Evaluating the Opportunities and Barriers to Implementing Changes in Sheep Farming Practices in Norway

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The Cover
Sheep on their way to outfield grazing supervised by the farmers.
(Photograph © Paul Kristian Homstad)

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ABSTRACT

As a result of a more active carnivore management in the past decade the conflict between carnivores and sheep on outfield grazing has increased considerably in recent years. In order to reduce the conflict several mitigating measures has been implemented all around the country.

This study highlights sheep farmer's opportunities and barriers to implementing operational changes in sheep farming practices, in the context of the conflicts resulting from large carnivore recovery in Norway. Sixteen interviews with sheep farmers were conducted, grouped according to their situation in terms of farming methods. We identified three groups of farmers; those who had changed husbandry methods, those who maintained the traditional methods and those who had given up sheep farming. The individual farmers were thus analysed as groups, not individuals.

The thesis deals with adaptation strategies in carnivore exposed areas. Sheep farmers have taken different choices, based on their perceived reality within the sheep husbandry sector. An attempt is made to describe the reality as perceived by the farmers, while trying to uncover the causes and effects of that reality. There are several factors affecting decision making in terms of the choice of husbandry system, such as loss of sheep to carnivores, economy and profitability, management authorities, the effects of mitigating measures and the value of cultural landscape and outfield. These factors are all detached to each other in one way or another.

A major factor affecting decision making is the conflict about carnivores, and the loss that they experience. There are a lot of emotions connected with big losses, both when you take into consideration the suffering of the herd but also the economic impact. Mental strain, health issues, anger and distrust of the management authorities are some of the effects of their difficulties. The farmers feel frustration at the way the management authorities functions. A scepticism and distrust of the management authorities and government policies is a dominant discourse. The result of the analysis reveals that lack of trust is a major barrier to moving beyond the present in passé.

What it takes to change farming systems to become more viable and adaptable is not a question with an answer to the difficulties in sheep husbandry, simply a suggestion to what could make the situation better in the future, and to help create new conflict reducing measures. The greatest challenge is to create new narratives that focuses on harnessing energy and creativity, but that requires farmers accepting the basic premises.

Key words: *sheep farmers, large carnivores, adaptation, barrier*

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Helene Grytbakk Lillevold, June 2015

"The degree of success depends on the capacity to adapt and the distribution of this capacity" (Adger et al., 2005)

Figure 1 *Sheep on outfield pasture*
(Photograph © Helene Grytbakk Lillevold)

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1 INTRODUCTION AND PROBLEM STATEMENT

1.1 The reason for choice of thesis

The agricultural sector has a long history. There are tangible traditions through generations and centuries. The family of the farmer is substantially stable across generations that have created the present farming culture. The agricultural sector has provided the basis for jobs, settlement and cultural values of great importance for some communities and families.

The nature of agriculture is changing, the role and significance of agriculture in local and regional development has changed along with the overall social development. The origins of present day food policies go back to concerns over food security (i.e. having enough food, especially during times of war). This has been especially acute following WW2 – but you can see the discourse going back as far as WW1.

The Norwegian polar explorer, discoverer, diplomat and scientist Fridtjof Nansen already in 1917 argued that agriculture and animal husbandry through all times has been the far most important means of existence in Norway (Nansen, 1917). He also pointed out the issue with agriculture production not to be expected to amount to very great quantities. Already at that time, Norway was valued by its uniqueness amongst European countries with a very small percentage of infield pastures (cultivated area) and a large portion of mountains, snowy mountains, glaciers and entirely barren ground. The dependency on imports increased from 1855 towards the war in 1914, although it decreased somewhat during the war due to the natural desire to decrease dependency on imports and disruption to shipping. At that time the government stimulated the agricultural production in every possible way.

After WWII the government and the largely rural Norwegian population placed even greater emphasis on productivity, self-sufficiency, efficiency, maintaining an average farming income as well as contributing to rural employment and rural settlement (Forbord et al., 2014). Ensuring a viable agriculture and living cultural landscapes has remained a clearly stated political goal throughout the country up to the present day.

Norwegian agriculture is still dominated by very small farms compared to the rest of Europe (where farming has been rationalised into much larger units and improved structural efficiency), and is due to a structural development of agriculture that is strongly regulated by the state through legislation and economic instruments. Pluriactivity in agriculture has existed and been a part of the income on farms through several generations (Blad, 2010). The development of a diversified agricultural sector is encouraged by multifunctional policies. Agriculture is being

restructured by the forces of "market productivism" encouraging larger, more commercialised, and specialised businesses. The number of agricultural holdings in Norway has decreased during the last 50 years, while the area of agricultural properties has remained stable, due to increased size on the farms and a change in how farmland is controlled, with more farmers leasing land.

The basis for the new policy guidelines according to the Norwegian Parliamentary white paper (Stortingsmelding) no.9 *Velkommen til bords* (Ministry of Agriculture and Food, 2011-2012), is to strengthen value creation from the agricultural and food sectors in different parts of the country. Agricultural politics is closely linked to the government's goal of utilising the entire national area for some form of production. The goal of the Ministry of Agriculture and Food is to maintain viable agriculture in rural areas to prevent farm closure and rural depopulation.

Diversity is claimed to be the greatest strength of Norwegian agriculture. However, as the saga of Achilles told, even the most robust has vulnerable point. There is a common opinion that taking from the many small and giving it to the large few, is an assault directed towards the Norwegian Agriculture. Diversity and pluriactivity is the very soul of Norwegian agriculture (Brandth and Haugen, 2011), and there are very strong arguments for why it needs to be yet more diverse to win new markets, ensuring public support, and reaching young people.

In the agricultural strategy, there are certain individual target areas that are important for the content of the thesis and justification for the choice of topic:

"Through innovation and change there is a great opportunity for increased value creation and development of attractive and competitive businesses based on agricultural resources and new knowledge. Increased wealth creation is a precondition for a viable agricultural and food policy»

Norwegian agriculture has a multifunctional role, among other duties related to food security, and both environment and regional policies.[1] In relation to multifunctional agriculture there are various environmental aspects that are important to focus on, such as preservation of the agricultural landscape and the role of agricultural management in relation to biodiversity. However, agriculture is only one of many land uses which can come into conflict with each other. For example, society has been placing increasing focus on the need to conserve biodiversity and to move towards sustainable production systems. While much of this does not

[1] Ministry of Agriculture. 1998. Jordbrukets multifunksjonelle rolle (The agricultural multifunctional role). (In Norwegian). https://www.regjeringen.no/nb/aktuelt/jordbrukets_multifunksjonelle_rolle/id262618/

come into conflict with the goals of agricultural production, there are some very strong areas of conflict. One of these concerns society's desire to conserve large carnivores in the same landscape that is used for agricultural production (Andersen et al., 2003b). The large carnivore species, brown bear (*Ursus arctos*), lynx (*Lynx lynx*), wolf (*Canis lupus*), wolverine (*Gulo gulo*), and golden eagle (*Aquila chrysaetos*) are considered as threatened species in national and European wide redlists, although many populations have recovered in recent decades in much of Europe (Chapron et al., 2014).

Agriculture, and especially the livestock sector is being challenged by conflicts between carnivores and livestock grazing in certain areas. Large carnivores, and their predatory way of life, lead to these major conflicts. The conflict has been a festering issue for many years, and has increased intensely in Norway during the last decades (Kaltenborn et al., 1999, Blekesaune and Rønningen, 2010). Carnivore species were absent for several generations and local communities are therefore not currently adapted to live with them[2]. Conflicts are often linked to:

- Depredation on livestock
- Animal welfare issues
- Economic loss
- Human, psychological and cultural conflicts
- Conflicts about knowledge
- Loss of the biodiverse grazing dependent cultural landscape

The conflict between carnivores and sheep husbandry is mainly related to free – grazing on outfield pastures. Important characteristics and possible explanatory factors for this conflict are a dispersed settlement pattern, small-scale farming structure based on animal husbandry and small stocks of sheep, and a need for utilizing grazing rights in outfields (forest, moorland and mountains - *utmark*) to compensate for limited arable land (Blekesaune and Rønningen, 2010, Kaczensky, 1996).

The heated debate is characterized by strong and divergent attitudes (Bjerke and Kaltenborn, 1999), and management of large carnivores has become one of the major political issues in the country. The main problem is the loss of sheep on the outfield grazing during the summer, and as a defence mechanism, farmers have continually developed new strategies to protect the herd. Significant increase in losses and the high costs of compensation payments has increased the

[2] County Governor of Nord-Trøndelag 2011. Forvaltningsplan for rovvilt i region 6 - Møre og Romsdal, Sør-Trøndelag og Nord-Trøndelag. (Management plan for carnivores in region 6 - Møre og Romsdal, Sør-Trøndelag og Nord-Trøndelag). (In Norwegian).

focus on identifying and implementing mitigation measures (Asheim and Mysterud, 2005). Easing the carnivore – sheep associated conflict is of prime interest to the nature management authorities.

Some of these strategies are used to a limited extent, creating further conflict (Linnell et al., 2012), which creates barriers for carnivore management. In recent years prioritized prevention and conflict mitigation measures have been initiated aimed at the operating conditions in the sheep husbandry due to the carnivore populations (Hind et al., 2010), and extensive means are today used to reduce losses of grazing unguarded sheep (Sørensen, 2012). Loss-reducing measures already tested include increased supervision, extraordinary supervision, herding, delayed grazing release, early gathering, fencing, carnivore secure fences, moving to emergency pastures, disturbance of carnivores, using livestock guarding dogs and carcass search dogs, and reducing carnivore populations through lethal control. The use of GPS collars on sheep have been a help to find carcass to confirm causes of death (Sørensen, 2012, Hind et al., 2010).The question is to what extent any of these measures actually help.

Having sheep on enclosed or infield pasture, as a farming method, instead of outfield grazing seems to be the only solution in areas with significant high annual losses to carnivores (Hansen, 2006). This requires sufficient space available for this purpose, in addition, these kinds of measures has many implications and challenges in this respect (Lindhjem et al., 2010)

Sheep farming is experiencing a time of great challenges with increasing demands on profitability and efficiency. Increasing numbers of large carnivores give increased losses and the need for more supervision during grazing. Forest encroachment of grazing land and reallocating outfields to other landuses reduces the availability of good grazing land.

The result is that not all farmers continue. For example, several farmers in Lierne municipality have quit during recent years (Sand et al., 2002)[3] citing large depredation losses (to bears) as the reason for the termination of sheep farming (Hind, 2010), either as the main reason or in combination with poor economy, animal welfare problems and aggressive carnivores. The psychological strain farmers experience when conducting a form of production with such large annual loss is also cited as an important cause. However, it is a general agreement that little profitability in sheep farming in combination with high predation is an important cause of liquidation of sheep farms (Tangeland and Krange, 2011).

[3] Liernes siste sauebonde gir opp. (Lierne's last sheep farmer gives up). Namdalsavisa. (In Norwegian). http://www.namdalsavisa.no/Nyhet/article7165709.ece 13.02.2014

According to Asheim and Mysterud (2005), the key challenge lies in an accepted political core target to achieve a mixture of grazing animals, reindeer herding, carnivores as well as opportunities for outdoor recreational life, berry picking and hunting in large areas, trying to satisfy different groups of interest in a multi-use landscape (Asheim and Mysterud, 2005).

1.2 Problem statement

As the situation is today, having both free-grazing sheep and carnivores in the Norwegian fauna, is creating a lot of conflicts and difficulties. A change in agriculture practices is urgently required. In many parts of Scandinavia some farmers have managed to reduce sheep losses to carnivores by making changes in farming structure on their sheep farms (Finset et al., 2011).

Landa, Gudvangen, Swenson & Røskaft (1999) conclude that the present sheep husbandry system of grazing unguarded sheep in the mountains and forests should be replaced by alternative forms that provide the sheep with more protection (Landa et al., 1999). Coexistence of carnivores and free-ranging domestic livestock without any depredation appears to be impossible (Landa et al., 2000). In areas where livestock farming in carnivore range is a threat towards carnivore conservation, effective guarding techniques should be adopted or livestock farming should be substituted with more compatible forms of production. A suggestion given is that incentives should be given to encourage farmers to adopt forms of livestock husbandry that are compatible with carnivores in important carnivore habitats. The most efficient techniques to protect livestock seems to be to concentrate on re-adopting older traditional herding methods, earlier gathering, later release, introduce more carnivore-adapted sheep breeds or switch to beef cattle, increasing the spatial separation by zoning of carnivores and sheep, and last but not least, having sheep on enclosed pastures.

The need to make some of these changes to husbandry has triggered complex reactions, including social resistance and conflict, as well as innovation and value creation.

1.3 Aim of the research

Understanding individual farmers' perceptions of opportunities and barriers for implementing operational changes in carnivore-prone areas is the main objective in this thesis.

The aim of the thesis is to gain an understanding and knowledge of the farmer's inner life and thoughts relative to adaptation strategies in carnivore – prone areas.

In the context of the carnivore situation in Norway, the main purpose of the research will be to look in greater depth into the underlying willingness to make changes, and get an insight into

farmers' thought process. What determines whether a person is willing to give up sheep farming totally, continue as before, or change? What grounds the basis for this selection, and the factors that influence decision-making, will be important in this research.

My goal is to provide an insight into what it takes to adapt livestock with the presence of carnivores, what choices are made, on what basis, and factors that affect decision making. In other words, it will focus on farmers' ability to adapt to the carnivores presence in the Norwegian fauna.

1.4 Research questions

1. What thoughts do the farmers have concerning the selection of farming systems?
2. What influences their decisions?
3. What choices are included in the decision making process?
4. What does it take to change farming system to become more viable and adaptable?

2 CARNIVORES AND SHEEP HUSBANDRY

2.1 Introduction

The current management of our carnivore species lynx, wolverine, wolves, brown bears and golden eagles is built upon the white paper (Stortingsmelding) no.15 *Rovvilt i norsk natur* (Ministry of Climate and Environment, 2003-2004), the Parliamentary consideration of this (Innst. S. nr. 174 (2003-2004)) and the Parliamentary Carnivore Settlement (rovviltforliket) of 17 June 2011.[4]

The settlement states initially that the management authorities must adhere to the provisions of Nature Diversity Act, the Berne Convention and the dual objective by the Carnivore Settlement of 2004. Today's policy has a twofold objective. It must be ensured sustainable carnivore populations, and a continued active and versatile use of outfield resources and viable rural communities.

The political guidelines for the management of carnivores and grazing animals indicates that management will be implemented in such a way that the level of conflict curbed the most through preventive measures and population regulation (Ministry of Climate and Environment, 2003-2004). Grazing denial should be the last resort. Increased focus on prevention and conflict mitigation measures also includes heavier measures like enclosed pastures and conversion to other operations in the areas where there is the greatest conflicts between carnivores and grazing animals. Great emphasis is placed on having good interaction between carnivore management and Norwegian Food Safety Authority.

Carnivore conflicts have characterized both rural communities and national politics in Norway for a long time, and it has become a stable line of conflict in Norwegian society today (Skogen et al., 2013). In social science, this debate has received little attention.

In January 2010 the new Animal Welfare Act[5] entered in force, where it was statutory that animals have intrinsic value. Proposition nr.15 (2008-2009)[6] clarifies farmers' duty to protect animals against carnivores and establishes that there are major challenges related to outfield

[4] Norwegian Environment Agency. 2013. Regelverket ved forvaltning av rovvilt. (Regulations of managing carnivores). (In Norwegian). http://www.miljodirektoratet.no/no/Tema/Arter-og-naturtyper/Rovvilt/Regelverket-ved-forvaltning-av-rovvilt/

[5] Animal Welfare Act of 2009. Lov om dyrevelferd. LOV-2009-06-19-97. Lovdata (In Norwegian). https://lovdata.no/dokument/NL/lov/2009-06-19-97

[6] Ot.prp. nr. 15 (2008-2009) Om lov om dyrevelferd (About Animal Welfare Act). Ministry of Agriculture and Food. Lovdata. (In Norwegian) https://www.regjeringen.no/nb/dokumenter/otprp-nr-15-2008-2009-/id537570/?docId=OTP200820090015000DDDEPIS&ch=1&q=

pasture used by reindeer / livestock and protected carnivores. The background is the increase in the loss of sheep and reindeer on pasture in recent decades.

2.2 Economy in sheep husbandry

The livestock production is the main production measured in value creation and employment in Norwegian agriculture[7]. There are about 2.3 million sheep in total in Norway, of which 2 million on outfield pastures. There has however been a downward trend in agricultural workforces mainly due to economic competition, economies of scale and technological progress, but also other sectors of the economy or other contexts, like cities, are more attractive than farming in rural areas. (Freibauer et al., 2011). Policies can have a strong impact on these trends.

It has been stated that Norwegian agriculture is not sufficiently economically viable to maintain the many relatively small farms across the country (Forbord et al., 2014). Payments for production have not been sufficient to prevent a decline in the number of farms, this due to a low profitability, long hours and a strong urban labour market. Along with that the farmers' economic importance and income has been changed. Many of the farms are too small to provide adequate returns for full-time equivalence (FTE). This is leading to more multi-working farmers, in other words, part-time farmers. The full-time farmer however, is buying up land and quotas, or leaseholders to other farms. The production environments are diluted, fewer farmers, less social environment and fewer contact points. More efficient technology and larger machines contributes to marginal areas being taken out of service due to decreased profit, the farmers are not seeing themselves served with making investments and changes.

According to the white paper nr.15 (2003-2004) the State allocates 70-80 million annually to compensate lost livestock and domesticated reindeer to protected carnivores. It is approximated that 14 percent of Norwegian sheep farmers currently are seeking compensation for livestock killed by carnivores. The remaining 86 percent of Norwegian sheep farmers experience extremely low depredation on free-ranging animals. The farmers have responsibility for proving the predation caused losses, which can be very difficult and labour – intensive. It can be difficult to prove whether a carnivore is the cause, or which carnivore is to blame, unless the remains are in good condition. The majority of the lost sheep is not compensated, although in cases

[7] County Governor of Nord - Trøndelag. 2014. *Husdyrhold i Nord-Trøndelag. (Livestock farming in Nord-Trøndelag)* (In Norwegian) http://www.fylkesmannen.no/Nord-Trondelag/Landbruk-og-mat/Husdyr/

where the actual carnivore cannot be identified, compensation may be paid out if there is a strong suspicion towards carnivore involvement.

2.2.1 Economic support for loss prevention measures

The Ministry of Climate and Environment has recently adopted a new regulation on subsidies for operational changes due to carnivores.[8] The purpose is to reduce the loss of sheep in particularly vulnerable carnivore areas. This is done as part of the work with a distinct zone management where it is important to distinguish carnivores and sheep. Compensation Applications for 2014 are treated by a new regulation: Regulation of 05.30.2014 No. 677 for compensation when livestock are killed or injured by carnivores (Compensation Regulations).[9]

In addition to the usual subsidies, the Agricultural Agreement provides support for loss prevention measures against depredation (Kjuus et al., 2003). The purpose of loss prevention measures is to ensure implementation of effective preventive measures to limit depredation on livestock. The Norwegian Environment Agency allocates a portion of funds for preventive measures to the county governors, who are responsible for facilitating subsidy applications for the regional carnivore committees. To get subsidies, it is essential that the measures is likely to have an effect on loss reduction.

The measure to keep sheep for a longer period on infield pastures than normal before being released to the outfield pastures is based on that the sheep should be kept away from areas where they can more likely be killed in the earliest period. Delayed release will be the most appropriate measure in lynx areas, based on loss surveys.

In areas where carnivore losses are at their most intense towards the end of the grazing season, early gathering could be an effective tool to reduce carnivore losses. This measure is particularly effective in areas with wolverine, but also in areas with bears and lynx.

In areas where they have severe problems with carnivore loss early or late in the grazing season, the deferred release and early gathering could be a possible means of reducing losses locally. Both deferred release and early gathering leads to a curtailment of grazing period on outfield grazing and longer stays on infield pastures, with the consequences that entails. Among other

[8] Ministry of Climate and Environment. 2015. *Ny forskrift om tilskudd til driftsomlegging på grunn av rovvilt. (New regulation on subsidies for operational changes due to carnivores).* https://www.regjeringen.no/nb/aktuelt/ny-forskrift-om-tilskudd-til-driftsomlegging-pa-grunn-av-rovvilt/id2395761/

[9] Norwegian Environment Agency. 2014. *Forskrift om erstatning når husdyr blir drept eller skadet av rovvilt av 30.5.2014 nr. 677. FOR-2014-05-30-677. (Regulations on compensation when livestock are killed or injured by carnivors).* Lovdata. (In Norwegian). https://lovdata.no/dokument/SF/forskrift/2014-05-30-677

things, users will have to rent land or buy fodder because they do not possess sufficient spaces. These measures entails that carnivore secure fences around infield pastures and possibly parts of outfield pastures are built. The carnivore secure fences provides a physical separation between sheep and carnivores, and is regarded as an effective means to reduce carnivore losses.

In cases where the usual preventive measures against carnivores is not sufficient, support may be given to measures that completely remove the contact points between sheep and carnivores, or reduce them to a minimum. Such restructuring measures include relocation of sheep to carnivore free areas, conversion to permanent infield pastures and conversion to other livestock productions. Alteration to having sheep on permanent infield pastures can be defined as a different form of operation, and therefore support can be obtain for such a shift.

2.3 Preventive and conflict mitigation measures

The Norwegian parliament has since the end - 1980s annually allocated funds from the state budget for preventive measures against carnivore damage on sheep (Brainerd, 2003). Preventive and conflict reducing measure funds are to be used as a measure that prevents carnivore damage or measures to reduce the level of conflict. In chronic damage areas measures that keep livestock and carnivore are separate priority.

In areas with annual major depredation on sheep, measures that separates carnivores and sheep in space and time be the absolute most effective at preventing loss (Hind and Hansen, 2014). Sheep farmers can apply for funding for measures that have a direct effect on loss reduction, or where such an effect can be achieved by the combination of measures. These are specified in the *Regulations concerning subsidies for preventive measures against depredation and conflict mitigation measures.*[10] The aim of the subsidy scheme is to ensure implementation of effective preventive measures to limit the damage carnivores can cause the production animals in agriculture, as well as conflict mitigation measures to minimize inconvenience to local communities and other groups.

Direct loss reducing measures:

a) Measures that separates carnivores and livestock physically
- Early gathering
- Delayed release

[10] Norwegian Environment Agency. 2013. *Forskrift om tilskudd til forebyggende tiltak mot rovviltskader og konfliktdempende tiltak. FOR-2013-01-01-3. (Regulations concerning subsidies for preventive measures against depredation and conflict mitigation measures)*. Lovdata. (In Norwegian). https://lovdata.no/dokument/SF/forskrift/2013-01-01-3

- Moving the sheep to less carnivore-prone areas
- Infield pasture
- Emergency areas
- Carnivore secure fences

b) Extended supervision combined with other measures.
   Extended supervision alone cannot be supported financially, but can be supported by these.
- Guarding dog
- Planned extended supervision as a necessary part of the measures mentioned a)
- Acute extraordinary supervision

c) Other measures that can be directly loss reducing

d) Restructuring to another industry

The table shows an overview of subsidies for preventive measures against depredation and conflict mitigation measures in Sør-Trøndelag and Nord-Trøndelag.

Table 1 *Preventive measure funds distributed to the counties in the period 2006-2011 (In millions)*

County	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Sør-Trøndelag	0,93	1,20	2,50	1,95	2,40	2,30	2,25	2,80
Nord-Trøndelag	3,92	4,50	9,60	11,40	10,70	9,90	9,50	8,65

(Source: (County Governor of Nord-Trøndelag, 2011, Hind and Hansen, 2014)

For exposed flocks where other preventive measures have been considered or tried, without sufficient effect, it may be appropriate to restructure to different livestock production or other industries. In many restructuring cases subsidies from the county rural development funds (BU-midler) (rural development assets) by Innovation Norway (the Ministry of Agriculture and Food's budget) have been provided for the establishment of new businesses on the farm (Finset et al., 2011). The purpose of the county rural development funds is to facilitate long-term and profitable value creation through contributing to development of new industrial business in agricultural properties, and the development and modernization of traditional agriculture. Restructuring is mainly carried out with support from FKT funds (prevention and conflict mitigation measures) through the Norwegian Environment Agency and The Carnivore Boards (Ministry of Climate and Environment's budget). The table shows an overview of the number of restructuring cases in Hedmark and Nord - Trøndelag, how restructuring is funded and number of winter fed sheep that is taken out of production.

Table 2 *Overview of restructuring cases and funding*
In the county of Hedmark and Nord – Trøndelag in the period 1990-2010.

County	Number of cases	Sum FKT-funds*	Sum BU-funds*	Sum other funds	Number of restructured winter fed sheep
Hedmark	22	6 891 000	8 050 000	639 000	1300
Nord-Trøndelag	33	30 592 000	4 530 000		3350

* = *Distribution between FKT funds and BU funds are in some cases uncertain (Finset et al., 2011).*

The Ministry of Climate and Environment has recently approved a new regulation on subsidies for restructuring due to carnivores with the aim to reduce losses of sheep in particularly carnivore-prone areas.[11] This is done as part of the work with a clear zone management where it is important to distinguish carnivore and sheep. Throughout several years there has been a restructuring of many sheep husbandries. In recent years there has not been set by own funds separately for operational changes, and there have been differing practices in the processing of applications for restructuring in various parts of the country. In 2015 seven million Norwegian kroner are earmarked restructuring.

2.3.1 Enclosed pastures as a preventive measure

Trying to satisfy different groups of interest according to the political core target creates extreme pressure on the activity to implement efficient and cost-effective mitigating measures for the sheep farmers (Asheim and Mysterud, 2005). Introduction of efficient mitigating measures against predation on grazing animals is a prime target in Norwegian nature management. The last 15 years there has been invested a lot of public support for such measures against the loss of livestock to carnivores (Lindhjem et al., 2010), and fencing off parts of the range pasture has been seen as one of the potentially most effective preventive measures (Hansen et al., 2004, Asheim and Mysterud, 2005). Keeping sheep on enclosed pastures as a mitigating measure has been implemented several places in the country.

[11] Ministry of Climate and Environment. 2015. *Ny forskrift om tilskudd til driftsomlegging på grunn av rovvilt. (New regulation on subsidies for operational changes due to carnivores).* (In Norwegian). https://www.regjeringen.no/nb/aktuelt/ny-forskrift-om-tilskudd-til-driftsomlegging-pa-grunn-av-rovvilt/id2395761/

Figure 2 *Carnivore secure fences*
(Photograph © Inger Hansen, Bioforsk Nord Tjøtta)

The major challenge converting from traditional sheep husbandry on outfield pastures to full or partial enclosed pasture grazing is to find an optimal balance between space requirements and number of animals (Hansen, 2006). Grazing areas are often a scarce resource. The length of the grazing period and sheep density will have a major impact on the wear of enclosed pastures. Pasture capacity and quality is of great importance to lamb growth, making the running of the enclosed pastures important. Sheep grazing on restricted pastures for several years in a row also make them prone to stomach/intestinal parasites, which is having a negative effect on lamb growth. Another challenge is the cost of using the areas where winter fodder is supposed to be produced, forcing the farmer to buy fodder or rent additional areas for grass production.

Keeping sheep on enclosed pastures will in some cases be the only appropriate preventive measures that can be taken to avoid large and acute damage to grazing animals (Kjuus et al., 2003). As the situation has evolved, including the establishment of several wolf packs and the growing population of wolverines and bears, the government sees it as likely that a greater extent in the future must take preventive measures based on separating carnivores and grazing livestock.

In cases where the usual preventive measures against carnivores is not sufficient, it can be given measures that completely remove the contact points between sheep and carnivores, or reduce them to a minimum. Such restructuring measures include moving the sheep to carnivore-free areas, conversion to permanent enclosed pasture or conversion to other livestock production.

2.3.2 Benefits of using enclosed pastures

Until the 1990s, the average loss for sheep farms affiliated organised pasture management (Organisert Beitebruk) about 4 percent and corresponded to about 80 000 sheep (Kjuus et al., 2003, Ministry of Agriculture and Food, 2011-2012). Losses due to carnivores was until then limited. Later the losses increased. In recent years, about 125,000 sheep have been lost on outfield pastures annually. On outfield pastures, sheep and lambs have a loss rate of 6.4 percent where the losses are primarily due to carnivores, disease, accidents, parasites and poisoning (alveld). Approximately 30 percent of the total losses are compensated each year as lost to protected carnivores. The average loss has been approximately 6.4 percent, an increase equivalent to approximately 46 000 animals per year. However, there are some variations between regions and herds.

By keeping sheep on enclosed pastures, this loss rate will probably decline somewhat as a result of not having sheep losses to carnivores. On the enclosed pasture, it would also be possible to supervise the animals more often, preventing animals from dying of diseases and poisoning. The risk of accidents is also less by keeping sheep on infield enclosed pastures. Although slaughter weights are likely to be lower than on the mountain pastures, the loss rate will decline, and the number of lambs slaughtered will increase.

2.3.3 Costs of maintenance of sheep on enclosed pastures

In addition to the usual compensation, the government spends about 28 million on measures to prevent injuries. Some of these funds are allocated on the regional carnivore committees in each county, with the remainder allocated by the Norwegian Environment Agency.

Norwegian Institute for Agricultural Research (NILF) started a project in 2002, in Hedmark, where they were asked to make estimates on costs having sheep on enclosed pastures (Kjuus et al., 2003). The project was divided into two phases; the work undertaken in Phase 1 consisted of calculations based mainly on material from the County Governor of Hedmark, according to the mission statement. It was made calculations of the costs of keeping sheep on enclosed pastures in a shorter period, for example earlier gathering of sheep in the autumn, and the costs of keeping sheep on enclosed pastures throughout the whole summer. Phase 2 was built on assessment and continuation of the calculations done in Phase 1. In phase 2 NILF worked continuously on having enclosed pasture as a more permanent type of farming, with calculations based on practical experience in districts where operations on enclosed pastures were normal (including parts of Østfold), as well as the experiences from users in Rendalen who have

changed their farming method into keeping the sheep on enclosed pastures. Factors that were considered included the space requirements per animal, need for parasite treatment and mineral supplements, fencing costs, and other factors that were not considered in the calculations so far (for example, the need for irrigation systems, carnivore secure fencing, shelters, etc.). Furthermore, the possibility of fencing the outfield pasture areas adjacent to infield pastures, to get a more diverse pasture, were explored. Lindhjem et al. (2010) in their evaluation of carnivore secure fences describes three types of fences; small lattices on infield pastures or on outfield pastures adjacent to infield pastures, small carnivore secure fences on outfield pastures and larger carnivore secure fences on outfield pastures (Lindhjem et al., 2010).

The additional costs by keeping sheep on enclosed pastures throughout the grazing period as a precautionary measure will fully, or partially be covered by the state with an application.

For the compensation which, until now has been given to pasture users in Rendalen municipality, Stor - Elvdal municipality and Alvdal municipality, the following principles have been applied:

The state covers the cost of feeding the sheep in the number of days corresponding to the normal grazing season in the outfield pasture (food compensation). The food consumption is based on grazing on enclosed pastures.

In addition, it will be given a compensation for the extra costs users have when dealing with sheep on infield pastures (operating expenses)(Kjuus et al., 2003).

Kjuus et al., (2003) discusses factors by converting to sheep husbandry on enclosed infield pastures, then look at the cost of investing in irrigation, shelters and carnivore secure fences. The area acquired extra to have sheep on enclosed infield pastures throughout the summer, can also provide fodder production outside this period. From this, it would be desirable to see the entire area as a whole, and such an assessment would provide needed a slightly smaller total area.

2.4 Carnivore management policy

The Carnivore Management in Norway must balance national targets for viable populations of carnivores with a versatile use of the outfields and utilization of outfield pasture resources (Andersen et al., 2003a). It must also take into account the human population with and without carnivores nearby. The social sustainability of carnivores, how many carnivores there is an economical possibility or willingness by the population to bear, might determine the number of large carnivores in the country (Asheim and Mysterud, 2005). This can be referred to as a "social carrying capacity".

Carnivore management in Norway has been, and still is subject of major discussions and changes. Through the White Paper no. 15 (2003 - 2004) *Rovvilt i norsk natur*, the goal is to ensure species' long-term viability in Norway (Ministry of Climate and Environment, 2003-2004). Within defined limits it is supposed to ensure that conflicts with grazing industry and other interest groups is reduced to a minimum. According to the regulations concerning carnivore Management § 6 (2005), [12] the management plan for carnivores is built on the national population goals for each carnivore species in the region. In the management plan, the carnivore board must emphasize a long-term geographic differentiation that involves the best possible separation between livestock and fixed occurrences of carnivores, based on balancing the conflicting considerations, which should be preserved.

In the Parliament's consideration of the white paper No. 15 (2003-2004), the country was divided into eight administrative areas, or carnivores regions. Each region will have a carnivore committee with significant responsibility within carnivore management.

The Ministry of Environment on the proposal of the County Councils appoints Carnivore Committees. Each region contains decided population goals for each large carnivore and a geographically differentiated management within each region.

Table 3 *Regional population goals for large carnivores.*

Management region	County	Lynx	Wolverine	Wolf	Bear
Region 1	Vest-Agder, Rogaland, Hordaland og Sogn og Fjordane	-	-	-	-
Region 2	Vestfold, Buskerud, Telemark og Aust-Agder	12	-	-	-
Region 3	Oppland	5	4		
Region 4	Oslo, Akershus og Østfold	6	-	3*	

[12] https://lovdata.no/dokument/SF/forskrift/2005-03-18-242/KAPITTEL_6-3-1#KAPITTEL_6-3-1

Management region	County	Lynx	Wolverine	Wolf	Bear
Region 5	Hedmark	10	5	3*	3
Region 6	Møre og Romsdal, Sør-Trøndelag og Nord-Trøndelag	12	10	-	3*
Region 7	Nordland	10	10	-	1*
Region 8	Troms og Finnmark	10	10	-	6
		65	39	3	13

**Joint management*[13]

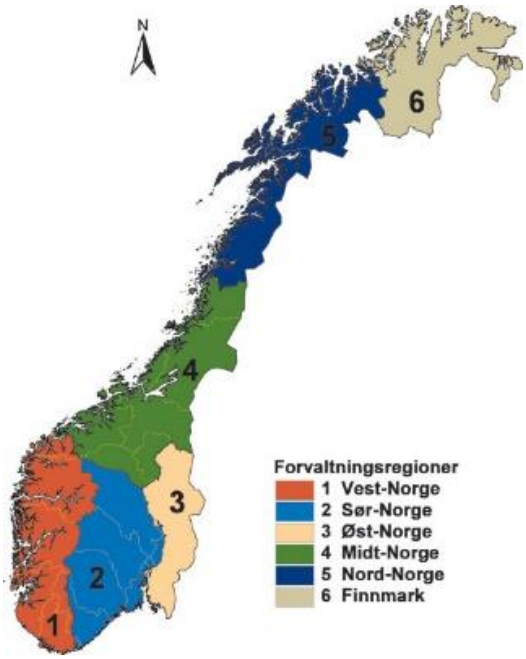


Figure 3 *Division into management regions for carnivores*

Within the framework of the national regulations, detailed guidelines and priorities for use of funds for prevention and conflict mitigation measures, and given recommendations on the use of agricultural policy instruments and reindeer policy instruments must be prepared.

The main purpose is to contribute to a long-term, coordinated and targeted strategy for adaptations within the region that is expected to result in lower losses and conflicts due to carnivores. In management context, actual knowledge is important on how depredation is related to carnivore density and the extent to which different mode of operation affects the loss (Landa et al., 1999). The management authorities must adjust and safeguard the different opinions and demands of those affected by the policies in the best possible way within the framework that the policies are created within.

[13] Norwegian Environment Agency. 2015. Bestandsmål. (Population goals). (In Norwegian). http://www.rovviltportalen.no/content/2598/Bestandsmal

2.4.1 Geographical differentiated management

The management plan shall apply a burden-sharing between the different management regions. Through geographic differentiation the goal is to limit the damage to livestock and domesticated reindeer (Linnell et al., 2003, Hind and Hansen, 2014)

Area differentiation is a key tool in efforts to manage a dual goal both to ensure carnivores and grazing industry (County Governor of Hedmark, 2014). The dual goal is an overriding principle in carnivore management. A long-term geographically differentiated management should lead to reduced damage through the best possible separation between grazers and fixed occurrences of carnivores. Geographically differentiated management is about varying the use of mitigating measures in different areas, and this encompasses much more than the black / white scenarios often associated with the term "zoning" (Linnell et al., 2003). Zoning is any form of geographically differentiated land management, and is only an issue because large carnivores cause several conflicts (Linnell et al., 2005). The division into zones is based on where you preferably want and can achieve breedings according to population targets, and where the most important pastures for sheep is located (County Governor of Hedmark, 2014). Criteria for selecting zones involve the density and extent of grazers and quality of pastures. Other criteria involved is the Sami reindeer grazing area, the region's population goals, expected development and diffusion of large carnivores, including influences from Sweden, and last, management area for wolves.

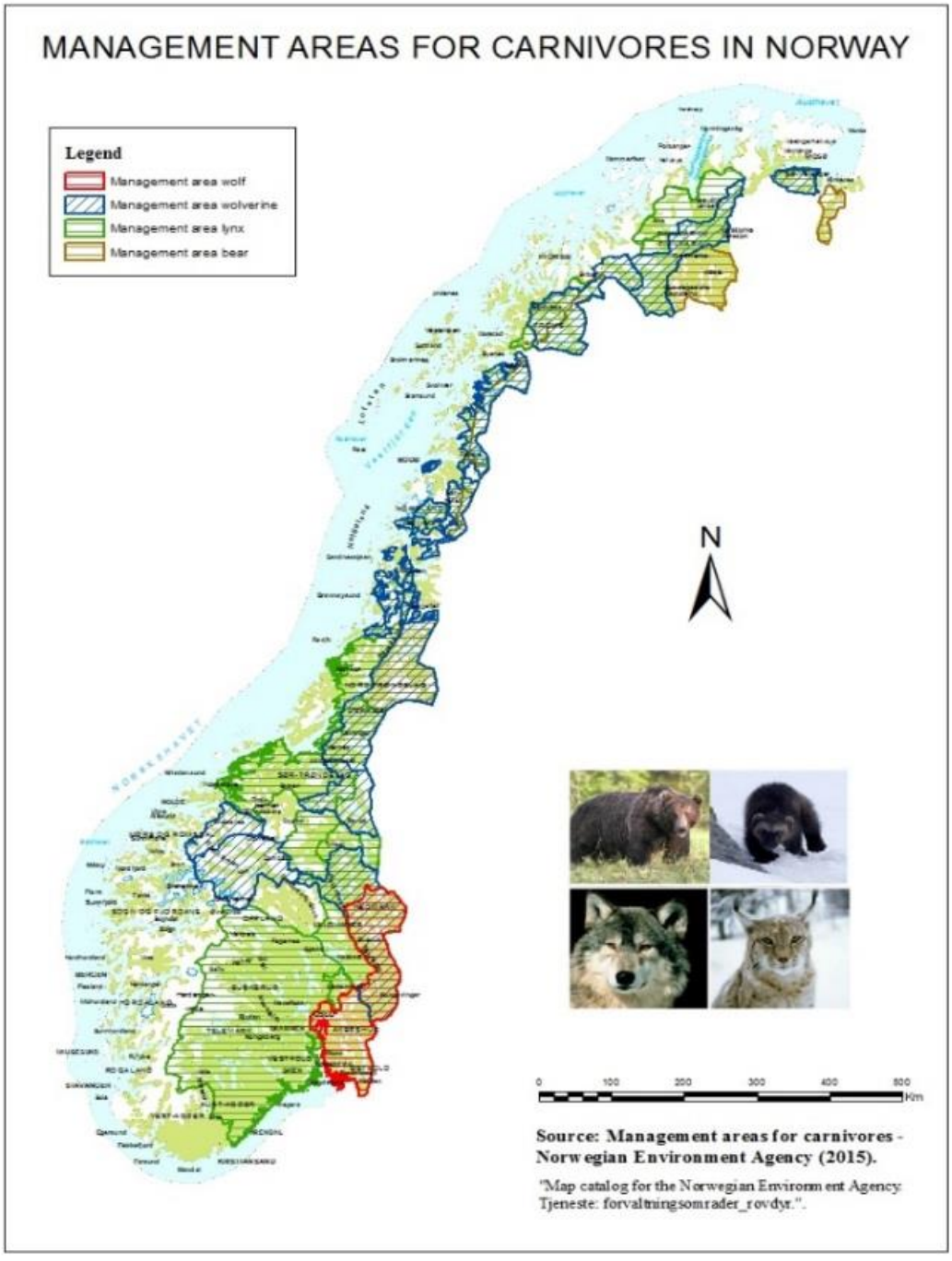
Within the management areas for carnivores, they have the main priority, while outside grazers are prioritized. This implies that carnivore areas are priority areas for breeding and within management areas measures will be aimed at grazers, for example in the form of support for fencing, early gathering etc.

The management plan for carnivores is divided into two zones:

- Prioritized grazing area without carnivores that represent potential damage. Breeding of lynx and golden eagles will occur. Map 1 reveals the overview of grazing areas in Norway.
- Areas that are important for achieving population goals for carnivores and important pastures (see map 2). Selected pastures located in this zone should be managed as prioritized grazing areas. Outfield grazing areas fenced with carnivore secure fences are to be managed as prioritized grazing areas.

Map 1 *Overview of grazing areas for sheep in Norway.*[14]

[14] Norwegian Forest and Landscape Institute. 2013. Nedlasting av kartdata - beite. (Downloading map data - pastures). http://www.skogoglandskap.no/kart/beitebrukskart_og_statistikk/artikler/2007/nedlasting_beite



***Map 2** Official limits for management areas.*
Established by the regional carnivore boards for lynx, wolverines, wolves and bears.[15]

[15] Norwegian Environment Agency. Map catalog for the Norwegian Environment Agency. http://kartkatalog.miljodirektoratet.no/map_catalog_service.asp?servicename=forvaltningsomrader_rovdyr

2.4.2 Management authorities - assignments and responsibilities

Management responsibility for carnivores is distributed across all levels of government, from the national level with the parliament and government to the local level with local authorities and carnivore contacts (Skogen et al., 2013). Figure 2 represent an overview on how the public management of carnivores is organised.

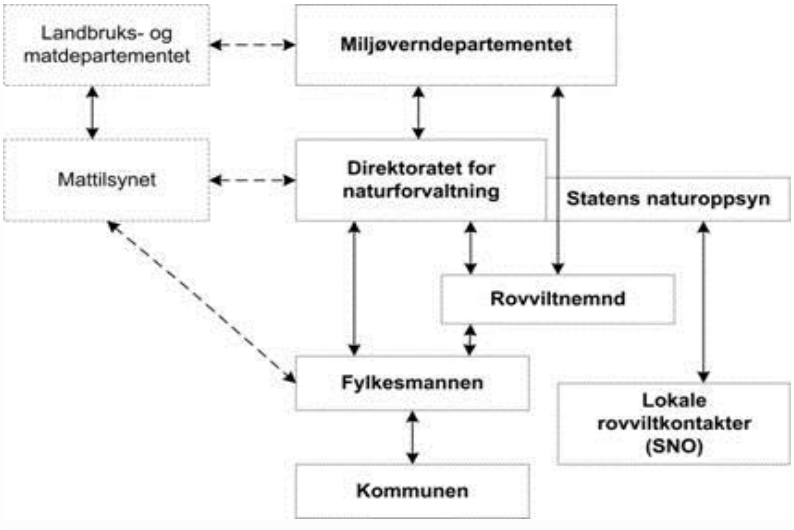


Figure 4 *Participants in carnivore management in Norway.*

Ministry of Climate and Environment - Klima og miljødepartementet[16]

Ministry of Climate and Environment is the authority responsible for all wildlife management and control management through budget legislation and long-term planning. The Ministry communicates government policies and follow up the priority areas within policy on carnivores and the constraints of government added. The Ministry appoints carnivore committee members and is the appeal body on decisions made by the committees.

Norwegian Environment Agency - Miljødirektoratet

The Environment Agency is governed by the Ministry of Climate and Environment and is the central academic professional body within wildlife management. The Agency is responsible for carnivore management at national level. This includes consideration of matters under the Nature Diversity Act and the Wildlife Act, obtaining knowledge through funding for research and dissemination of knowledge and information. The Agency is also the appellate on decisions made by county governors.

[16] Norwegian Environment Agency. Aktørene i rovviltforvaltningen. (The actors in carnivore management). http://www.rovviltportalen.no/content/56/Rovviltforvaltning

Regional Carnivore Boards – Regionale rovviltnemnder

Within each carnivore management region there is a regional carnivore board, which has responsibility for ensuring that populations of carnivores are maintained at the level that the Parliament has determined. The board prepares a regional management plan for carnivores and is responsible for prioritizing preventing and conflict-reducing measures, as well as responsibility for the various hunting and killing regimes for carnivores in each region. Through the management plan, the regional carnivore boards are to emphasize a long-term geographic differentiation that involves the best possible separation between grazers and fixed occurrences of carnivores based on balancing the conflicting considerations that must be safeguarded.

The Nature Inspectorate – Statens Naturoppsyn (SNO).

The Nature Inspectorate (SNO) is part of the Norwegian Environment Agency. SNO perform practical work in the field and has local offices spread across the country.

The Nature Inspectorate's carnivore section is working to assist animal owners with documentation of depredation on livestock and domesticated reindeer, preventing environmental crimes directed against large carnivores, monitor populations and implement measures after the decision issued by the central authority wildly. SNO has local carnivore contacts across the entire country.

County Governor - Fylkesmannen

The County Governor has important responsibilities in the management of large carnivores within each county. The county allocates funds for preventive mitigation measures based on regulations for subsidies for preventive and conflict mitigation measures in relation to depredation, as well as from the constraints of the management plan for carnivores within each region.

The County Governor processes applications for hunting wolverines and lynx, and applications for compensation for damage to livestock caused by carnivores. The County Governor is responsible for management of golden eagles, including applications for gunning and determining gunning by lynx, wolverine, wolves and bears within the allocated quota from carnivore committees.

The municipality - Kommunen

The municipalities has the general responsibility in game management, but they usually has no authorities in carnivore management (Skogen et al., 2013). The reason it the conservation status

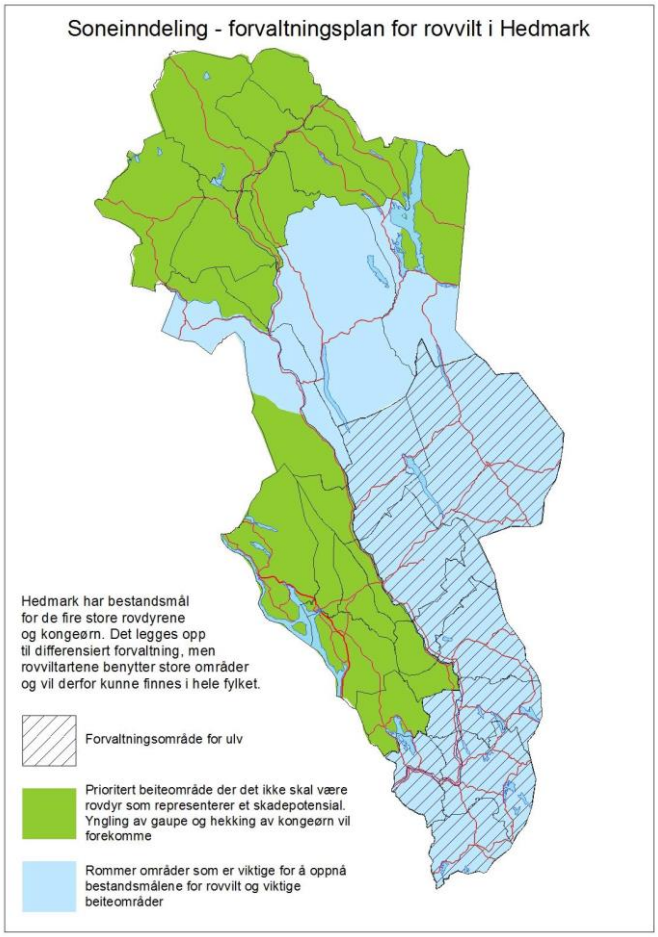
for carnivores, along with their range of living stretching throughout several municipalities. However, the municipalities has assignments connected to damage reduction, hunting permits, documentation of damage and population registration.

2.4.3 Hedmark County - Management Region 5

The first management plan for region 5 was adopted in March 2007 (County Governor of Hedmark, 2014). The plan was divided into three different zones - prioritized grazing areas, prioritized carnivore areas and an area containing both important pastures and important carnivore areas. In the Carnivore Settlement, it is established that loss numbers in sheep husbandry must be reduced, and that a clear management of zoning is crucial to achieving this.

Carnivores

The adopted policy on carnivores largely affects the framework conditions for sheep husbandry in Hedmark. The management plan for carnivores in Hedmark is divided into two zones, green (grazing prioritised area) and blue (areas that are important to accomplish population goals for carnivores and important grazing areas) (map 3), in addition to a separate delineation of the management area for breeding wolf.



Map 3 *Zoning - Management plan for carnivores in Hedmark*[17]

[17] County Governor of Nord-Trøndelag 2011. Forvaltningsplan for rovvilt i region 6 - Møre og Romsdal, Sør-Trøndelag og Nord-Trøndelag. (Management plan for carnivores in region 6 - Møre og Romsdal, Sør-Trøndelag og Nord-Trøndelag). Carnivore Management Committee in Region 6. (In Norwegian)

The Norwegian population of *wolves* is part of the Scandinavian wolf population. About 400 animals inhabit in Scandinavia.[18] About 30 wolves are regarded as "all-Norwegian", in addition to 50 boundary. There is a joint management between region 4 (Østfold, Oslo and Akershus) and 5 (Hedmark) (County Governor of Hedmark, 2014). The regional management plans must be coordinated at this point to ensure a comprehensive and sustainable management of wolves, with the lowest possible losses and conflicts.

For region 5, the national population goal for *lynx* is 10 annual breedings. The minimum number of registered family groups before hunting forms the basis for the population size, which is considered as an average of the last three years. The population size has recently been close to the population goal.

The national population goal for *wolverine* in region 5 is five annual breedings. The population goal is based on the average number of breedings recorded in the last three year period. In region 5, there has been a significant increase in the population until 2011. To reduce the losses of sheep to wolverine, the aim is to avoid breeding in the prioritized grazing areas, and achieving population goals in central and south-eastern parts of the county. Geographically these areas are large enough to achieve these population goals.

The national population goal for *bears* is three annual breedings. Region 5 is the only region in southern Norway with its own population goal for bears. For region 5 the population goal (3 annual breedings) corresponds to 20 females and 30 males. The population goal for bears is not reached. Documentation on the number breedings on brown bears is harder than for the three other large carnivore species.

Sheep husbandry

Livestock industry is important with regard to maintaining an active agriculture, and in reaching the goal of increased food production (County Governor of Hedmark, 2014). It is stated in the white paper no. 9 (2011-2012) that food production should increase in line with the population growth (20% by 2030). Grazing industry is important for achieving this goal and the outfield resources constitute a great value in this context (Ministry of Agriculture and Food, 2011-2012)

In the county of Hedmark, protected carnivores constitute a big challenge for animal welfare in many pastures (County Governor of Hedmark, 2014). The balance required protecting both the interests of sustainable carnivore populations in accordance with established population goals and an acceptable animal welfare on pastures in parts of Hedmark is demanding. A considerable

[18] http://www.rovdata.no/Ulv/Bestandsstatus.aspx.

effort in maintaining a good animal welfare on pastures and to prevent livestock losses is put down, but the losses to carnivores are still too high in certain areas.

Sheep losses on outfield pastures have been registered since the 70s. Losses have increased with an increase in carnivore populations, and today the average percentage loss is around 9 percent (see figure 3). Expecting the same low loss numbers as in the 70s and 80s is not realistic due to the change in the carnivore population size in Norway and Sweden.

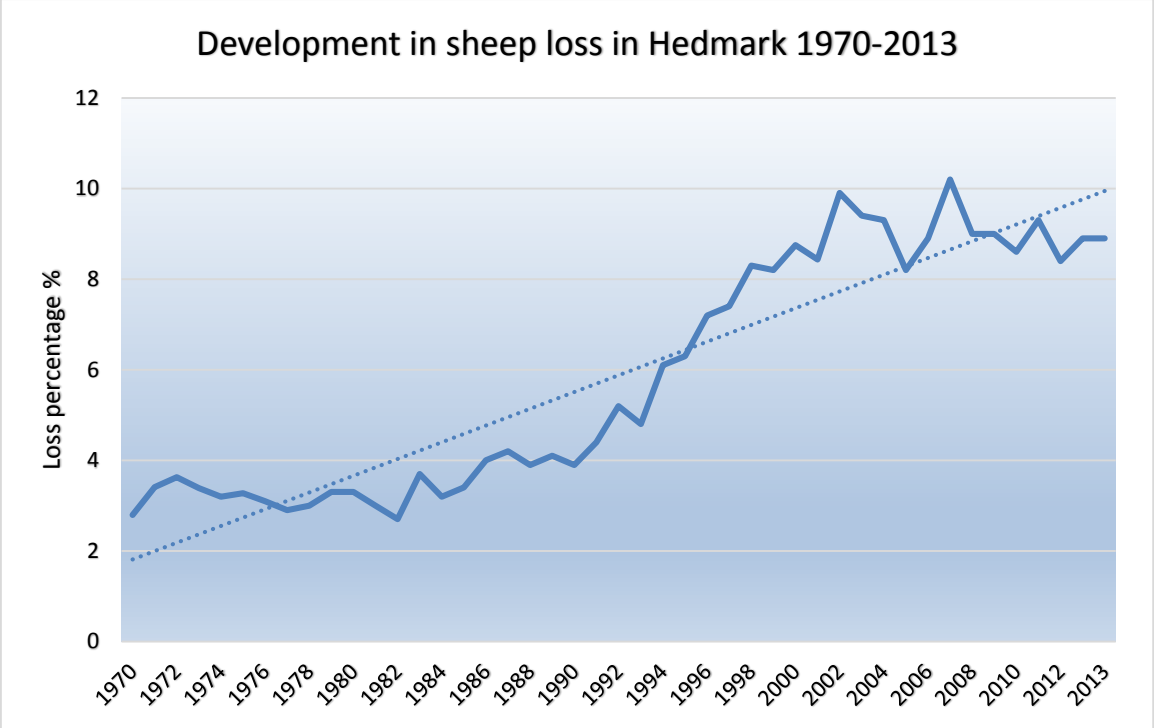
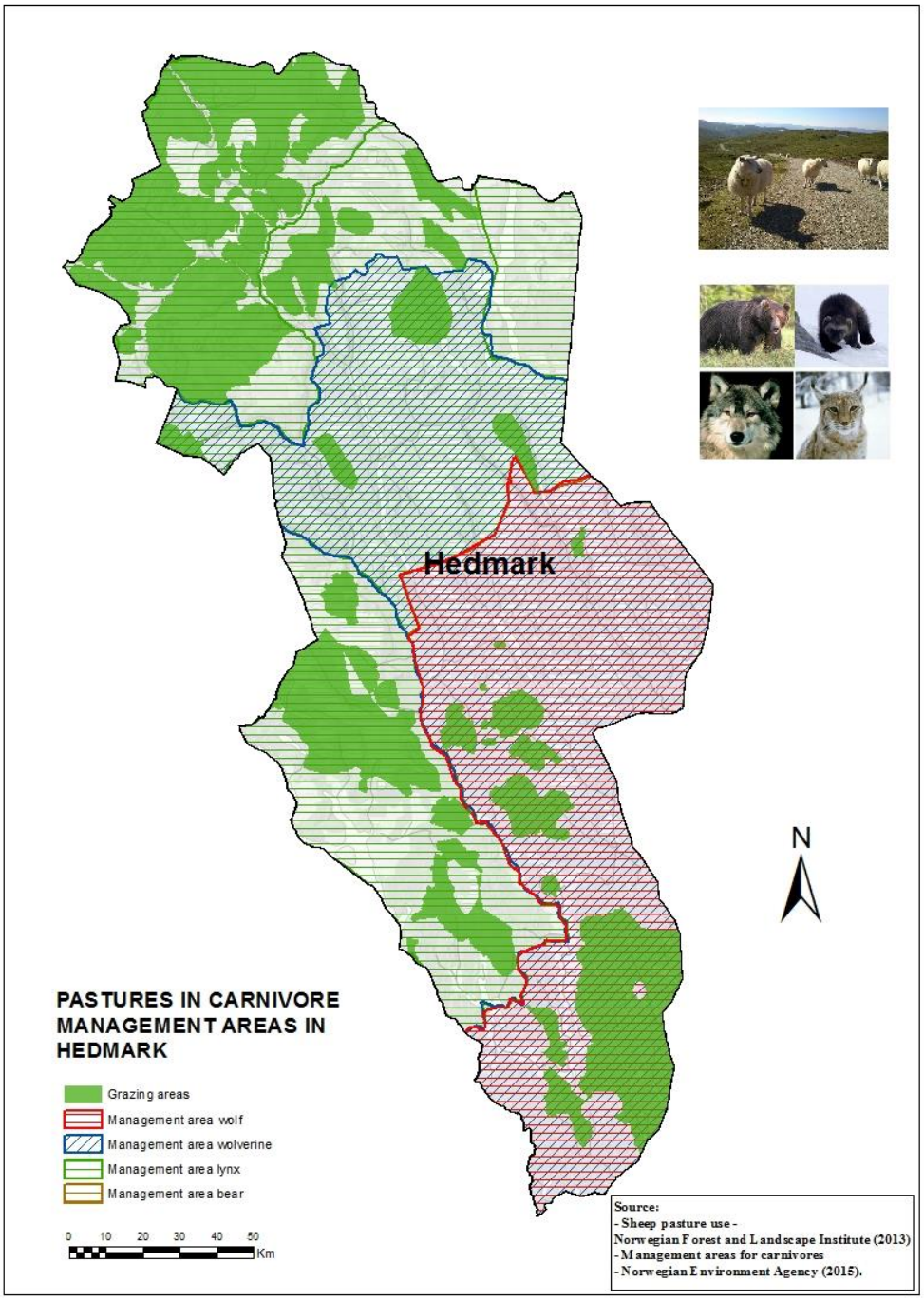


Figure 5 *Loss percentage on sheep in Hedmark*[19]

Compensation payments in recent years have shown a downward trend, and the requirement for 2014 is the lowest since 1994.[20] On the other hand it is positive to note that losses in Hedmark has declined somewhat, although some of the decline in the loss can be explained by a simultaneous decrease in the number of animals on pastures in the most carnivore exposed areas (County Governor of Hedmark, 2014) At the same time considerable resources to preventive measures are spent, and targeted management to reduce potential harm are conducted.

[19] Norwegian Forest and Landscape Institute. Grazing statistics. Statistics for sheep grazing in Norway and for each county from 2004 - 2013, and county statistics for organized grazing from 1970 to 2013. http://www.skogoglandskap.no/kart/beitestatistikk/map_view

[20] http://www.fylkesmannen.no/Hedmark/Miljo-og-klima/Rovvilt/Erstatning-for-tap-av-husdyr-og-tamrein-til-rovvilt/Erstatningsoppgjoret-for-sau-tatt-av-fredet-rovvilt-i-2014/



Map 4 *Grazing areas and management areas for carnivores in Hedmark*[21]

The map reveals the conflicting areas between grazing areas for sheep and carnivore management areas in Hedmark. The wolf zone is causing a lot of difficulties for sheep husbandry.

[21] Norwegian Forest and Landscape Institute. 2013. Nedlasting av kartdata - beite. (Downloading map data - pastures) http://www.skogoglandskap.no/kart/beitebrukskart_og_statistikk/artikler/2007/nedlasting_beite
Norwegian Environment Agency. Map catalog for the Norwegian Environment Agency. http://kartkatalog.miljodirektoratet.no/map_catalog_service.asp?servicename=forvaltningsomrader_rovdyr

2.4.4 Sør-Trøndelag and Nord-Trøndelag

In carnivore management, Sør-Trøndelag and Nord-Trøndelag belong in management region 6, which also include Møre and Romsdal county. In the thesis Møre and Romsdal county is excluded.

The first management plan for region 6 (Møre and Romsdal, Sør-Trøndelag and Nord-Trøndelag) was finally approved in November 2006 (County Governor of Nord-Trøndelag, 2011). The management plan facilitates achieving established population goals, and at the same time ensures predictability for interested parties, including farming, reindeer husbandry and outfield pasture-based industries. The County Governor of Nord-Trøndelag, the Department for Environmental Affairs, is the secretariat for the Carnivore Board.

Carnivores

The management plan for region 6 aims to contribute to secure carnivore species' survival through fulfillment of the parliamentary population goals, lower conflicts and to ensure industry operation, including active use of outfield grazing, through targeted measures. It also includes predictability. The management plan is to ensure that there is a burden distribution between sites. Areas with a particular responsibility for a carnivore tribe shall be relieved from the challenges with other carnivore species, as far as possible.

The *bear* areas will often have major conflicts related to sheep husbandry; heavy, long-term measures to prevent the loss of sheep must be prioritized in these areas. Funds for fencing, delayed release in the spring, early gathering and measures that separates bears and sheep are very relevant. Using FKT-funds for restructuring/operational changes may be considered within the carnivore zone for bears. On the other hand, in areas without breeding goals the threshold for withdrawal of tortious bear is supposed to be significantly lower than in areas with aim of breeding. The goal is four annual breedings bounded by border of Nordland in the north, Sweden to the east, the municipality border between Snåsa and Verdal, and Snåsa, Steinkjer and E6 in the west.

It must be ensured a continuous *lynx* population in those areas where there is a goal of breedings. In areas with the aim of breeding of bears the population of lynx should be kept low where heavy bear damages occurs. In areas with lynx injuries there must be a focus on effective loss prevention, for instance subsidies for later release in the spring. Quota hunting is a means to reduce injuries. The goal for Sør – and Nord – Trøndelag is 10 breedings.

The area with the aim of breeding of *wolverines* should ensure a continuous distribution of wolverines between the northern and southern Norwegian population. This means that breedings should be evenly distributed in these areas. In areas with wolverine injuries commitment will be made on effective loss prevention. This can involve heavy and long-term measures. Subsidies for early gathering, alternative grazing areas and fortified fences around these are very relevant measures. Despite that some areas do not have goals of breeding, it must be expected wolverine activity. Possible damage caused by wolverine in other areas makes heavy long-term preventive measures a high priority. The goal for Sør – and Nord – Trøndelag is seven breedings.

In region 6, there is no national goal of establishing breeding of *wolves*. Roaming wolves must however be expected within the entire region.

Individuals on stray from eastern / northern distribution may be of great importance for the genetic diversity of the South Scandinavian wolf population. The threshold for withdrawal of such individuals should for that reason be higher than for dispersal from the South Scandinavian population.

Sheep husbandry

The carnivore board for Region 6 acknowledges that the carnivore population goals adopted by the Parliament for the region will lead to substantial animal suffering, loss for the pasture users and major conflicts resulting from this (County Governor of Nord-Trøndelag, 2011). The board therefore believes that a heavy emphasis on preventive measures is necessary.

Numbers retrieved from organised pasture management (organisert beitebruk)[22] reveals that there has been a stable increase in sheep husbandry in Sør - Trøndelag, and Nord – Trøndelag from 1970 until 2000. From 2000 until 2013, there has been a fairly small decrease in number of sheep in these counties. Not surprisingly, the loss increased radically throughout the first 30 years, but has been stable since. Within sheep industry in Sør – Trøndelag the production has been fairly stable.[23] Livestock farming in Nord-Trøndelag is increasing in size, though sheep husbandry is stable with an unchanged scope. The production scale has over a time shown a decline, but the demise has decreased. In 2013, for the first time in several years been, there was a growth in the number of grazing animals. The decline in the industry however is not

[22] Norwegian Forest and Landscape Institute. Grazing statistics. Statistics for sheep grazing in Norway and for each county from 2004 - 2013, and county statistics for organized grazing from 1970 to 2013. http://www.skogoglandskap.no/kart/beitestatistikk/map_view

[23] County Governor of Nord-Trøndelag. 2014. Husdyrhold i Nord-Trøndelag (Livestock farming in Nord-Trøndelag). http://www.fylkesmannen.no/Nord-Trondelag/Landbruk-og-mat/Husdyr/

exclusively due to challenges with losses to carnivores. Fewer farmers also makes it difficult to maintain active grazing unions (beitelag).

More than 80,000 sheep was registered in Sør – Trøndelag and Nord – Trøndelag in 2004 (table 4), while the numbers for 2014 are reduced to 75,000.

Table 4 *Change in number of sheep in Sør-Trøndelag and Nord-Trøndelag 2004 – 2014.*[24]

County	01.01.2004	01.01.2014	Change
Sør-Trøndelag	49 235	47 532	−3,46%
Nord-Trøndelag	32 484	27 951	−13,95%

It is generally difficult to find good initiatives and measures that can ensure sheep and carnivores residing in the same area at the same time.

Sør-Trøndelag had about 6.5% loss of ewes and lambs on pasture in 2013, while the total loss in Nord-Trøndelag was around 10%.

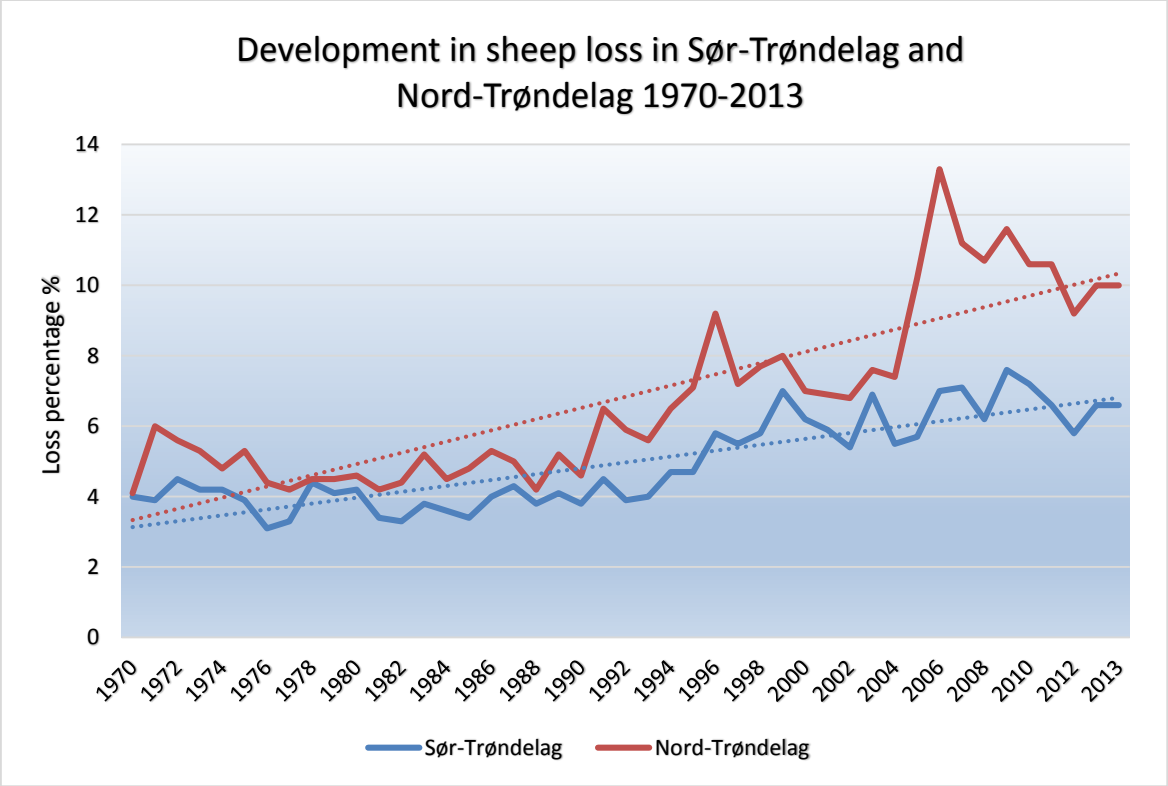
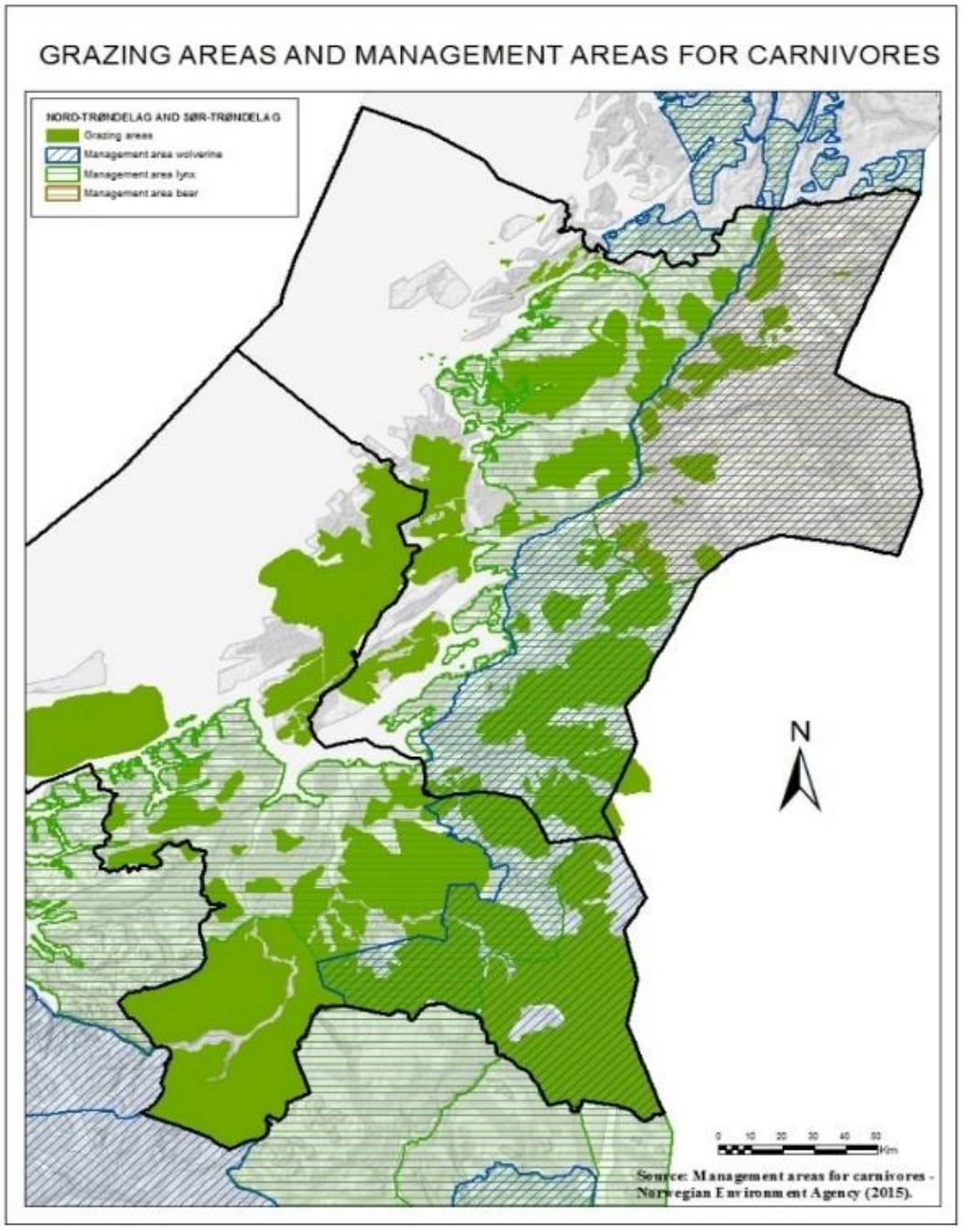


Figure 6 *Loss percentage on sheep in Sør-Trøndelag and Nord-Trøndelag* [25]

[24] https://www.slf.dep.no/no/statistikk/utvikling/antall-dyr/voksne-sau/antall-husdyr-voksne-sau

[25] Norwegian Forest and Landscape Institute. Grazing statistics. Statistics for sheep grazing in Norway and for each county from 2004 - 2013, and county statistics for organized grazing from 1970 to 2013. http://www.skogoglandskap.no/kart/beitestatistikk/map_view



Map 5 *Grazing areas and management areas for carnivores in Trøndelag*[26]

As can be seen from the map, there are conflicting areas between carnivore management areas and grazing areas for sheep. In Trøndelag the core area for bear is causing the largest amount of stress and loss in sheep husbandry.

[26] Norwegian Forest and Landscape Institute. 2013. Nedlasting av kartdata - beite. (Downloading map data - pastures) http://www.skogoglandskap.no/kart/beitebrukskart_og_statistikk/artikler/2007/nedlasting_beite Norwegian Environment Agency. Map catalog for the Norwegian Environment Agency. http://kartkatalog.miljodirektoratet.no/map_catalog_service.asp?servicename=forvaltningsomrader_rovdyr

2.5 Sheep farmers' attitudes towards large carnivores

Attitudes are complex phenomena. In his book *The Value of Life: Biological Diversity and Human Society* (1997), Kellert states that there is considerable variation across demographic and socio-economic groups in attitudes toward animals (Kellert, 1997). Especially carnivores elicit intense and often extreme attitudes. A study on attitudes toward large carnivores among sheep farmers experiencing different degrees of depredation was conducted in two different regions in Norway, Hedmark and Rogaland (Vittersø et al., 1999). Paradoxically, farmers from the region with the highest depredation rate expressed less negative and more positive attitudes toward large carnivores than their colleagues from the region with a low rate of depredation. The two regionally distinct populations experience two different rates of depredation in their livestock. The economical and other consequences of the carnivores' presence are a central part of the farmers' experience of large carnivores. Some farmers have given up breeding lambs, and many more anticipate that they will have to give up unless the rate of depredation is reduced. As farmers expressed increasing concerns about the impact of large carnivores on their ability to remain sheep farmers in the future, the negative attitudes increased and the positive attitudes decreased in strength. When the respondents answered that it would be difficult to continue sheep farming if the level of depredation does not decrease, they probably and primarily express concern for the economic consequences. The reduced negative attitudes toward carnivores which are observed when the anticipated (economic) consequence of sheep loss is controlled for, could indicate that the livestock vs. carnivore conflict should become less intense if systems of economic compensation minimized such consequences. However, thinking that future sheep farming will be difficult may be associated with a broader psychological state related to pessimism or hopelessness regarding the future. Obviously, such a state would be influenced by a wide array of factors, ranging from economic prospects to social and psychological aspects of social networking and well-being. Increasing economic strain has been imposed upon farmers, and an enduring centralization of social and health services has contributed to growing pessimism in many rural areas.

In the livestock – carnivore conflict there are complex influences of diverse socio-demographic conditions (Kaltenborn and Bjerke, 2002). Kaltenborn and Bjerke describe the cognitive hierarchy as a structure where basic values, beliefs, attitudes, norms, behavioural intentions, and behaviours are thought to build upon one another. Attitudes toward carnivores differ across groups delineated by demographic and socioeconomic variables like age, gender, education, and occupation (Kaltenborn et al., 1999, Kaltenborn and Bjerke, 2002). Attitudes toward groups

of animals are formed early in life, and seem to be relatively durable over time. Kaltenborn, Bjerke, & Vittersø (2008) pointed out in their attitude-study on carnivores and sheep farmers that we probably will witness a reduction in negative attitudes toward large carnivores as time passes due to the decrease in proportion of livestock producers in Norway. However, they also point out that conflicts between farmers and wildlife managers are unlikely to decrease, *"since the attitudes toward large carnivores held by the constituencies most likely are embedded in a complex cognitive (and political) web constituted by variables like political or social power, territoriality (ideas about private property and rights to the pastures), and fundamental beliefs about the relationship between humans and nature in general"* (Kaltenborn et al., 1999).

Education is a variable that has been used in most studies of environmental attitudes (Krange et al., 2011). It works well as an indicator of socio-cultural position, and will also be useful in the present study. Many studies, both Norwegian and international, have shown that there is a correlation between level of education and how people relate to environmental and nature conservation. Those who have more education are more concerned about environmental protection than those who have little education. This research shows that the same applies to the view of the large carnivores; the highly educated are often most positive.

Previous studies has shown that farmers' emotional attachment to their sheep predicted the attitudes toward carnivores; the stronger the attachment that farmers revealed to their sheep, the more negative were their attitudes toward large carnivores (Vittersø et al., 1998).

A recent report presented results of a questionnaire survey conducted in the County of Nord-Trøndelag in the spring of 2013 targeting all sheep farmers in Nord – Trøndelag (Nossum, 2013). In the report, the situation for sheep farmers was surveyed in terms of the status of the operating system and the motivation to continue as a sheep farmer in the future

The survey revealed that the majority of sheep farmers mostly used infield pastures, but a similar proportion utilized the mountain pastures as well. Fewer had outfield pastures close to their farms, and only a small percentage had pastures that were impacted by carnivores. Only one third of the farmers in the survey collected more than 50 percent of their income from sheep. A similar proportion earned less than 10 percent of their income from sheep. If they got the chance to make their career choice again, 64 percent of the respondents would have chosen to become farmers again, either as sheep farmers or with another form of production on the farm. Only 12 percent would choose another profession. As it came to what the respondents believed would strengthen the motivation to be a sheep farmer, taking care of the farm and the cultural landscape scored the highest. For sheep farmers it is practically important to combine this with

other paid work, the relationship comes before the operational economy. Concerning future plans for production, 41%of the sheep farmers wanted to increase their flocks, while one out of three wanted to continue with the production to the same extent as at present. One out of ten wanted to end or reduce production. Those who answered that they would like to increase production reasoned it primarily due to an increase of income, but also because they had more pasture available. Only 20 percent said they would do so because they have the work capacity (N = 122).

If we look at those who do not want to increase production, three factors were important, namely poor economy, problems with carnivores, and a proportion being happy with today's situation as it is.

2.6 Sheep farmers, carnivores and landscape

In a report from NINA (2009) researchers investigated how attitudes toward large carnivores are related to different perceptions of the landscape (Skuland and Skogen, 2009). The report was based on a study conducted in the municipality of Trysil in south-eastern Norway. *"The aim of this study is to shed light on how attitudes toward carnivores are rooted in people's understandings of the landscape, and to explore whether perceptions of changing land use and changing landscapes affect the conflicts over large carnivores".* They discovered that attitudes toward large carnivores are indeed related to how people use and perceive the landscape.

What they call *use landscape* is prudent utilization of resources as an obligation, a landscape where there is room for logging, farming and livestock. This perspective is characterised by a perception of harmony between both humans, animals and plants, but large carnivores qre perceived as disturbing this harmony, and they have only a limited place in this utalitarian landscape. Behind the conflicts over large carnivores there is a deep anxiety concerning changing land use. Farm abandonment, reduced grazing, an impression of public scepticism toward hunting and incessantly expanded protection of land (protected areas) and species, and the manner in which the land and its resources are utilized, are perceived as threatening. The growth of large carnivore populations makes these changes even more visible.

Traditional sheep husbandry, which implies ("natural") outfield grazing is regarded as an enrichment in the Norwegian landscape. On the other hand, several informants claimed that the modern form of sheep husbandry, which Norwegian farmers practice, has left the traditional - which meant herding - with the consequence that the animals now are exposed to carnivores.

In connection with the ideal of the "use landscape", management of the carnivores is meant to remove problem individuals. In that context, management hunting, especially in connection with damage to livestock, is also seen as a way to maintain the cultural landscape. By the last century farmers and local hunters had collaborated to exterminate carnivores that were perceived as both a threat to life in the village and in the forests.

For the "use landscape", the encroachment of pastures by shrubs and trees, rural depopulation and abandoned farms are tangible evidence of a way of life in flux. Declining agriculture leaves visible traces, which tell of a way of life that is crumbling.

This study has shown that farmers see it as a privilege to take over the farm after their parents, and that many others also identify strongly with this view. It is perceived as a mockery of previous generations toil to let the landscape overgrow and die out. To understand why farmers, and others with roots in traditional outfield pastures are sceptical towards carnivores, it has proved fruitful to examine how they give meaning to the landscape they live and work in. The work forms the basis of opinion formation, and when use declines, it challenges their notion of landscape. Earlier generations' work is perceived as having been in vain and what is left is an uninhabited landscape that testifies to decline and decay.

Traditional outfield pasture use, such as small farms and grazing animals can provide the landscape with an appealing (nostalgic) touch and visible symbols.

Both hunters and farmers look with some concern at the emergence of a third landscape ideal – the "wilderness landscape", which in many ways fundamentally differs from the "use landscape" and the "dynamic landscape". Scepticism indicates that many are aware that the cottage owners and tourists landscape experience that carnivores in the landscape are an enrichment.

Different perceptions of carnivores are therefore woven into the basic patterns of landscape understanding. Carnivore conflicts are therefore also conflicts about the landscapes meaning. When "mingling with" the landscape changes, it certainly challenges some existing landscape ideals.

3 THEORETICAL PERSPECTIVES

Long and Cruz (2003) defined social life as heterogeneous and polymorphic, comprising a wide diversity of social forms and cultural repertoires, even under seemingly homogeneous circumstances (Long and Cruz, 2003), social action never being an individual ego – centred pursuit. In their paper, they argue the case for an actor-oriented analysis of development policy and intervention. The farmers' actions are taking place within networks of relations, shaped by routine and explorative organizing practices. Certain social conventions, values and power relations also bound their social action. In the sheep farmer's lifeworld differences are produced, reproduced, consolidated and transformed and it is necessary to study how, and to identify the processes involved, along with the structural outcomes.

Implementing changes in agriculture has to do with culture, farmer type, actor – structure distinction and adaptation. The theoretical perspectives is therefor the basis for gaining knowledge about the farmers' culture, different archetypes and discourses, and the actor – structure perspective, to be able to answer the thesis' research questions.

3.1 Culture and perceptions of nature

In the agricultural context, as well as in social life, meanings, values and interpretations are culturally constructed but differentially applied and reinterpreted (Long and Cruz, 2003). This happens in accordance with existing behavioural possibilities or changed circumstances, thereby generating 'new' cultural 'standards'. Culture has a lot in common with the discourse concept as both include opinion structures shared by several people. The difference is that culture includes more profound structures than discourses. Jacobsen (2012) shows that the complexity and the perception of ancient culture is strong. For a new culture to emerge, one must both unlearn something and simultaneously learn something new. This applies to individuals, groups and organizations.

Cultural practices will often affect what opinions people have about how nature should be managed, and in addition reflect peoples' overall value orientations. Some people support conservation interests, while others add the most emphasis on that "nature is there to be used". People's stance on specific issues is sometimes related to such general perceptions. People's knowledge of nature stems from quite different sources (Krange and Skogen, 2001). Schematically, we can distinguish between two quite different forms of knowledge: knowledge based on research and knowledge that is based on people's experiences through the everyday

use of nature. Also farming culture has a certain influence on the individual farmer, farming culture has strong ties and many basic rules that govern agricultural norms and values.

Attitudes in the carnivore question, on the other hand, are related to what kind of knowledge people trust, and it is an example that these attitudes join a wider cultural context, where knowledge is an important constituent. The former social research on carnivore conflict has illuminated how the conflict is rooted in greater divisions in society (Skogen and Krange, 2003).

A first explanation of different perceptions of nature emphasizes economic interests (Krange and Skogen, 2001). People with roots in traditional sectors such as agriculture and forestry often have a different view of how nature should be managed than people who live off activities that are distant from nature. It is likely that people's views on nature is influenced by having worked in a sector where the entire income depends on how natural resources are exploited. This economic dimension is important for understanding how opinions are formed, but it provides no adequate understanding of why people have different views on how nature should be used. To understand how attitudes and beliefs evolve one must try to see them in the context of private life in the broadest sense. Historic alterations that change the economic conditions of the towns will also become applicable in the countryside. Some occupations are growing, others decreasing in number, some disappearing completely and new ones appearing. Skogen (2001) argues that especially young people’s attitudes toward nature are dependent on class background and sociocultural heritage (Skogen, 2001). Young people’s environmental orientation was part of a larger cultural package.

Many rural people believe that nature is best protected through active use and management by the local community, "as we have always done." Values, norms and traditions are also influenced by landscape and changes therein.

Outfields can give quite diverse benefits to different groups of people, and it is not infrequently difficult to balance various interests in one and the same landscape (Berge, 2006), (Haugset, 2011). When the same geographical landscape is used for various types of resources, conflicts could arise when users of one type of resource or benefit threatens or ruins the experience for users of other types of goods or services. This is well described for the conflict between livestock husbandry and carnivore management. In connection with the management of outfields the beliefs one has about what nature is and what the values of nature are will play an important role.

3.2 Discourses in agriculture

A discourse can be defined as an institutionalized way of talking that regulates and enhances action and thus wields power (Jäger and Maier, 2009, Wodak and Meyer, 2009). What is perceived as "truth" in the carnivore – livestock conflict is closely linked to the prevailing discourses. A discourse is one way of considering a topic, shared by several people acting as a lens through which the topic is considered (Benjaminsen and Svarstad, 2010). Discourses are pure social constructions that can have real impacts and real consequences in life. Various stakeholders, in this case the farmers, each have separate opportunities to make their own discourses. Discourses wield power in a community because they institutionalize, reinforce and regulate ways of talking, thinking and acting. Formations of opinion - the social constructions of reality - do not take place inside the heads of isolated individuals. Communication is a social activity, also the language and terms used in daily life. Discourses on nature, landscape, environment and village frame collective and individual actions, and hence the positions in conflicts (Skuland, 2008).

Adger et al. (2001) and Svarstad et al. (2008) describes four major types of discourses on biodiversity: *Promethean, Preservationist, Win–win, Traditionalist* (Adger et al., 2001, Svarstad et al., 2008). Benjaminsen and Svarstad (2010) addresses three types of discourses on environment and development, especially regarding the use and management of protected areas (Benjaminsen and Svarstad, 2010). The *Promethean discourse*, denotes an understanding that protection of nature is superfluous. In Norway, according to the environmental authorities, wilderness or "untouched nature" is defined as sites located more than 5 km from roads, railway lines or power lines, but is an "objective" measure of untouched nature. The idea of "wilderness" that should be protected against use of natural resources is central in the *Preservationist discourse*, referred to as *the fortress conservation discourse* by Benjaminsen and Svarstad (2010) because the conservation area is virtually defended like a fortress, and most forms of use are prohibited (Benjaminsen and Svarstad, 2010). In the Preservationist discourse, understanding of conservation is received primarily through scientific knowledge. There is strict practice of conservation regulations and the local population's needs and interests are not considered as important. The “wilderness indicator” (INON) (Skjeggedal et al., 2005) is used as a method to visualize the destruction of nature in Norway, and to make Norwegians more aware of this. This indicator is used in management and planning. But even though "wilderness" exists as an idea in Norwegian environmental management, it was gradually outcompeted by a discourse that focused on the importance of local participation in conservation, the *Win-win*

discourse. It pointed out the importance of letting people in, and around, protected areas participate in the management of these protected areas, and to provide locals economic benefits of the conservation. This new discourse argues that local population's interests should be safeguarded. Gains from protection and income from tourism in protected area should accrue local communities and local stakeholders. People who experience various forms of loss in connection with the conservation area, should receive compensation for this. It emphasises the importance of partnerships between local residents and external stakeholders, such as government agencies. In the Win-win discourse, use and conservation should go hand in hand, and it is believed that through use, local participation, involvement and business development one gets "ownership" and understanding of conservation activities. This is believed to create benefits for all parties. A major focus in the Win-win discourse is the preservation of natural values and connections among other things besides commercial interests.

Within the *Traditionalist discourse* external actors intervening in environmental and resource use issues is categorically rejected, while local actors, such as the farming industry, are seen as being capable of managing biodiversity and other natural resources if they are given the chance. It is based on the belief that "the community knows best," and good attitudes comes through active use, ownership and control. The belief in that a strict protection of nature is unnecessary and negative Nature is believed to be "protected" through active use and management by the local community, "as we have always done."

The actors in agriculture have a common notion that the trustees of the Nature Diversity Act[27], i.e. the Norwegian Environment Agency, occasionally makes initiatives within a Preservationist discourse surrounding natural resource management. Typologies of this discourse exists in the Parliamentary Carnivore Settlement.[28]

[27] Nature Diversity Act of 2009. Lov om forvaltning av naturens mangfold (Law on management of biodiversity). (In Norwegian). https://lovdata.no/dokument/NL/lov/2009-06-19-100

[28] Parliamentary Carnivore Settlement. Representantforslag 163 S (2010–2011). https://www.stortinget.no/globalassets/pdf/representantforslag/2010-2011/dok8-201011-163.pdf

3.3 The farmer as a decision maker

Humans tend to resist adopting new knowledge when there is no immediate advantage or urgency to change (Freibauer et al., 2011). Farmers' decisions depend on a number of factors that fall outside the physical/ production area of the farm. To make better decisions and a more sustainable and profitable farm, the farmer needs to be aware of the range of decisions and factors affecting those decisions.

Factors that may influence environmentally relevant behaviour patterns that have been studied are diverse, such as the understanding of barriers to performing the behaviour, the difficulty of the behaviour, the understanding of the effectiveness of the behaviour, knowledge of the behaviour, and social influences on the behaviour (Bamberg and Schmidt, 2003). The lack of a strong theoretical basis in many of them is a problem. More theory-driven models contain precise operationalization of the theoretical constructs used and specify the causal processes through which they affect the farmer's behaviour. These are models examine the relationship between attitudes and behaviour.

The norm activation model

Personal norms are the only direct determinants of prosocial behaviour patterns. The farmer's behaviour will correspond to personal norms; the person is both aware of the consequences of the behaviour and feels some responsibility for the consequences. Responsibility has the greatest explanatory power when it comes to environmentally friendly behaviour, and can be explained by a norm-activation model (Schwartz, 1970). Activated liability appears only when the farmer understand the consequences their behaviour may have on other people. Without the knowledge and confidence to research, it is believed unlikely that own behaviour affect others negatively, and therefore no feeling responsible.

The theory of planned behaviour

The theory of planned behaviour is a general theory of social behaviour. It can be used to explain all kinds of intentional social behaviours. According to Ajzen (1991) intentions to perform different kinds of behaviours can be predicted with high accuracy from attitudes toward the behaviour, subjective norms, and perceived behavioural control (PBC); and these intentions, together with perceptions of behavioural control, account for considerable variance in actual behaviour (Ajzen, 1991). The benefit/cost arguments are important. When confronted with two alternatives, the farmer chooses the most positive behavioural consequences (Bamberg and

Schmidt, 2003). This model suggests that attitudes, subjective norms, and perceived behaviour mediate the influence of all kinds of outcome expectations on intention.

The theory of interpersonal behaviour

This is similar to the TPB model. It includes expectancy-value and normative beliefs constructs to explain a farmer's intention to perform a specific behaviour and the actual performance of that behaviour (Bamberg and Schmidt, 2003). The level of consciousness decreases as the level of habit in performing the behaviour increases. Apart from intention and behavioural control, the construct habit is considered as an additional predictor of behaviour. Intentions are immediate antecedents of behaviour, and habits also mediate behaviour. Both these influences are moderated by facilitating conditions. Expectancy-value beliefs help to explain the intention. Expectancy-value calculations represent the "cold" cognitive assessment and evaluation of long-term behavioural consequences, whereas the affective measure should represent the "hot" evaluation of consequences associated directly with the performance of the behaviour.

3.3.1 Bounded rationality

Models of rationality provide prescriptions for behaviour, yet, the models have changed over the last centuries when they conflicted with actual behaviour (Gigerenzer and Selten, 2002). 'Bounded rationality' aims to understand the actual cognitive processes in human behaviour (Henrich et al., 2001). Referring to the book Bounded Rationality: The Adaptive Toolbox, the theory of rationality was thought of as a description of human behaviour as well as a perception for it. The term "bounded rationality" emerged in 1962, and Herbert A. Simon used the metaphor of a pair of scissors, where one blade is the "cognitive limitations" of actual humans, and the other is the "structure of the environment". The models of bounded rationality however, describe how a judgement or decision is reached rather than merely the outcome of the decision. They describe the class of environments in which these heuristics will succeed or fail (heuristics is the study of how to best obtain and store knowledge). Simon's concept (Simon, 1955) contributes with nuances of what shapes economic actors' actions and what is important to understand when their motivation is assessed. There are three things that are important to recognize. Farmers, like all actors, are characterized by limited cognitive capacities because they never possess all the information about the choices they must make, which is due to the limited amount of available information they can access and process. They are influenced by the institutional framework they are a part of, and are sometimes letting emotions and irrationality control the action. Bryan D. Jones (1999) states that decision makers intend to be rational, being goal oriented and adaptive, but because of human cognitive and emotional

architecture, they sometimes fail, occasionally in important decisions (Jones, 1999). There are two types of limits on rational adaptation; limits on how we go about making decisions, and limits which affect particular choices directly. He argues that people possess some cognitive tendencies that shape our understanding of the scope of action and that can often translate into miscalculations. These tendencies can be seen as bias, and in his work he has many examples of this and the consequences for the individual and community development. To name a few, he shows that humans prefer security at the expense of change. Therefore, we tend to preferentially see information and indications that confirm already assumed contexts and maintain the current situation.

The psychologist Daniel Kahneman (2011) argues that people possess some cognitive tendencies that shape our understanding of the scope of action and that can often translate into miscalculations (Kahneman et al., 2011). One cognitive limitation he describes is that people have a loss aversion which means we are more sensitive to losses than gains. It may result in actors in agriculture being engaged in the farm longer than would be rational in the market logic because we consider invested time and money as hard to let go of. Kahneman's research shows that an understanding and recognition of human characteristics will be useful when analysing actors in agriculture. It can provide a further dimension to understand what it is that structures human behaviour. Adaptation is one of those issues.

3.3.2 Adaptive capacity

Adaptation is complex and often over-simplified in impacts studies and undertaken by multiple actors and is driven by both pressures and opportunities (Dixon et al., 2014).

"Adaptation is a dynamic social process: the ability of societies to adapt is determined, in part, by the ability to act collectively"(Adger, 2003).

In several social fields, adaptations are considered measures to combat the risks associated with the interaction of environmental hazards and human vulnerability or adaptive capacity (Smit and Wandel, 2006). Adaptation can refer to a process, action or outcome in a community or group in order to better cope with, manage or adjust to some changing condition, stress, hazard, risk or opportunity. It can also be described as adjustments in a system's behaviour and characteristics that enhance its ability to cope with external stress or adjustments in individual groups and institutional behaviour in order to reduce society's vulnerability to climate, in the climate change context. Jung described adaptation as the process of coming to terms with the external world, on the one hand, and with one's own unique psychological characteristics on

the other (Sharp, 1991). As Adger et al (2005) specifies it, adaptation is made up of actions throughout society, by individuals, groups and governments and can be motivated by many factors, including the protection of economic well-being or improvement of safety (Adger et al., 2005). Reducing people's vulnerability to climate change can be viewed as a parallel to the reduction of the sheep-carnivore conflict.

Adaptive capacity in agriculture, but also human societies in general, requires sufficient resources and appropriate institutional structures (Dixon et al., 2014) and there has lately been a shift from asset-oriented approaches to adaptive capacity to include the processes which enable or constrain the ability to, for example, draw upon or switch between resources. This requires approaches that move away from simply looking at what a system has that enables it to adapt, to recognizing what a system does to enable it to adapt. Different assets, processes and capabilities combine and interact at various levels to create adaptive capacity. Interventions aimed at building adaptive capacity need to go beyond merely supporting 'coping strategies' and support farmers to build up their asset base and strengthen those capabilities and dynamic processes which are critical to resilience and economic development (Frank and Penrose-Buckley, 2012). Frank & Penrose-Buckley have pointed out the farmers' short-term timeframes for decision-making and farm-level investments as a key barrier to building adaptive capacity. Being part of an organisation can potentially increase the planning horizon for individual farmers but a democratic approach to decision-making can cause hindrances. The degree to which the farmers can be flexible depends on their access to information and knowledge. Institutions shape the farmers ability to respond to climate impacts and pursue adaptation strategies. Entitlements are the ability of individuals and communities to access the resources, services and assistance they need, but also help from institutions. Experimentation and innovation are essential characteristics of adaptive capacity. It is central to ensure that a farming system can cope with and adapt to the carnivore situation in Norway. Flexible forward-looking decision-making and governance gives the ability to anticipate change and shape plans and institutions accordingly. Strong market access and influence, a good asset base and developed flows of knowledge should support flexible forward-planning and decision-making at the individual farmer level.

Table 5 *Adaptive capacity at the local level*[29]

Adaptive capacity at the local level	
Characteristic	**Features that reflect a high adaptive capacity**
Asset base	Availability of key assets that allow the system to respond to evolving circumstances
Institutions and entitlements	Existence of an appropriate and evolving institutional environment that allows fair access and entitlement to key assets and capitals
Knowledge and information	The system has the ability to collect, analyse and disseminate knowledge and information in support of adaption activities
Innovation	The system creates an enabling environment to foster innovation, experimentation and the ability to explore niche solutions in order to take advantage of new opportunities
Flexible forward-looking decision-making and governance	The system is able to anticipate, incorporate and respond to changes with regards to its governance structures and future planning

Dixon and colleagues (2014) concluded that modernisation in agriculture has had both positive and negative impacts on the components of adaptive capacity, where the most significant differences are related to diversity. Multiple pressures and opportunities influence adaptive capacity and characterize current farming systems and will continue to shape future adaptive capacity. Implementing changes in sheep farming practices, such as having sheep on infield pastures instead of outfields, or moving the sheep to a less carnivore-prone area, represent a major change in the farming system. Dixon and colleagues propose the use of the vulnerability-resilience framework to develop and implement interventions that enhance adaptive capacity; consideration of how to better integrate modern farming methods to maintain diversity, rather than a one size fits all approach; and a greater focus on building inclusive formal institutions. Skogen (2003) suggests to take into account not only the particular, concrete conflicts of interest involved in a given controversy, but also the larger societal mechanisms that these conflicts enter into, to make management truly adaptive (Skogen, 2003). He further specifies that; *"The stance people take on land use issues is influenced by many factors, and some of these may only partially or indirectly originate* ***from*** *the actual subject matter of the conflict. To understand the driving forces behind these disputes, it is therefore necessary to have a broader scope, and not least take culture and cultural power relations into account."*

[29] Frank, J. & Penrose-Buckley, C. 2012. *Small-scale Farmers and Climate Change: How Can Farmer Organisations and Fairtrade Build the Adaptive Capacity of Smallholders?*

3.4 Archetypes in sheep husbandry

Describing people's behaviour and type involves to a large degree personality psychology. A lot of different words are used in describing behaviour and type, such as archetypes, personality types, farmer types, ideal types, characters etc.. Archetypes are used in the thesis' theory frames. In the case of archetypes you have a nucleus which constitutes a cluster that gets smaller and smaller. The archetype is where things are 100% something. You have something that is more reality than real. A kind of typology is created, that is the type of discourse that is idealized. In the rhetoric around carnivores, you will find a core, you will find that they are all places around the core. The core develops according to how people use it. The archetype itself is never to be found. You will never find a sheep farmer who is only in the rhetorical world. There is a negotiation where this is socially constructed in the farmer. In the carnivore debate, there are large and strong archetypes.

Farmers are a diverse group of people. Every farmer type considers and finds out how he or she will conduct their farm. Along with the taught agricultural norms and values, the farmer will be affected by the values the family stands for.

Jostein Vik at the Centre for Rural Research has recognised five farmer types (Vik, 2011) which are also applicable to sheep husbandry. The farmer types describes the empirical reality along some other dimensions than those who emerges in other descriptive statistics in agriculture. They focus on conditions that describe some key features of farmers, the farms and especially the strategic adaptations farmers eventually envisions in their future.

Vik's farmer types (Vik, 2011)

1. **The large - scale farmer** - has large agricultural areas and is a volume manufacturer. Hence they often have large incomes and are often full-time farmers with employees. Operated alone or with positive joint operation farmers. Is concerned with similarity in the reward system and use the appropriate channels for production, sales and processing policies. This is relatively young farmers, and it is largely farmers with agricultural education at various levels. These farmers are confident and optimistic. Envisages increasing production. The large - scale farmer is optimistic about the economy and plans further expansion.
2. **The reduction farmer** - is dissatisfied with their situation both economically and socially, and has a strong negative expectation for future financial results. It is clear that there will not be any increase in the production (or increased work effort) on the farm.

These farmers envisage that the probable development trend is that they work more outside the farm. This includes farmers who have experienced negative development of the financial result on the farm, and this is the category of farmers who have the lowest collected entrepreneurial income from agriculture and forestry. The experience of their own health is somewhat below average, and they feel in fairly large extent also often lonely. Many are negative joint operation farmers. Expresses generally negative attitudes to agricultural and cooperative policy, and there are poor agricultural professional environment where the farmer lives. To a greater extent it can be understood as a defensive or reduction oriented large - scale farmer.

3. **The startup farmer** - Young and newly established. To a considerably greater extent than others is satisfied with their own health. They have agricultural education and plans to increase both production and labor. They believe in the farm and the future. These are prepared to invest in the farm and the future, although many also envisage that they will work more outside the farm. When it comes to the farm and the operation this category distinguishes to a small extent from the average except that they have a somewhat low unit entrepreneurial income from agriculture and forestry. The commencement farmer includes the farmers who have allowed themselves to be recruited. They have good agricultural professional environment, are positive and adapt in agricultural, technological and organizational ways. Along with the large – scale farmer the commencement farmer is a category that gives cause for some optimism with regard to the industry's future.
4. **The innovation farmer** - Differs little from the average in terms of age, size of the farm, quota size, participation in joint operation, the size of entrepreneurial income etc. Orient themselves toward the creation, development, additional trade and processing / sale of farm products. Is offensive in investment and wants to create their own products. They face challenges with a strategic change and take greater part of the value chain itself. Are somewhat more likely to have agricultural education, and that they had, and expect, poorer financial results in a somewhat greater extent than average. This group is divided in their opinion on the agriculture - cooperative policy.
5. **The stagnation farmer** - Somewhat more difficult to see the contours of. Usually not operating in joint operations but alone. Feels significantly lonelier as a farmer. Have somewhat better economy, but does not take future choices, which is distinctly for this category. Is fairly average in terms of age, education, satisfaction with their own health,

the size of the driven agricultural area. Is expecting a deteriorating economic result in the future. There are no plans pointing out of the unfavorable situation this farmer is located in - socially and partly economic. This is a farmer sitting on the fence observing what others are doing. The farmer is the germ of the assessment of closure. Meanwhile highly critical of the agricultural professional environment that gives contagion effect in the agricultural environment.

The distance is short towards the different archetypes because of a very frequent use of the archetype in politics, and it is frequently repeatedly in media. The closer you come to the centre of power, the more you confront the archetype. There is a fairly large distance between the archetype and reality.

There are the variances that are very exciting in this research. Ideally, we might find out that those who have left sheep husbandry have other deviations than the farmers who have implemented operational changes in agriculture.

Jung describes archetypes as *"… systems of readiness for action, and at the same time images and emotions. They are inherited with the brain structure-indeed they are its psychic aspect. They represent, on the one hand, a very strong instinctive conservatism, while on the other hand they are the most effective means conceivable of instinctive adaptation. They are thus, essentially, the chthonic portion of the psyche, if we may use such an expression- that portion through which the psyche is attached to nature, or in which its link with the world is most tangible."(Steinmetz, 1998, Sharp, 1991)*

4 METHODOLOGY

4.1 Introduction

This chapter presents the methodological framework used in conducting this research. "A method is a process, a means to solve problems and come up with new knowledge. Any measures that serves this purpose, belong in the arsenal of methods "(Everett and Furseth, 2012). To distinguish between method and methodology in research, Kirsch and Sullivan (1992) defines method as a technique or way of proceeding in gathering evidence, and methodology as the underlying theory and analysis of how research does or should proceed (Kirsch and Sullivan, 1992). It is the approach, the research question, and purpose of the investigation that influence the choice of method.

While quantitative methods emphasize the extent and number, the qualitative approach seeks to delve into and emphasizes importance (Fjeldvik, 2009). Qualitative research presents certain problems in the areas of researcher -to-subject relations (Kirsch and Sullivan, 1992)

In the initial stage there is a requirement to identify the subject, with awareness of the ontological and epistemological positions (Crang and Cook, 2007). This means, where you come from, why you study this topic, and why you want to interview the informant. Moreover, outlining an appropriate research design, an overall plan which aligns methods and an empirical approach to the research question, considering the practical fieldwork, ethical issues, how to analyse, and publish.

The most appropriate choice of method in this research was dependent on the questions asked and the sort of information the researcher wanted to generate.

This methodology part contains the details within the range of the whole research process, why case studies, why qualitative research method benefitted, the research design, study sites, how the data was collected and analysed.

4.2 Research design

Attitudes and emotions around sheep husbandry and carnivore issues are complicated and require a certain depth analysis to create the best possible understanding of the informant’s reality. The interviewees each have their narrative and perception of the reality they find themselves in, and the discourses that exist are produced in different ways. The purpose of the qualitative research interview is precisely to describe and interpret themes in the interviees world, as seen from their point of view. The individual situation and personality characterizes

much of the framework around their view of reality. Reality is complex; the ability to adapt will be individual and different from person to person.

This thesis concerns adaptation strategies in carnivore exposed areas. The sheep farmers have taken different choices, based on how they perceive reality within the sheep industry. This is a descriptive analytical representation of it. It is an attempt to describe the different realities as perceived by the farmers, and to uncover the underlying causes and consequences of these realities.

Many factors affect the stories they tell. Personal qualities clearly influence both their willingness to adapt. Some were more open to change than others are, while others argued from an existing discourse.

A discourse is an exercise of power and an attempt to define what is real. To define what is important is difficult for a single sheep farmer, from his own, entirely personal opinions. Discourses help place an individual's experience into an established network of arguments. Discursive patterns are constructed and reconstructed through discursive practices and through action. Throughout the analysis process, it is important to look at the discourse on a more creative level. The various actors have a point of view and a position. The discourse serves as hooks, which their beliefs and perceptions can be hung on. In the larger debate, the farmers' own experiences are collected as resources, which they use to construct a bigger picture. It is like a crutch they use to support their own arguments, a kind of strategy or function in their argumentation that provides a group identity. Through a discourse they have a feeling that they have an argument existing inside a larger picture.

Finding the way to solutions in the carnivore debate will require getting around the institutionalised rhetoric and getting in touch with the individual people who are on the ground. Rhetoric is potentially counter-productive, especially at the organizational level because it acts as a barrier to any form of change.

This thesis focuses on trying to identify what separates those who manage to find a reality that accepts that the carnivores are present, and those who are struggling? What is needed to adapt? Is it internal or external factors that determine the ability to adapt?

The foundation of this thesis is about the interactions taking place between actor and structure, and a discussion about sheep farmers' attitudes and reactions.

4.2.1 Qualitative research and literature studies

The basis for the qualitative research interview is the conversation (Fog, 2004). The main features of qualitative research (to be concerned with social structures, people's experiences of places and events, opinions and beliefs) implies that the researcher is always placed "in" what is being studied (Dowling, 2000). *'Both qualitative and quantitative researchers recognize this lack of separation between research, researcher, and society. What typically distinguishes a qualitative researcher's approach to the issue is the emphasis they give to it'*. In qualitative research, interviews are used to gain an insight into the thoughts and feelings on the topic. Qualitative techniques emphasise quality, depth, richness and understanding (Clifford et al., 2010), which is essential in relation to the research questions, to reveal genuine and honest opinions about the topic, with the narrator's own language, why they think and act as they do. Kvale and Brinkmann define interviews as "*an inter - change of views between two persons conversing about a theme of mutual interest*" (Kvale and Brinkmann, 2009). Kvale and Brinkman highlight different aspects of knowledge that is relevant to the qualitative interview illuminated in different philosophical directions. Key approaches are hermeneutics, phenomenology and pragmatism, as well as discourse and dialectic.

Kvale and Brinkmann (2009) describes 12 aspects of the mode of understanding in the qualitative research interview from a phenomenological perspective (Kvale and Brinkmann, 2009). These are important to take into account in the preparation stage. The theme of the qualitative research interview is the interviewee's lifeworld and his/ her own relationship to it. The interview aims to interpret the meaning of the central themes in the interviewee's lifeworld. The interviewer records and interprets the meaning of what is being told, and the way it is told. The interview aims to obtain qualitative knowledge through common parlance, as well as collect open and nuanced descriptions of various aspects of the interviewee's lifeworld. Descriptions of specific situations and events are obtained, not general opinions. The interviewer should show openness to new and unexpected phenomenon, and avoid predefined categories and interpretation schemes. The qualitative interview focus on specific themes; it is not tightly structured, and it is open for ambiguities. The interviewing process should be open for changes, as new insights may emerge, and the interviewee may change their own descriptions and interpretations of a theme during the interview. Various interviews can evoke different statements on the same theme, depending on the sensitivity of the interviewer. Knowledge collected will be produced through the interpersonal interaction in the interview

situation. A successful research interview can be a valuable and an enriching experience for the interviewee, who can get new insights into their own life situation.

The analysis of interviews will be supplemented with a thorough analysis of documents / literature, emphasizing previous research and theory surrounding attitudes towards the selection of sheep husbandry system, the reactions and opinions, and how the financial aspects appear around it all.

4.2.2 Case study research

The thesis will be referred to as "case - study - research" and involves the study of a small number of instances of a phenomenon, to explore the depth of nuances of the phenomenon and the contextual influences and explanations of the phenomenon (Baxter, 2010). Case studies are used when research questions are either descriptive (what is happening / has happened?) or explanatory (how or why something happened?). The method favours the collection of data in a natural setting -not derived data such as data from questionnaires, and is commonly used when conducting evaluations of something you have done (in the field). The attention is restricted to a smaller area, and a limited unit (such as in this study of the farmers) and does not serve as a representative population sample.

4.2.3 Target groups

This thesis will concentrate on three categories of sheep farmer, for each of which we had a set of questions:

Farmers who have given up, or want to give up

What was the reason for giving up? Were there other reasons than carnivores, such as economy, age, reduced profitability, etc.?

Farmers who continues as before

Farmers, who choose to continue as before, will eventually be forced to make a choice, whether to give up or whether they will actually try to adapt. Which means are necessary to achieve this, and what is stopping them?

Farmers who have managed to adapt

Farmers who have managed to adapt by adopting a solution to reduce the sheep - carnivore – conflict by changing farming method (outfield pasture → enclosed pasture). For these we are interested in knowing what pre-conditions were necessary to enable the transition.

4.2.4 Informants

From the background research, Nord – Trøndelag and Hedmark counties seemed to be relevant areas where I could gather data. In the process of obtaining my informants, contact was established with the Agricultural Departments of the Counties of Nord-Trøndelag and Hedmark. They provided lists with respondents that could be of interest for my research. Since I live in a sheep farming area, I chose a couple from my home district as well. They were meant to function as "test – persons", but their insights was interesting, so leaving them out would have wasted key information. The second stage involved contacting potential respondents and making arrangements for interviews. Some interviewees also suggested other potential respondents, a few of which were just outside the borders of the studocunties.

Selection of sample size can have a tremendous effect on the outcomes of any study. To estimate the number of participants in a study required to reach saturation depends on certain factors. It depends on the quality of data, the size of the study, the topic, the amount of useful information obtained from each participant, and the qualitative method and study design used (Morse, 2000). To create the best possible result, a large sample of informants would be the optimum. But time was limited, and a sample size of 16 informants was selected as a compromie to fulfill the research objectives within the time available. Because some of the informants I had established contact with either brought their spouse or a parent to the interview the material was obtained from a total of 23 individuals. There was a bias in the distribution between genders in the collected data, 26.1% women and 73.9% men. The average age of the respondents was 48 years, and the majority of respondents were around 50 years of age.

Gradually the interviewing process became a process characterized by repetition of arguments, and a pattern emerged among informants from the various groups, which gave me confidence that the amount of data was satisfactory.

The use of a tape recorder ensured that minimal information was lost and allowed detailed text analysis afterwards.

Table 1 *Number of informants in each region and each group*

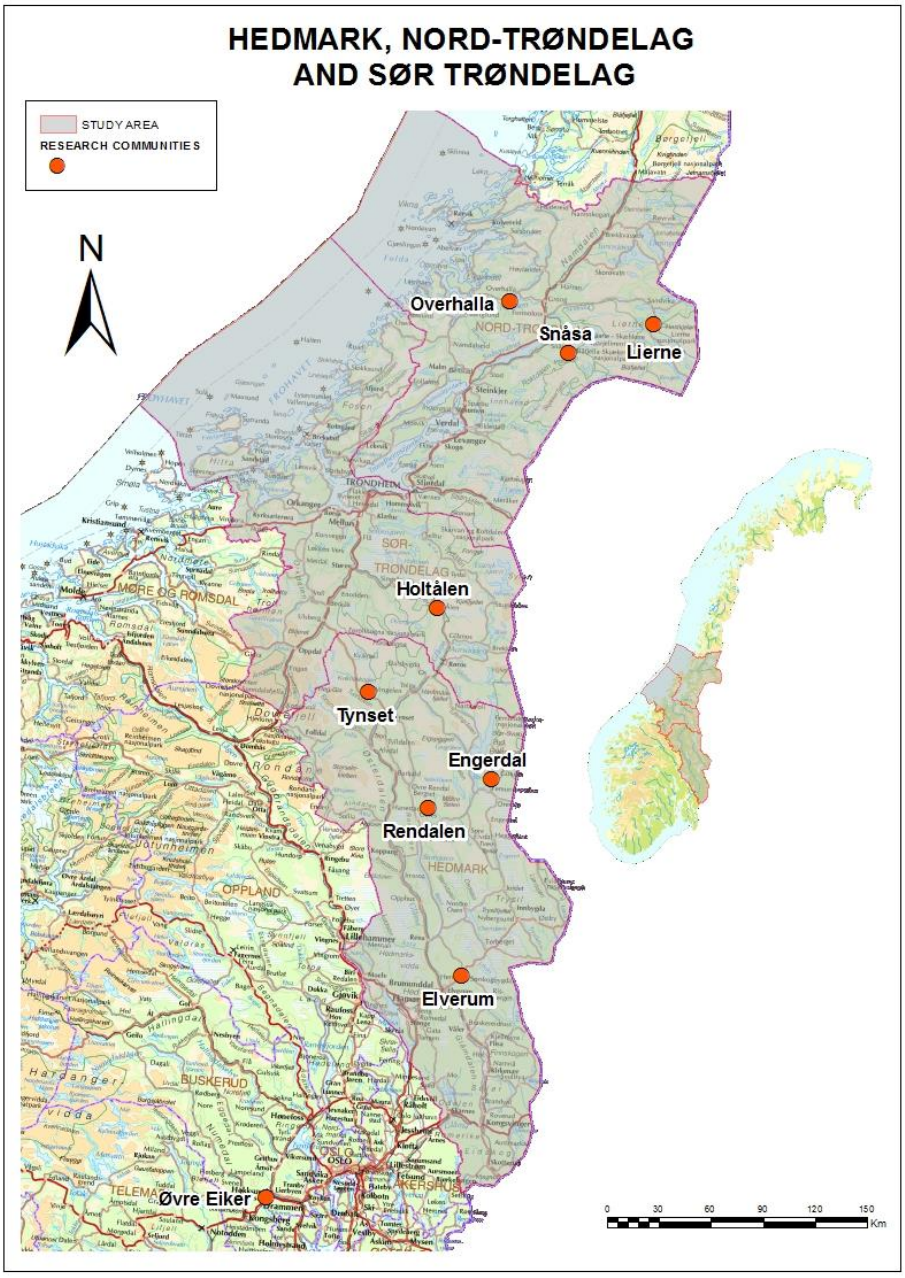
County	Farmers who have quit sheep farming	Farmers who continue as before	Farmers who have implemented operational changes
Sør – Trøndelag	-	2	-
Nord – Trøndelag	1	2	7
Hedmark	4	2	3
Buskerud (random)	-	2	-

4.2.5 The interviews

This is research, which aims to delve into, possibly detect arguments, and map a little known phenomenon, which makes the use of semi - structured or unstructured interviews more appropriate than structured interviews. Semi-structured interviews are a verbal interchange, talking with people, in ways that are self-conscious, orderly and partially structured (Clifford et al., 2010). This type of interview allows new ideas to be brought up during the interview as a result of what the interviewee says. Semi – structured interviews create a deeper understanding of why farmers have chosen as they have done, and what has influenced their set of thoughts. The interview guide took into consideration the qualitative interviews two dimensions: the theoretical with regard to the relevance of the research project topic, as well as the dynamic to create a good interview interaction (Kvale and Brinkmann, 2009). The question formulation was loose, only formulated in terms of question suggestions, which were grouped into five categories. These main categories were (1) introductory questions, (2) economy and profitability, (3) the view of rural communities and agriculture, (4) nature and (5) future perspectives.

4.3 Study area

In areas with a high degree of conflict and an expected increase in carnivore populations there has been an increased focus on adaptation measures within sheep husbandry during recent years. Due to the limited funding and high costs of individual measures, the use of restructuring measures has been geographically limited, but Lierne in Nord-Trøndelag and parts of Hedmark County have been prioritized for the last 20 years because these areas receive heavy depredation pressure from bears (in Lierne) and both bears and wolves (in Hedmark)



Map 6 *Study area and informant locations*

4.3.1 Hedmark

Hedmark is the largest county in southern Norway with an area of 27,388 km^2.[30] Nearly 60 percent of the area consists of forests. The human population density in Hedmark is relatively low. Rendalen is one of the communities with the lowest population density (0.6 per km2). The population size is 194,433 in all Hedmark. Some municipalities have experienced strong population growth the last 15 years, such as Elverum, and to a certain extent Tynset. In the same period there have been similar large population declines in other municipalities such as Rendalen and Engerdal.

Hedmark is in the traditional sense divided in the following areas: *Hedmarken, Østerdalen,* and *Glåmdalen.*[31] The nature varies from mountains in the north, to forests in the east, and productive farmland in the southern valleys. There has in recent years been a decline in employment in the primary sector (particularly in agriculture).

The county has widely varying conditions for agricultural operations due to differences in soil and climate.[32] Livestock husbandry accounts for about 75% of value creation and agricultural employment in Hedmark. Milk production is the production of greatest importance to economic growth and employment. Sheep husbandry is also important in Hedmark. As well as many other regions in Norway, there has been a decrease in sheep husbandry. From 2004 to 2014 there has been a decrease on 15 percent, from 45.152 sheep in 2004, down to 38.298 in 2014.[33]

Carnivore conflicts have a long history in Hedmark, particularly regarding brown bear and lynx. (Skogen, 2003). Hedmark is by far the most troubled community in Norway concerning large carnivores, especially following wolf recovery at the end of the 1990's (Ministry of Climate and Environment, 2003-2004). This has not only caused conflicts with sheep farmers. Rural communities, outdoor recreational activities, hunting interests and Sami reindeer herding are also affected. Many people are also complaining of a decrease in life quality due to the presence of carnivore populations.

The informants were spread over a quite large area in Hedmark, all living in carnivore management zone and close the management zone for wolves.

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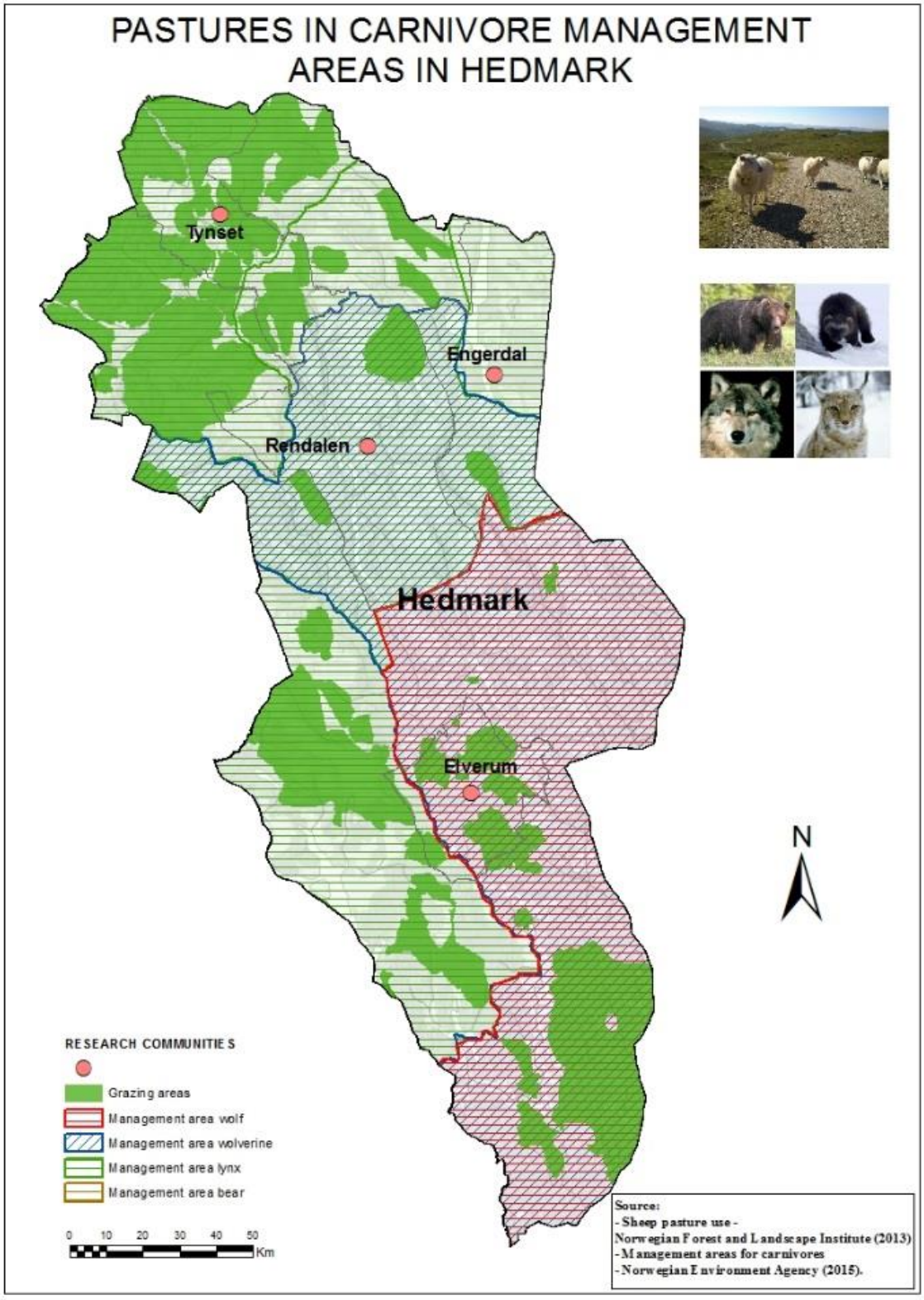
[30] http://www.hedmark.org/index.php/Om-fylkeskommunen/Fag-stab-og-serviceenheter/Strategisk-stab/Fakta-og-statistikk/Fylkesstatistikk-for-Hedmark-2014

[31] http://www.hedmark.org/Om-fylkeskommunen/English/Information-about-Hedmark

[32] County Governor of Hedmark. Husdyrfylket Hedmark. (Livestock county Hedmark) http://www.fylkesmannen.no/Hedmark/Landbruk-og-mat/Husdyr/

[33] Directorate of Agriculture. 2015. Antall sau - voksne sau (Number of livestock - adult sheep). https://www.slf.dep.no/no/statistikk/utvikling/antall-dyr/voksne-sau/antall-husdyr-voksne-sau



Map 7 *Farmers living in carnivore management areas*[34]

[34] Norwegian Forest and Landscape Institute. 2013. Nedlasting av kartdata - beite. (Downloading map data - pastures) http://www.skogoglandskap.no/kart/beitebrukskart_og_statistikk/artikler/2007/nedlasting_beite Norwegian Environment Agency. Map catalog for the Norwegian Environment Agency. http://kartkatalog.miljodirektoratet.no/map_catalog_service.asp?servicename=forvaltningsomrader_rovdyr

4.3.2 Sør – Trøndelag and Nord – Trøndelag

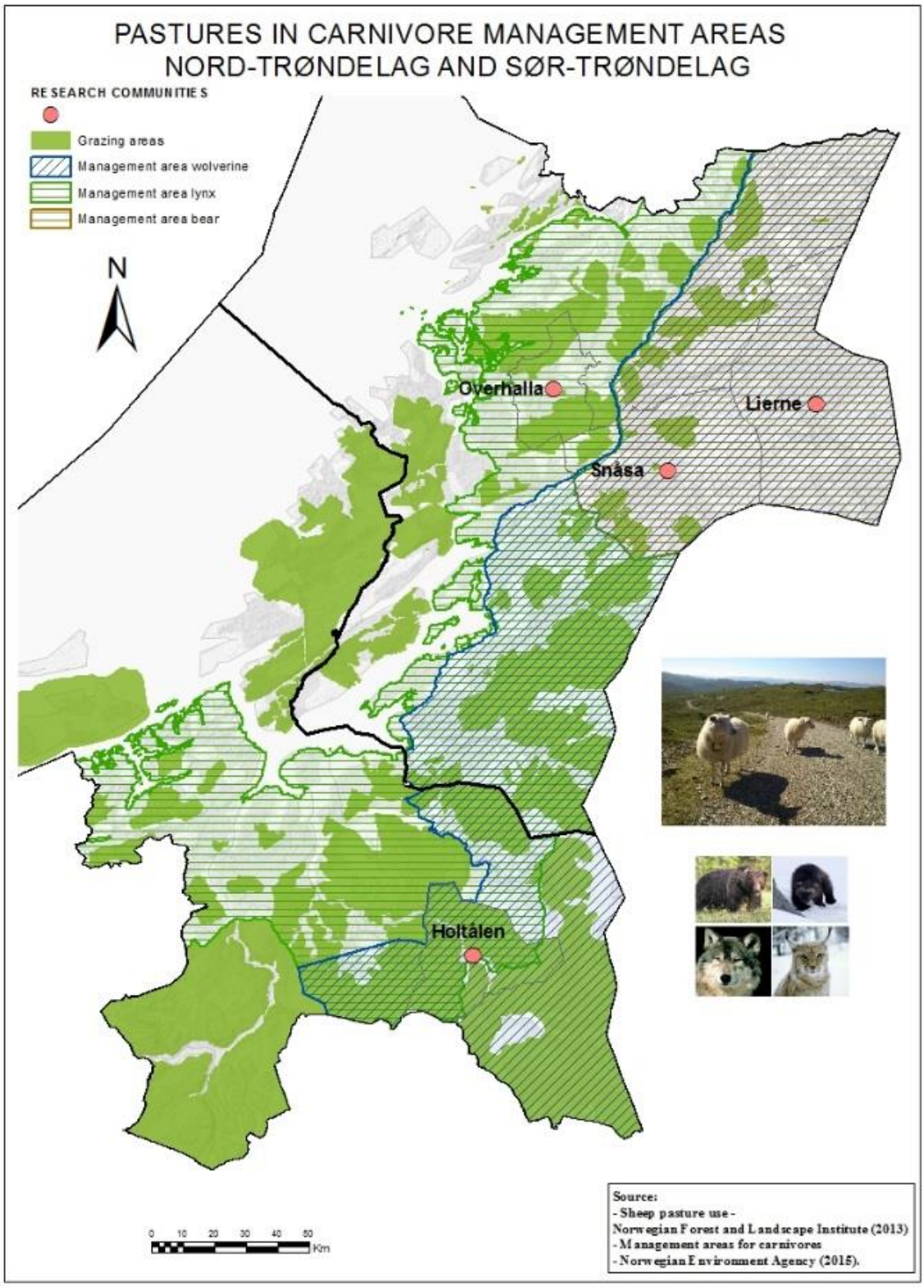
Sør-Trøndelag and Nord-Trøndelag counties are often collectively referred to as Trøndelag, or Central Norway because of its central geographical position. The human population size in Sør - Trøndelag is 306,197, and 135,738 in Nord-Trøndelag. Trøndelag has a settlement patterns with large areas of sparsely populated areas, while there is a strong concentration in the Trondheim area.[35] There has for a long time been a centralization trend with rural inhabitants moving to cities and suburban areas, as well as within the municipalities, towards the local centers. However, overall the population is growing. From 2000 to 2014 there has been a stable population growth in both Sør- and Nord-Trøndelag. The greatest population growth is in the municipalities around Trondheim. There have been a relatively large decline in both Snåsa, Lierne and Holtålen.

Agriculture in Trøndelag has in recent years maintained its production volume, although the number of active operating units and the number of employees has become significantly reduced.[36] In both counties there has been a huge decline in employment in agriculture and forestry, with a total of 2,172 fewer employed for both counties. Agriculture and forestry account for 2.2% of employment in Sør-Trøndelag and 6.2% of employment in Nord-Trøndelag.

The majority of the informants lived in Nord-Trøndelag, in the management zones for bears, close to the Swedish border. These are the most conflictful areas concerning sheep husbandry in central-Norway.

[35] Sør-Trøndelag fylkeskommune. 2015. Fakta og tall (Facts and figures) http://www.stfk.no/no/Fylket_vart/Fakta_og_tall/

[36] County Governor of Nord-Trøndelag. 2014. Husdyr. Husdyrhold i Nord-Trøndelag. (Livestock farming in Nord-Trøndelag). http://www.fylkesmannen.no/Nord-Trondelag/Landbruk-og-mat/Husdyr/



Map 8 *Farmers living in carnivore management areas*[37]

[37] Norwegian Forest and Landscape Institute. 2013. Nedlasting av kartdata - beite. (Downloading map data - pastures) http://www.skogoglandskap.no/kart/beitebrukskart_og_statistikk/artikler/2007/nedlasting_beite Norwegian Environment Agency. Map catalog for the Norwegian Environment Agency. http://kartkatalog.miljodirektoratet.no/map_catalog_service.asp?servicename=forvaltningsomrader_rovdyr

4.4 Data analysis

After the direct interaction in the interview situation the recordings were transcribed in full before analysis could begin (Kvale and Brinkmann, 2009). The differences between speech and written texts can create a number of practical and principled issues. The analysing phase starts already when you are in the field, thinking about the outcome (Crang and Cook, 2007), where data is constructed and produced, not "harvested".

4.4.1 Transcription and analysis

There is no sharp distinction between data collection, transcription and analysis in a qualitative research interview (Kvale and Brinkmann, 2009). The transcriber is subject to numerous limitations that are difficult to transcend. Transcribing means transforming, changing from one form to another. In the process of transcription, the conversation between two people physically present in the same places becomes abstract and fixed in written form. A lot of information is lost already in the transcription phase in the form of tone of voice, body language and intonation. Although it may be unfortunate to write a conversation into a text, transcripts provides great advantages in the further analysing process. It provides a text that is easier to get an overview of, structure, and later code and analyse.

People have different personalities; some do not talk so much about feelings. They use different narrative style, some are down-to-earth and factual, not revealing their emotions. There is a context in how one interprets things. Certain people with a lack of an emotional way of expressing themselves may have trouble expressing themselves in certain ways, even if the argument is equally real. Assumptions will be made about what exists in their stories. There will always be some uncertainty, because we do not know, we are not inside the people's heads. That is an uncertainty that we must live with. Do we have enough proximity to understand what they mean? There will always be a problem. We have not lived in their situation.

There may be an interaction between personal and external factors. The personal factor will give a particular effect in a given situation. Identifying certain factors will lead to a step beyond what they actually say.

The process included isolating, identifying and creating factors based on findings. The data determines the number of categories and does not always come out as envisioned. This is a part of the discovery process. The clue is not deciding too quickly on categories, because you might start adapting answers into categories, which may govern the findings.

The different discourses were compared for the three different groups, and the goal was to find out what was common between them. The hope was to find discourses that differed between the three groups.

Questions by questions were examined, and for each group factors and statements were identified, categorized and condensed, based on the interview-questions.

A part of the research was to define what was inside and outside the archetype throughout the interviews. Then describe it and distinguish what was common and what was not. I was hoping to find that the three categories had both. Concerning the carnivore debate it contains a certain level of distance from reality.

4.5 Data Quality and Consideration

4.5.1 Positioning myself regarding ethics

Qualitative research typically involves interpersonal relationships, interpretations and experience, and there are certain issues of which qualitative researchers need to be aware (Dowling, 2000). In the research process, it is important to reflect over the role of a researcher. I clarified with the informants that the researcher is a student, and the purpose was only to collect meanings and opinions for her own purpose, and nobody else was to see them, except her supervisors. I assured them that research would not harm them by any means. One can expect some variation in attitudes and practices among various population groups. As a social scientist, it is therefore important to always be aware of the possible importance of "variables" such as gender, age, social class and education.

Ethics can be defined as the behaviour of scientists, and their responsibilities and obligations to those involved in research, including funders, the public, and most importantly, the subjects of the research constitutes a problem that must be addressed in my research (Dowling, 2000). Ethical questions in the research relationship have become more significant, qualitative research continues to change and researchers face new issues using new tools to produce knowledge (Miller et al., 2012). Ethical issues in research interviews occur especially because of the complexities associated with "exploring people’s privacy and adding descriptions out in public" (Kvale and Brinkmann, 2009). As a researcher, carefully considering the ethical significance of your actions in different contexts is important and one must be prepared to take responsibility for your actions. It is important to create a relationship with the key informants, but with certain limits. It is also important to consider the different power conditions encountered.

Qualitative methods involve an invasion of a person's privacy by asking personal questions or observing interactions. Therefore, it was important for me to assure the interview objects that they cannot be recognized through descriptions in the thesis.

It was important that my research would not my informants to risk, either mentally or socially. Given the extreme level of conflict among rural communities associated with large carnivore issues this was not a trivial matter. I also had to be careful not to ask questions that may offend or upset the individual farmer.

I was fully aware that this was an inflammatory topic for many and that there existed strong opinions that might be difficult to handle and be impartial to.

Key aspects of the interview phase are *objectivity, subjectivity, inter-subjectivity, critical reflexivity, position and personality (Dowling, 2000)*. In my case it was impossible to be solely objective, but it was however important to reflect on my role as a researcher. Being subjective will create a deeper understanding of those who are interviewed and their opinions. It seemed important and useful to have an ability to engage with, instead of pulling away from the objects (Crang and Cook, 2007). Being clear on positionality will lead to more insightful analysis

To embrace subjectivity also means embracing inter-subjectivity *'meanings and interpretations of the world that are created, confirmed, or not confirmed as a result of interactions (language and action) with other people within specific contexts*' (Dowling, 2000). Inter-subjectivity can for example be a game between researcher and the interviewees (farmers). Critical reflexivity is "*a process of constant self-conscious examination of yourself as a researcher and the research process. It deals with analysing your own situation as if it was something you studied. What is happening? What social relations are introduced? Will they affect data?* '

In my role as a scientist, I recognized the power of information of my objects, the farmers; they had been engaged in this activity for many years and even decades. They also had a better and deeper understanding of the various policies in agriculture, as well as strong opinions about how they performed. I as an observer can / will be seen as the outsider that will not be on the same level as the interviewees.

My own perception of reality is not always consistent with what the farmers answered or alluded to. In such situations, it is good to have training and not show disagreement, incomprehensibility or start a discussion rather than to record the farmers' actual meanings for use in the thesis. What I find in the farmers' response is defined as the core of the findings. The findings will be used as research results, and nothing else.

I expected to meet a number of different reactions, with some being accommodating and willing to disclose to me as the outsider, others might be more reserved and may not even want to disclose in any way. It was important for me to create an understanding of my role in different settings, and try to create a comfortable and pleasant atmosphere around the interview. The advantage I had was that I was already involved and had experiences with sheep husbandry. Thus, I could more easily be respected and heard, and gained better access as a researcher. Personality and emotional intelligence is claimed to be of equal importance for the outcome of a research project (Moser, 2008).

4.5.2 Validity, reliability and transferability

In qualitative research, credibility is central to the concepts of validity, reliability and transferability (Rolfe, 2006, Creswell and Miller, 2000). Creswell and Miller (2000) define the viewpoint for establishing validity in a study as a lens. They argue that qualitative researchers use a lens established using the views of people who conduct, participate in, or read and review a study. The assessment of credibility in the qualitative research interview involves to which extent the researcher has produced results that are reliable, valid and transferable. It is important that the research is relevant and has significance, this is achieved through documented reflexivity, which means that the researcher has a critical look at their own ideas, role, the use of methods, meeting with informants, interpretation and so on.

By its nature an in-depth qualitative study with a limited sample size is not representative of the overall population of farmers, therefore there are valid questions concerning the transferability of the results. Because the arguments presented by the interviewees reached saturation we are fairly confident that our findings have a generalizable validity, although it must be born in mind that each farmer will have their own variation on the broad themes identified here.

5 THOSE THAT HAVE CEASED WITH SHEEP HUSBANDRY

5.1 Introduction

Small farmers are disproportionately vulnerable to the cumulative impacts of changes in sheep husbandry due to carnivores, marginalization and dependency on natural resources. This can be compared to the smallholder farmers' situation with respect to climate change (Frank and Penrose-Buckley, 2012). Issues concerning carnivores are constantly observed and felt by farmers, and from agricultural, wildlife management and animal welfare perspectives there is an urgent need to identify approaches that reduce economic losses and enhance the adaptive capacity of farmers and their communities to respond to this change in environmental circumstances. Evaluating the effectiveness of preventive measures against sheep losses to carnivores is complex. The measures can be assessed by their effect on number of sheep lost to depredation, feasibility and acceptability (Hind and Hansen, 2014). Farm structure is very important for the individual farmer, creating a strong identity. This results in strong opinions about different measures that can lead to changes in operating structure and operational changes.

5.2 Loss of sheep to carnivores

Loss of sheep to carnivores has always fluctuated, but has never as big of a problem as when carnivores recovered after the enactment of conservation legislation. The farmers that have ceased handling sheep had experienced a drastic increase in loss of sheep to carnivores before they quit. Many of those that have ceased with sheep production claim that losses to carnivores were the decisive factor. They had all been producing sheep since the time when carnivores weren't a major problem for the sheep industry. But as the carnivore populations increased, so did the losses.

There are a lot of emotions connected with big losses, both when you take into consideration the suffering of the individual sheep that are injured or killed, and the economic impact. One of the sheep farmers that quit described it as "hell", that all the time and energy put into caring for the sheep throughout the year was ripped away. The carnivores kept coming closer, eventually going after and harming sheep on the pasture close to the farm. Eventually the situation came to a point where the farmer couldn't see any other way except to quit. Another farmer spoke of becoming frustrated and angry which was his way of dealing with the situation. Some farmers even experienced it as such a big strain that it lead to health problems which some even struggle with to this day. Some had plans to keep sheep in the future, but felt that it was impossible when

they perceived that carnivores were being given a higher priority than farmers trying to build a living.

5.3 Economy and profitability

In addition to affecting farmers psychologically and motivationally, all have experienced the economic impact. One of the informants felt thoroughly deceived when he initially received large sums of money for hiring herders, so that the consequences of creating carnivore reproduction zones would not affect him, but afterwards the aid plans were removed. He further claimed that he did not received funds to restructure, as many others did. They had tried to build a life work that could be transferred to the next generation, but felt they had no choice other than to give up.

The fact that they lost so many sheep to carnivores, destroyed much of the economic base and earnings which is, according to farmers, quite bad initially. One claimed that sheep production isn't a gold mine. The advantage of producing was rather that it was pleasant to do, you could stay out in the forest, or produce/do other things in addition. It was felt that one must adapt to the revenue the sheep industry provides.

> *"You won't become a millionaire out of it. But I still believe that you can make a living out of it»*

What many describe as the advantage with producing sheep, compared to reorganizing the whole farm to produce anything else, is that you can avoid accruing massive debts. Sheep production is cost-wise more effective than any other activity within agriculture. On the other hand, the low earnings from sheep have caused many to cease with sheep and shifting to something else that provides a better economy.

The economic factor undoubtedly weighed heavily on the respondents. Although it was argued that one can live on the income you have from the sheep, one of the main reasons stated for ceasing with sheep production is that there is better economy in other products. The crucial moment was when farmers were given support to stop with sheep production and start with something that was more profitable.

Within this target group, all respondents were located in areas with lots of carnivores, whether in reproduction zones for wolverines and bears, or the management zone for wolves. This was claimed to have resulted in the loss of up to 50% of the herd in some summers. There is a lot of

emotion attached to such massive losses, both in terms of the suffering it inflicts on the sheep, and the economic loss.

The respondents who quit, or partially ceased with sheep, were eventually forced to take measures that would reduce losses. They had all been producing sheep since before carnivores were a big problem for the sheep sector, but as the density of carnivores increased, so did the losses, and in the wake of this, the consequences became more prominent.

5.4 Mitigating measures

All these respondents stated that either they tried various measures to limit losses to carnivores, but without effect, or they had not been willing to try because they didn't have had any faith that they would help. One of the farmers felt that he was tricked into releasing the sheep late and gathering them early, but claimed that it ruined the sheep, and that it created a lot of extra work. Additional work became a main argument to not carry out measures, mainly because they had to constantly search for carcasses (in order to get compensation) and do extra supervision which they weren't paid for. This is also something Blekesaune and Rønningen describes in the article "Bears and fears" from 2010, that the practical and emotional strain of spending increased time searching for dead or wounded sheep leads to farmers leaving agriculture in an already marginalized rural community (Blekesaune and Rønningen, 2010).

The measures tested included supervision, extra supervision, late release and early gatherings, but without much success. The final nail in the coffin was when they were denied the possibility to release the sheep on outfield pastures by the state veterinary authorities because of inevitable losses.

> *:". we were almost expected to have one shepherd per ewe in the forest, and it is barely affective, we must almost have them on a leash."*

Several were required to have sheep on infield pastures because of too high losses on outfield pastures, which led to problems with diarrhoea, and a drop in sheep weights. Many were given support for carnivore-proof fencing, for some this came too late, and others had already decided to restructure. The fact that they received support for restructuring made the decision to quit a lot easier.

5.5 The management authorities' behaviour towards the sheep sector

The limiting factors most commonly mentioned were public management and government policy. There is a common thread throughout the story that the management authorities and politics are to blame for the situation they are in today. The interviewees showed a clear scepticism towards central authorities and the knowledge base that it fundamental to the way things are managed. Many were however clearly more upset with the management and scientists than they were towards the carnivores. The carnivore conflict has thus evolved from being a conflict between humans and carnivores, to being a conflict between people who have different opinions about carnivores.

The reason that many people choose to cease with sheep production are the limiting factors that farmers choose to emphasize. The management system received much of the blame. The attitudes that exist towards loss reduction measures, subsidies, distribution of funds, and orders from central authorities limited this group's ability to see other possibilities.

They were all tired of fighting against a management and a society which they claim priorities carnivores, rather than those who have worked all their lives to produce sheep. Not only do they feel unfairly treated, they feel that they have not been heard when it concerns carnivores. The same goes for many of those engaged in the sheep industry today. They state that there have been many empty promises, where they have been promised this and that, but have been left unfulfilled. Some believe that to argue with the authorities is as effective as smashing your head against a brick wall.

Politicians are perceived as hiding behind a parliamentary carnivore management agreement, which can be interpreted in a number of different ways, and ensures that no one is to blame.

> *"It's almost so you can compare it a little with how they removed the old people in the past. They put them right out on a cliff, then they took a big stick, then all went together and pushed off the old people, and no single person was responsible."*

Most of those who have quit blame it on central politics and believe that there is political agenda to end sheep farming. Some argue that the management authorities would not have been able to run things like they have unless there was a political majority supporting it. Large carnivores split all parties. When it comes to carnivores and their supporters, they feel that making animals equals to humans is disturbing.

The management authorities have decided that the numbers of carnivores should be increased, and this is creating a lot of anger among sheep farmers. One of the respondents believed that politics and management authorities should clearly decide whether it should be sheep on the range or not. He believes that they already had decided that they shouldn't be there. The dual aims (of both sheep in the outfields and large carnivores) are believed to be unattainable, and many farmers had the opinion that carnivores and sheep do not go together, at least not with the numbers of carnivores the politicians have set. They feel that it is a lost cause already.

> *".. I feel it has been the main goal, to reduce agriculture I mean. They have used carnivores as an excuse, to get rid of some farmers. I do not think it is regarded as a problem among many. "*

There is a great deal of scepticism as to how management is conducted, including the goals set for the population targets for carnivores, especially wolves. There is distrust towards the fact that the wolf is classified as an endangered species.

> *"The definitions used one way and not the other. It's okay that yellow zone ... we will not have the zone. But in the green zone, once it is said that it open for grazing, then it should be free to shoot anything that makes it not possible to graze there. So they bet that people will do something voluntarily, a drawback, it becomes almost like rowing a boat and taking out the plug, you will be allowed to rest, but you must constantly bail the water, and you're not allowed to put the plug in again. So it is constantly with carnivores, you're allowed to graze, but not to remove anything."*

Of those who have quit there are several who think they have received too little help and advice. There is general consensus about feeling powerless at the lack of help when losses to carnivores occur.

> *".. like last fall, when I did not get any help when I had a female bear with three cubs in my pastures who harassed and killed sheep."*

They have received demands from the wildlife management authorities and the Norwegian Food Safety Authority, but no advice on how they could have done things differently. The level of cooperation is viewed as being inadequate.

"There is supposed to be a collaboration between the wildlife management authorities, farmers and the Food Safety Authority, but the partnership only works between the Food Safety Authority and the wildlife management authorities, ***against*** *the farmers."*

The documentation requirements in relation to compensation have been tightened which is an annoyance for many. Several farmers claim that the rangers from the State Nature Inspectorate (who inspect compensation claims) come too late when they find carcasses, so that it is difficult to prove that it was killed by carnivores. That makes many farmers angry.

5.6 The value of the cultural landscape and outfield grazing

Cultural landscapes and outfields have a high value as pasture for sheep, and therefore the right to those pastures (grazing rights – which are often independent of land ownership) are valuable for all farmers. It is a use right that is to the benefit of the users, which they claim is ignored when they are provided with subsidies to refrain from using this right. There are some who believe that those who do not make use of their rights do not get any compensation in return. One of the farmers believed that subsidies should solve the problem, however, differences lie in what farmers and the management authorities attach to the word subsidy. Some feel that the true meaning of the word subsidies are not recovery of lost income (i.e. compensation) but something you get in addition.

One of the farmers claimed that it means more to farmers to be able to use their grazing rights than for the state to pay compensation for the losses that might happen. They feel that the state cannot just take it away from them. There are many people who believe that they have been deprived of their right to use outfield pasture. Those who have to refrain from using their pastures are adamant that they want to have it back again, when the "lockout" is over.

"It is clear that paying subsidies for some years works in a way that people think is ok. I'm so pressured right now, I will accept it. But many people give up anyway. And then [the authorities] will have achieved their goal."

There is general agreement that grazing animals belong in the uncultivated outfield pastures. They are believed to prevent shrub encroachment and reforestation and keep the paths open for hunters and tourists. The reduction in sheep grazing was felt to leading to a change in the vegetation. One of the informants emphasized that things worked very well without wolves and bears, in their parents 'and grandparents' generation, but that one should be able to find a solution to it now.

When considering the option to have sheep on infield pastures in order to limit the losses, no one believed that this is a solution. Insufficient access to land is the main reason, as the infield pastures that most farmers have is ill suited to keep sheep, and many are plagued with parasite problems due to using small areas and excessive grazing. Sheep are believed to not be designed to stay on infield pastures for long periods of time. Some feel that the sheep should go in the woods and on outfield pastures with the different grass varieties that exist there, to get variety in their diet and which they are completely dependent upon. One of the farmers was of the opinion that if he had set his mind to it, he could have gotten access to enough infield pasture. But when he looks at others who have sheep on infield pastures and how much extra work and problems it entails for them, he is glad he did not chose this solution.

Some have ceased with sheep husbandry because it creates a better utilization of the space for other production systems. One idea several agreed upon is that if you have large areas, one might be successful with sheep, but then one should cultivate something other than meat.

> *"You know, they advertise highland lamb, Lofoten lamb and Hallingsskarvlamb, I wondered if we should advertise innmarkssau [sheep from infield pastures]? That would be destructive advertising."*

5.7 Comparison

The factors affecting their decisions could be categorised and put into tables and compared. The first table includes the agricultural issues, while the second reveals attitudes towards carnivores and carnivore management.

Table 6 *Factors characterizing those that have ceased with sheep regarding agriculture*

Nr*	Age	County	Full-time/ part-time	Livestock size	Mountain/ lowland	The sheep as a value	Farmer-type
1	60	N-T	Part-time farmer	120-140	Mountain	Both economic and personal. Utilize resources	Reduction and stagnation farmer
2 & 3	50	He	Full-time farmer (part-time sheep)	75	Lowland	Economic Utilize resources	Reduction and stagnation farmer
4 & 5	60	He	Part-time farmer	250-330	Lowland	Economic and personal, creates wellbeing	Reduction and stagnation farmer

*Nr-informant nr.

Table 7 *Factors characterizing those that have ceased with sheep regarding carnivores*

Nr	County	Zone	Attitudes to carnivore management	Feelings around loss
1	N-T	Core area for bear. Carnivore zone for bear and wolverine.	"Then they introduced the core areas. And it wasn't supposed to affect us. "	"It was unpleasant. I had them on infield in the autumn, when we took home sheep, and the bear came after, entering the infield, and continued to kill the sheep. It became unpleasant."
2 & 3	He	Wolf-zone, management area for bear, wolverine, wolf and lynx.	"... so then we do not get a hunting permit. We did not get it before it became a wolf zone either, so it did not matter. It has been impossible to get a hunting permit here. "	"Then we had to go afraid all summer for that phone call. In the early days I operated with sheep it was a relief when we drove them to the cottage. But after more and more carnivores came, it became more and more difficult."
				"I miss the trips up in the mountains when it was peaceful and nice…
4 & 5	He	Wolf-zone and manage-ment area for bear, wolverine, wolf and lynx.	"But in the green zone, once it is said that it should be possible to graze there, then it should have been possible to freely shoot what makes impossible to graze there."	"It's a hell! …. when other people decide that here there should ruin here, when they come to the outfields."
				"…I have a temper where I vent some frustration by it. And my husband, he gets pain in his joints. My mom got it in the stomach, and how the kids have suffered under this here, we are a little uncertain."

6 THOSE THAT CONTINUES AS BEFORE

6.1 Loss of sheep to carnivores

For those interviewees located in southern Norway, the areas of Hedmark and Rendalen, the year 2014 was characterized by tremendous losses to wolves. Many presented an average loss of 15-20% of the sheep released onto outfields. In addition to some experiencing large losses on enclosed infield pastures and feeling that the loss affects their motivation to continue operating.

I experienced a kind of scale in terms of how they dealt with the idea to continue operating and how they handled the situation. It went from total hopelessness, with a perception of it being an intolerable situation that was difficult to live with, to those who would not let themselves break and would not give up without a fight. How each individual farmer handles a situations like this, is very varied dependent on the individual. In many ways how they describe the situation they are in and how they feel when parts of their flocks is lost reflects their personality. What distinguishes seems partly to be the relationship they have to their sheep. The farmers talked about the emotional reaction as containing one or more external factors relating to the specific event and a personal factor related to their bond with animals. When the personal and external factors come together you get the situation that the farmer describes. Those who see the sheep as an individual, and not just an economic value, are characterized by a greater mental strain when experiencing greater losses.

> *"Many days you really felt that you can't be bothered, but it is the psyche that strikes you out. Because when you just put on your clothes... when you get outside, then you find that you have the will. "*

One farmer residing in a small mountain village in Trøndelag where carnivore losses are not particularly intense looks at the loss he has in the barn before releasing sheep to outfield pastures as the biggest challenge. He believes that one cannot be too sensitive when it goes wrong, or put it down to a fault in themselves. For the sheep who must pay with their lives, he says that one cannot feel sorry for them. Meanwhile he runs quite a large operation and is keen to build the best possible breeding lines, so that it will be possible to live off the sheep.

In another mountainous area, another farmer operated with both sheep and cattle. He felt that the situation was not sustainable, and he had tried several protection methods. After several years of heavy losses, he had repeatedly considered giving up with sheep, and had reduced the

flock size. He had mostly focused on trying to make the operation profitable, but had realized that sheep on their own wasn't enough. Several others found themselves in the same situation. One of the informants was in the process of ceasing with sheep, he claims that he had seen that an end was inevitable. He thought that when you experience heavy losses you have to just unplug your feelings or else you would become mad. He described himself as emotionally cold when it comes to carnivore losses, but has come to the conclusion that it is better to quit. Some others are cynical when it comes to having large losses to carnivores and don't let it affect themselves psychologically.

Some of the informants were younger farmers, some living near densely populated areas of southern Norway. They had other feelings about the situation. They were increasingly concerned about the sheep as an individual and found it painful to lose sheep to carnivores.

> *"You know many of them, that's what makes it so bad. Even when you have 100 ewes and 180 lambs you know most of them. I didn't think that one could get a relationship to sheep, because when keeping sheep, a sheep a sheep. But when you in the sheep barn ..."*

Some tell stories that describe the feelings they are left with; a feeling of powerlessness that is created when you experience huge losses to carnivores. The situation was characterized by hopelessness, and to engage with sheep farming felt suddenly like a total waste. They asked if it is appropriate to make money when some of the animals had to suffer?

> *"I saw my son standing with a lamb and he says, "This is the one Dad, it's bad". I got right up to it, I did not think it was anything, but then I saw that it was torn in the neck, and it looked completely apathetic. They become like that, the've got an insane ability to persevere. "Just shoot it, there is nothing to speculate on", I say. Nothing happened, so I asked on the radio why he hadn't shot it. Then he says, "... no, it's so nice here, to look beyond the lakes and ...I cannot shoot it right away, I," he said, "I have sat and talked a little with it and cuddled it a little". Then he shot it …."*

In addition to the emotional part of experiencing losses to carnivores, there is also the extra work it creates and the fact that part of the breeding stock is ruined. Farmers struggle through the winter to create the best genetic herd, which they can breed further. Spring is hectic with new lambs, and the resources that are put into the barn feels totally wasted when they die on summer pastures. But the relationship to the sheep goes hand in hand with the economic aspect.

"We have a line that we are trying to breed, if we think that the ewe has a good temperament or is a good mother, produces good milk, facilitates childbirth and gets fine lambs, that is what we are going for. For the County [wildlife management authorities who pay compensation], and those that shall pay for it, a sheep is a sheep, it is worth a certain amount of money and that's it. It is more than that to the farmer."

6.2 Economy and profitability

One of my informants believed that in the sheep sector you are at the mercy of subsidies. Half of his income came from selling the meat, and the rest camefrom subsidies. Without subsidies in sheep husbandry, there are many who would have had to give up. There are split opinions about the goals set by the Ministry of Agriculture and Food, with the minister, Sylvi Listhaug at the head, about demanding more efficiency and greater production. Some were positive about this and were willing to abide by these new policies, but they were a minority. One was of the opinion that if Listhaug had achieved everything she had set as a goal, sheep farming as it is today would have ceased, although the same informant also thought it was fair that those who ran large operatiions should have enough so that they can live off it. There are only a few that can operate with as much as 1,000 sheep, so these are very limited.

Another informant was alarmed by the proposals made by Listhaug for larger farms and considered it unrealistic. He believed that it is impossible to increase to 400 winter fed ewes to improve profitability, and in addition have carnivores. Carnivores are used as an argument for the requirements set towards efficiency and revenues of the sheep, they are labelled as a factor for them to get bigger.

"When it comes to the requirements towards efficiency, I do not think that the income generated from the sheep is bad, if I didn't have to be concerned about carnivores, to put it that way (laughs) ... Had it not been for carnivore problems, I would probably have had a few hundred sheep now for winter-feeding."

Another said that hiring more shepherds to reduce losses isn't economically sound. He believed that we cannot compare ourselves with other countries because the labour costs in Norway are too high. Another looked at the value of food production, and pointed out that on that point Listhaug has been clever with the goals she has set, but he disagrees with the policies she advocates.

Meanwhile another thought that if you are too big, then the subsidies drop so dramatically that you do not get a full salary. Because of this you do not base your farm only upon sheep

production either, but try to take out the most profitable pieces of it. If one runs the farm so that it goes well financially, you have to spend a lot of hours on it. It isn't perhaps the economy it stops at , but perhaps the fact that you don't have much time off to begin with.

> *" It is possible to live with the fact that the income in agriculture is low, , it is predictable (laughs), and in a way you adjust your cost of living to your income. But when your livelihood is suddenly destroyed, in just over a week in the summer, and you do not get understanding at all from the management authorities, it's all just so hopeless!"*

6.3 Mitigating measures

Several of those engaged have tried to introduced measures to limit losses to carnivores. Many however points out the inadequacies in the conflict-reducing measures. Some have received funding for supplementary supervision, but it is agreed that shepherds are not profitable. You must have so many and it is not economically profitable. One informant thought that the state should pay for it, because the economics of sheep farming does not allow for it. He added that it has been tried before, and that they are still doing everything that has proved beneficial before. He has no doubt that it would have been done to this day, if it had been economically profitable to maintain herding! Those who have had major losses to carnivores have received support for herders to be employed during the summer, but not enough. They believe that there isn't enough money to have shepherds as full-time employees.

> *"... It is almost like they just go there and find carcasses so you can start hunting. This is not right either. You do not prevented attacks, you just observe. No, I think it's more okay to get them delivered to the slaughterhouse after all, that's why we're doing this."*

One of the farmers had received support to move the sheep up into the mountains, where they rent pastures, some distance away from the farm. It is something that the County authorities use as conflict mitigation measures in carnivore-prone areas. It is convenient in terms of gathering and employment, but they have lost many sheep at home pasture so they do not understand the point, when they do not have time to get them on the mountain before they are being taken.

6.4 The management authorities' behaviour towards the sheep sector

The relationships that exist between sheep farmers and the management authorities is characterized by frustration. The management authorities are perceived as having their own

logic, and must determine facts from its own administrative procedures and logic, rather than the farmers' statements. Their perceived experiences describes an asymmetric relationship.

The farmer did not feel that they are believed. Some believed that it has improved now, but that one was previously mistrusted and thus did not receive compensation. The management authorities should have believed the farmers a little earlier. This they believe is the case also in terms of documentation of losses to carnivores. Farmers are neither heard, nor believed, as employees from the management system must go out and confirm it for themselves. What characterizes much of this blame laying seems to be linked to what relationships users have to the various organs. One of the farmers thought they had a good cooperation with the SNO rangers and did not blame them for anything, while another believes that SNO is obstructing as much as the Norwegian Environment Agency.

Many felt frustration at the way the management functions today. A scepticism and distrust of the management authorities and their policies was a clear discourse. Concerning the management style there were strong opinions all around. Some blamed it on the politicians, others blamed the Environmental Agency and the Ministry. One of the farmers believed that politicians had lost power and that the administrators in the management system were obstructing the process and not doing as the politicians intend. He felt that politicians were too weak, and that they must open their eyes soon and see that they are about to destroy not only a whole sector but also rural areas. He believed that the carnivore compromise in the Parliament is not really being implemented, and that the politicians had already lost the fight. The management was not felt to be acting in the sheep industry's favour and did not show signs of understanding the problems that farmers were experiencing. There was a general feeling of hopelessness. Government and the economy control agriculture, and the authorities were regarded among some respondents as obstacles in today's agriculture. Some argued that the carnivore policies are not being followed through. One farmer went so far as to say that confidence in the management authorities is at an all-time low.

One of the farmers complained about too much indecisiveness from the government, which has made it difficult to plan ahead. Ever new, unnecessary measures and obstacles were being imposed on them and it was not something they could control. You had to constantly change to keep up with regulations, directions and policies being laid down. Subsidies were introduced, and then in the next round removed. The complaint was about a system that lacked stability.

Being inside a reproduction zone for large carnivores has been the biggest challenge for one of the farmers. The fact that the carnivore zone was decreased, and that a stricter regime was

imposed in the region has created problems. He believed that there was a lack of management for these areas, and if there had been better control; it would have been possible for him to run his farm.

> *"The carnivore zones simply allow them to breed. There is no plan, or will to remove crazy bears [presumably those who kill sheep]. They allow it to just run wild"*

Many are puzzled by the zones created, and why there should be carnivores in pasture prioritized areas (outside the carnivore zones), and why it should be so difficult to remove the carnivores that are within the areas where they really should not be. The opinion of most is that the management delays the processing of applications to kill carnivores, so that the carnivores have an opportunity to get away. It was felt that this did not work well from the farmers' point of view, and it was said suspected that this is what was originally intended. The interviewees felt that carnivores should be shot when there was tracking snow on the ground during winter and spring in the prioritized grazing areas, as the only solution.

The media was also blamed for much of the negative attitudes towards agriculture, and they were held responsible for putting farmers and locals against each other. They reinforced the conflict more than was necessary.

SNO is responsible for conducting fieldwork within "The national monitoring program for large carnivores" and delivers data to research and management institutions for analysis. This includes among other things counts of the number of carnivores and supervision. This was seen as a potential problem, one of the interviewees said. SNO should not only run supervision, but also management. Another challenge is that they felt that a lot of documentation was being kept secret compared to in the past, and that the documentation was erroneous. Another farmer had even gone so far that he hired a lawyer to access the reports from carnivore contacts, sent by those responsible for regional carnivore documentation. The reports were alleged to contain false information with regard to the cause of death of the sheep. The carnivore contacts are also partly blamed, along with the rest of the management authorities, for lacking knowledge and providing erroneous information to farmers.

Among farmers the methods of conducting carnivores censuses was also questioned, as they believed that practical counts did not accurately reflect the real situation on the ground. One of the farmers argued, among other things, that one lynx is not counted unless it moves more than 3 km off its last recorded point, within a certain time limit. If it settles in and sleeps for three days, then it does not exist.

6.5 The value of the cultural landscape and outfields

Cultural landscape and outfields are some of the pillars, which are rooted in Norwegian sheep farming. Being able to use outfields as a pasture for the sheep is a prerequisite for many that operate today.

Using the outfields for grazing is claimed to be an excellent way to keep sheep. Because of this, the sheep farmers believed it was sad that they could not utilize outfield pastures for a form of food production that is 100% organic, because of the carnivores. One of the farmers feel that it is silly of politicians to talk about the environment and locally produced food, when they cannot make use of the value that lie in the outfields as a resource for the sheep.

Grazing animals were regarded as an important resource to prevent shrub encroachment and to maintain the cultural landscape. It is the grazing animals that have cultivated the landscape we have, and today there are too few grazers. There was a consensus that tourism and hunters won't come to these areas if the grazers are removed. Profitability is also a fair point when it comes to outfields and cultural landscapes. It helps to keep the forest and undershrub down by cutting, but this is a hard and unrewarding task. Therefore, grazing animals are of priceless value to help keep the cultural landscape open.

There was great willingness to facilitate for the hunters and the public who want to use the outfields. Most sheep farmers have a good relationship with the other users of the outfields, and they emphasized reciprocity, where they get feedback in case anybody finds an injured sheep for example. However, some pointed out the challenges with areas containing lots of second homes.

There were, however, different opinions when it comes to the presence of carnivores in outfields. Most believed that they belong there, that they are at the top of the food chain on a par with humans; one expressed a belief that they are vital for nature. Society has not understood the context and when they do realize, it is too late.

> *"Had they removed all the people then everything would work itself out, but remove the bees and small microbes then the whole bandwagon will be overturned, it is those that are important. There is status in carnivores, that is what they are doing, that is what they get money for environmental protection. They do not get the same money for supporting the microbes that are truly important. So if we had have removed carnivores and people, everything would have worked out anyway."*

6.6 Comparison

The factors affecting their decisions could be categorised and put into tables and compared. The first table includes the agricultural issues, while the second reveals attitudes towards carnivores and carnivore management.

Table 8 *Factors that characterize those that continue as before regarding agriculture*

Nr	Age	County	Full-time/ part-time	Livestock size	Mountain/ lowland	The sheep as a value	Farmer-type
6	50	S-T	Full-time farmer	500	Mountain	Economic and wellbeing	Large-scale farmer
7	40	S-T	Full-time farmer (part-time sheep)	100	Mountain	Economic Utilize resources	Innovation farmer
8	50	N-T	Part-time farmer	140-150	Mountain	Economic	Reduction farmer
9	50	N-T	Full-time farmer (part-time sheep)	180-200	Mountain	Economic	Large-scale farmer
10	50	He	Part - time farmer	250	Lowland (forest)	Economic and personal, creates wellbeing.	Reduction and stagnation farmer
11 & 12	30	Bu	Full-time farmer (part-time sheep)	120	Lowland (forest) and mountain	Economic and personal, creates wellbeing and food.	Start-up farmer
13	40	He	Part-time farmer	80	Mountain	Economic and personal, creates wellbeing.	Reduction and stagnation farmer

Table 9 *Factors that characterize those that continue as before regarding carnivores*

Nr.	County	Zone	Attitudes to carnivore management	Feelings around loss
6	S-T	Carnivore zone for wolverine and lynx.	"Without the wolverine most of the flock would have survived."	"One cannot be too sensitive about the fact that it goes wrong, or put the blame on themselves. It must be forgotten quickly. I do it because you cannot feel sorry for them and ...
7	S-T	Carnivore zone for wolverine and lynx.	"There should be no carnivores in prioritized grazing areas, but there are! Then it is strange that there should be a tremendous problem to shoot them, to get a permit to shoot them. It should have been mandatory to take them out if they do damage then. It seems like you get a yes, but they want to delay it for a few days, giving the carnivores an opportunity to get away. "	"It is really is tolerable. I feel I've tried a lot and done a lot, both supervision and radio collars."

Nr.	County	Zone	Attitudes to carnivore management	Feelings around loss
8	N-T	Carnivore zone for lynx.	"You could say, like with carnivores, after starting with licensed hunting / quota hunting on lynx it has been shot more lynx and it there have been more losses. So I think, if they had not interfered so much, I think it would have worked out, like it did before."	You disconnect. You cannot keep on thinking about it, then you go crazy!
9	N-T	Carnivore zone for bear and wolverine	"The biggest challenge now is that I am within the carnivore reproductive zones, which was curtailed, therefore it becomes a stricter regime within the carnivore zone. But carnivore zones today consists of just letting them breed. There is no plan or desire to withdraw problematic bears and stuff. They just let it pass. "	"I have not really let it sink in. So I've been pretty cynical."
10	He	Green zone. Manage-ment area for lynx.	"... It is green zone, so it should be prioritized for grazing animals, and then I feel that we must try to hold out, although it can be though at certain times."	"… when you get carnivores in it's a hell, you come down and find animals torn apart, that are alive, and everything like that. It's the worst time, then, really."
11 & 12	Bu	Manage-ment area for lynx.	"They have the Carnivore Settlement to deal with, they have their zones. And a wolf is not familiar with either national borders, or the municipal boundaries, that much we know. We are not supposed to have wolves west of the Glomma (river), they should remain east of it. "	"You know many of them, that's what's so ugly…We have a breeding line that we try to breed" "So it's sort of just the feeling going down in the pasture, and finding them strewn everywhere, it's pure massacre…There are so many consequences, it destroys so much more than...It is not just the compensation."
13	He	Manage-ment area for lynx and wolverine.	"This was a green zone when the grazing cooperative was created in 2003, but then suddenly they had just changed it into a blue zone. There the wolverine has it rights, in a way. It may be grazing animals there, but they do not have first right. So we started to argue about it, but then it was changed again. It's sort of ... you know, that stands out in it all, that we are in a way never heard! We are never informed! "	"It becomes such a hopeless situation. I kept on facing a real psychological slam in the summer because it was so tough! There were corpses everywhere… One day I shot some thirty. They were bitten both here and there."

7 THOSE THAT HAVE IMPLEMENTED OPERATIONAL CHANGES

"I think it works very well to have sheep on enclosed pastures if you own a lot of forest and very large areas. But a part of the challenge is to graze on infield pastures and arable land, like I do. ……. Having 200 sheep on 1.5 hectares is making the parasitical pressure outrageously high."

7.1 Loss of sheep to carnivores

In Lierne in Nord-Trøndelag, a huge decline in the number of farming families has occurred from the late 1980's until today. This was formerly a very active sheep farming environment, with good grazing areas and good slaughter weights on the sheep. Then "the crisis came to Holandsfjellet" (a mountain in Nord-Trøndelag) as described by a farmer referring to the recolonization of the area by bears from Sweden. Several farmers were given financial support to restructure and start with dairy production, but this just caused the focus of the crisis to move to the neighbouring municipality of Snåsa. One of the sources talked about how they were previously able to live with carnivores by being mobilized as volunteers to kill problematic carnivores. Increasing restrictions and the creation of zones for carnivores (especially bears) put an end to outfield grazing of sheep in Skjækerfjella in Lierne. Also in Rendalen in Hedmark the carnivores had become an increasing problem. One of the farmers talked about huge losses to both bears and wolves, with the consequence that they lost half the flock, and were forced to bring them home from the outfield earlier than normal.

The consequences of having such huge losses to carnivores has been a deciding factor for many. One of the farmers believe that it is a part of life's realities if one is to keep sheep in carnivore prioritised areas.

"... It was no use to continue in that way. We had to buy sheep every year [to replace those that were killed] and we never got a proper flock either. We could forget about breeding as well."

For those who succeeded with this type of reorganization of how they operated, the loss figures changed drastically for the better, one of the farmers struggled with losses of up to 70% when they had their sheep on outfield pasture. Some still experience some losses on enclosed infield pastures, but to a lesser extent than previously. The reason why some still have losses to carnivores in pastures is that the fences are not totally carnivore proof, or that the lynx is the

main problem (and lynx can jump over most fences). In addition, they now have the opportunity to engage in breeding and thus build up a good flock and not least, produce food.

Nevertheless, it is not the opinion of everyone to see the big trend in losses to carnivores as alarming, it just seems like such a big impact because there are less sheep in the area, and the carnivores have less sheep to choose from. One believes that it come down to how you read the numbers. He believes that, if one bear has 1,500 or 10,000 sheep to choose from, the loss of those who own them will vary greatly depending on the size of the herd. If three farmers have to share the loss to three bears, then it becomes a lot worse compared to if 12 farmers where to share the same loss. So the numbers can lie; that's why we get such big losses now. Because it is not so many individuals we are talking about, it is just that it is such a large percentage of the herd being released.

7.2 Economy and profitability

A general rule of thumb in the sector is that you have to have 300 sheep on pastures if you are to live of it. However, this is not feasible with the area of infield available. Others claim that they would have made the same adaptations to fencing the sheep in again, but it would depend on the carnivores that cause the problem.

> *"As long as we live in a municipality in which it is resolved again and again that the bear should have free range, we would have done the same again."*

What was needed to make these changes was mainly money and land. Restructuring costs a fair bit when you take the work needed into consideration. A lot of work and many hours had gone into setting up fences. Many also pointed to additional work with maintenance of the fences. The economic costs are huge when making changes that involves fencing in large areas of land that are required when keeping sheep. Although sheep are a relatively simple and cost-effective animal and inexpensive to start up with, there are expenses in relation to the fences, the leasing of land, and treatment of parasite. For the most part farmers have received economical support from the County authorities for the fences. Supervision of the fences has also been covered, but only for as long as the funds stretch, it is claims, and there is no guarantee that such funds will be available in the future.

It has however not been as profitable for everyone. Some of the farmers applied for economic restructuring support to reduce the flock size, to be able to make use of the major outfield property which belonged to the farm. When reducing the flock by a third, then one loses a part of the economic basis for the farm, and this is where restructuring funds were intended to help.

But they point out that a gradual restructuring implies that one does not receive financial compensation, and the most profitable would be to cease with sheep altogether.

One of the informants also claimed that he receives economic support for having sheep on infield pastures, but that it all goes towards leasing of land and buying fertilizer, so it is not a satisfactory situation. The situation for him is that he didn't chose to have his flock on infield pastures, but he has been forced to do so. The costs are however still large.

7.3 Mitigating measures

Measures carried out by the informants include:

- Fences (regular and carnivore proof with electricity)
- Sheep on infield pasture
- Changing to different outfield pastures
- Assistance with parasite treatment
- Move the sheep to another area of outfield pastures
- Switching to another sheep breed

To make operational changes on a farm where sheep have been kept in the traditional way for many years, has for many been a necessity but also characterized by emotional reactions. The values that they have grown up with of having sheep on outfield pastures, before carnivores returned weighs heavily with many farmers. It is described as a great husbandry system which worked well when running a farm. But because of the carnivore problems it became an ethical question of animal welfare about whether it was right to continue as before or not.

The main reason for change was a willingness to continue with sheep and the values inherent in sheep farming, as well as the feeling of well-being it creates. There is also a lot of value in producing food, and to exploit the resources of the farm in a sensible way. One of the farmers believes it is a paradox, that we import way too much food, and that we are not able to produce enough food ourselves with all the land we have at our disposal. Yet there is still a motivation to produce food.

> *"It is meaningful to produce food, good food, and food that the people want. ……. We have the ability to produce more, we have the landscape for it. And farm buildings for sheep are so basic. If one could make use of the outfields, it should be possible to produce much more meat in Norway."*

There were several factors that have helped to make operational changes possible for farmers. Huge losses to carnivores helped initiate the process, with applications for fences to keep out carnivores and financial support from the County authorities. What helped to make the process easier for some, was the additional assistance from the vets with parasite treatment and information on how to treat the sheep against coccidiosis several times a year, which is necessary for grazing on infield pastures to work.

All interviewees have had, to a greater or lesser extent, problems with parasites. Some have come to grips with the problems, but others are still struggling. Another factor to reduce parasite pressure is to have enough space available so they can rotate pastures. There are few who have large enough areas so that they can manage this change, but renting land has made it possible for those who have succeeded with it. The ability to fence parts of the outfield, including on state owned commonage, emerged as an important consideration.

7.4 The management authorities' behaviour towards the sheep sector

Attitudes towards the management authorities was, similar to the other groups, marked by skepticism, mistrust and frustration. The interviewees described a system and a bureaucracy that is complicated and cumbersome, and where everything that has to be done takes too much time. No one talked about hatred towards carnivores, but there are counter-forces when it comes to implementing measures that have been the challenge.

> *"I feel no hatred against carnivores, but it's impossible to get it to work. Then you have that kind of opposing forces that are absolutely hysterical if we are talking about putting in a measure [presumably use of lethal control], regardless."*

Although they felt that their voices were heard, they also felt that nothing happened. On the other hand they expressed a feeling that it has been more difficult for the older generation who stood "at the barricades" to be heard.

Management of grazing prioritised areas and carnivore prioritised areas differs in that the policy in the two areas is different. It was felt that it should be easier to implement measures to eliminate problematic individuals in an area of grazing priority. Many believed that it should be easier to remove the problematic individuals also in carnivore priority areas, but these areas are characterized by a strict regime for putting anything into action. This is seen as a major challenge and a limitation for those who operate in these areas where outfield pastures are thus not a viable option.

"It would be different if it was possible to remove problematic individuals in a priority grazing area, as it's called now, then we believe it would have worked just fine. But here it isn't a topic at all. There are certainly many before us who have tested it, and it doesn't work."

The most problematic issue was for farmers' experiencing losses in grazing prioritised areas, which is fuelling the already existing mistrust and anger towards the management authorities.

"The problem is that although the area is prioritized for sheep, the carnivores are still there and kill sheep. How much resources and will is there then to insert the necessary measures to keep the areas reasonably under control in terms of the development of the carnivore population?"

Like those who have quit, those who operate as before believe that the population goals for carnivores should have been lower. One claims that although areas are designated as grazing prioritised, they fail to take out enough carnivores so that they can get a balance in the population, and thus the populations grows and grows. But it has improved in recent years, when you look at the increased removal of bears in Skjækerfjella. There are several who agreed that it has helped.

Some believed that the management authorities are too heavily influence by guesswork when it comes to population targets for carnivores and that the monitoring programme underestimates the numbers of carnivores. It would have been fine if it was the politicians who decided on the number of carnivores, and stuck to it. However, it is not in the power of the politicians anymore, but at the Environmental Agency. Many felt a great mistrust towards the Agency, claiming that the way management is run is ruining rural culture.

"They've ruined the whole municipality this way, eradicated the entire livelihood for so many."

Although operational changes have improved the situation in relation to losses to carnivores, many feel that the situation is unsatisfying. There is still scepticism and pessimism related to infield pastures, and these attitudes seem to hang together with experiences and relationship to how the management authorities operates. Some point to the barriers connected to lack of administrative help and using enclosed pastures.

"That it should be so difficult to get any help when we are trying different possibilities. It's not enough just putting up fences everywhere either, there are different landowners and not everyone is at all interested in that. It is not certain that fences are the solution,

but when we use fences there are enormous areas to fence in. And damn, it's not just for a man to maintain it either."

The farmers who are resident in a carnivore zone have a feeling that the whole burden of adaptation is put on them. They believe that these areas never should have been created so concentrated. The development in these areas are characterising how they envision the future, stating that if the situation stays unchanged it will be impossible to continue to operate with sheep husbandry. There is a lot of anger and frustration towards the management authorities, some find it impossible to understand the current management policy.

"That they should increase the bear population here, and decrease it in Sweden, I can't understand, is there anyone with common sense that can understand this!? I do not think there's anyone who understands anything of this. "

The status of the carnivore populations is also questioned, especially the bear population which is shared with Sweden. One believes that it would have been different if it had been endangered.

Many feel unfairly treated when it comes to politics, and have experienced much hardship. Some are left with the feeling that society has made more and more demands so that the farmers should be discouraged from keeping sheep.

The way some describe it, is that by changing the form of operation they have adapted themselves compared to the previous generation. Many have experienced and grown up with the idea that the older generation has stood on the barricades and tried to talk sense to those responsible for policy on carnivores without effect. They call the policy today an arrogance of power, without nuances. In some cases it is believed that a lack of knowledge infects the management style. There are not many who understands the policy that authorities are trying to implement now when it comes to the size of farms required. One opinion is that they do not know which country the politicians reign over. The fact that Norway is special when it comes to its scattered farming is viewed as a value that should be maintained. It seems like that is the essence of the opposition to the policies that they now are trying to introduce. Everything being centred to towns and far to the south, and rural areas left to their own devices, is not the type of country farmers want. Rural areas are already experiencing depopulation and shrub encroachment / reforestation of the cultural landscape. Norway is a viewed as tourist destination, and people are impressed with the great nature, but the farmers believe this is because the cultural landscape is maintained, to some extent, and that people are still living throughout the landscape.

"I'm almost in shock that we have a minister of agriculture and food who acts as she does. We are used to that everyone who has been given the position as minister to control food and agriculture works towards developing agriculture and bringing about a policy where people should live and work the soil and produce food. "

The feeling now is that the farmers have got an enemy in the Department of Agriculture that wants to the greatest extent possible, close down farms. Many blame politics for the situation that exists today, with large conflict levels and barriers. One claims that politicians are too weak, that many do not know what it is all about, and that the government want to shut down most of agriculture. Some argue that even locals have to take their share of the blame, who are affected by higher policies to acquire benefits for their own.

"It's got to be weak local politics when they go along with all this. It affects the whole livelihood of the area."

Some see it as a challenge that they are totally at the mercy of politics, perhaps to a greater degree within the fences, when it comes to receiving subsidies for supervision and other preventive measures. They feel that the future is quite controlled by others. An excessively large proportion of sheep farmers' incomes come from subsidy. The general opinion is that it is not sustainable in a long term view.

7.5 Barriers

The adaptation to the current carnivore situation has not been without problems. It has been a process characterized by uncertainty, challenges and obstacles. There are some who point at the uncertainty, and what is advisable to do at any time. A question has been if you should gamble or shut down. There will always be uncertainty when it comes to change.

None of the interviewees claim that they manage to live off the sheep in this way, although they would have liked to. There the spaces limitations comes into play. Also if one fences in state-owned land there are clauses and restrictions relating to it that must be followed. Fences must be taken down after the summer so they don't obstruct for other interests, which has been a logistical challenge for a couple of informants. Conflicts of interest will also act as a barrier if you want to be bigger, to have enough land that one can live off the sheep. Many see it as an economic constraint, one of the farmers meant that he would lose the economic basis for the farm this way. When economic support for restructuring remains absent, it becomes a much more costly process.

One of the farmers believed that more farmers could have started with sheep, but that they are too entrenched in what they are doing, in principle they will not see other possibilities. The same applies the other way around. He believes that there are many who want to quit but will not admit it. They do not want say that they will stop, but want to have a reason to say they quit, and it is easy to blame carnivores, too little land, too little profit, and so on. He believes that to quit as a farmer is not any worse than to quit in any other profession, and that many keep going out of spite.

Restructuring, especially conversion to enclosed infield pastures has not only been well received in the sheep industry. Not everyone likes adaptation, and they have been critical and condescending towards those who have succeeded. One of the farmers felt that people thought they had resigned and would not fight anymore; these attitudes were expressed especially by the older generation. They are not alone with the carnivore problems, but they do different things in order to adapt to it according to one of the farmers, but many also had understanding for the choice they have made. One of the informants expressed understanding for the negative reactions, pointing out the pressure that may occur in the sheep industry if it turns out that these changes work and that this could be the future. There is an understanding for the reactions that arise when someone chooses to adapt, seemingly without finding it problematic.

7.6 The value of the cultural landscape and outfields

There has been a change in people's attitudes to natural areas over the years and who should decide the ways they are managed. It has developed into a confrontation over who should have the greatest rights and who should have the main say over policy directions.

"It ends up with the battle for the outfield, which is very significant."

One of the farmers had clear views on how the rights are rooted, and saw the challenges of urbanization that are happening around the country. He directed harsh criticism towards the urbanization trend, which makes the use of outfields more problematic because people do not understand the interconnections that exist in nature. He saw a formidable task in spreading information, in particular to tourism and other recreational purposes, and to the general population about the farmers' rights to use the outfields, and what lies at the bottom of it. He felt that the solution could be to build alliances, to get people from the cities closer to nature and rural Norway, and in this way create a greater understanding. His aim was that they should get the kind experiences that will help create the attitudes that farmers depend on and create a mutual respect. However, there were differing opinions about which elements belong in

Norwegian nature. Both livestock, tourists, hunters and carnivores were recognised as having a place there, but carnivores were regarded as being destructive for the way outfields are used today and as a resource to produce food.

> *"Nobody believed that carnivores would take over Indre Namdal, to put it that way then. I guess they are starting to notice it elsewhere as well now."*
>
> *"When you look at the grazing resources that exist in the forests and mountains here, there is no doubt that it is sheep that should have been grazing here."*

The main focus when it comes to grazing sheep on outfields is releasing sheep and avoiding carnivore losses, which would be the most profitable for both sheep and farmer. One of the farmers expressed that as long as outfields were not a good option it is good to have the fenced in areas as alternatives.

None of the interviewees doubted the potential commercial value of the grazing resources that exists in the outfields. They saw no conflict with a flock of sheep grazing alongside tourists. They saw that there was a benefit for all that there are grazers, which keep the shrubs down and trails open. It was expressed that as long as the sheep grazed there all the time, that it would keep the shrubs down, but they would struggle to open them if they had to start anew.

In areas where there is major investment in summer farming (Norwegian = *seter*), this fact is highly appreciated among sheep farmers. They take care of a culture that is almost about to disappear and are focused on product development. The main thing is that they take care of a culture that is unknown to the urbanized population. They do not earn much money from doing this, but they have a subsidy that is at the bottom which they get for clearing the cultural landscape, fixing up old buildings and taking care of that specific culture.

7.7 Comparison

The factors affecting their decisions could be categorised and put into tables and compared. The first table includes the agricultural issues, while the second reveals attitudes towards carnivores and carnivore management.

Table 10 *Factors characterizing those that have implemented changes regarding agriculture*

Nr	Age	Full-time/ part-time	Livestock size	Mountain/lowland	The sheep as a value	Farmer-type
14 & 15	50 & 70	Part-time farmer	70	Enclosed pasture	Economic	Innovation farmer
16	30	Full-time farmer (part-time sheep)	85	Enclosed pasture - lowland	Economic and personal, creates wellbeing.	Start-up farmer
17 & 18	50 & 70	Part-time farmer	200	Mountain	Economic and personal, creates wellbeing.	Withdrawal and stagnation farmer
19 & 20	40 & 45	Full-time farmer (part-time sheep)	125	Enclosed pasture - lowland	Economic and personal, creates wellbeing.	Large-scale and innovation farmer
21 & 22	60	Part-time farmer	300	Enclosed pasture - lowland	Economic	Withdrawal and stagnation farmer
23	50	Full-time farmer	430	Moving the sheep to the mountain	Economic	Large-scale and innovation farmer

Table 11 *Factors characterizing those that has implemented changes regarding carnivores*

Nr	County	Zone	Attitudes to carnivore management	Feelings around loss
14 & 15	N-T	Carnivore zone for bear and wolverine.	«Skjækerområdet (area in Nord-Trøndelag), which we are members of, is taken out of the area that partly is to be prioritized for sheep. It should be easier to insert measures. It has become easier in recent years, they actually have managed to take out several bears in Sjækerfjella. And it has helped, over the past two to three years losses have gone down, from being absolutely critical to being somewhat less, after they managed to take out two bears that struck indiscriminately."	"I feel no hatred against carnivores, but it's impossible to get it to work. Then you have that kind of opposing forces that are absolutely hysterical if we are talking about putting in a measure, regardless."
				"It is part of life's realities if you operate with sheep in the carnivore priority areas. Our thought was, when it comes to our farm, how can we use our resources on this farm, and how we can operate in a way that we think is pleasant to hold on to, and economically viable."
16	N-T	Carnivore zone for bear and wolverine.	"Smaller population goals and small areas, smaller carnivore zones. If you ask me, it would have been enough to have bears in three locations in Norway, whose aim is that we should have the species. Our bear population has the exact same genes as the Swedish…If the Swedes take the bear for us, so we do not need to do that. There had been nothing if it had been endangered.	"I did not think beforehand that I would manage as well as I did."
17 & 18	N-T	Carnivore zone for bear and wolverine.	"There are not large enough areas to fence that you can live off it…when we struggled with losses, we were obliged to enclose them. Then it's just a season they start with lamb weights then, and caught up in it. It is never quite good in this carnivore zone, I think. I think there is strong desire to get away every sheep."	"... it would have been useless to continue in that way."
19 & 20	N-T	Carnivore zone for bear and wolverine.	"If it had been like that there were politicians and what they said, that decided it, and they remained at the numbers, it was the one thing. But the way it is now, then it's not the policy that really decides. It is the Directorate for Nature Management, and that block of people who really decide. And I do not think they are so very good at counting occasionally. For it is much more bears than they admit that it is."	"..so we lost 25% of the herd, until we turned on the electricity. Around the house here. But we did not experience losses after we got the electric fences."
				"For us so there is no option to release them into the mountains and maybe not get back more than half. It is not very pleasant."
21 & 22	He	Releases in green zone. Manage-ment area for lynx and wolverines, close to area for wolves and bears	"We are in a green zone. It is not supposed to be wolf there!"	"I must say now that I've hit the wall. We had problems last year and, but then we managed to keep it down. But this summer it was too fiercely."
				"It is very safe and nice that they are on infields, then we know where they are. Because you cannot manage to take care of them [when on the outfield]."
23	He/S-T	Releases in a green zone.	"In order to achieve something you have to discuss the basis of the conditions specified in Parliament. One cannot discuss that we want the carnivores gone when it is determined that they should be here. However, one must be able to discuss and find better solutions on how to get rid of carnivores in pasture prioritized areas."	"This is a consequence of the carnivore problems. I cannot bear the burden alone.

8 UNDERSTANDING THE DESICISIONS OF THE FARMERS

8.1 Introduction

This chapter summarises the main conclusions of the study. It describes the main findings of the research and how they relate to the research questions described in Chapter 1. The chapter ends with a concluding remark with making some recommendations relevant for carnivore exposed areas regarding the implementation of operational changes in sheep husbandry.

The thesis deals with adaptation strategies in carnivore exposed areas. The sheep farmers interviewed in this study have taken different choices, based on how they perceive reality within the sheep husbandry. This is a descriptive analytical representation of it. It is an attempt to describe the reality of the farmers, while trying to uncover the causes and effects of that reality perception.

In this game of competition over who has the most valid, or legitimate, knowledge, the farmers' feelings and experiences with their reality cannot be ignored. In this conflictful situation, this type of research is interesting for farmers to take part in; giving them a chance to speak out and reveal their honest opinions. Insights into the relationships between general life values and attitudes toward carnivores emerged, as did other factors determining their attitudes to sheep husbandry.

Gender, age and education are often relevant background variables in this type of research. Gender has previously been shown to have an impact on attitudes to carnivore related issues. In this case, the role of ender could not be explored in depth due to only 26 % of respondents being female. However, a general impression emerged of the women being more sceptical towards carnivores than the men. They were also different when it concerned the relationship to the sheep as individuals. Women displayed a more personal relationship to the animal than the men did. Another difference was that women in particular expressed more concern for the family's safety (especially with respect to the wolves in Hedmark) and less willingness to accept wolves nearby, than men did.

Complex dynamics shape the structure of the farm sector. Previous studies, like my research, have shown that start-up farmers and reduction/stagnation farmers are observed in all age groups, but start-up farmers are concentrated in younger age groups, and reduction/stagnation farmers are concentrated in older groups. The younger and newly established farmers (the start-up farmers), have smaller farms, grow faster, and are less likely to own farmland than older, more experienced farmers. Some of the farmers have decreased farm size at advanced ages,

mostly due to carnivore pressure. Financial constraints, pluriactivity, the pleasure of sheep husbandry and a continuous operation of a "generation farm" explained smaller farm size of the start-up farmers.

Where the informants are located geographically is essential in relation to their attitudes towards carnivores, management authorities and todays dual goals of maintaining sheep production and large carnivore conservation. There are strong attitudes especially in management zones for wolves and bears, which is not so surprising, where they experience a significantly greater amount of loss to carnivores.

Fifty percent of my informants were full-time farmers, but only 12.5 percent were full time sheep farmers, living mostly of the income from sheep husbandry. The large-scale farmers had larger flocks and valued the sheep differently, both according to loss and profit. The most important difference between these and the rest of the full-time farmers are that they have sheep on outfield pastures outside both carnivore zone for wolf and bear, and only dispersing individual carnivores were causing problems from time to time. These farmers agree that losses to carnivores must be expected with the dual goals they have to adhere to.

The current policy direction of the Minister of Agriculture and Food is to promote large and efficient farms. This is a pity, many believed, for there is so little of Norway that could be used for this type of farming. Norway is special in that way. The farmers are asking themselves how long the government will provide workable conditions for rural farms. The minister of Agriculture and Food is getting a lot of blame, and her changes are very much in the minds of farmers.

The analysis revealed that the strongest and shared opinion among the informants was the positive value they attributed to the cultural landscape and outfield grazing of sheep as a specific form of husbandry. They had no doubt that outfield grazing it the best form of grazing for sheep and the most satisfying from the point of view of the farmer.

Having sheep on enclosed pastures was not regarded as a practical nationwide solution, with informants stating that it should only be implemented in very exposed areas.

8.2 What thoughts do the farmers have concerning the choice of husbandry systems?

The loss experienced by sheep farmers to carnivores is a main factor affecting much of their thoughts around their choice of operational structure, as well as an explanation of their situation today. Meanwhile, there is a discourse on the bottom that forms much of the basis around carnivore conflict.

8.2.1 Those that have ceased with sheep husbandry

Ceasing with sheep husbandry has for some felt like a defeat. They feel that they have been forced or pressured into it, where they saw no other option than to quit.

For some the situation has gotten better, not having to deal with the physical or the psychological strain, and are producing better, but different, products on their farms today. Yet they miss the sheep and the trips in the in outfields' peaceful surroundings.

On the other hand, not everyone has had such positive effects after quitting with sheep. For some the economic situation is difficult as market problems encountered when restructuring has given a difficult economy, and many are left with massive debt because of it. An exhausting and protracted struggle against the management system has affected many, yet they do not give up.

There is no doubt that there is an emotional bond to the sheep as individuals which leads to so many quit or considering quitting, in addition to losses within the flock being so large that the economic foundation to produce sheep crumbles.

8.2.2 Those that continue as before

The reason so many still keep sheep is because of the satisfaction it creates, and the sense of purpose, contribution and meaning that it gives. Keeping sheep is for many a way of life. You have to adapt to that life and adjust expectations to the income this life gives. This also means that you have to let some things go, like trips during the holidays and free time during the week. Even though only a few people can survive on the income from only sheep, none want to quit because of the value this way of life has. Many see the value of keeping this way of life alive, they want the farms to be alive. They want to give the next generation a chance to also adapt to this way of life. Often it is about the connection with the rural community where they grew up, so they want to contribute to the community in a sensible way. There is general consensus about

this, if you are going to live in a community you have to have something to do, otherwise you will lose your connection to the community.

> *"You live in this community, so you have to do something, if not there is not any point. Why live here if you don't have anything to do? You have to get a job and earn an income."*

Keeping sheep demands small resources and does not cost much to start with and because of this the people that want to get into agriculture take a chance and create a belief about what they are doing, and it feels right. On the other side, there are very few who consider sheep as their main occupation. A lot of people consider it too hard to get it to become profitable enough to create one job, with the demands towards Norwegian agriculture to be profitable and efficient. Often sheep production will be combined with other things outside agriculture, or as an addition to producing corn, pigs or chicken to name a few. This last point is also a reason many keep sheep, it is easy to combine the production of sheep with other activities.

There are few who consider sheep production to be a duty, they do it because that is where the work is, they want to create something that can be passed on, and consider it to be meaningful to produce food. Being able to use outfields as pasture for sheep is certainly an invaluable resource.

There is however not only positivity connected to producing sheep. As the situation has become for many today, with an increase in the carnivore populations and higher demands from the public wildlife management authorities, there are some that continue sheep production out of spite. They do not want to lose rights that they feel they have a claim to, in particular to use the outfields as pasture. This use of outfield pastures is the best way to produce sheep and is an integral part of Norwegian agriculture society which is being lost in larger and larger parts of the country.

8.2.3 Those that have implemented operational changes

There are diverse opinions concerning the practice of grazing sheep on infield pastures. When I asked the question about recommendations there were a variety of opinions;

- *"It is suitable for some, but not all"*
- *"It depends on the goal with sheep husbandry and income"*
- *"Would have done the same again"*
- *"Depends on which carnivore is the problem"*
- *"If the future is sheep on enclosed pastures and small scale farming many will choose something else to do"*

- *"Absolutely not!! Poor results"*

The attitude to changing operating structure on a farm often depends on that farmers experience with the effect of measures and their level of resistance towards carnivore management. Change has for many been viewed as necessary to keep on going with agriculture as a livelihood. There will always be different experiences and attitudes with and towards change. Some point out that some will benefit from change, while others might not. One from the older generation who have been part of this reorganization, specifies that the reasoning behind wanting to begin with sheep will vary, but that if the sheep sector in the future is going to be based upon having sheep on pastures in small-scale form, he believes they will choose to do something else. He can see the reality of the situation but admits that it is a bitter pill to swallow.

One of the farmers differentiated between generations as his main point, the younger generation have a different education, experience and different choices when it comes to making a career. Age is a factor all informants in this situation have in common, they all belong to a different generation and have different abilities to see other possibilities. The differences in generations givse them different perspectives and possibilities to see different solutions, and other ways to operate regardless of the carnivores.

> *"Of course it is a little bitter sometimes, but one sees the reality, and even if it had not been carnivores, many could probably have found it expedient to convert to new farming methods."*

Not even among those that have implemented operational changes are there any that depend on sheep production as their only source of income. Economics, interests, land availability and the management authorities are given as reason to not do this. There is not enough income in sheep production to earn a living, in addition to area limitation due to the fact that most of the sources in this group have their sheep on infields pastures. Other interest are also given as a reason, the wish to have something to do on the sides, better incomes from producing other things. In some areas other land-use interests and the reindeer herding sector will cause limitations to where you can keep your sheep, and thus the size of your herd.

Operational changes have for the most part been positive, both in terms of motivation and economics. Many describe their days as being completely different in a mental respect, they don't have to search for carcasses but can check on the flock without being worried about how many will make it down alive during the autumn. They talk about the sense of security they feel with having the sheep on infield pastures. The economic advantage is being able to still produce

food, and being able to keep a closer eye on breeding. The main focus, for many, to reorganize was to decrease the workload, the hours, and get it to become more efficient. The wish was largely to retain a production on the farm in way that the farm was adapted to. One of the farmers was also open to expand into new fields according to interests, such as tourism or outdoor activities, in other words, pluriactivity.

Many are sceptical to having sheep on pastures because of parasite problems. It is an important factor which confirms that keeping sheep on infield pastures may not be the correct way and it isn't suitable for everyone. Some experience it to a greater or lesser degree. For some, the costs of keeping sheep on enclosed pastures have become greater than the benefits. This source said that having sheep on enclosed pastures to minimize losses to carnivores does not help when they die anyway.

8.3 What influences their decisions?

8.3.1 Those that have ceased with sheep husbandry

Reasons for ceasing with sheep husbandry are for sheep farmers the factors functioning as barriers in continuing or trying to change. These barriers have influenced their decision about giving up on sheep husbandry.

The age span in this target group is between 50 and 60, and they all have ceased with sheep husbandry, but are still involved in agriculture with other productions. The flock / herd size on their farms varied a great deal, the farmers in the lowland more south in the country seemed to have more sheep than the farmer operating in the mountainous areas in Nord-Trøndelag. To group in farmer types is not always an appropriate way to describe them, however they could all be qualified as reduction and stagnation farmers regarding sheep husbandry. They were dissatisfied with the economic situation in sheep husbandry and expressed negative expectations to the financial results ahead. They experienced negative financial developments both due to the loss of sheep to carnivores and low income in sheep husbandry. Operating with sheep in carnivore management zones for bear and wolf has caused a great deal of loss, anger, frustration and mental strain. The major barrier is the distrust towards the management authorities and the feeling of not being heard.

The farmers express scepticism towards the agricultural and wildlife management systems in terms of the loss reduction measures, subsidies, distribution of funds and requirements from the authorities. These requirements have created a lot of pressure for them. The development of agriculture with requirements for efficiency and larger farms is hard to swallow for many, creating more additional work and is more time demanding. They claim that the income in sheep husbandry is hard to make a living out of, and none of them had sheep husbandry as the only income. Their philosophy and experience was an improved economy in other productions, which was a conditional truth. Another obvious barrier is the restricted access to available area, if having sheep on enclosed land is the only solution to prevent losses. Linked to that is the decreased economy of using enclosed pastures, due to decreased slaughter weights and increased use of anti-parasite medication. Getting financial support to cease sheep farming and start with other production systems made the decision easier.

The informants felt that they had tried almost everything possible to prevent losses to large carnivores, but had not succeeded in making the situation better. They expressed a feeling of hopelessness and complained about receiving little help from the authorities concerning what

to do to make the situation easier. The greatest barrier, and the main discourse in sheep husbandry concerning carnivore management, was the geographically differentiated management and the increased carnivore populations. Large losses to carnivores and the sheep's suffering are to a large degree causing mental strains, leading to health problems.

This all boiled down to a great deal of pessimism, where they expressed that they saw no other option than to end sheep husbandry.

8.3.2 Those that continue as before

The attitudes expressed by today's sheep farmers are to a great extent equally expressed, and similar to of those that have ceased.

The age span in this target group is somewhat lower, and you cannot avoid seeing the differences in attitudes between the younger and older farmers. From my results it seems like the older farmers, that have been involved in sheep husbandry the longest, express more down to earth attitudes regarding losses to carnivores, instead of losing it completely. But the differences in this regard also reflect a lot on personality and farmer type. How the farmers tackle the loss of sheep and how they place it as a value are mostly related to personal characteristics.

The accessibility to land is inhibiting them from having sheep on enclosed pastures due to reduced profitability. They claim that there is not enough profitability and economy in sheep farming to make big investments in a possible change. It is expensive to set up fences, there are a lot of maintenance costs, and a great deal of additional work attached to it. Having sheep on enclosed pastures involves a lot of medication to treat parasites, and they ask questions about the resulting meat quality. They have seen and heard negative experiences of their peers, which has made them doubtful about this mitigation measure. At the same time they claim that carnivores have managed to cross the fences, which is making the whole measure useless. Another hindrance is the reindeer industry getting in conflict with setting up fences that are placed in the outfields.

Other loss-reducing measures have been tried, without having decreased the loss rate significantly. Supervision does not help, you have to have so many workers, and there are not enough finances in the sheep husbandry. Several of the farmers really feel that they have tried everything.

The feeling of a lack of help was prominent, they simply did not know what to do, and how. And processes in the administration take too much time. Some say it is fair that those who

operate on a large scale should receive enough resources to that they manage to live by it. Others express the view that sheep husbandry is hard make profitable as it should have been to get a full-time job out of it, and they are alarmed by the goals of the minister of agriculture and food for greater efficiency saying they are unrealistic - the cost levels in Norway are too high.

The opinion of the wildlife and agricultural management authorities is low. The shared expression is that the carnivore policy must change, as the carnivore population goals are going to kill the entire sector which is dependent on the outfields.

8.3.3 Those that have implemented operational changes

Those that have implemented operational changes have experienced different kinds of barriers, making the process more difficult and time consuming. The uncertainty about the process of change is the personal barrier experienced by all, if this is the right thing to do, and how to do it. The process of change requires a certain extent of external help to achieve it. A slow bureaucracy and contractual issues on state owned land made the process a great deal more difficult and more time consuming. Not all received support for restructuring, which made the process much more costly than it could have been. There have also been some conflicts with other interests (hunting, tourism) which caused a limitation on the fencing.

The age span in this target group varies to a great extent. But I cannot help but noticing the difference in farmer type. The oldest informants seemed to be more negative about the future and were in the closure phase, and experiencing more barriers regarding the implemented changes. They somehow lacked the ability or will to see beyond their own negative situation. They also expressed negative assumptions concerning future perspectives regarding large carnivores. The younger start-up and innovation farmers are also still experiencing technical difficulties, but they express it differently.

The result of the change from using outfields to having the sheep on enclosed pastures has been successful for some, but for others the reduced availability to land has resulted in large loss and reduced slaughter weights due to bacteria infiltration and parasites.

8.4 What choices are included in the decision making process?

The choices included in the decision making process are generally described by the way they are group, according to how they operate today. They have either chosen to cease with sheep because of different factors described in chapter 8.3. The same is for those that continue as before or have implemented operational changes as a way to prevent closure on the farm.

8.5 What does it take to change farming system to become more viable and adaptable?

8.5.1 Those that have ceased with sheep husbandry

When asked about what could have been done differently in terms of sheep and carnivores, a decrease in the carnivore populations stands out as a common recommendation. Indirectly, wildlife management is the thing that should have be changed. One claimed that having a twofold objective is useless, as they do not go together. Another factor is the right to defend property, which should be upheld so one has the opportunity to protect the sheep under attack. The same applies to the green, grazing priority zone. One argues that it is said that the sheep should be able to graze there, so there should be a free-to-shoot policy towards anything that makes it impossible to graze there. He believes that the right to protect property is an illusion.

There are many who have fears, but also excitement about the future of the sheep industry. Fears that carnivores will spread throughout the country in the end, and that many will quit because of it. Considering the current dual goal, there are many who only think about amounts, and some wonders what will be left when the finish comes. Others feel the fear that the whole rural culture will be lost, and people find it much easier to take other work. It was often stated that a rich country like Norway should be able to feed their own population, one must assume that it should be done based on the goods that can be produced here.

> *"One should assume that a rich country like Norway is able to feed their population, at least when you consider the goods that we can produce domestically."*

Among farmers who have ended sheep husbandry, another factor was the right to defend their property, giving them a chance to protect the sheep under attack. The right to remove damaging carnivores in the green pasture priority zone should also be prioritized, since it is said that it is possible to have sheep grazing on outfield range pastures.

8.5.2 Those that continue as before

When it comes to the sheep industry, the current situation is for many characterized by frustration and concern for the future. In addition, there are many who experience the pressure in relation to the profitability of the sheep industry. Unless the situation changes the way forward for many is viewed as being difficult. One of the farmers did not think it will change before we feel hungry in this country.

A couple of my sources are already in the doorway, so to say, to cease with sheep farming. One of them experiencing a mixture of resignation and optimism, resignation when it comes to

sheep, optimism for what he is about to start with. They have been prepared for the development within the industry and have sought other opportunities. Several experience a lower motivation but they do not want to quit. The communities within the sheep industry is for many important, they are supportive to each other and stand together in difficult times. One points out that this is what makes it tolerable.

"Carnivore policies must change!" is the slogan. The perception is that population goals for carnivore will kill all livestock production based on the outfields. One of the farmers is of the opinion that that landowner should be given the right to decide for themselves who should been grazing on their land, obviously referring to carnivores. He refers to the people who have property that they have the right to determine what goes on their land and power when it comes to that. He compares it to the state releasing wild dogs onto private land without taking the responsibilities of doing so.

Another major factor is the immigration of wolves from Sweden. It was felt that the Swedes should have been allowed to reduce the wolf population by half, as they wanted, but they were denied permission by the EU. The problems with the wolf comes from there, one of the farmers said. In addition, the fact that they cannot remove enough wolves is perceived as a major problem in Hedmark areas and further south. Furthermore, you get wolf related issues for game species, and the overall use of the outfields.

8.5.3 Those that have implemented operational changes

The sheep farmers who have adapted and succeeded are positive about the future, yet to varying degrees. The future of the farm is positive with a predicted development in sheep farming with increasing lamb weights and overall better results, which creates motivation. They feel confident that the added investment of time and energy will lead to a better flock, and with the improved flock they can get better resources back. It is described as a contrast to when carnivore conflicts were at their height, the better flock that you sent out, the greater the chance that they were eaten or injured. They will now focus on development and modernization.

Trade in addition to the main industry has always been characteristic on farms, and remains so.

> *"On this farm, what you do has always changed over time. What you do with the resources available to you. Because times change, society changes, so you have to adapt."*

For those who have not experienced the reorganisation as a success, the situation is different and they feel disheartened and hopeless when they think about continuing. Their stance to continue will depend upon wildlife management and carnivores.

Having children who might be interested in taking over the farm creates a motivation to continue operating. Not everyone has this motivation to continue and that shapes their view of the future within the sheep industry.

Some describe that to be a full-time sheep farmer and focus fully on what you are doing, has a unique value in itself. This feeling has in a way been hung away on a peg, and will probably not be taken up again either. They realize that the farm will be smaller in scale and less professional than when the previous generation ran it.

When it comes to the sheep industry, the future is characterized by fear and uncertainty. It is alleged that there are not many things in our society that implies that there should be a strong sheep husbandry in the future. This fear of the future is justified by the attitudes that exist, along with carnivore problems and the political direction. With fewer sheep farmer the professional environment will become smaller, and the development will stagnate.

There was a feeling that you has to be quite persistent if you were to engage in the sheep industry in smaller places, one has to really want to run a farm. There is a saying about sheep not being an easy earner. They do not primarily engage in the sheep industry because they have to have the income to survive, but because of the well-being it creates.

This leads to a question on how many generations it will be possible to create an interest to continue.

9 CONCLUDING REMARKS

9.1 Attitudes connected to sheep husbandry

Attitudes towards different stakeholders in the field may be equally important for the development of conflicts as attitudes towards the carnivores. It also means that the carnivore conflicts certainly cannot be eliminated as long as they are woven into other more fundamental societal conflict patterns, and even may have an important symbolic function.

The agricultural sector is affecting the farmer's life, but to a large degree personal values and attitudes increasingly seems decisive for a whole range of dissimilar lifestyles. As Long and Cruz (2003) points out, meanings, values and interpretations are culturally constructed but differentially applied and reinterpreted. The lives of the agricultural population is probably more closely related to structural constraints than is usual, because external political and social conditions largely determine the economic and policy framework for life in agriculture.

Sheep farmers are part of a discourse, which according to Jäger and Maier (2009) and Wodak and Meyer (2009) regulates and enhances their actions and wields power in sheep husbandry. Some are more open and have the ability to see beyond their own situation. Others are more concerned with the presentation of themselves, and see only their own hopeless situation. The farmers feel that the management authorities makes initiatives within what both Adger and colleagues (2001) and Svarstad et al. (2008) calls the Preservationist discourse, that they are kept away from the carnivore conservation areas, and that they are not prohibited to use the outfields where carnivores is a priority.

One way of explaining the farmers' limited adaptive capacities is because they do not possess all the information about the choices they make, which is due to the limited proportion of the available information they can adopt and deal with. They are to a great degree influenced by institutional frameworks, and are sometimes letting emotions and irrationality control their actions. As Krange and Skogen (2001) points out, we can distinguish between two different forms of knowledge: knowledge based on research and knowledge that is based on people's experiences through the everyday use.

Maybe they intend to be rational, goal-oriented and adaptive, but are limited in how they go about making decisions, and these are limits which directly affect their choices. The farmers clearly preferred familiarity at the expense of change. You could say that the farmers tended to see information and indications that confirm existing beliefs, and therefore choose not to

change. According to Freibauer and colleagues (2011), humans tend to resist adopting new knowledge when there is no immediate advantage or urgency to change.

When it comes to this opportunity to adapt, it appears to be both the external framework and the personal characteristics that governed their willingness and ability to make changes. In the carnivore settlement there is a large focus on conflict mitigation measures, and apparently the management authorities and politicians believe that these will help to reduce the problems farmers are experiencing with losses to carnivores. This is felt as being an attempt to hide the real issue under the carpet.

The farmers have the impression that their situation and perception of the conflict are not taken seriously. In many cases depression and discouragement is an accurate picture of the current reality, not a cry for attention. For those who have given up the fight and ceased with the sheep, or are in the closure phase, there are stronger feelings than among those who have succeeded with reorganization. But feelings also exist here, which is interesting. One would think that once they have made changes, moved to enclosed infield pastures and eliminated the carnivore problem, that pessimism and discouragement should have been replaced by optimism and faith in a brighter future within the sheep sector. Based on the results this does in part support this, but far from as satisfactory as the management authorities had hoped or desired. Those who have succeeded with operating changes have an increased belief in the future of their own farm as it is run today, with relatively small numbers of sheep and fenced infield pastures. Faith in the future within the sheep industry is however linked with scepticism and doubt. This is a real fact. The reasons they have given appear to be both reasonable and realistic.

In many situations it appears that farmers are more sensitive to losses than gains. They continue with sheep husbandry with a continuous high loss rate and psychological strain because of the investments they have put in the farm, both time and money. They do not want to give up.

"*Where's the new carnivore policy that was flagged in the election campaign?*" was asked in an article in the Nord-Trøndelag Farmer Union.[38] They feel that from various parties, not least from the current coalition, beautiful formulations about the Carnivore Settlement and the importance of the grazing industry was expressed - and a desire to utilize outfield resources. "*Instead we are now witnessing an abdication of responsibility by the political parties*". The pasture users feel they are in a struggle of life and death in carnivore-prone areas. It is the battle

[38] Nord-Trøndelag Farmers' Union. 2014. Beitenæringa i Nord-Trøndelag – hva nå? (The grazing industry in Nord-Trøndelag - what now?) http://www.bondelaget.no/nyheter/beitenaringa-i-nord-trondelag-hva-na-article79038-5083.html

for producing safe, Norwegian food based on the vast outfield resources that exist in Norway. There is also the battle for true understanding. It is asked whether the Parliament knows the real impact of the Carnivore Settlement. Nord-Trøndelag Farmers' Union want an active use of the outfields and a strong grazing industry in the county. They have therefore partnered with Nord-Trøndelag Sheep and Goat association, Nord-Trøndelag Reindeer industry, Nord-Trøndelag Farmers and Smallholders association, NJFF Nord-Trøndelag and the People's Campaign for a New Carnivore Policy NGO.

"*We have yet another bloody grazing season behind us*", was expressed at the annual meeting in Hedmark Farmers' Union.[39] With a final judgment, they were certain that the management authorities would take the judgment seriously. It lacked a lot on that. During the winter a new management plan was created. It states that there should not be carnivores that pose a potential for killing sheep in the green areas, with a small modification for lynx and eagles. This means that there are not supposed be bears, wolves and wolverines constituting a damage potential in these areas. The farmers feel that we should not have wolves in Norway as there are no "Norwegian" wolves, and then there is no "Norwegian wolf" that we have a responsibility to preserve in the future.

The farmers' impression is that they have few options. The farmers state that the carnivore policy must change, there has to be a change in carnivore management with smaller population goals, smaller carnivore management zones, smaller areas assigned for carnivore reproduction, and less concentrated carnivore reproduction areas. Removing "problem individuals" should be also be easier.

They also want more subsidies to be given to the farming industry and more economic support for loss reduction measures. However, it is very hard to imagine an increase in subsidy to sheep farming with current political and social trends, due to international trade agreements and especially if it requires reducing carnivore conservation objectives. There are, however, split opinions concerning quantity and efficiency. The minister of agriculture and food is getting a lot of attention, and her desired policy changes are very much in the mind of farmers. This implies that the large carnivores must be seen in the context of wider structural changes in agricultural policy that do not favour small scale sheep farmers. Large carnivores have become symbolic of many other wider issues with which they are only partly connected (Skogen and Krange, 2003, Linnell, 2013). Carnivores coming back to a rural area where they were

[39] Hedmark Farmers' Union. 2014. Årsmøtet i gang med leders tale (The annual meeting started with the leader's speech). http://www.bondelaget.no/hedmark/arsmotet-i-gang-med-leders-tale-article77414-177.html

previously extinct is perceived as a threat towards both the sheep sector and traditional lifestyles. The carnivores have for many become symbols of the wider changes to their landscapes and communities. Most of the anger and blame, however, is pointed towards the carnivore management authorities rather than directly at the carnivores.

The idea of having sheep on enclosed pasture as a preventive measures was only viewed as being acceptable in very exposed areas. While some want a continued presence of carnivores, there are also some who do not want them here at all.

It is believed, however, that grazing in outlying areas is a significant welfare benefit for the animals and that a certain injury and loss extent is foreseeable by grazing in outlying areas. It comes to finding the right balance between access to grazing and what can be accepted of suffering in the pasture. These desired changes are very unlikely to go down without creating massive conflicts with environmental legislation.

There is a lot of fear concerning the future. Is the hard truth: Adapt or die?

There has arisen a certain amount of social criticism towards Norwegian sheep husbandry, which is strongly visible both in media and in discussions around carnivore and agricultural interests. One thing the critics points out is the use of breeds with poor flocking instincts and, because they are primarily bred on high performance and production (meat, many lambs, wool etc.) rather than an ability to survive untended in the outfields. The Norwegian Animal Protection Alliance stated in an article "heavy breeds have lost much of the natural vigilance and propensity to escape as the wild sheep have. Therefore, they are easier prey for carnivores" (Dyrevernalliansen, 2014).

Yet another criticism is that the sheep industry in Norway has expanded and evolved in a time when carnivores were absent and further, that most of the losses are related to other factors than carnivores - again unsuitable breeds, diseases, loss to dogs, accidents and theft.

One of the main critics involve lack of herding/supervision in the outfields.

As concluded, the general opinion on changes in sheep husbandry is a change in the carnivore policy; a change in carnivore management, smaller population goals, smaller carnivore management areas, smaller areas assigned for carnivore reproduction and less concentrated carnivore reproduction areas. It is important to point out that the desired changes are most likely impossible to reconcile with our understanding of large carnivore ecology and even what we know about the functionality of conflict-reduction measures. Reducing the carnivore goals

beyond today's minimal goals is of course a legitimate political objective for an interest group to pursue – but is highly unlikely to gain public support.

To succeed within sheep husbandry has a lot to do with adaptation. The farmers report that they create a belief in what you do, and it feels right. They do what they can to adapt to the goals and limits that are set within the industry. One of the farmers had set the appropriate words for it, "*that times are changing, society is changing, and you have to adapt*".

For many the main obstacle is simply that the spatial resources are inadequate for infield fencing, and there is no solution to it as it will ultimately limit the number of sheep farms in the region. This can be concluded by a formula where one takes acreage available, parts of the area that each sheep require, and find how many sheep will fit in that area. It limits itself. Pluriactivity in agriculture is most likely here to stay, at least as long as the policy and regulatory framework within the sheep industry is the way they are today.

Several farmers directly, or indirectly, argued for more subsidies for the farming industry, which is very hard to imagine with current political and social trends, due to international trade agreements and especially if it requires reducing conservation objectives.

The process of trying to find a solution in sheep farming preventing large losses will continue. Yet it remains to find the perfect solution – if it is ever to be found. This conflict can be put in comparison with the conflict in the salmon industry, where aquaculture represents a threat towards wild fish stocks. It is also comparable with the adaptation to global climatic changes, where adaptation is a difficult process.

9.2 What next?

It is clear that this is a conflict without a satisfying solution. However, what it takes to successfully bring about change is not easy to conclude.

The motivation factor is hard to get past. Their situation affects and characterizes their motivation to continue in sheep husbandry. What can be concluded is that motivation can be determined as an important factor to make the farming industry more viable and adaptable. Personal characteristics, attitudes and willingness to change are essential factors in surviving in the future sheep husbandry. For a new culture to emerge, according to Jacobsen (2012), one must both unlearn something and simultaneously learn something new.

It is obvious that the lack of trust is a major barrier to moving forward.

In this study I have documented something that has already been shown in previous research. The loss reducing effect of the different measures seems limited due to the fact that they do not work as expected, are too expensive, or have other disadvantages (Dahle et al., 2002). There are some positive results of fencing, but overall the experience is not very promising, costs are very high, one relies on high subsidies for fencing and fences often prove to not be carnivore proof. An alternative is to make greater use of infield pastures in areas where there is a surplus of this, where it then becomes important to have good agreements around fencing. However, the whole underlying logic and the utilization of resources in sheep husbandry is currently based on the use of outfield resources.

One possible solution is the possibility of a reorganization of the means of compensation from one where you pay for lost animals towards paying a reward for survival, which would probably give stronger incentives to improve herding and other measures that protect sheep (In Sweden such a model is used for Sami reindeer herders). What is then essential is that authorities are willing to pay for sheep husbandry and for testing new compensation forms. The logic of this "mirror principle" is linked to not compensating for lost revenue, but to stimulate two goals; maintained / increased carnivore populations and reduced livestock loss. The political willingness to pay for this is the challenge.

There is also a basis for concluding that some areas are so exposed to carnivores that closure is the only option, both because of the economic, psychological and animal welfare consequences. Then one may be left with some areas, especially along the coast and on islands, which may be most relevant for sheep farming.

The lack of advice can be solved by providing them good, alternative available solutions (ex. area) that are understandable, in areas where this is possible.

A better cooperation between farmers and authorities and insights into actual power relations – openness would maybe reduce the incomprehensibility the farmers' experience. Research has shown that trust between different groups of actors is a core necessity in carnivore management (Andersen et al., 2003b). Today, this trust is weak, and this undoubtedly contributes to a greater conflict. With better cooperation and transparency between actors more farmers hopefully will join in creating rural industries by being motivated rather than being demotivated, if the result of the thesis shows a modification of direction and probability.

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APPENDICES

Appendix 1: Informed consent

INFORMED CONSENT

Description of the project assignment

I am writing a thesis in Natural Resources Management at the Faculty of Natural Sciences (NT), Norwegian University of Science and Technology (NTNU).

The topic of my project is sheep farmers' opportunities and barriers to implementing operational changes that reduces depredation of grazing animals. I wish to examine what thoughts farmers have around the selection of operating form, and what is affecting their decisions.

Notes from the interview as well as a description of these reflections will be written down and used in the thesis. Would you like a citation check before publishing, this will be arranged.

Voluntary participation

All participation is voluntary and you can withdraw anytime. I'd rather use audio recording, but are you against this respected this. The audio recording will be used only by me and will be used for transcribing. You can terminate the interview or withdraw information provided during interviews and observation.

Anonymity

The notes and this assignment will be anonymised. This means that none other than I is to know who has been interviewed, and the information will not be returned to you. This means that whoever reads this thesis will NOT be able to identify informants who contributed their views and information.

Consent

Before the interview begins, we ask you to consent to participation by signing that you have read and understood the information on this sheet and want to participate.

I have read and understood the information above and give my consent to participate in the interview

Signature Date

Appendix 2: Open topic questions with certain structured questions

To those who have quit sheep farming:

Introductory questions

1. How long were you in sheep industry?
2. How large was your stock?

Economy and profitability

3. Did you have income outside of the farm?
4. Did you experience large loss to carnivores?
5. Was there economic challenges that made you chose to quit?
6. Was this something you had considered for a long time?
7. Did you have under any circumstances considered other possibilities?
8. If yes, what barriers put a stop to these?
9. What do you think the requirements set in agriculture today do with the profitability of sheep industry?
10. Do you think that there are someone to blame for this?
11. How has the economy changed after you quit sheep husbandry?
12. Do you have a job? What are you working with today?

The view on the village and agriculture

13. What were the main reasons why you decided to make the decision to close down?
14. Did it feel like a defeat?
15. Did you feel obliged to operate?

Nature

16. What is your view on cultural landscape and outlying pastures?
17. Who do you feel belonging there (animals, tourists, hunters)?
18. Have access to enclosed pastures been a crucial factor for choosing to quit?

The future perspective

19. How do you perceive the situation you are in, based on your own judgment? Has this instance influenced health, psyche, motivation etc.?
20. Do you feel that you have the ability to control your own future?
21. Did you feel that you were heard?
22. Do you fear for the future on behalf of the sheep industry?

To those who chose to continue as before:

Introductory questions

1. How long have you been involved in sheep industry?
2. Why sheep?
3. How large was your stock?

Economy and profitability

4. Do you experience large annual losses (to carnivores)? How much? Loss ratio?
5. How do you feel about that this proportion of your herd being lost each year?
6. What do you feel should have been different today regarding sheep and carnivores?
7. What do you mean that the requirements set in agriculture today are doing with the profitability of sheep industry?
8. Have you considered converting to another form of operation / make changes in your operational form?
9. Do you work outside the farm?

The view on the village and agriculture

10. Did you feel obliged to operate?

Nature

11. What is your view on cultural landscape and outlying pastures?
12. Who do you feel belonging there (animals, tourists, hunters)?
13. What is your opinion about having sheep on enclosed land versus having them on outlying areas during the summer?

The future perspective

14. What are required for you to eventually adopt a more loss reducing operating form?
15. What do you see as the biggest problems / barriers to make change?
16. Who do you think is responsible for the barriers in today's agriculture?
17. How do you perceive the situation you are in, based on your own judgment? Has this instance influenced health, psyche, motivation etc.?
18. How do you see the future prospects of your farm?
19. Do you feel fear for the future on behalf of the sheep industry?
20. Do you feel that you have the ability to control your own future?
21. Do you feel that you are being heard? Empty promises from the authorities?

To those who have changed operation form:

Introductory questions

1. How long have you been involved in sheep industry?
2. How large is your stock?

Economy and profitability

3. What do you believe the requirements set in agriculture today do with profitability?
4. Did you experience large annual loss?
5. Do you work outside the farm?

The restructuring

6. What was necessary to make this change?
7. Has the change been profitable?
8. How have the annual loss changed?
9. What measures were made?
10. What has it cost (labour, economy)?
11. What was the biggest barriers / problems to make this change?
12. What reactions have you experienced in connection with the operational change?
13. Would you recommend converting to other farmers who are struggling?
14. What recommendations do you have?

Nature

15. What is your view on cultural landscape and outlying pastures?
16. Who do you feel belonging there (animals, tourists, hunters)?
17. What is your opinion about having sheep on enclosed land versus having them on outlying areas during the summer?

The future perspective

18. Do you consider it as your duty to operate with sheep?
19. How do you perceive the situation you are in, based on your own judgment? Has this instance influenced health, psyche, motivation etc.?
20. How do you see the prospects for your farm?
21. Do you feel that you have the ability to control your own future?
22. Did you feel that you were heard?
23. Do you fear for the future on behalf of the sheep industry?

Appendix 3: Vik's farmer types

The large-scale farmer - have large agrarian areas and is volume manufacturer. Hence large income and often full-time farmer with employees. Operates alone or with positive joint operation farmers. Is concerned with the similarity in the reward system and uses the appropriate channels for production, sales and manufacturing policies. These farmers are confident and optimistic. Wants their children to take over.

The innovation farmer - is oriented towards the establishment and further development. Is offensive in investment and will create their own nourishment. They face challenges with a strategic change and take greater part of the value chain itself. Doubts a little about own children taking over, it has to be on their own premises. This group is divided on the farm - cooperative policy.

The withdrawal farmer - is dissatisfied with their situation economically and socially. Many are negative joint operation farmers. Family members will not take over the operation. Feeling ill health and lonely. Operates passively, not doing investments on the farm. Negative attitude to agricultural and cooperative policy in general, and there are bad agricultural professional environment where the farmer lives.

The stagnation farmer - Operates generally not in joint operations but alone. Feel lonely as a farmer. Has somewhat better economy but does not take future elections. Is sitting on the fence, watching what other farmers are doing. The farmer is in the germ of the assessment of closure. Children are uncertain and awaiting the approach of takeover. Highly critical to the agricultural professional environment that gives contagion effect in the agricultural environment.

The startup farmer - Young and newly established. Both groups have agricultural education and plans to increase both production and work effort. The farmers have allowed themselves to recruit. They believe in the farm and the future. These are prepared to make investments in the farm and the future, and at the same time recommending children to take over. Have a good agricultural professional environment, are positive and adapts agricultural, technological and organizational.