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The importance of Norwegian agriculture for the cultural landscape

A sub-project under the Ministry of Agriculture's evaluation programme on multifunctional agriculture

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Preface

The World Trade Organization (WTO) will initiate negotiations on the further liberalization of the global trade with agricultural commodities by the end of 1999. These negotiations are based on Article 20 of the Uruguay Round's Agreement on Agriculture, which states, *inter alia*, that the reform process is to be continued, with the long-term objective of substantial and progressive reductions in the support and protection of the agricultural sector. In this context, however, a number of issues are to be taken into consideration, including the so-called non-trade concerns.

The Norwegian authorities have started preparations for the new round of WTO negotiations, and have placed substantial emphasis on the non-trade concerns. Norwegian agriculture is regarded as being a "producer" of more than just food and fibres, for example, national food security, viable rural areas and environmental benefits. The term "Multifunctional Agriculture" is being increasingly applied to describe these additional functions.

In the summer/fall of 1998, the Norwegian Ministry of Agriculture initialized an evaluation program in order to survey and analyse a number of issues in relation to "multifunctional agriculture". The present report is one of the contributions in this context, with the emphasis on agriculture as a provider of cultural landscapes.

This has been a co-project between Norwegian Institute of Land Inventory (NIJOS) and Norwegian Agricultural Economics Research Institute (NILF). The first part of the report, which deals with the classification of Norwegian cultural landscapes, has been the main responsibility of NIJOS (chapter 2.1–2.3). NILF has written chapter 2.4–2.6, based on NIJOS' data. NILF is also responsible for the report's second part, which deals with policy instruments (chapter 3).

Nils Kristian Nersten, NILF, has been project coordinator for the project as a whole, while Oskar Puschmann, NIJOS, has been in command of NIJOS' part of the work. In addition, Johnny Hofsten (NIJOS), Anne Elgersma (NIJOS), Grete Stokstad (NILF) and Runhild Gudem (NILF) has been important contributors in the writing of this report. The maps has been prepared by Roar Lågbu (NIJOS). Siri Fauske was responsible for the final lay out of the manuscript. The report was translated from Norwegian by Karl Kerner.

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Director

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1 Introduction

The World Trade Organization (WTO) will initiate negotiations on the further liberalization of the global trade with agricultural commodities by the end of 1999. These negotiations are based on Article 20 of the Uruguay Round's Agreement on Agriculture, which states, *inter alia*, that the reform process is to be continued, with the long-term objective of substantial and progressive reductions in the support and protection of the agricultural sector. In this context, however, a number of issues are to be taken into consideration, including the so-called non-trade concerns.

The Norwegian authorities have started preparations for the new round of WTO negotiations, and have placed substantial emphasis on the non-trade concerns. Norwegian agriculture is regarded as being a "producer" of more than just food and fibres, for example, national food security, viable rural areas and environmental benefits. The term "Multifunctional Agriculture" is being increasingly applied to describe these additional functions[1]. With regard to Norwegian agriculture, it will be of major importance for Norway that sufficient consideration is given to the non-trade and other concerns during the next round of the WTO negotiations.

In the summer/fall of 1998, the Norwegian Ministry of Agriculture initialized an evaluation program in order to survey and analyse a number of issues in relation to "multifunctional agriculture". The present report is one of the contributions in this context.

[1] The economic terms "public goods" and "positive/negative externalities" are often used to designate agriculture's additional functions (multifunctionality). As opposed to marketable "private goods" such as agricultural products, public goods are non-excludable, that is, their enjoyment by one person does not detract from another's enjoyment of the same good. The cultural landscape is one example hereof.

1.1 Objectives

This project was based on the following objectives:

Objective 1: Analyse agriculture's role in maintaining viable cultural landscapes.

Objective 2: Analyse to what degree public supportive and protective measures are necessary to ensure that Norwegian agriculture can maintain (and develop) the cultural landscape. Evaluate to what degree non-product-specific support is necessary in this sense.

The first part of the report thus attempts to *document* to what degree agriculture produces public goods/positive externalities in the form of cultural landscapes. The basis for this analysis is the landscape classification system developed by Norwegian Institute of Land Inventory (NIJOS), which makes use of various database systems in order to integrate administrative data with digital mapping data (LGIS).

The second part deals with the *use of policy measures*. Different kinds of already existing and possible new relevant measures are evaluated.

It must be emphasized that the project did not attempt to elaborately carry out analyses of valuation in this connection. Furthermore, we did not in any way attempt to calculate the level of support considered to be representative of the population's willingness to maintain the cultural landscapes. This is an extremely comprehensive and complex field, which could not be dealt with in depth due to the project's financial and time limitations.

2 Cultural landscape and Norwegian agriculture

2.1 The cultural landscape and its values

In addition to its primary function of producing food, agriculture contributes to the creation and maintenance of a varied and valuable cultural landscape.

The concept of *cultural landscape* is quite broad, and includes numerous fields. Michael Jones of the Department of Geography in Trondheim (Jones 1989) has analysed how various user groups interpret the meaning of the concept of cultural landscape, and arrived at the following main divisions:

1. The cultural landscape is any landscape formed or influenced by humans.
2. The cultural landscape can be regarded as valuable features or elements in man-made landscapes that are endangered.
3. The cultural landscape can be regarded as landscape elements of importance for a group of people or in a certain cultural or socio-economic context.

Definition 1 is extremely general and includes more or less everything. Often, the use of the term cultural landscape is limited to certain parts of landscapes under human influence. One usually distinguishes between the agrarian and the urban cultural landscape (Norderhaug 1988).

Definition 2 is based on *cultural landscape values or qualities* such as biological, cultural-historical and aesthetic values, to name a few. Definition 3 deals with the role of cultural landscape in developing personal and regional identity.

The agrarian cultural landscape includes ”areas under the influence of past and present farming activities – arable and surface cultivated land, pastures and grazing land with associated forest and field edges and residual areas. This includes intensively farmed areas, both small and large-scale, extensively cultivated areas, as well as abandoned and overgrown areas” (Ministry of Agriculture 1992).

Other definitions also emphasize that the agrarian cultural landscape includes productive farming areas, associated semi-natural areas and remnants of natural habitats, cultural monuments and areas that used to be farmland, but are now starting to become overgrown (Daugstad & Jones 1994).

2.2 Norwegian farming regions

In order to study and document the relationship between landscape and agriculture, Norway is divided into ten main cultural landscape regions (Elgersma & Bruun 1998), which more correctly can be designated as farming regions or farmscapes.

The ten farming regions defined in Norway are:

Region 1: Coastal districts of Southern Norway and Nordland
Region 2: Lowlands of Eastern and Central Norway
Region 3: Forested districts of Southern and Eastern Norway
Region 4: Valley and highland districts of Southern Norway
Region 5: Mountainous areas of Southern Norway
Region 6: Fjord districts of Western and Central Norway
Region 7: Forested districts of Northern Norway
Region 8: Fjord districts of Nordland and Troms
Region 9: Coastal districts of Troms and Finnmark
Region 10: Mountainous areas of Northern Norway

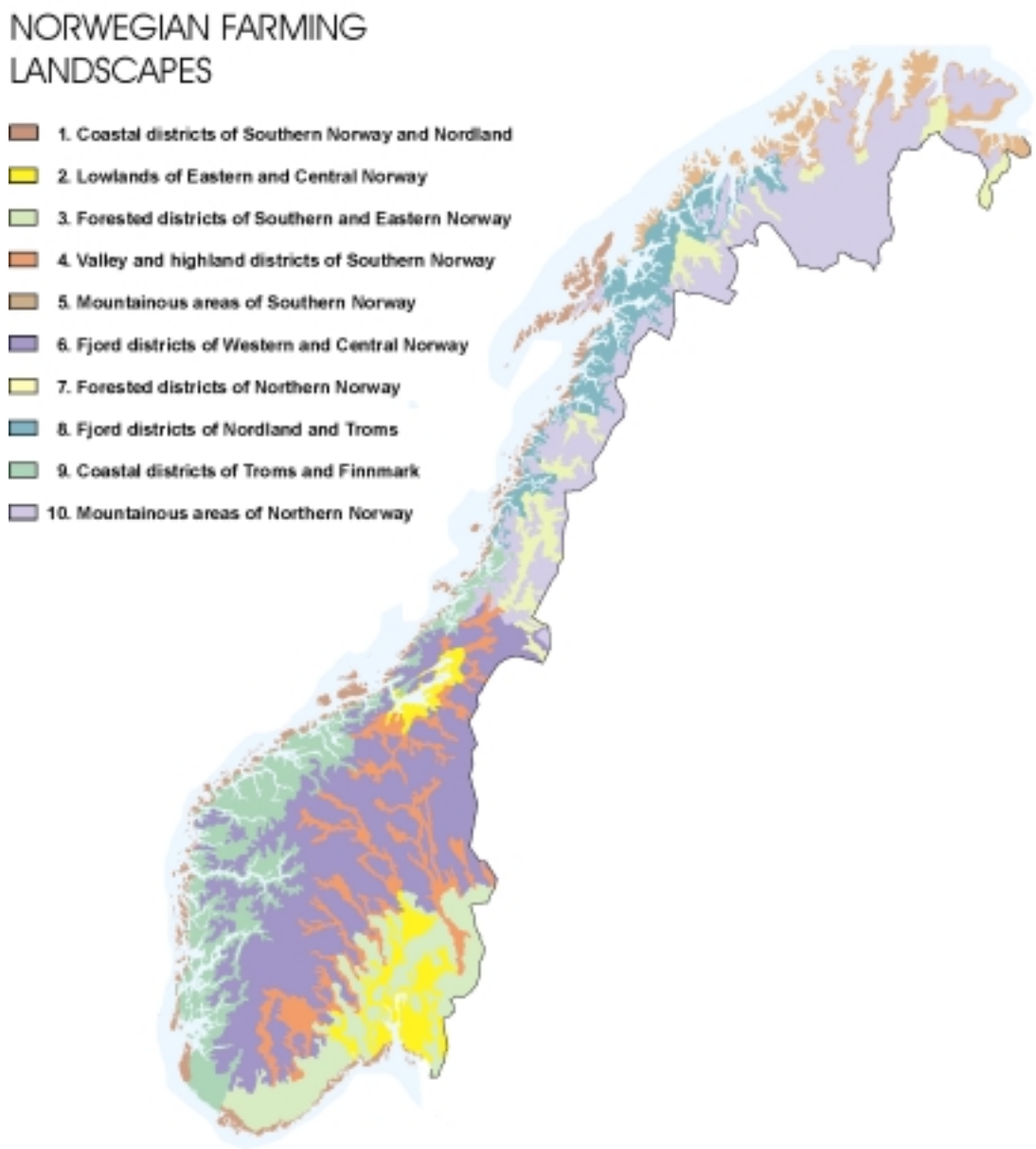


Figure 2.1 Norwegian farming landscapes (Elgersma & Bruun 1998), a classification emphasizing farming conditions in a number of major regions. The division is based on NIJOS' national reference system for landscapes

2.3 Norwegian farming landscapes

2.3.1 Methology and background

Since the concept of cultural landscape can be interpreted in many different ways, it is necessary to define and adapt the concept so that it is useful in practice.

In this project the term cultural landscape is only applied to agrarian cultural landscapes. In addition, the country has been roughly divided into different farming regions in order to give a better picture of the geographical distribution of the farming landscapes.

This division is based on the NIJOS project "National reference system for landscapes", which describes a hierarchical classification system that divides Norway into 45 landscape regions (Elgersma 1996). Based on these 45 regions, the country is further subdivided into 444 sub regions (at county level), which again can be subdivided into landscape areas (municipal level). The long-term objective of this national reference system is to learn more about the values existing in local landscapes and relating these to regional and national landscape values.

The Norwegian landscape classification is based on the "Visual Management System" by the US Forest Service. This analytical approach emphasizes the delimitation of the landscape's visual space. On the level of national landscape regions, landform is especially important for landscape classification. In addition, other natural and cultural features are described, e.g., geology, lakes and watercourses, vegetation, agricultural land, built-up areas and technical facilities. The links and the dynamics between these components are described in the presentation of the various regions' landscape character.

NIJOS has merged the 45 landscape regions of the national reference system into 10 major farming landscape regions. In contrast to the former classification, which is mainly based on landform, the latter division attempts to classify regions according to the predominating farming conditions. Thus, the natural landscape can vary considerably within a farming region, but the conditions for farming within each region are relatively uniform.

On the following pages, the 10 farming landscapes of Norway are presented in detail. The descriptions include data on various agricultural aspects which are taken from The Agricultural Subsidies Database (Statens kornforretning, 1996). The objective is to present the farm structure, status quo and challenges in the different regions. In the long run, these farming regions are to be used as a basis for a more accurate national management of agrarian cultural landscapes.

2.3.2 Region 1 – Coastal districts of Southern Norway and Nordland

The coastal region in southern Norway and in the county of Nordland is the least homogenous of the Norwegian farming regions, since the approximately 1,600 km long coastline has extremely diverse natural landscapes. The region covers about 4.6 % of the total Norwegian land area.

The *coastal districts of southern Norway and Nordland* (Region 1) varies between skerries, fjords and alpine landscapes, with countless small-scale formations such as headlands, inlets and sounds. A multitude of islands, rocks and skerries is also very characteristic, adding strongly to the distinct maritime feel of the region.

In southern Norway the coastline has a typically low coastal contour, with a rugged, small-scale topography. The landscape changes abruptly between bare skerries, lush rock crevices and small level areas. Moving north along the west coast, the coastline gradually takes on more distinct contours. In the northern part of the region, high mountains with snow-capped peaks rise straight up from the sea, often with nothing more than a narrow strip of sandy beach between the sea and the typical alpine landscape. A very typical element of the Norwegian coastline is bare rock, either as low skerries, coastal rock or mountains cliffs, interspersed with ravines and mountain shelves. In contrast, there are also some areas dominated by flat land forms, such as the large moors and bogs in western and northern Norway.

Similar to the entire European Atlantic coast, most of the Norwegian coastal landscape had earlier been deforested due to human influence. Agriculture along the coast was based on year-

round grazing, combined with some harvesting and heath-burning. This was a pan-European coastal landscape, from the Bay of Biscay in the south to the Vesterålen islands in the north, called the Atlantic coastal heathlands. This heath landscape has nearly disappeared in today's southern Europe, and has also become a rare sight along the Norwegian coast since the way of farming that had created this landscape no longer exists. Nowadays, an increasing number of coastal regions are typically covered by unproductive deciduous and pine forests. In addition, there are some areas with productive forests, such as the softwood and hardwood forests along the south-eastern coast. At the southernmost tip of this farming region one can find Europe's northernmost extension of the temperate high-value broadleaved forest (nemoral vegetation zone), characterized by such species as beech and oak.

The climate changes from sub-oceanic, with little precipitation, in the Skagerak region, to high precipitation oceanic climate in western Norway, and to cool oceanic in Nordland. The length of the growing season varies between 220 days in some parts of south-western Norway, 200 days along the Skagerak and western Norwegian coast, and 170 days in the Lofoten islands in Nordland.

Farming conditions

Of the total land area in the region, approximately 9 % is cultivated farmland (133,159 ha). The irregular and small-scale topography breaks up the farmland into many small, scattered fields. The coastal region's natural conditions often only enabled the development of small farms with a small-scale field structure. This is especially common along parts of the southern coast. Naturally there are exceptions, as the region also includes three of the country's large-scale farming areas (the Vestfold moraine, Lista and Jæren). Nevertheless, the average farm size in the region is rather small. One out of five farms still in operation is smaller than 5 ha, and about 25 % of the farms have acreages of between 5 and 10 ha. Less than 1 % of the farms are considered to be large farms (by Norwegian standards), having more than 50 ha cultivated land.

The smallest holdings were traditionally farmed in combination with other occupations, e.g., fishery, shipping and coastal piloting. Such combined operations ("pluriactivity") still occur, but in most cases farming has gone from being the main income to only being a source of secondary income. In addition, the pluriactive farms are getting larger, while the smallest holdings are often abandoned. At least 17 % of the registered farmland is not being cultivated. In a cultural perspective, this is an unfortunate development, since the smallholdings combined with fishery and seafaring were so characteristic for the Norwegian coastal landscape. However, the number of farms has been declining rapidly during the past decades, mainly due to the number of people moving away from the smallholdings. Thus, the buildings on many farms have not been maintained, and abandoned farmland is beginning to become overgrown. Earlier, many such holdings were bought as summer and holiday residences, especially along the southern coast.

The region's farms can be categorized into four main groups, depending on how they are located in the landscape.

- The first group is most common along the south-eastern coast, where the farms often lie scattered in crevices between the hills and ridges of bedrock. The scattered fields are usually located on marine or coastal sediments. On the west coast, much of the farmland is on morainic soil, which can be seen by the characteristic stone walls in an open heath landscape.
- Another type of farms can be found in the areas where the mainland abruptly forms steep coastal cliffs. Here, the farmland is often scattered, and the farms usually lie for themselves, or in small settlements, in the ravines and valleys of coastal sediments. In some places, the land is suited for efficient use of farm machinery, in contrast to the barren and mountainous surroundings, as can be seen on the photograph from Solund in Sogn og Fjordane (western Norway).
- The third farm type is typical for the islands and mainland along the coast of Nordland county, but can also be found further south. These farms are located on the coastal ridges, i.e., flat or nearly flat strips of land between the ocean and the more rugged inland terrain. These relatively large and flat areas are also suited for efficient farm mechanization. Nevertheless, a small-scale farming landscape has survived in a number of places, often due to limitations by farm boun-

dries and stone walls. The slopes of the surrounding hills and mountains are often extensively used as grazing land. These barren grasslands are typical for this type of farming landscape.

- The final group of farms differs from the three previously mentioned categories. These are found on areas dominated by large and relatively level Quaternary deposits. One such example is the Jæren region in south-western Norway (just south of Stavanger), one of the country's most important farming districts. Other, similar farming areas can be found on fertile glacial deposits on the mainland or on islands along the coast. There are also several large farming settlements on extensive coastal plains and cultivated moorland along the western and northern coast.

Livestock husbandry is common on many present-day coastal farms, especially along the western and northern coast. The average herd size is rather small, 22 % of the dairy farms in the region have only between 1 and 9 milking cows, and 31 % of the farms have 10–14 cows. Only 16 % of the dairy farms have herds of more than 30 cows. The majority of these "large" farms are on Lista or Jæren, two major regions for Norwegian dairy production. The same two areas, in addition to some parts of the south-eastern coast, also account for most of the farming region's grain production (approximately 15,000 ha) as well as potato and vegetable growing (approximately 4,150 ha).

Most of the region's coastal farmland is however used to produce grass. In spite of spanning 11 degrees of latitude, grass yields are quite uniform throughout the entire region. This is due to the mild sub-oceanic to oceanic climate generated by the Gulf Stream, resulting in the relatively long growing season even north of the Polar Circle. The mild winters enable a longer grazing season than in most other farming areas in Norway. In some areas, year-round grazing by Norwegian wild sheep is practiced, in order to maintain the characteristic European coastal heath landscape.

Figure 2.2 Region 1 – Typical farmland of clefts and crevices in Solund in the county of Sogn og Fjordane

2.3.3 Region 2 – Lowlands of Eastern and Central Norway

The second farming region, *the lowlands of eastern and central Norway* (Region 2) ("central Norway" used here to cover the two Trøndelag counties), is the most cultivated region in Norway, and covers approximately 4.6 % of the country's land area.

The elevation marking the ocean level during the last ice age (marine limit) is higher in this farming region than anywhere else in the country, at about 150–210 meters above present sea level. The Quaternary deposits consist mainly of fine-grained marine sediments, and clay soils predominate. The farming landscape is a rather large-scale landscape by Norwegian standards, with variations from open, rather flat landscapes in the typical lowland farming areas to the narrow valley settlements with limited vistas. Soft, rolling hills are typical for this part of the country. One larger area in the northern part of this region, lying above the marine limit, has an undulating morainic landscape, but also a relatively large-scale, intensive agriculture.

Following the last glacial period, the Scandinavian land mass rose, and the oceans receded. Many of the original level marine sediments in this region thus developed into hilly erosion landscapes. The typical ravines were formed, with steep clayey slopes and small gullies alternating with small terraces and plains. In general, the marine sediment landscapes are more or less broken up by low hills and ridges with a thin soil cover. These ridges are either forest-clad in the inland districts, or nearly bare in areas near the coast. In some places, the landscape has a fractured topography, with a varied pattern of marine sediment plains dispersed between the low hills and ridges.

Large lakes are common in many parts of eastern Norway. Along lakes and watercourses the landscape often undulates, with ravines and bare, protruding rocks. In the region there are also a number of large rivers, which have formed many smaller and larger river plains. The rivers often meander majestically through the landscape, which in addition is characterized by a variety of glacial deposits forming typical steps and terraces.

In addition to the farming settlements on the marine sediments, the region also includes some of Norway's large farming districts on fertile, calcareous morainic soils. The landscape in these areas is wide and open, with gently rolling hills intermingled with a few small-scale land forms. The vegetation is predominantly boreonemoral (northern coniferous and deciduous forest zone), though dominated by conifers. In favourable locations, more valuable broadleaves such as oak, maple, elm, ash and bird cherry can be found.

The climate is sub-oceanic to continental in eastern Norway, and oceanic with high precipitation in Trøndelag. The length of the growing season varies between 190–200 days in the southern parts of eastern Norway to 170–180 days in Trøndelag.

Farming conditions

The region's substantial Quaternary deposits are the basis for the country's by far largest and most continuous farming areas. Farmland (approximately 357,300 ha) covers about 25 % of the region's total area. In comparison, the total acreage of cultivated land in Norway only represents 3 % of the country's total land area. Historically, and even nowadays, this farming region is associated with good living conditions and prosperity. The conditions for the efficient use of farm machinery are also much better here than in most other regions in the country. This is due to the region's natural topography, but is also a result of significant efforts at levelling many ravines for more efficient large-scale grain production.

The average farm size is nearly 20 ha, well above the average for other regions. The largest farm units are located on the marine sediments at the open plains or on the morainic soils of the rolling hills. Some of the farms in these areas are larger than 50 ha, which can be considered *relatively* large even by European standards. Of the region's approximately 18,000 farms, 5.2 % are larger than 50 ha, and 32.5 % are between 20 and 50 ha.

In spite of the relatively high share of medium to large sized farms, there are still considerable variations in farm size. In those areas dominated by small-scale land forms, as well as in higher elevations, the average farm size is quite a bit smaller. These smaller farms are often located on the fringes of the more wide-open farming districts. Approximately 30 % of the farms

in the region are thus smallholdings, i.e., operations with less than 10 ha. Historically, many of the region's smaller farms originated as crofts under one of the larger farms. These crofts are an important element of Norwegian rural history, and there are therefore efforts to preserve some of the authentic crofts.

The region is furthermore influenced by being Norway's granary, with much of the countryside covered by cereal monoculture. Grain is grown on approximately 70 % of the arable land (about 249,000 ha). Nevertheless, many other crops are also grown in the region, and in many cases specific areas are specialized in the production of certain crops. Examples hereof are the potato-growing districts of Oppland county, the vegetable-growing districts in Østfold county and the strawberry-growing districts in Sør-Trøndelag county. In total, potato and fruit/vegetable production only cover 2.5 % and 1.5 % of the region's farmland, respectively.

Grass is grown on approximately 22 % of the farmland (about 7,900 ha), mostly in connection with livestock husbandry in the region (mainly cattle and sheep). Cattle husbandry is most widespread (approximately 185,000 animals), accounting for 54 % of all "grazing stock", i.e., cattle, sheep, horses and goats. There is a slight trend that the largest farms also have the largest herds, even though herd sizes are relatively similar in spite of varying farm size. Only 4 % of all dairy farms in the region have more than 30 dairy cows, and are considered to be large farms by Norwegian standards. However, these farms have 11 % of the total number of dairy cattle in the region. The largest dairy farms are often centrally located in the large-scale, typical farming districts. However, the density of livestock farms is often higher in the marginal farming areas, where smaller fields and difficult terrain impede the efficient use of farm technology necessary for grain production. Most of the region's smallest dairy herds (there are about 1000 farms with herds of 1–9 cows) are in these marginal areas.

Figure 2.3 Region 2: A typical landscape of the eastern Norwegian clay soil region, with remains of hillside pastures in Sandsvær (Kongsberg, County of Buskerud)

Whereas most of the large dairy farms graze their herds on cultivated pastures, a more characteristic grazing landscape has developed on and near the farms in the marginal areas. This can be explained by the continued utilization of marginal land and ravine slopes as grazing land. The reduction of the total number of livestock farms (nation-wide) often affects the farms with the smallest herds first. This leads, *inter alia*, to the disappearance of the traditional grazing landscape. Scrub encroachment on the characteristic ravines in this region is a clear example of this development.

The farm buildings in the best farming districts are often quite splendid, and of dimensions that rather seem to suit days bygone. Many of the farmsteads are impressively well-kept, and often include gardens, avenues, ponds and magnificent farmyard trees, thus giving an overall impression of prosperity. In many of the local communities, old burial mounds have a central place in the farming landscape.

2.3.4 Region 3 – Forested districts of Southern and Eastern Norway

The *forested districts of southern and eastern Norway* (Region 3) cover about 9.0 % of the total Norwegian land area. As indicated by the name, forests are the major element of the landscape in this region.

Gneiss and granite are the major types of rock in the south, west and south-eastern parts of the region. Metamorphic rock and sandstone can be found in the central and north-eastern parts. Part of the region lies below the marine limit, and here clay deposits can be found in hollows. Above the marine limit, morainic deposits of varying depth dominate. Many different types of forest occur, varying from the coastal mixed hardwood forests with some boreonemoral species to the extensive northern-boral coniferous forests in the south inland areas and in higher elevations.

In addition to the extensive coniferous forests, another characteristic is a coarse-structured ridge topography, although significant variations occur with regard to bedrock structure and landscape relief. Much of the region, especially in the south, is covered by a shallow layer of soil, while the Qauternary deposits are much deeper in the north and north-east. The southern part of the region has a ridge topography, interrupted by larger and smaller cleft valleys. This results in a closed, rugged and undulating landscape with a level horizon. In the south-west, a few larger valleys occur. In the north and north-east, the landscape is more gentle with rolling hills, and the terrain is smoother due to the enormous morainic deposits. Large bogs are also typical for coniferous forests in the north and north-east.

Near the coast the watercourses are generally rather short, and in the inland areas they are typically tributaries of the large rivers in the main valleys. The rivers of the region are thus not of any significance, but there are on the other hand a large number of lakes.

The climate varies from sub-oceanic with mild winters in the south-west to continental cold inland climate in the north-east. The length of the growing season varies between 200 days in the south-west to 150 days in the north-eastern parts of the region.

Farming conditions

Farmland only covers 1.7 % (approximately 50,500 ha) of the region's total land area. There are a total of 4,400 farms, of which the majority can be classified as small: about 25 % are less than 5 ha, and about 33 % are between 5 and 10 ha. Most of the smaller farms are typically situated on poor soils and have widely scattered fields. Since land consolidation is often impossible, it is also difficult to develop a large-scale, mechanized agriculture. Traditionally, a large share of the farms in the region have thus been dependent on combining farming with forestry. Often, forestry gave a better income than farming, and as a result, agriculture in the region has historically not received the same priority as forest operations.

Throughout the past decades, many farms in the entire region have been abandoned. This applies especially to the smallest (under 5 ha) and most remote farms. This is illustrated by the fact that in 1996 about 22 % (= 14,300 ha) of the region's registered farmland *did not apply* for direct payments. This is a considerable figure, especially when regarding the proximity to the

rather densely populated areas of south-eastern Norway. The same development can be observed even in some of the forest areas with relatively good farming conditions. Consolidation of small farms to larger operating units is common, as well as the renting/leasing of farms. Nearly 40 % (19,400 ha) of the region's farmland was leased in 1996. In sum, less than 50 % of the region's farmland is operated by its actual owners.

The average farm size is 11.5 ha. However, this figure is misleading. In spite of increased farm consolidation, the smallholding is still the most dominant element of the region's farming landscape.

The farms in the region can be classified into four categories, according to topography and soil conditions. The farms with the poorest soils and most small-scale field distribution are in the southern and central parts. The soil cover here consists of shallow morainic deposits, often interrupted by bare rocks and knolls, which present natural limitations for clearing land in the first place. The farms are usually small, and lie scattered in the landscape, only rarely forming small farming settlements. The resulting landscape is a small-scale farming landscape in which the fields represent limited clearings in the otherwise dense coniferous forests. In recent years, bogs have been cultivated, thus increasing the farms' acreage somewhat. Some of the farms in the southern part of the region that are located in forested valleys with poorer soil can also be classified in this group. Many of the farms in this category have been abandoned during the past 50 years, especially in the counties of Agder and Telemark.

The region's most prosperous farms are those on the fertile morainic deposits. Deep soils, large fields and gentle slopes enable the efficient use of farm machinery in large-scale arable cropping. Such farms can however only be found in very limited areas in the south and south-western parts of the region.

A third category includes farms on clay soils below the marine limit, usually located in small valleys, fissures or along lowland lakes. Field size and shape can vary considerably, except where farms lie on alluvial deposits, with larger and more evenly shaped infields. A significant share of the region's total farmland belongs to farms in this category.

Figure 2.4 Region 3: The farms on the fertile morainic deposits are among the region's most prosperous.The picture shows a farm on the Tveiter moraine in the county of Aust-Agder

The farms associated with the typical morainic areas in the northern and eastern parts of the region represent the fourth farm category. Here the farms often lie scattered in a wide open landscape dominated by rolling, forested hills. Farm size varies a lot, but many farms are small-holdings (less than 10 ha), either as single farms or as small forest settlements. Crofts and old ”Finn-settlements” are examples of such farms. In a few areas, farm settlements or hamlets of a larger number of farms occur.

There is a fair amount of grain production in the region due to its (relative) southerly location and stable inland climate. Cereals are grown on approximately 32 % of the region's farmland, especially in the areas under the marine limit and on the eastern morainic deposits. Forage crops are, however, the region's most grown crops, covering about 60 % of the region's total farmland.

There is only a moderate extent of livestock husbandry in the region. Approximately 25 % of the farms have a total of about 100,000 sheep. The same share of the region's farms, i.e. 25 %, have dairy cattle. Due to the region's typical small-scale farm structure, the dairy herds are generally quite small. As many as 46 % of the region's dairy farms have between 1 and 9 cows, and 35 % of the dairy farms have herds of 10–15 cows. Only ten farms have more than 30 dairy cows.

2.3.5 Region 4 – Valley and highland districts of Southern Norway

The region *valley and highland districts of southern Norway* (Region 4) covers about 8.1 % of the total Norwegian land area. Located east of the Caledonian mountain range, the region is characterized by numerous long and deep valleys surrounded by a landscape of foothills and mountains.

The valley bottoms in Trøndelag county lie under the marine limit, and are often covered by deep layers of marine sediments. The upper ends of these valleys are dominated by alluvial deposits. In the central counties of Buskerud, Oppland and Hedmark the valleys are surrounded by foothills, and further to the west by alpine mountains. The valleys get deeper and more U-shaped in western parts of the region. The valley slopes are often steep, and the valley bottoms are narrow. Morainic deposits alternate with valley plains and alluvial soils. In parts of Telemark county, the course of the valleys is often determined by the structure of the underlying bedrock. The narrow valleys are often V-shaped, and have rugged slopes. Morainic and weathered soils alternate with rocks. Telemark also has some U-shaped valleys with steep slopes and mostly flat valley bottoms. The slopes usually consist of morainic material, whereas the valley bottoms mainly consist of alluvial deposits.

Many rivers are either dry or have greatly reduced flow rates due to hydroelectric power dams. There are numerous small and medium-sized lakes, surrounded by either gentle forested and farmed slopes, or by steep hills and mountainsides. Coniferous forests dominate, but in higher elevations mountain birch can be quite predominant. In certain areas deciduous trees are spreading, since mountain grazing and outfield harvesting, which used to be common, are hardly being practiced any more. In favourable locations, such as on southern slopes, one can find broadleaved trees that otherwise are rare in this part of the country. On such sites one can also still find old pollards, relicts from earlier farming practices.

The climate is oceanic in the southern and northern valleys, and continental in the central and eastern valleys. The length of the growing season varies between 170 days in the southern valleys and in lower elevations to 130 days in the mountain settlements.

Farming conditions

Cultivated farmland (175,000 ha) accounts for 6 % of the region's total land area. Limiting factors are climate, topography and soil conditions. However, these factors vary greatly within each valley, but also between valleys. In accordance with varying natural conditions, farm sizes also vary considerably. Typically, there are almost no really large farms; only 2 % of the region's farms have more than 50 ha cultivated land. The average farm size is 14 ha, and 37 % of all farms are

between 10 and 20 ha. The distribution of small and medium-sized farms depends on the topography and the orientation (i.e., southern or northern slope) of the infields.

Figure 2.5 Region 4: A row of farms on a southern slope: a typical picture in many of the region's valleys, as here from Leveld in Buskerud county

Many of the valley bottoms are covered by extensive alluvial deposits. Such cultivated river plains and the newly cultivated alpine meadows produce a major share of the grass grown in the valley and mountain settlements, and are thus of great importance for today's agricultural production in these areas. These valley farms can form large, continuous farming districts, in which the farmsteads, with their historical buildings often intact, are visible landscape elements for those travelling along the valleys. Since most of the land cultivation on these river plains has been carried out in recent years, and the large, level areas enable modern, mechanized farming methods, there are only very few cultural monuments associated with pre-industrial farming in these areas. The few cultural features that existed were often removed in connection with cultivation or land consolidation. Furthermore, the gravel- and sandy soils of the alluvial plains did not allow the "development" of such phenomena as stone walls or lush hay meadows.

Such cultural features and sites are, however, found on valley and mountain farms on morainic soils. These hillside farms lie on valley terraces, steep hillsides, on small plateaus or hidden between knolls and other rock formations. The farms can be either single farms, or gathered in small hamlets or even larger settlements. Farm size varies between the medium-sized farms of the oldest settlements to the tiny farms clinging to the highest parts of the valley slope.

Most of these hillside farms are typically located on the "sunny side " (southern slope) of the valley, where the sun's radiation is greatest[2]. The local climate is best about halfway up the slope, avoiding both frosts along the valley bottom and winds from the mountain tops. This was decisive for the location of the farms and their infields in the days when all farms grew cereals, using farming methods that were not impaired by even the steepest slopes. Since stony morainic

[2] In Norwegian valley settlements, it is common to speak of the "sun-side "(*solsida*) and the "shadow-side" *skyggesida*) of the valley.

soils are so common, it is not surprising to see many stones that were removed from the soil when the land was cleared. These stones can be seen in stone walls surrounding fields and pastures or in support structures on farm roads. Stones from land clearing were also piled in the numerous stone piles so characteristic for many of these hillside farms.

Under the transition to modern farming methods, many of the old farms lost their position and status as large farms, especially those on the steepest slopes. Obviously, modern agriculture did *not* favour farms with fields in such terrain. Throughout the 20th century, much of the traditional infield acreage of the hillside farms has been abandoned – an ongoing process. For example, in 1996, direct payments were not applied for for about 8.5 % of the region's farmland, meaning that 1,590 ha were no longer being actively farmed. A significant share of this are fields on steep slopes, which often were either abandoned or transformed to (permanent) pasture. Farm size is thus decreasing, and at present, smallholdings of less than 5 ha account for about 15 % of the region's farms, and farms with 5–10 ha account for about 27 %. However, the transition to grazing land is an asset for the landscape experience, since this assures the "openness" of the landscape, and enables the preservation of some of the remnants from traditional, pre-industrial farming.

Meadow and pasture land covers about 72 % of the region's farmland (12,630 ha). Cereal production is common on alluvial plains and gentle slopes in lower elevations. Cereals account for about 20 % of the total acreage (3,250 ha). Due to, among other reasons, the access to extensive grazing land, livestock husbandry dominates the region. Cattle husbandry predominates, and about 41 % of the region's farms have dairy cattle. Dairy herds are generally small, and approximately 34 % of all dairy farms have only 1–9 cows. Only about 1 % of the dairy farms have more than 30 cows. Sheep husbandry is also widespread, with about 530,000 sheep divided among 4,150 farms. Most of the sheep herds are relatively large (by Norwegian standards), 51 % of the sheep farms have more than 100 head of sheep on summer (mountain) pasture.

Due to the extent of livestock husbandry, the impact of grazing within the region is significant. Pastures are common along the rivers and ravines of the valley bottoms, or adjacent to the infields of the hillside farms. However, much of this pastoral landscape is deteriorating, since cattle nowadays increasingly graze on cultivated pastures and sheep grazing mostly takes place on mountain pastures. Most farms of the region combine their agricultural operations with forestry, and in many areas forestry accounts for the main income.

In a national context, the farm buildings of this area are often very characteristic. Solid timber houses are a common sight on the farms in the valley and mountain settlements. The region represents the core area for buildings from the Middle Ages and protected timber houses older than 100 years. Several of the country's most important cultural landscapes also lie within the region, which thus plays a major role in the preservation of Norway's pre-industrial rural cultural heritage.

2.3.6 Region 5 – Mountainous areas of Southern Norway

According to the definition used here, the mountains of southern Norway cover 28 % of Norway's land area. The region's landscapes vary from sub alpine forests to wide open mountain plateaus, including Europe's largest alpine plateau, one of the largest glaciers, and numerous dramatic transitions from low foothills to majestic mountain peaks.

The southern and western areas are dominated by a mountainous plateau between 800 and 1200 meters above sea level. In the south, the landscape varies between rugged and more gentle mountainous areas. In the west there are deep valleys and more marked landscape forms, high mountain peaks and many glaciers. Along the axis of the mountain chain, a number of rock intrusions occur, often visible as isolated plateaus with steep cliffs, e.g., Hallingskarvet. To the east, the mountains mainly consist of weathered peaks on extensive plateaus, and include large expanses of mountain forests. Norway's highest mountains lie in the central and northern part of the region. The foothills of these mountains are also often forested.

The soil cover is shallow in the southern and western parts, whereas there are deep morainic deposits in the east and north. The alpine regions are mostly covered by bare rocks and landslide soil. The mountain region is divided into four vegetation zones, corresponding to climatic variations. The *sub alpine* vegetation consists of sparse coniferous and deciduous forests, mainly pine and mountain birch. The lower and intermediate alpine zone is characterized by treeless vegetation. In dry areas, lichens dominate, whereas various berry and heather species are abundant in areas with more precipitation. On fertile soils, lush bush vegetation and large bogs can be found. The high alpine vegetation consists of scattered, small mosses, lichens and a few vascular plants growing between the rocks.

There are thousands of large and small lakes, streams and rivers in the mountains of southern Norway, especially on the southern and western plateaus. The abundance of water and the high elevations have led to the widespread construction of hydroelectric power dams in the region. A large number of rivers have therefore been either totally drained, or have greatly reduced water flow.

Farming conditions

The natural resources in the mountain regions have been utilized for thousands of years. Of major importance for the cultural landscape was beyond doubt the widespread practice of alpine dairy farming, in which the cattle were moved to the mountains for the summer months. Forests were harvested in order to improve the grazing lands, at the same time yielding materials for buildings and fences, and as fuel for the processing of livestock products. The livestock's grazing activities then prevented forest regrowth, so that alpine dairy farming for hundreds of years characteristically led to an open, only sparsely forested grazing landscape. With the end of these farming practices, natural forests can re-establish, albeit at a slower pace than in the lowlands due to the harsh mountain climate.

Figure 2.6 Region 5: Cultivated pastureland in Bjerkreim, county of Rogaland

Mountain dairy farming has gone through a dramatic development during the past 150 years. In 1850, there were about 50,000 mountain summer farms in Norway, in 1950 there were still about 20,000 left, and today there are only 2,820, most of which are located in the mountains of

southern Norway. This development has a major impact on the landscape in the immediate vicinity of the summer farms. In areas where summer farming lowered the timberline by about 3–400 meters, mountain forests are now creeping up the hillsides again. This means that a previously open cultural landscape is now overgrowing with forests. However, since the alpine ecosystems change slowly, it takes a long time to cover up the traces of earlier farming methods. Thus, many mountain farming landscapes can still be experienced, even though the actual summer farming ceased several decades ago.

Another form of mountain farming was common in the southernmost parts of the region, in which the main goal was to harvest winter fodder from outlying alpine meadows. The livestock were moved around much more than in the ”permanent” mountain dairying, where the herds often were in one area for the entire summer, and thus the impact on the surrounding landscape wasn't as heavy. This form of summer mountain farming became more or less obsolete from around 1970.

However, even in areas where there still are active summer mountain farms the forests are slowly gaining ground. Modern mountain farming hasn't maintained the landscape in the same way as the traditional practices did. Nowadays, livestock mainly grazes on fenced-in pastures, and sheep roam freely in the mountains without returning to the mountain farm every evening. The major difference is however that the mountain forests are no longer used as a fuel source for the processing of dairy products or as building materials for farm outhouses and fences.

Most of the remaining mountain farms in Norway are operated by farms located in farming areas in proximity to the mountains, especially those in region 4, the *Valley and highland districts of southern Norway* (Region 4). It is no coincidence that these farms have continued the practice of mountain farming to a greater degree than farms in other regions. Due to the prevailing natural conditions, a transition to grain production was not possible, and thus livestock husbandry and grass production remains the backbone of farming in the region. In addition, these farms often lie quite close to the country's best mountain pastures, and it has therefore been natural to continue the utilization of this immense natural resource. Another factor is the fact that the topography in the east of the mountain region allows the construction of an extensive road system in the mountains, thus making the summer farms more easily accessible and allowing the modernization of mountain farming methods. This explains, in part, the establishment of large areas of newly cultivated pasture land in the lower regions of the south-eastern Norwegian mountain ranges during the past decade.

In addition to the mountain summer farms, owned by farms in other regions, the mountains of southern Norway also include 1,100 active farms. These are either single, scattered alpine farms at higher elevations, or settlements of farms in mountain valleys, at slightly lower elevations. The average farm size is 14.3 ha cultivated land, which by Norwegian standards is quite large. This relatively large farm size is mainly due to the cultivation of mountain bogs and modern summer pastures. Of the region's total farmland, 64 % is operated by the owner, and 25 % is leased.

Only 10 % (1,800 ha) of previously registered farmland is now abandoned, showing that the region's farming activities and settlement pattern have to a large extent been maintained. Cultivated land in the region only represents 0.2 % of the region's total area. However, in spite of the high elevation, harsh climate and rugged topography it must be stated that agriculture nevertheless has a major impact on the region's mountain areas, considering the extent of summer pastures and the effect of the more than one million grazing sheep on the alpine vegetation.

2.3.7 Region 6 – Fjord districts of Western and Central Norway

The farming region *fjord districts of western and central Norway* (Region 6) (”central Norway” used here to cover the two Trøndelag counties) covers about 11.5 % of the total Norwegian land area. Western Norway's magnificent and dramatic fjord landscape is well-known all over the world.

Characteristic for the region are the deep fjords surrounded by snow-capped mountains and mighty glaciers, which stand in sharp contrast to the lush green mountainsides and peaceful

farming settlements. Where the fjords run into the sea along the western coast, the landscape relief is more moderate. Here the fjords are often very wide, and their deltas divide the mainland into many islands. Moving inland, the elevation of the surrounding landscape increases, and along the inner parts of the fjords, the mountains steeply rise to about 1,500 meters above sea level. Here, the fjords often branch into several directions.

At the head of the fjords steep and narrow valleys continue into the mountain ranges, often with large and deep fjord lakes, steep cliffs and high waterfalls. Further north in the region the landscape gradually becomes less dramatic and the vegetation is not as lush.

The Quaternary deposits are unevenly distributed. In western Norway, the sediments are generally shallow morainic deposits, whereas central Norway (Trøndelag) is partially covered by deep marine deposits. Alluvial deposits are common along the valley bottoms, and further up the mountainsides are glacial terraces. The marine limit increases from 30–40 m along the western coast to 125–150 m above sea level at the fjord heads and in Trøndelag. The marine limit, to a large degree, determines the location of the settlements in the entire fjord region. The higher elevations are totally dominated by alpine landscapes, varying from mountain plateaus along the coast to more rugged alpine formations with jagged peaks in the inland regions.

The watercourses are generally short with small catchment areas. However, due to the large amount of precipitation, the water flow is substantial.The watercourse profiles are often steep and dramatic near the source, with lots of waterfalls and rapids. Further down the valleys, the rivers often flow more calmly along the alluvial plains of the valley bottoms. Deep fjord lakes can be found in the larger valleys.

The vegetation is dominated by deciduous forests, mainly birch. Along the steep but sheltered fjord slopes, the favourable micro-climate and, in some locations, fertile soils support a very diverse and lush vegetation. Naturally occurring pine forests can be found in the entire region, and spruce plantations are becoming a common sight on many hillsides. These spruce plots are often quite visible, and their rectangular form and characteristic colour can at times seem out of place in this landscape.

The climate is strongly oceanic along the outer fjord region in western Norway and in Trøndelag, and slightly continental in the inland fjord and valley regions in the west. The length of the growing season varies greatly, from 140 days in the inner valley regions to about 200 days along the mouths of the fjords.

Farming conditions

The region's farmland covers approximately 5 % of the region's total land area (184,000 ha). There are 17,850 operating units, averaging about 10 ha cultivated land per farm. Most farms are thus rather small, with 25 % of the farms having less than 5 ha, and 31 % between 5 and 10 ha. Only 20 farms have more than 50 ha cultivated land, and can be considered large by Norwegian standards.

Farm size and farm mechanization are clearly limited by the prevailing topographical conditions. Modern farming methods are possible on some of the alluvial deposits, in wider valleys and on a few relatively flat islands. Grassland represents as much as 94 % of the cultivated land, cereals only about 1 %. However, the region includes some of Norway's most important, and the world's northernmost fruit growing districts. Even though only little more than 1 % of the region's farmland is used for soft and hard fruit growing, several of the innermost fjord settlements are completely dominated by this production. Vistas of blossoming fruit trees against the background of snow-capped mountains are a well-known trademark for the region.

Dairy production is however the backbone of the region's farming, with the largest number of dairy cattle (approximately 92,250) in the country. About 46 % of the farms have dairy cattle, but the herds are generally small. Of all dairy farms, 40 % have between 1 and 9 cows, and 38 % have 10–15 cows. Approximately 50 % of the farms have sheep, and the region's 807,000 sheep represent about 36 % of the nation's total number of grazing sheep. Goat farming has been declining dramatically during the past decades, and the 33,200 goats only represent 3 % of the total number of grazing animals in the region (cattle, horses, sheep and goats).

With regard to the cultural landscape, the region can be divided into three distinct zones. In the outer, *coastal zone*, including a number of islands, farmland consists typically of small and scattered fields. Most farms are small and lie on morainic soils near the coastline or fjord. On some islands, the farms may also lie on fertile, weathered soils, and both cattle and sheep husbandry are common. Further north in the region, the coastal zone lies partially under the marine limit, and the terrain is often more level. Some larger farms may grow cereals to a certain extent. Traditionally, many of the farms along the coast were combined with various maritime occupations (seafaring, fishing, etc.). However, many of these farms have been abandoned during the past few decades.

Most of the region's farms lie in the *central fjord zone*. The farms here are generally larger than in the coastal zone, since there are more valleys with rather deep morainic deposits. Along the fjords, the farms often lie on terraces of landslide and morainic soils. The major type of farming is livestock production, but fruit-growing is predominant in certain areas. Furthest south in the region is an area with poor soils and rugged topography. Here the farms lie on islands of morainic deposits, contrasting the otherwise meagre growth of the surrounding landscape.

The *inner fjord zone* is characterized by its dramatic nature and generally shallow soils. The farms are small and located on the fjord slopes on landslides, weathered or morainic soils. Farms can also be found on the alluvial deposits of the valley bottoms. Traditionally the steep outfields were utilized by polling trees and using the foliage as fodder, harvesting outlying grassland or as grazing land. It is still possible to see remnants of these traditional methods such as stone walls and rock heaps. And even though some of the old mountainside pastures and stands of pollards still can be seen, much of the region's traditional landscape of outfield utilization is becoming overgrown. Nowadays dairy production, goat and sheep husbandry are most important. In the southern part of the region, fruit production is widespread, especially apples and sweet cherries. About one quarter of Norway's production of these fruits comes from this region. Certain areas have also specialized in strawberry production. In addition, there some farms perched high up on ledges on the fjord slopes, without road access but with breathtaking views. However, very few of these farms or the once abundant summer mountains farms are still in operation.

Figure 2.7 Region 6: Typical valley in western Norway between fjord and mountains. From Aurlandsdalen in the county of Sogn og Fjordane

2.3.8 Region 7 – Forested districts of Northern Norway

The farming region *forested districts of northern Norway* (Region 7) covers about 4.4 % of the total Norwegian land area.

South of the polar circle natural spruce forests predominate, whereas further north birch is much more common on the mountainsides, and pine forests grow on the alluvial deposits in the valleys. To the far north, spruce is again the predominant species, here representing the western extension of the Siberian taiga.

The bed rock consists mainly of Cambro-silurian, as well as some pre-Cambrian rocks. The soils derived from the Cambro-silurian rock are fertile and support a lush vegetation. The region's Quaternary deposits are usually rather deep moraines, as well as alluvial deposits in the valleys. In the southernmost valleys marine sediments can also be found.

The valleys in the north resemble shallow troughs in an expansive, flat mountain plateau. In the south, the valleys are deeper, with steep slopes and surrounded by rugged mountains. A number of tributary, V- and U-shaped valleys occur. Wide valley bottoms with quietly flowing, meandering rivers are typical. There are alluvial terraces, often at varying elevations, thus causing rapids and waterfalls. South of Saltfjellet, parts of the valley bottoms lie below the marine limit, and are covered by deep clay sediments in which ravines have been formed.

Within the region there are some areas without the distinctive characteristics of valley landscapes, e.g., to the far south. The landscape here is an undulating, hilly and open landscape with many large lakes and expansive forests. To the north-east, near the Russian border, lies a distinctive valley, which has a plateau character, with many lakes, bogs, moraines and other glacial deposits. This area is also atypical for the region.

The wide and meandering rivers in this region are among the largest in Norway. For generations, the rivers served as a major transportation route, on which the characteristic river boats were used.

The climate is sub-oceanic, with high levels of precipitation in the southern parts, and partially continental in the north. The length of the growing season varies between 160–170 days in the southernmost valleys to 120 days in the far north.

Farming conditions

There are only 20,200 ha cultivated farmland in the region, representing only 1.4 % of its total land area. There are about 1,460 farms in the region, most of which are located on the flat alluvial deposits. The average farm size is 14 ha. In the so-called "wilderness settlements" outside the main valleys, many of the region's smallholdings of less than 5 ha can be found. Many of these have been abandoned during the past decades, like so many other smallholdings and marginal farms elsewhere in Norway.

Countless outlying fields, natural meadows and pastures have been extensified, especially in the south, where such forms of land use often represent transitional phases before forest growth takes over. In this way, large areas of farmland are being abandoned. The farmers in the region applied for state support for only 78 % of the registered farmland. The fact that 22 % of the farmland is not receiving support usually implies that it is no longer being actively farmed.

However, the farmland that still is being maintained often stretches out nearly continuously along the alluvial valley plains. The fields are often bordered by trees or small woods. In the northern valleys, the farms often lie along the rivers, but further upstream the farms and fields usually lie scattered as small islands of farmland in the extensive forests. In the more open hill country of the southern parts the farms are usually scattered or gathered in small hamlets.

Topography and field shape are often less problematic for large-scale farming than in southern Norway, and the fields are thus often relatively large. Some of the northern forest dales in the region were first settled and cultivated as recently as 100–200 years ago. Some farmland in the far north was first cleared and cultivated during the past few decades. Thus, the farming acreage has increased significantly in some settlements in recent years. Under the prevailing northern climate conditions, grassland predominates, covering about 90 % of the region's total

farmland. The remaining area is used for growing a variety of different crops, often for home consumption.

Dairy production is the most important production throughout the entire region, and approximately 42 % of the farms have dairy cattle. In spite of relatively good access to grazing land, the herds are generally quite small. About 33 % of all dairy farms have between 1 and 9 cows, and 42 % have 10–15 cows. Sheep husbandry is also widespread, with a total of 80,000 sheep winterfed on about 620 sheep farms. The average farm has 130 sheep winterfed, but 24 % of the farms have less than 50 sheep. Numerous farms have goats, and some areas are among the leading goat milk producing districts in Norway. Goats represent about 6.6 % of the region's grazing livestock. Only the region *fjord districts of Nordland and Troms* (Region 8) has a higher relative share of goats (9.3 %).

The region has excellent mountain and forest pasture resources. In the southern parts of the region, the mountain pastures are used to graze the numerous reindeer herds. In the same areas, income from forestry can also be significant, whereas the northern forests are mostly used for firewood. Another important source of additional income for many farms in the region is salmon fishing.

Figure 2.8 Region 7: From Namdalen in the county of Nord-Trøndelag

2.3.9 Region 8 – Fjord districts of Nordland and Troms

The farming region *fjord districts of Nordland and Troms* (Region 8) covers 5.7 % of Norway's land area.

The fjords in the northern counties of Nordland and Troms penetrate far into the mainland, reaching close to the Swedish border in this part of the country, the result being that much of the mainland is reduced to countless islands and peninsulas. The fjords in the north are generally shorter, but also wider than the fjords in western Norway. Often, they are surrounded by rugged and steep mountains.

Due to varying geological conditions, the fjord landscapes vary. Granite predominates in Nordland, and the land forms are thus extremely alpine and barren. The are nearly no marine or glacial deposits, only in isolated patches on the otherwise bare rock surface. In the areas with Cambro-silurian rocks, the landscape is less jagged, and the deep, fertile Quaternary deposits support a vegetation that is surprisingly lush, considering how far north the region is located. Most of the fjords in the region are trough-shaped. The fjord deltas are wide and branched, thus forming an extensive island and peninsula landscape. The landscape is here characterized by the narrow coastal strip lodged between the mountains and the fjords. These narrow coastal zones have a relatively deep soil cover, based on the morainic and coastal deposits. It is thus possible to find large areas of cultivated farmland. Further inland (eastwards), the fjords become less and less branched, except for some short tributary fjords, which continue as U-shaped valleys into the surrounding mountain ranges. The soil cover in these areas consists mainly of landslide and weathered soils.

The heads of the fjords are often connected by isthmuses and valleys, which often have substantial and fertile soil deposits, usually based on various types of glacial deposits. In general, there is much fertile soil in the entire region. In higher elevations, soil cover is sparse, and eventually bare rocks and extreme alpine conditions predominate.

The most common tree species is birch, mixed with some pine. There are also some pure pine forests, and in the south of the region there are some naturally occurring coastal spruce forests. On the outer islands, the timberline lies between 200 and 300 m above sea level, and increases to about 600 m above sea level in the innermost fjord zone. Above the timberline, green strips of mountain pastures can often be seen.

Along the coast, the climate is mainly cool oceanic, but gradually becomes more continental further inland. The growing season varies between 140 to 170 days.

Farming conditions

There are 29,600 ha cultivated farmland in the region, representing only 1.6 % of its total land area. Most of the farmland is situated on the level beach zone along the fjords. Farms can either occur in settlements or as single, scattered homesteads. Another common location for many farms are the fertile areas at the head of the fjords and along the wider valley bottoms. The overall impression is that most farms lie fairly scattered, and that much of the land along the fjords is uninhabited forest, with only a few abandoned farms in between. In addition to the major farming districts, there are several so-called ”wilderness settlements”, i.e., marginal farms which increasingly, however, are being abandoned. The same applies to farms in remote valleys and isolated islands; in both cases there can be up to 100 % abandonment.

Applicants for direct payments covered for only 62 % of the total registered acreage in the region, implying that 38 % of the region’s farmland is no longer being actively farmed. This figure is very high, even in a Norwegian context. For northern Norway this means that a unique cultural landscape, important for the character of the region, is slowly disappearing.

In spite of the overall negative trend, there has been some extent of land clearing and cultivation in the more central farming districts. The region’s total farm acreage has thus actually increased during the past years. Nevertheless, these newly cultivated areas can hardly compensate for the loss of cultural diversity represented by the disappearance of old outfields, mountainside pastures, grazing land, farm buildings, boat houses, etc. from the landscape. Even though many of these elements can be regarded as characteristic for the northern Norwegian fjord landscape, the cultural landscape in the region is rapidly changing. Marginal farmland and traditional farming methods are being abandoned, and the people are moving to the convenience of urban or semi-urban life.

There are 2,455 farms in operation in the region. The average farm size is about 12 ha, including own property and leasehold acreage. A total of 26 % of the region’s farmland belongs to farms that are no longer in operation, i.e., land that is leased by others. This acreage, and the previously mentioned 38 % that are no longer actively farmed at all, imply that only 36 % (17,000 ha) of the farmland is being maintained by the landowners themselves. Only in the *coastal districts of Troms and Finnmark* is the proportion of land maintained by landowners lower (31 %).

With regard to the cultural landscape this can present a problem, since few farmers are willing to apply for support to implement cultural landscape measures on others' properties. Reasons include that there usually are more than enough challenges on the own farm, the leasing contracts are often short-term, and last, but not least, that most public support programmes require a significant degree of own funding. For the cultural landscape in the region this means that landscape elements on the self-run farms will be maintained, but cultural monuments and marginal farmland on abandoned farms and leaseholds will most probably deteriorate.

There are still a considerable number of smallholdings in the region, and 23 % of the farms with less than 5 ha are still in operation. Farms of this size very often tend to be in danger of being abandoned.

Grasslands for roughage production and pastures cover 90 % of the region's farmland. The remaining acreage is used for several different crops, including potatoes, which are grown on 1.4 % of the total farming area. The extent of livestock husbandry is modest, with emphasis on sheep farming. About 1,365 operating units have approximately 143,000 sheep on mountain pastures during the summer months. In addition, 33 % of the region's farms have dairy cattle. Herds are often small, and 34 % of the dairy farms have less than 10 cows. Goat husbandry is common, and the 17,500 goats represent 20 % of the total number of livestock in the region. The rough grazing lands in the area are very favourable for small ruminants.

Figure 2.9 Region 8: Kvæøya in the county of Troms

2.3.10 Region 9 – Coastal districts of Troms and Finnmark

The coastal region in the far-northern counties of Troms and Finnmark covers 4.7 % of Norway's land area. Facing the Arctic Ocean, this is one of Europe's most exposed coasts. Arctic storms and icy northerly winds often prevent people from being outdoors, both on land or at sea. The landscape is characterized by a steep and barren coastal contour.

The bedrock on the large island in the southern part of the region is hard and infertile. The coast is here steep and inaccessible, with some narrow coastal plains just underneath the barren hills. On these narrow plains some coastal deposits can be found. In some of the flat-bottomed

valleys and on some islands the soil cover can be deeper, thus allowing some agriculture. The large islands to the north are often plateaus with steep cliff coastlines, and in some places glaciers. Quaternary deposits are scarce, and most of the region is barren, treeless wasteland. However, in some protected locations, low-growing birch forests and some pines can be found.

Further east, the coast consists of large peninsulas separated by wide fjords. The inland mountain plateaus end in steep coastal cliffs, like fortresses against the open sea. There are a few smaller fjords, generally with shallow soil cover, except for areas with coastal deposits. The vegetation is sub-arctic, with nearly no forest growth.

The inner fjord zone in Finnmark consists of trough-shaped valleys in mountain plateaus. The fjords are wide and have steep slopes, often with edges of deep Quaternary deposits. Otherwise the landscape is a gentle, rolling terrain, with some flat river deltas where the valleys meet the fjords. These are often rather protected, and birch as well as some pine grow on the mountainsides. Nevertheless, it is more or less a barren and open landscape. In the region's easternmost parts is a low, forested and slightly rugged granitic landscape with narrow fjords, which is quite different from the rest of the region's landscape.

The climate is slightly oceanic with low summer temperatures. The length of the growing season is 120–140 days.

Farming conditions

Most of the settlements in the region are, or were originally, fishing villages. Many fishermen also settled in places with soil that could be cultivated. Such farms occurred on the narrow coastal strip under steep mountainsides, in narrow valleys, fjords and other remote places, often miles from the nearest neighbour. Most of these farms are nowadays abandoned and long stretches of the coast are thus uninhabited. Some of these old smallholdings are still in operation, e.g., on some of the large islands in the south of the region. A few of these farms still maintain the traditional combination of fishing and farming. However, this form of pluriactivity is becoming rare, even in these parts of the country.

Figure 2.10 Region 9: From Øksfjord in the county of Finnmark

In the inner regions of the large fjords in Finnmark, the conditions for farming are better than along the coast. Here, even today, new land is being actively cultivated. Often, several farms are located in small settlements along the edges of the fjords or on river deltas. There are also numerous individual, scattered farms. Even though a relatively large number of the farms are in operation, the farming activities in the region can only be described as very scattered. As all buildings in the region, the farm buildings are clearly a result of the prevailing architecture of the reconstruction period after the last World War.

Considering the harsh natural conditions, it is not surprising that farmland covers only about 0.4 % (5,590 ha) of the region's total land area. All in all, there are only about 460 farms in operation left in the entire region, a very small figure compared to the large number of fishery-based smallholdings that used to exist. The average farm size is nowadays 12 ha. This may seem surprisingly high, but is presumably due to the fact that many farms base their activities on leasing additional land from nearby abandoned farms. Approximately 40 % of the region's farmland is land which is leased by the present operator.

The relative share of leased land could nevertheless have been much higher for some of the farms in operation, since the region has the country's highest share of farmland no longer receiving governmental support. As much as 48 % of the cultivated land is no longer registered as receiving direct payments, which in Norway usually means that the land is no longer being actively farmed. Abandoned smallholdings represent much of this abandoned farmland, but also larger, better situated farms have been abandoned, e.g., due to their remoteness. There are many examples of entire hamlets or farm settlements that have been abandoned, independent of how favourable (or not) the actual farming conditions were. At best, these holdings are nowadays used as holidays homes, but usually both buildings and the land are abandoned and deteriorate.

Of the region's active farms, 26 % have less than 5 ha cultivated land, and 26 % have between 5 and 10 ha. Grassland used for silage and as pasture covers 92 % of the region's farmland, and 27 % of the farms have dairy cattle. Compared to other regions the dairy herds are relatively large, since about 50 % of all dairy farms have between 15 and 30 cows. Sheep husbandry is common, with approximately 30,000 sheep on rough and mountain pastures in the grazing season. A few farms also have dairy goats, which represent about 6 % of the region's total number of grazing livestock.

The importance of forestry is minimal, except for the sale of some birch wood. Important additional income is derived from activities such as hunting, fishing, cloudberry picking, down and egg gathering. Furthermore, a few farmers combine agriculture with reindeer husbandry.

2.3.11 Region 10 – Mountainous areas of Northern Norway

The *mountainous areas of northern Norway* (Region 10) cover 19.5 % of Norway's total land area. The region can be divided into two main areas, according to different topographies: the southern alpine mountain ranges, and the northern highlands, consisting mainly of extensive plateaus with some large river valleys.

The southern area is part of the Caledonian mountain range, and the bedrock is mainly made up of various sedimentary rocks. In between there are also pockets of granite. There is a distinct change in landscape near the border between the counties of Troms and Finnmark, more or less marking the transition from the southern mountains to the northern plateau. The entire mountain plateau in Finnmark ("Finnmarksvidda", a low-lying, forested plateau) is mainly made up of gneiss. Even further north, on the large peninsulas, there are areas with layered sandstone and slate.

The alpine regions in the south have a rugged relief with many peaks. The relief is further intensified by glacial valleys, a continuation of the fjord landscape to the west. The mountains' alpine character is often underlined by the occurrence of deep cirques. Glaciers can be found in the highest mountains, sometimes forming glacial plateaus with protruding nunataks. In general there are few Quaternary deposits, and the landscape, especially in the granite areas, is extremely barren.

The foothills have a gentler, undulating topography, with some wide valleys. Only in some few places are the foothills as rugged and inaccessible as the main mountain range. There are many lakes. Most of the area is covered by glacial moraine, especially in the lower elevations. Due to the fertile soils, the vegetation in the foothills and valleys is rather lush, when considering the extreme northern latitude.

The northern highlands are a relatively uniform landscape at about 300–500 m above sea level, covering most of the inner areas of Finnmark. The plateau is mostly covered by morainic soils and loose rocks, and an estimated 15,000 lakes. There are furthermore countless bogs, areas with birch thickets and some barren hilltops. Periodical permafrost is common. To the north, the plateau is bordered by a ”wall” of overlying sandstone formations, forming the so-called *Gáisene*, a row of rounded mountain peaks of about 1000 m above sea level. The largest rivers, which are used for transport, follow the shallow valleys or depressions in the surrounding plateau.

The climate varies between cool oceanic in the mountains near the coast to continental in the inland mountains and plateaus. The growing season is short, varying from 60–70 days in the alpine regions to 110 days on Finnmarksvidda.

Farming conditions

Most settlements lie in the river valleys, and a few towns are home to the majority of the region’s inhabitants. Most of the region’s few, scattered farms also lie here. Cultivated farmland covers only 0.02 % (1,440 ha) of the region’s total area. There are less than 100 farms in operation, of which most are located on Finnmarksvidda (the Finnmark Plateau), especially near the towns of Karasjok and Kautokeino. The average farm size of 15.7 ha is the second highest figure in the country. Most farms in the region are actually of average size; 40 % of the farms have 10–20 ha, only 10 % have less than 5 ha and there are none with more than 50 ha.

Figure 2.11 Region 10: Along the river of Karasjohka at the Finnmark Plateau

Nearly half of the registered farm acreage is farmed by the owner, 20 % by leaseholders, and approximately one third is no longer being actively farmed. Even though this abandoned farmland only amounts to 750 ha, it is nonetheless of value in an agro-ecological context. There is little agriculture in arctic regions, even in Norway. Many of the farms in the region are thus

important, both nationally and internationally, as reference farms illustrating the development of arctic farming.

Almost all of the farmland (98 %) is used to grow grass for silage or pasture. The total number of grazing livestock (goats, sheep, horses and cattle) in the region is 3,650 animals. Sheep and cattle husbandry are most common, accounting for 58 % and 37 % of the livestock, respectively. About one fourth of all farms have sheep, with an average herd size of 83 sheep per farm. One half of all farms have dairy cattle, with an average herd size of 13 cows per farm.

The most common ”livestock” in the region are however domestic reindeer. Finnmarksvidda is considered the heartland of the Sami (Lapp) culture, and reindeer husbandry thus represents the major use of this mountain plateau. More than 100,000 reindeer graze on the plateau during fall and winter, thus making use of the area's enormous lichen resources. In spring, most of the reindeer are moved to the summer pastures along the coast. Nowadays, reindeer husbandry has become more and more modernized, making use of snowmobiles, centralized slaughtering facilities, etc.

In addition to traditional farming and reindeer husbandry, other sources of income include hunting, fishing, trapping and cloudberry picking throughout the mountain areas. For those whose property includes stretches of salmon rivers, the sale of salmon fishing licences is also an important source of income, as well as the development of wilderness-based tourism.

2.4 Farming conditions in the different regions

In the previous chapter the farming regions in Norway were presented from a ”landscape perspective”. The following presentation takes an ”agricultural perspective”, based on data from the Agricultural Subsidies Database (Statens kornforretning 1996). The division into farming regions follows the classification by NIJOS. A more detailed overview of the data is presented in the appendix tables.

2.4.1 Farmland distribution

The *lowlands of eastern and central Norway* (Region 2) have the largest share of the country's farmland (37 %), followed by the *fjord districts of western and central Norway* (Region 6), *valley and highland districts of southern Norway* (Region 4*)* and the *coastal districts of southern Norway and Nordland* (Region 1), with 19, 18 and 14 per cent, respectively. These four regions together account for 88 per cent of Norway's agricultural land. The *lowlands of eastern and central Norway* (Region 2) differ considerably from the other regions, with over 24 per cent of the region's land area being farmland. The *mountainous areas of southern and northern Norway* (Region 5 and 10) cover 48 per cent of the country's land area, but account for slightly less than 2 per cent of its farmland. Figure 2.12 shows the percentage of farmland of the various regions' total area.

The *lowlands of eastern and central Norway* (Region 2) have the highest percentage of farmland in operation (94%) (figure 2.13), followed by the *valley and highland districts of southern Norway* (Region 4) (92%), the *mountainous areas of southern Norway* (Region 5) (90%) and the *fjord districts of western and central Norway* (Region 6) (88%). In the northern regions such as the *coastal districts of Troms and Finnmark* (Region 9), the *fjord districts of Nordland and Troms* (Region 8) and the *mountainous areas of northern Norway* (Region 10) a lot of farmland lies fallow. This is most pronounced in the *coastal districts of Troms and Finnmark* (Region 9), where about half of the agricultural land is no longer being farmed. At least ¼ of all farmland is being farmed by others than the owners. The *fjord districts of Nordland and Troms* (Region 8), the *coastal districts of Troms and Finnmark* (Region 9) and the *forested districts of southern and eastern Norway* (Region 3) have the largest share of leased farmland in operation, with 42, 40 and 38 per cent, respectively.

One should note, however, that the figures regarding fallow land are somewhat uncertain. These are calculated on basis of two different data sources. Although the level is uncertain, the conclusion with respect to the distribution between regions is still valid.

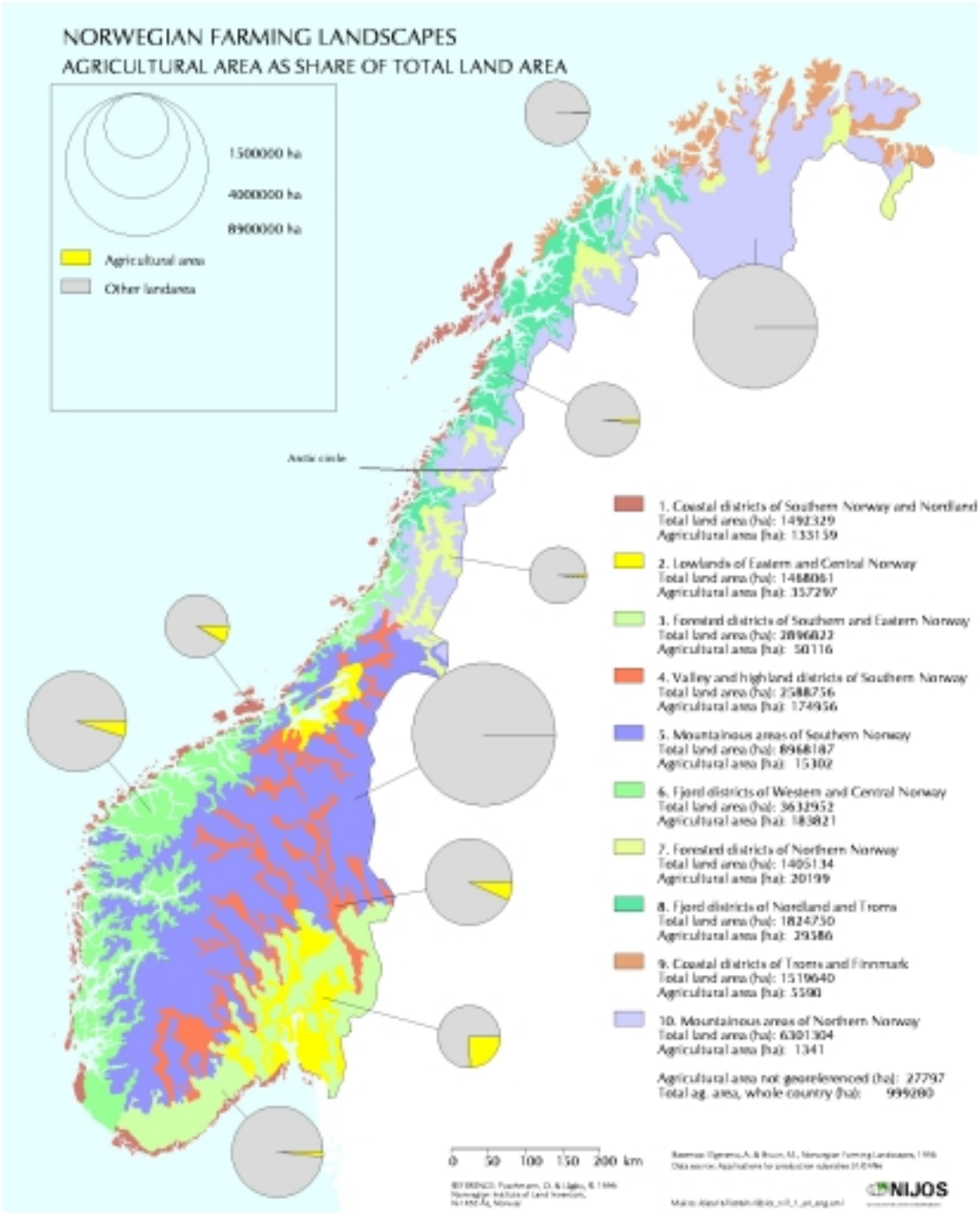


Figure 2.12 Agricultural ara as share of total land area

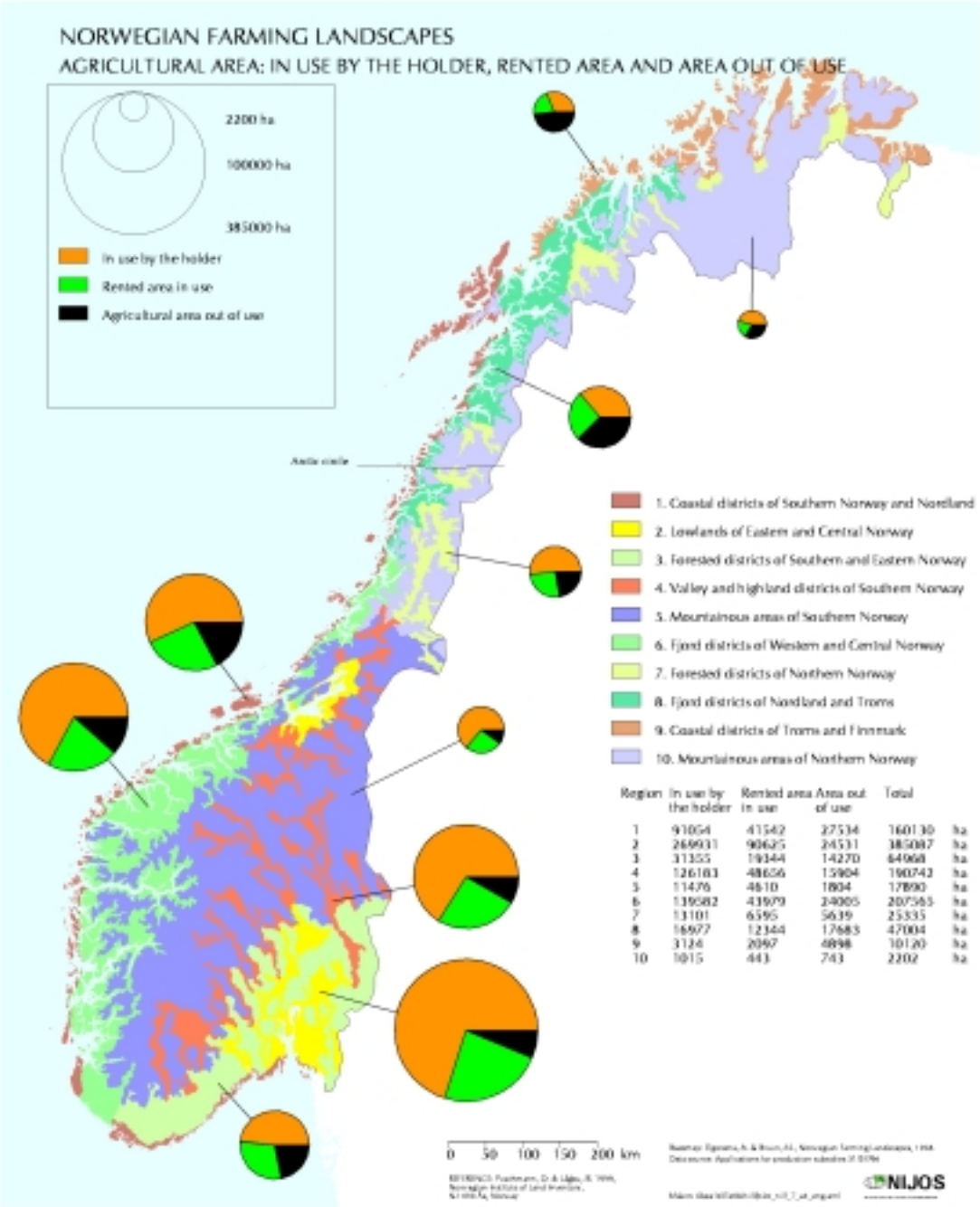


Figure 2.13 Agricultural area: In use by the holder, rented area and area out of use

2.4.2 Farm distribution and farm sizes

It is not surprising that most farms are located in those regions that include most of the country's farmland (The *lowlands of eastern and central Norway* (Region 2), the *fjord districts of western and central Norway* (Region 6), the *valley and highland districts of southern Norway* (Region 4) and the *coastal districts of southern Norway and Nordland* (Region 1)*)*. More than 85 per cent of all Norwegian holdings are located within these four regions. Each of the two regions *lowlands of eastern and central Norway* (Region 2) and *fjord districts of western and central Norway* (Region 6) contain about one fourth of all farms. As mentioned before, a bit less than 40 per cent of the country's farmland is in the *lowlands of eastern and central Norway* (Region 2), compared to the *fjord districts of western and central Norway* (Region 6), which have about 20 per cent of the farmland. This implies that the lowland farms are larger than the farms in the fjord settlements. These two regions have the largest and the smallest farms of the country, with average farms sizes in the lowlands and the fjords of 19.9 ha and 10.4 ha, respectively (figure 2.14). The average farm size for the entire country is 14.3 ha.

The *lowlands of eastern and central Norway* (Region 2) stand out from the remaining regions with its large share of farmland (over 18 per cent) owned by farms larger than 50 ha (figure 2.15). The percentage of farmland on such large farms is significantly lower in all other regions. The l*owlands of eastern and central Norway* (Region 2) is also the region with the largest share of farmland on holdings of 20-50 ha (49%). The other regions have a more even distribution of the farmland on farms from 10 to 50 ha, with the exception of the *fjord districts of western and central Norway* (Region 6), where slightly less than half of the farmland is on 10-20 ha large farms, and only 23 per cent on 20-50 ha large farms.

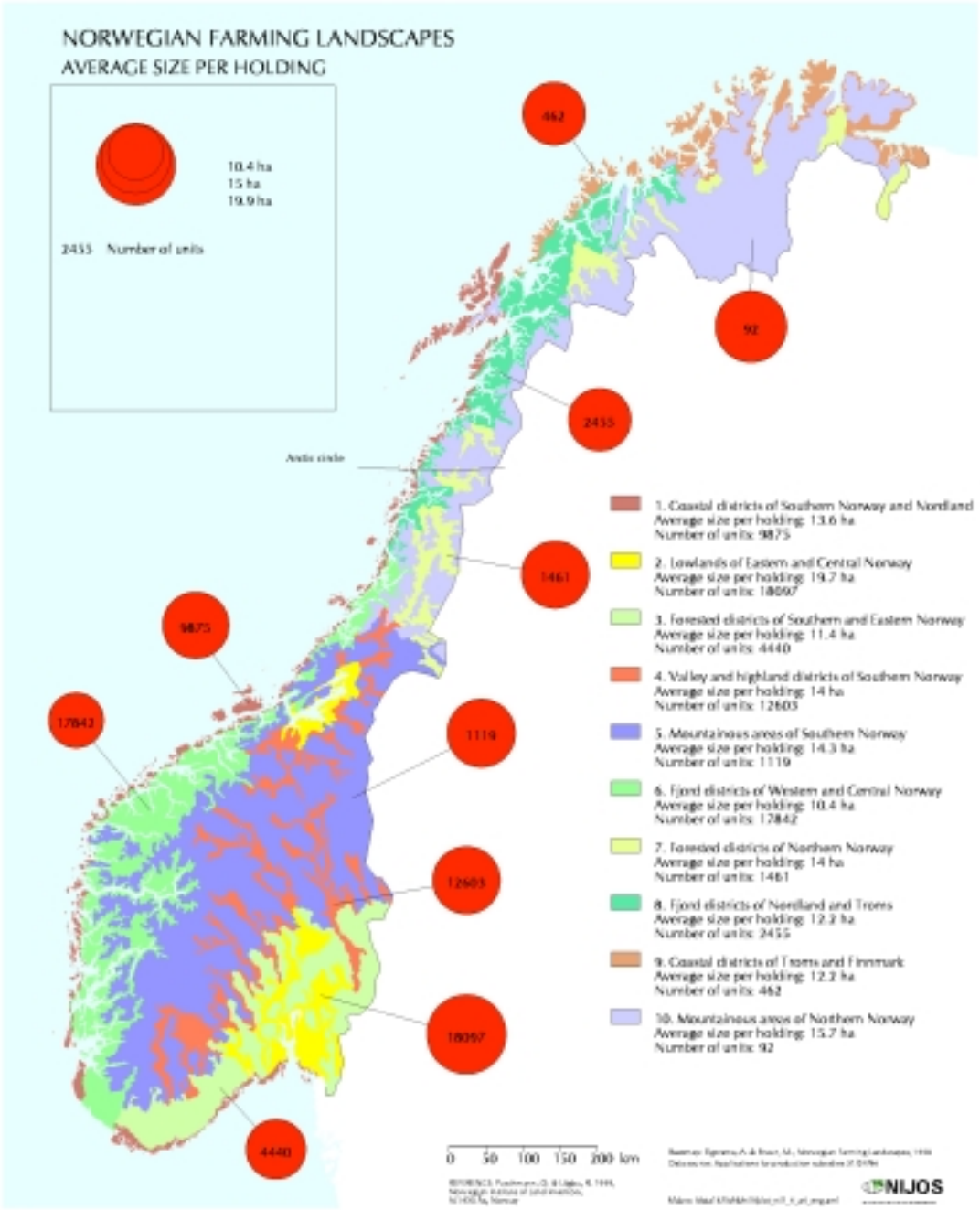


Figure 2.14 Average size per holding

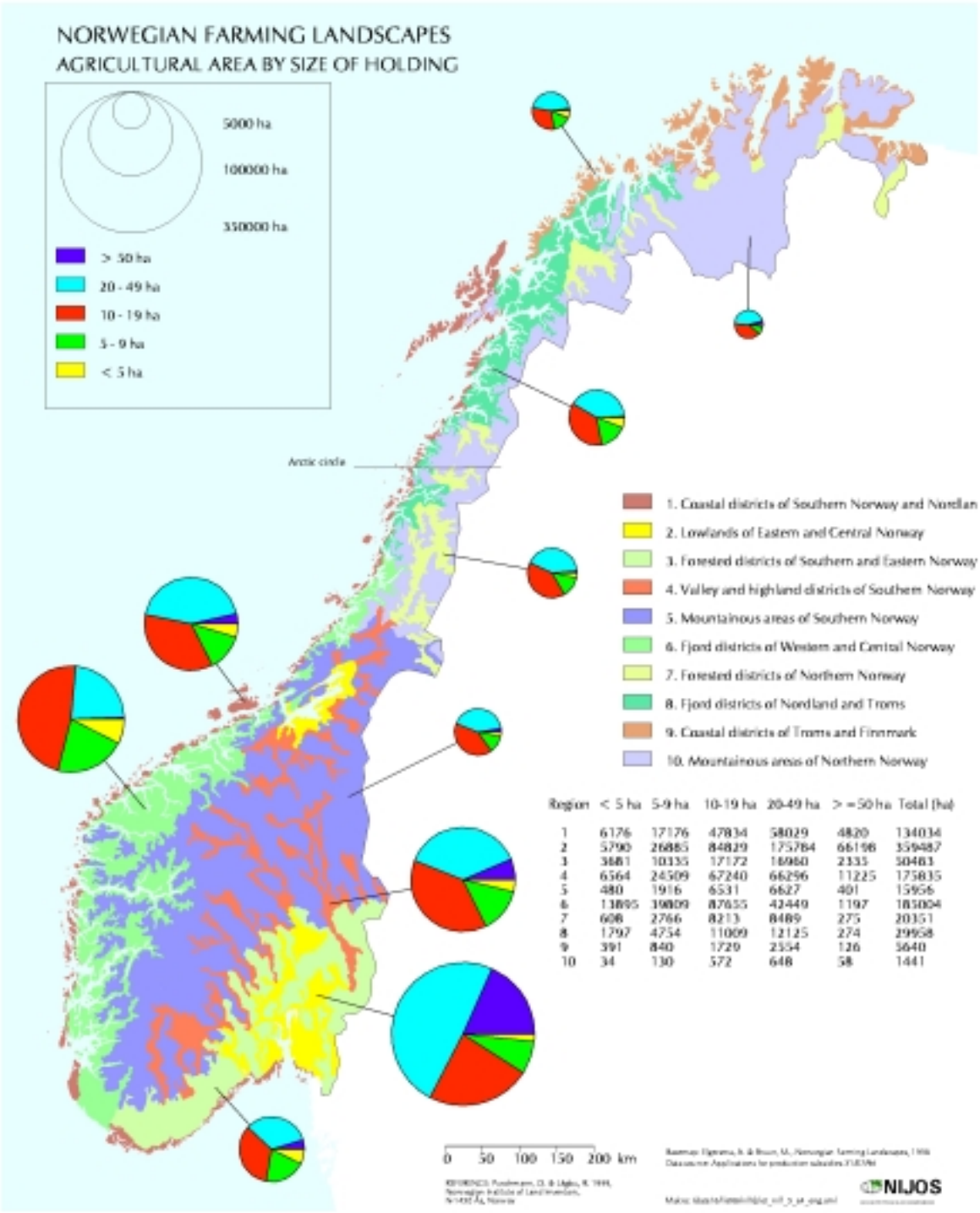


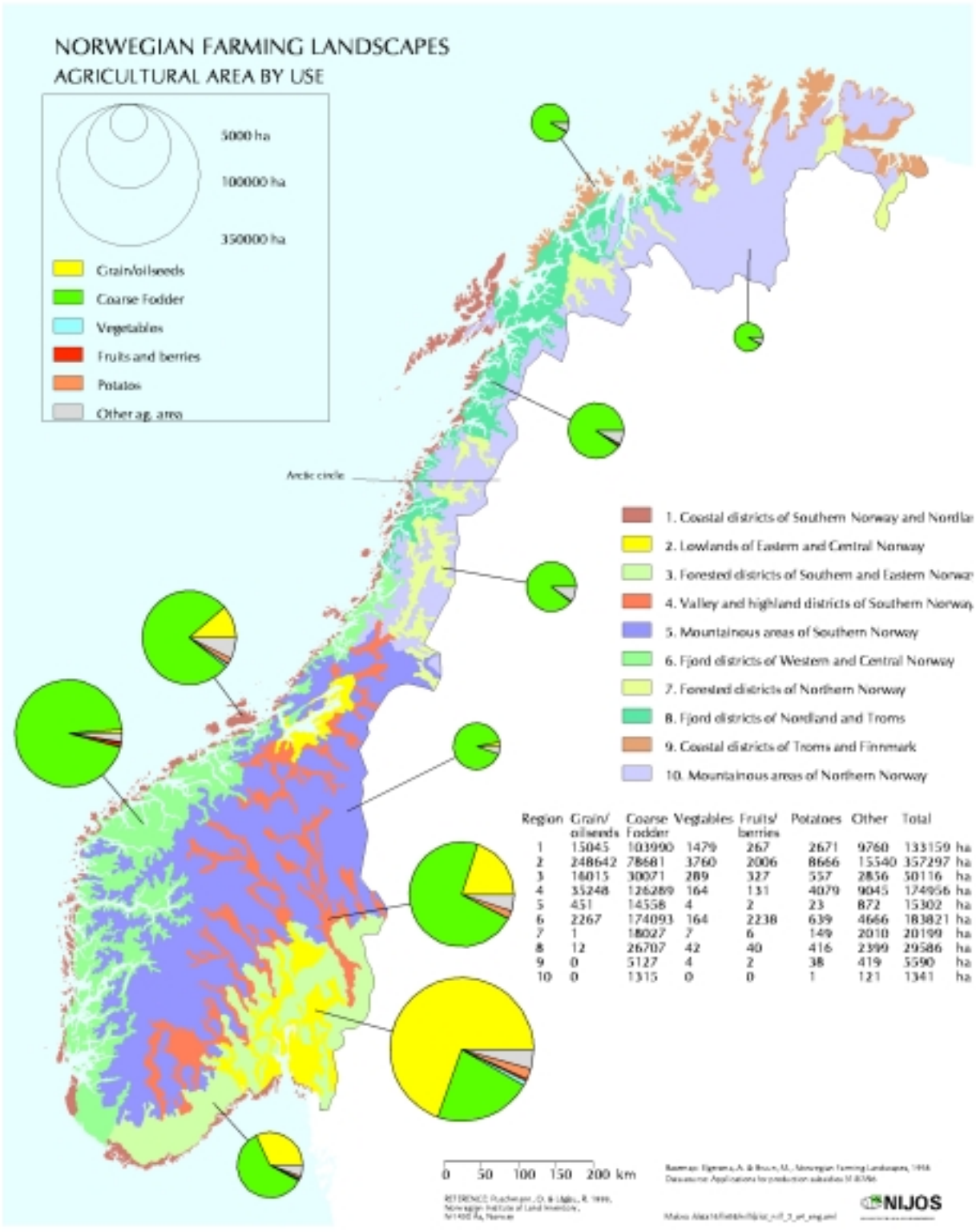
Figure 2.15 Agricultural area by size of holding

2.4.3 Distribution of crops

The region *lowlands of eastern and central Norway* (Region 2) is a major producer of grains (248,600 ha), potatoes (8,700 ha), hard and soft fruit (2,000 ha) and vegetables (3,800 ha). This represents about 78 per cent of Norway's cereal acreage, over half of its potato acreage, 40 per cent of the fruit acreage and about 60 per cent of the vegetable acreage (figure 2.16). Cereals are grown on approximately 70 per cent of the region's farmland, and roughage on 22 per cent of the farmed area.

The *valley and highland districts of southern Norway* (Region 4) also contribute significantly to Norway's grain and potato production (11% and 24%, respectively), in addition to a substantial production of roughage. In this region, 70% of the farmland is used to grow roughage, and 20% to grow cereals. The *fjord districts of western and central Norway* (Region 6) have the highest percentage of the country's fodder-producing (30%) and fruit-growing (45%) acreage. Roughage and hard and soft fruit are grown on 94 per cent and 1 per cent, respectively, of the region's farmland.

One fourth of the country's vegetable-growing land is on the *coastal districts of southern Norway and Nordland* (Region 1). This region also accounts for a relatively large share of Norway's potato and roughage production (16% and 18%, respectively). Roughage is grown on 78 per cent, and cereals on 10 per cent of the region's farmland. The *forested districts of southern and eastern Norway* (Region 3) is the region with the most even distribution between grain and roughage production, with 32 and 60 per cent of the total farmland, respectively. In a number of regions, roughage is grown on about 90 per cent of the cultivated farmland (*fjord districts of western and central Norway* (Region 6), the *coastal districts of Troms and Finnmark* (Region 9), *forested districts of northern Norway* (Region 7), *fjord districts of Nordland and Troms* (Region 8), the *mountainous areas of southern Norway* (Region 5) and the *mountainous areas of northern Norway* (Region 10)).



Region	Grain/ oilseeds	Coarse Fodder	Vegtables	Fruits/ berries	Potatoes	Other	Total
1	15045	103990	1479	267	2671	9760	133159 ha
2	248642	78681	3760	2006	8666	15540	357297 ha
3	18015	30071	289	327	557	2856	50116 ha
4	35248	126289	164	131	4079	9045	174956 ha
5	451	14558	4	2	23	872	15302 ha
6	2267	174093	164	2238	639	4666	183821 ha
7	1	18027	7	6	149	2010	20199 ha
8	12	26707	42	40	416	2399	29586 ha
9	0	5127	4	2	38	419	5590 ha
10	0	1315	0	0	1	121	1341 ha

Figure 2.16 Agricultural area by use

2.4.4 Distribution of livestock

Cattle husbandry is most common in the four regions having most of the country's cultivated land (the *coastal districts of southern Norway and Nordland* (Region 1), the *lowlands of eastern and central Norway* (Region 2), the *valley and highland districts of southern Norway* (Region 4) and the *fjord districts of western and central Norway* (Region 6)). The fjord districts of western and central Norway (Region 6) have the highest percentage of Norway's dairy cattle, young livestock and grazing stock (30%, 28% and 35%, respectively), whereas the lowlands of eastern and central Norway (Region 2) have the largest share of the country's suckler cows (38%).

A significant percentage of the country's sheep and goats are in the fjord, valley and highland districts. Most sheep grazing on rough and mountain pastures are found in the fjord districts of western and central Norway (Region 6) (38%), in the valley and highland districts of southern Norway (Region 4) (25%) and on the *coastal districts of southern Norway and Nordland* (Region 1) (12%). The *fjord districts of western and central Norway* (Region 6) have most of the country's goats (40%), followed by the *fjord districts of Nordland and Troms* (Region 8) with 21 per cent and the v*alley and highland districts of southern Norway* (Region 4) with 16 per cent. The *lowlands of eastern and central Norway* (Region 2) have most of the country's pigs and laying hens, with approximately 50 and 35 per cent of the total stock, respectively. The c*oastal districts of southern Norway and Nordland* (Region 1) and the *fjord districts of western and central Norway* (Region 6) also have a relatively large share of Norway's pigs and laying hens.

Figure 2.17 shows the distribution of dairy cattle herd sizes. Figure 2.18 shows the distribution of the number of sheep per holding grazing on mountain/rough pasture.

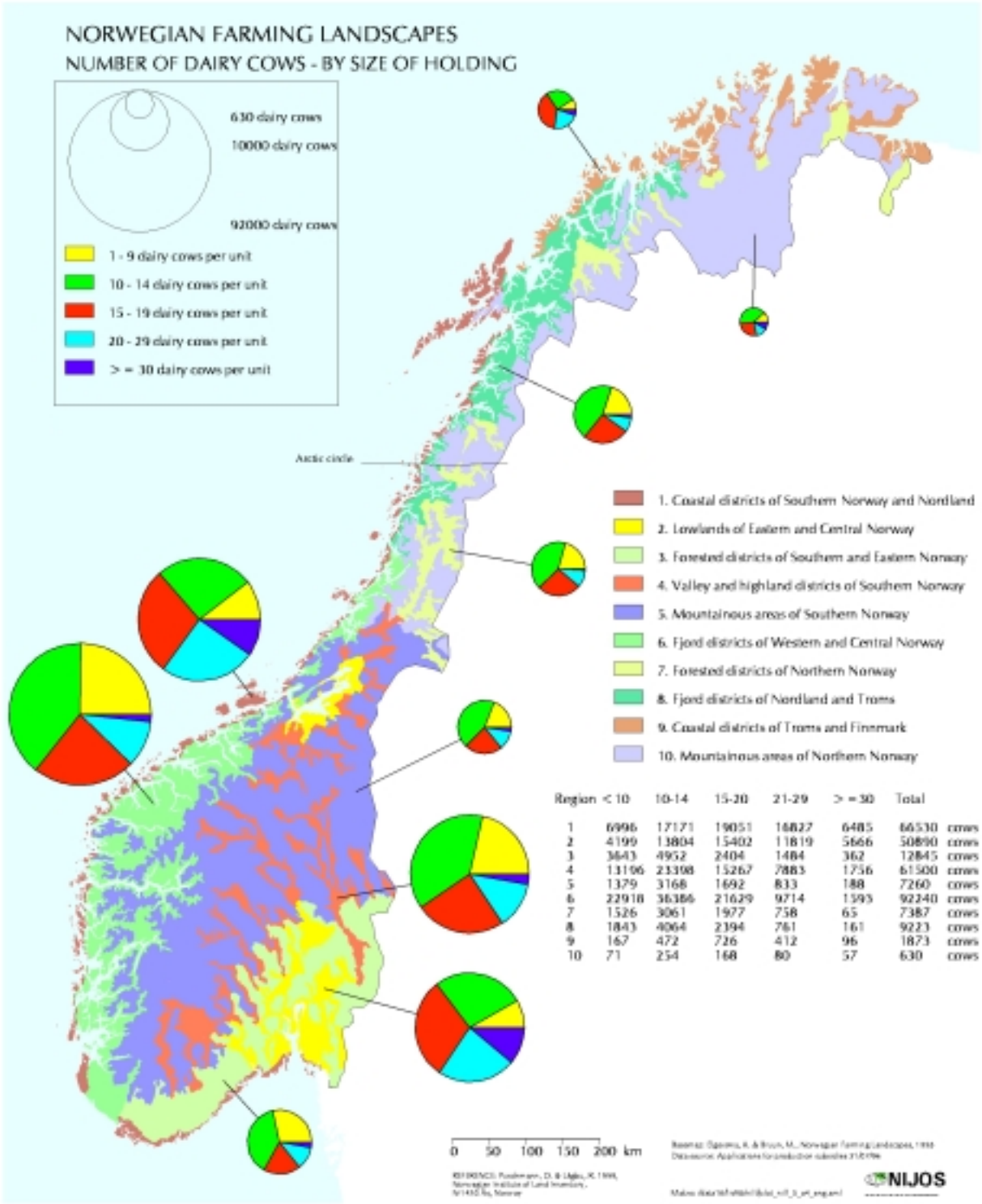


Figure 2.17 Number of dairy cows, by size of holding

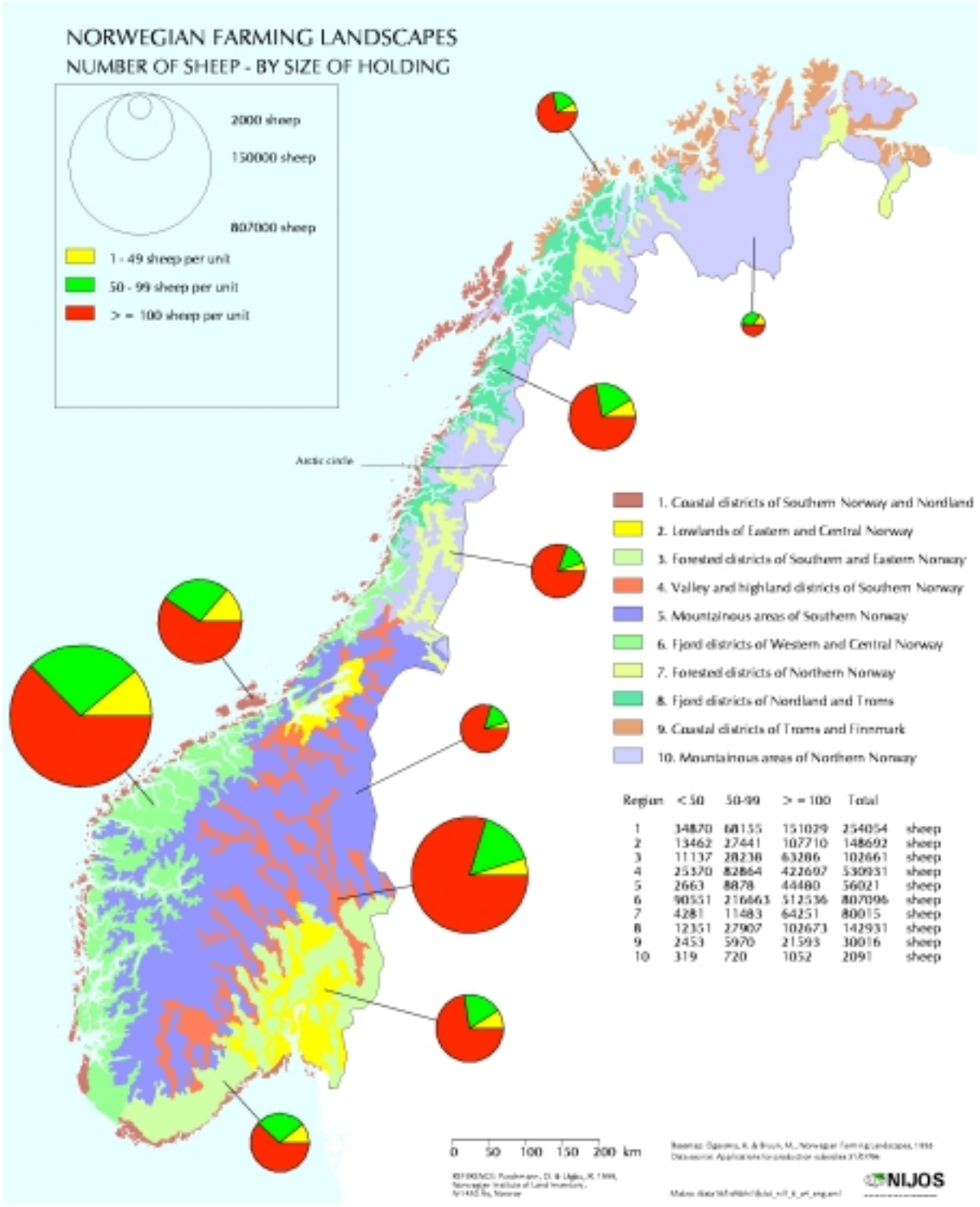


Figure 2.18 Number of sheep, by size of holding

2.4.5 Cultural landscapes and population infrastructure

When discussing agriculture's value beyond that of food production, the importance of the farming landscape for the public is often mentioned, including both the country's own population as well as visitors and tourists. Landscape in this context contains biological, cultural-historical and aesthetic values.

Valuable cultural landscapes have been surveyed by municipal, regional and national authorities. Such surveys are often based on certain values, e.g., biological/ecological and cultural-historical, and the landscape analysis is then carried out according to these criteria. It is then often stated that areas satisfying the largest number of criteria are the most valuable.

Another aspect which has not received as much attention, concerning the preservation of cultural landscapes and the maintaining of farmland, is the question of how many people actually have access to and are thus able to enjoy a farming landscape. This would imply that the value of farming landscapes is greatest in and near urban areas, where there are lots of people who can appreciate pastures, fields and the lush vegetation of field and forest edges. Often, town and city people appreciate living in or near such landscapes more than people who spend their daily lives in natural, but perhaps remote, surroundings. In urban areas, where land for development is scarce and expensive, farming landscapes are often a source of recreation, and are used for walking, biking, fishing, etc. From such a perspective, even a modern, functional farming landscape will be valued, even though it may not contain any special biological, cultural-historical or aesthetic values.

Sub-region 8.2., the farming villages of Toten and Hedmark, which is a part of the *lowlands of eastern and central Norway* (Region 2), is a good example of a cultural landscape with substantial local value (figure 2.19). The region is relatively densely populated by Norwegian standards, and ordinary family housing represents about 70 per cent of the buildings in the area. Nevertheless, the landscape is strongly influenced by agricultural land and farm buildings, since most farms lie scattered and clearly visible due to the open character of the farming landscape.

Figure 2.19 Distribution of familyhouses (yellow), vacation cabins/ -cottages (green) and farmbuildings (black). From the lowlands of eastern Norway

Roads and railway lines cutting through farming areas enable many people to visually enjoy the landscape. Nowadays, many tourists experience the cultural and natural landscapes in Norway through their car windows.

Figure 2.20 shows the geographical distribution of farm units in Norway. In the valleys, the farms are relatively closely spaced and are easily visible from the main roads and railways, which often follow the terrain. Many farms lie close to urban areas, and are thus of value for a large percentage of Norway's population. However, it is also in these areas that the process of urbanization and the pressure on the land is greatest, and where lots of farmland is in danger of being transformed to housing developments and industrial areas. A recent example is the development of the Gardermoen region in Romerike, in connection with the construction of Oslo's new airport.

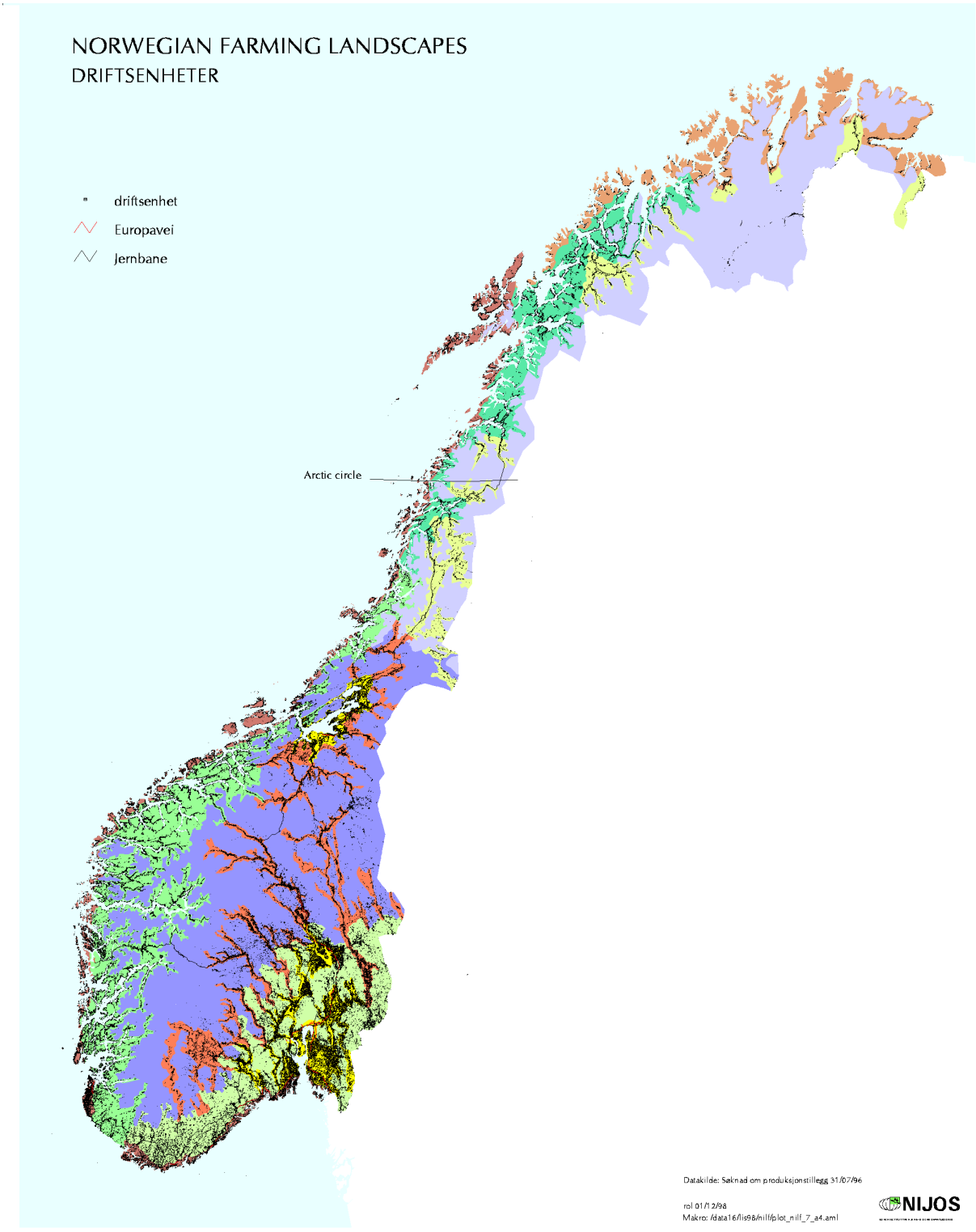
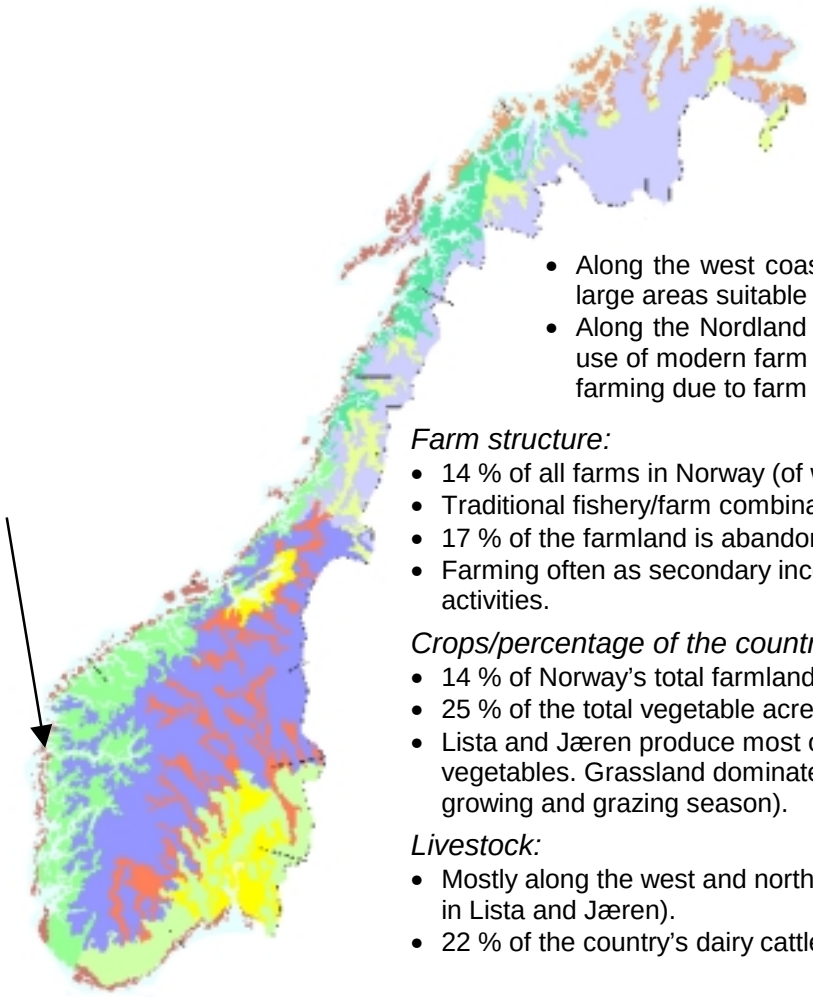


Figure 2.20 Geographical distribution of farmunits in Norway (black)

2.5 Agriculture and the cultural landscape – a summary

The previous chapters give extensive descriptions of the various types of farming landscapes in Norway, as well as describing the farming activities associated with the various farming landscape regions. A summary hereof is presented in this chapter.

Region 1:
Coastal districts of Southern Norway and Nordland



Natural and farming conditions:

- Varying natural conditions and topography, small, scattered fields, especially in the south. Exception: Lista and Jæren in the southwest and the moraine in the southeast with large, fertile farm plains.
- Along the west coast there are a few level and relatively large areas suitable for modern farm machinery.
- Along the Nordland coast farms lie on flat coastal plains, use of modern farm machinery possible. Also, small-scale farming due to farm boundries and stone walls.

Farm structure:

- 14 % of all farms in Norway (of which Jæren has 0.2 %).
- Traditional fishery/farm combination common.
- 17 % of the farmland is abandoned.
- Farming often as secondary income, or in combination with other activities.

Crops/percentage of the country's farmland:

- 14 % of Norway's total farmland.
- 25 % of the total vegetable acreage.
- Lista and Jæren produce most of the region's grains, potatoes and vegetables. Grassland dominates the rest of the coastal area (long growing and grazing season).

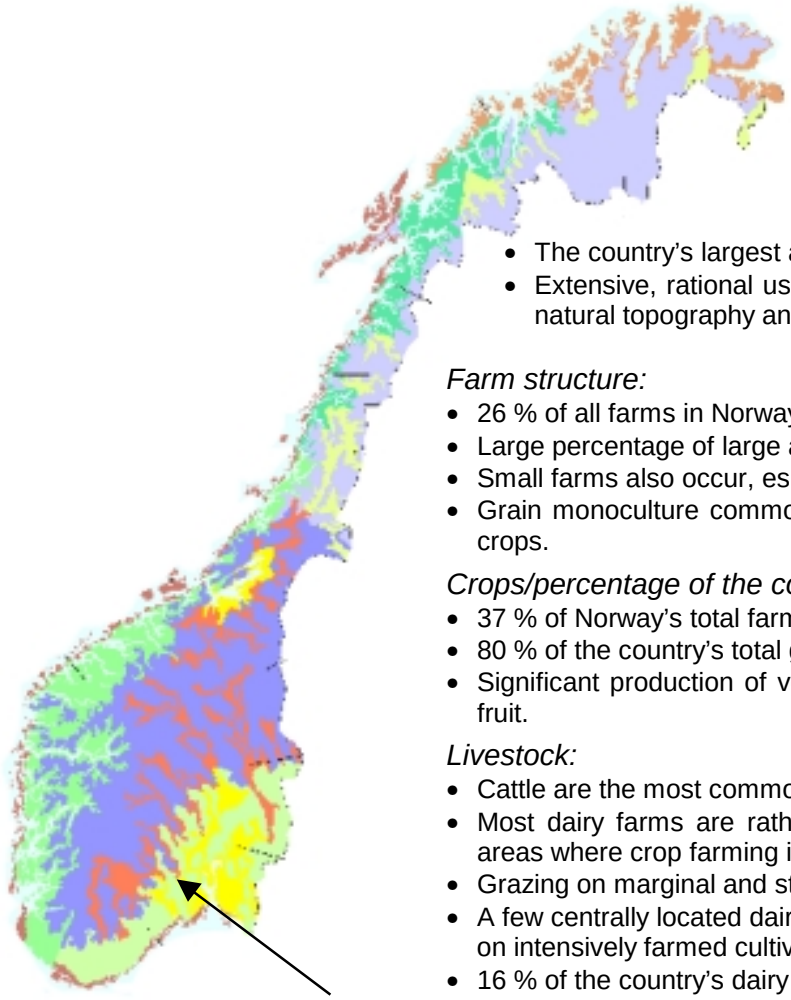
Livestock:

- Mostly along the west and northern coasts, small cattle herds (except in Lista and Jæren).
- 22 % of the country's dairy cattle.

Farming and the cultural landscape:

- Farming contributes to maintaining landscape variety, with fields adapted to the natural conditions, often squeezed in between the sea and the rocky coastal terrain.
- This characteristic small-scale coastal landscape is in danger of disappearing due to the abandonment of the small holdings. Farm buildings and the land are not being maintained, and many fields are overgrowing.
- Many of these farms are being turned into holiday houses (especially in the south).
- The region includes remains of the coastal heath landscape which earlier streched along the entire European Atlantic coast. This characteristic landscape has become a rare sight, due to the termination of the associated farming methods (year-round grazing, outfield harvesting and heath-fires).

Region 2:
Lowlands of Eastern and Central Norway



Natural and farming conditions:

- Large-scaled landscape, varying from wide, open farming plains to low-lying valleys. The plains are interrupted by knolls and ridges, giving av small-scale landscape in places.
- The country's largest and most uniform farming district.
- Extensive, rational use of farm machinery possible, due to natural topography and previous levelling of large areas.

Farm structure:

- 26 % of all farms in Norway.
- Large percentage of large and medium-sized farms.
- Small farms also occur, especially in higher elevations.
- Grain monoculture common, certain regions specialized in other crops.

Crops/percentage of the country's farmland:

- 37 % of Norway's total farmland.
- 80 % of the country's total grain production.
- Significant production of vegetables, potatoes and hard and soft fruit.

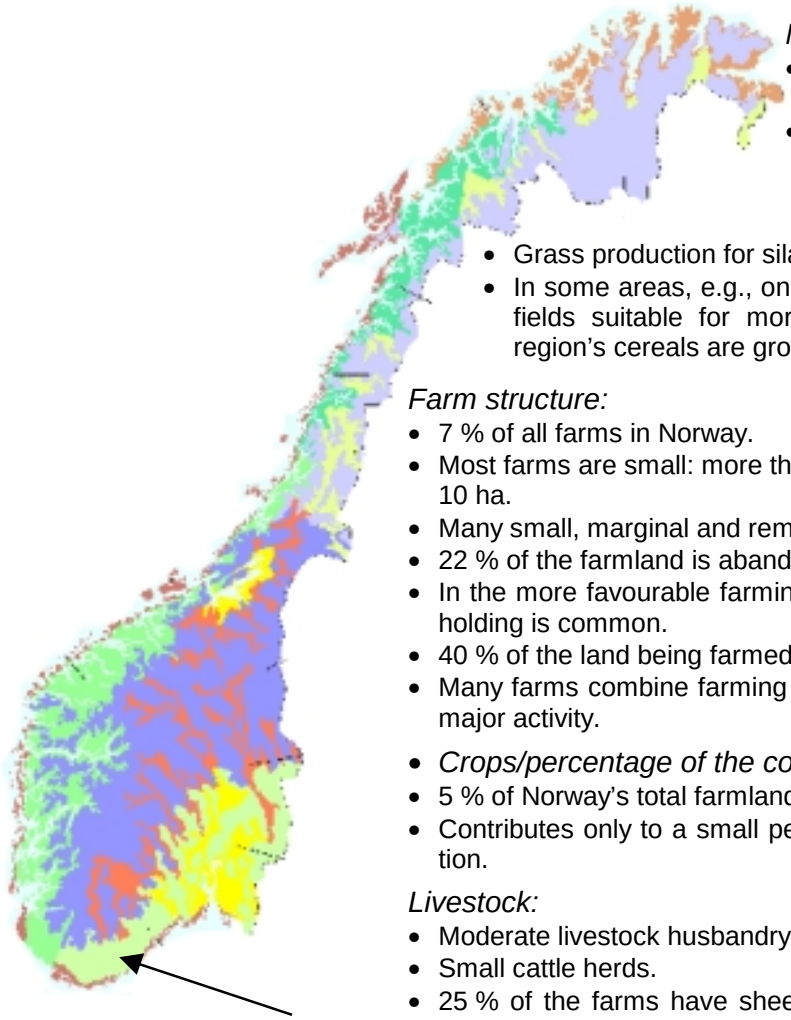
Livestock:

- Cattle are the most common livestock:
- Most dairy farms are rather small, and located in the marginal areas where crop farming is difficult.
- Grazing on marginal and steep land.
- A few centrally located dairy farms have larger herds, which graze on intensively farmed cultivated pastures.
- 16 % of the country's dairy cattle.

Farming and the cultural landscape:

- Large-scale crop production dominates the region. Certain natural and cultural elements create landscape variety, e.g., bare rocks, streams, field border vegetation, forest groves, etc. In the most prosperous farming villages, several cultural elements are typical such as specialized buildings, avenues, burial mounds, etc. These represent a cultural heritage which agriculture should respect and also help to maintain.
- Many smallholdings were earlier crofts and thus represent important cultural monuments with social-historical value.
- The abandonment of smaller, marginal livestock farms results in the disappearence of a characteristic grazing landscape, e.g., many ravine valleys are overgrowing.

Region 3:
Forested districts of Southern and Eastern Norway



Natural and farming conditions:

- The region has a rugged, hilly topography, dominated by forests.
- Small and scattered field structure is common, thus few possibilities for large-scale, rational farming methods.
- Grass production for silage, hay and grazing dominates.
- In some areas, e.g., on alluvial plains, there are some larger fields suitable for more large-scale farming. Most of the region's cereals are grown here.

Farm structure:

- 7 % of all farms in Norway.
- Most farms are small: more than one half of all farms are less than 10 ha.
- Many small, marginal and remote farms are being abandoned.
- 22 % of the farmland is abandoned.
- In the more favourable farming areas, farm consolidation and lease-holding is common.
- 40 % of the land being farmed is leased.
- Many farms combine farming with forestry, and often the latter is the major activity.

- *Crops/percentage of the country's farmland:*
- 5 % of Norway's total farmland.
- Contributes only to a small percentage of the country's crop production.

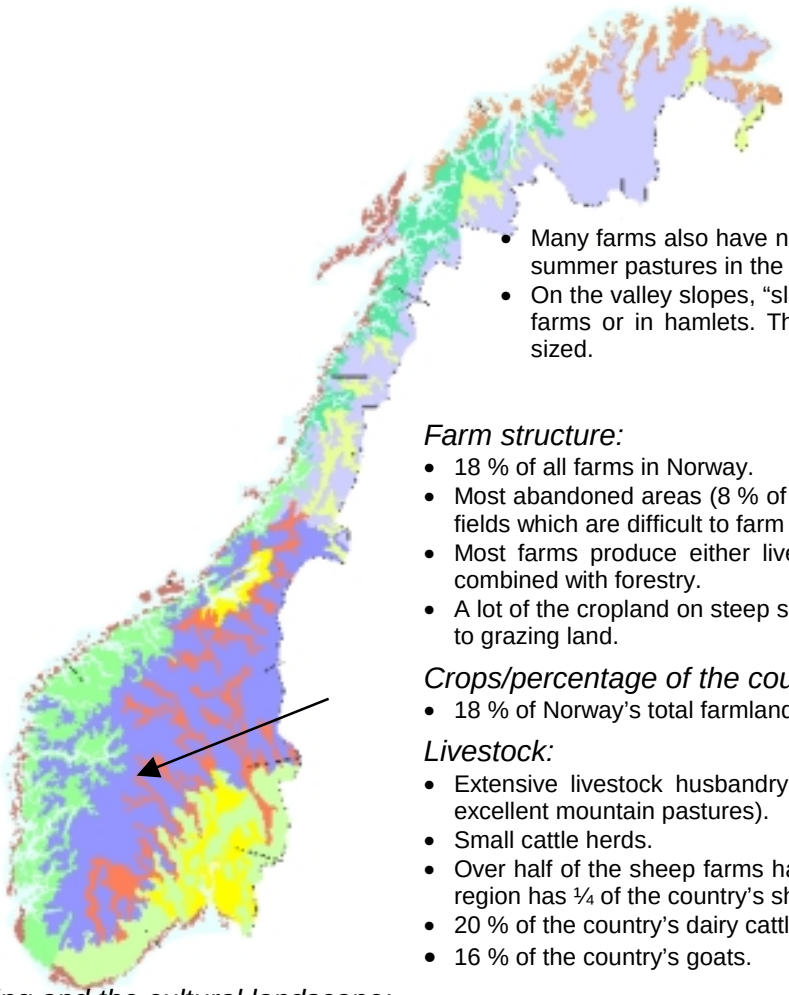
Livestock:

- Moderate livestock husbandry, cattle and sheep.
- Small cattle herds.
- 25 % of the farms have sheep on mountain pastures, evenly distributed between small, medium and large sized herds.
- Accounts for only a small share of the country's livestock.

Farming and the cultural landscape:

- Agriculture's role as a food producer is insignificant in the region. However, the farms that do operate create variation and open spaces in an otherwise uniform forest landscape.
- There are many farmsteads with traditional log houses of high historical value. In a number of cases, the traditional and characteristic red-coloured farm buildings have been maintained.
- However, abandoned and vacated farms lead to overgrown fields and deterioration of characteristic settlements, farmsteads and buildings.

Region 4:
Valley and highland districts of Southern Norway



Natural and farming conditions:

- The landscape features long main valleys, each with varying natural conditions and topography.
- A large part of the farmland is on cultivated alluvial plains. Here, medium-sized farms produce most of the region's forage crops.
- Many farms also have newly cleared land on bogs and near old summer pastures in the mountains.
- On the valley slopes, "slope farms" lie either scattered as single farms or in hamlets. Their size varies from small to medium-sized.

Farm structure:

- 18 % of all farms in Norway.
- Most abandoned areas (8 % of total farmland) are steep pastures and fields which are difficult to farm with machinery.
- Most farms produce either livestock, fodder crops or grain, usually combined with forestry.
- A lot of the cropland on steep slopes and hillsides has been converted to grazing land.

Crops/percentage of the country's farmland:

- 18 % of Norway's total farmland.

Livestock:

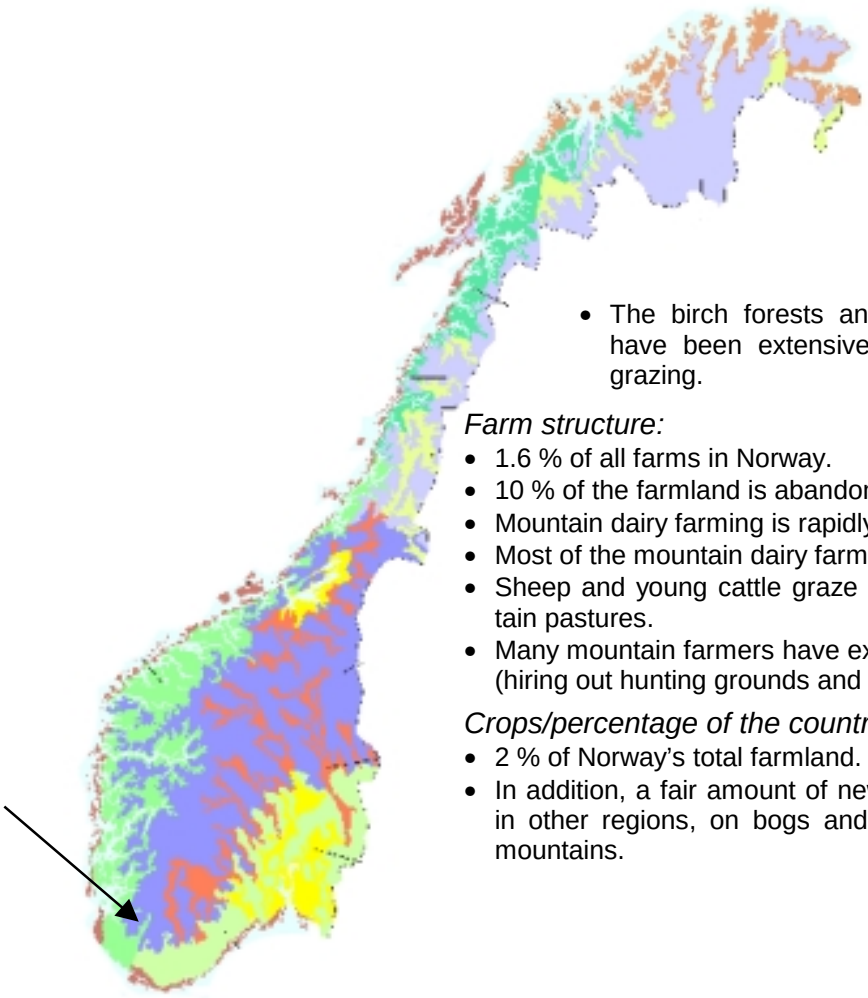
- Extensive livestock husbandry, mainly cattle and sheep (access to excellent mountain pastures).
- Small cattle herds.
- Over half of the sheep farms have more than 100 grazing sheep. The region has ¼ of the country's sheep.
- 20 % of the country's dairy cattle.
- 16 % of the country's goats.

Farming and the cultural landscape:

- Characteristic pastural landscapes (along the rivers and ravines of the valley bottom, and on the old fields of the "slope farms") is disappearing because cattle now mainly graze on cultivated pastures and sheep in the surrounding mountains and foothills.
- The conversion of steep cropland to grazing land on the valley slopes is an asset for the landscape; its openness is maintained and remnants from traditional farming methods are also kept visible and preserved.
- Associated with the old fields of the "slope farms" are field stones which can be found in stone walls, supportive structures and stone heaps which are characteristic for many of these farms.
- The preserved traditional timber farm buildings are typical for the region, which has successfully preserved many of the pre-industrial rural cultural traditions.
- Agriculture and the farming landscape are "favourably located" in relation to major roads and railways in the region, and are thus important for tourism.

Ål/Buskerud

Region 5:
Mountainous areas of Southern Norway



Natural and farming conditions:

- A vast region, varying from some productive forest areas with scattered farms to extensive mountain ranges and plateaus.
- Very little farmland.
- Farms are either scattered in the mountains, or in settlements at lower altitudes in small mountain valleys.
- The birch forests and bare plateaus in the mountains have been extensively used for summer dairying and grazing.

Farm structure:

- 1.6 % of all farms in Norway.
- 10 % of the farmland is abandoned.
- Mountain dairy farming is rapidly declining.
- Most of the mountain dairy farms in Norway are in the region.
- Sheep and young cattle graze extensively on the abundant mountain pastures.
- Many mountain farmers have extra income from hunting and fishing (hiring out hunting grounds and mountain huts).

Crops/percentage of the country's farmland:

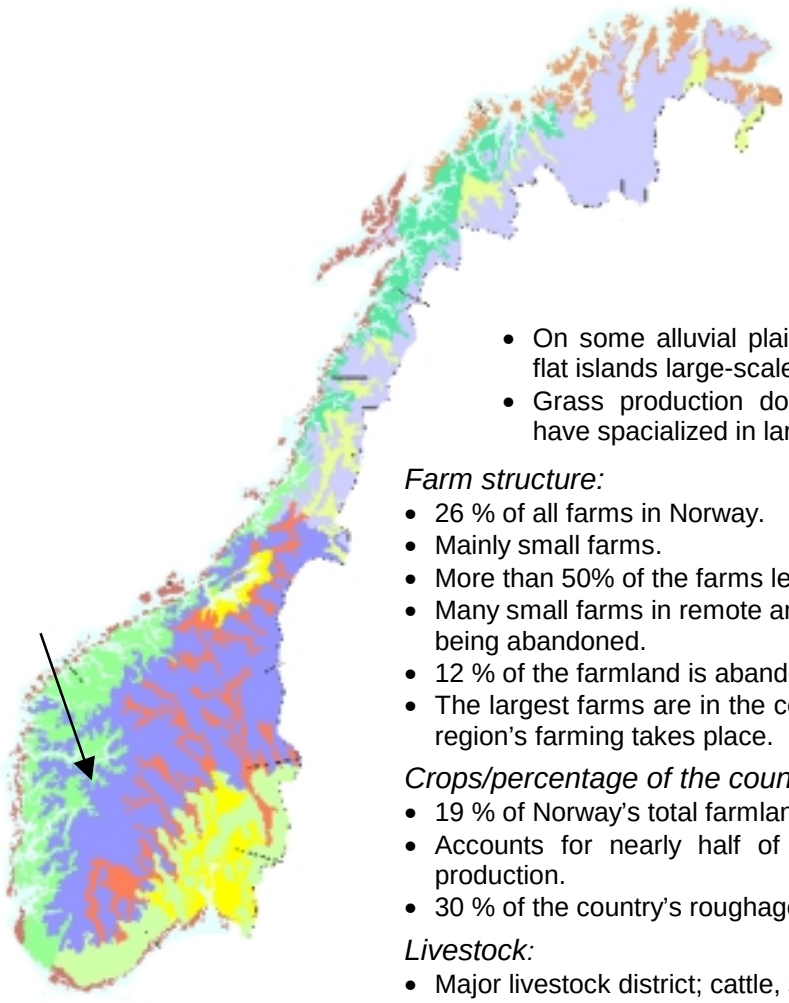
- 2 % of Norway's total farmland.
- In addition, a fair amount of newly cleared land belonging to farms in other regions, on bogs and near old summer pastures in the mountains.

Farming and the cultural landscape:

- Contributes to the open landscape of the mountain dairy farms.
- The decline of mountain dairy farming, with its use of forest and pasture resources, contributes to the renewed establishment of mountain forests and the disappearence of the characteristic open landscape. Many summer farm buildings deteriorate.
- Regrowth of mountain forests even in those areas where there still is active summer farming. On the modern mountain dairy farms, cattle primarly graze on cultivated, fenced-in pastures, and sheep roam freely in the mountains without returning daily to the farm.

Bjerkreim/Rogaland

Region 6:
Fjord districts of Western and Central Norway



Natural and farming conditions:

- The region is mountainous, but the natural conditions for farming vary from the outer to the inner fjord areas.
- Steep terrain, poor field consolidation and small fields limit the extent of rational, machine-based farming methods.
- On some alluvial plains, in larger valleys and on certain flat islands large-scale, modern farming is possible.
- Grass production dominates, but certain villages/areas have spacialized in large-scale fruit growing.

Farm structure:

- 26 % of all farms in Norway.
- Mainly small farms.
- More than 50% of the farms less than 10 ha.
- Many small farms in remote areas or on the steep fjord slopes are being abandoned.
- 12 % of the farmland is abandoned.
- The largest farms are in the central fjord zone, where most of the region's farming takes place.

Crops/percentage of the country's farmland:

- 19 % of Norway's total farmland.
- Accounts for nearly half of the country's hard and soft fruit production.
- 30 % of the country's roughage production.

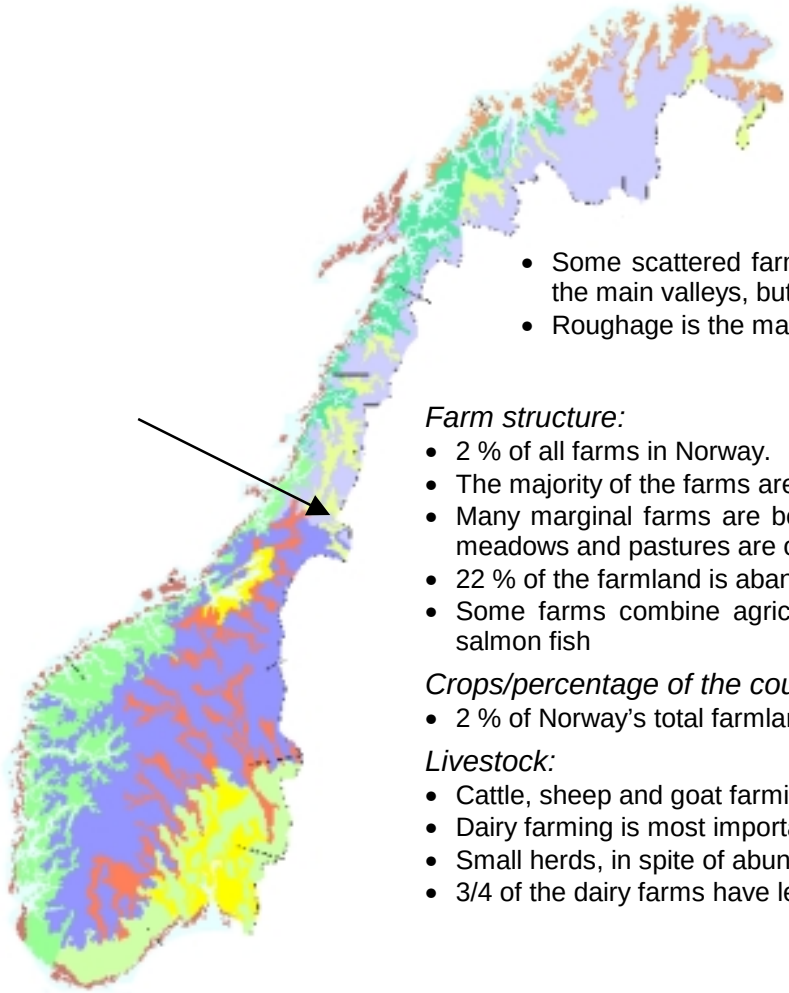
Livestock:

- Major livestock district; cattle, sheep, goats.
- Dairy production is most important.
- Small cattle herds.
- The region has large percentages of the country's dairy cattle (30 %), goats (40 %) and sheep (38 %).

Farming and the cultural landscape:

- Charcteristic, small-scale agriculture, containing numerous cultural elements such as wooded pastures, areas with pollards, heaps of field stones, stone walls, etc.
- Many of these cultural monuments are overgrowing.
- Farm buildings in western Norway vary considerably. In some areas, stone gable-ends are typical, and a few of the characteristic cluster farms have also been preserved.
- The fjords in western Norway are a well-known and popular tourist attraction for Norwegians and foreigners alike.

Region 7:
Forested districts of Northern Norway



Natural and farming conditions:

- Valleys and hilly landscapes predominate.
- Most of the farmland on alluvial plains. Fields often split up by forest.
- Some scattered farms and hamlets are located outside of the main valleys, but many of these are abandoned.
- Roughage is the main crop.

Farm structure:

- 2 % of all farms in Norway.
- The majority of the farms are medium-sized.
- Many marginal farms are being extensified or abandoned, natural meadows and pastures are overgrowing.
- 22 % of the farmland is abandoned.
- Some farms combine agriculture with reindeer husbandry and/or salmon fish

Crops/percentage of the country's farmland:

- 2 % of Norway's total farmland.

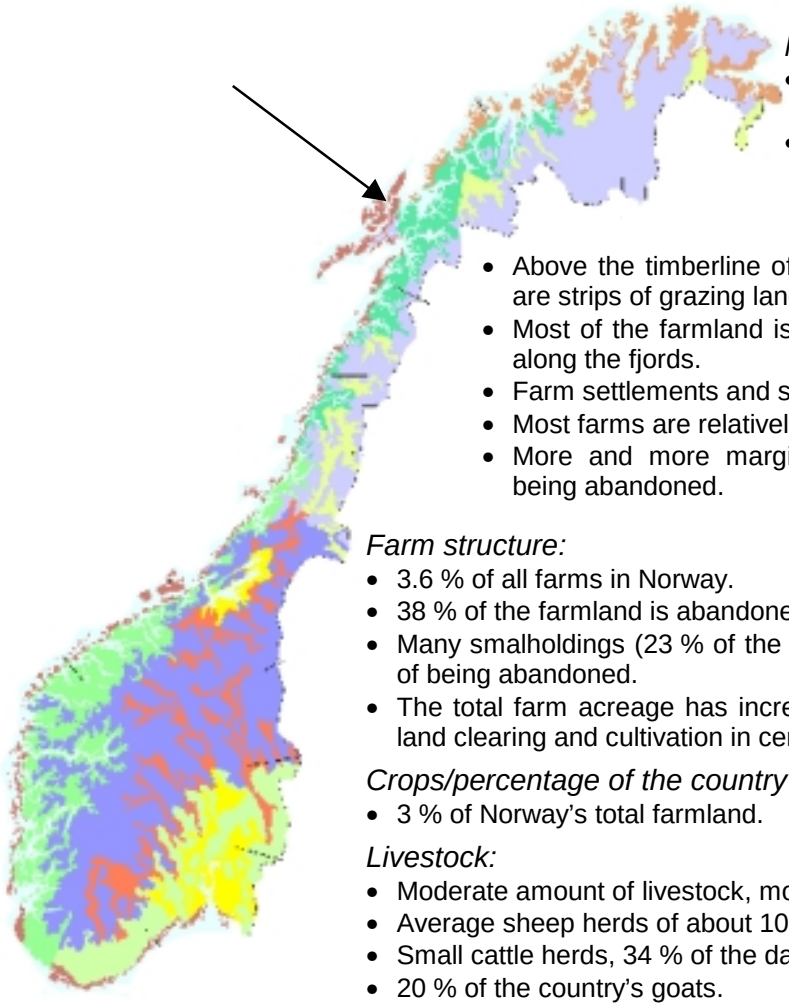
Livestock:

- Cattle, sheep and goat farming is common.
- Dairy farming is most important.
- Small herds, in spite of abundant pasture land.
- 3/4 of the dairy farms have less than 15 cows.

Farming and the cultural landscape:

- Many marginal farms and small-holdings have ceased to farm and have been abandoned during the past decades. Extensification of numerous mountain pastures, natural meadows and pastural landscapes, especially in the southern part of the region.

Region 8:
Fjord districts of Nordland and Troms



Natural and farming conditions:

- Varied fjord landscape with many islands and peninsulas.
- Coastal zones and valleys are suitable as farmland, which lies scattered in these areas like "patchwork".
- Above the timberline of the fjord and valley slopes there are strips of grazing land.
- Most of the farmland is located on the flat coastal plains along the fjords.
- Farm settlements and single farms.
- Most farms are relatively scattered.
- More and more marginal farms and island farms are being abandoned.

Farm structure:

- 3.6 % of all farms in Norway.
- 38 % of the farmland is abandoned.
- Many smalholdings (23 % of the farms < 5 ha), which are in danger of being abandoned.
- The total farm acreage has increased during the past years due to land clearing and cultivation in centrally located areas.

Crops/percentage of the country's farmland:

- 3 % of Norway's total farmland.

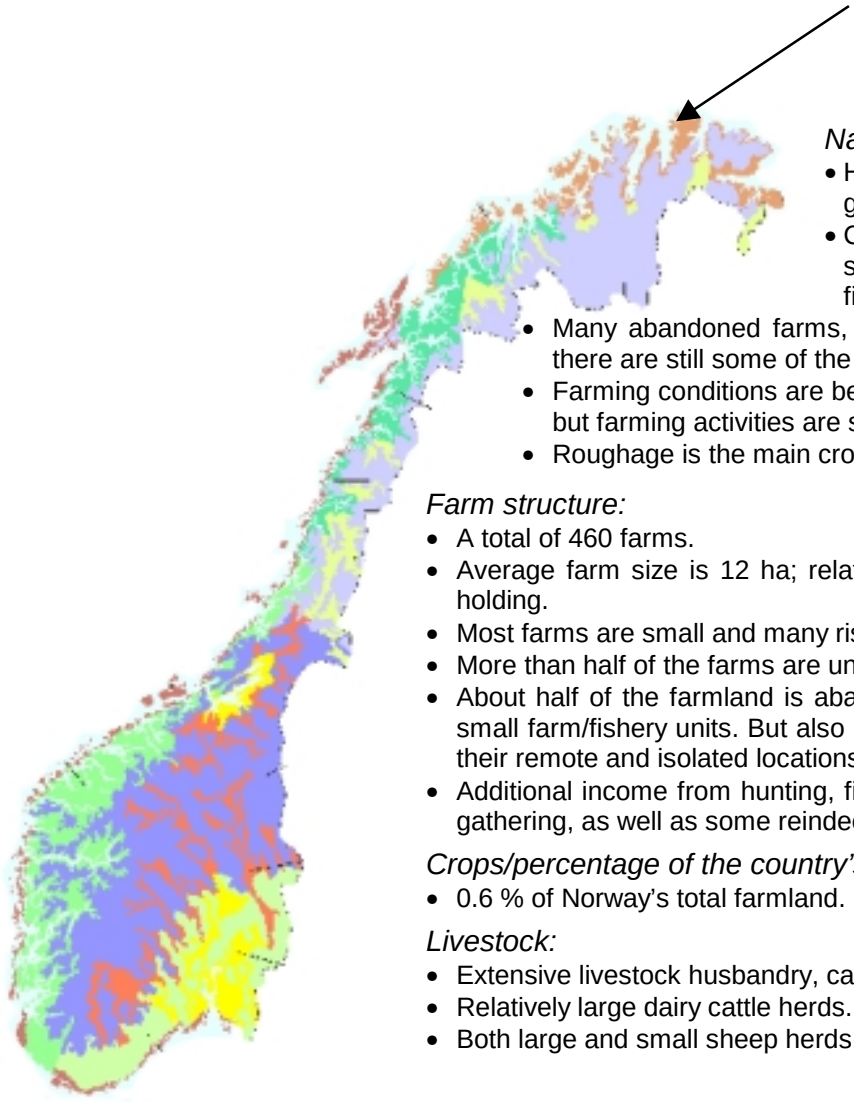
Livestock:

- Moderate amount of livestock, mostly sheep.
- Average sheep herds of about 100 animals.
- Small cattle herds, 34 % of the dairy farms have less than 10 cows.
- 20 % of the country's goats.

Farming and the cultural landscape:

- A number of cultural elements still give the fjord landscape its special character. However, elements such as old natural meadows, hillside pastures, infields and farm buildings are slowly disappearing
- One fourth of the farmland in operation is leased land. This is a problem for the cultural landscape, since leaseholders usually implement fewer landscape oriented measures (due to costs, short-term leasing contracts and more than enough challenges on own property).

Region 9:
Coastal districts of Troms and Finnmark



Natural and farming conditions:

- Harsh climatic conditions, varied topography and a lot of barren landscape.
- Coastal zone with many small, scattered fields, often combined with fishery.
- Many abandoned farms, but on the large islands in the south there are still some of the pluriactive farms in operation.
- Farming conditions are better along the large fjords in Finnmark, but farming activities are scattered.
- Roughage is the main crop.

Farm structure:

- A total of 460 farms.
- Average farm size is 12 ha; relatively high due to extensive lease-holding.
- Most farms are small and many risk being abandoned.
- More than half of the farms are under 10 ha.
- About half of the farmland is abandoned, of which most belongs to small farm/fishery units. But also better farms are abandoned due to their remote and isolated locations.
- Additional income from hunting, fishing, cloudberries, down and egg gathering, as well as some reindeer husbandry.

Crops/percentage of the country's farmland:

- 0.6 % of Norway's total farmland.

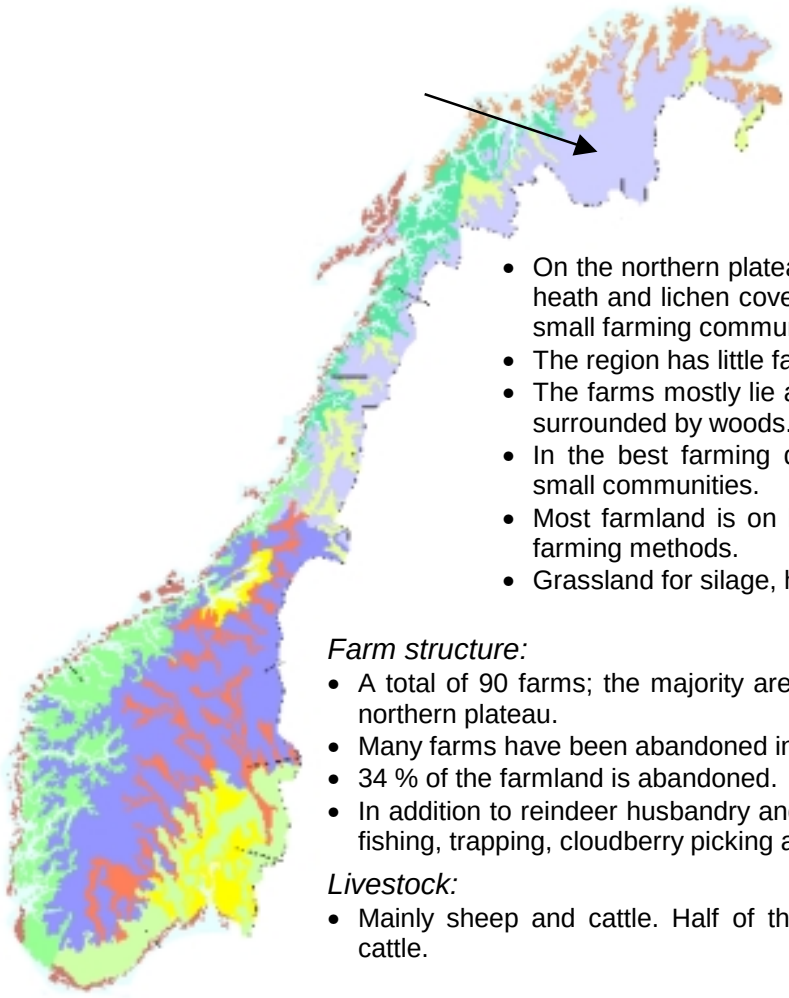
Livestock:

- Extensive livestock husbandry, cattle, sheep and goats.
- Relatively large dairy cattle herds.
- Both large and small sheep herds.

Farming and the cultural landscape:

- On the large islands furthest south there are still active farming communities of the traditional farming/fishery combination.
- Otherwise there are many examples of farms being abandoned because of their remoteness and difficult accessibility by either roads or ferries.

Region 10:
Mountainous areas of Northern Norway



Natural and farming conditions:

- The region can morphologically be divided into the southern, alpine areas and some large valleys to the north.
- In the south, high alpine vegetation predominates, with birch forests in some of the valleys.
- On the northern plateau, birch forests alternate with bogs, heath and lichen covered rocks. Quiet rivers flow through small farming communities.
- The region has little farmland.
- The farms mostly lie along the rivers, often scattered and surrounded by woods.
- In the best farming districts, the farms are gathered in small communities.
- Most farmland is on level ground and suited for rational farming methods.
- Grassland for silage, hay and grazing dominates.

Farm structure:

- A total of 90 farms; the majority are medium-sized, and located on the northern plateau.
- Many farms have been abandoned in recent years.
- 34 % of the farmland is abandoned.
- In addition to reindeer husbandry and farming, activities include hunting, fishing, trapping, cloudberry picking and tourism.

Livestock:

- Mainly sheep and cattle. Half of the region's active farms have dairy cattle.

Farming and the cultural landscape:

- Even though agriculture only plays a modest role, it is very important in an agro-ecological context. Farming under arctic conditions is rare, and many of the region's farms thus have a significant national and international value as reference farms for arctic agriculture.

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3 Policy instruments

The cultural landscape is formed by human activity. The agrarian cultural landscape includes farmyards and all areas influenced by farming activities. Agricultural policy instruments influence the farmers' use of the landscape, and thus affect the development of the agrarian cultural landscape.

This chapter will discuss the project's second objective, i.e., analyse to what degree public support and protective measures are necessary to ensure that Norwegian agriculture can maintain the cultural landscape. In this context the need for product-specific support measures will also be evaluated.

To start with, we'll take a closer look at the connection between land use and the production of agricultural commodities, followed by an evaluation of present policy instruments, seen in relation to the "production" of cultural landscape. Furthermore, we'll present some calculations in order to assess the need for product-specific support. Finally, the chapter concludes with a general discussion, in which lines are drawn to the farming regions described in chapter 2.

3.1 Land use and farm management

Present land use is a result of both natural conditions and existing agricultural policy. For example, high grain prices have made it more profitable to produce grain than livestock fodder in the eastern Norwegian lowlands. As a result, surface-cultivated and other marginal land has not been utilized as intensively as in earlier times. Such marginal areas represent a small share of the total available resources, and their non-utilization was more profitable than their utilization. At the same time, a lot of old grazing land has been levelled, and thus the acreage that can be farmed with modern farm machinery has increased at the expense of the original ravine landscapes. Another example is the extensive use of mountain and forest pastures instead of infield and wooded pastures for sheep grazing. Advantages of mountain grazing are less problems with parasites and better nutritional value of the grass throughout the grazing season. In addition, there are public subsidies for the organized use of mountain grazing lands. The gathering of sheep in the autumn also has a social and cultural aspect, comparable to the annual elk hunt, an important part of Norwegian rural life.

The production of pork and poultry (including eggs) is mainly based on the use of feed concentrates. The relationship between these productions and land use is primarily the

requirement concerning available farmland for the utilization / disposal of farmyard manure. Such farmland can either be used to produce forage crops or vegetables, or, as in most cases, to grow annual oilseed or cereal crops. The production of pork and poultry is thus not included in the following discussion.

Most of the farmland in Norway is used to grow forage and cereal crops, either as cash crops or input factors in dairy and meat production. Figure 3.1 illustrates the connection between land use and agricultural production, in which livestock feed plays a central role. The figure can be seen to either represent a single farm, or an entire region, with the choice between grain production or livestock husbandry for meat and milk production (cattle, goats, sheep).

The left-hand column represents different forms of land use. Cultivated land, i.e., tillable land, can be used to either meadows or other cash crops as grain. Surface cultivated land can usually not be tilled, but often the use of farm machinery for harvesting is possible. The wooded pastures are typically used for grazing, and can neither be tilled nor harvested with machines. Other areas used for grazing are the mountain and forest pastures.

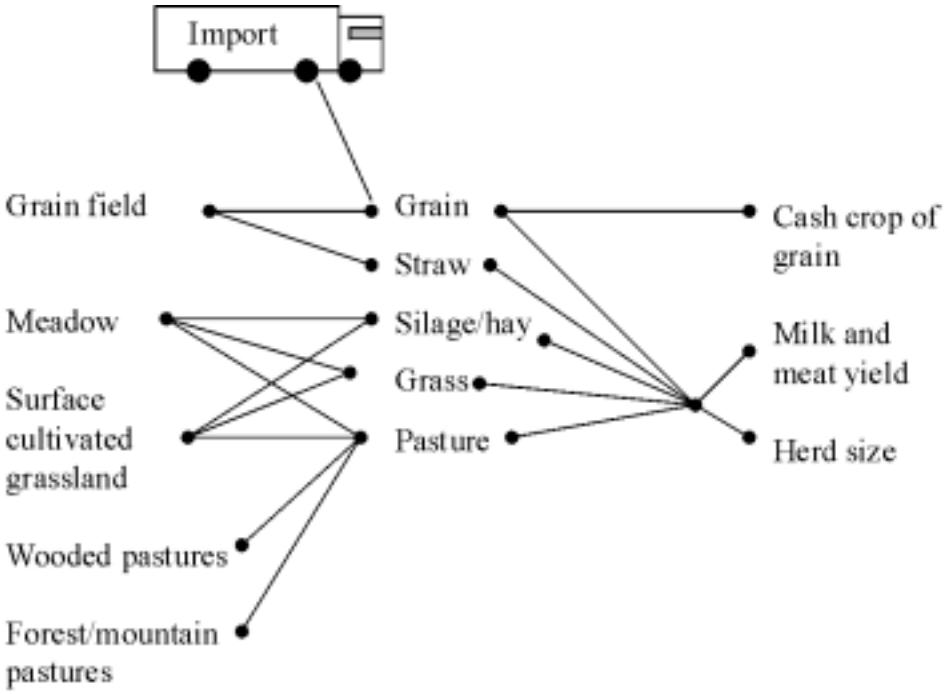

Figure 3.1 The role of livestock feed as the link between land use and agricultural production

The middle column shows the different types of livestock feed, and the lines from the first to the second column indicate which types of feed originate from varying land use. Grain can be either a cash crop or used as livestock feed. Furthermore, the import of feed grain (concentrates) is shown to illustrate that farm operations can also be based on a large share of purchased grain, either from abroad or other regions within the country. All feedstuffs represent a farm's potential feed basis, but the actual distribution of feed use depends on, *inter alia*, changing political and economical conditions. For example, in the 1970's and 80's it was profitable to use as much roughage as possible in ruminant-based productions. Physiologically, the roughage percentage can be varied considerably, and depends in practice a lot on the price of feed concentrates. Low concentrate prices favour the use of concentrates at the expense of roughage use.

The farmer chooses how to utilize the farm's feed potential for the production of milk/meat, and whether to emphasize high yields per animal (smaller herds) or a more moderate individual yield level, thus enabling larger numbers of livestock. Several of the support measures for Norwegian livestock farmers are headage-based, i.e., on the number of animals kept, so that

the number of animals also can be seen as a ”sales product” from the farmer's point of view. The figure illustrates this by the division between ”milk and meat yields” and ”herd size”.

It is important to note that the available feed basis greatly influences the choice of production strategy. For example, intensive dairy production is not compatible with large-scale use of wooded and mountain pastures and other marginal grazing lands. Different livestock species and breeds have varying qualities with regard to the utilization of different types of farming and rough grazing land.

The possibilities for, and the cost of, utilizing non-tillable areas vary considerably from farm to farm.

- In the short run, farms in the same region can have different limitations with regard to the utilization of their feed basis. Two major limiting factors are farm buildings and farm size (area of land which can be operated with farm machinery). For example, a small farm with arable land would favour intensive grassland management, or poor livestock housing capacity would favour a more intensive livestock production, which in turn reduces the use of typical marginal grazing areas.
- In a more long term perspective, land use management is influenced by:
  - the possibilities and resources available to the farm operator (rights, access, climate, etc.). In many parts of Norway, for example, the natural conditions do not allow cereal growing. The rights and the access to rough grazing land also vary considerably from region to region.
  - General level of feedstuff prices, and the relative price differences between them.

3.2 An assessment of present policy instruments

One of the aims of this report is to gain insight into the different types of support in Norwegian agriculture. At present, farmers have a wide variety of support measures to relate to, with lots of different criteria defining the basis for support. Nevertheless, we find it difficult to envisage completely new support schemes, as long as they are to be tied to agricultural activities, which naturally are a necessary prerequisite for maintaining an agrarian cultural landscape.

In this chapter we will take a look at the different types of support schemes presently in use, and evaluate their effects, first and foremost with regard to the agrarian landscape.

According to the principles of the OECD, and in many ways of the WTO as well, farm support can be divided into two main categories: market price support and direct support. The former is paid directly by the consumers, the latter by the taxpayers via public spending.

Support schemes can furthermore be divided into subcategories, depending on the criteria forming the basis for support: headage support, acreage support, price support (product-specific), farm unit support and investment support. Which economic incentives this support provides, depends greatly on the size and production of the farm. Since support rates are often reduced or dropped altogether with increasing farm size[1], many support schemes will in the end for large farms be regarded as a fully decoupled payment, only dependent on that the farm is in operation. This implies that the support has no impact on the production decisions. The relative effect of farm support on different types of holdings is illustrated in the four figures in chapter 3.4.

3.2.1 Price support

Changes in price support have the same effects as changes in market prices. Increased prices of a certain commodity acts as an incentive to increased production, resulting from both greater extent of production (more livestock, increased acreage) and increased production intensity. If the price of, e.g., grain increases, the total acreage used for grain production can increase due to the utilization of otherwise marginal land. The total acreage can also increase when one product becomes relatively more profitable than another due to price changes (the substitution effect).

[1] This does not include market price support, regional deficiency payments, acreage support for cereals and base deficiency payments.

With increasing, but marginally decreasing, returns per unit, a price increase will result in increased inputs, therewith increasing yields per unit. For example, a price change could influence the level of economically optimal fertilization and thus affect yield levels per ha. Increased milk prices will act as an incentive to higher milk yields per cow.

Price support is an efficient instrument for securing a certain production. However, extremely intensive farming as a result of high prices can conflict with the production of certain public goods such as the maintenance of specific landscape elements or walking paths through/along the farming landscape. In addition, price support acts as a stronger incentive to increased fertilizer and pesticide use than other types of support.

There are a number of price support schemes:

Market price support
Market price support is an integrated part of the domestic prices of Norwegian produce. The level of support is based on the difference between Norwegian prices and world market prices. Market price support represents the major part of Norway's "yellow box" support (AMS), which is (part of) the reduction commitment pursuant to the GATT/WTO agreement. As previously mentioned, market price support is a general, "flat-rate" support which is not aimed at any specific regions or farm sizes. It is, however, aimed at certain productions.

Base deficiency payments
These payments are not differentiated by regions, and are paid for cows' and goats' milk by the dairy associations.

Regional deficiency payments
This form of price support is differentiated by regions, and can thus contribute to supporting agriculture in certain regions more than others. The support is rendered to the production of beef, lamb, mutton, cow and goat milk. (In some regions, the payments are also provided to pig meat producers.)

Both the base and regional deficiency payments are budgetary support measures, and are classified as direct support. They influence product supply, but in contrast to market price support, not the demand side (demand curve). They do not influence the price of inputs and results in a larger demand than the alternative. Such direct support can therefore be considered as less trade distorting than market price support, since it enables import to a greater degree.

3.2.2 Support to livestock farming (Headage support)

Headage support is based on the number of livestock. The transition from dairy price support to headage-based support favours a less intensive use of input factors (and thus lower yields) per cow. Less emphasis on high yields also enables the use of more extensive grazing land. Another effect seems to be less differences in yield between different breeds, since the payments do not depend on yield level. Whether or not increased livestock numbers lead to increased forage crop acreage depends on the costs of forage production and possibilities for receiving acreage support. The increased need for livestock fodder resulting from a larger livestock population can also to a large degree be met by increased import of grain and concentrates. The type of grazing land utilized is also a matter of costs. The use of typical wooded pastures can be expensive, since this often requires extensive low yields (i.e., large areas are needed).

During the past years, a slower increase of yields per cow has been observed. However, this cannot be solely ascribed to headage-based support measures. The milk quota system is probably just as important.

Headage support
Payments vary between different livestock species and combinations. The rates are reduced (and eventually dropped altogether) with increasing production volume. For ruminants, the rates are not differentiated by regions.

Vacation and replacement scheme
This support is a repayment for documented hired labour expenses. It is based on the number and kind of livestock, and is limited upwards. For the largest herds, the hired labour support is in effect a non-product-specific support measure.

Rough grazing support
This support is paid for livestock grazing on rough grazing land (forest and mountain pasture) for at least 8 weeks. It is thus meant to specifically stimulate the use of rough grazing lands.

3.2.3 Acreage support

Acreage support measures are directly tied to the area of farmed land, and therewith also to the agrarian cultural landscape. Acreage support is meant to discourage from alternative usage of cultivated farmland such as afforestation, fallow and abandonment. The most important of the acreage-based support schemes is the acreage and cultural landscape scheme, which is presented below. The other three forms of acreage support aim at favouring specific regions or grain production methods.

Acreage and cultural landscape scheme
The support is based on the officially registered farm acreage, and on rates varying with farm size, crops and geographical zones. The forage-growing acreage that can receive support is limited upwards, but not the grain-producing acreage. In those regions where cereal growing is not a viable alternative, the scheme limits the profitability of farming more than 40 ha. On the other hand, the rates for roughage, potatoes and vegetables are considerably higher for the first few hectares than for grains, with significant regional variations. In order to receive this support, it is not permitted to make any substantial changes to the cultural landscape. Thus, the scheme contributes to the protection of landscape elements for which one otherwise does not receive direct support (field ridges, streams, etc.).

For livestock farmers the acreage and landscape scheme makes grazing more lucrative than intensive ley cultivation, since the payments, within certain limits, are independent of crop and livestock yields. (Support is reduced for very extensive farming, and requires a certain minimum number of animals / production volume.) The acreage scheme acts as an incentive to continue farming areas in spite of relatively low yields or difficult terrain. In general, the acreage scheme favours extensification of farming operations to a greater degree than price support measures.

Support for fodder production in the mountains
The support is meant to compensate for the additional expenses associated with growing livestock fodder in mountainous areas. It is given to cultivated and surface-cultivated areas, which are fertilized and harvested as hay or silage.

Support for farms in steep terrain
The support is meant to compensate for the disadvantages of farming in predominantly steep terrain. The support scheme is based on the cultivated and surface-cultivated acreage. At least 50% of this area must be in operation and have a slope of 1:5 or steeper. A subsidy of NOK 2100 per ha is given up to a maximum of 5 ha.

Reduced tillage support
This support scheme aims at encouraging farmers to minimal autumn tillage, and does therefore not include grassland. Support is given at a per ha rate for the following measures:

- Overwintering of grain and oilseed crops in stubble. Rates vary with varying erosion risk.
- Catch crops (arable fields).
- Grass-covered drainage gullies on arable land.

The support scheme is meant as a (partial) compensation for the costs of such measures.

3.2.4 Farm unit support

Farm unit support, has the effect of maintaining farm units. This support increases profitability especially on small farms with high production costs, thus making farm consolidation less attractive. The support therewith also contributes to active use of already existing farm buildings. The rates for both the acreage and headage-based support schemes decrease significantly with increasing farm size, and to a substantial degree, these schemes act as farm unit support measures. Farm support payments are often tied to certain criteria (acreage support – crop variety; headage support – types of livestock), and in this way they influence farm management decisions. However, the support does not directly influence marginal production factors such as fertilizer intensity, yield levels, etc.

Other types of farm unit support include:

Structural income support to dairy farms
Support paid on a per litre basis, up to a maximum of 30,000 litres. For the vast majority of farms, producing more than this limit, the support is in effect a non-product-specific measure.

Support to mountain dairy farming
Aimed at stimulating the use of mountain summer pastures, thus preventing the traditional alpine pastures from overgrowing.

Support to young farmers
For farmers under the age of 35. The support is limited to one person per holding (NOK 4,000 for women and NOK 3,000 for men in 1998/1999).

3.2.5 Investment support

Subsidies are given for new investments, as well as for replacement or expansion of old farm buildings. The maximum grant is limited to NOK 150,000 (180,000 in northern Norway) or 30% of the construction costs. For larger individual farms or joint operations this subsidy is in effect non-product-specific support.

The investment subsidies, even though directly tied to the construction and maintenance of farm buildings, have a certain effect on the cultural landscape through their contribution to maintaining a small-scale farming structure.

3.2.6 Laws and regulations

Various laws and regulations affect the cultural landscape by influencing the type and intensity of farm operations.

Milk quota
Milk quotas play a major role in stimulating Norwegian dairy farmers to place more emphasis on meat production, therewith increasing the number of livestock instead of focusing purely on high

milk yields. The quotas help to curb milk production, which is easily spurred by the relatively good profitability in Norwegian dairy farming.

Regulation on livestock exercise
Due to the ”Regulation on cattle and pig husbandry” there has been some increase in grazing activities. The regulation strictly applies to *exercise*, and not necessarily grazing. It is required that cattle graze for at least 8 weeks. However, grazing is not required if the cows are kept in loose housing. On farms without loose housing facilities this regulation does however contribute to increased use of pasture land.

The regulation on minimum acreage for manure dispersal is only a minor problem on farms with only livestock and/or cereals. The regulation requires a minimum acreage (for manure dispersal) in relation to the number of livestock.

3.2.7 Policy instruments and land use – a summary

At present, market price support, the acreage and cultural landscape scheme, and headage support are the most important agricultural policy instruments. Today's land utilization is a result of the relative competition between alternative land use strategies. Technological advances that change the costs of varying productions, as well as changes in prices and subsidies influence how the land is used. All types of farm support can be critical for a farmer's decision on whether or not to continue farming. However, various support schemes have different effects on how farms can be run profitably, what crops are to be grown, which grazing areas to utilize, etc. The way in which the support schemes are formulated can thus influence the development of the cultivated landscape. Another aspect is that the subsidy structure also determines how much additional (financial) stimulus is necessary in order to maintain especially valuable landscape elements.

The direct effect of any support is related to what the subsidies actually apply to, but there will also be indirect effects. This is illustrated in figure 3.2. The boxes and arrows show the direct effects of the various types of farm support. For example, headage support favours livestock production and can result in generally more livestock. This would be the direct effect. More livestock need more fodder, and this could lead to increased use of farmland for forage production and grazing land. However, the increased fodder requirement can be met in several ways, e.g., by increased import of feed concentrates or increased domestic grain and straw production. There may also be a shift from grain to forage production and increased utilization of wooded and rough grazing land. These are indirect effects, which depend on the costs of the different types of forage production. On the other hand, an acreage subsidy for leys and meadows will directly contribute to maintaining grassland areas. This reduces the cost of forage production on such land, and increases the profitability of a roughage based production.

Accordingly, the direct effect of market price support is to encourage the intensification of production. The indirect effects depend on the relative profitability between different types of land use. Financial support of a certain production will lead to the redisposition of farmland for use in the production receiving increased support/prices.

Farm unit support acts to maintain operating units. The indirect effect depends on whether the alternatives (with no support) are farm consolidation or the complete abandonment of the area. Farm consolidation does not alter land use drastically, since it still is used for agricultural production, but the termination of all farming activities leads to significant changes of the cultural landscape over a period of time.

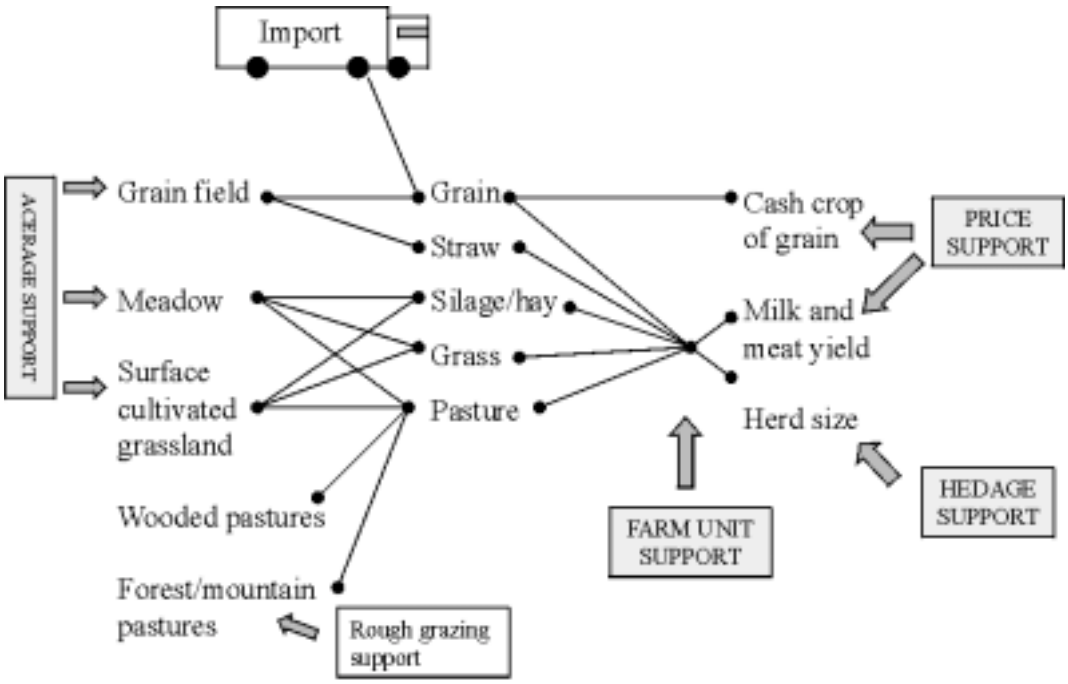

Figure 3.2 The direct effects of different types of agricultural support measures

As can be seen in the figure, wooded pastures are not directly supported as a form of land use. In certain cases, this type of grazing land is classified as cultivated pasture, and sometimes it can be considered as rough grazing land. There are however no general subsidies aimed at specifically encouraging the use of this type of grazing land.

Grazing, especially on unfertilized mountain pastures, is often mentioned as being important with regard to maintaining biodiversity. This activity is encouraged by the support to mountain dairy farming, as indicated in the figure.

The type of farm support also influences variations in yearly income, thus affecting how prone farmers are to annual income fluctuations. Market price support, for example, is directly tied to production volume. Other forms of support, however, are less dependent on yields and production levels, but to a greater degree on the use of input factors. Farmers are thus less exposed to income fluctuations due to climatic conditions, etc. For risk-averse farmers this implies that the minimum level of support necessary to ensure the continuation of their farming activities can be lower if given as non-product-specific support, e.g., acreage support, than as market price support.

Nevertheless, it has been argued that a transition from market price support to other forms of support would not be a sufficient incentive to assure the development of a ”desirable” form of agriculture. This statement is discussed in chapter 3.3.

3.3 Income and cost calculations on four types of farms

In this chapter we will present income and cost calculations from four different types of farms, in order to illustrate the level of support, the relationship between different forms of support, and the relationship between product-specific income, including product-specific support, and variable costs. The calculations, presented in figures 3.3, 3.4, 3.5 and 3.6 , are based on income and cost data from four of the model farms used by the Budget Committee for Agriculture (Budsjettnemnda for jordbruket, 1998). In many ways, the chosen farms can be considered as typical representatives for Norwegian agriculture.

3.3.1 Explanation of the calculations

The figures for present income and costs (two bars on the left) are based on farm accounts from 1996, which then have been adjusted to 1998 prices and subsidy rates.

The sources of income are divided into the following groups, the colour indicating the type of support (yellow, blue or green box) according to the WTO-classification:

- World market value of the goods (grey)
- Market price support (yellow box)
- Base deficiency payment (yellow box)
- Regional deficiency payment (blue box)
- Headage support (direct support, blue box)
- Structural income support to dairy farming (direct support, blue box)
- Acreage and cultural landscape scheme (direct support, blue box)
- Direct support, mainly the vacation and replacement scheme (green box)
- Additional support (green box) to replace previous price support

The costs are divided into:

- Variable costs 1 (concentrates, forage, fertilizer, seeds)
- Variable costs 2 (electricity, rental costs of machinery and land, expenses due to animal production purchase of livestock)
- Variable labour costs (only grain production)
- Fixed costs (administration, insurance and maintenance costs)
- Interests and depreciation
- Return to labour (and own capital)

In the two right-hand bars, the ”yellow box” support has been removed. In addition, costs have been adjusted to the expected decline of prices on input factors such as feed concentrates, milk products and live animals. The factors used to convert existing Norwegian prices on products and input factors to world market prices are presented in Table 3.1 (Norwegian price x factor = “world market price”) . These are estimates based on prices in the OECD PSE-database. The adjustment of domestic prices to an estimated ”world market price level” is naturally associated with a large degree of uncertainty.

Table 3.1 Factors used to convert Norwegian price level to ”world market price level”

Income and expenses	World market price factor
Grain	0.45
Seed, plants	0.55
Feed concentrates	0.60
Milk and dairy products	0.50
Beef/live cattle	0.45
Mutton & lamb/live sheep	0.85
Wool	0.25
Roughage	0.55

The return to labour and own capital is kept at the same level for both scenarios.

In order to compensate for income reductions caused by the removal of ”yellow box” support, it has been assumed that a new ”green box” support has been introduced (marked ”additional support (green box)” in the figures).

3.3.2 Results

The calculations indicate that farm support is absolutely necessary to enable today's form of agriculture, and therewith also for the maintenance of an agrarian cultural landscape. However, the calculations represent a very static approach to the issue, and can be mainly regarded as a worst case scenario; a situation in which it is assumed that a farmer will purely continue the same production strategy. When possible, farmers will also change their strategies in adaptation to price changes. Nevertheless, in a short term perspective the calculations can be quite accurate.

The figures illustrate that the most important of the present direct support schemes are characterized as ”blue box” support, according to the GATT/WTO criteria. Most important is the acreage and cultural landscape scheme. On cattle and sheep farms, headage support and the replacement scheme also contribute significantly. Regional deficiency payments are important for the western Norwegian dairy farm and the sheep farm. In figures 3.5nd 3.6 the results for dairy farms in two different regions are shown, western (fjord landscape) and eastern Norway (lowlands, best farming region). Direct support represents a much larger share of the income on the farm in western Norway than on the farm in the eastern lowlands. Differences in income are due to both farm size and varying support rates in the different regions.

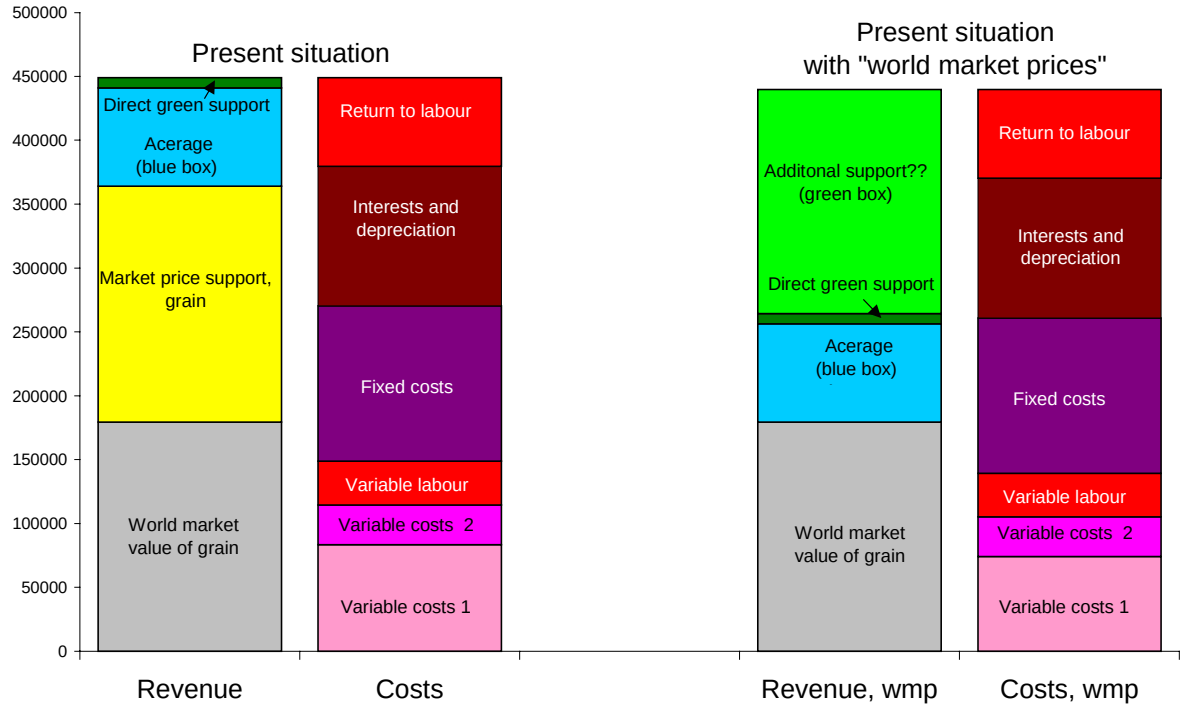

Figure 3.3 Revenue and costs on a 40 ha grain producing farm (region 2). Present situation (1998) and the present situation calculated with ”world market prices” (wmp) on grain. NOK per farm.

Source: Calculations based on the Budget Committee for Agriculture (1998) (Norway) and OECD (1998)

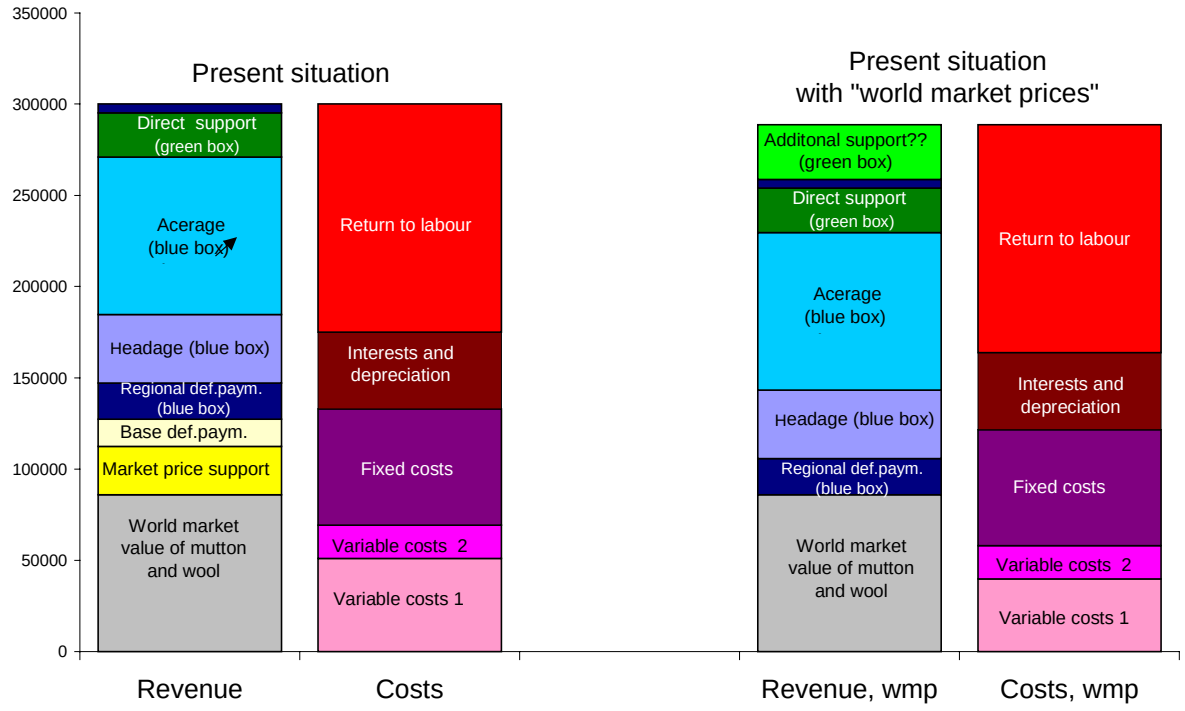

Figure 3.4 Revenue and costs on a sheep farm with 122 ewes in Norway's mountain and valley region. Present situation (1998) and the present situation calculated with" world market prices" (wmp) on mutton/lamb and wool, excl. base deficiency payments. NOK per farm

Source: Calculations based on the Budget Committee for Agriculture (1998) (Norway) and OECD (1998)

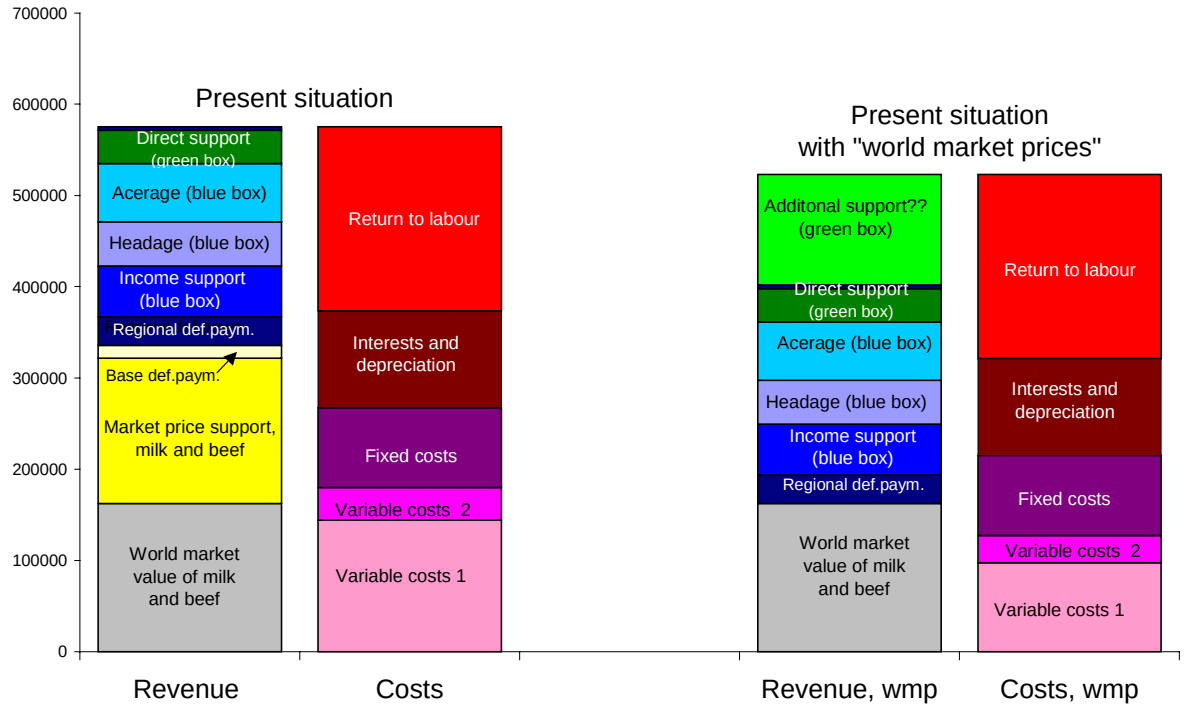

Figure 3.5 Revenue and costs on a dairy farm with 12 cows in western Norway. Present situation (1998) and the present situation calculated with "world market prices" (wmp) on milk, beef and concentrates, excl. base deficiency payments. NOK per farm

Source: Calculations based on the Budget Committee for Agriculture (1998) (Norway) and OECD (1998)

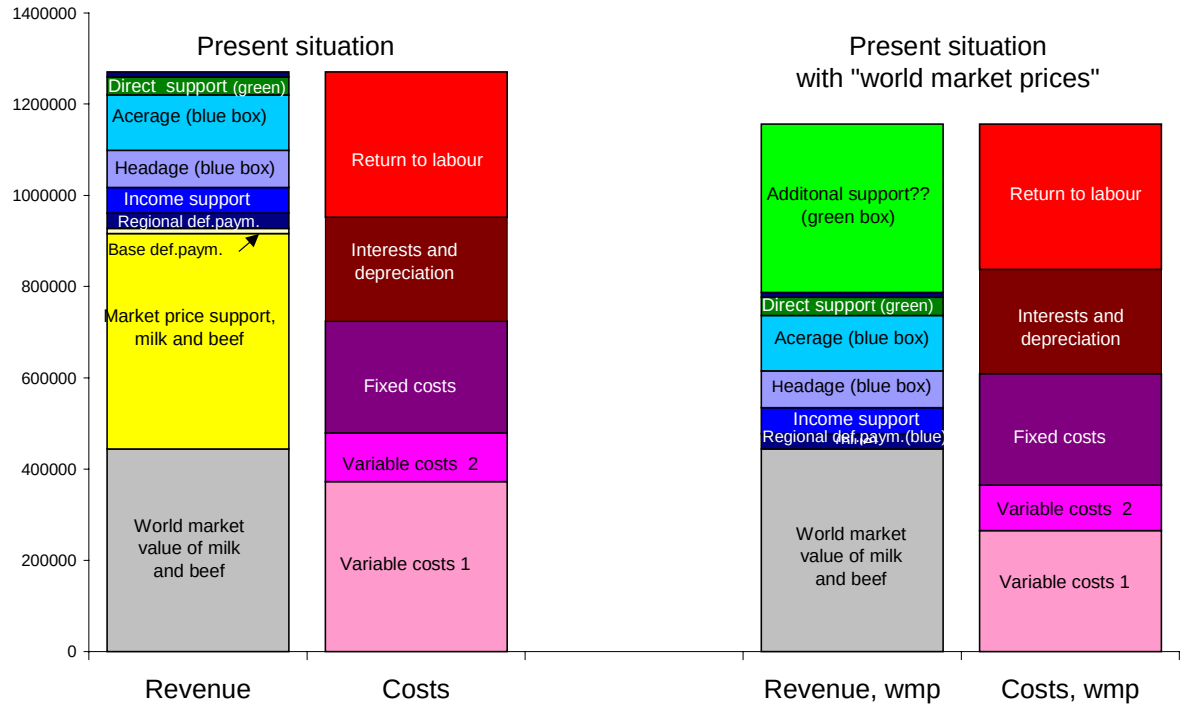

Figure 3.6 Revenue and costs on a dairy farm with 23 cows in eastern Norway. Present situation (1998) and the present situation calculated with" world market prices" (wmp) on milk, beef and concentrates, excl. Base deficiency payments. NOK per farm

Source: Calculations based on the Budget Committee for Agriculture (1998) (Norway) and OECD (1998)

3.3.3 Variable costs and market price

In order for a farmer to have the financial incentive to, e.g., cultivate, sow and harvest his/her grain fields for a single year, the variable costs for these operations must be covered by the product-specific income, in this case income from selling the grain. In other words, the short term requirement is that the marginal costs do not exceed the marginal income. The figures above show total figures. Supposing here that the variable costs are independent of the production volume, the relative ratio between variable costs and sales income (incl. product-specific support) corresponds to the ratio between marginal costs and marginal income.

An important issue in this connection is which costs are to be considered as variable. This is also a question of the period of time one is considering. The costs characterized as variable in the presented calculations are listed in chapter 3.3.1.

A problem can arise in the transition from product-specific support to other forms of support if the variable costs exceed the variable income. Such a situation requires contracts on farm practice, etc. if a farmer is to have any economic motivation for implementing cultural landscape maintenance.

The calculations show that the production income, given world market prices (i.e., excluding "yellow box" support), actually covers the variable costs. Even though these are individual cases, with some uncertainty with regard to the data and the conversion to the world market price level, they nevertheless indicate that it should be possible to significantly reduce the present level of product-specific support while increasing the share of non-product-specific support, and still maintain sufficient financial incentive for farmers to harvest crops and to continue their production.

3.4 Policy instruments and the agrarian landscape

One of the objectives of this project has been to analyse to what degree public support and protective measures are necessary to enable the maintenance of the cultural landscape by Norwegian agriculture. The need for possible product-specific support should also be assessed.

So far, we have discussed the connection between land use and the production of agricultural commodities, and evaluated present policy instruments with regard to the "production" of cultural landscape. In addition, a number of cases illustrating these connections were presented, and the need for product-specific support was evaluated. We will conclude this chapter with a more general discussion, in which we also would like to include the farming regions described in chapter 2.

3.4.1 What are our goals?

When evaluating the use of policy instruments it is highly important to have a clear picture of one's goals. However, these are rarely unambiguous. This applies also to the preferences of a society concerning the type of cultural landscape it desires. In addition, such preferences usually change over a period of time.

The guidelines for the current Norwegian agricultural policy are described in the Report to the *Storting* (Norw. Parliament) no. 8 (1992–93) – *Landbruk i utvikling* (Landbruksdepartementet, 1992). Guidelines for the environmental policy are also given herein, including the emphasis on increased production of cultural landscape and other public goods. This implies, inter alia, that agricultural production should increasingly consider issues relating to the cultural landscape (page 17). The Report to the *Storting* does not state any detailed objectives concerning the type of farming landscape envisaged, but according to the Ministry of Agriculture the guidelines should be followed up locally by developing action-oriented environmental and resource plans. Environmental and cultural landscape issues are also discussed in the annual reports to the *Storting* in connection with the agricultural negotiations (between the government and farmers' unions), but here as well in a relatively general and superficial manner. In the Report to the *Storting* no. 67 (1997-98) on the agricultural negotiations 1998 (Arbeids- og administrasjons-departementet 1998) it is, e.g., mentioned that:

> *".. the considerations of farming activities to the cultural landscape are included in both legal and economical policy instruments. These considerations are meant to secure flora, fauna and their biotopes, our cultural heritage, traditional farm buildings, as well as possibilities for the public to walk in and experience (the cultural landscape). The environmental values are associated with individual farms as well as larger regions such as mountain pasture land, coastal landscapes, ravine landscapes and the typical forest and farming settlements. In order to maintain these environmental values, it is necessary to ensure that such areas continue to be inhabited, farmed and utilized, for example, by use of rough grazing lands, and by promoting knowledge of traditional farming methods" (p. 25).*

As shown in chapter 2, the Norwegian farming landscape is extremely varied. This is mainly due to topographical and climatic conditions, but also to the prevailing political/economical conditions in Norwegian agriculture. The landscape is changing, due to changing farming methods, but also because of termination of farming activities. It is questionable if society wishes to preserve the agrarian landscape in its present state. The costs for such a preservation are widely considered as being too high. Another possibility may be that today's policy instruments are not suited to maintain the cultural landscape in the desired way. In other words, they are not focused well enough with regard to their objectives.

3.4.2 The need for support

It is obvious that Norwegian agriculture is at present receiving substantial support, and that such farm support will also in future be necessary in most parts of the country if agriculture is to be maintained at all. The calculations in the previous chapter clearly show this. However, without agriculture it is difficult to maintain an agrarian cultural landscape. Reduced farming activities will still create farming landscapes, but perhaps not to the extend desired by society.

Another important question, though, is *how much support* would be necessary to maintain the cultural landscape in one or another desired form. This depends on several factors:

- What are the objectives with regard to the cultural landscape? As mentioned, these are not unambiguous. It is not known what type, or how much farming landscape society desires. Therewith, it is also difficult to make decisions on what development to support.
- What is the financial situation on farms in general? How much support would be necessary in addition to product-derived income (at world market prices)? And, if additional support is necessary, how should emphasis be placed in relation to other public goods that also need funding, e.g., rural employment measures?
- Support cannot be evaluated independently from possible cost reductions. For example, it is not certain if the desired cultural landscape can be achieved with the present farm structure.

Due to these conditions, it has not been possible to quantify the necessary level of support within the scope of this project.

3.4.3 Formulating policy instruments

It is difficult to discuss the formulation of policy instruments in detail when society has no clear concept of how it would like the agrarian cultural landscape to develop, while at the same time the level of support also depends on a number of ”external” factors, regarding both costs and income. Nevertheless, it is possible to make some general remarks based on the regional divisions and the presented calculations.

There are significant regional differences in the cultural landscape. This implies that the conditions necessary to maintain some form of agriculture also must vary. The varying (natural) conditions influence the income potential within the different regions, or they necessitate varying levels of support. The policy instruments have to thus be differentiated and specifically targeted with regard to the existing regional variations.

The varying conditions also affect the possibilities for future structural changes, and thus the potential for cost reductions. As already mentioned, we are not sure as to what degree the present Norwegian small-scale farm structure is absolutely a prerequisite for achieving the desired cultural landscape. An increase in herd size on a dairy farm from 12 to 20, 30 or 40 cows does not necessarily need to lead to a degradation of the cultural landscape. This will depend on how the policy is formulated, and on which criteria need to be fulfilled in order to receive support. For example, the establishment of large dairy farms in region 2 (*lowlands of eastern and central Norway* (Region 2); predominantly grain-growing areas) would hardly be considered as a depreciation of the cultural landscape in this region, perhaps quite the opposite.

On the other hand, it is difficult to make any significant structural changes in other regions due to the existing natural (topographical) conditions. Farm consolidation is difficult in areas with lots of scattered, small fields. Also, transport is costly due to long distances. A typical example of such conditions is region 3 (*forested districts of southern and eastern Norway* (Region 3)), but also to some extent region 1 (*coastal districts of southern Norway and Nordland, excluding Jæren*) and region 6 (*fjord districts of western and central Norway*). In such regions, rather generally formulated policy instruments would be sufficient to maintain the farming landscape. The major objective would be to make it economically feasible to continue farming and thus preventing the winding down of farming altogether.

In the most marginal regions, i.e., those with the harshest natural conditions, the question of ”to be or not to be” is even more pronounced (northern Norway, mountains in southern Norway). Here, the limiting factor is perhaps not so much the natural conditions, but more so the overall conditions of the existing regional policies. Farm support alone may not be sufficient in order to maintain the agrarian landscape.

Another issue, which could be used as an argument against substantial structural changes, is the importance of farm buildings for the cultural landscape. Farm consolidation means larger, but fewer farms, and in the long run fewer buildings. However, there are regional variations, since many farms in some regions would continue to exist as part-time farms and/or for residencial purposes. This applies mainly to those areas that have possibilities for alternative employment, e.g., the grain-producing areas in region 2 (*owlands of eastern and central Norway*). In this connection the need for possibly introducing support measures directed specifically towards the preservation of desirable farm buildings should be evaluated.

The question of product-specific vs. non-product-specific policy instruments is a question of how much product-specific support is necessary in order to maintain an active farming landscape, but also a question of which criteria to associate with the direct support. Even though the amount of data is not large, the calculations we presented suggest that there still will be sufficient financial incentive even when reducing the present level of product-specific support significantly. This should form a basis for more targeted policy instruments, directed specifically towards various elements in the maintenance/development of the cultural landscape. Also, it would also result in less trade-distorting agricultural support. If it should however prove necessary to have product-specific support, it would be preferable to have a regionalized price support for certain areas, instead of a more general market price support. A political problem in this connection would naturally be the possible increase of budgetary support, in any case in the short run.

The Norwegian farming landscape is extremely varied. This is due to the topographical and climatic variations, but also, as a result thereof, because the type of farming which ”produces” the landscape also varies. The conditions for farming vary from extremely good, requiring little support, to extremely difficult, requiring substantial support. This variation also means that all policy instruments need to be specifically adapted. In general one could say that the better the conditions are for farming, the more specific the policies should be. For example, preserving special landscape elements such as field border zones, stone walls, generally enhancing landscape variation. On the other end of the scale, in some areas it will be important to secure financial viability in order to keep farms in operation at all.

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Appendix tables – Farming conditions in the different regions

Since region 1, the coastal region in southern Norway and Nordland includes Jæren, which represents about ¼ of the region's farmland, several of the tables below are specified for the region excluding Jæren and Jæren alone. Otherwise Jæren would in many cases raise the region's average values. Due to the regional classification of the data, all data which cannot be geographically traced is not included. Nevertheless, the data is sufficient to illustrate the relative distribution and variation between the regions.

Distribution of farmland

Table 1. The regions' share of the total (Norwegian) land area, total farm acreage and percentage of farmland

Region		Share of total land area (%)	Share of total farm acreage (%)	Percentage farmland of the regions' total area
1.	Coastal districts of Southern Norway and Nordland	4.6	13.7	8.9
	Jæren	*0.2*	*3.5*	*56.2*[1)]
	Coastal districts of Southern Norway and Nordland excl. Jæren	*4.5*	*10.2*	*6.9*
2.	Lowlands of Eastern and Central Norway	4.6	36.8	24.3
3.	Forested districts of Southern and Eastern Norway	9.0	5.2	1.7
4.	Valley and highland districts of Southern Norway	8.1	18.0	6.8
5.	Mountainous areas of Southern Norway	27.9	1.6	0.2
6.	Fjord districts of Western and Central Norway	11.3	18.9	5.1
7.	Forested districts of Northern Norway	4.4	2.1	1.4
8.	Fjord districts of Nordland and Troms	5.7	3.0	1.6
9.	Coastal districts of Troms and Finnmark	4.7	0.6	0.4
10.	Mountainous areas of Northern Norway	19.6	0.1	0.02

1) Percentage farmland of Jæren's land area

Table 2. Relative distribution of farmland not in operation and actively farmed land, specified by own and rented land (in %) [1)]

Region		Not in oper.	In oper.	Own land	Rented land
1.	Coastal districts of Southern Norway and Nordland	17	83	69	31
2.	Lowlands of Eastern and Central Norway	6	94	75	25
3.	Forested districts of Southern and Eastern Norway	22	78	62	38
4.	Valley and highland districts of Southern Norway	8	92	72	28
5.	Mountainous areas of Southern Norway	10	90	71	29
6.	Fjord districts of Western and Central Norway	12	88	76	24
7.	Forested districts of Northern Norway	22	78	67	33
8.	Fjord districts of Nordland and Troms	38	62	58	42
9.	Coastal districts of Troms and Finnmark	48	52	60	40
10.	Mountainous areas of Northern Norway	34	66	70	30

1) The calculations regarding farmland not in operation are somewhat uncertain. See text in chapter 2.4.1

Distribution of farms and farm sizes

Table 3. Farm distribution and average farm size by region

Region		Number of farms	Relative share of the country's farms (%)	Average farm size (ha)
1.	Coastal districts of Southern Norway and Nordland	9875	14.4	13.6
	Jæren	*2053*	*3.0*	*16.6*
	Coastal districts of Southern Norway and Nordland excl. Jæren	*7822*	*11.4*	*12.8*
2.	Lowlands of Eastern and Central Norway	18097	26.4	19.9
3.	Forested districts of Southern and Eastern Norway	4440	6.5	11.4
4.	Valley and highland districts of Southern Norway	12603	18.4	14.0
5.	Mountainous areas of Southern Norway	1119	1.6	14.3
6.	Fjord districts of Western and Central Norway	17842	26.1	10.4
7.	Forested districts of Northern Norway	1461	2.1	13.9
8.	Fjord districts of Nordland and Troms	2455	3.6	12.2
9.	Coastal districts of Troms and Finnmark	462	0.7	12.2
10.	Mountainous areas of Northern Norway	92	0.1	15.7
Norway		68446	100.0	14.3

Table 4. Relative distribution of the regions' farmland by farm size (in %)

REGION		Farm size category (ha)				
		Under 5	5-10	10-20	20-50	over 50
1.	Coastal districts of Southern Norway and Nordland	4.6	12.8	35.7	43.3	3.6
	Jæren [1)]	*1.9*	*7.1*	*36.0*	*51.3*	*3.8*
	Coastal districts of Southern Norway and Nordland excl. Jæren	*5.5*	*14.8*	*35.6*	*40.6*	*3.5*
2.	Lowlands of Eastern and Central Norway	1.6	7.5	23.6	48.9	18.4
3.	Forested districts of Southern and Eastern Norway	7.3	20.5	34.0	33.6	4.6
4.	Valley and highland districts of Southern Norway	3.7	13.9	38.2	37.7	6.4
5.	Mountainous areas of Southern Norway	3.0	12.0	40.9	41.5	2.5
6.	Fjord districts of Western and Central Norway	7.5	21.5	47.4	22.9	0.6
7.	Forested districts of Northern Norway	3.0	13.6	40.4	41.7	1.4
8.	Fjord districts of Nordland and Troms	6.0	15.9	36.7	40.5	0.9
9.	Coastal districts of Troms and Finnmark	6.9	14.9	30.7	45.3	2.2
10.	Mountainous areas of Northern Norway	2.4	9.0	39.7	45.0	4.0
Norway		4.0	13.2	34.0	39.9	8.9

[1)] Relative distribution of farmland in Jæren by farm size

Crop distribution

Table 5. Distribution of crops by region. Hectares

Region		Grain	Roughage	Potatoes	Hard/soft fruit	Vege-tables
1.	Coastal districts of Southern Norway and Nordland	15045.3	103990.7	2671.4	267.3	1479.8
	Jæren	*3081.2*	*24024.2*	*1060.2*	*39.4*	*443.5*
Coastal districts of Southern Norway and Nordland excl. Jæren		*11964.1*	*79966.5*	*1611.2*	*227.9*	*1036.3*
2.	Lowlands of Eastern and Central Norway	248641.7	78681.8	8666.4	2006.5	3760.8
3.	Forested districts of Southern and Eastern Norway	16015.1	30071.3	557.4	327.7	288.9
4.	Valley and highland districts of Southern Norway	35248.4	126288.9	4079.1	131.1	163.9
5.	Mountainous areas of Southern Norway	451.4	14557.9	23.4	1.6	0.4
6.	Fjord districts of Western and Central Norway	2266.7	174093.5	639.1	2238.4	164.2
7.	Forested districts of Northern Norway	0.9	18027.2	148.7	6.4	6.9
8.	Fjord districts of Nordland and Troms	11.9	26707.3	415.9	40.5	41.7
9.	Coastal districts of Troms and Finnmark	0.0	5127.6	37.9	1.8	4.4
10.	Mountainous areas of Northern Norway	0.0	1315.1	1.3	0.0	0.0

Table 6. Relative distribution of crops by region (in %)

Region	Grain	Roughage	Potatoes	Hard/soft fruit	Vegetables
1. Coastal districts of Southern Norway and Nordland	4.7	18.0	15.5	5.3	25.0
Jæren	*1.0*	*4.2*	*6.1*	*0.8*	*7.5*
Coastal districts of Southern Norway and Nordland excl. Jæren	*3.8*	*13.8*	*9.3*	*4.5*	*17.5*
2. Lowlands of Eastern and Central Norway	78.3	13.6	50.3	40.0	63.6
3. Forested districts of Southern and Eastern Norway	5.0	5.2	3.2	6.5	4.9
4. Valley and highland districts of Southern Norway	11.1	21.8	23.7	2.6	2.8
5. Mountainous areas of Southern Norway	0.1	2.5	0.1	0.0	0.0
6. Fjord districts of Western and Central Norway	0.7	30.1	3.7	44.6	2.8
7. Forested districts of Northern Norway	0.0	3.1	0.9	0.1	0.1
8. Fjord districts of Nordland and Troms	0.0	4.6	2.4	0.8	0.7
9. Coastal districts of Troms and Finnmark	0.0	0.9	0.2	0.0	0.1
10. Mountainous areas of Northern Norway	0.0	0.2	0.0	0.0	0.0
Norway	100.0	100.0	100.0	100.0	100.0

Table 7. Relative distribution of crops within each region (in %)

Region	Grain	Roughage	Potatoes	Hard/soft fruit	Vegetables
1. Coastal districts of Southern Norway and Nordland	11.2	77.6	2.0	0.2	1.1
Jæren[1)]	*9.1*	*70.8*	*3.1*	*0.1*	*1.3*
Coastal districts of Southern Norway and Nordland excl. Jæren	*12.1*	*80.6*	*1.6*	*0.2*	*1.0*
2. Lowlands of Eastern and Central Norway	69.2	21.9	2.4	0.6	1.0
3. Forested districts of Southern and Eastern Norway	31.7	59.6	1.1	0.6	0.6
4. Valley and highland districts of Southern Norway	20.0	71.8	2.3	0.1	0.1
5. Mountainous areas of Southern Norway	2.8	91.2	0.1	0.0	0.0
6. Fjord districts of Western and Central Norway	1.2	94.1	0.3	1.2	0.1
7. Forested districts of Northern Norway	0.0	88.6	0.7	0.0	0.0
8. Fjord districts of Nordland and Troms	0.0	89.1	1.4	0.1	0.1
9. Coastal districts of Troms and Finnmark	0.0	90.9	0.7	0.0	0.1
10. Mountainous areas of Northern Norway	0.0	91.3	0.1	0.0	0.0

[1)] Relative distribution of crops in Jæren (in %)

Distribution of livestock

Table 8. Relative distribution of livestock by region (in %)

Region		Dairy cows	Suckler cows	Young cattle	Grazing live-stock	Sheep[1)]	Goats	Pigs	Horses	Laying hens
1.	Coastal districts of Southern Norway and Nordland	21.4	15.3	22.7	14.8	11.8	5.3	17.6	13.1	26.4
	Jæren	*8.6*	*3.1*	*9.0*	*3.4*	*1.1*	*0.1*	*11.8*	*3.5*	*15.6*
	Coastal districts of Southern Norway and Nordland excl. Jæren	*12.9*	*12.2*	*13.7*	*11.4*	*10.7*	*5.3*	*5.8*	*9.6*	*10.8*
2.	Lowlands of Eastern and Central Norway	16.4	37.8	19.5	10.6	6.9	1.2	49.8	34.1	35.3
3.	Forested districts of Southern and Eastern Norway	4,1	7.4	4.5	4.6	4.8	0.4	5.2	9.0	7.5
4.	Valley and highland districts of Southern Norway	19.8	16.3	18.0	22.5	24.6	16.0	9.4	15.7	6.5
5.	Mountainous areas of Southern Norway	2.3	1.4	2.0	2.5	2.6	3.0	0.6	2.0	0.6
6.	Fjord districts of Western and Central Norway	29.7	18.8	28.1	34.7	37.5	40.7	15.3	20.6	20.4
7.	Forested districts of Northern Norway	2.4	1.2	2.0	3.3	3.7	8.9	0.3	1.8	0.6
8.	Fjord districts of Nordland and Troms	3.0	1.6	2.7	5.8	6.6	21.4	1.6	2.8	2.4
9.	Coastal districts of Troms and Finnmark	0.6	0.1	0.5	1.2	1.4	2.8	0.2	0.7	0.3
10.	Mountainous areas of Northern Norway	0.2	0.0	0.1	0.1	0.1	0.2	0.0	0.2	0.0

[1)] On rough grazing land