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Expanding Horizons

Settlement Patterns and Outfield Land Use in the
Norse North Atlantic

Dawn Elise Mooney, Lísabet Guðmundsdóttir, Barbro Dahl,
Howell Roberts and Morten Ramstad (eds.)



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The wood artefacts on the left side are from Borgund, Norway while the artefacts on the right side are from Norse Greenlandic sites.

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Preface

This volume stems from the Expanding Horizons project, which began in 2018. The project was funded by a Workshop Grant from the Joint Committee for Nordic Research Councils in the Humanities and Social Sciences (NOS-HS), held by Orri Vésteinsson, Ramona Harrison, and Christian Koch Madsen. Funding was awarded for two workshops, as well as a subsequent publication of the material presented. Workshop organisation and grant administration were carried out by Morten Ramstad, Lísabet Guðmundsdóttir, Howell Roberts, Barbro Dahl, Birna Lárusdóttir, and Dawn Elise Mooney. The workshops gave researchers and practitioners from across the North Atlantic region an opportunity to forge new connections with each other, not only through academic presentations but also through shared experiences of archaeological sites, standing Medieval structures and their surrounding landscapes.

The first Expanding Horizons meeting took place in Norway, on June 1st–4th 2018. The program began in Bergen with a tour of the city's Medieval sites, led by Prof. Gitte Hansen, before travelling to Mo in Modalen for two days of presentations and discussions. The workshop was attended by 36 participants, 27 of whom gave presentations on topics including archaeological survey in mountain regions, driftwood, seaweed, stone, birds and feathers, and fishing and marine mammals. The two-day seminar was followed by an excursion visiting sites including the stave churches at Borgund, Hopperstad and Kaupanger, the Viking trading sites at Kaupanger and Lærdal, and Norway's oldest secular wooden building, Finnesloftet in Voss, built around AD 1300. In between archaeological sites, the excursion also took in the dramatic fjord landscape of western Norway. Here and in Iceland, both the upstanding structures and their surrounding landscape should be seen as key actors in the development of the settlement and subsistence practices discussed in this volume.

Just under a year later, on April 25th–28th 2019, the Expanding Horizons group met again in Iceland. Forty-one participants gathered in Brjónsstaðir for two more days of talks and discussions. While the first workshop had a main focus on remote wild resources, the second focused on settlement and land-use patterns, agricultural practices, and trade and exchange. Again, the workshop concluded with an excursion to local archaeological sites. Attendees visited the episcopal manor farm and church at Skálholt, the reconstructed Viking Age house at Stöng in Þjórsárdalur, the caves at Ægissíðuhellir, the archaeological site at the manor farm Oddi and the preserved medieval turf-built farm and museum at Keldur. Photographs of the participants of both workshops are presented on the following pages.

Partly due to the ongoing coronavirus pandemic, more time than anticipated has passed between these meetings and the publication of this volume. We thank the authors for their patience, and for their outstanding contributions to the archaeology of western Norway and the Norse North Atlantic diaspora. We are also very grateful to our colleagues who assisted the editors in the peer review of this volume. Lastly, we thank you, the reader, and we hope that you find inspiration in the papers presented here.

Stavanger/Reykjavík/Bergen, Spring 2022

Dawn Elise Mooney, Lísabet Guðmundsdóttir, Barbro Dahl, Howell Roberts and Morten Ramstad



Attendees of the first Expanding Horizons workshop at Mo in Modalen, June 2018.

Back row, left to right: Jennica Einebrant Svensson, Garðar Guðmundsson, Even Bjørdal, Orri Vésteinsson, Morten Ramstad, Jørgen Rosvold, James Barrett, Gísli Pálsson, Michael Nielsen, Christian Koch Madsen, Konrad Smiarowski, Howell Magnus Roberts, Ragnar Orten Lie; Middle row, left to right: Solveig Roti Dahl, Brita Hope, Ragnheiður Gló Gylfadóttir, Kristoffer Dahle, Douglas Bolender, Hákan Petersson; Front row, left to right: Mjöll Snæsadóttir, Birna Lárusdóttir, Lilja Laufey Davíðsdóttir, Irene Baug, Kristin Ilves, Jørn Henriksen, Kathryn Catlin, Lilja Björk Pálsdóttir, Gitte Hansen, Kristborg Þórsdóttir, Élie Pinta, Dawn Elise Mooney, Lisabet Guðmundsdóttir, Sólveig Guðmundsdóttir Beck, Ramona Harrison. *Photo: Kathryn Catlin.*



Attendees of the second Expanding Horizons workshop at Brjánsstaðir, April 2019.

Back row, left to right: Howell Magnus Roberts, Morten Ramstad, Kjetil Loftsgarden, Kristoffer Dahle, Douglas Bolender, Ragnheiður Gló Gylfadóttir, Hildur Gestsdóttir, Michael Nielsen, Orri Vésteinsson, Jennica Einebrant Svensson, Trond Meling, Knut Paasche, Anja Roth Niemi, Knut Andreas Bergsvik, Simun Arge; Middle row, left to right: Guðrún Alda Gísladóttir, Brita Hope, Hákan Petersson, Kathryn Catlin, Even Bjørdal, Ragnheiður Traustadóttir, Élie Pinta, Solveig Roti Dahl, Per Christian Underhaug; Front row, left to right: Kristborg Þórsdóttir, Sólveig Guðmundsdóttir Beck, Guðmundur Ólafsson, Gitte Hansen, Mjöll Snæsadóttir, Lisbeth Prösch-Danielsen, Kari Loe Hjelle, Irene Baug, Christian Koch Madsen, Ramona Harrison, Barbro Dahl, Dawn Elise Mooney, Thomas Birch, Lisabet Guðmundsdóttir, Jørn Henriksen. *Photo: Lisabet Guðmundsdóttir.*



Lisbeth Prøsch-Danielsen

Haymaking as the driving force for shieling use from the Viking Age/early Medieval Period: a comparative study of two outfield areas in southwestern Norway

This paper focuses on the southernmost group of shielings in Norway where haymaking was the driving force for the shieling practice. Two shieling zones in the county of Rogaland that differ in respect to relief and proximity to their 'home' farms are compared: one from the inner fjord, subalpine birch zone and one from the outer coastal heathland plateau. Land-use practice is discussed using archaeological, ethnological and historical data supplemented by pollen analysis. The activities in these two shieling zones vary over time, as did the way in which they stored hay. On the coastal plateau the use of shielings has been practiced since the Pre-Roman Iron Age/Roman Iron Age transition, while in the inner fjord area it is recorded from the Migration Period. The use of shielings for haymaking can be traced back to the Viking Age/Early Medieval Period in both areas; however, the Post-Medieval Period seems to be the major period for the stacking of hay. On the coastal heathland plateau, hay was stored using single poles and four-post buildings, while single poles and enclosures were used in the fjord district. Mowing was practiced in both areas up to AD 1950.

Introduction and background

In recent decades, efforts have been made to illustrate the exploitation of outfield resources and in particular those areas associated with shieling zones and mountain pastures in western Norway (e.g., Magnus 1986, Kvamme 1988, Randers and Kvamme 1992, Bjørge *et al.* 1992, Prescott 1995, Moe 1996, Potthoff 2005, Lillehammer 2007, Hjelle *et al.* 2015, Hope 2016).

The term shieling (støl in western Norway) refers to a property in the outfields used annually for the permanent farm's livestock and for hay harvesting. The shieling includes buildings and the adjoining outfields (Potthoff 2005, p. 8). The shieling's curtilage (stølsbø) refers to the area between the buildings strongly influenced by the livestock, whether it is fenced in or not.

A prerequisite for the use of shielings is a settled 'home' farm nearby. Shielings served three main functions: to provide summer pastures for the livestock, as a site for processing milk products and to serve as a base for collecting additional winter fodder (Reinton 1955, Daugstad and Schippers 2016). Grazing in the infield is thus avoided in the summer season, as this area

is reserved for winter fodder production and for cultivation. The Norwegian shielings were divided into three groups: full, dairy and haymaking shielings, based on Reinton (1955, pp. 3, 12-13).

One of the aims for the interdisciplinary Expanding Horizon workshops was to shed light on the exploitation of outfield resources and the use of shielings as part of the farm's economic system from the Viking Age/Early Medieval Period across the North Atlantic region. Since Iceland and later on Greenland were settled largely from Norway, it seems reasonable to assume that they all shared cultural traits such as land organization and subsistence strategy (Albrehtsen and Keller 1986, Sveinbjarnardóttir 1991, Øye 2005, Sveinbjarnardóttir *et al.* 2008, Ledger *et al.* 2013).

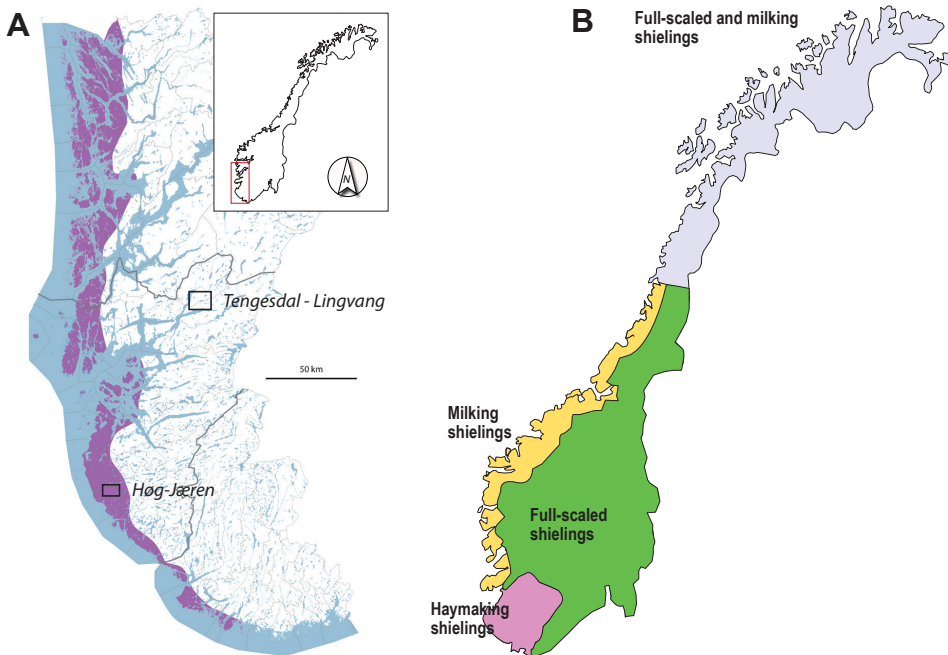


Figure 1. a). Map showing the location of the two studied shieling zones in southwestern Norway; the Høg-Jæren Plateau within the coastal heathland (shaded in pink) and the Tengesdal-Lingvang watercourse in the subalpine forest in the inner fjord district; b). The distribution of shieling practices in Norway according to Reinton (1955).

The main topic of this paper is to compare two shieling landscapes in Rogaland, southwestern Norway, namely the Tengesdal-Lingvang watercourse (T-L W) and the Høg-Jæren Plateau (H-J P) (Figure 1), where haymaking was the driving force for the use and crucial for the maintenance of the shielings. Milking of the livestock was also practiced in both areas, but dairy products were usually processed at the 'home' farm. Additionally, the archaeological and historical remains and differences in stacking traditions (the way hay is cut, dried and stored) will be discussed. The second goal is to provide a chronology for the stacking tradition in Rogaland, and, finally, to see if shieling practices with regard to haymaking have parallels in Iceland and Greenland by using relevant literature.

The use of shielings reached its peak in Norway in the period AD 1600-1850 (Grude 1891). After AD 1890, shielings went out of use in the coastal areas of Rogaland, while in the fjord area of Ryfylke ten shielings continued in use. In the T-L W, the last shieling was abandoned in AD 1947. After the Second World War, haymaking in outfields also decreased dramatically, and in AD 1959 none were reported anywhere in Norway (Statistisk Sentralbyrå 1961). Farmers had begun cultivating pastures close to the 'home' farm and storing grass in silos; since c. 1980 they have stored hay in large round bales.

The use of shielings and the regulation of outfield resources and the storage of winter fodder, including the use of haystacks, was first mentioned in the Gulating Law from c. AD 1050-1260. This law was replaced by Magnus Lagabøte's Law from AD 1274, which illustrates how permanently settled farm(s) and the adjacent shieling(s) were interlinked and exploited as commons between farmers from one bygd (Berge 2019). The Law of Tenancy (Larson 1935, pp. 89-107) dictated that, "*If men have a dispute over a shieling pasture or a lot in the forest, let him have it who has been in possession of it with a right unquestioned and unimpaired for twenty winters or more than twenty, if the facts are known to witnesses*" (paragraph 85). So, "*the boundary markers of the shieling pasture shall be where they were of old. Let no one move them from their places unless it is done so that no one suffers damage thereby*". Rights were similar in the mountain pasture: "*No one is there allowed to send cattle (and other ruminants) home (to the owner) with a warning, for there horn shall meet horn, and hoof (shall meet) hoof*" (paragraph 84). This saved the costs related to fencing in the outfields. The dates for joint movement of cattle between the farms in the lowlands and the shielings was set, "*If men lived near together on the same farm, they shall drive (their cattle) out of the farm pasture when two months of the summer (c. 14 June) are spent*". One is not allowed to leave the upper pasture before the end of the fifth summer month (14 August).

Hjálmróður, a pole where a haystack could be raised, is also mentioned in the Gulating Law: "*It is not allowed to dig up the stack support after the moving day; he may cut them off above the ground and take them away; but if he (the tenants) digs them up, he shall pay the fine for trespass to the owner of the land*" (paragraph 75). It says that both hay- and cereal stacks could be owned by a single farmer or shared between several farms. In the Gulating Law it is confessed that the pole belonged to the farmer(s) that had the legal rights to scythe and thus harvest in the outfields.

The fact that the Gulating Law is cited as a model for the Icelandic law code at the establishment of the Icelandic commonwealth in the year AD 930 (Robberstad and Lien 1981), is of interest for the Expanding Horizons project.

The studied areas

Tengesdal-Lingvang watercourse (T-L W)

The investigation of the T-L W took place in the period 1982-84 (Høgestøl 1984, Høgestøl and Prøsch-Danielsen 1986, Prøsch-Danielsen 1990), and covered an area of c. 70 km². Three farms and their shielings from this area will be addressed: Tengesdal, Selland and Lingvang (Figure 2).

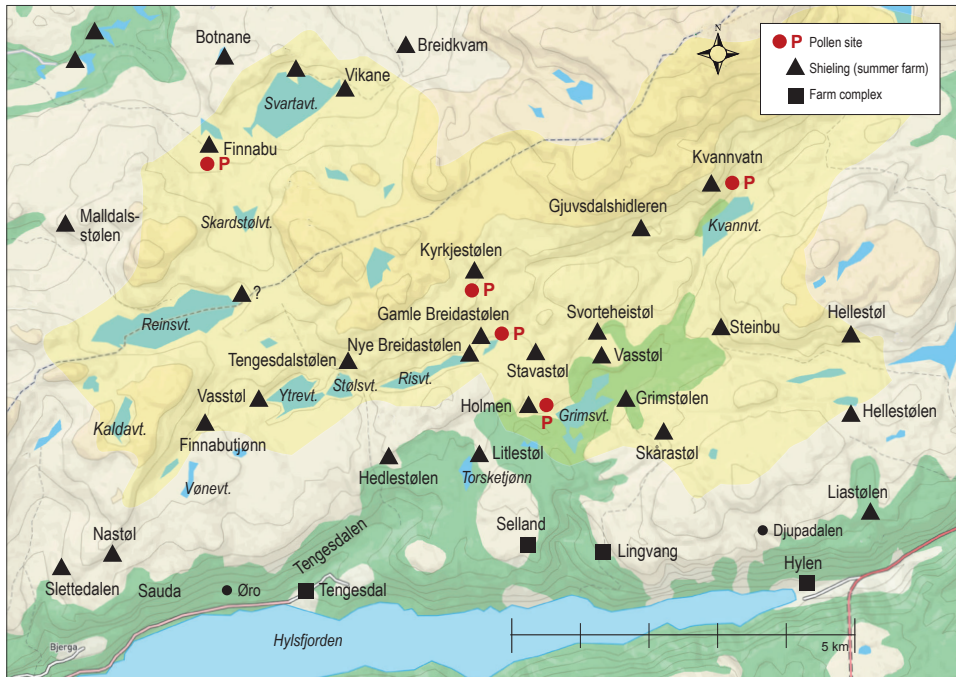


Figure 2. Map showing the studied farms, shielings, and the location of pollen sampling sites in the Tengesdal – Lingvang watercourse (shaded in yellow).

The T-L W is situated in the steep, inner fjord district of Rogaland, with mountains ranging up to 1540 m. The mountainous terrain widens out to a more undulating landscape at an altitude of c. 500-750 m. The area lies within the marked oceanic zone O2, with altitudinal zonation, and with high annual precipitation (Moen 1999, p. 126).

The farms are situated within mixed forests, while most of the shielings are situated in the subalpine birch forest or just above the forest limit ranging from 530-690 m asl (Selsing *et al.* 1991, p. 223). The shieling zone covers small patches of grass- and fertile moorland suitable for livestock grazing (cattle, goat and sheep) and haymaking (see also Pedersen 1982).

Høg-Jæren Plateau (H-J P)

This project started in 2000 and focused on the interior of the southern coastal heath section (Prøsch-Danielsen and Simonsen 2000, Prøsch-Danielsen and Fyllingsnes 2013, Prøsch-Danielsen *et al.* 2018, Prøsch-Danielsen *et al.* 2020). The study is limited to the present-day farm Aniksdal (80 m asl), stretching 7 km upwards to 360 m asl and covering c. 31 km²

(Figure 3). The farm is divided into three parts: Foren (an infield area with crop fields and hay-meadows), Bumarka (fertilized infield used for grazing) and Engjane (non-fertilized outfield used for grazing and haymaking). The shielings were situated in Engjane outfield, at a modest altitude stretching from 180-250 m asl.

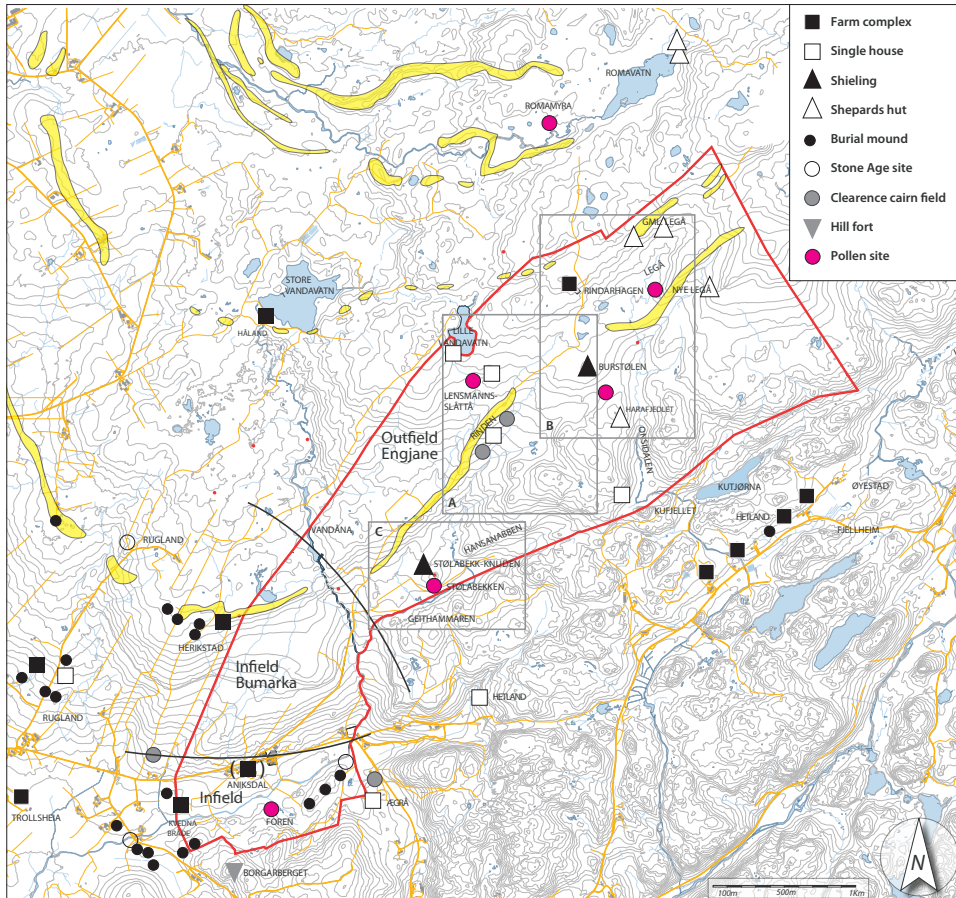


Figure 3. Map showing the borders of the farm Aniksdal with outfields at the Høg-Jæren Plateau. Shielings, cultural remains, and pollen sampling sites are marked. Yellow lines mark marginal moraines. Boxes A-C correspond to Fig. 9 (after Prøsch-Danielsen et al. 2020).

The basement is divided into two parts: bedrock is exposed to the east while Quaternary deposits dominate in west. Rinden, a marginal moraine, forms a natural corridor between the farm and the shielings. The area lies within the highly oceanic section O3, humid sub-section O3h, with high annual precipitation (Moen 1999, pp. 126, 131).

The plant cover is heath- and grassland, with mires and bogs. The area is treeless although human impact has decreased since the Second World War. The pressure on the vegetation continues due to grazing by young cattle and sheep.

Methods and material - a landscape historical approach

Two different approaches and data sets are combined to make a diachronic study of the use of these two shieling zones. The first approach uses the archaeological and ethnological data sets found by field surveys (Table 1), small test trenches, radiocarbon dates (Table 2a), interviews and databases (askeladden.ra.no and www.unimus.no).

Table 1. Four farms with their shielings within the Tengesdal-Lingvang watercourse and at the Høg-Jæren Plateau. All structures inside and outside the curtilage are described (information from Hoel and Jacobsen 1983, Jacobsen and Hoel 1984, Høgestøl 1984).

Home farm and shieling m asl	Structures at the curtilage	Structures outside the curtilage
TENGESDAL Suldal 0-200		
Litlestølen 530	Ruin (1) with cowshed, clearance cairns, single pole haystack base (1)	Raised barns (3) with inscriptions AD 1935-50, haystack enclosure 5 x 3 m to the N, haystack enclosures (3) east of Torsketjønn
Hedlestølen 625	Ruins (4), two with planks recorded. One of them registered as a barn	Barns (2) partly destroyed, west of Tengesdalselva: one built in AD 1923, one with initials from 1883, 1891 and from 1930-40. To the east, near Risvasshøgda, one barn probably built on the remains of an older shieling. Several haystack enclosures nearby, one of them 3 x 5 m
Vasstøl 700	Ruins (2), one probably a barn or a cowshed. Fence or enclosure for haystack, single haystack pole base	Pathway to Tengesdalstølen. Fence in southwest part of the lake Ytrevatnet
Tengesdalsstølen 700-715	Existing buildings (4), ruins (4) one probably a living quarter, one used for making cheese, one for pigs. Fence separating the curtilage into two parts; one for livestock grazing, the other for haymaking. Cowshed below one of the buildings. One building raised in AD 1928. In the 1930s, used for goats (300-400). Then up to up to AD 1947 used for cows in addition to haymaking	Haystack enclosures (2) (one 4 x 3.5 m), single haystack pole base 1.5 x 1.5 m, situated at "Legdå", all north of the curtilage. South of Tengesdalstølen; a large flagstone over a brook on the pathway to Stølsvatnet; haystack enclosures (2), one measuring 5.5 x 4.5 m, single stack pole bases (2) at "Geitasteinen", one rock shelter for storing poles. North side of Risvatn; pathway, barn, haystack enclosures (3) 5 x 3.6 m, 5 x 5 m, a fence preventing the cows to go to fare from the curtilage. Stone fence northeast of Torsketjønn

Home farm and shieling m asl	Structures at the curtilage	Structures outside the curtilage
Finnabutjønn 775 (holding Øro)	Ruins (4) probably a living quarter, a barn, cowshed and shed for calves or pigs, several clearance cairns	Fences (2) between Finnabutjønn and Vønevatnet. West of Finnabutjønn, grassland and boggy area
SELLAND Suldal 300 (abandoned AD 1888)	Abandoned AD 1888	After AD 1900, the outfields used for sheep (owned by a company). Hay meadows mown by the farmers at Tengesdal and Lingvang from AD 1888 until AD 1950
Holmen 620	Ruins (3), one with cowshed beneath (4.4 x 3 m), one with a younger single haystack pole base inside, animal pen, deep pools (2), a curtilage that is closed by two fences	East of the curtilage: enclosures for haystacks (4), one measuring 4 m in diam. with a single haystack pole base inside, two of them (5 m in diam, and one 6 x 3 m) with birch trees inside, one single haystack pole base. North of the curtilage: 2 enclosures for haystacks (both 4 m in diam.), one with a single haystack pole base. West of the curtilage: single haystack pole bases (5), one mown mire measure 40 x 50 m
Vasstøl 590	Ruins (4), one used as a shed for pigs?, one served as a cowshed or barn, enclosures for haystacks (4), with an in-fenced (50 m)	Enclosures for haystacks (several), of which one is highly visible 5 x 3 m to the east. Several mires used for haymaking
Nye Breidastølen 695	Existing building, built app. AD 1900	Enclosures for haystacks (2)
Gamle Breidastølen 710-745	Ruins (4), separated in two and two, one used for pigs?, another used for making cheese	A nutrient rich curtilage vegetation (zone with phyllite) used for both livestock grazing and haymaking. Enclosures for haystacks (3), one larger 5 X 5, one with fences nearby. Oval enclosure for haystacks 9 x 8.2 m between Svartenut and Risvatn
Gjuvsdalshidleren 705	Ruins (2) measuring 6.5 x 3 m and 4.3 x 4.2 m, enclosures for haystacks (2), one up to 4 m in diam, single pole haystack base	All haystacks in Gjuvsdalen might be in use for Gjuvsdalshidleren as well. Grassland for livestock grazing and haymaking
Svorteheistøl 710	Ruins (7), two with cowsheds, one for pigs, one barn. Single pole haystack bases (4). The curtilage covers 30 x 75 m	North of the curtilage enclosures for haystacks (2), the largest measuring 4 x 5 m. Large areas with grassland and mires
Stavastølen 740	Ruin, rock shelter used for storing, enclosure for haystacks (6 m in diam.)	Enclosures for haystacks (3) between Risvatn and Holmane. Two measuring 3 x 7. 5 m. Rich grassland, above the birch forest
Kyrkjestølen 860	Ruin 7 x 6 m, animal pen 15 m in diam.	Enclosures for haystacks (3). All app. 5 m in diam., single pole haystack base. An area probably used for single pole haystacks is fenced in. All situated east of Kyrkjestølen in Gjuvsdalen. Scanty vegetation, marginal
Fence separating the farm Selland and Lingvang		

Home farm and shieling m asl	Structures at the curtilage	Structures outside the curtilage
LINGVANG Suldal 300 (abandoned AD 1950s)		
Grimstølen 590-610	Existing buildings (3) (5.5 x 3.1 m and 3.5 x 3.4 m) one with a cowshed beneath, one for pigs, one used for making cheese, enclosures for haystacks (2) measuring 11 x 7.3 and 3.2 m in diam., both with bases for poles, one deep pool, clearance cairns	Existing building (used for hunting deer) and ruin, both southwest of Grimstølen. Between Fisketjørn and Grimstølen several fences and enclosures for haystacks are registered. Between Grimstølen and Skåråstølen, an enclosure for haystacks (9 m in diam.), a 50 m long fence crossing the valley and a 25 m long fence probably used to guide the livestock. In the valley system from Grimstøl to Hellestøl and the lake Krokvatnet, fences crossing the valley and several enclosures for haystacks. Grassland and mires, small brooks nearby. Regrowth of birch and shrubs. North part of Grimsvatn, enclosure for haystack, a meadow for haymaking and a fence
Steinbu 680	Existing building raised in 1945, ruins (2) made of stones, one with a cowshed underneath, one probably a barn, enclosures for haystacks (2) measuring 15 x 20 m and 10 x 5 m. The largest one has three intact single haystacks poles inside. The curtilage measure 40 x 40 m and is fenced in north.	Southwest: enclosures for haystacks (3), largest 3 m in diam., three separate fences of which one in a mown meadow. One of the fences is made up of birch wood like a rustic fence of diagonal design (<i>skigard</i>) that seems rather modern. Grassland south of Vardanuten. Large areas with mires/meadows southwestern of Steinbu used as hay meadows
Skåråstøl 690	Ruins (3), two probably used for calves or pigs. Enclosures for haystacks (2) measuring 4 and 5 m in diam, the curtilage in closed by fences in north and east.	Fence between Skåråstøl and the farm Lingvang and one southeast of the shieling. Enclosures for haystacks (2) below Vardfjell, one with to single haystack pole bases (720 m asl)

Home farm and shieling m asl	Structures at the curtilage	Structures outside the curtilage
ANIKSDAL Hå 65-80		
Stølabekk-knuden 180	Ruins (4-5), three measuring 3.5 x 4 m, probably three living quarters and one or two probable houses for storing the milkmaid's equipment. Probably not used as living quarters. Animal pen (1). Curtilage covers the hilltop. Distance to permanent farm 2 km	Pathway from the permanent farm passing the hilltop Gjeithammaren (Goat Mountain), enclosures for haystacks (2) measuring 6.5 x 7 m and 10 m in diam. Ruin (animal pen or barn) to the north in the outfield, separated to the shieling by flagstones over the brook, Stølabekken. Known fields for haymaking close by.
Rinden, shieling and shieling zone 200-230	Ruin with two rooms, measuring 5-7 x 19 m, probably serving as storage in multiple periods. The oldest room might be a living quarter.	Along the marginal moraine, animal pens (4), several clearance cairns, one dated to AD 18-214, a group of haystack foundations with four-posts and one enclosure for haystack with a four-post building inside. Partly cleared for grazing, partly for haymaking. To the north is a large gently sloped fen used for haymaking and peat cutting
Burstølen 250	One ruin probably used for storing food or hay. Not used as a living quarter. A small fence stretches 5 m from the ruin to the south. The fence might have served as a shed for the livestock. No curtilage visible.	A valley system, Onsidalen, with nutrient rich grassland, stretches southward to the mountain Kufjedlet (Cow Mountain). Northeast are large areas with mires used for haymaking. Several (20) haystack foundations with four-posts are registered close to Burstølen and downslopes to Stølabekk-knuden in the Engjane outfield. Four shepherds' huts are registered in the upper Aniksdal valley system; all probably from Post-Medieval Period

The second approach uses pollen analysis to reveal human impact and shaping of the landscape over time. Samples were collected from peat bogs close to shielings by using a peat corer or PVC-tube. Samples for microfossil studies and microscopic charcoal particles (10-200 µm) have been prepared and analyzed using standard methods (Fægri and Iversen 1989). It is possible to distinguish between pollen assemblages from mown meadows and grazed sites, but in western Norway the assemblages may vary along a gradient from coast to inland (Hjelle 1999). Both practices favour light demanding species like *Plantago lanceolata*, *Rumex acetosa*-type, *Ranunculus acris*-type and Asteraceae sect. Cichorioideae (Hjelle *et al.* 2018, Prøsch-Danielsen *et al.* 2018). In our studied areas the different sites have been put to multiple alternating uses: 2-3 years cycles of haymaking followed by use as pasturage. Here, therefore, the criteria for pastures and mown meadows were increased values of Poaceae, Cyperaceae, and an increase in pollen from taxa associated with grassland and meadow plants. In the fjord area, *Gentiana purpurea* is a signature for scything (Høeg 1976, p.32), while in the coastal heathland the parallel species is *Gentiana pneumonanthe* (Steinnes 2011). Coprophilous fungal spores, such as Sordariaceae-type, Sporomiella-type and Podospora-type (van Geel *et al.* 2003) have

been counted from the cores at the H-J P and recently at one locality (Holmane) in T-L W. The pollen diagrams were plotted using the TILIA computer program (v. 2.0) and CONISS was used to assist in creating the LPAZ (Local Pollen Assemblage Zone) (Grimm 1987, 1992).

Table 2a. Radiocarbon dates obtained from structures in the Tengesdal-Lingvang watercourse and at the Høg-Jæren Plateau in Rogaland.

Lab. ID.	Locality	M asl	Context	Dated material	Conv. radiocarbon age (BP)	BC/AD (2 sigma)	Sampling year
	Tengesdal-Lingvang Watercourse						
T-7649	Kyrkjestølen, shieling	860	Charcoal layer in ruin	Charcoal, unspec.	500 ±90	AD 1291-1632	1983
T-7648	Holmen, shieling	620	Lowermost charcoal layer in ruin	Charcoal, unspec.	190 ±70	AD 1524-1631	1983
	Høg-Jæren Plateau						
B-293859	Aniksdal, farm	80	Field, agricultural phase	Hordeum vulgare var vulgare	1770 ±30	AD 223-375	1973/74
T-1765	Kvednabråde	80	Charcoal layer from a farm complex	Charcoal, unspec.	2150 ±80	389 BC-AD 8	1973/74
T-1766	Kvednabråde	80	Charcoal from a posthole in a farm complex	Charcoal, unspec.	2190 ±90	406 BC-AD 9	1973/74
TUa-7663	Stølabekk-knuden, shieling	180	Charcoal layer, building 2, latest use	Charcoal, Betula	225 ±30	AD 1636-1925	2008
TUa-7656	Rinden, clearings cairn	198	Layer 3, infill min. age of clearings cairn	Charcoal, Betula	1910 ±35	AD 26-219 A	2008
TUa-7657	Rinden, clearings cairn	198	Layer 5, just below clearings cairn, max. age	Charcoal, deciduous trees	2860 ±35	1187-919 BC	2008
TUa-7660	Burstølen, shieling	252	Fire place, latest use	Charcoal, unspec.	780 ±35	AD 1212-1285	2008
TRa-425	Rindarhagen, enclosure	257	Just below enclosure, max. age	Charred seeds	645 ±25	AD 1284-1395	2009
TRa-428	Rindarhagen, enclosure	257	Just below enclosure, max. age	Peat	920 ±25	AD 1036-1205	2009

Lab. ID.	Locality	M asl	Context	Dated material	Conv. radiocarbon age (BP)	BC/AD (2 sigma)	Sampling year
TUa-7659	Nye Legå, shepherd's hut	265	Fire place, latest use	Charcoal fragments, Ericaceae	70 ±30	AD 1692-1919	2008
TUa-7658	Gamle Legå, shepherd's hut	280	Fire place, latest use	Charcoal fragments, Ericaceae	160 ±35	AD 1662-1904	2008

Table 2b. Radiocarbon dates from pollen cores close to shielings in the Tengesdal-Lingvang watercourse and at the Høg-Jæren Plateau in Rogaland. The dated material is peat.

Lab. ID.	Locality	Locality	Depth below surface	Conv. radiocarbon age (BP)	BC/AD (2 sigma)	Dated event	Sampling year
	Tengesdal-Lingvang W.						
T-5732	Breidastølen	Breidastølen	17.5-20 cm	1200 ±70	AD 675-986	Start shieling phase, grazing and mowing	1983
T-5734	Breidastølen	Breidastølen	35-37.5 cm	2540 ±80	812-416 BC	Forest clearance, antropogenic indicators	1983
T-5735	Breidastølen	Breidastølen	52.5-55 cm	3600 ±70	2189-1751 BC	Regrowth	1983
T-5731	Breidastølen	Breidastølen	95-97 cm	4750 ±80	3651-3365 BC	Sporadic grazing	1983
T-5733	Breidastølen	Breidastølen	122-123 cm	5890 ±90	4992-4543 BC	Alnus-Betula forest	1983
T-6293	Holmane	Holmane	39.5-40.5 cm	730 ±70	AD 1174-1397	Shieling phase, mowing and grazing	1984
B-577899	Holmane	Holmane	56.5-57.5 cm	1490 ±30	AD 545-642	Start shieling phase, grazing	1984
T-6292	Holmane	Holmane	94.5-95.5 cm	2630 ±80	986-522 BC	Start human impact, grazing	1984
	Høg-Jæren Plateau						
B-363991	Foren	Foren	47.5-48.5 cm	3050 ±30	1405-1223 BC	Home farm settled	2008
B-315530	Legå	Legå	26-27 cm	250 ±30	AD 1522-1940	Grassland, mowing cont.	2011
B-315531	Legå	Legå	53-54 cm	1100 ±30	AD 887-1017	Grassland and mown meadows, shieling	2011
B-381524	Legå	Legå	67.5-68.5 cm	2160 ±30	356-57 BC	Grassland and mown meadows	2011
B-315532	Legå	Legå	124-125 cm	3080 ±30	1421-1263 BC	Drop in AP. Grassland, regularly burnt	2011
B-381525	Legå	Legå	199.5-200.5 cm	4300 ±30	3011-2881 BC	Shrub and field layer with herbs	2011

All radiocarbon dates have been calibrated using the IntCal13 calibration curve in OxCal (v. 4.3) (Reimer *et al.* 2013, Bronk Ramsey 2015), and reported as radiocarbon dates BP and/or as calibrated years BC/AD at 2σ (Table 2a and 2b).

Results

Tengesdal-Lingvang watercourse (T-L W)

Archaeological and ethnological data set

Altogether, twenty-three registered shielings were shared between eight farms (Figures 2 and 4). Sixteen of these belong to three farms, Tengesdal (5), Selland (8) and Lingvang (3) (Table 1).

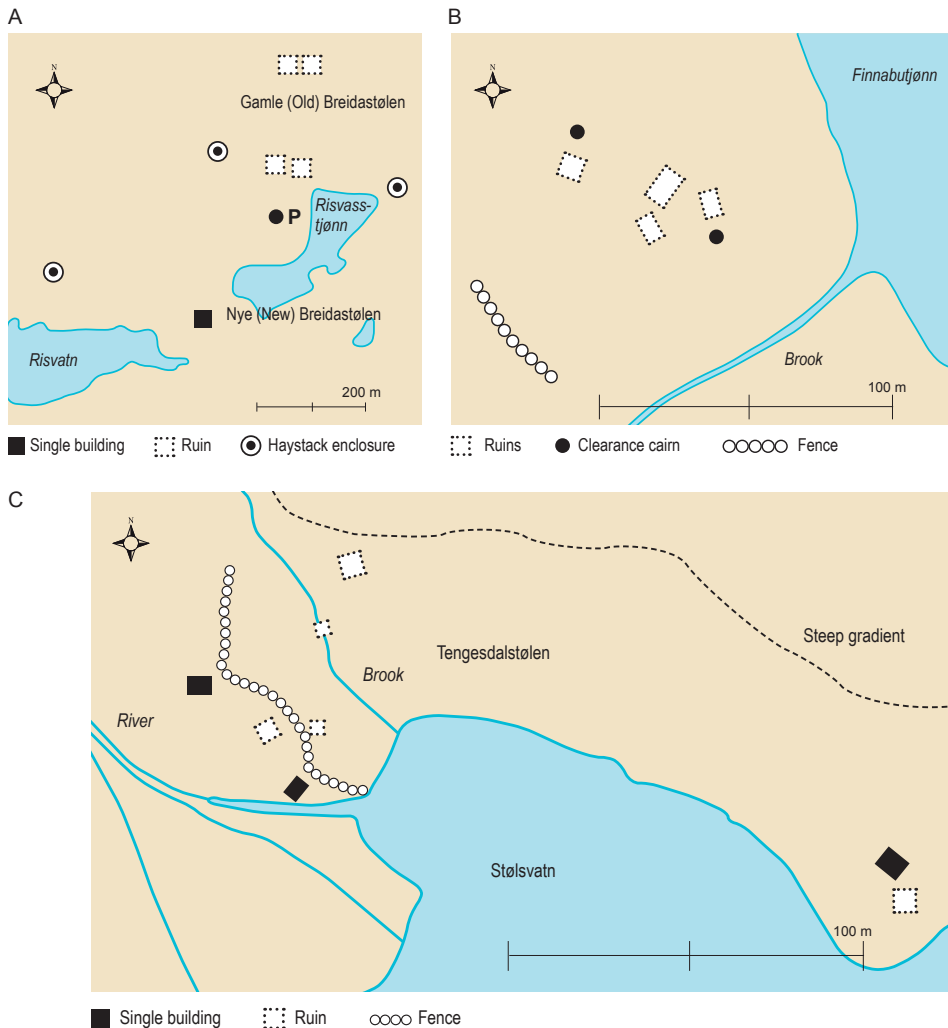


Figure 4. Close up of some shielings and the distribution of cultural remains in the Tengesdal-Lingvang watercourse; a). Nye Breidastølen and Gamle Breidastølen (from Prøsch-Danielsen 1990); b). Finnabutjønn (original drawing, Anne Ragnhild Hoel 1984); c). Tengesdalstølen (original drawing, Anne Ragnhild Hoel 1984).

The Tengesdal farm is actually a collection of several farm holdings. It held a central position, close to the fjord. Shielings were in use until AD 1947, while mowing in the outfields were performed until AD 1950.

The farms Selland and Lingvang were situated on terraces along the steep fjord side and are now abandoned. At Lingvang, shielings were in use until AD 1939.

At Tengesdal and Lingvang, there was a shift from cattle to goat husbandry in the 1920-1930s (Jacobsen and Hoel 1984). Up to 400 goats were kept at Tengesdal at one time. Between AD 1940 and 1947, the farmers at Tengesdal returned to cattle husbandry.

The oldest farms facing Saudafjorden were settled in the Late Bronze Age/ Pre-Roman Iron Age, while those facing Hylsfjorden were settled in the Viking Age/Medieval Period (Høgestøl and Prøsch-Danielsen 1986). Stray finds, a whetstone and some ceramics, found close to Holmane (Selland) date to the Viking Age/Medieval Period, and the lowermost charcoal layer in one of the ruins is dated to 190 ±70 BP (90 % in the range AD 1630-modern day). At Kyrkjestølen (Selland) one charcoal layer is dated to 500 ±90 BP (AD 1287-1632). These charcoal layers may represent one of several periods when these shielings were in use. Many of the shielings have two sets of buildings (e.g., Gamle and Nye Breidastølen, Tengesdalsstølen). Four shielings still have one or several buildings intact, now used for recreation. The main period for the shielings and the cultural monuments left as ruins in the landscape is the 1800s-early 1900s (Jacobsen and Hoel 1984).

Each farm's shieling zone was framed by natural watercourses and lakes and were separated by boundary markers in the terrain such as fences or cairns. There are also several fences separating the shielings within individual farm units. In most cases, fences are found close to hay meadows with haystacks, their main function being to prevent livestock from gaining access to the winter fodder. Otherwise, fences helped the dairymaids to keep the cattle close to the shielings (e.g., Tengesdalsstølen). There is close correlation between shielings and patches of grass and meadows used for pastures and haymaking.

The mown meadows or mires are rather small in T-L W, some cover only 40 x 50 m, and the curtilage varies between 40 x 40 m to 30 x 70 m. Groups of clearance cairns are recorded at several of the curtilages.

The shielings consist of one or several buildings with dwelling houses for peoples that stayed there throughout the season. Many of these buildings have a cowshed in the basement, which was also used for sheep and goats; otherwise, the animals (including calves and pigs) were kept in separate buildings. The cattle were sometimes kept in animal pens close by during the night (e.g., Holmane, Kyrkjestølen). There were separate buildings for storing dairy products and for cheese-making. Deep pools for cooling the milk are also recorded at some of the shielings. This demonstrates that dairy products were being processed at the shielings. Although often associated with goat breeding, these structures are also seen at Gamle Breidastølen, a farm that was abandoned in AD 1888, prior to the main period of goat husbandry in the Ryfylke area. This suggests that both cattle and goats were being milked.

Hay storage

Haystack enclosures (stakktufter) and single-pole haystack bases are recorded both inside and outside the curtilage (Jacobsen and Hoel 1984, Table 1). Both types are primarily built of stone. Altogether, 80 enclosures have been recorded in the T-L W, sometimes using natural blocks as one sidewall (Figures 5 and 6). The enclosures vary in size from approximately 4 m in diameter to 15 x 20 m (Steinbu). The largest ones could accommodate up to four single-pole haystacks.

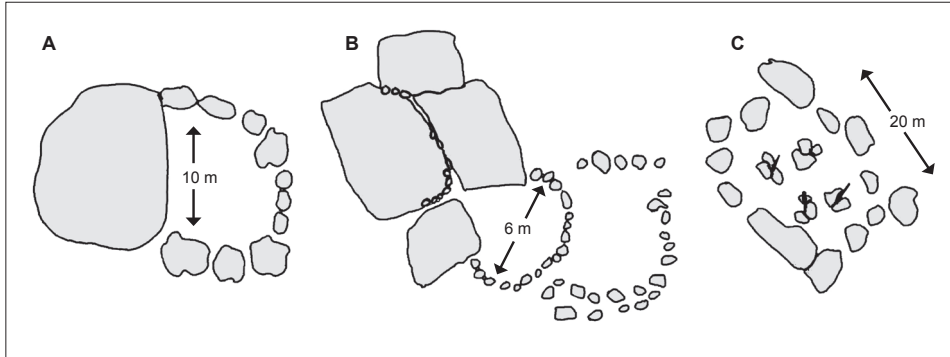


Figure 5. Haystack enclosures (stakktufter) vary in shape and size within Tengesdal-Lingvang; a). Haystack enclosure from Steinbu, Lingvang (original drawing, Åse Jacobsen 1984); b). A double haystack enclosure from Stavastøl, Seland (original drawing, Anne Ragnhild Hoel 1984); c). Haystack enclosure (stakktuft) with four single-pole haystacks (stakk) from Steinbu, Lingvang (original drawing, Åse Jacobsen 1984).



Figure 6. Haystack enclosures (stakktufter) in Tengesdal. Photo: Per Kristian Austbø.



Figure 6. Haystack enclosures (*stakktufter*) in Tengesdal. Photo: Per Kristian Austbø.

Some poles used in single-pole haystacks are still intact, but generally only the stone base is visible today. The stone base can measure up to 1.5 x 1.5 meter. Some of the rock shelters have served as storage for poles.

Raised barns (7 in all) for storing hay outside the curtilage are only recorded in the lower valley system close to the Tengesdal river, and they all seem to have been built from AD 1880 onwards. They were probably in use until mowing ceased around AD 1950.

Pollen data set

Two pollen diagrams are presented from the Holmane and Breidastølen shielings. Both belong to Selland farm (Figures 7 and 8).

At Holmane, the following pre-shieling phases indicate human impact in the area:

- LPAZ H2: AP (arboreal pollen) is c. 50 % throughout this zone. The lower boundary is dated to 2630 ±80 BP (BC 860-790). Anthropogenic influence is recorded by continuous pollen curves for *Plantago lanceolata*, *Rumex acetosa*-type, *Urtica*-type, and a slight increase in microscopic charcoal. Coprophilous fungi spores from *Sporomiella* starts at the zone border.

Shieling phases:

- LPAZ H3: From 1490 ±30 BP (AD 436-644) (the Migration Period), there is a slight decrease in AP followed by a rise in microscopic charcoal dust. There is also a rise in *Plantago lanceolata* and the appearance of *Podospora* and species in the genus Sordariaceae

appear, indicating animal dung and thus grazing activity in the area. Grazing is further indicated by a rise in pollen types indicative of that process, such as Poaceae, Cyperaceae, *Rumex acetosa*-type, *Ranunculus acris*-type, *Urtica*-type, *Geranium*-type and *Geum*-type and a peak in light-favouring *Potentilla* species, mostly *P. erecta*.

- LPAZ H4a: The lower boundary is dated to 730 ±70 BP (AD 1161-1399) (Early Medieval Period). All grassland indicators recorded in LPAZ H3 are present. *Ranunculus acris* and Asteraceae sect. Cichorioideae increase and may represent the start of mowing. A single grain of *Hordeum* pollen is also recorded. Simultaneously there is a peak in the coprophilous fungi *Sporomiella*.
- LPAZ H4b: The lower part of the zone border is estimated to c. AD 1600 (Post-Medieval Period) and the upper part to c. AD 1800. There is a drop in AP followed by an increase in microscopic charcoal dust, indicating forest clearance. Simultaneously there is an increase in species associated with mown meadows and grassland like *Plantago lanceolata*, *Rumex acetosa*-type, *Ranunculus acris*-type, Asteraceae sect. Cichorioideae and A. sect. Asteroideae. The indicator species for mown meadows in southwestern Norway, *Gentiana pneumonanthe*-type (here probably *G. purpurea*) is also recorded.
- LPAZ H4c: There is a decrease in pollen types indicative of grazing and mowing, while there is a peak in *Sphagnum* spores and spores from coprophilous fungi, Sordariaceae and *Sporomiella*.

At Breidastølen, the following pre-shieling phases indicate human impact in the area:

- LPAZ B3 + B4: Sporadic use of the area for grazing (*Plantago lanceolata*) is recorded from 4750±80 BP (3662-3364 BC), the Early Neolithic (EN). The site was forested by *Alnus* and *Betula* with peaks in pollen from species usually found in subalpine birch forests, such as *Potentilla* type, *Trientalis* and *Melampyrum*. Increase in AP (LPAZ B4) is recorded between 3600 ±70 BP (BC 2060-1900) and 2540 ±80 BP (BC 810-550).
- LPAZ B5: From c. 500 BC, AP decreases from 50 % to 30 %, indicating forest clearance. There is a rise in anthropogenic indicators seen by continuous curves for *Plantago lanceolata* and *Artemisia* and a rise in microscopic charcoal.

Shieling phases:

- LPAZ B6a: At the transition between the Merovingian Period and the Viking Age, pollen from grazing indicators such as Poaceae, *Plantago lanceolata*, *Artemisia*, *Chenopodiaceae* and *Rumex acetosa*-type as well as pollen from meadow plants like Asteraceae sect. Asteroideae, *Geum*-type, *Thalictrum* and *Ranunculus acris*-type increase together with a rise in the curve for microscopic charcoal. A single grain of *Avena* pollen is recorded at Breidastølen 1200 ±70 BP (AD 675-975).
- LPAZ B6b: Pollen from taxa associated with mowing is recorded; like Asteraceae sect. Cichorioideae and *Gentiana pneumonanthe*-type.

Høg-Jæren Plateau (H-J P)

Archaeological and ethnological data set

Ruins of three separate shielings are recorded in the Aniksdal valley system (Figures 3 and 9, Table 1), although these have not been used within living memory.

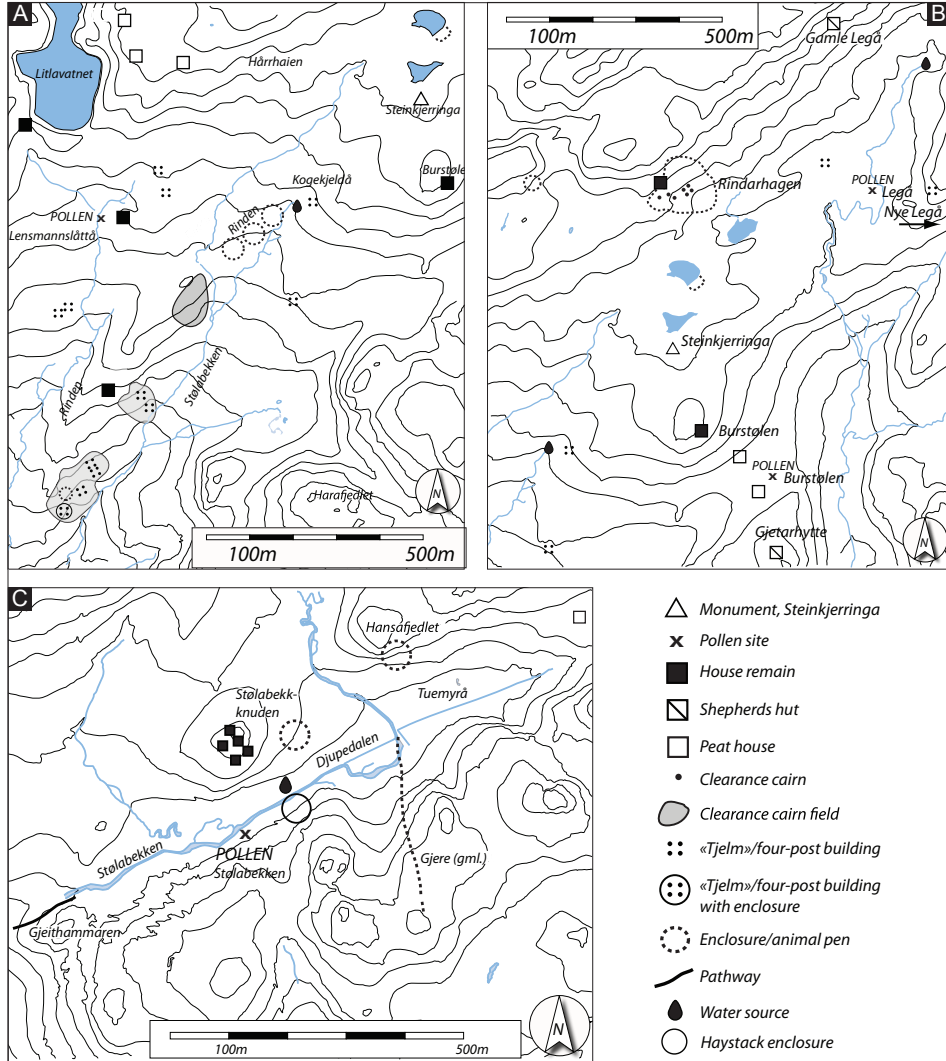


Figure 9. Close up of the separate shielings and shieling zones and the distribution of cultural remains at the Høg-Jæren Plateau; a) The shieling zone at Rinden; b) The farm complex Rindarhagen and the intertwined shieling Burstølen; c) The shieling at Stølabekk-knuden (from Prøsch-Danielsen et al. 2020).

The farm Aniksdal included several farm holdings. Today, sheep graze in the outfields, cattle in the infields and young cattle in both. One holding keeps up to 300 pigs. Shepherds (children) were used until AD 1910, a practice that is visible in today's landscape as a series of small rock

shelters and shepherds' huts situated in the upper valley system, 3-5 km from the 'home' farm. Two of these have been dated to 160 ±35 BP (AD 1664-1912) and 70 ±30 BP (AD 1691-1924, 70 % within AD 1810-1919) (Prøsch-Danielsen *et al.* 2020).

Aniksdal's advantage, compared to other farms in low-lying Jæren, is its large outfield areas. Historical evidence from AD 1667 documents that farmers from coastal farms rented strips of fields in the Engjane outfields (Næss 1986). In AD 1723, the farm's livestock comprised 8 horses, 34 cattle and 32 sheep. Many horses were needed for transport of resources from the outfields: hay for fodder, as well as peat and twigs of heather for fuel. Outfields were common land and joint resources prior to the AD 1860-1890s. In AD 1912, the Engjane outfield areas with hayfields and peat rights were regulated (Prøsch-Danielsen and Fyllingsnes 2013). The heath vegetation has been regularly burnt, and grassland mowed up to AD 1950 in a rotation system. Only one of the local farmers can recall hay being stacked, in AD 1935. After AD 1950, hay was dried on the ground and later brought back home using horses and wagons. Today the Engjane area is used partly for grass cultivation, and since 1980 hay has been stored in round bales. The modern infields at Foren and Bumarka have been fenced in since the 1850s.

Most of the prehistoric farms and cultural monuments in the lower part of the Aniksdal valley and in the valley system southeast of the H-J P, can be traced to the Iron Age (askeladden.ra.no). The oldest farm complex at Aniksdal, Kvednabrådet, is dated to 2190 ±90 BP (406 BC-AD 8) and 2150 ±80 BP (389 BC-AD 9), which indicates a date within the Pre-Roman Iron Age. However, plough marks have been found underlying the Iron Age occupation surface, indicating that the site was settled prior to this (A. Lillehammer and Andreassen 1974). This is also suggested by pollen analysis from the infields (Prøsch-Danielsen *et al.* 2020). A relief brooch and a cruciform brooch date a group of burial mounds in the infield to the Migration Period (c. AD 400-550) (Kristoffersen 2000) and indicate that the farm was in use throughout the Iron Age. Only one find, a single-edged sword, is dated to the Viking Age, c. AD 800-900 (Petersen 1919). No finds or cultural remains from the Medieval Period have been identified in the infield, and it is likely that these underlie the modern farm buildings. However, there are many medieval finds in the Engjane outfields.

Some of the house ruins in the outfields may have had different functions at different times, as shielings, cowsheds, or barns. The three shielings of Rinden, Burstølen and Stølabekk-knuden represent different periods, and only the youngest one comprises several buildings (Table 1, Figure 9c). None of the shielings or their curtilage is fenced in.

The oldest ruin, at Rinden (Figure 9a), is separated into two rooms that probably represent multiple periods. Test trenches did not uncover any artefacts or charcoal layers. Three larger stones inside the upper room indicate that this could not have functioned as living quarters. The building probably served as storage for fodder or it may simply have functioned as a shed for the livestock (Wankel 2010). A nearby group of clearance cairns has been dated to the Roman Iron Age (see Table 2a). Four animal pens and a haystack enclosure are also recorded. The undated animal pens are either earthworks or stone-built, all with an opening downslope. There is also a group of four-post buildings (tjelm, see definition below) along Rinden, one situated within a haystack enclosure.

The Rindarhagen farm complex is situated in the upper Aniksdal valley. The remains (two houses) were destroyed in AD 1960 (Figure 9b). Clearance cairns, a row of stones at the edge of a field and the farm's stock passage and enclosure still exist. The infield area covered 10,700 m². Outside the farm's enclosure there is a 420 m² animal pen with usage dated to the Viking Age/Medieval Period, 920 ±25 BP (AD 1030-1167) and 645 ±25 BP (AD 1283-1394). The tax lists show that Rindarhagen was abandoned before AD 1520 (Fyllingsnes 2013, p. 116). The Burstølen shieling, 600 m south of Rindarhagen, is dated to 780 ±35 BP (AD 1190-1283) and comprised a small fence attached to a single house. From here, there is access to fertile meadows towards the Onsidalen valley and to a larger mire complex known as Legå. Several ruins of four-post buildings (*tjelm*) are found close to Burstølen.

The shieling at Stølabekk-knuden comprised a group of five buildings and two animal pens (Figure 9c). The sizes of the ruins (3 in all) suggest they served as living quarters. Two buildings were smaller and could have been used for storage. One of the houses is dated to 225 ±30 BP (AD 1640-1931), but the period of use must have been prior to the late 19th century, as there is no living memory of its use. One larger and one smaller enclosure (earthworks) for keeping haystacks are recorded close by.

Hay storage

At H-J P, three categories of haystacks are recorded (Prøsch-Danielsen and Fyllingsnes 2013). The simplest ones are single-pole haystack bases found in the Engjane outfield. The largest group (20 in all) is the four-post buildings called *tjelm* (Lillehammer 2004, pp. 135-137). Four piles were raised in a square 2.7-2.8 m apart, each pile with a base of stones. The hay was stacked on a pole in the middle and then the *tjelm* was sealed by a roof made of rye or sedges to protect the haystack from rainfall (Figure 10). All examples are recorded in the Engjane outfield. In Aniksdal only the four stony bases are recorded.



Figure 10. Four-post building (*tjelm*) from Råneheia in Hå, 1926. Photo: Ingjald Mehus, copyright Dalane folkemuseum.

Haystacks with an outer enclosure are called *stakktuft*. The enclosures might be built of stones, as earthworks or a combination of both. Five are found in Bumarka or the lower part of the Engjane outfield.

Only one ruin of a barn for storing hay is recorded in the Engjane outfield. It measures 6 x 6 m and is of a western Norwegian type that can be dated to the late 19th or early 20th century. Just outside the entrance, several single-pole haystacks bases have been observed.

Pollen data set

One pollen diagram from Legå, approximately 500 m from the shieling at Burstølen, will be presented (Figures 9b and 11). Five other pollen diagrams from the 'home' farm and the outfield are described in Prøsch-Danielsen *et al.* (2020).

Pre-shieling phase at Legå indicating human impact in the area:

- LPAZ L3: The lower boundary is dated to 3080 ±30 BP (1418-1208 BC). AP drops from 70 % to 40 %; this is especially visible in the curve for *Abnus*. Grassland taxa like *Rumex acetosa*-type, *Ranunculus acris*-type, *Valeriana*, *Circium* and other species included in the genus Asteraceae, Rubiaceae, *Lychnis*-type and Cyperaceae increase. A few pollen grains of *Plantago lanceolata* and *Succisa* were also identified. At the transition between the subzones LPAZ 3A and 3B, estimated to c. 500 BC, the number of herb taxa decreases. Grasses and the content of microscopic charcoal increase.

Shieling phases:

- LPAZ L4a: The lower boundary is dated to 1100 ±30 (AD 889-1013). AP is below 20 %. There is a sudden increase in microscopic charcoal reaching a peak at 80 %. The LPAZ is characterized by grassland and meadow taxa such as Poaceae, Cyperaceae, *Ranunculus acris*-type and *Potentilla* type and coprophilous fungal spores of Sordariaceae are present from the onset. The number of herb pollen increases and comprises taxa such as species in the genus Asteraceae, *Achillea*, *Pedicularis*, *Vicia cracca*, *Succisa*, *Plantago lanceolata* and Brassicaceae. A single grain of *Hordeum* pollen is also recorded.
- LPAZ L4b: The content of microscopic charcoal drops from 80 % to 35 %. This event is dated to 250 ±30 BP (AD 1521-1800). There is a peak in Poaceae, *Rumex acetosa*, *Plantago lanceolata*, *Urtica*-type and in the coprophilous fungi spores of Sordariaceae.

Discussion and conclusion

In the following, the shieling management strategy will be discussed from the two separate areas in Rogaland and then compared with the shieling practice in Iceland and Greenland.

Tengesdal-Lingvang watercourse (T-L W)

The earliest farms on the west side of the mountainous massif were settled at the transition between the Late Bronze Age and the Pre-Roman Iron Age, c. 500 BC. This early influence is recorded in all pollen diagrams in the T-L W shieling zone (Breidastølen, Holmane, Kyrkjestølen, Kvannvatn, Finnabu) c. 500 BC, by continuous curves for *Plantago lanceolata* and a rise in microscopic charcoal (Prøsch-Danielsen 1990). This corresponds fairly well with other western Norwegian outfield studies (Kvamme *et al.* 1992, Moe 1996, Stene 2015). It coincides with the development of the rigid infield-outfield agrarian system, with an increased need to obtain manure for the permanent fields and enough fodder to overwinter livestock. To solve these problems, outfields were used for summer pastures.

Initial expansions in western Norwegian shieling zones are often followed by new expansions in the first century AD (Magnus 1986, Kvamme 1988, Moe 1996, Skrede 2005, Hope 2016). This is only recorded in our study area in the pollen diagram from the Holmane shieling by records of pollen taxa associated with grassland followed by an increase in microscopic charcoal and coprophilous fungi spores and is dated to 1490 ±30 BP (AD 436-644), the Migration Period. It is suggested that Holmane had served as a summer farm from this time.

The main expansion seems to occur in the Viking Age/Early Medieval Period and is called the 'Andre Landnám'/ 'Inner Colonization' (Pedersen 1982, Høgestøl and Prøsch-Danielsen 1986, Loftsgarden 2017). The farms in our study facing Hylsfjorden were settled in this period.

The 'Inner Colonization' is expressed in the T-L W shieling zone as diagnostic stray finds of a whetstone and ceramics, and by an increase in pastoral pollen indicators, grass (Poaceae) and pollen taxa indicative of meadows, like *Plantago lanceolata*, *Rumex acetosa*-type, *Ranunculus acris*-type and Asteraceae sect. Cichorioidea (Hjelle 1999). This rise, recorded in the pollen diagrams from Holmane and Breidastølen, may represent the start of mowing at the shielings. The finds of clearance cairns at several of the shielings in the T-L W also imply that the curtilage was cleared of stones to allow grazing and hay production. Of interest here is the fact that, in Icelandic, the noun *breiða* may be related either to something that is distributed widely, or to fertile meadows that were ideal for mowing sedge or hay, and that the farm Breiðabólstaðr was the first farm settled in the Reykholt valley due to its attractive fertile plains (Þorláksson 2011, pp. 213-214).

This period was, climatically, the most favourable epoch of the Middle Ages in the fjord district, and was followed by a period of climatic decline (Selsing *et al.* 1991). Single pollen grains of cereals are recorded in the pollen diagrams from the studied shielings. In the shieling zone at Hamrabø, further east, there are also finds of clearance cairns and cereal pollen combined with a high content of microscopic charcoal, but these have been interpreted as a permanent settlement within the time period AD 980-1050 (Selsing *et al.* 1991). Nevertheless, the presence of cereal pollen in the T-L W indicates a close contact between the lowland farms and the uplands, and probably represent the earliest use of shielings in a more permanent multi-altitude system.

The Black Death (starting AD 1350) caused a population decline in the inner part of Ryfylke that took about 200 years to recover from, and farms and shielings were abandoned (Pedersen 1982). This hiatus is not immediately obvious in the pollen diagrams, but level 35 cm (LPAZ H4a) at Holmane might point in that direction. This could probably have been clarified by counting several spectra around this level.

A new expansion occurs in the Post-Medieval Period when the population growth increases to the same level as before the Black Death. In the pollen diagrams this period is recorded in LPAZ H4b from Holmane (estimated from AD 1600 to AD 1850) and in LPAZ B6b from Breidastølen. In both pollen diagrams there are pronounced records of pollen taxa representing both grazed areas and meadow plants associated with haymaking.

The greatest population growth occurred during the first half of the 19th century, which peaked and then began decreasing just before AD 1900 (Pedersen 1982, p. 19). According to written sources, the changes in population are mirrored in the exploitation of outfield resources, and the re-use of shielings arrived relatively late in Ryfylke, from c. AD 1760s (Pedersen 1982, p. 72). The most intensive period of use is in the time interval between AD 1800 and AD 1850. After AD 1850, all farms had access to one or several summer farms (Pedersen 1982, p. 34).

The distance from the 'home' farm to the shieling(s) was not great, but the steep fjord landscape (up to 650 m in height) made it impossible to transport the milk home every day, so dairy products were processed at the shieling and brought home later. This is particularly clear in the goat breeding period from AD 1920-30, where several of the shielings had separate houses for milk processing and storage, as well as pools for cooling. These shielings are all situated in subalpine birch forest with access to fuel. In the late 19th century, farmers focused on meat production to minimize the need for milking, as the inner part of Ryfylke was far from the market for dairy products (Pedersen 1982, p. 78). This reorganization of work may be recorded in LPAZ H4c from Holmane, which shows a peak in coprophilous fungi spores in the upper part of the pollen diagram and a drop in pollen taxa associated with meadow plants and haymaking.

Winter fodder was necessary for breeding livestock, and farmers steadily expanded upwards to meet this need. Nearly every small patch of mire, grassland or meadow was mown. Some of the shielings that are situated in the lower subalpine birch forest may have been used in springtime for haymaking as a supplement to the main shieling, e.g., Litlestølen and Hedlestølen for Tengesdalsstølen (Jacobsen and Hoel 1984). The capacity of the infields at the permanent farm was limited, and the farmers compensated by utilizing the most remote areas in the valley system throughout the summer season in a rotation system, e.g., at Selland, which had as many as eight summer shielings. Hayfields were mown each second or third year. A corresponding rotation system with multiple shielings has also been recorded in the Hamrabø shieling zone further to the east (Hoel and Jacobsen 1983).

In the Viking/Medieval Period the shieling zone was owned jointly, as described in the Gulating Law (c. AD 1100) and Magnus Lagabøte's Law (AD 1274). Ownership of the shielings was gained through continuous occupation over a certain period and was geographically framed by the natural watercourses, rivers, lakes, and mountains. It is unknown when private ownership became a reality in the T-L W, but ownership of shielings is reported from other western

Norwegian upland sites from the mid-19th century (Potthoff 2005, p. 81). The fencing-in of separate 'properties' seems to be a relatively new phenomenon. However, curtilages and hay meadows were sectioned off with fences to prevent the livestock from gaining access to the winter fodder, and most haystacks were fenced in. The stacked and dried hay was brought home during winter on sledges.

In the T-L W, the shielings were primarily used for haymaking, with dairying as a secondary practice. The use of shielings for haymaking has roots in the transition between the Viking Age and the Early Medieval Period. Haystack enclosures and single haystack poles primarily coincide with the curtilages and fenced-in areas. This leads us to believe that stacking is a relatively new phenomenon in the T-L W, probably postdating AD 1600-1760.

Høg-Jæren Plateau (H-J P)

Høg-Jæren held a central position for coastal people who utilized resources seasonally beginning in the Mesolithic (Bang-Andersen 1979). Transhumance is seen already by 2500 BC, with increases in activity at c. 1300 BC and c. 200 BC. This is c. 1000 years earlier than is recorded at the T-L W. The landscape was steadily transformed to a heath- and grassland by intentional fire management, where tree and shrub cover was reduced to 20 % around the turn of the first millennium, and 10 % by the transition between the Viking Age and Early Medieval Period (Prøsch-Danielsen *et al.* 2020).

A pollen diagram from the infield area Foren in Aniksdal shows that the 'home' farm in the valley floor was established in the Early Bronze Age, 3050 ±30 BP (1401-1226 BC) (Prøsch-Danielsen *et al.* 2020). This corresponds with the earliest records of pollen taxa associated with grassland and with an increase in microscopic charcoal at the Legå site in Aniksdal. This confirms that the first farmers in Aniksdal also used the outfields in Engjane for grassland (Prøsch-Danielsen *et al.* 2020).

The use of shielings can be dated to c. AD 1, with subsequent use at the transition between the Viking Age and Early Medieval period, and in the period AD 1600-1700. At the H-J P, the three shielings do not overlap in time and thus do not occur in a multiple-altitude system as in the T-L W.

The oldest shieling at Rinden is complex, with several structures probably used over several periods, with a clearance cairn dated to c. AD 100 as the starting point (Table 2b). This coincides with the farm complex Kvednabråde further down the valley system and with the development of the rigid infield-outfield system mentioned earlier. The groups of clearance cairns at Rinden show that the marginal moraine was cleared of stones to improve grassland/meadows and to increase outfield pastures. Rinden may, therefore, represent the earliest shieling zone used by the farmers in the Aniksdal valley in the yearly transhumance cycle. The building at Rinden may have served as a milking shed, hay storage or as a shed for the livestock, with a base at the 'home' farm 3-4 km downslope. This may also be the case for the building's youngest phase, which had an additional room upslope (Prøsch-Danielsen *et al.* 2020).

The three earthwork animal pens at Rinden belong to a period with extensive use of shepherds, probably younger than Roman Iron Age. Similar earthworks or sheepfolds are encountered in Iceland (Bruun 1928), in the Faroe Islands (Arge 2005, p. 70) as well as in Eastern Greenland.

However, in Greenland, the Norse ruins are interpreted as sheep and/or goat pens that served to round up free-roaming animals (Madsen 2019, pp. 136-137). At the H-J P these animal pens have also been used for shearing wool, a tradition that was maintained up to the Second World War at Ualand, the farm next to Aniksdal (Agnes Ualand, pers. comm.). The four-post buildings (*tjelm*) at Rinden most likely post-dates the Pre-Roman Iron Age.

The Burstølen shieling is dated to the Viking Age/Early Medieval Period and may be considered as a home-shieling closely intertwined with the farm complex at Rindarhagen (250 m asl) and with the animal pen in-between. Milk could be processed at the farm, using peat for fuel in this heath- and grassland area. At Rindarhagen, all criteria for a year-round occupation are present (Myhre 1978, p. 258): arable land, livestock and probable hunting/fishing near Storamos. So, Rindarhagen represents an independent production unit on the margins of a larger agrarian system (see discussion in Lillehammer 2007, p. 167, model 3), dated to the Medieval Period. Several smaller buildings close to known pathways suggest increased activity in the Medieval Period (Prøsch-Danielsen and Fyllingsnes 2013).

The building at Burstølen has probably been used as storage, either for food or for hay. The utilization of meadows for haymaking in the outfield is documented continuously in the pollen diagram from Legå in LPAZ L4a, covering the time period between 1100 ±30 (AD 889-1013) and 250 ±30 BP (AD 1521-1800), even after the nearby Rindarhagen farm was abandoned (before AD 1520). At this stage, the grassland was included in the common land again.

The youngest shieling at Stølabekk-knuden is a home-shieling, closely intertwined with the farm holdings at Aniksdal just two km distant. It is dated to the Post-Medieval Period but was probably only in use in the Early Modern Period (1600s or 1700s), as its use is out of living memory. Milk could be brought back home every day for further processing. The fact that Stølabekk-knuden is situated close to the favourable grass and meadows Gimrahodl, Finnarvodl, Sædhodl and Teigdugane, illustrates that there was a focus on haymaking in the daily work at the shieling. This is also verified by finds of enclosed haystacks nearby. As opposed to the T-L W, the studied curtilages, grassland and hay meadows were not fenced in. This implies that outfields were common land and is an argument for occupation of the shieling at Stølabekk-knuden prior to AD 1860-1890, when the outfield areas were regulated.

Access to winter fodder was never a concern. Aniksdal had several advantages: a gentle gradient from the lowlands to the upper plateau, trackways on natural features that facilitated transport by horse (documented from AD 1723), and a varied and patchy vegetation with grasses and meadows, mires and heathland covering c. 80-90 % of the valley floor. When burnt, heathland could be grazed throughout the year in this snow poor part of the country. These advantages created a surplus. The farmers at the coast were welcomed to rent hay meadows and strips for peat-cutting in the Engjane outfields at least from AD 1667.

Stacking of hay by using single-pole haystacks or four-post building (*tjelm*) was practiced up to 1970 in the uplands east of the H-J P (Figure 10, Øyri 2000, p. 33). One interviewer remembered a haystack set up in AD 1935. The fact that the haystacks are constructed without a protective enclosure most likely indicates that these forms of hay storage are from a period of renewed transhumance and controlled herding, also seen in a series of shepherd huts in the

upper part of the Engjane outfields. Charcoal layers from firepits in the ruined huts date this herding to the Post-Medieval Period (AD 1660-1920), a period of population recovery after the Black Death, when the use of outfield resources once again became essential for the farmers' survival. It seems that stacking using single-pole haystacks and four-post buildings (*tjelm*) is a post-Medieval phenomenon. On the other hand, five examples of enclosed haystacks are situated within the infield area, close to an old fence system at the border between Bumarka and Engjane. This fence system might have roots in the Iron Age/Medieval Period, separating the farmland within the fence (*innan garðs*) from the outfields (*utan garðs*) (Øye 2005, pp. 10-11). These haystacks could represent a period without herding going back to the Viking Age/Early Medieval Period.

These types of haystacks must not be mixed up with the earthen enclosures called *alvedanser* recorded at the low-lying parts of Jæren (Lillehammer and Prøsch-Danielsen 2001, Prøsch-Danielsen 2001, Lillehammer 2004). *Alvedanser* comprise an enclosure and a ditch and served as bases for haystacks, dating at the earliest to AD 410-450 and AD 670-900 (Lillehammer 2007, p. 168). These two traditions meet at the Høg-Jæren escarpment, though with a time lag of c. 600-700 years.

The two shieling zones investigated here differ in many ways: altitude, access from the 'home' farm, human impact and forest clearance, and the utilization of grass pastures and hay meadow resources in the outfield over time. One common characteristic is that the 'home' farms had low infield capacity, but large outfield resources. In addition, fodder and the use of shielings were key elements of the farmers' survival strategy at least from the Viking Age/Early Medieval Period, and perhaps already from the Pre-Roman Iron Age/Roman Iron Age transition at the H-J P, as seen by clearing of the Rinden shieling zone. The use of haystacks is mainly a post-Medieval phenomenon in both areas, but probably with roots in the Viking Age and Early Medieval Period in the Aniksdal valley. At Jæren, stacking of hay is built on years of traditions in the use of *alvedanser*.

Does a practice of haymaking shielings have parallels in Iceland and Greenland?

The Norwegian three-partition shieling model by Reinton (1955) has been included in studies from Iceland and Eastern Greenland (Albrethsen and Keller 1986, Sveinbjarnardóttir 1991, p. 91, Ledger *et al.* 2013), but Sveinbjarnardóttir pointed out that this rigid model did not fit into the Icelandic system. The Norwegian model made in the 1950s is probably based on shieling practices in the post-Medieval Period from AD 1600-1850. According to Sandnes (1991, pp. 219-220), 'this is also the period when 'Real', or ethnographical shielings, in the historical known sense, are established'.

The use of shielings was practiced from the onset of the Landnám period, AD 872, in Iceland. This is documented in many studies (e.g. Sveinbjarnardóttir 1991, Lucas 2008, Brown *et al.* 2012). According to Thompson and Simpson (2007, p. 152), 'the Icelandic agricultural system of sedentary pastoralism remained virtually unchanged through much of the Icelandic history'. In the 19th century the shieling system was slowly dying out (Vésteinsson pers. comm.).

The Norse met a new set of challenges related to their subarctic location, with a harsh climate and sparse or no tree cover. They occupied the valley floor grassland in the coastal areas, which

provided rich pastures in springtime and sufficient fodder to overwinter the stalled animals later in the season. In addition, the farmers had ready access to marine resources (Byock *et al.* 2005, p. 204). The resources in the infield were relieved by using the shieling zone or the common highland (*afriéttur*) for livestock grazing in the summer season.

The use of shielings as part of a decentralized farming economy is also confirmed in the Icelandic sagas, the Grágás lawbook (AD 930-1262/4) and in the Icelandic Jónsbók lawbook of AD 1281, where the word *sel* (Icelandic for shieling) is mentioned as a grazing field. Also, the periodic use of the shielings is highly regulated (Jónsbók, 172), as well as the use of *engi* (meadows) (Hastrup 1989). However, stacking is not mentioned. *Heimavinnu* (housework) and *heyvinnu* (hay-work) are first mentioned as part of the maid's daily work in the household law of the 17th century (Hastrup 1989). Folds or animal pens are found at several of the Viking Age to Medieval Period shielings studied, but no haystack bases or haystack enclosures are reported. In only one shieling study, from Pálstóftir (starting point, AD 950 ±2) in Eastern Iceland, has decomposed hay/grass been identified in a small storage cell tied to the living quarter (Lucas 2008). Together with the find of an animal pen, this illustrates traditional shieling practices.

According to Orri Vésteinsson (pers. comm., Dec. 2020),

Haymaking was not an integral part of the shieling system as we know it from ethnographic accounts. The pastures around the shielings were so heavily grazed that there would not be much grass left to be mown. A large number of haystacks, especially in northern Iceland, are found in the outfield close to where the hay was mowed for easier transport during the winter. Hence, the location of the haystacks is dictated by the logistics of transport from meadow to farm and any connection to shielings would be incidental. Even if haymaking was a part of the shieling function, the haystacks providing evidence for this practice would unlikely be found on the shieling site itself.

In Greenland the Norse settlement is dated to c. AD 985 and a practice with shieling activity is recorded shortly after at AD 1050-1150 in the southern part (Ledger *et al.* 2013). In the first phases at the 'Mountain Farm' Vatnahverfi, the plant communities seem to have been burnt to create grassland and good pastures. The palynological signature with high values of Poaceae, a rise in microscopic charcoal and coprophilous fungal spores is used as evidences for a full shieling. In the time interval between AD 1225-1325 the management was intensified to create hayfields (Ledger *et al.* 2013, pp. 815-816). Here Ledger *et al.* (2013, p. 819) use the presence of high values of Poaceae and *Ranunculus acris*-type pollen as the palynological signatures for haymaking. The authors, however, do not go to the step of calling this a haymaking shieling. Their assumption is that hay production reflects the spread of settlement from the lowland valley into the mountain, or reflects a full farm when population pressure increased (Ledger *et al.* 2013, pp. 819-820). Albrethsen and Keller (1986, pp. 96-101), on the other hand, classify several ruins belonging to the 'Eastern settlement' in Greenland as haymaking shielings. Their criterion is that the ruin group should consist of one or more barns placed on terrain where access is difficult and/or in places with good but limited grass areas. However, the archival material in this study is unclear. Currently, there is no archaeological evidence for hay stacking in Greenland.

The study from south and southwestern Greenland by Madsen (2019) distinguishes between two types of shielings: the marine shielings with a non-farming functionality focusing on marine resources, and the terrestrial shielings associated with agropastoral transhumance. Here the definition used for shieling is a seasonal, task-specific production or logistic site.

As seen from this study, there are local adaptations in shieling practices and in spatial organization within the Norwegian shielings and in the shielings across the North Atlantic region. Several models have been demonstrated, encompassing local environmental conditions, from lowland to highland transhumance in Norway to a more horizontal transhumance along fjord coasts in Greenland. There is no doubt that haymaking was practiced in the shieling zones throughout the North Atlantic region, as hay (winter fodder) was essential for the survival of the livestock, but of course there seems to be a delay westward in the North Atlantic due to the arrival of the Norse settlers first in the Viking Age/Medieval Period. Currently, the storing of hay in the shieling zone is only recorded from Norway and Iceland.

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From the 9th century AD onwards, Norse migration resulted in the spread across the North Atlantic of cultural traits originating in Norway. The challenging landscapes of this region rewarded resilience and adaptability, evidenced by complex subsistence strategies incorporating the exploitation of a variety of outfield resources. However, differing methodologies and approaches across the region have limited the extent to which the connections between western Norway and the North Atlantic have been explored in archaeological research. The Expanding Horizons project brought together junior and senior practitioners in archaeology and related fields, from both within and outside of academia, to address this. The papers in this volume present case studies of outfield resource use and its impact on settlement patterns, placed in the wider context of Norse settlement and subsistence across the North Atlantic.

