A Comparison of the Greenlandic Eastern and Western Settlements

By Thomas H. McGovern

1. Introduction

In the past decade, much fresh research concerning the lost Norse colonies of West Greenland has been carried out. There has been intensive survey in both Eastern and Western Settlements (1), a series of excavations in the Western Settlement (2), and a good deal of laboratory research on Norse paleoeconomy (3). Building on a long and distinguished tradition of Scandinavian Greenlandic scholarship, this new research and fresh data may justify some preliminary attempts to generalize about the nature of the Norse colonies. This paper presents a very broad, and very preliminary comparison of the two settlement areas.

2. Biogeography and Climate

Some general similarities in topography and vegetation mask some significant physical differences between settlement regions. Both settlement areas are mountainous, and in both areas local topography strongly conditions possible farm location. In both settlement areas, the Norse farms tend to cluster in the inner fjords; their association with continental climate zone and the richer inner-fjord floral communities supported by the warmer continental summers is very close (4). The Estern Settlement did extend nearer to the sea, with farms spreading into the mid-fjord zones in several areas. In both areas, inner-fjord pastures below about 200 m in elevation are by far the most productive.

While precise comparison of such prime sea-level pasture area is difficult, it is certainly true that the Western Settlement lacks the broad expanses of comparatively level lowland found around Igaliko, the Vatnahverfi, or the inner reaches of Eiriksfjord (fig. 1). Vertical zonation also appears to be more marked in the Western Settlement than in the Eastern (fig. 2). There is little pasture (or vegetation of any sort) above about 350 m in the Western Settlement, while both pastures and high altitude farm ruins are present at such elevations in the Eastern Settlement (5). Thus the Western Settlement farmers had less prime lowland, and less opportunity to expand grazing, haying, and summer settlement into highland valleys (fig. 3).

While vegetation communities show broadly similar species composition (6) in the two regions, growing conditions in the Western Settlement region are noticeably more difficult. Modern recorded winter temperatures at Igaliko (in the center of the former Eastern Settlement) are significantly warmer than the recorded winter temperatures at Kapisigdlit (in the center of the former Western Settlement) (7), and the summer growing season is over a month shorter. Hay yield projections based on the Bergthorsson method (8), drawn from Icelandic agricultural experience, would predict an average hay yield for prime Eastern

Fig. 1. Lush grasses today surround the ruins of one of the byre complexes at the episcopal manor of Gardar (modern Igaliko) in the Eastern Settlement.

Settlement sites nearly 5 times the projected hay yield for the central Western Settlement. While such projections should not be taken literally (9), this and other measures of pasture productivity suggest that the Western Settlement pastures would have been less productive in normal years, more vulnerable to relatively small-scale, short-term climatic fluctuations, and probably less resilient in the face of overgrazing and large-scale, long term climatic changes.

3. Extent of Settlement

Basing his estimte on surviving documentary sources, Knud Krogh reports that ca. 1300 there were recorded 90 farms in the Western Settlement and 190 in the

Fig. 2. Sharply defined vertical zonation of vegetation is evident in this July photo taken from ca. 100 m elevation looking down on the Western Settlement site V 45 (photo center, in the middle of the peninsula extending into Itivdleq Fjord).

Eastern Settlement (or a ratio of about 1 to 2) (10). Archaeological work has turned up about 80 farm sites in the Western Settlement and nearly 400 in the Eastern Settlement (or a ratio of about 1 to 5). While we seem to be missing a few sites still in Western Settlement (11) we appear to have a surplus of farms in the Eastern Settlement (12). There are a number of possible causes for this discrepancy between documents and the archaeology:

1. The sources may be noting only the large to mid-size Eastern Settlement farms, ignoring the small steadings producing little extractable surplus. The smaller, distant Western Settlement may have come under a different accounting system.

Fig. 3. This Western Settlement farm (structure in photo center near 1 meter scale) at about 250 m elevation in the Kapisilik valley is near the upper limits of permanent farms in this settlement.

2. Many Eastern Settlement farms may have already been abandoned by 1300 (13) while the Western Settlement may have become vacant more suddenly.

In any case, even a diminished Eastern Settlement would have had at least twice the number of farms as the Western Settlement, and it spread over 12 major fjord-systems compared to the Western Settlement's 2 to 3 fjord-systems.

4. Size and Complexity of Farms

For several generations the considerable size of the bishops' manor at Gardar/Igaliko has been noted, and many of the larger farms of both settlement areas com-

Mean Floor Area

	Hall	Byre	Barn	Storage
Eastern Settlement				
mean	45	50	51	41
n =	7	8	8	6
Western Settlement				
mean =	28	27	36	12
n =	8	14	14	10

Fig. 4. Mean Floor Area (in square meters) of selected types of Greenlandic structures (excluding Ø47 Gardar). Note that the available sample is certainly heavily biased towards the larger sites. For discussion of data, see McGovern 1985b.

Mean Percentage of Domestic Mammals

	Cattle	Horse	Dog	Pig	Goat	Sheep	Caprine
Eastern Settlement							
mean % =	39.81	0.87	0.45	0.75	2.08	6.00	58.13
n =	6	6	6	6	4	4	6
Western Settlement							
mean % =	30.38	0.46	1.67	0.11	3.88	5.29	67.43
n =	8	8	8	8	8	8	8

Fig. 5. Mean Relative Percent of Domestic Mammals for available archaeofauna for Norse Greenland. Based on Number of Identified fragments per Species (NISP) counts. Caprine catagory includes both sheep and goats as well as sheep or goat fragments that cannot be identified to species level. For discussion of data, see McGovern 1985b.

pare favorably with roughly contemporary Icelandic farmsteads. However, both general impressions of unexcavated site size and our available excavated floor area data (14) would seem to suggest that there was a higher proportion of large farms in the Eastern Settlement. Even without including the clearly exceptional episcopal farm, figure 4 indicates the larger scale of all the Eastern Settelement farm structures currently measured (15). Almost all the smaller Western Settlement farms fall into Roussell's "centralized farm" type, and many lack the more elaborate sets of outbuildings documented on many Eastern Settlement farms. Interestingly, the smaller Western Settlement farms appear to have a significantly higher ratio of hay barn to cattle byre than the Eastern Settlement sites, perhaps reflecting the longer winters of the northern fjords.

5. Subsistence Economy

Both settlements share a common imported North Atlantic herding economy dominated by domestic cattle, sheep, and goats kept mainly for secondary products (milk and wool). Figure 5 presents the available zooarchaeological data (mean relative percent of domesticate group, based on number of identified fragments per species (NISP) for what we believe are the later phases of occupation (16). In both settlements, the remains of horse and dog are probably systematically under-represented. In both settlements, relatively high % of cattle and relatively low % of caprines (sheep & goat) mark large, presumbably higher status farms (17). Probably because our Eastern Settlement sample includes no extremely small sites and the Western Settlement sample includes several, the Western Settlement mean of cattle is lower and its mean for caprines is higher than that of the Eastern Settlement. If we take these sampling problems into account, the two regions' general husbandry patterns appear roughly similar.

Sheep and goat

However, a closer look at sheep/goat ratios and caprine harvest profiles may indicate differing options be-

ing taken within a single overall strategy. In the Eastern Settlement, the mean ratio of sheep to goat bones is roughly one goat to six sheep, while in the Western Settlement the mean ratio climes to about one goat to two sheep, and in the smaller Western Settlement farms goat bones slightly outnumber sheep. This may reflect a response to a less fully-cleared landscape, as goats can efficiently browse willow, birch, and alder thickets, metabolizing the bark and leaves more effectively than sheep (18). It may also simply reflect an adaptation to generally poorer herding conditions in the Western Settlement.

While only a few sites have produced large enough archaeofauna to allow for reasonable construction of harvest profiles, the data we do have suggests some differences in caprine culling practices between settlements. Tooth rows from V 54 (n = 23), V 48 III (n = 63), V 48 II (n = 144), and V 48 I (n = 81) show a strongly uni-modal distribution, with over 90% of the specimens full adult. Tooth rows from Ø 71 S (n = 294), like harvest profiles from Icelandic sites Storaborg and Adalbol (19) show an equally marked bi-modal distribution, with a harvest peak in the ca. 6 month age group. While more samples are needed to check this trend, it would appear that at least some Estern Settlement farmers were managing their flocks to produce both meat and secondary products (as were medieval Icelanders), but that Western Settlement frmers concentrated more fully on secondary products.

Caribou

Caribou meat may well have provided the Western Settlement farmers with a substitute for lamb, as caribou bone is much more common in Western Settlement collections. Our available faunal collections show an Eastern Settlement mean percent (of major taxa) of caribou bones of about 2.5%, and a Western Settlement mean percent of about 18%. Where uplands in the Eastern Settlement may have been extensively used for herding saeters, Western Settlement uplands show evidence for intensive caribou hunting (20). It is likely that the different bone percentages reflect the different hunting possibilities in the different districts (21).

Seal

While seals were certainly of vital importance in both settlement areas (49% of major taxa in the Eastern Settlement, 57% in the Western Settlement), the mix of species taken was somewhat different. In both areas, harp seals (blaasider og sortsider *Pagophilus groenlandicus*) were most important (Western Settlement = 61% of seals, Eastern Settlement = 64%). However, in the Eastern Settlement the large migratory hooded seal (klapmydser *Cystophora cristata)* is the next most common (23%) and in the Western Settlement the harbor or common seal (spraglede sæler *Phoca vitulina*) is second in importance (30%). Hooded seals are rare today in the former Western Settlement area, and are nearly absent from the Western Settlement bone collections (> 1%). Harbor or Common seals are today rare in the Eastern Settlement area (and in the late phase bone collections, mean = 7%), though this is probably tied more to climate than any other factor (22). Probably because they lacked harpoons and elaborate ice hunting gear, the Norse colonists in both regions took almost no ringed seals (netsider, *Phoca hispida*), as only a few bones of this seal have been found on any Norse site (about 1.7% of seal bones in Eastern Settlement, 1.4% in Western Settlement) (23).

6. Trade and the Nordrsetur

Available documentary sources make clear that while European traders did sometimes visit the Western Settlement directly, most trade and overseas contact took place in the Eastern Settlement. The entrepot at Herjolfsnes and the massive storage structures of the bishop's manor at Gardar have been documented for some time.

While the Western Settlement may have seen fewer trading ships in its fjords, it was certainly deeply involved in transatlantic exchange, through participation in the *Nordrsetur* hunt (24). We know that a range of arctic species were taken, but most of our zooarchaeological evidence relates to the walrus. Walrus bones are found on a surprising range of farm sites: large and small, inland and coastal., Eastern Settlement and Western Settlement. The bone fragments most commonly found are chips and chunks of the heavy skull right around the tusk root- apparently the result of tusk extraction on the home farm. Also found are the impressively large bacula, or penis bones, which seem to have been collected as a sort of paleofreudian trophy. Other bones are uncommon, suggesting that the tusk units (and trophy pieces) were brought back along with boneless meat and hide.

The wide distribution of fragments suggests some sort of share system. While such bone fragments are not easy to reasonably quantify, it is clear that the Western Settlement has many more than the Eastern Settlement. Collections made in 1984 at V51 Sandnes are still under analysis, but preliminary results indicate a very substantial amount of walrus tusk-extraction debris. While both settlements appear to have sent men to the Nordrsetur, the Western Settlement seems to have been most heavily involved in the hunt.

7. Summary – Differences in Vulnerability

It would thus appear that farmers in both settlements were following similar patterns of life, but that the smaller and generally less impressive Western Settlement farms appear to have been more dependent upon hunted caribou and seal, keeping more sheep and goats (especially goats) on less favored pastures, and probably involving themselves more heavily in the Nordrsetur hunt (fig. 6). How significant were these differences?

It would appear that they may have become critically significant in the 14th century, as climate cooled, Inuit immigrated, and times became hard throughout Norse Greenland. Recent husbandry models (25) indicate that a 2 degree (C) drop in mean yearly temperatures would cause serious hardship to Norse stockraisers, requiring major stock culling and increased use of wild resources. If Little Ice Age cooling (often modeled as a ca. 2 degree reduction) produced still more continental conditions in both settlement areas, the colder and already more continental Western Settlement would certainly be worst hurt.

The Bergthorsson hay yield projection method suggests that even a slight lowering of Western Settlement winter temperatures would have a major impact on pasture productivity, probably causing chronic failure of the hay crop. Reduced accumulated growing season temperatures and increasing inter-annual variability would also tend to reduce the ability of inner fjord vegetation communities to resist grazing pressure, probably contributing to increasing erosion documented by Fredskild (26). Subject to significantly more marginal growing conditions in the best of times, the Western Settlement pastures would certainly be more adversely affected by cold fluctuations and less quick to recover during warmer periods. The imported

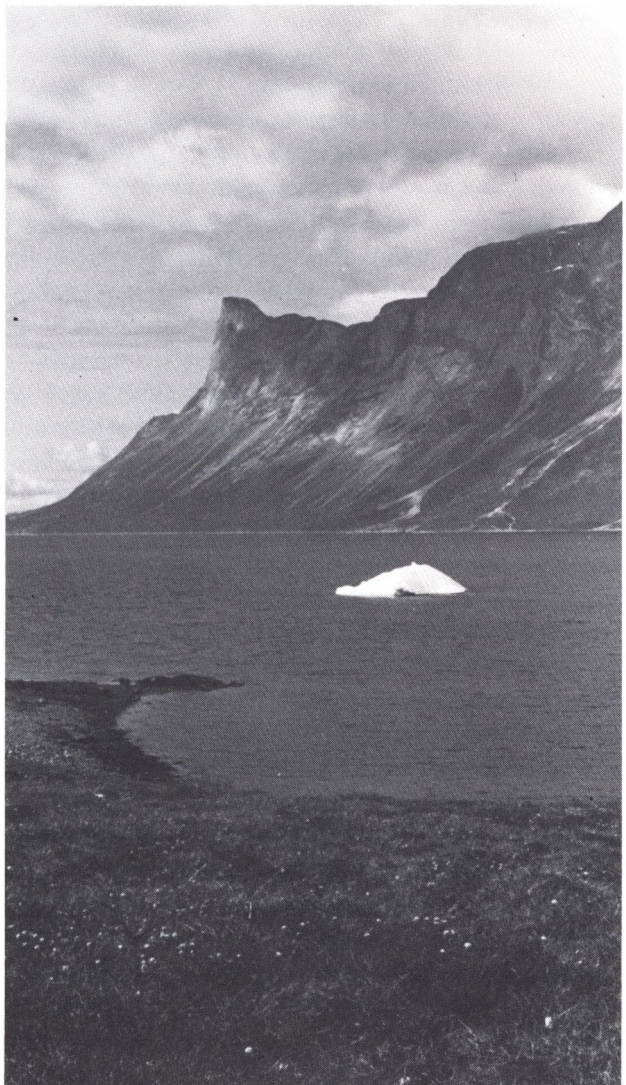

Fig. 6. Even very steep slopes were occupied by Western Settlement farms, such as the shores of the Pisigsarfik mountian range, seen here from across Kapisigdlit Kangerdluat fjord. Two farms occupied the slopes visible just above the iceberg.

North Atlantic animal husbandry portion of the Western Settlement subsistence economy would thus be under more severe stress, sooner.

Wild species would then act as a particularly important reserve resource, and we can see that both caribou and seals were more common in the Western Settlement bone collections. Increasingly continental climate would tend to favor caribou populations under modern circumstances (27), but overgrazing by domesticates (especially by an all-too-efficient sheep/goat mix) would tend to make the inner-fjord caribou "refuge zones" less attractive.

More serious would be changes in seal availability. It has been well documented that seal migration patterns (especially timing and concentration) vary considerably with changing climate (28). The drop of approximately 1 degree (C) in average yearly temperature between the late 1950's and the present in West Greenland has triggered major changes in harp seal availability to human hunters in the former Norse settlement areas. Briefly, modern catch data indicates that harp seals and common seals have both become much harder to catch in Southwest Greenland, but that hunters in Qaqortoq and Narssaq Kommunes have been able to keep total seal catch up through shifting to hooded seals and ringed seals (29). While Norse hunters did not take ringed seals in any number, Eastern Settlement hunters did take a large number of hooded seals. Our one stratified site from the Eastern Settlement (Ø17a) does indicate a jump in hooded seal percentage between lower and upper layers. Thus a failure of harp and common seal hunting would be a serious problem for both settlements, but the Western Settlement hunters evidently lacked the hooded seal to act as substitute.

Along with changing climate, increasing Inuit con-

tact and decreasing contact with Europe are well documented in the later Middle Ages. Because of its involvement in the Nordrsetur hunt, the Wester Settlement residents would have felt both events keenly. Lowered demand for walrus ivory and other Greenlandic products may have made the rewards of the always-dangerous northern hunt still more meager, and contact with Thulefolk may have had its share of hazard too. We are still ignorant of the details of that contact (30), but it would appear to have been a mixture of limited exchange and mutual blood letting. A small community like the Western Settlement could ill afford the loss of even a single boats' crew in the Nordrsetur or in conflict closer to home. The constricted nature of the mouth Western Settlement fjord system would have restricted optimal harp sealing areas for both cultures, possibly exacerbating resource conflicts.

In any case, it seems clear that the early end of the Western Settlement was not an accident, but a result of a congruence of forces that bore more heavily upon the smallest, most arctic, and ultimately most marginal part of the Norse colony.

Noter

1. Krogh 1982, Berglund 1986, Albrethsen & Keller 1986, McGovern & Jordan 1982.
2. Andreasen 1982, McGovern et al. 1983, Pedersen 1985.
3. Møhl 1982, McGovern 1985b, Buckland et al. 1983.
4. Bocher 1954.
5. Albrethsen & Keller 1986.
6. Fredskild 1973.
7. See Krogh 1982, s. 168-69 for a graphic presentation.
8. Bergthorsson 1985.
9. See McGovern 1986 for discussion.
10. Krogh 1967, 1982.
11. Most of these are probably destroyed by erosion, though new Western Settlement farms have been added as recently as 1984.
12. Many new farm sites have been discovered in the Eastern Settlement in recent years; a much higher proportion of new sites than in the Western Settlement.
13. As argued by Krogh 1967, pp 53-54.
14. See McGovern 1985b s. 91-94 for data & discussion.
15. It should be noted that small farms, often with less stone in their construction and often located on steep, cryoturbated slopes are comparatively unattractive excavation projects, and our sample for both settlement areas is certainly heavily biased towards the larger and more impressive sites.
16. See McGovern 1985b for discussion.
17. McGovern 1985b, fig. s. 1-4 .
18. Dr. Stefan Adalsteinsson pers. comm.
19. Amorosi, Russell & McGovern 1985, McGovern 1982.
20. Blinds, caches, & drive systems have been documented in 1977, 1981, 1984, 1986 in the Western Settlement, see McGovern & Jordan 1982, Christensen pers. comm.
21. See Morten Meldgaard 1985 for an excellent review of Greenlandic caribou population history & dynamics.
22. See McGovern & Bigelow 1984.
23. This is in strong contrast to the hunting patterns of both modern Inuit Greenlanders and their ancestors, which secured large numbers of ringed seal.
24. For a more complete discussion of Nordrsetur evidence, see McGovern 1985a.
25. McGovern 1986.
26. Fredskild 1973, 1982.
27. M. Meldgaard 1986.
28. Vibe 1967.
29. See McGovern 1986 for discussion.
30. See McGhee 1984, McGovern 1985a.

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