep (<i>Ovis aries dom. L.</i>)	106	9%
Goats (<i>Capra hircus dom. L.</i>)	2	.1%
Caprines	407	33%
Total Caprines	515	42%
Birds		
Guillemot/Murre (<i>Uria sp.</i>)	10	1%
Bird species indet.	212	17%
Fish		
Atlantic cod (<i>Gadus morhua L.</i>)	57	5%
Haddock (<i>Melanogrammus aelgf. L.</i>)	6	.1%
Ling (<i>Molva molva L.</i>)	1	.1%
Saithe (<i>Pollachius virens L.</i>)	2	.1%
Torsk (<i>Brosme brosme L.</i>)		
Cod family (<i>Gadidae</i>)	22	2%
Fish species indet.	140	11%
Total NISP	1237	
Large Terrestrial Mammal	727	
Medium Terrestrial Mammal	684	
Unidentified mammal fragments	8528	
Total TNF	11176	

Group 634 contains a fairly typical spread of Icelandic fauna. This is especially clear when compared to unit 454, the largest unit in terms of faunal material to date taken from Skálholt. Caprines outnumber cattle almost 2:1. This proportion is closer to an Icelandic norm than that of unit 454 where cattle dominate. The percentage of cattle, 22%, is within the bounds of other higher end sites from different periods of Icelandic history. In comparison, archaeofaunal assemblages from the medieval farm sites of Sveigakot and Hofstaðir in the north of Iceland exhibit similar percentages of caprines, with cattle routinely representing between 15-20% of the archaeofaunal assemblages in the early period after Landnám, and then falling to 10-15% later in the early medieval period (McGovern et al 2001, Perdikaris et al 2004). The archaeofaunal assemblage

from a lower ranking 18th century site in NW Iceland, Finnbogastaðir, has cattle making up roughly 10% of its assemblage (Edvardsson et al 2004). Both the early modern southern farm of Storaborg and the high status farm of Bessastaðir near Reykjavik had cattle making up roughly 20% of their assemblages (Sveinbjarnsdóttir 1988). See the comparative chapter for an in depth discussion of other contemporary sites relative to Skálholt. Because of the size and number of Skálholt's property holdings throughout Iceland these numbers can only be taken as a proxy of consumption patterns, not overall husbandry strategy.

Caprines

The element distribution of the caprines suggests that these animals were slaughtered at Skálholt. Elements from across the skeleton of the animal are present (figure 45). The assemblage is however dominated by those areas of the animal skeleton that hold the greatest amount of meat, the hind and forequarters and the skull. This pattern is reinforced if we look at the MGUI scores for this part of the assemblage (figure 43).

Skálholt Group 634 Caprine Bone Element Distribution

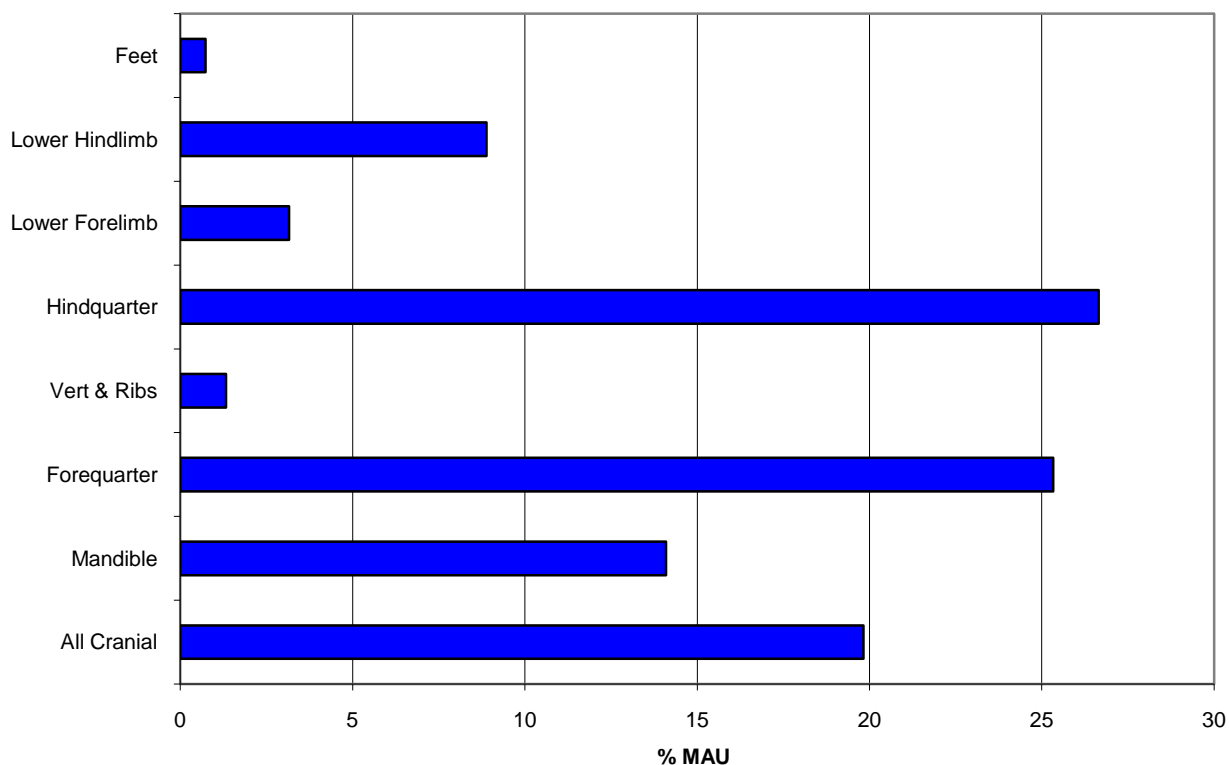


Figure 45

The MGUI quartiles reinforce the pattern of greater numbers of more meat, fat, and sinew carrying portions of the skeleton being deposited in this midden. Though elements from across the skeleton are present in this midden, suggesting that the animal was slaughtered onsite, there is a much higher proportion of high meat load bones, possibly indicating that this midden was the product of domestic consumption and not just butchery waste.

The age structure of the caprines in group 634 again suggests provisioning of meat for the Skálholt population. The mandibular eruption rates show no newborns or yearlings and very few individuals under 3 years of age (figure 46). This midden suggests that at least part of the population of Skálholt was being provisioned with mature sheep.

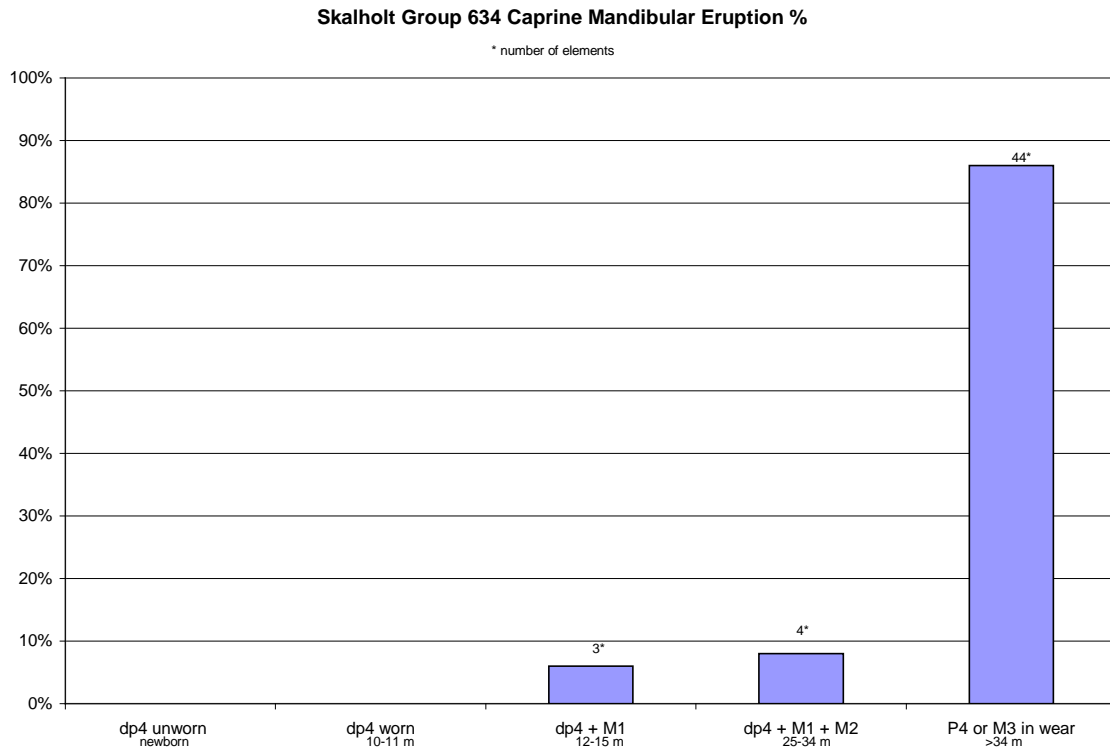


Figure 46

The wear states for the intact caprine tooth rows gives more detail regarding these mature sheep (figure 47). The wear state numbers indicate that these mature sheep were generally between the ages of 3 to 6 years old. These sheep then were neither very young nor very old.

Skalholt Group 634 Caprine MWS

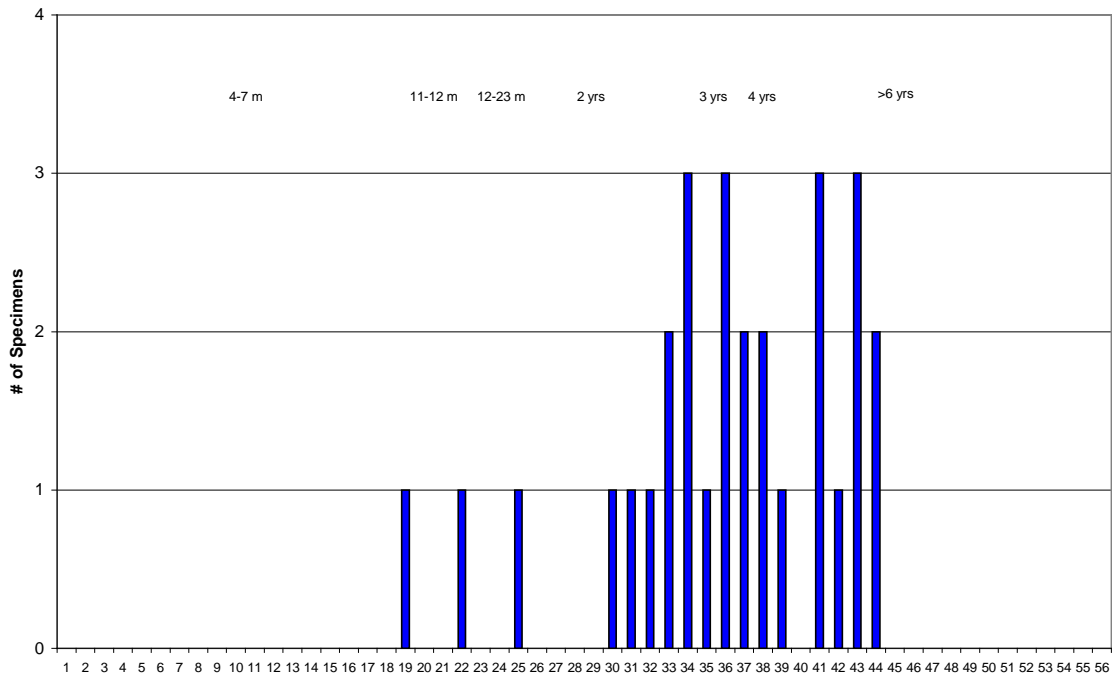


Figure 47

The wear of caprine molars can be differentially affected by factors such as the amount of grit and soil in their rangeland. Grit in the grass, possibly caused by erosion or tephra fall, can increase the rate of wear on the teeth of grazing animals thus possibly skewing the age estimations based on the wear state of their molars (Mainland 2000). To counter this possible noise caused by environmental factors we can examine long bone fusion rates as well (figure 48). The long bone fusion states generally reinforce the impression given by the mandibular wear states. One difference is that there seem to have been a few yearlings, roughly 3, as indicated by the presence of unfused proximal femurs. Otherwise there is a pattern of less fused long bones as we move through the bones by age of fusion towards those that fuse at a later age. Though the proximal tibia, which fuses sometime in the first half of the third year of life, shows a relatively high rate of fusion, the distal radius, which fuses at the same time shows a

relatively low rate of fusion. The average of the two is still less percent fused than the bones which fuse earlier. The bone fusion data does reinforce the mandibular wear state data, especially in the fact that both very young and the very old animals are not apparent. Though it does not look like there were many very old sheep it might be the case that the sheep older than roughly 4 years might have been retired milkers. Those between 2 to 4 years old might have been bad milkers or prime animals offered up for provisioning. A combination of a milking herd that is culled for meat provisioning could be what we are seeing here.

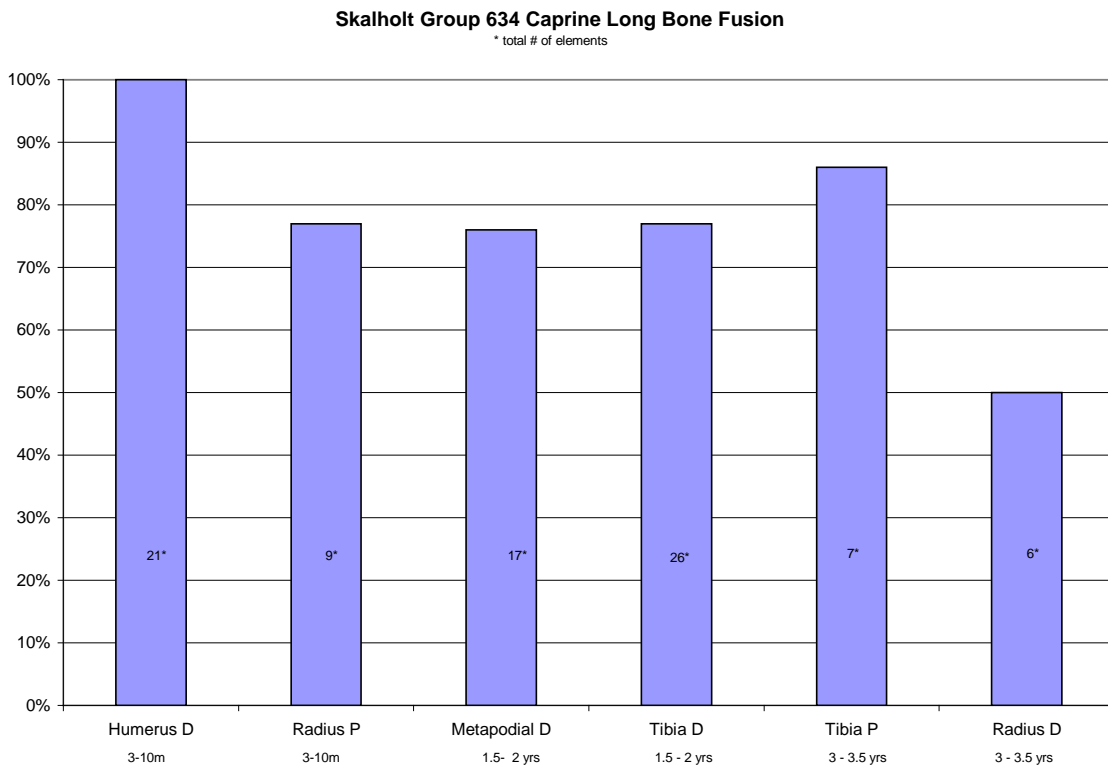


Figure 48

Cattle

Cattle bone element distribution, like the caprines, indicates that the animals were slaughtered at Skálholt (figure 49). The MGUI quartiles indicate that the cattle bones were largely from areas that had the highest amount of bone, fat, and sinew. Like

the caprines this midden looks like a product of domestic consumption from the Skálholt complex.

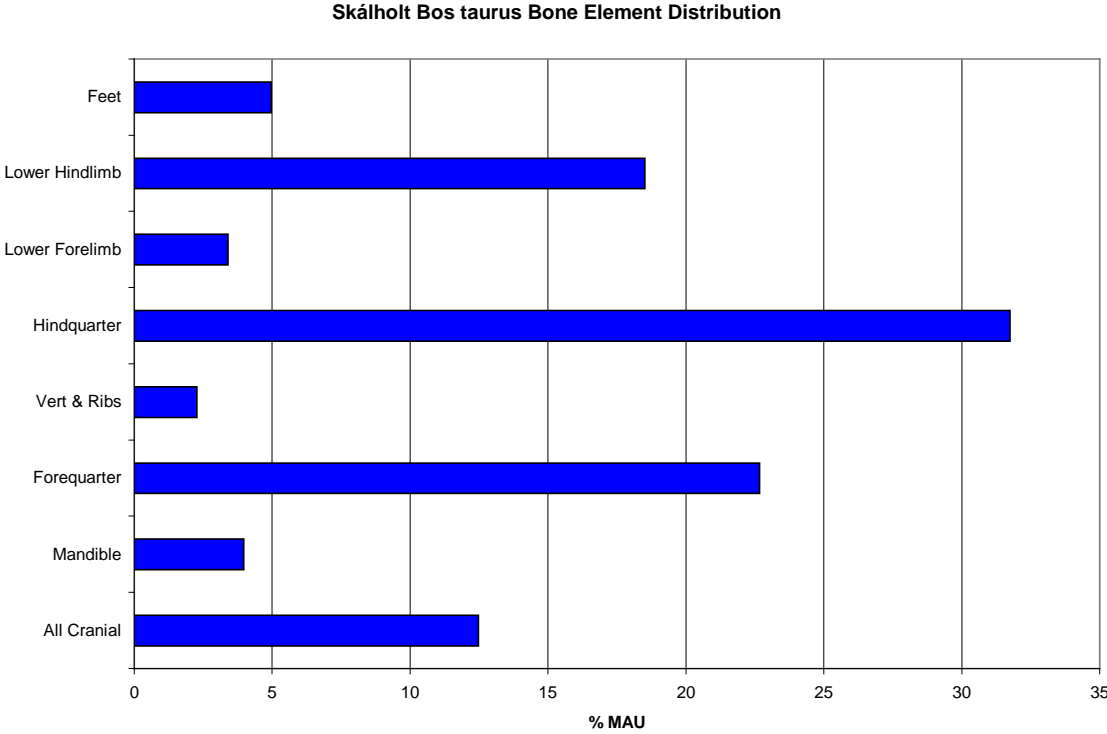


Figure 49

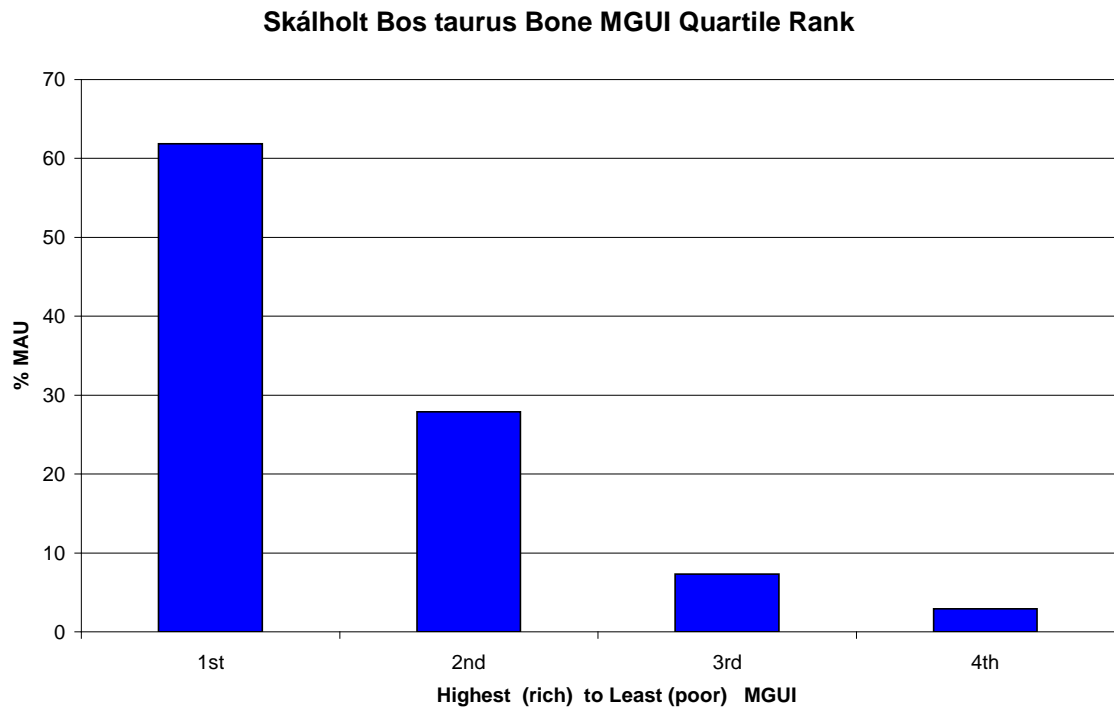


Figure 50

There were too few intact cattle mandibles for good analysis. There were 2 maxilla with medium wear on the M3 molar, 1 maxilla with light wear on the M3 molar, one maxilla with only the P4 molar still intact with no wear at all, and finally one mandible with the P4 molar intact showing very light wear. These specimens, though too few for in depth analysis do suggest that all these specimens came from animals that were young but whose adult teeth had erupted and were in light to medium wear. This would mean ages of roughly 2-4 years.

Skálholt Group 634 Bos taurus Long Bone Fusion

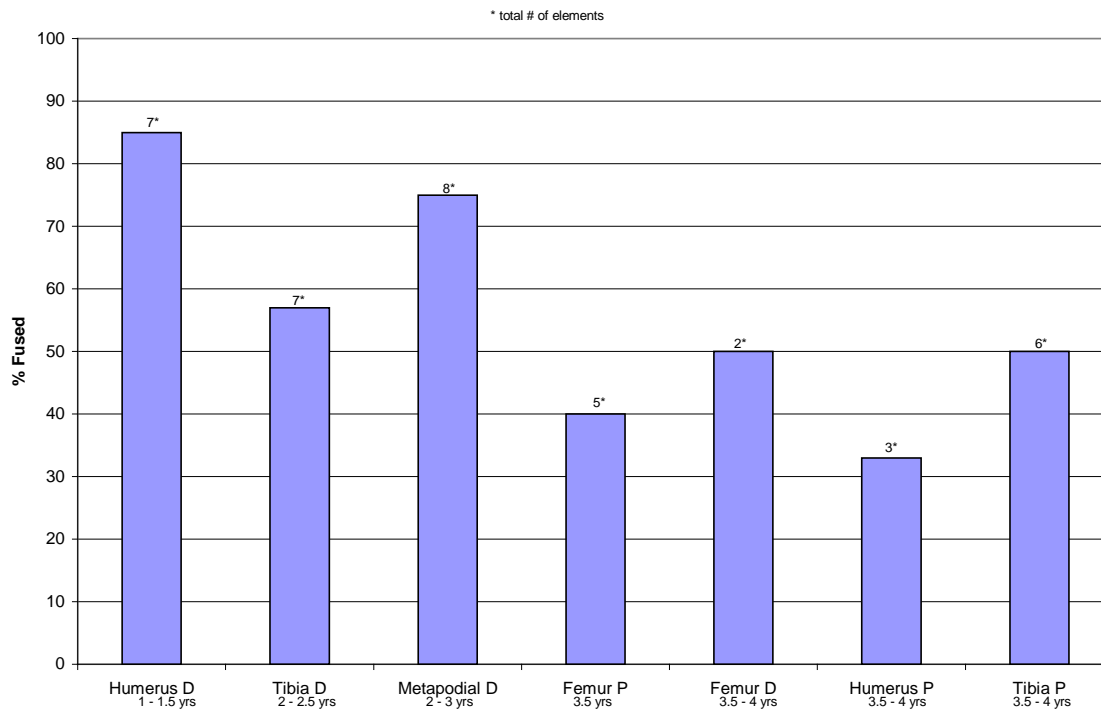


Figure 51

Though the total number of specimens used for the bone fusion analysis is not great, especially towards the later fusing long bones, there are enough to get some idea of the age profile. It is a somewhat odd profile, but this could be because of sample size or even seasonal slaughter patterns. In general it looks as if the cattle represented by group 634 were slaughtered after their 2nd to 3rd year of life and in some cases after their 4th year. There are a high proportion of mature animals slaughtered at the height of their growth curve. This is similar to the profile of unit 454 and seems to indicate a beef production strategy, though there could be some older animals in group 634 as well. Like the caprines we could be seeing a strategy involving the culling of animals from a dairy herd to supply beef for Skálholt. The younger animals could possibly be bad milkers or prime animals used for provisioning. On the other hand this could be a

dedicated beef strategy, though it would seem more in the realm of common sense to cull those who do not produce satisfactory amounts of milk for meat. This might be indicated by the broader age patterning (relative to group 383 and 1440).

Fish

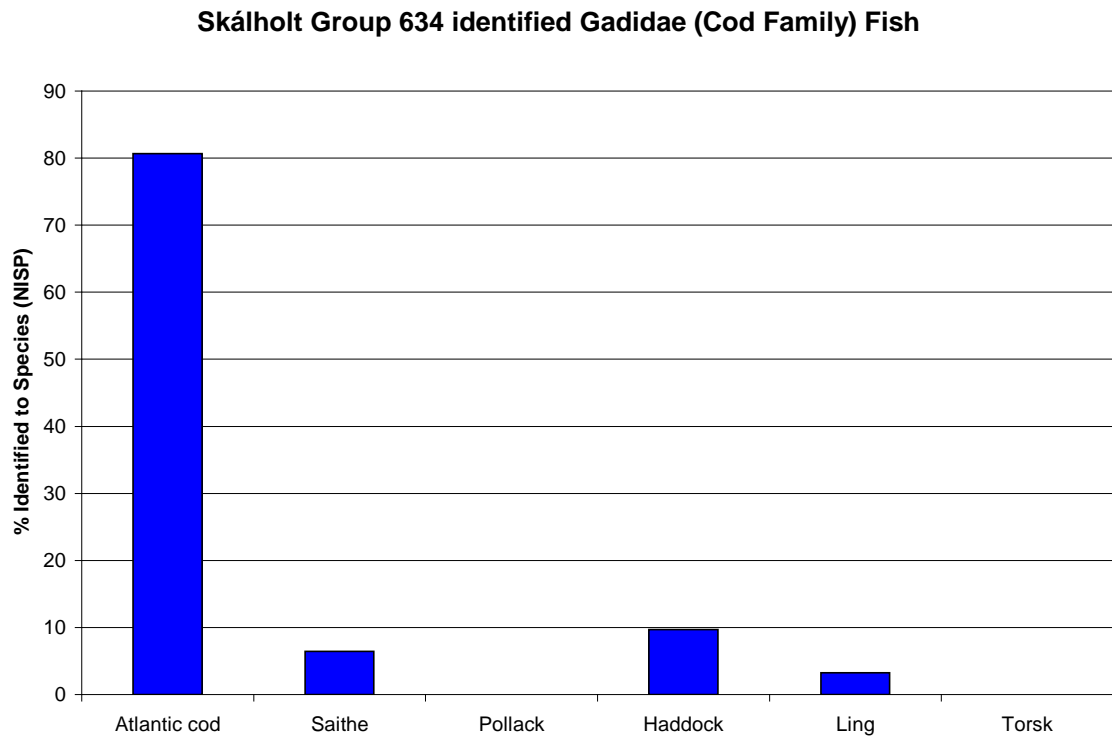


Figure 52

The fish bones in this assemblage are dominated by cod (*Gadus morhua*). Small proportions of haddock, saithe and ling are also apparent. Though there are not enough numbers of elements identifiable to species to do in depth analysis of the fish remains (figure 53) illustrates the numbers of cranial versus vertebral cod elements found.

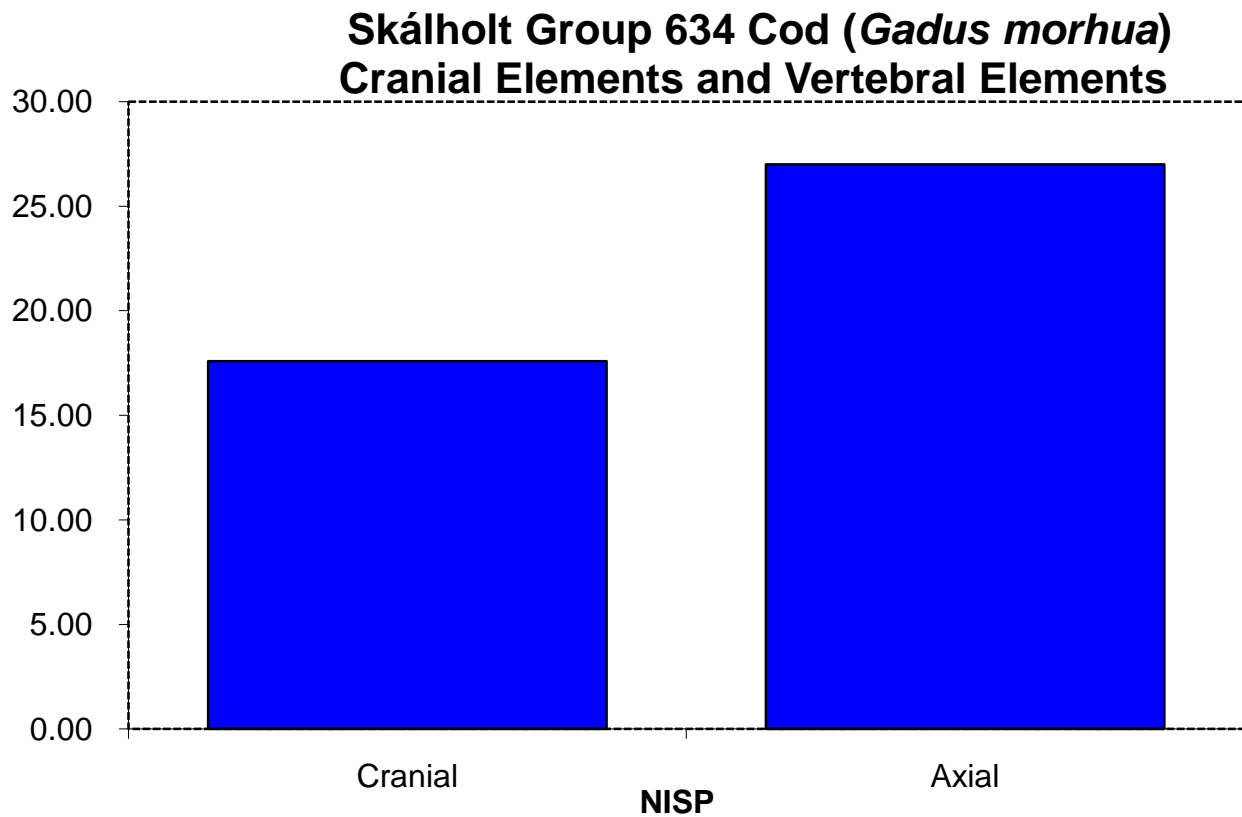


Figure 53

This distribution suggests that a certain amount of the ocean fish, specifically cod were coming into Skálholt fresh. Skálholt is, for Iceland, relatively far from the sea. Bringing fresh ocean fish into the complex is another sign of the wealth of this site. We know from written records, specifically menus for the student body as well as other sources, that dried fish, especially stockfish was a central element of the diet for the students and presumably the staff at Skálholt. Yet some of this population, most likely the Bishop and his guests and possibly immediate household were eating fresh cod.

Birds

The only identifiable to species bird bones were from the *Uria* species, commonly known as guillemots or murre. These birds breed on the coast of Iceland, though some, such as the Black Guillemots, can be year-round residents (Hilmarsson 2000). The presence of the bird at Skálholt, considering the bird's maritime habits, indicates that there was some transport of sea birds to Skálholt. This is no surprise but it does increase the variety of foods seen archaeologically at Skálholt.

Domestic versus Butchery Waste

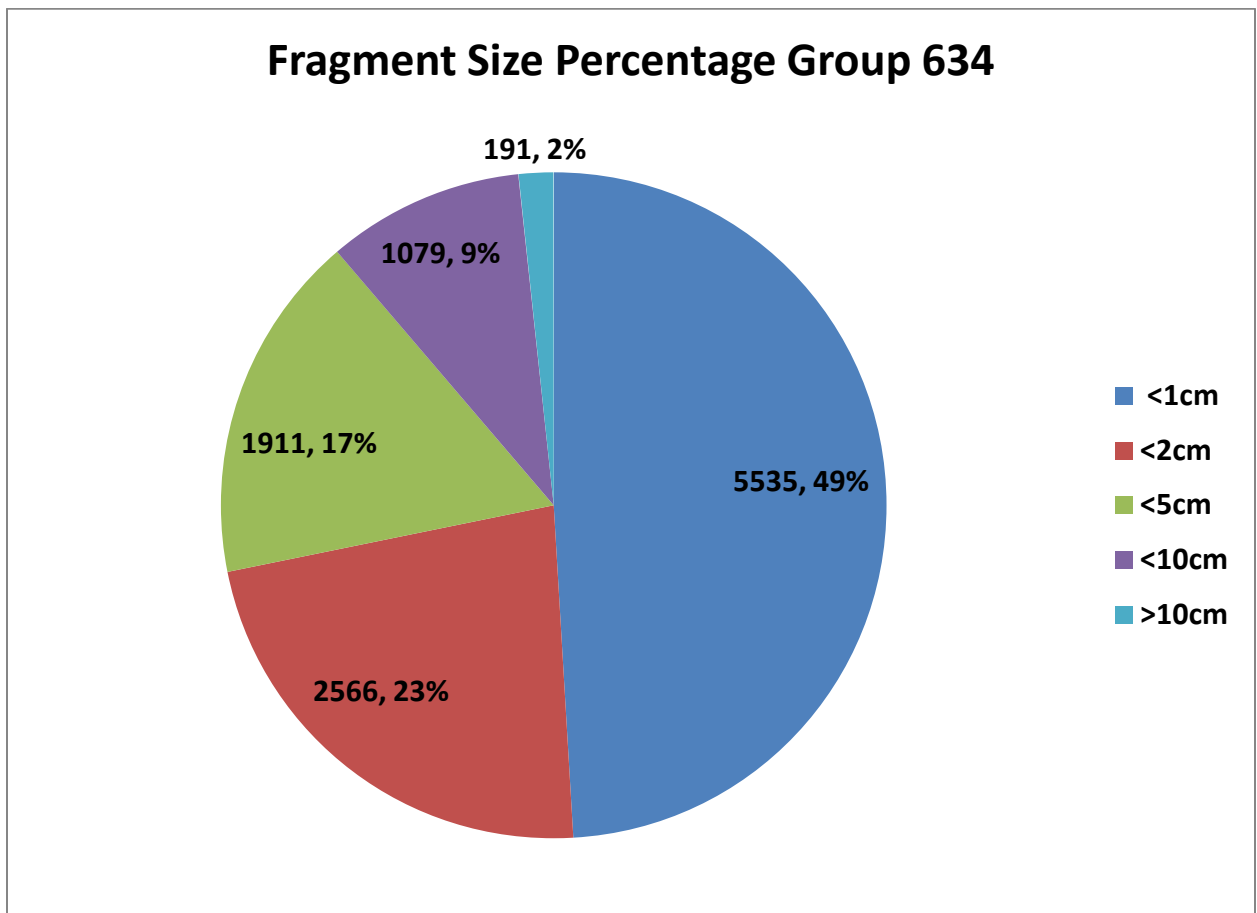


Figure 54

Group 634 seems to be a mix of domestic waste with some possible butchery waste as well but nothing close to the primary butchery waste seen in unit 454. The

fragment size numbers as well as the numbers and types of burnt bone reflect this. Overall the unit has a reasonable distribution of fragment sizes indicating that bone from a number of domestic processes was being deposited here (Figure 54).

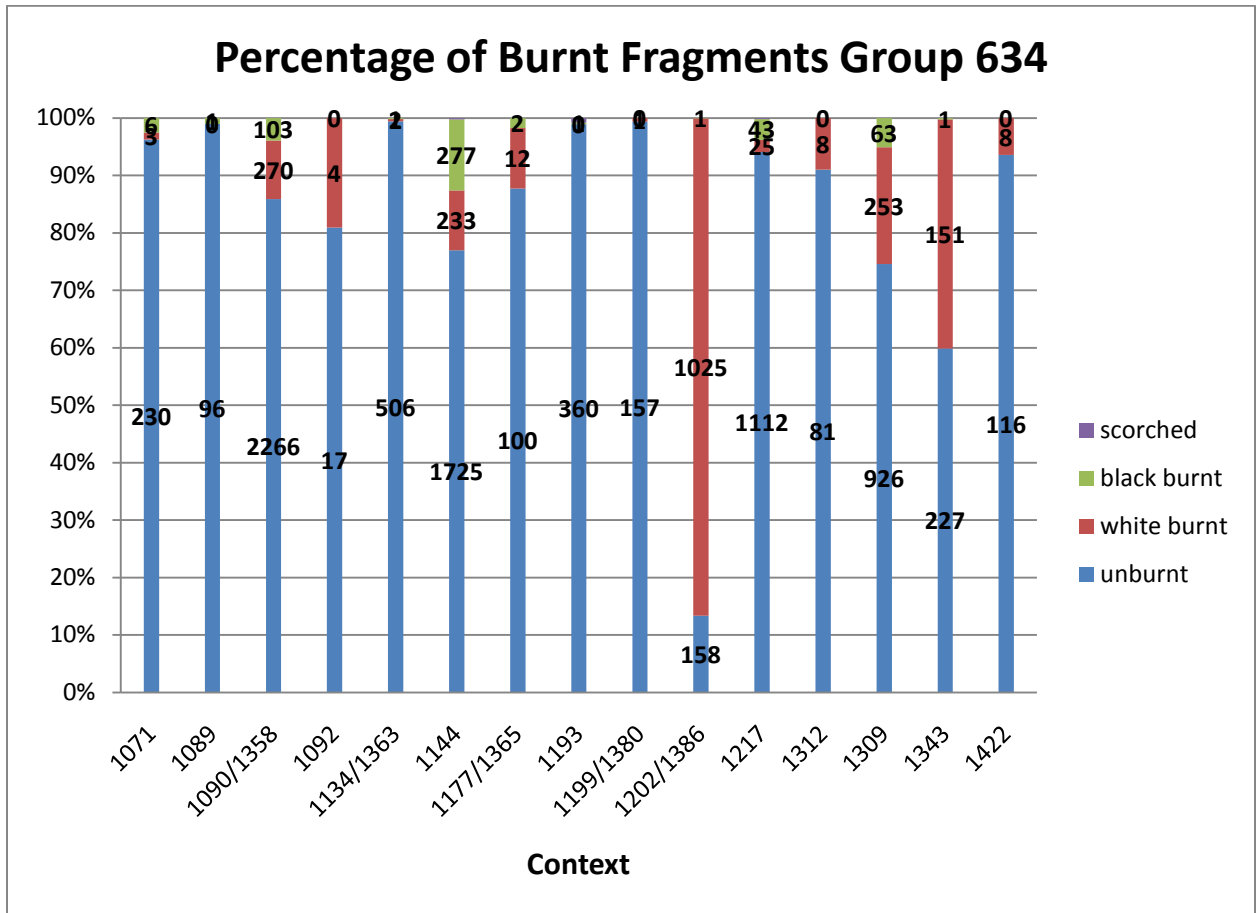


Figure 55

The burning numbers by context show (figure 55), with the exception of context 1202/1386 and possibly context 1343, a fairly small but still significant amount of burnt bone. Most of the burnt bone in these contexts is dominated by white burnt bone, indicative of hearth sweepings. All the contexts, though the two highest have very small percentages, contain burnt bone and all of them can be seen as in part made up of domestic household waste. Context 1202/1386 might represent a specific hearth cleaning episode sometime in the middle of the 18th century.

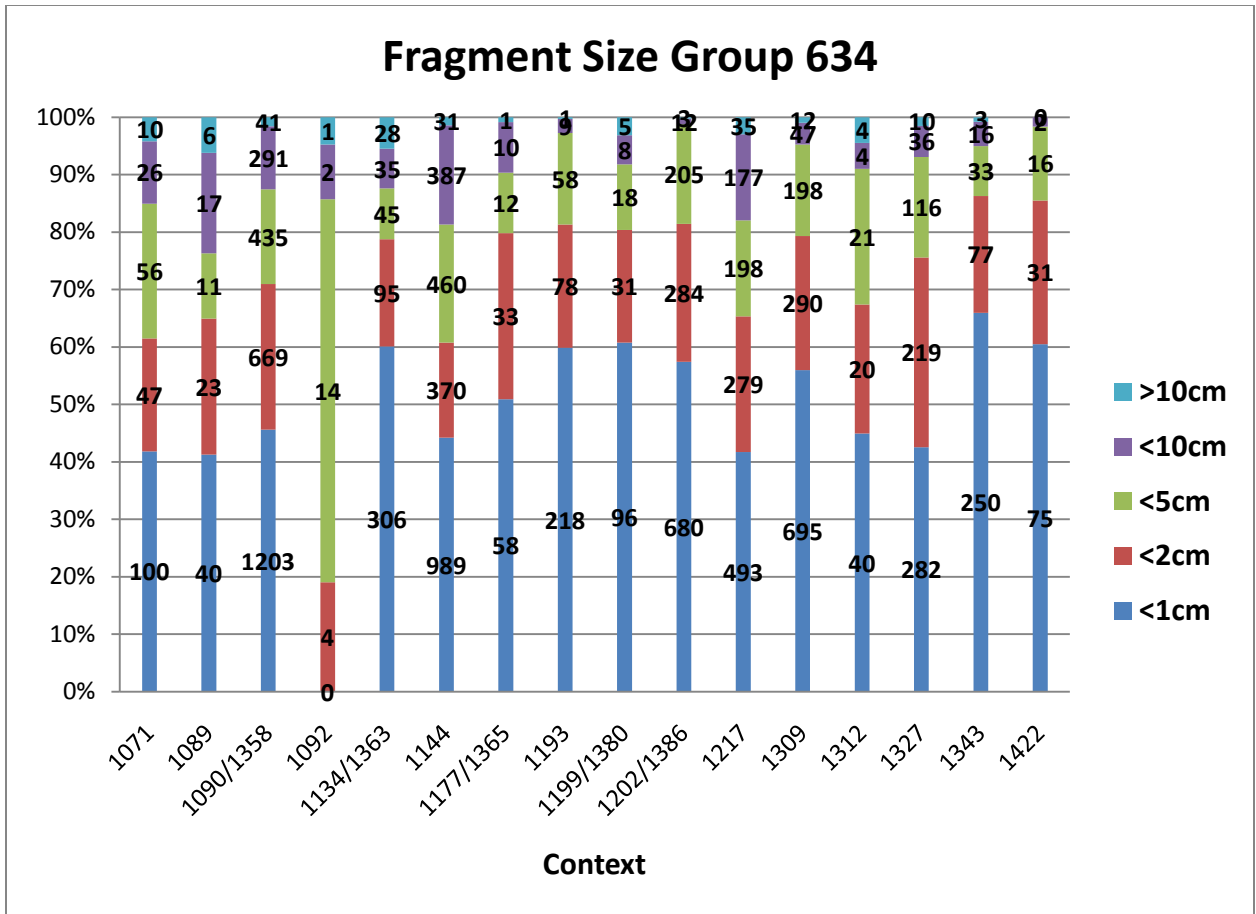


Figure 56

The fragment size numbers by context (figure 56) reflect the pattern seen in the group overall.

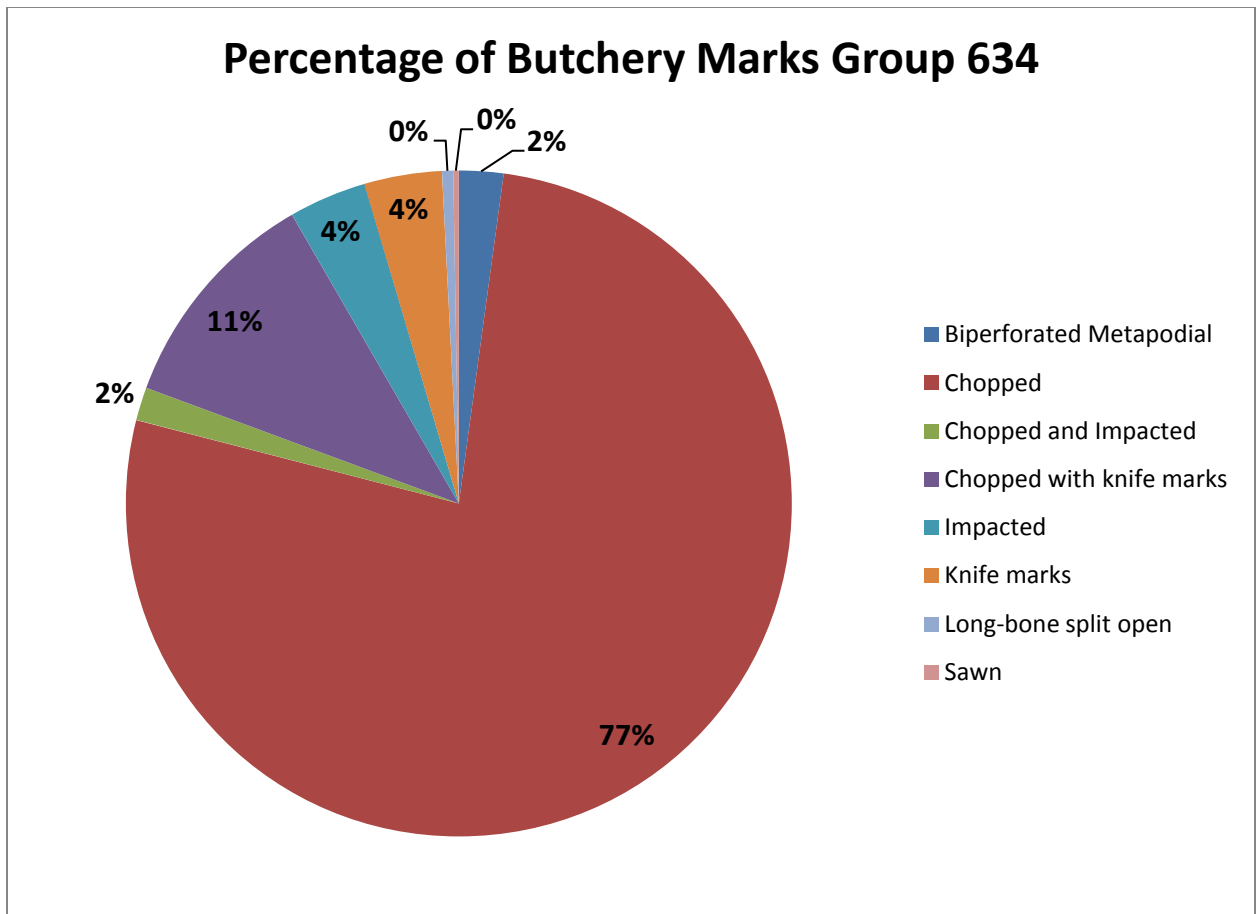


Figure 57

Only 3% of the bone fragments in Group 634 show any sign of butchery marks (372 out of 11,286 fragments). Of these we have a large number of chop marks, made by a cleaver or some other large heavy blade. These would most likely have been the product of primary butchery. There is also a significant number of elements with knife marks as well as knife marks on chopped pieces. This is indicative of domestic consumption. The biperforated metapodials are another uniquely Scandinavian sign of domestic consumption. Metapodials would often, especially from the late medieval period into the 20th century, be perforated at one end on the epiphysis and at the other end right above the epiphysis on the shaft itself. This allowed the diner to easily suck the marrow out of the bone. This was primarily done with caprine metapodials. This was

so customary that it should not be used as a sign of famine or poverty. Within living memory some people had their own fancy silver instruments for this process in Finnmark, Norway (Bjarnar Olsen, personal communication). The butchery numbers back up the impression that much of the material deposited in Group 634 came from the main complex of Skálholt and that it was the product of cleaning and other domestic episodes.

Discussion

Group 634 seems to be the product of provisioning the school, Bishop's household, and complex of Skálholt. The idea that these animals were culled from dairy herds is possible. Whether these animals came from herds based at Skálholt or at one of the numerous farms owned by the Bishopric and farmed by tenants, often paying rent in kind, cannot be determined at this time. Not only did the Bishopric of Skálholt own many farms but often a number of animals on these farms were the property of Skálholt as well, at times raised solely for the purpose of furnishing the Skálholt complex with meat and dairy products. Tenant farms were also obliged to supply fodder for those animals based at the Skálholt farm itself (Grímsdóttir 2006). The absence of neonates and younger animals as well as older animals could result from the fact that the actual husbandry of at least some of these animals took place on tenant farms. The husbandry archaeological signatures that we commonly produce from age profiles might not be available from this particular assemblage. This assemblage is likely the product of the consumption side of animal husbandry, not the supply side. From the consumption end of this assemblage we again have evidence of fairly intensive meat provisioning for the complex at Skálholt. Being one of the largest and richest concentrations of population in

Iceland before the founding of Reykjavik at the end of the 18th century it is not surprising that large numbers of animals would be used for supplying the complex.

Chapter 11 - The Cattle of Skálholt

Inventories of cattle slaughtered for the Skálholt community in the 16th and 17th century show a mix of older animals and two and three year old animals (Grímsdóttir 2006). Yet the numbers of younger, two and three year old cattle are much smaller than the older cattle. For example in 1559 inventories of slaughtered animals for food and payment at Skálholt show 53 cows, 55 old bulls, 15 three year olds, 10 two year olds, and two 1 year olds. For the year 1568 43 cows, 30 old bulls, 15 three year olds, 10 two year olds, and 2 one year olds. In 1643 accounts note 30 bulls and 30 old cows (Grímsdóttir 2006, 125). It is not entirely clear what the inventories meant by 'older animals'. In unit 454 there are very few very old animals, meaning over 6 to 8 years. In group 634 it is hard to tell the range of older animals due to the lack of tooth wear analysis, yet what little there is has no animals older than 4 years. There is a clear discrepancy between the zooarchaeological data from groups 383 and 634 and the inventories discussed by Grímsdóttir. The zooarchaeological data from these units are dominated by younger and mature animals, the older animals mentioned in the inventories do not seem to appear in the archaeological record from these middens.

A number of possibilities could explain this discrepancy. The slaughtered animals would have been used for both direct consumption at the Skálholt complex and for payment to laborers and staff working at Skálholt. It is possible that the meat from the older animals was used for payment of wages and thus transported off site for consumption while the smaller amount of meat from younger animals was used for the direct consumption by the inhabitants of the Bishop's household.

It is also possible that there were different places for butchering the younger prime animals and the older animals. Maybe this was a function of separate butchery areas for meat destined for the payment of wages and meat destined for the tables of Skálholt. This seems unlikely at the site of Skálholt itself. The drawings and maps of Skálholt from the 17th and 18th century only show one meat store shed, this being the one near the excavated middens. Yet the records show animals owned by the Bishopric slaughtered at the Skálholt as well as at farms owned by the Bishopric. It is possible that the older animals were slaughtered on farms owned by Skálholt and that the younger animals were brought to the estate for slaughtering there.

Another possibility has to do with different trash disposal patterns. If the young prime animals were destined for the Bishop's table and those of his staff and the older animals were at least partially transported off the site as wages and otherwise consumed in different parts of the complex then maybe the cattle from the middens of group 383 and group 634 are domestic, post consumption trash from the tables that received young prime beef.

We know that the farm at Skálholt did not hold enough animals to feed the population at the complex. The Jarðabok register of 1713 has the individual farm at Skálholt holding 24 cows and 1 uncastrated bull, 140 ewes, 10 rams, and 18 horses. This is not enough for the provisioning of the whole estate. The great majority of the Bishop's animals were held by tenant farms through both *kúgildi* and other arrangements involving the keeping and foddering of animals (Grímsdóttir 2006, 122).

Another possibility suggested by this data has to do with the *kugildi* system. If farms that owed the *kugildi* to Skálholt were obliged to supply prime beef age cattle to

fulfill their obligation this might entail another level of disadvantage to the farmers in question. If they were obliged to surrender prime beef age cattle then they were also losing any potential productivity from dairy production that might have resulted from animals with a longer life span. Of course a portion of this dairy produce would have been given up for the *kugildi* but at least some of it would have been left for the farmer's own consumption. If some of these younger prime age cattle are the products of the *kugildi* it represents a further burden on the subsistence economy of the Icelandic farmer/tenants involved as they would have lost what little resources they might have gained from the *kugildi* system.

Naturally and Artificially Polled Cattle

What makes the cattle of context 454 exceptional, beyond their meat harvest signature, is that all of the cattle crania (ten skull elements in which the horn core area was intact) recovered from context 454 are polled (without horns). Eight of these crania were naturally polled (figure 58), and two were artificially polled. In one of the artificially polled examples, infection set in after the removal of the horn (figure 59).



Figure 58 – Examples of the naturally polled crania from unit 454



Figure 59 – Example of an artificially polled cranium from unit 454

Polledness is a naturally occurring characteristic that occurs with moderate frequency in modern Icelandic cattle descended from the original breed brought to Iceland by the original Scandinavian settlers in the late 9th century (Kantanen et al. 2000). The historical population on the other hand had the polled characteristic only in small numbers (personal communication, Eythorsdottir; (Kantanen et al. 1999; Kantanen et al. 2000). The faunal data from settlement period and medieval Iceland

reflect this. The overwhelming majority of cattle crania found are horned. The early modern record is small, but so far the material from Skálholt is the only faunal collection to produce this type of polled profile.

Dr. Uno von Troil, who accompanied Joseph Banks on his trip to Iceland in 1772, remarks on the hornless cattle in the south of Iceland (von Troil 1780: 132). Drawings made by an artist also accompanying Joseph Banks confirm their presence at Skálholt at least in the year 1772 . Another traveler to Iceland earlier in the century, Niels Horrebow, remarked that there were some polled cattle in the south but that the majority were in fact horned (Horrebow 1758). It should also be said that of the two groups only Horrebow traveled throughout Iceland. Banks and von Troil traveled from Bessastaðir to Mt Hekla, the goal of their trip, to collect geological specimens. Along their way they stopped at Skálholt⁵ and traveled through a region largely owned by the Bishops.

⁵ Sadly neither have much to say specifically about Skálholt. Banks says very little in his journal except for the priggish comment that the Bishop was a "gentleman", unlike most everyone else he had met.



Figure 60 – Prospect of Skálholt looking north. The cathedral is on the left and the school and Bishop's household are below and to the right of the cathedral. The buildings in the foreground are most likely outbuildings of the main complex. The cattle on the bottom right are polled.



Figure 61 – The cattle in the bottom left are blown up in this picture to make their polledness more obvious. Note their small size relative to modern cattle.

It is impossible to say with any great certainty at this point in the research where exactly these cattle came from, but it is the case that during the seventeenth and eighteenth century Europeans were developing some of their first polled breeds of cattle, including the Scottish Galloway and the Aberdeen-Angus breeds that were created and raised solely for beef production (Bath 1966). It is also accepted by livestock and agrarian historians that the first dedicated beef economies in Europe were formed at this time. Scotland supplied Galloway, Angus, and Highland beef cattle in large numbers for the Edinburgh and London markets (Trow-Smith 1951, 151-153), while the Danish nobility supplied the Netherlands with large numbers of beef cattle in the eighteenth century (Bath 1966, 286). The latter may have been the source of the bishop's polled cattle as there was already a precedent for a beef cattle economy coming from Denmark. It is also likely that Denmark imported new varieties of beef cattle after the cattle plague of the 1740's destroyed as much as half of the Danish cattle population (Kjærgaard, 1994, 27-28). It is entirely possible, though not yet investigated, that the Bishop of Skálholt or one of his household might have encountered this beef enterprise and new breed imports through the Danish nobility. Though the Scottish polled beef breeds would also seem to be good candidates for the cattle of unit 454, this would be pure speculation at this point. The cattle of unit 454 are more likely from the 17th century and the development of new breeds was not only an 18th century phenomenon. The Netherlands were importing new breeds of cattle for breeding purposes throughout Europe by the 16th century (Thomas 2005). It is just as plausible to suggest that these cattle might have been of originally Dutch origin. Yet, according to geneticists who have worked with Icelandic cattle, any importation before

the 19th century was highly unlikely (Kantanen et al. 2000). Another possibility is that they are all native Icelandic cattle but that only the naturally polled variety existed around Skálholt. This might have been the case but the fact that other cattle in this assemblage were artificially polled makes them distinctive in relation to other Icelandic cattle found in archaeological contexts. One possibility is that the cattle were bred towards a polled variety and those born with horns were artificially polled to minimize damage caused by the horns, especially during their confinement during the long winter months. Yet if this is the case it is at this point exceptional in that all of the Icelandic zooarchaeological data, excepting Skálholt, reinforces the idea that Icelandic cattle were generally horned until modern times. Another possibility is that the horned cattle in the assemblage were polled in order to look like the other naturally polled animals. This might have been a move more attuned towards aesthetics than husbandry practice. Another intriguing possibility is that this might be an attempt at a proto-Lamarckian breeding strategy (in contemporary Enlightenment Sweden improving agricultural enthusiasts were confidently planting masses of tea bushes and Danish improvers were attempting to alter size and conformation of local dairy cattle) (Kjaergaard 1994; Koerner 1996; Koerner 1999). The larger issue is that these polled cattle may be indicative of an elite community that is clearly in touch with the scientific, agricultural, and even pastoral fashion sentiments of early modern Europe. That the Bishops of Skálholt were so connected to the larger European world is not at all surprising, but it is striking that this connection might be expressed in and through their cattle. These cattle were already being treated in a very different way, as beef producers, than the majority of other Icelandic cattle. That they were also physically different makes the contrast with

the rest of Iceland even greater (Hambrecht 2006; Hambrecht 2007). These cattle could be a sign of the intensification in breeding efforts and knowledge that is often cited as a result of the Agricultural Revolution, and following this a material sign of changing technologies and even attitudes emerging out of the early modern age.

The writings of improving farming theorists and the experience of practical farming experiments associated with the early Agricultural Revolution is one probable inspiration for the decisions that resulted in the appearance of these cattle at Skálholt. Most agricultural historians agree that the essence of the Agricultural Revolution was the major increase in cultivated land, and in new agrarian technologies, crops, and commercial animal breeds that appeared during the early modern period in Europe, especially in the Netherlands and in England. There is also a consensus that these new technologies and breeds led to increased agricultural production (Overton 1996, pp 1-9). Less agreed-upon is when this revolution began though it is generally agreed that it was in development throughout much of north-western Europe by the 17th century, and that it reached its height in the second half of the 18th century. A recent article on the zooarchaeology of animal husbandry improvement in England, suggests there was a gradual but consistent increase in the size of domestic animals starting in the mid-14th century (Thomas, 2005). Though the author does not claim this as the beginning of the Agricultural Revolution he does suggest that these findings might show that improving animal husbandry can be traced back earlier than previously thought. Denmark experienced the expansion of agricultural lands and new agricultural techniques in the 17th century, though it can be argued that this expansion led to a grave ecological crisis in the 18th century (Kjærgaard, 1994).

Behind the Agricultural Revolution there was an overall concentration on the harnessing and controlling of nature. This went well beyond the biblical precedent of the creation story in Genesis by emphasizing the ability to engineer nature and cull the unproductive elements from it (Worster, 1994, chp 2). In the context of agriculture this engineering was most often termed “improvement” (Dalglish, 2003, chp 5). Though the nature of improvement changed according to the point of view of the agents involved, generally speaking land, crops and animals were manipulated in order to increase their value and productivity through an application of literate, orderly “enlightenment” principles of formalized planning, systematic record keeping, and the application of simple numerical statistics. Early Modern Icelanders were not strangers to this improving impulse. Alongside the 1780 Icelandic manual of agricultural improvement, *Atli*, by Bjorn Halldorsson, there are eighteenth-century private “improving” journals of farmers from throughout Iceland (Ogilvie, personal communication). There is also a significant spike in barley pollen seen in soil samples dated to the 17th century taken from Skálholt (Einarsson, 1962). These data might indicate an attempt at growing barley in the Skálholt area, another potential indication of an improving impulse, in this case from the same community that raised and slaughtered these exceptional cattle.

The idea of improvement is often associated with the rise of capitalism and the profit motive, but the Bishop’s beef cattle are a difficult fit for this model. It would be hard to understand the introduction of these polled beef cattle and the artificial polling of native cattle as motivated by profit and the accumulation of capital. It is possible that the Bishops intended to stimulate a market for beef in Iceland, but this is very unlikely. It is more likely that these cattle management decisions were inspired by the desire to

reinforce the high status of Skálholt through conspicuous beef consumption and to signal participation in the new set of European standards for appropriate behaviors of landed elite farm managers, re-emphasizing elite intellectual and social connections with the outside world. The bishop's cattle thus appear to have been intended to enhance social rather than financial capital. Their presence at Skálholt looks backwards to longstanding patterns of chiefly display and consumption as much as ahead to the oncoming world of commerce and modernity. The bishop's cattle, like the early modern manor and school of Skálholt itself stand between two worlds, and their bones tell a story more rooted in social change and changing world view than in biology or subsistence economy.

Codified in Icelandic law from the high middle ages, horned cattle had legal status as units of valuation and exchange. They were used to value property and pay debts and legal sanctions, and were central to Icelandic culture from the first settlement to the development of a dedicated fishing economy in the nineteenth and twentieth centuries. The horns are an explicit part of the definition of cattle in Icelandic law (Grágás). Moreover, horn itself was a valuable raw material for crafts productions on an island with a limited supply of wood and no utilized source of ceramic quality clay.

Skálholt's naturally and artificially polled cattle are different from the vast majority of previously encountered cattle archaeofauna in Iceland -- different in function and possibly legal definition. In a strict reading of Icelandic law they were worth much less. I would argue that the introduction of cattle that did not fit into the traditional views of what the highest value cattle should be by one of the highest status settlements on the whole island was a dramatic and public statement of difference. To both utilize cattle

as a high-status; one-time return investment while also taking them out of the traditional legal and economic system, is a vivid demonstration of power and wealth.

Artificial polling of existing horned cattle also shows a strong impulse on the part of the powers at Skálholt to change the Icelandic landscape not only through introduction of a new breed of animals but through the physical alteration of native cattle. This deliberate alteration of natives to resemble the newcomers, I believe, moves the agency behind these cattle into the realm of fashion and ideology. There was no practical reason to artificially poll these animals other than to create a uniform faunal landscape that reflected the ideologies and pastoral fashion pretensions of the Bishop of Skálholt.

The Agricultural Revolution is closely intertwined with Enlightenment thought. The two movements do not cleanly overlap in time yet they did have enormous influence on each other. In terms of nature, Enlightenment thought is broad, but there is an overall concentration on harnessing and controlling nature. These themes go well beyond the biblical precedent of the creation story in Genesis by emphasizing the ability to engineer nature and cull the unproductive elements from it (Worster, 1994, chp 2). In the context of agriculture this engineering was most often termed “improvement,” a term in which both movements meet and combine (Dalglish, 2003, chp 5). Though the nature of improvement changed according to the point of view of the agents involved, generally speaking land, crops and animals were being manipulated in order to increase their value and productivity. Seventeenth and especially eighteenth-century Icelanders were not strangers to this improving impulse. Alongside the 1780 Icelandic manual of agricultural improvement, *Atli*, by Bjorn Halldorsson, there are eighteenth-century

private “improving” journals of farmers from throughout Iceland (Ogilvie, McGovern, personal communication).

What we see in unit 454 at Skálholt is a far more dramatic form of innovation and a greater break from traditional pastoral economies than has yet been seen in any other archaeological context in the North Atlantic. Carolus Linnaeus, the father of modern taxonomy and one of the brightest stars of the Enlightenment, epitomized a more radical end of the improving ideal when he stated as one of his goals the commercial growth of tea, saffron, and rice in Swedish Lapland. Turning this sub arctic region into a fertile agricultural zone producing cattle, wheat, and exotic spices (Koerner, 2000, pp 79-81) was one of his dream projects. The audacity of his vision reveals the extent to which the agricultural improvement impulse represented thinking that had gone far beyond the biblical commandment to utilize the beasts of the earth for their benefit. One's ability, and right, to alter God's creatures, just as one would a farm implement, was grafted onto the original commandment of Genesis (Worster, 1994, pp 39-41).

The idea of the inheritability of externally imposed traits, transformism, predates Jean-Baptiste Lamarck and was one of many potentially legitimate branches of natural science in the eighteenth century (Corsi, 1988). The possibility that the artificial polling of the horned cattle was an attempt at a transformist or Lamarckian breeding program is another intriguing possibility. In any case, cattle associated with Skálholt were re-ordered in a way that reflected new attitudes towards the organic world espoused by Enlightenment figures such as Linnaeus and Lamarck.

The Enlightenment reverberated through the parlors and universities of Europe, and, I would argue, amid the paddocks and pastures of Iceland through Skálholt. I

believe that the zooarchaeological assemblage of unit 454 is a product of an improving impulse brought to Iceland by the Bishop of Skálholt or one of his household. The creation of a new faunal landscape had an ideological foundation, based on a new understanding of the plasticity of nature and our own potential agency within it.

Chapter 12 – Metrics

Morphological Change and the Agricultural Revolution

The Agricultural Revolution is generally considered to have its origins in the 17th century and to have greatly intensified in the 18th and then 19th centuries (Overton 1996; Bath 1966). This historical process is characterized by greatly increased agricultural production as well as the creation of numerous new breeds in both domestic plants and animals. Zooarchaeologists are in a unique position to study this phenomenon through the analysis of faunal assemblages from this period. Changes in size and morphology should be present in the archaeological records. Care needs to be taken in these investigations as increased size for instance does not necessarily correlate with agricultural improvement and the Agricultural Revolution. For example some cattle breeds that were developed in the early modern period for the purposes of beef production had short legs as did some sheep (Umberto Albarella 1997; Thomas 2005). Thus taphonomy can have a dramatic impact on the results of size reconstruction done on individual elements. There are also issues around changes in fodder quality and quantity that could have affected the size of domestic animals during this period (Umberto Albarella 1997). Yet changes in size and morphology can be used as indicators of agricultural innovation and along with historical as well as other environmental archaeological sources be used to investigate the development of the Agricultural Revolution. In the case of Iceland the zooarchaeological records of domestic animals has produced two cases in which there might be indications of size and morphological changes. Polledness, both natural and artificial, as possible morphological changes related to the Agricultural Revolution were discussed in the last

chapter. Animal size is the other possible trait that could be related to the Agricultural Revolution.

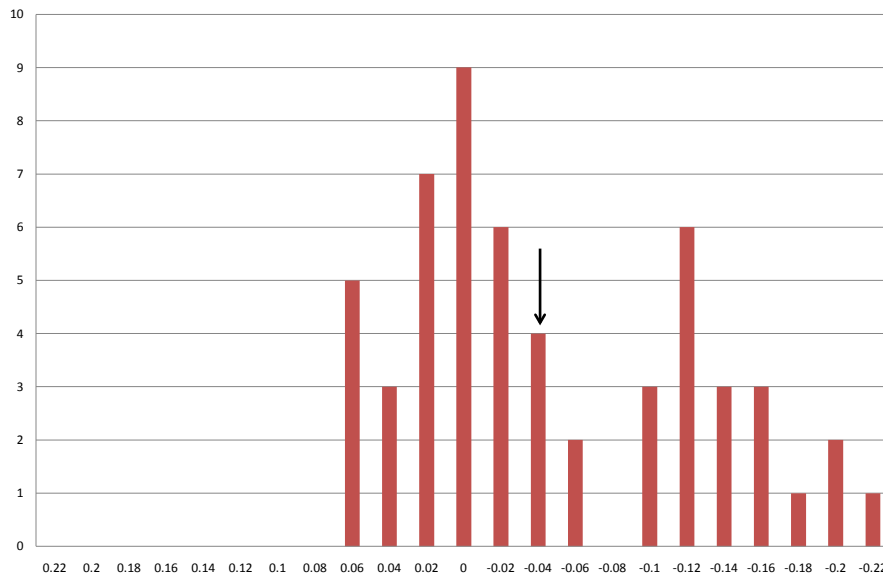
Animal Size

Preliminary metrics analysis of cattle bones from Icelandic contexts dating from the Settlement Period through the early modern period suggest a possible increase in the size of cattle in the early modern period. It must be noted that cattle are rarely present in large numbers with the levels of survivability needed for adequate metrics analysis in Icelandic archaeological contexts. There are not enough archaeological specimens existing for size reconstruction through the application of known formulas to specific bone measurements. Also the previously noted issues around animal shape can make size reconstruction around measurements from specific elements problematic. Because of this the log ratio method was utilized. As a standard for comparison elements from one specimen from the American Museum of Natural History were used. This specimen #14098 was a cow slaughtered in 1893 in Schoharie County, New York. It is important to note however that what is important is not the relative difference in size between the Icelandic specimens and the specimen from the American Museum of Natural History but the differences between the Icelandic specimens relative to the comparative specimen #14098 (U. Albarella 2002; Thomas 2005).

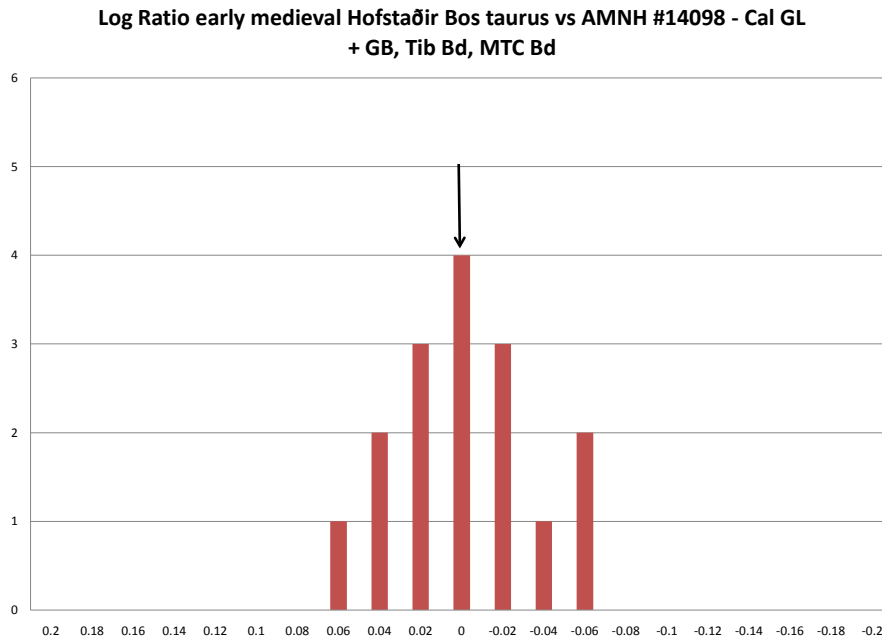
This effort is in its infancy and there are many temporal and geographic holes that need to be filled in by the archaeological record. The results below are to be treated as preliminary at best. I have taken two medieval sites and one late medieval site for comparison with the specimens from Skálholt. There are a number of archaeological

sites in Iceland currently generating large faunal assemblages, one of which, Skutustaðir, promises to generate a large well preserved assemblage that spans the whole breadth of Icelandic history (Hicks and Harrison 2009).

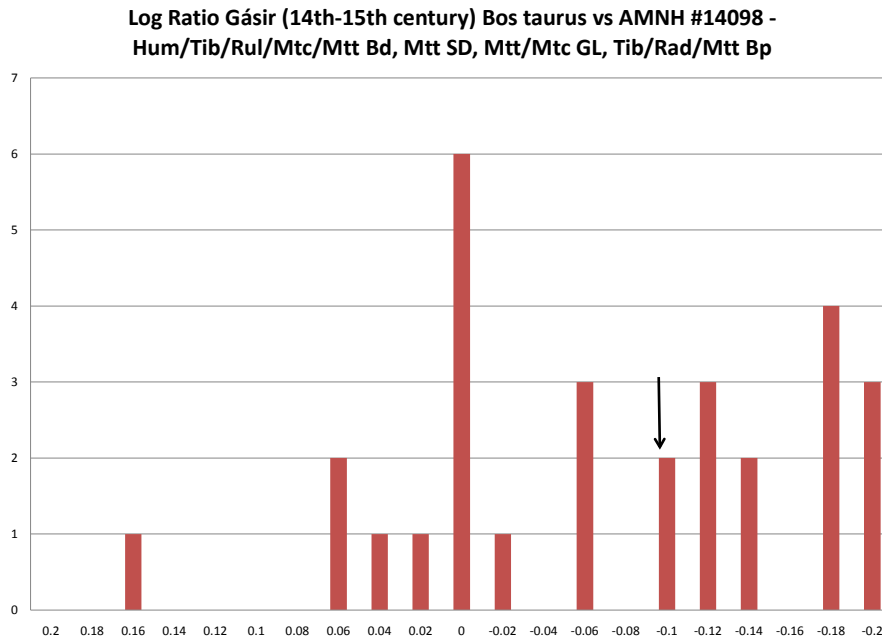
**Log Ratios Hrisheimer Bos taurus vs AMNH #14098 -
Hum/Rad/Tib/Mtc/Mtt Bd, Mtc/Mtt SD, Cal/Mtc/Mtt GL, Mtc/Mtt Bp**



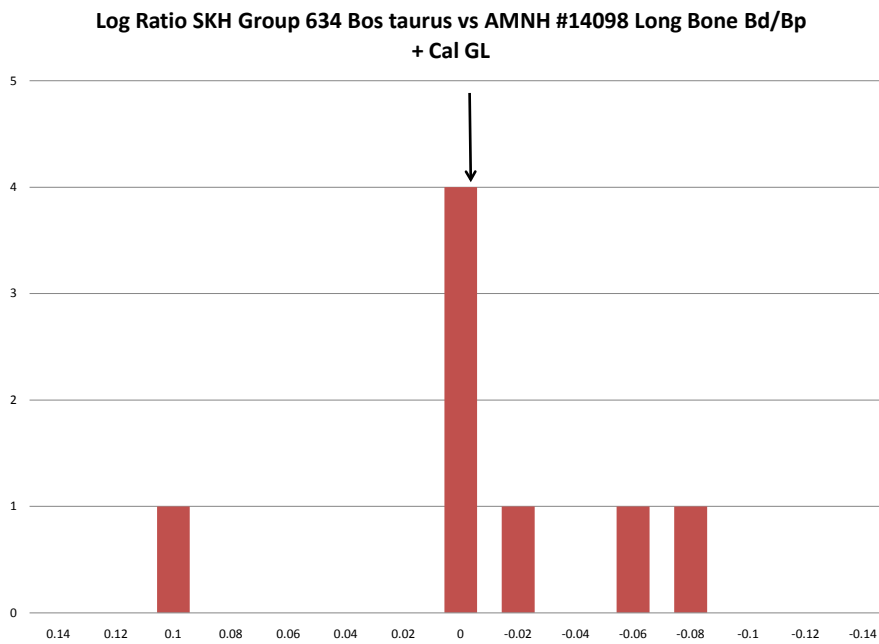
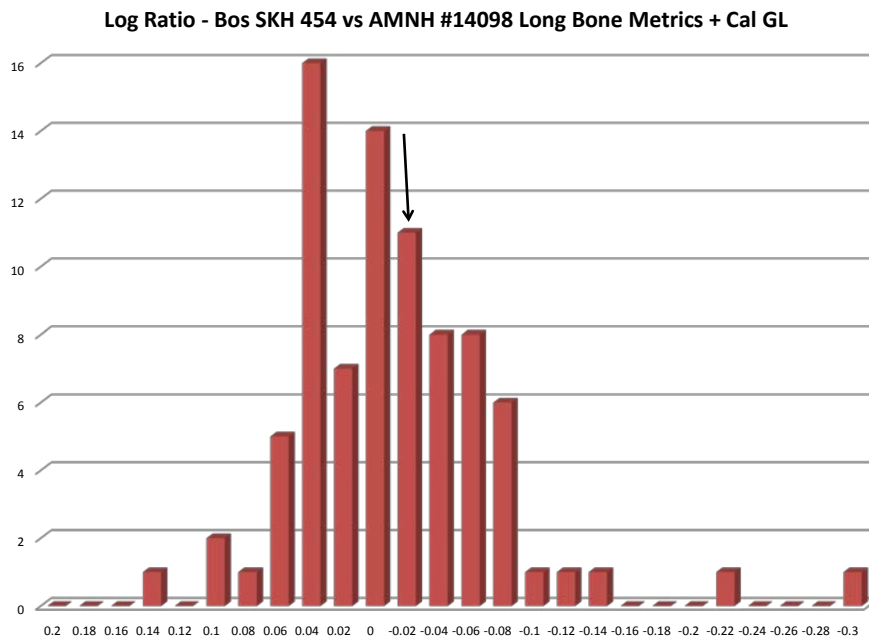
Cattle bones from the settlement era (874 – c. 975 CE) site of Hrisheimar show a clear tendency to be smaller than the 19th century comparative specimen. The region that contains this site would, at this time, have had access to good pasture land and presumably good stores of winter fodder (McGovern et al 2007). These cattle would most likely have been of a Norwegian variety (Kantanen et al. 1999).



The site of Hofstaðir (c. 950 – 1000 CE) is an interesting case. The cattle bones here show themselves to be from animals of approximately the same size as the comparative specimen. Analysis of this assemblage has however revealed that the cattle bones from this site were mostly from relatively large bulls and that there was very likely pre-Christian ritual activity taking place at this site centered around the decapitation of bulls and seasonal feasting (G. Lucas and T. McGovern 2007). This case shows that an Icelandic bull of this time period from this region was most likely roughly the same size as a 19th century New York state cow and that they were significantly bigger than a more typical population of cattle containing mostly cows and possibly steers from a site in the same region and from a slightly earlier period.



The Gásir site was a late medieval trading center (14th century) in the north of Iceland in Eyjafjord. This site was seasonal and the merchants who occupied it were provisioned with cattle from farms in the surrounding region. There is also the possibility that the merchants brought their own provisions in the form of processed meat or even on the hoof (Ramona Harrison n.d.). Both of these elements might be reflected in the high level of variation, relative to the other examples, seen in this particular log ratio distribution.



The final two log ratio distributions come from the Bishop's farm at Skálholt. The first (454) is based on faunal data dated to the second half of the 17th century and the second (634) from the middle of the 18th century (Hambrecht 2009; Hambrecht et al.

2006). Both indicate sizes larger than the previous examples, except for the exceptional case of Hofstaðir. The 18th century material (634) is possibly from animals somewhat larger than the 17th century material (454) but considering the very low amount of data from the 18th century material it is best to consider both as one early modern body of data. Considered together they could be indicative of animals that are significantly bigger than those of the earlier periods.

Obviously this analysis is in its first steps. Much more data from different periods and parts of Iceland is needed. The ideal situation would be data from different periods from a series of sites. This type of data should be available in the coming years. Until then this first glimpse offers the possibility that we are seeing a long-term cultivation of cattle in Iceland leading to larger animals.

Chapter 16 - Skálholt in Comparison

There have been a number of later historical sites excavated in Iceland (figure 62), but most of these projects, apart from excavations at Skálholt and Reykholt were rescue projects and many of the zooarchaeological reports exist as unpublished “grey literature” (for downloadable copies of these reports see the NABO website www.nabohome.org). Early modern excavations in Iceland have produced a disproportionate share of the total artifacts recovered from all periods, and a marked increase in artifact recovery as well as the occurrence of new types (glass, ceramics, pipes) regularly provides a working division between late medieval and early modern contexts (Vésteinsson 2004). The great increase in the circulation of material objects in the early modern period can be seen as one symptom of modernity in Iceland as elsewhere (Deetz 1977). Many of these excavations have also produced very large faunal assemblages, most of which have been analyzed, including the high status sites of Viðey, Reykholt⁶, Nesstofa and Bessastaðir (T. Amorosi and T. McGovern 1993; P. C. Buckland, Sadler, and Sveinbjarnardóttir 1992; T. Amorosi et al. 1994; T. Amorosi et al. 1992). There are analyzed assemblages from the mid to low status farm at Finnbogastaðir in the northwest of Iceland and from the church farm of Svalbarð in the northeast of Iceland (Edvardsson et al. 2004; T. Amorosi 1992). There is an assemblage from the test-excavation of the site of Miðbær on the island of Flatey in Breiðafjörður, northwest Iceland (Colin Amundsen 2004). From downtown Reykjavik

⁶ The preservation of the faunal material from Reykholt was unfortunately very uneven, and it was not possible to fully quantify the archaeofauna from this important site, so it has been excluded from the comparative tables.

there are now analyzed faunal assemblages from three rescue excavations, Aðalstræti 10, Aðalstræti 14-16 and Tjarnargata 3c (Perdikaris, Amundsen, and McGovern 2002; Ramona Harrison et al. 2008; Tinsley and T. McGovern 2001). There is also a large archaeofauna from the southern coastal farm of Stóraborg (Russel, T. Amorosi, and T. McGovern 1986). Finally, there is the ongoing analysis of the very large assemblage from the Bishop of southern Iceland's cathedral farm at Skálholt (Hambrecht 2007; Hambrecht et al. 2006). The majority of these collections come from higher status sites, and most come from the warmer (boreal) south and south west of the island and only two archaeofauna at present represent the sub-arctic north. While the majority of the recent excavations were carried out using closely comparable NABO-recommended recovery strategies, some of the older collections were not from fully sieved excavations. Additional early modern archaeofauna from the West Fjords at Eyri and Vatnsfjord (R Harrison et al. 2008; A Pallsdottir and M Gorsline 2007), from Möðruvellir in Eyjafjord (R Harrison and Roberts 2007) and from Skútustaðir in Mývatnssveit (Ewald and T McGovern 2008) are now undergoing analysis, so the pace of research suggests that any conclusions presented here are perhaps fortunately unlikely to be long lasting (for downloadable copies of these reports see the NABO website www.nabohome.org). However, the currently analyzed Icelandic early modern archaeofauna already form a very substantial body of data which can begin to be applied to major historical and environmental issues of the period.

Iceland

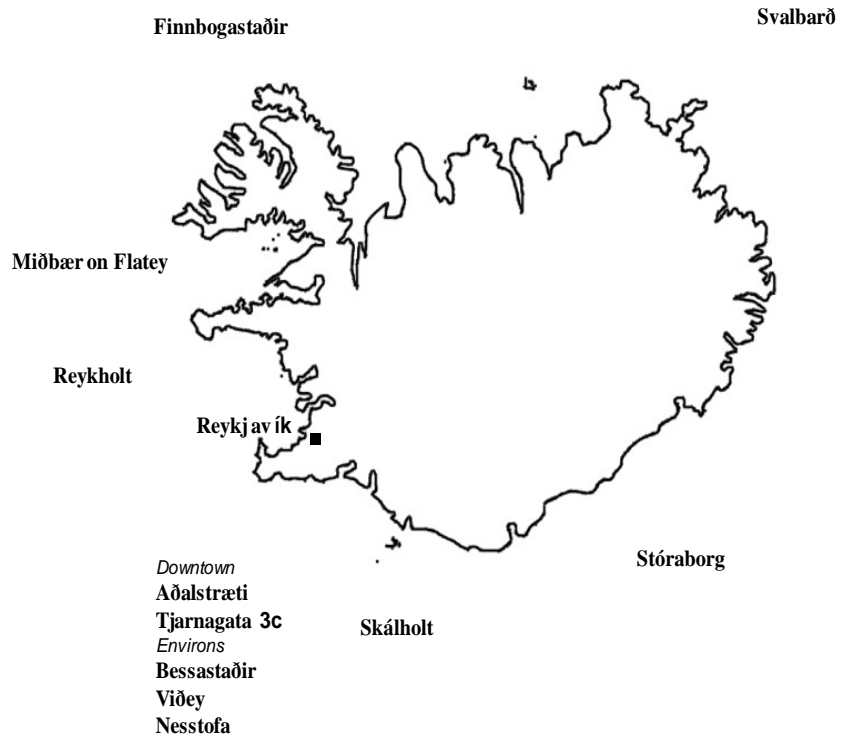


Figure 62 - Map of Iceland showing the location of the early modern sites referred to in this chapter.

Svalbarð : An Elite Farm in the Sub-Arctic

Excavations at a deeply stratified midden at the site of Svalbarð farm in Þistilfjórð in NE Iceland in 1987-88 recovered a substantial archaeofauna from the early 11th century to the early modern period; only the later phase (AU 7/8) datable by tephra and artifacts to the 18th-19th century is discussed here (see Amorosi 1992 for a preliminary

analysis).⁷ Svalbarð is described in the Jarðabok⁸ as a *beneficium* of the diocese of Hólar. As a regional church farm Svalbarð held a relatively large amount of good grazing land along the coast and up the valley of the Svalbarðsá river, as well as use-rights and rent from a range of regional resources. Beach rights over much of the western part of Þistilfjórð assured the right to hunt seals and collect driftwood, wreckage, and other valuable flotsam. A portion of any whale stranded on the beach was also saved for the farm at Svalbarð. Such beach resources were of great value in Iceland, as driftwood was one of the only sources of timber suitable for boat or house construction, and a “whale stranding” in colloquial modern Icelandic still means an unexpected jackpot. Svalbarð owned the best landing place for boats in the region and could collect a share of fish in payment for its use. The Jarðabok also mentions that this farm paid no tithes and that though it did owe a cow rent, this was paid to the local priest, who was also the occupant of the farm (Amorosi 1992).

Svalbarð was thus in a good position within its region, well provided with access to both marine and terrestrial resources and with enough status to provide the flexibility to shift its economic strategies among multiple income sources and without major fixed external obligations to constrain its managers. Yet the northeast corner of Iceland was vulnerable to climate fluctuations and sea ice. As noted by Ogilvie (1992) northern Iceland is generally more affected by colder weather than the south of Iceland; the

⁷ The faunal analysis of the Svalbarð site is ongoing. Dr James Wollett of Laval University in Quebec has begun new excavations at Svalbarð beginning in the 2008 season. Work will continue over the next few years and the Svalbarð data will continue to develop.

⁸ 1710-1712 census and inventory of Iceland

written records from this region report increased sea-ice and colder weather for much of the early modern period, and a map created by the bishop of Hólar, Guðbrandur Þorláksson, published in the collection of the Dutch cartographer Abraham Ortelius in 1590 showed driftwood, sea ice, seals and a great many polar bears packed into the Þistilfjórð bay (Ogilvie 1981). A dramatic increase in the number of seal bones (from ca 6% of the Svalbard archaeofauna in later medieval contexts to over 60% in the early modern) and the increasing presence of the bones of the ice-riding harp seal (*Phoca groenlandica*) probably reflects both the incoming drift ice and human response to this major threshold crossing in the marine ecosystems. Hunting of the common or harbor seal (*Phoca vitulina*) took place in Iceland from the Settlement Period onwards, but harp seal bones only appear in the late medieval and early modern period (Ogilvie et al. in press). Harp seals live on drift and pack ice, while the harbor seal lives in coastal waters and is averse to summer drift ice (Ogilvie et al. 2009; J. Woollett 2007). The appearance in the early modern archaeofauna of harp seal bones, as well as a few bones from bearded seals, walrus and polar bear are the product of intensified hunting on increasing drift and pack ice off of the coast of northeast Iceland in the early modern period. Such sea ice hunting of the abundant migratory ice riding seals had long been a key element of Norse subsistence in Greenland (McGovern 1985), but had not seen widespread use in Iceland; new skills were being acquired and new risks were being taken by Icelandic sealing parties in northeast Iceland in the 17th-18th centuries (Ogilvie et al. 2009; AEJ Ogilvie 2000).

The impacts of summer drift ice in this area upon other parts of the subsistence economy may have spurred such efforts. The Jarðabók mentions that the sheep houses

of Svalbarð were all on the coast, 'against the sea'. This placement would have exposed the sheep to the impacts of adverse sea ice conditions in the spring lambing season. This may be reflected in changing mortality profiles in the Svalbard lambs: bones of neonatal sheep rise from 2-5% of caprines in medieval times to over 16% in the early modern period. The percentage of mussel shells (*Mytilus edulis*) in the Svalbarð archaeofauna likewise increases from 6% of the total collection in medieval layers to over 12% in early modern layers. While some mussels may have been collected for fish bait (fish bones also appear to increase from around 30-40% in medieval layers to just over 65% in early modern), ethnographic accounts from the region repeatedly identified mussels as famine food, and older residents retained an aversion to them for this reason down to the late 20th century (Amorosi 1992).

Svalbard's managers apparently reacted to the disproportionately harsh climatic impacts inflicted on the northeast by drift ice and a general reduction in the growing season by mobilizing its household and region for intensified maritime resource use. Some elements in this strategy may have been traditional (mussel collection, inshore fishing, common seal hunting along the shore) but to turn the floating sea ice from pure threat to productive hunting grounds of harp seals and polar bears required daring and innovation. While the bishop at Skálholt in the ice-free south had the option of elaborating upon a pasture-focused, cattle based farming economy and further developing pre-existing patterns of conspicuous consumption of terrestrial products, the managers of the Svalbard church farm were actively seeking new maritime adaptations to creatively adapt to the potentials as well as the challenges of the new sea ice patterns.

Finnbogastaðir : A Small Farm in the North West

The Finnbogastaðir archaeofauna from the Strandur district of the West Fjords was collected in the summer of 1990 as part of the cooperative *Icelandic Paleoeconomy Project* involving the National Museum of Iceland and the City University of New York (Edvardsson et al. 2004). Artifacts recovered (ceramics and a single kaolin pipe stem) indicate that the deposits sampled extend from the early 18th to early 19th centuries, with the most productive context probably dating to the first quarter of the 18th century.

Finnbogastaðir is in the eastern edge of the West Fjords, a region of Iceland often seen as agriculturally marginal. There is little pasture land between the highlands and the deep fjords and the northwest peninsula is vulnerable to sea ice from the Denmark Strait in both winter and summer. Aside from agriculture the major resources of the Northwest in the 18th and 19th centuries included fishing, sealing, egg collection, bird hunting, driftwood, and the windfalls provided by the stranding of both whales and ships (Kristjánsson 1980). In the 1706 Jarðabók land registry the Finnbogastaðir farm appeared as a fairly typical farm in its district, valued at 16 hundreds, which was a mid-range farm for the West fjords. Compared to the rest of Iceland the farm would be classified among the poorer farms. It was a royal farm, owned ultimately by the King of Denmark, though there was a fairly complex and not atypical management structure between the tenants and the authorities in Copenhagen.

Two tenant households occupied the farm at Finnbogastaðir at the time of the Jarðabok survey (such joint occupancy was not unusual prior to the great epidemics later in the century). One tenant was Sr. Bjarni Guðmundsson the local Lutheran priest

with his household while the other was a small farmer Brandur Björnsson and his family. Sr. Bjarni was highly literate (in more than one language) and was an educated man with contacts outside the district, while Brandur seems to have been a local farmer with little education. Sr. Bjarni maintained four servants (both male and female) as well as his wife and four children (it was not uncommon for poor tenants to have still more impoverished landless servants living in their households). Both household heads ranked far above the landless and homeless indigents, but by any reasonable standard both Sr. Bjarni and Brandur were poor men, and neither were more than one or two bad seasons from disaster. However, there were clearly different degrees of poverty among tenants in 18th century rural Iceland. Sr. Bjarni had a mix of milk cows, wethers, milk ewes, and two horses as well as younger cattle and sheep apparently being maintained over the winter with an eye to stock renewal. He also owned some additional stock maintained at the nearby church farm Árnæs. Brandur supported his wife and six children with a single cow and five milk ewes.

Sturla Friðriksson (1972) estimated that under conditions of traditional Icelandic agriculture (before the mid-19th century) it took the product of nine ewes to sustain one adult, with six ewes equaling one cow. If we use these figures as a rough guide, it is possible to show that in Finnbogastaðir's district, the total number of animals could not possibly sustain the number of people actually living on the farms in 1706. Both households at Finnbogastaðir appear to have had a shortfall: Sr. Bjarni had approximately 5.3 human rations to maintain his ten household members while Brandur had only 1.1 human rations to feed his family of eight. The households of early 18th-century Finnbogastaðir, like the great majority of their contemporaries in the northwest

fjords, must have relied on other resources to maintain bare subsistence. We are informed that seal hunting was sometimes successful and that both households had access to boats for fishing, but the Jarðabók register typically makes no attempt to quantify non-agricultural production (Edvardsson et al. 2004). The early modern archaeofauna (which probably represents the combined refuse of both households) corresponds in most respects with the information on stock keeping provided in the land registry. All animals mentioned in the registry are present in the assemblage and the ratio of cattle to caprine bones in the archaeofauna (1:9.96) matches the overall ratio of cattle to sheep in the registry (1:9.43). The seals mentioned in the entry appear as bones in the midden, and whale bones correlate with recorded (and highly disputed) strandage rights. The archaeofauna also indicates the importance of marine resources at Finnbogastaðir: just over 97% of the collection is made up of fish, seal, sea bird, and marine mollusk remains (Edvardsson et al. 2004). It would appear that as early as 1703, poor but educated men in the West Fjords were already investing what scarce resources they had in a combined subsistence and market fishery, and small holders were dependent on fishing for day to day survival.

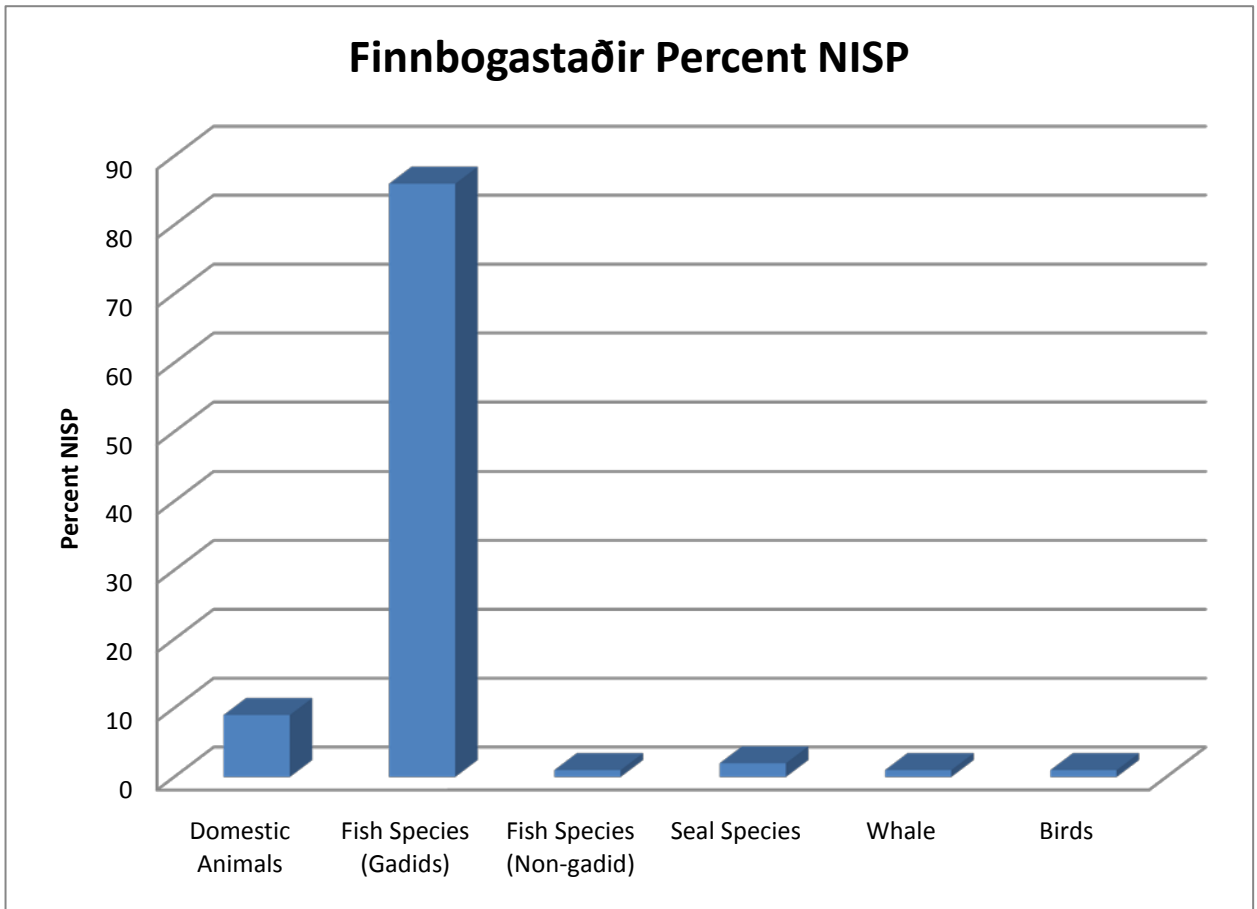


Figure 63

Tjarnargata 3c, Aðalstræti 10, Aðalstræti 14-16 : early Reykjavík

During rescue excavations in downtown Reykjavík in 1999 nearly 100 kg of well-preserved animal bone was recovered in investigations at Tjarnargata 3C by the Archaeological Institute Iceland (FSÍ) directed by Mjöll Snæsdóttir. This collection represents one of the largest archaeofauna recovered from Iceland to date. The Tjarnargata 3C collections derive from a widespread sheet midden deposit that clearly post-dates a 1500 CE tephra, and contains a range of artifacts (including much imported English and Dutch pottery and many pipe stems) dating to the late 18th to early 19th centuries. It probably represents refuse discarded by multiple households and local shops, fish processing centers, and small craftsmen participating in the rapid

urbanization of what is now central Reykjavik. The collection shows some distinctive urban characteristics, with clear indications of local butchery being significantly supplemented by meat-rich joints presumably imported from nearby farms provisioning the growing city. The remains of some preserved hams almost certainly indicate trans-Atlantic shipment, and serve to illustrate the expanded dietary range of the urbanizing population. Other bone remains illustrate another side of early modern city life: rodent gnawed bones, remains of stray dogs, scavenging gulls and fulmars, and other elements of an unwanted commensal “urban fauna”. The collections also reflect the eventual source of Reykjavik’s prosperity as it is dominated by fish bones. These are nearly all cod, and the ratio of the skeletal elements present and the reconstructed live length strongly suggest that intensive preserved fish preparation (probably for stockfish) was a major activity in the locality (Perdikaris et al. 2002). The bone element distribution pattern shows a clear commercial fish production signature with a significant surplus of head bones (cut off and discarded at the landing site) and lower numbers of vertebrae (exported with the dried or salted body: Perdikaris et al. 2007ab). While cod were largely exported (apart from some individuals too small to dry effectively) a substantial amount of haddock was retained as whole individuals to provision the fisher folk and their supporting work force (a pattern continuing into the 20th century).

The inside foundation of the house at Aðalstræti 10 was excavated in August to September of 2005, yielding bone material which weighed about 30 kg. The excavators found rows of stones associated with the original wooden floor of the present building as well as several thick cultural layers underneath which were dated to the 18th century mainly based on pottery and clay-pipe fragments. The archaeofauna is associated with

these pre 1760s cultural layers which predominantly consisted of peat ash from fire-places. The 2005 Aðalstræti archaeofauna is thus roughly datable to the late 17th and early 18th centuries CE and appears to be closely associated with the early modern farm buildings. The Aðalstræti 05 collection is thus closely contemporary with the larger Tjarnargata 3c bone collection excavated in 1999 from beneath the parking lot of the modern Icelandic Parliament building, which appears to have been an outdoor dump/processing area used by multiple households and the growing fish processing trade (Perdikaris et al. 2002). A much smaller assemblage from Aðalstræti 14-16 has been included. This was a household dump of domestic waste. They are all roughly contemporary and within close proximity of each other. All show the same early urban characteristics discussed in the Tjarnargata 3c assemblage and show the signs of the first attempts at centralizing the dried fish trade in Iceland in the 18th century.

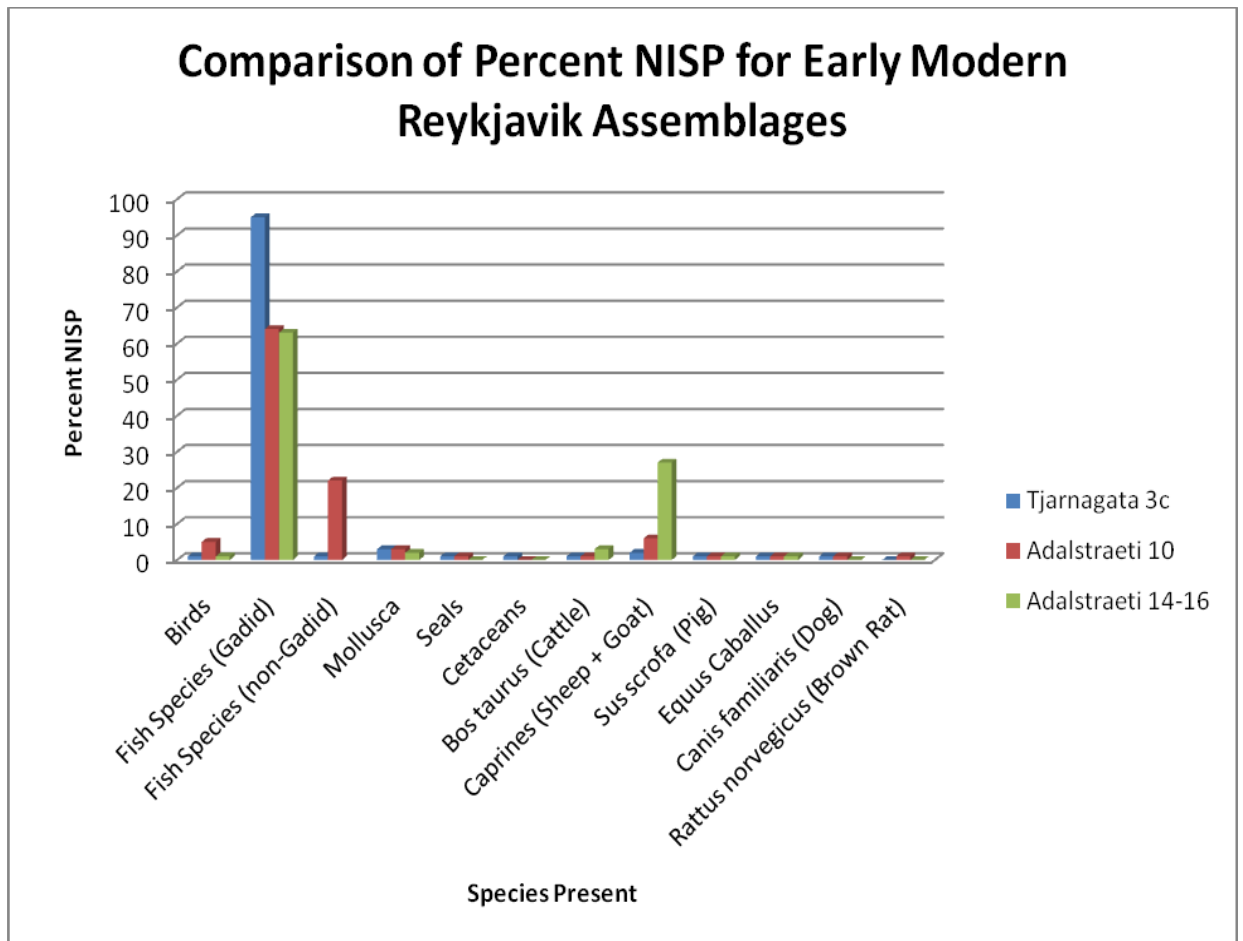


Figure 64

Víðey, Nesstofa, and Bessastaðir : royal administrative centers around Reykjavik

All three of these sites were excavated as rescue operations. Bessastaðir was the seat of the Danish Governor and from independence on it has been the President of Iceland's residence. The preservation was not excellent but a small quantifiable assemblage was recovered from an area exposed for the construction of a new parking lot when excavated by Guðmundur Olafson in 1987. Víðey is an island off of Reykjavik and it was the seat of the Danish Lieutenant Governor in the early modern period. Archaeological faunal material from the early modern period was recovered in

excavations by Margaret Halgrimsdóttir in 1990. These excavations were associated with the construction of a conference center on the island. Nesstofa is located on the Seltjarnarnes peninsula which is now a part of the city of Reykjavik. A stone house, one of the first in Iceland, was built here in 1761-1763 for Iceland's first Physician General Bjarni Pallson. These three sites of Danish colonial authority were all located in close proximity to each other around the area that was to become Reykjavik.

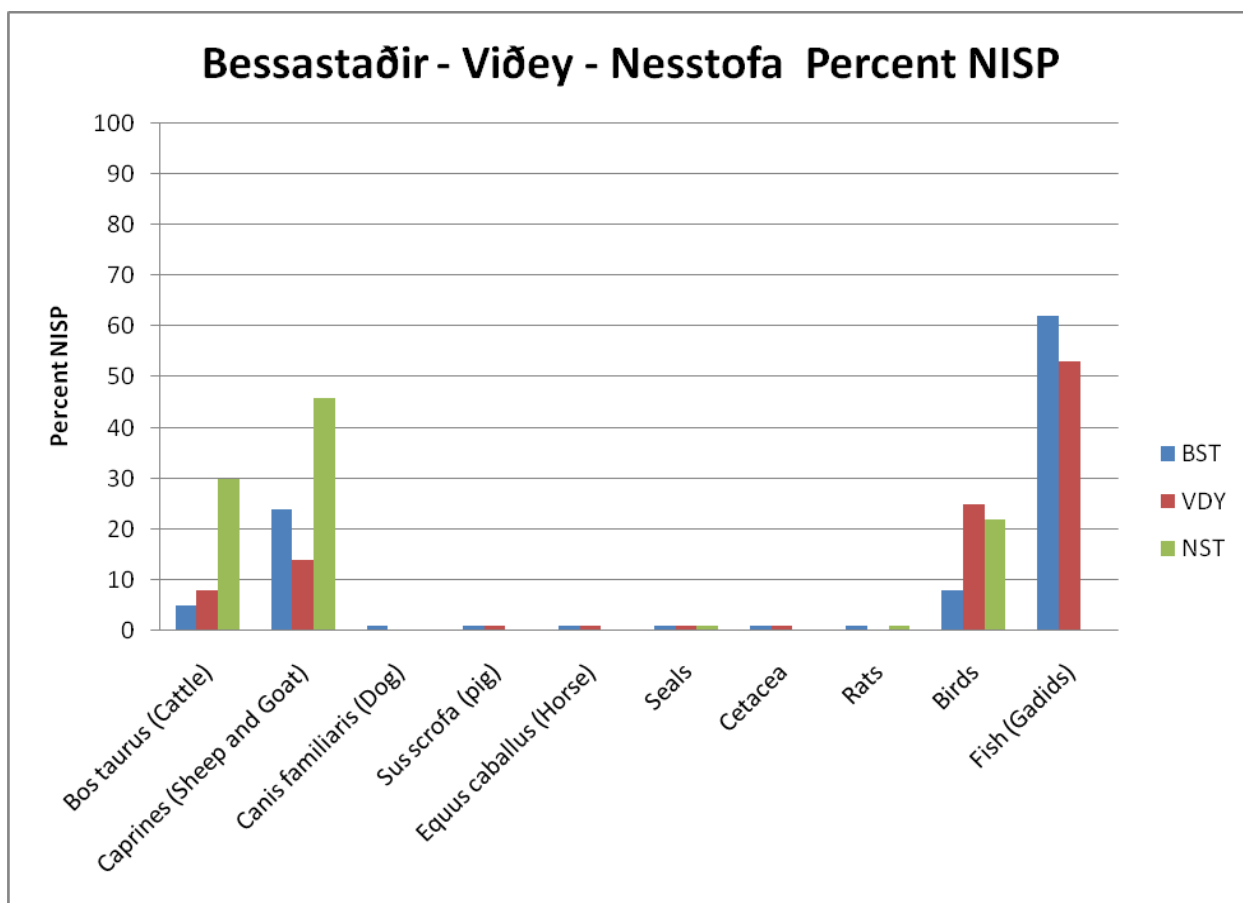


Figure 65

All three sites, though elite by most definitions show a pattern similar to farms from the rest of Iceland, excepting Skálholt. The total assemblages are dominated by fish, and largely by gadids. The fish from the Nesstofa site have not yet been analyzed, though an informal visual survey of the assemblage reveals large numbers of gadids.

Within the domestic mammals there are significant numbers of cattle but caprines still outnumber them. Other domesticates only appear in very small numbers. The age profiles of the slaughtered cattle at both sites are based on small numbers with fairly bad preservation but they seem to suggest a dairy economy in all three cases. The presence of small numbers of seals and cetaceans at the sites is not especially surprising given their oceanside locations (T. Amorosi and T. McGovern 1993; T. Amorosi et al. 1994; T. Amorosi et al. 1992). Yet at Bessastaðir the presence of a very small number of both polar bear and walrus bones might suggest something about the elite nature of the site. The governor might have had access to fairly exotic goods such as walrus ivory and polar bear skins. Neither of these animals was common in Iceland at this time. They most likely arrived via sea ice during climatic episodes as described above. The display of these objects might have part of the governor's panoply of authority. They also might have been processed here on the way to Denmark. Polar bear bones have been found at a few other locations, namely in the assemblages of some medieval monasteries in Iceland (Pálsdóttir et al 2007).

Stóraborg : A Middle Ranking Farm on the South Coast

Stóraborg was a fairly prosperous farm on the southern coast of Iceland that was abandoned due to coastal erosion in 1834. The excavations from 1978 to 1991, led by Mjöll Snæsdóttir, revealed archaeological contexts from the early modern back into the medieval period. This site was not sieved and faunal material was hand selected. The number of identified specimens (NISPs) are therefore somewhat suspect, and fish bones would have been especially biased against in this situation. Even very small fish vertebrae that would be lost without sieving can be identified down to species. The fish

numbers reflected here are likely to be a much smaller representation of total fish remains than is truly the case (Russel, T. Amorosi, and T. McGovern 1986).

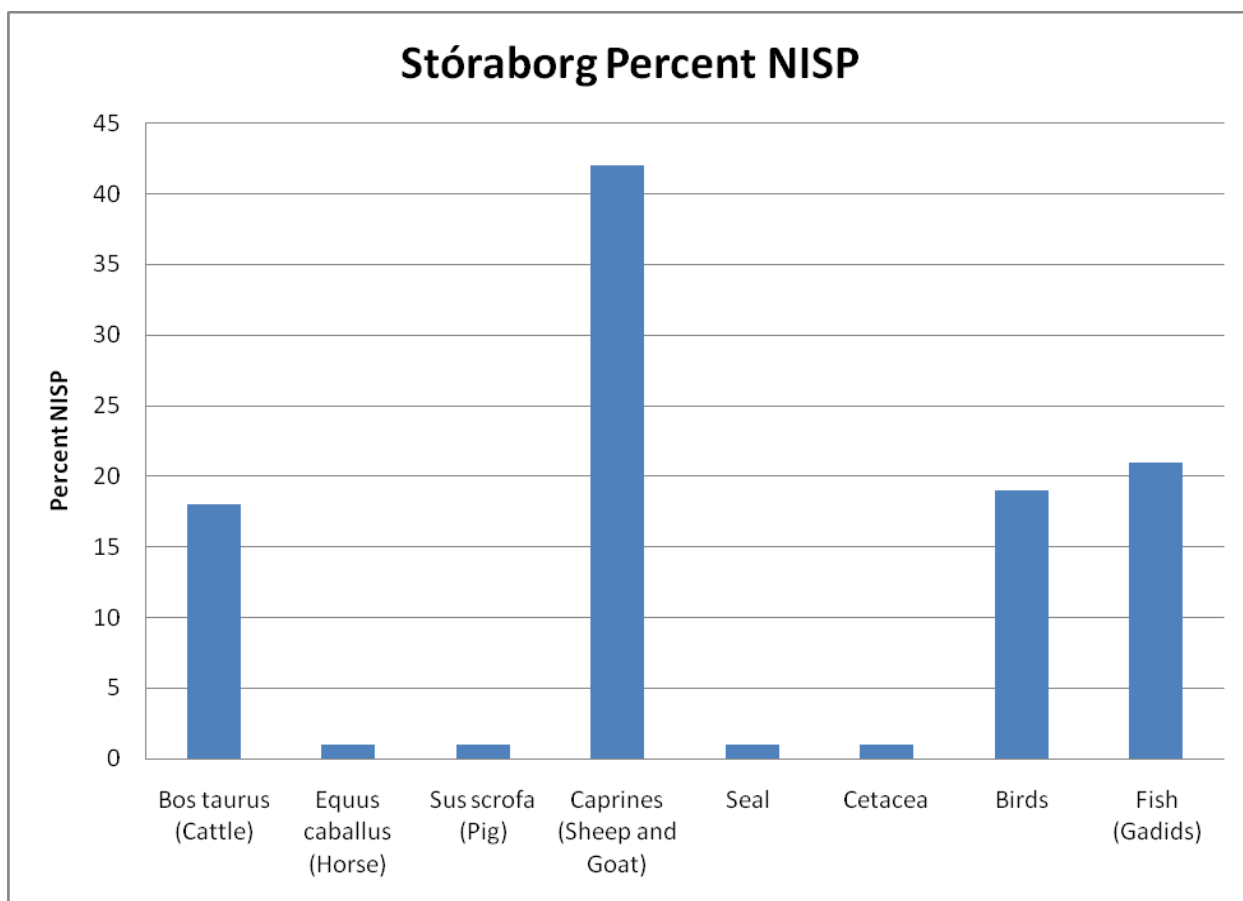


Figure 66

Miðbær on Flatey – a Farm at the Center of the Fish Trade

The Miðbær site is on the island of Flatey in Breiðafjörður, NW Iceland. Flatey has a small but sheltered harbor that attracted both local and foreign fishermen from the late medieval period through the early modern period. French, Dutch, English, Basque, and German vessels all used this harbor between the 16th and 18th centuries (Colin Amundsen 2004). The Miðbær site is located in the center of this small island and has an associated midden that goes down to at least the 13th century. A column sample of this midden was taken in 1989 and though the excavation was small it produced a very

7respectable NISP for the early modern period. As might be expected on an island site the terrestrial domestic animals are small in proportion to the birds and fish. The birds are made up primarily of puffin (*Fratercula arctica* L.) a bird that has been, and still is, harvested for food and feathers. The fish are dominated by gadids and these by codfish (*Gadus morhua*). The size reconstruction of codfish represented in this sample suggest that they were too small for stockfish production and were the result of subsistence fishing (Colin Amundsen 2004).

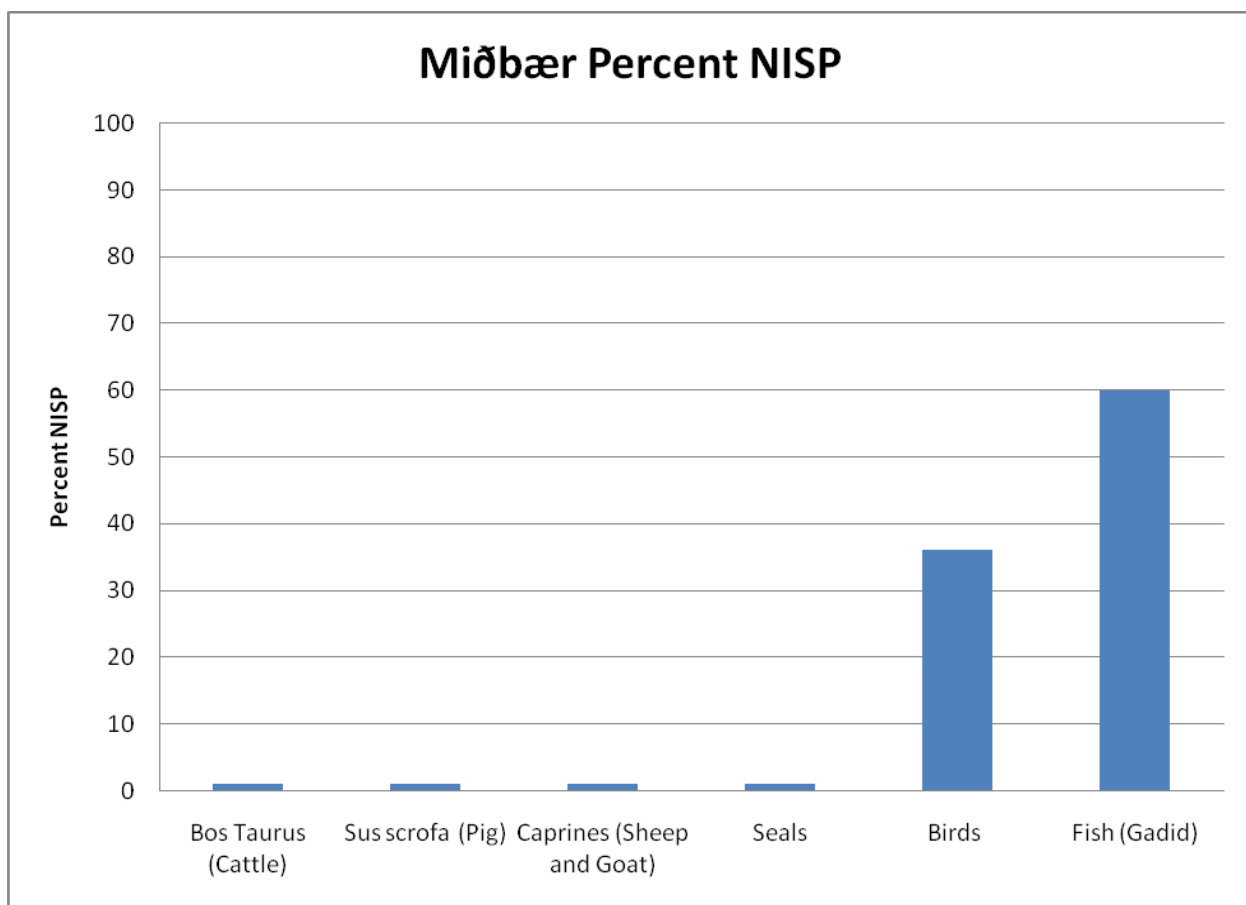


Figure 67

This assemblage is a small sample of what promises to be a large and rich midden. Though it seems to represent waste associated with subsistence production and not participation in the early modern trade in dried cod, it does reflect the sites

island location in the preponderance of fish and bird resources. It is also too small a sample to be representative of the site. Hopefully this potentially very rich midden located on an island that participated in the early modern (as well as medieval) trade in dried cod will be more fully excavated in the future.

Discussion

Appendix 1 presents all the NISP data from these sites in one table. An initial comparison of the early modern Icelandic zooarchaeological data suggests a great degree of variation and adaptability on the part of Icelanders (figure 10). Patterns that can be observed are the large amount of fish, specifically gadids, showing the increasing penetration of the trade in dried cod from the Settlement Period through the medieval period and into the early modern (T. H. McGovern et al. 2006; Perdikaris and T. H. McGovern 2007). This increase in gadid bones can also be interpreted as a reaction to adverse climatic conditions that made terrestrial subsistence a much riskier effort. The increase in seal hunting at the northeastern site of Svalbarð also might be a similar response (AEJ Ogilvie 2000; Ogilvie et al. 2009). We can see in the more anomalous results, the cows of Skálholt, status maintenance strategies as well as the possibility of agricultural innovation.

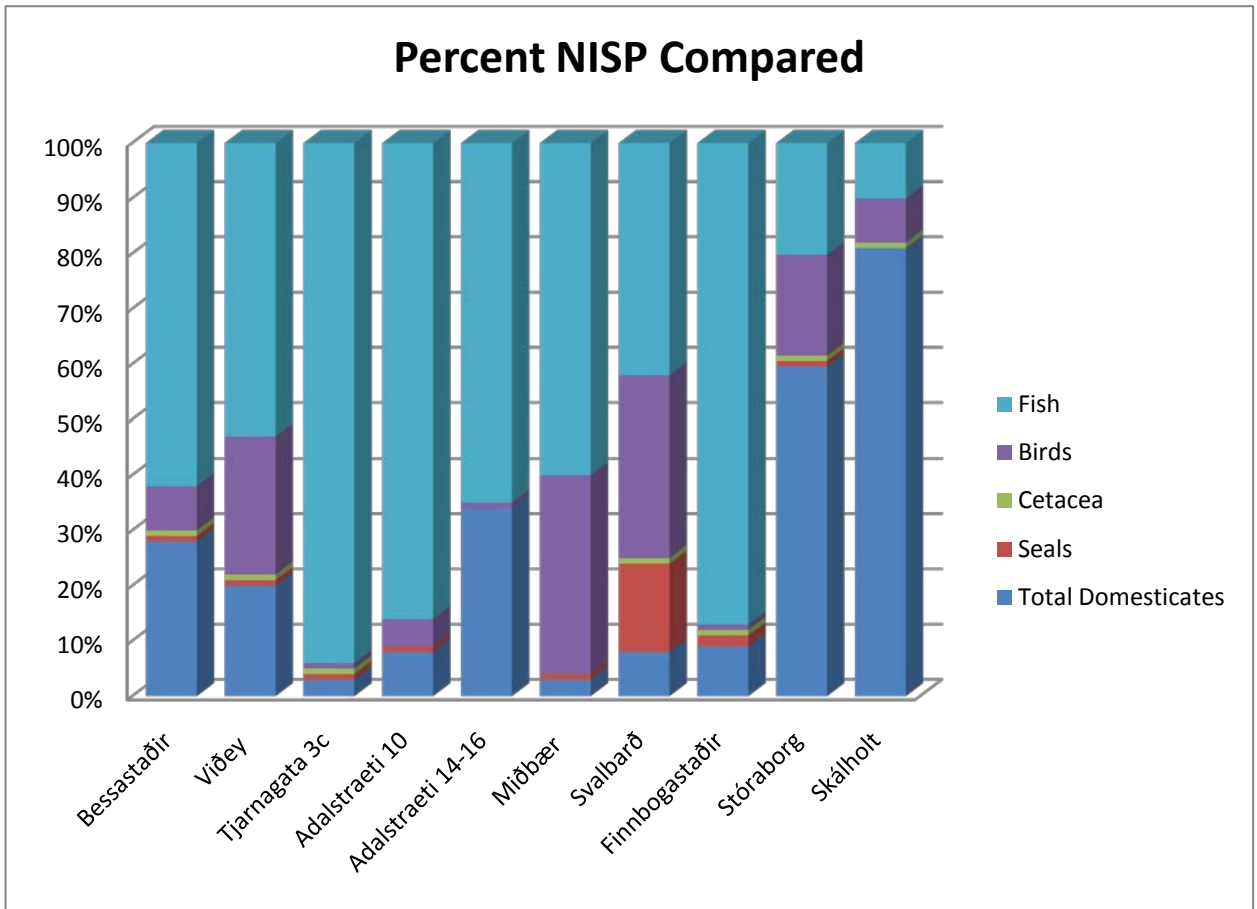


Figure 68

The Bishops of Skálholt maintained a quality of life far more luxurious and expensive than that of the overwhelming majority of Icelanders at this time. The elites of Iceland during the 17th and 18th were, like their continental counterparts engaged in conspicuous consumption in order to reinforce their political and cultural power (Hreinsson 2005). These demands included the need to feast visitors and in general keep a table in keeping with the power and reputation of a bishop who was also a local magnate and an ecclesiastical member of a royal colonial administration. Like other large land holders of the period, the Skálholt bishops of the early modern period were troubled by shortages of labor caused by famine, disease, and the attractions of non-agricultural employment. Like all Icelanders in this period they felt the effects of the

multitude of climatic, demographic, and volcanic challenges, but unlike most land owners they had the advantages of relatively protected pastures in the warm south whose sustained productivity provided a steady income and allowed a cattle-heavy farming strategy that left room for beef consumption. Unlike local elite centers like Svalbarð, they also had an effective island-wide dispersal of their holdings, further buffering them against fluctuating climate and local disasters. While the general downturn in farming conditions during the 17th and 18th centuries and the resulting loss of rental income affected them, it affected them far less than managers in more environmentally vulnerable areas, or those with less ability to shed risk and avoid negative impacts (Lárusson 1967). Political, economic, and religious power allowed for the creation of buffers against climatic and economic change and the Skálholt Bishops made it through hard times with their life style and their power intact though diminishing - until the earthquake of 1784 abruptly wrecked the ancient manor complex and proved the catalyst towards an irrevocable shift of power to the developing fishing town of Reykjavik.

These initial comparisons generate a number of observations and questions. One of the first is that each assemblage reflects the regional resources available to the inhabitants of each site as well as the desire to obtain them. This last point is important in light of the structuralist “prisoners of culture” argument made by Hastrup (1990). Kirsten Hastrup in her work *Nature and Policy in Iceland 1400-1800*, presents a case that Iceland in the early modern period was not only subjected to the negative consequences of climate change and Danish mercantilism, but that they were themselves mentally incapable of reacting to these phenomenon in any effective way.

Hastrup argues that this was the case because Icelandic mentalities were so rooted in the ideals and structures of the Commonwealth Period (900-1262/1264 CE) that they did not have the conceptual tools to deal with the problems of the early modern period. Icelanders were literally incapable of improving their land or of adopting new farming or fishing technologies because their culture was stalled in the structures of an earlier period (Hastrup 1990). This disconnect between Icelandic culture and the realities of the environment and economy created a situation in which innovative response was impossible as the Icelandic mentality was incapable of truly perceiving the problems confronting them. The argument posits the Icelandic mentality as an element as detrimental to Icelandic survival as climate change or volcanism. This structural interpretation of the troubles of early modern Iceland has been criticized for, among other things, being based on a too literal analysis of early law codes and sagas of Iceland, emphasizing mentalities at the expense of agency to an extreme, and even of being an example of orientalism through the exoticization of the Icelanders in this anthropological analysis (Durrenberger 1988a; Durrenberger 1988b; Durrenberger 1992; Pálsson 1995). Contrary to a view of early modern Iceland as having been a static society with an internal ideological brake against innovation and change the zooarchaeological analysis of these assemblages reveal the ability of early modern Icelanders to respond to their environment by changing subsistence strategies to meet new conditions. It reveals the diversity of reactions to hard times reflecting the importance of local conditions for all the sites discussed with the exception of Skálholt which had access to resources from across Iceland.

One of the central questions that has been asked about early modern Iceland is why there were no successful attempts at institutional reform towards creating a more effective buffer between Iceland and the tough conditions it faced. Certainly there were major geographical, environmental, and legal/social/cultural impediments to agricultural reform and an intensified participation in the dried cod trade, both of which it has been argued would have helped alleviate the hard times of the early modern period (Eggertsson 2005; Gunnarsson 1980; Gunnarsson 1983; Hastrup 1990; Lárusson 1967; Dan Vasey 1996). Yet the zooarchaeological data from the existing early modern excavations in Iceland suggest a different perspective on this question. The clear presence of international influences in the form of the cod trade, the ham hocks at Tjarnagata 3c, and the possibility that the polled cattle of Skálholt were a product of Icelandic participation in the Agricultural Revolution show the adaptability of the Icelanders in the face of tough conditions. The exploitation of maritime resources at all the rest of the sites (with the assumption of similar numbers at Stóraborg and Nesstofa) reveals the ability of the Icelanders to cope through the use of resources close at hand. All these examples should, I suggest, be seen as the actions of individual farms and agents in the face of tough times. While most studies of early modern Iceland are historical and thus emphasize the documentary evidence and macro-level analysis, the zooarchaeological data comes from the actions of households, whether relatively large and prosperous such as Skálholt or small and relatively poor such as Finnbogastaðir. In this case this archaeological micro-scale perspective reveals a much more adaptive and dynamic set of responses than historical analysis has typically suggested.

This is just the beginning of a zooarchaeological approach to the study of the early modern period in Iceland. One of the more obvious results of this discussion is the need for further research on a wider spectrum of settlements in early modern Iceland. Another route to be taken should be to engage in inter-Atlantic comparisons. In the end it is hoped that this thesis will stimulate further discussion and work in the very fertile field of early modern Icelandic as well as North Atlantic archaeology.

Conclusions

Ecodynamics of Modernity in Iceland

Historical archaeology, and specifically historical environmental archaeology is uniquely tooled to be able to contribute to the investigation of human-environmental relationships over the last 500 years. This thesis is a first step towards this effort.

Iceland in the early modern period still retained its borderline existence in the sub-arctic. As discussed earlier and in many other publications Iceland's unique location at the northernmost border of a Eurasian style husbandry economy makes it something of a canary in the coalmine for climate change. Small changes in climate on a global scale might be felt in a much more dramatic way in Iceland. This is precisely what has made it such a fruitful place for the study of medieval European lifeways in the face of climate change. Yet since it was settled in the late 9th century Iceland has never been a completely isolated place. It has throughout its history been part of larger cultural, political, and economic networks. This is an issue that medieval archaeology in Iceland has been engaging with greater frequency recently. For the early modern period these networks grew and became even more complex. Like the rest of the world it became a reality that changes in distant parts of the globe could have profound effects at home. If the patterns this thesis has presented and suggested might be signs of a 'modern' reality are actually that then they show the material effects of this new early modern world in the 17th and 18th centuries. Processed provisions being imported in while less processed, commodified natural capital exported out are clear indications of a quickened world system. More precise breeding and treatment of cattle and possibly even the presence of a prime beef economy might also be the product of ideas that

were formed in the journeys between Iceland and the salons and universities of Copenhagen and the rest of Europe. The early modern period saw an intensification of the exploitation and manipulation of the immense natural capital available in not just the Americas but the whole world (Richards 2006). For some of the inhabitants of Reykjavík the data presented here suggests that these wider networks allowed for a buffering against the vicissitudes of climate change in this subarctic region through the presence of imported provisions. In the case of Skálholt the data here suggests the possibility that the influences from the wider world network were in the form of ideas rather than trade goods.

For Skálholt, or at least the bishops of Skálholt, their main buffers against climate change, as well as all the other challenges of this period were their wealth and the fact that they owned land and the rights to resources across a wide swath of Iceland. As a strategy it is hardly novel or 'modern'. It is a strategy as old as civilization itself. The zooarchaeological assemblage from the middens outside the complex reflect this clearly.

This thesis is a small step in the effort towards engaging in a historical archaeology of modernity in Iceland. It is also a small step in the ongoing effort to integrate environmental and historical archaeology together in order to investigate what has been called the ecodynamics of modernity. Like all archaeology more suggestions are produced than cold facts, and like all scholarship more questions have been generated than answers. But it is hoped that this thesis will contribute to the success of the research that will continue at the site of Skálholt as well as at other early modern sites in Iceland and the rest of the Atlantic world.

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