Interim Report on Archaeofauna from Undir Junkarinsfløtti, Sandoy, Faroe Islands

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ABSTRACT: Ongoing archaeological excavations at the site of Undir Junkarinsfløtti, on the island of Sandoy, Faroe Islands have revealed a substantial amount of well-preserved midden material associated with a Viking Age to Late Norse structure. Analysis of the archaeofauna recovered during the 2003 and 2004 field seasons has recorded over 36,000 bone and shell fragments, nearly 27,000 of which have been identified to species level. This preliminary research has found evidence for a subsistence economy at Undir Junkarinsfløtti that differs significantly from those seen elsewhere in the Norse North Atlantic. In addition to the usual suite of domestic mammals (cattle, pigs, sheep and goats), the Undir Junkarinsfløtti assemblage suggests a heavy, sustainable exploitation of local seabird populations (primarily puffins and guillemot). Fishing appears to have focused primarily on cod, the vast bulk of which seems to have been processed for export rather than on-site consumption.

Keywords: Faroe Islands, Zooarchaeology, Viking Settlement, Seabirds, Early Fishing.

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INTRODUCTION

This paper represents an interim report on the analysis of the archaeofauna recovered during the 2003 and 2004 excavations at the site of Undir Junkarinsfløtti (UJF), located in the village of Sandur on the island of Sandoy, Faroe Islands. Excavations thus far have revealed a Viking Age to Late Norse structure partially filled with midden material some 2 meters below a sterile shell sand overburden. Though excavations of UJF are ongoing, the work carried out thus far has produced a substantial amount of well-preserved animal bone and shell. Indeed, the 2003 and 2004 excavations yielded over 36,000 bone and shell fragments, with a total number of identified specimens reaching nearly 27,000. In all three phases of the site, the archaeofauna is dominated by bird, shellfish and fish remains, with domestic and marine mammals making up no more than 6% of the total. This, combined with other characteristics of the faunal assemblage, suggest a subsistence economy at Undir Junkarinsfløtti that is significantly different than those seen elsewhere in the Norse North Atlantic.

EXCAVATION AND RECOVERY

The 2004 excavation at UJF focused on the area immediately behind the erosion face excavated in 2003 and 2000 (see Church *et al*. 2005; Arge 2001; Lawson *et al*. 2005). Excavations have been carried out following natural stratigraphy, with the removal of one layer at a time. Following NABO protocol, all deposits were dry-sieved using 4mm mesh, while bulk samples (2—12 liters) were taken from each context for flotation and sedimentary analyses (Church *et al*. 2005). Additionally, a series of Kubiena tin samples were taken for use in soil micromorphology analysis (*ibid*.).

Based on radiocarbon dates, stratigraphy, and artifact analysis, the occupational deposits excavated at the site have been separated into three analytic phases, which span the Viking Age (earliest) through to the Late Norse period (latest): UJF 1 (dated to 9th—12th centuries calAD), UJF 2 (11th—12th centuries calAD), and UJF 3 (11th—13th centuries calAD) (Church *et al*. 2005). UJF 1 includes contexts 21—25 and 28. UJF 2 includes contexts 15—20. UJF 3 includes contexts 3, 5—9, 14, 101—111, 113—117, 119, and 123—125. These three phases will also be employed in this report when discussing temporal trends in the archaeofauna. Such grouping is useful in that it produces larger sample sizes and a clearer picture of general changes in the faunal assemblage through time.

LABORATORY METHODS

Analysis of the Undir Junkarinsfløtti archaeofauna was carried out at the Hunter College and Brooklyn College Zooarchaeology Laboratories and made use of the extensive comparative skeletal collections at both laboratories, including specimens currently on loan from the American Museum of Natural History. All fragments were identified as far as taxonomically possible (selected element approach not employed), though 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), and "Small Terrestrial Mammal" (small dog-fox sized) categories. Only those elements positively identifiable as *Ovis aries* were assigned to the "sheep" category, while all other sheep/goat elements were assigned to a general "*caprine*" category. Murre

and guillemot are not distinguishable on most bones and are presented together as *Uria sp*., except where positive identification of *Uria lomvia* (guillemot) could be made. Fish identifications follow the most current ICAZ Fish Remains Working Group recommendations (including most cranial and vertebral elements), with only positively identified fragments being given species level identification (thus creating the usual large cod-family or *gadid* category as well as a substantial number of unidentified fish bones). Following NABO Zooarchaeology Working Group recommendations and the established traditions of North Atlantic zooarchaeology, we have made a simple fragment count (NISP) the basis for most quantitative presentation. Measurements of fish bones (made to the nearest millimeter using a Mitoyo Digimatic digital caliper) follow Wheeler & Jones (1989). Mammal elements have been measured following Von Den Dreisch (1976). Mammal tooth-eruption and wear recording follows Grant (1982). General presentation follows Enghoff (2003).

Digital records of all data collected were made following the 8th edition NABONE recording package (Microsoft Access database supplemented with specialized Excel spreadsheets, see discussion and downloadable version at www.geo.ed.ac.uk/nabo). All digital records (including archival element-by-element bone records) and the faunal assemblage itself will be permanently curated at the Faroese National Museum. A compact disc (CD) version of this report is available upon request from seth.brewington@gmail.com.

TAPHONOMY

As has long been acknowledged and thoroughly discussed by zooarchaeologists (e.g. Grayson 1984; Lyman 1994), archaeofauna are subject to a wide variety of environmental factors that impact the degree to which these remains do or do not survive in the archaeological record. A great many processes—such as scavenging, trampling, wind or water erosion, soil acidity, and site disturbance—can affect how much, if any, of an animal will remain in the archaeological record after it dies. Add to this the difficulties of obtaining full recovery of faunal assemblages in any archaeological excavation and it should become clear that archaeofauna are not direct representations of the past, but rather *proxy data*. As such, zooarchaeological data must be used with care and should be prefaced with an examination of the taphonomic factors that likely had an impact on the assemblage under study.

Fragment Size

The maximum dimension of each bone fragment was measured and placed into one of five size categories. The UJF archaeofauna appears highly fragmented, with the majority of bone fragments in all three phases measuring at or below 2 cm. However, it should be noted that, as will be discussed below, the vast majority of this material is bird and fish bone, much of which is relatively small even when whole. Nevertheless, the mammal bones recovered in 2003 and 2004 were, indeed, highly fragmented, allowing for very little metric analysis. The mammal assemblage recovered during the 2005 and 2006 seasons, however, might well provide enough intact material to allow for meaningful metric analysis and animal size reconstruction estimates.

Scavenging

Signs of scavenging, as indicated by dog and/or rodent tooth marks on the bones, are relatively rare in all phases at UJF. Rodent and dog tooth marks are present on far less than 1% of all bone fragments for each of the three phases. Tooth marks were not observed on any fish or bird

bone. This is not surprising, since most bird and fish bones are neither large enough nor dense enough to withstand gnawing. However, the frequency of tooth marks present on the UJF archaeofauna remains very low even if we remove all fish and bird bones from consideration.

Burning

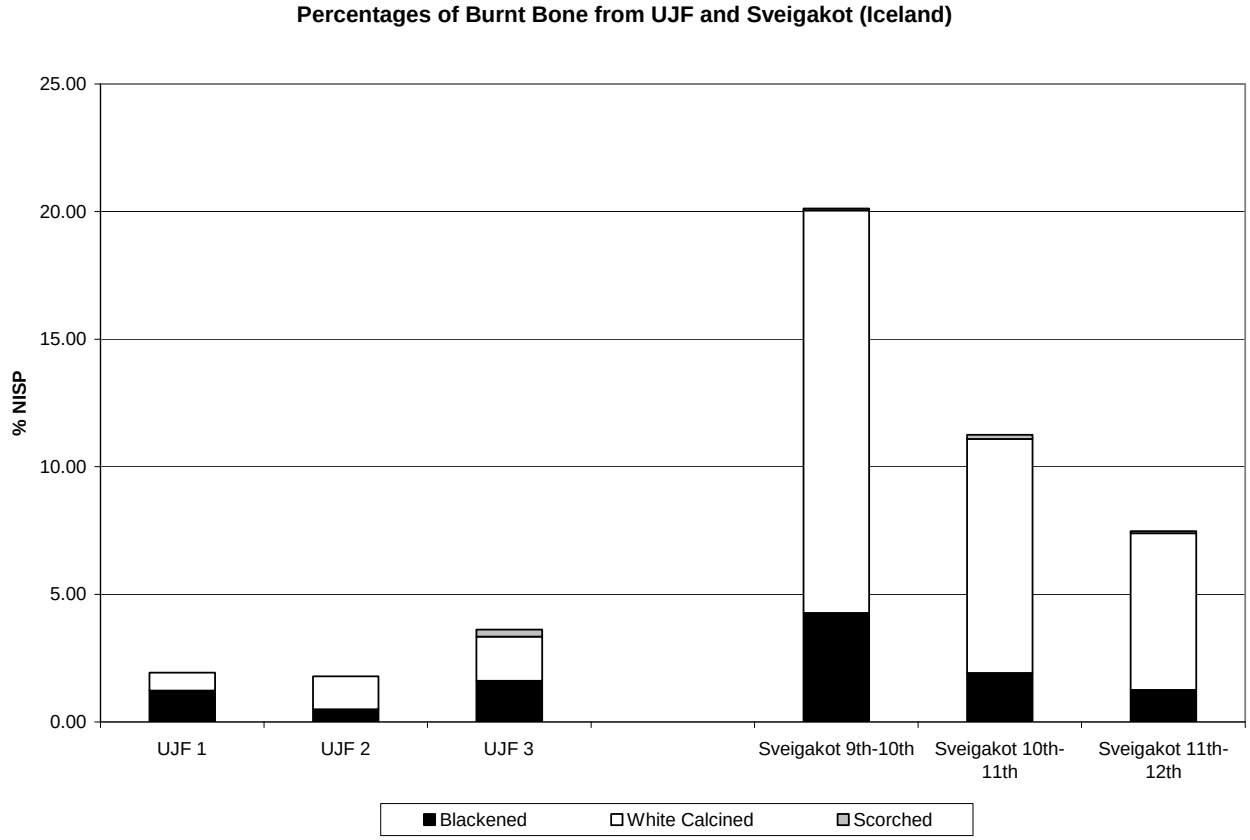

Figure 1.

As is clearly evident in Figure 1, burnt bone makes up a relatively low percentage (well under 5%) of the total faunal assemblage in all three phases at Undir Junkarinsfløtti. The low percentage of burnt bone at UJF—particularly the calcined bone that has been subjected to greater temperatures than the blackened material—is particularly striking when compared to comparable Viking Age sites in Iceland. As an example, Figure 1 includes data from Sveigakot, a roughly contemporaneous site in the Mývatnssveit region of Iceland (Vésteinsson 2001). As at Sveigakot, the burnt bone from UJF was generally found in association with deposits that are interpreted as the result of hearth cleaning. However, whereas these deposits at Sveigakot contained a good deal of charcoal (Simpson et al. 2003; Vésteinsson 2001), the Undir Junkarinsfløtti deposits produced very little charcoal, containing instead large amounts of burnt peat. The relatively low frequency of calcined bone at UJF might be attributable, therefore, to the lower temperatures produced by peat-fueled fires.

SPECIES PRESENT

Overview of Taxa

The 2003 and 2004 excavations at Undir Junkarinsfløtti yielded a substantial archaeofaunal collection, with the total number of bone and shell fragments exceeding 36,000. Analysis of the UJF faunal assemblage has identified several species of domestic mammals, birds, fish, and sea mammals.

Figure 2 illustrates the relative importance of each of the major taxa represented in the UJF archaeofauna. As is clearly evident in this graph, domestic mammals make up a relatively small percentage of the total number of specimens identifiable to species level (NISP) in all three phases, comprising at maximum only about 6% (in UJF 2). Rather, the UJF archaeofauna is characterized by large proportions of bird, fish, and mollusk. While the fish component outnumbers the bird in UJF 1, the relationship has reversed by the next phase (UJF 2) and by the last phase (UJF 3) the bird and mollusk components are each far larger than the fish.

In several respects, the overall pattern of taxonomic representation in the UJF archaeofauna is remarkably different than the patterns seen in contemporary Icelandic and Greenlandic sites. Figure 3 presents the same Undir Junkarinsfløtti data illustrated in Figure 2 alongside Norse farm sites in Iceland, Greenland, and (representing the probable ideal Norse farm faunal assemblage) one site in Norway. The sites are placed in roughly chronological order, with earliest sites/phases located on the far left of the graph and the latest on the right. Compared with all of these sites, UJF maintains a very low proportion of domestic mammals and a very high proportion of wild bird and fish through time. Contrasting with UJF, domestic mammals make up at least 20% of the archaeofauna in all but two of the comparison sites (W51 and W48 in Greenland). While wild birds are taken in large numbers upon initial settlement (*landnám*) in Iceland, the proportion of birds soon drops drastically as the populations of seabirds are greatly reduced by over-exploitation. Over-harvesting of seabirds does not appear to have occurred at Undir Junkarinsfløtti, where birds not only make up from 28% to 55% of the total assemblage in each phase, they also increase in the later phases. Also interesting is the trend in fish bone representation through time at UJF. Unlike the early sites in Iceland, the earliest phase at UJF is dominated by fish bone (about 64% of the total). As noted above, fish then decline in representation in the later two phases (about 27% of the total in UJF 2 and 13% in UJF 3). This is certainly not the case in the Icelandic sites, where the fish component is relatively large and generally increases through time.

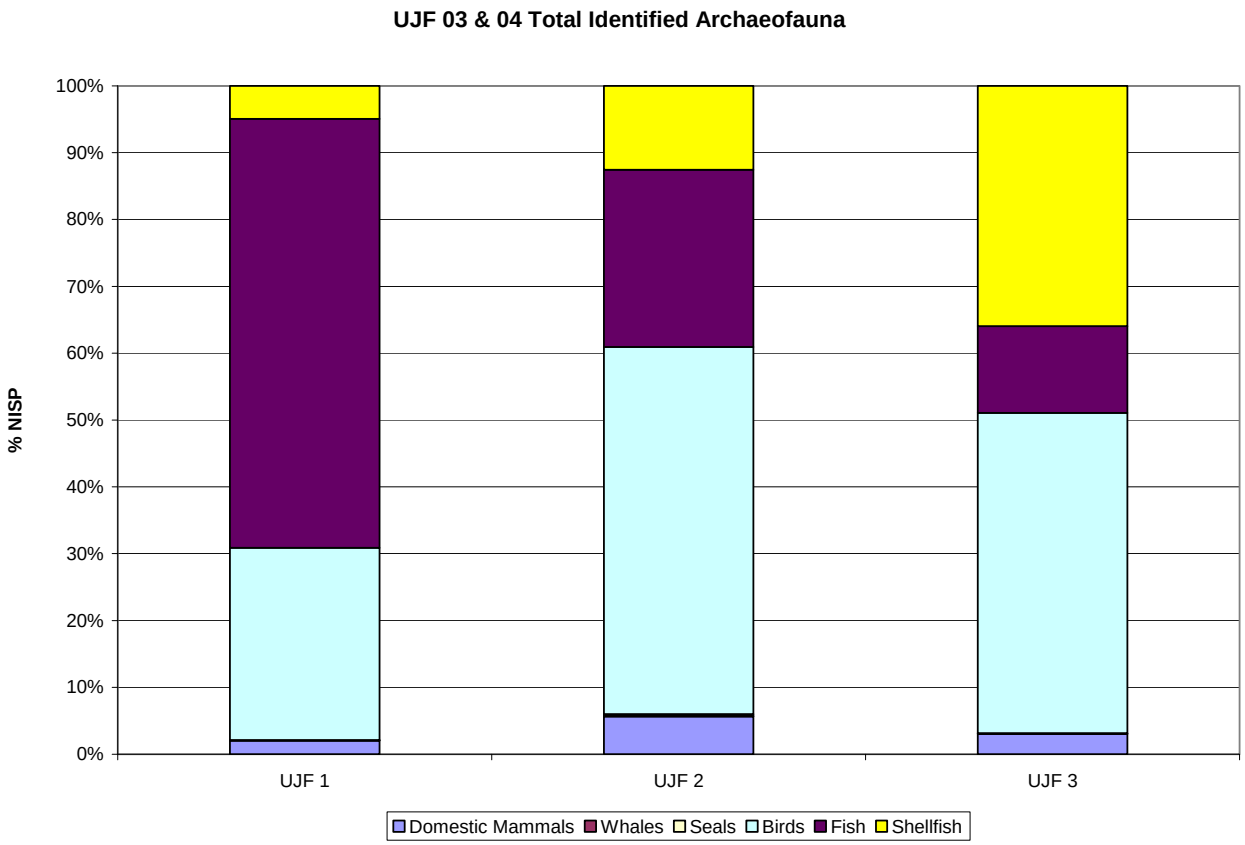

Figure 2.

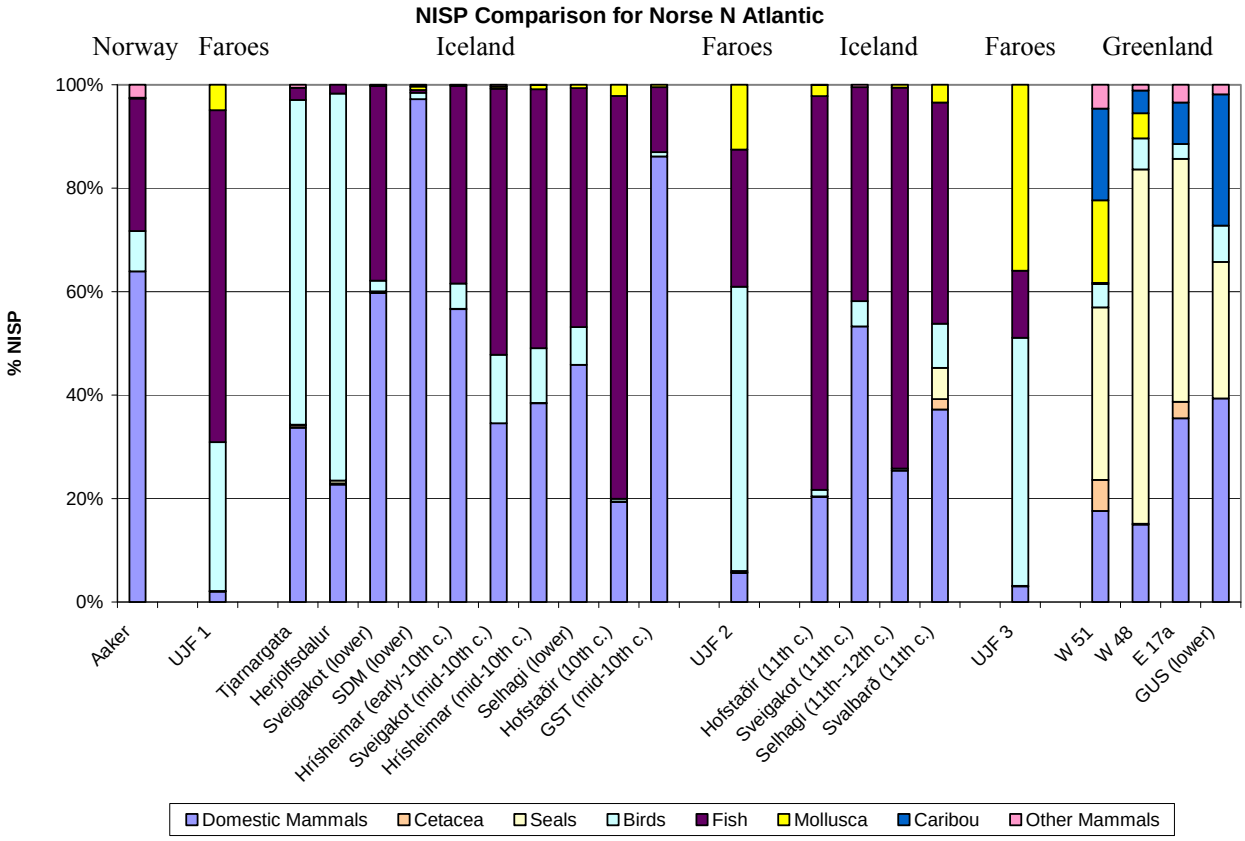

Figure 3.

Domestic Mammals

Figure 4 presents a breakdown by analytic phase of species representation within the domestic-mammal component of the Undir Junkarinsfløtti assemblage. The domestic assemblage is dominated in all three phases, but increasingly through time, by sheep (*Ovis aries*) and goat (*Capra hircus*), or "caprines," as they are collectively termed. Sheep and goat skeletons are morphologically very similar to each other and are distinguishable on only a very few elements. The majority of sheep and goat material is therefore only identifiable to the "caprine" level. Nevertheless, nearly all of the distinguishable caprine bones from the UJF assemblage (with the exception of one) have been sheep. While this apparent paucity of goats at UJF is unusual in comparison with typical Norse North Atlantic sites, it is important to note the low sample size: the total number of caprine bones identifiable as sheep or goat in the entire 2003 and 2004 UJF assemblage was only 62. Further research will certainly increase this sample size and should shed further light on the actual proportion of sheep to goats at UJF.

Another unique characteristic of the UJF domestic assemblage is the apparent maintenance of relatively large numbers of pigs (*Sus scrofa*) through all three phases. While pigs are generally relatively numerous in *landnám*-period sites in Iceland and Greenland (McGovern et al. 2001), their numbers drop dramatically by about the mid-11th century, when increasing environmental degradation makes pig-keeping unsustainable for most farmers. At UJF, however, the situation is different. While the relative proportion of pigs declines by the final phase (from around 17% of the total in UJF 1 and UJF 2 to around 9% in UJF 3), pigs nevertheless remain a significantly large percentage of the total domestic assemblage until at least the 12th century.

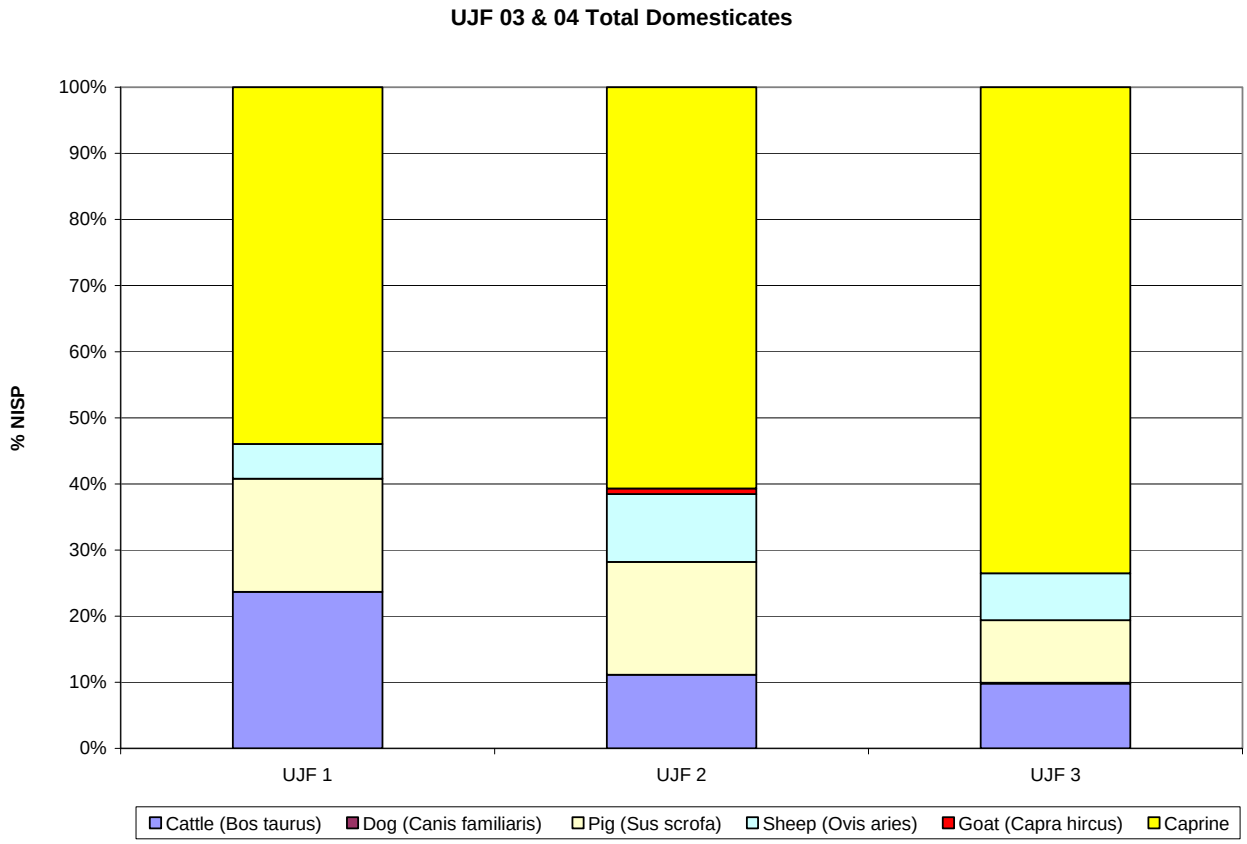

Figure 4.

The proportion of cattle (*Bos taurus*), while comprising nearly 25% of the domestic assemblage in the earliest phase, declines significantly in the subsequent two phases. This pattern is typical of Norse North Atlantic sites, where the initial settlers of Iceland and even Greenland sought to keep relatively large numbers of cattle, presumably based on an ideal farming strategy more common (and feasible) in the Norwegian homeland (Amorosi *et al*. 1997).

Livestock Management

Examination of the age-at-death profiles of Undir Junkarinsfløtti's domestic archaeofauna can potentially be useful in determining the probable livestock management strategies being employed at the site through time. It has been shown (Halstead 1998) that different management regimes (i.e. dairying vs. meat-consumption) typically involve quite different culling strategies. Naturally, any study of past livestock management practices, if it is to be reasonably sound, requires a large enough sample size. Given the relatively low number and fragmented nature of Undir Junkarinsfløtti's domestic archaeofaunal assemblage, therefore, it is no surprise that an examination of management strategies at UJF is, thus far, capable of providing only provisional (and potentially misleading) results. Nevertheless, analysis of the data available suggests livestock mortality rates very similar to those found at contemporaneous Icelandic sites (McGovern *et al*. 2001). Specifically, the morality profile for cattle at UJF seem to correspond well with the Icelandic sites, where some 20—50% of the individuals were culled while still neonatal (less than 3 months old) or foetal (unborn) (*ibid*.), a pattern consistent with a primarily dairying-based economy (Halstead 1998).

Figure 5 provides counts and relative proportions of adults versus juveniles among the identifiable cattle, caprine, and pig specimens. Determination of age-at-death was made by examining longbone epiphyses fusion states and general bone morphology. As noted above, the percentage of neonatal or foetal cattle in the UJF assemblage ranges from 50% (UJF 1) to about 35% (UJF 3), with a trend toward the culling of fewer young cattle through time. The data for caprines suggest that relatively few (about 2—10%) were culled while juveniles, while the pig data suggest an even lower juvenile mortality rate (from 0—5%). Again, it must be stressed that these results are only tentative, since they are based on generally very low sample sizes.

Age-at-death can also be determined through an examination of tooth eruption and wear states. Each domestic mammal mandible and maxillary fragment that was recovered was given a reference number and the eruption and wear states for each of the molars and the forth premolar were recorded. As with the longbone fusion data, the available dental data is, as yet, too hampered by small sample size to allow for a confident assessment of livestock management at Undir Junkarinsfløtti. Both the single cattle mandible and pig mandible come from young animals. The caprine mandibles come from animals of varying ages, though the majority likely belonged to young individuals.

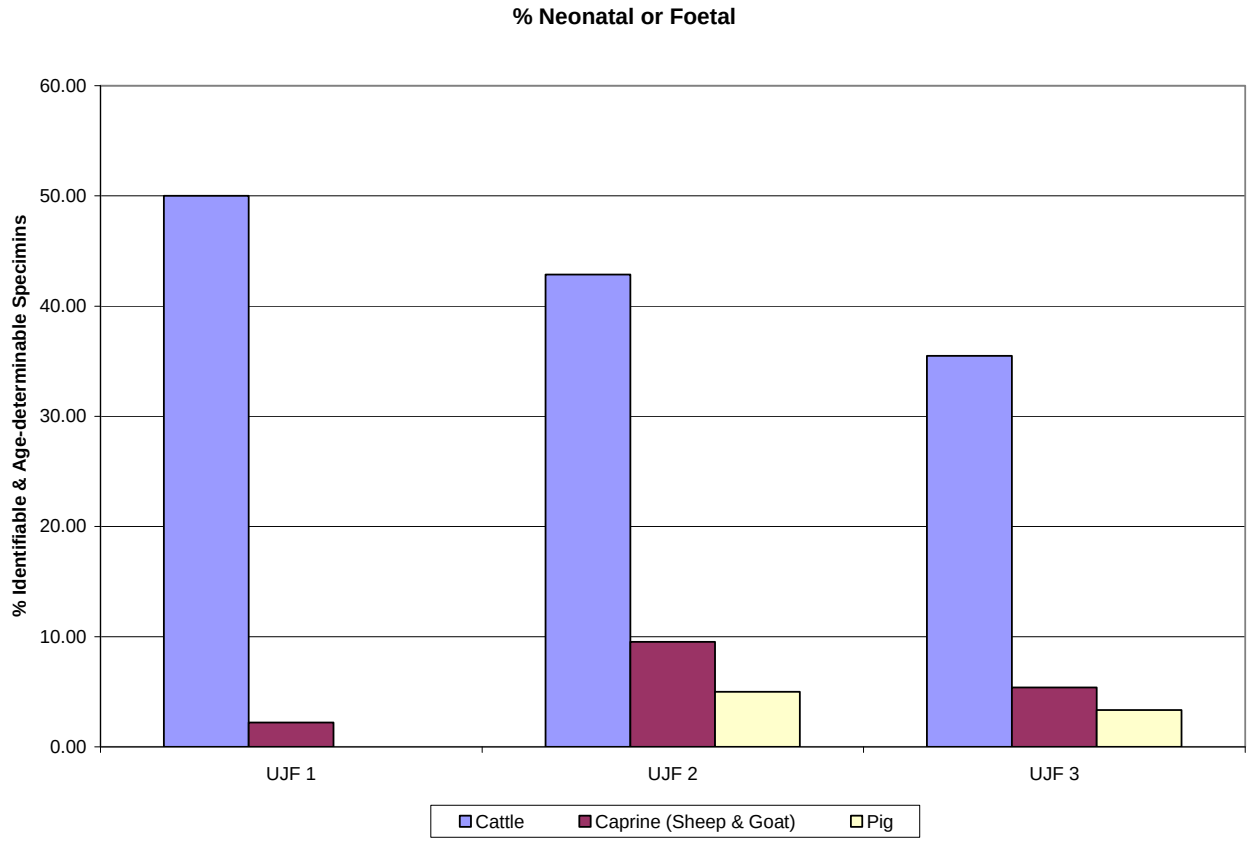

Figure 5.

Sea Mammals

The number of whale and seal bone recovered during the 2003 and 2004 excavations at UJF has been quite small. It is likely that the whale bone represents craft-working debris. All but two of the whale bone fragments are 2cm or less in size and several display cut marks. The small size of these whale bone fragments prohibits a determination of species. Species-level identification of the seal bone was also largely unsuccessful, though this was due not to small fragment size but rather the extreme intra-species variation of seal skeletal morphology. Nevertheless, five seal teeth were identifiable as belonging to the grey seal (*Halichoerus gryphus*). The non-dental seal material could at least be assigned to a general size category and, based on size and known species distribution, most of the seal material likely came from either grey or harbor (*Phoca vitulina*) seals.

Birds

The vast majority of bird bone in all phases at Undir Junkarinsfløtti comes from the puffin (*Fratercula arctica*). If we consider only that portion of the avifauna identifiable to species level, puffins account for about 77% (in UJF 1) to 90% (UJF 3) of the total bird bone assemblage. It should be added, though, that most of the bird bone not securely identifiable to species level is almost certainly puffin, further adding to the near dominance of this species in the UJF avifaunal assemblage. There were several other species identified in the assemblage, however, as indicated by Figure 6.

The historically-documented (and present-day) practice of seabird nesting-cliff exploitation in the Faroes appears to have played a significant role in the subsistence economy at UJF, as evidenced by the large numbers of puffin, murre/guillemot (*Uria* species), razorbill (*Alca torda*), manx shearwater (*Puffinus puffinus*), and shag (*Phalacrocorax aristotelis*). As noted earlier, birds comprise the second largest taxon in the earliest phase of occupation at UJF and the largest in each of the later two phases. The apparent sustainability of seabird exploitation as represented in the UJF archaeofauna contrasts sharply with the Icelandic pattern. Whether this sustainability was the result of hunting-restricting laws, small human-population size (resulting in a relatively small demand on the seabird populations), or some other factor(s) is not yet clear and will require further research.

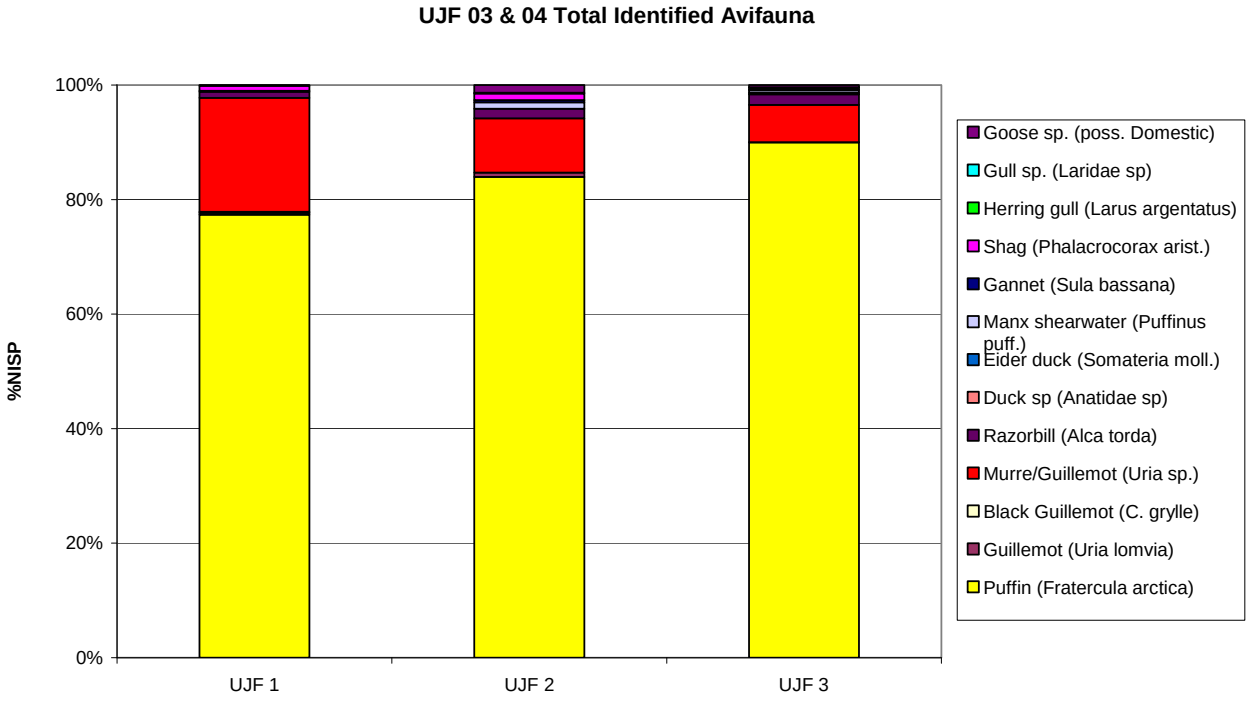

Figure 6.

Fish

Of the specimens identifiable to species level, the cod family (*Gadidae*) makes up by far the largest component of the Undir Junkarinsfløtti fish archaeofauna, with the majority of cod bones belonging to the Atlantic cod (*Gadus morhua*). Of the unidentifiable fish bone fragments, it is likely that the vast majority also belong to cod. As with the avifaunal portion of the UJF assemblage, then, the fish component is largely dominated by one species.

Preliminary analysis of Atlantic cod element distribution for the UJF specimens reveals a clear over-representation of cranial relative to axial elements, a pattern that appears in all three phases. These data suggest that the Atlantic cod material at UJF is largely the byproduct of *rotscher* (*råskjær*) production, rather than mere on-site consumption. A better understanding of the exact nature and extent of *rotscher* production at the site will require further analysis of the UJF fish bone assemblage, including measurements of the dentary and premaxillary bones, which will allow for a reconstruction of live fish length (Wheeler & Jones 1989).

Mollusks

As illustrated earlier in Figure 2, mollusks make up a significant portion of the total Undir Junkarinsfløtti archaeofauna, particularly in the last phase, UJF 3. The great bulk of the identifiable mollusca fragments (and probably most of the unidentifiable fragments as well) belong to the common limpet (*Patella vulgata*) (Figure 7). Unfortunately, mollusca shells are easily fragmented and therefore tend to be over-represented in the faunal assemblage. When only whole shell and those fragments containing the center of the shell are considered, the total count for each species is greatly reduced, though the limpet remains by far the most represented.

Though mollusks are known historically to have been consumed by humans living along the coast in the British Isles and elsewhere in the North Atlantic (Fenton 1992), the practice is believed to have been generally restricted to times of severe hardship (*ibid*.). A potentially more-probable explanation for the limpets at UJF is that they were used as fishing bait. Limpets and other shellfish have long been used as fishing bait in the Northern Isles of Scotland (*ibid*.) as well as the Faroe Islands. Further study should provide for a better understanding of the role of mollusks at UJF.

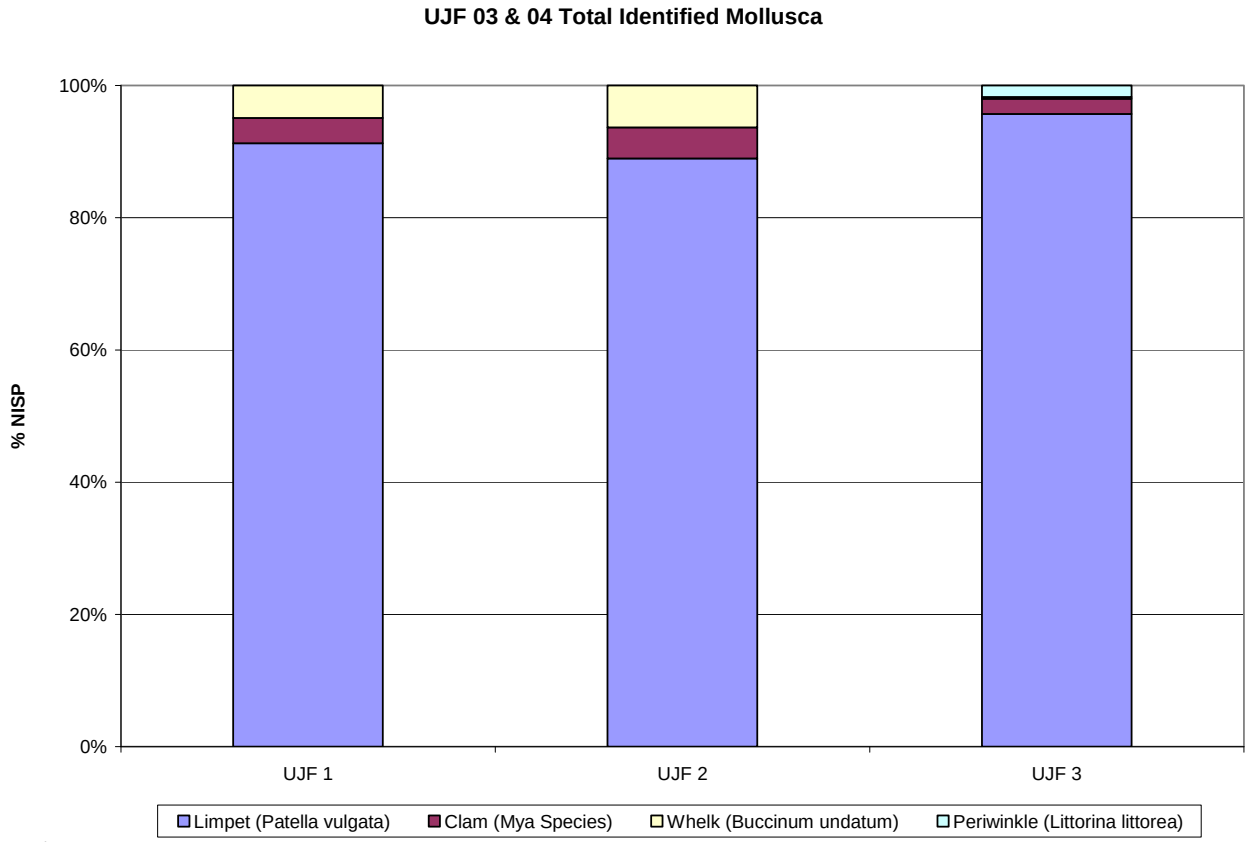

Figure 7.

DISCUSSION

Compared with contemporary Norse sites elsewhere in the North Atlantic, the archaeofauna thus far recovered and analyzed from Undir Junkarinsfløtti is both typical (in the general makeup of taxa present) and unique (in the relative proportions of each taxon). It is clear that the inhabitants of UJF

in all three phases kept the traditional suite of domesticates—cattle, sheep and goats, and pigs—and supplemented this basic animal component of the farming economy with wild resources, such as seabirds and fish. As has been noted throughout this report, the uniqueness of the UJF archaeofauna arises from several characteristics of the assemblage, notably:

1) the apparent paucity of goats, even in the earliest phase;
2) the relatively long duration of pig-keeping;
3) the relatively high proportion of wild resources (particularly seabirds) relative to domesticates; and
4) the decrease in relative proportion of fish through time.

Each of these trends appears real, though further research (such as the forthcoming analysis of the considerable amount of archaeofaunal material recovered in the 2005 excavation) should provide more detail. Given what is now known, however, we are able to make a few comments on each of the above-noted characteristics.

Goats

With only one specimen thus far identified, goats appear to have been vastly outnumbered by sheep in all phases of settlement at Undir Junkarinsfløtti. Even given the inherent difficulties in distinguishing goat from sheep remains, it seems likely that goats were far less common at UJF than in contemporaneous Icelandic or Greenlandic sites. One explanation for the scarcity of goats at UJF

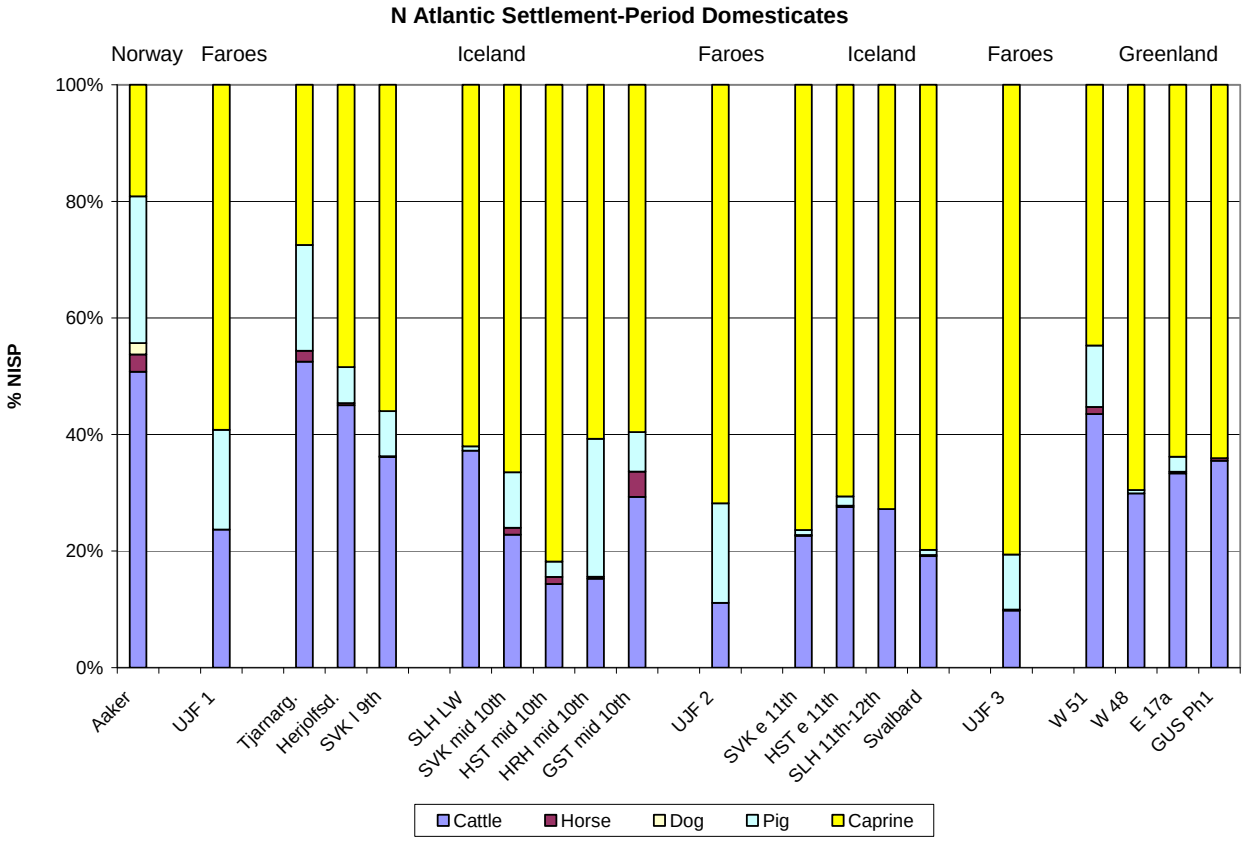

Figure 8

might be related to the fact that the Faroes appear to have been, at the time of first settlement by the Norse, largely treeless (Edwards & Craigie 1998, Hannon *et al*. 2001, Jóhansen 1985, Lawson *et al*. 2005). Such a landscape might well have made goat-keeping far less appealing to the settlers, since goats are relatively easy to maintain in forested environments.

Pigs

A treeless Faroes might also have been expected to discourage pig-keeping, since these animals are also easily kept in forests (Ward & Mainland 2004). Surprisingly, though, we find that not only are pigs present in significant numbers at UJF, the relative proportion of these animals remains fairly constant through time. Figure 8 presents a comparison of relative proportions of domesticates during the three phases of occupation at UJF and some roughly contemporaneous sites in Norway, Iceland, and Greenland.

Since free-ranging pigs would presumably not have had access to forests for pannage and would have also been potentially devastating to populations of cliff-dwelling seabirds, it seems quite possible (and perhaps likely) that pigs in the Faroes were kept in pens from very early on after initial settlement. Penned animals, of course, require fodder. A seemingly good choice for pig fodder might have been fish offal, since this would have saved grain and vegetation for the cattle, caprines, and horses. However, recent carbon isotope analysis of pig bone from UJF has shown that these pigs were not fed marine resources (McGovern, Amundsen, & Cook, in prep.; Dobney & Albarella, in prep.).

Wild Resources

The wild-resources component of the Undir Junkarinsfløtti archaeofauna is interesting in two main respects. First, the relative proportion of wild seabirds and fish in all three phases at UJF is much higher than the domesticates component. While the relative proportion of fish declines in the later two phases (UJF 2 and UJF 3), the aviary component increases (Figure 2). If the mollusca component is not included (based on the hypothesis that mollusks were used as fishing bait), the relative decrease in fish and concurrent increase in birds through time is clear (Figure 9). It is worth noting that the removal of mollusks from consideration does not significantly alter the relative role of domesticated mammals in the UJF assemblage, which remains relatively minor in all three phases (Figure 2 compared with Figure 9).

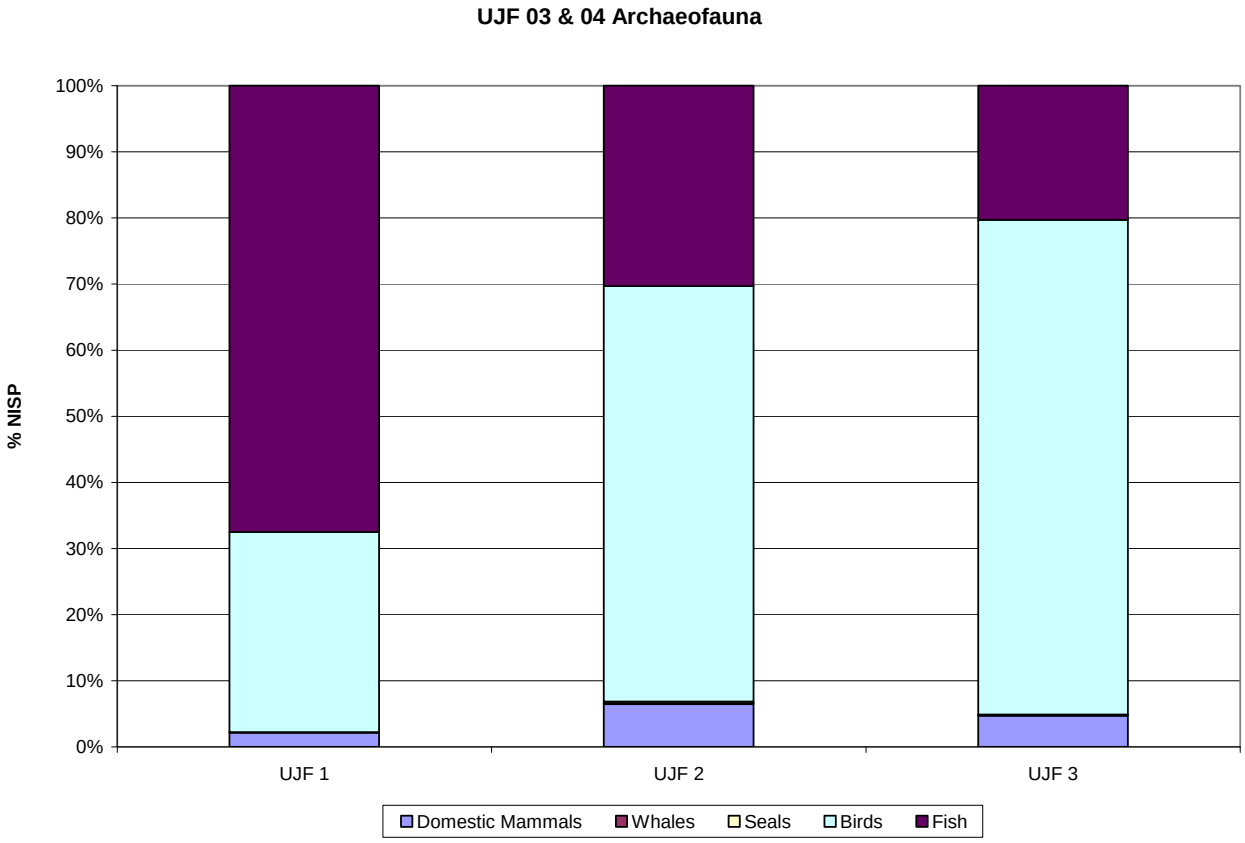

Figure 9.

While a relatively large presence of wild seabirds is perhaps not surprising for the earliest phase of settlement, when these animals might initially not have been wary of human predation, the increase of this resource in relation to the other taxa in the later phases is indeed intriguing. This apparently sustainable, long-term exploitation of wild seabird populations in the Faroes (admittedly, as evidenced thus far by only two sites: UJF and neighboring Sondum) might be explained by one of the following factors:

1) *Conservation*. The settlers might have attained sustainability through conservation. Such an act might have been carried out intentionally, through laws or other social incentives intended to protect the viability of seabird populations. Conservation could also have been attained unintentionally, however, by restricting land use and/or seabird exploitation rights. It is entirely possible, of course, that conservation was attempted in a variety of different ways at different times and in different locations throughout the Faroes.

2) *Small Population Size*. Sustainable exploitation of wild seabirds might also have been merely the fortuitous result of low human-population size, resulting in a demand on the resource that did not exceed its stress limits. It may be that low population was initially responsible for preserving seabird populations, but that a later increase in population size necessitated conservation efforts.

Whether or not either of these explanations accurately accounts for the sustainability of seabird exploitation in the Faroes will only be determined with further research.

The second interesting feature of the wild-resources component of the Undir Junkarinsfløtti assemblage is that the seabirds are nearly exclusively guillemot and (especially) puffins. There are several puffin and guillemot nesting locations on Sandoy and neighboring islands, so it seems logical that these species would have been easiest to exploit. Whether or not the relatively large representation of seabirds in the UJF assemblage is unique to the site or typical of early Faroese settlements will only be answerable with further study.

Fish

The decline in fish relative to seabirds and domestic mammals from the earliest to the latest phases at Undir Junkarinsfløtti (Figure 9) contrasts sharply with the trends seen in contemporaneous sites in Iceland (Figure 3). As noted above, the majority of fish bone from UJF comes from cod and appears to be the byproduct of *rotscher* production, presumably for export. Provided this picture is accurate, does the relative decline in fish through time represent a diminishing emphasis on *rotscher* production at the site? Again, further analysis of the assemblage (especially metric analysis) is needed before a clear understanding of the role of fishing at UJF can be gained.

CONCLUSION

Undir Junkarinsfløtti is a unique and important archaeological resource. The excellent preservation conditions and long-term occupation of the site provide the opportunity to learn a great deal about early Faroese subsistence and trade economies. Though work at UJF is ongoing, preliminary analysis of the site's archaeofauna is suggesting that the earliest Norse settlers of the Faroe Islands quickly adapted the traditional farm-based subsistence economy to the unique environmental and ecological characteristics of their new home. Further multi-disciplinary research at UJF, combined with research at other locations throughout the Faroes, will allow us to more fully understand the evolution of the Faroese palaeoeconomy and its relation to the rest of the Norse world.

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