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# **Reindeer Husbandry in Southern-Norway: Status quo and how it is impacted by external factors.**

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## Acknowledgements

This study is a humble attempt to contribute to this field of knowledge. My thesis journey started after a conversation with a stakeholder from one of the reindeer companies in southern Norway. It was an ambivalent experience as I had perceptions of reindeer husbandry as a form of food production that ticks many of the boxes of sustainable animal production systems: utilizing natural resources in areas not suited for many other purposes; maintaining a productive and diverse landscape; and last but not least, focusing on animal welfare by promoting natural instincts and herd behaviour with minimal stress and physical handling. As the conversation developed and we started opening more up, I became aware that behind the presumably ideal situation, the reindeer husbandry practitioner was experiencing challenges from multiple directions. The fact that most of the public are probably not aware that reindeer husbandry exists in this region, let alone the status quo and what challenges reindeer husbandry presumably is facing is what made me even more interested in finding out more about this. The nature of the people that I met during the initial conversations is what ultimately made me want to focus on this topic in my research. A big thanks goes out to the people from Fram-, Vågå-, Lom-, and Filefjell Reinlag and everyone I got to meet and work with during the week of participant observation along with Fram Reinlag. I was met with an overwhelming amount of welcomeness, openness, and honesty by everyone, I only hope I can repay you through this work and with gratitude. I especially want to thank you Anders Lerberg Kopstad for all the dedication, effort, and wisdom you have contributed with. You are the one who made this journey possible and a great inspiration to me. I am excited to be creating the future alongside you and your family who I have come to hold very dear.

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## Abstract

Reindeer husbandry has been practiced in the arctic regions for centuries and is one of few ways of utilizing natural resources in regions where plant productivity is marginal and weather conditions harsh. It is a trade which in Norway often is associated to the northern parts of Scandinavia and the indigenous Sami people, and few people are aware that Innlandet County holds the second largest semi-domestic reindeer population in Norway, and that they are owned and managed by four “non-indigenous” private reindeer companies. These four companies manage collectively nearly 20 000 reindeer during the summer season and produce 200 tons of reindeer meat each year.

The main discussions and focus in the literature and research on reindeer husbandry have been centred around the topic of conflicting interest between the reindeer husbandry practitioners, private landowners, and the state, who all have interests in the same regions. Another example of a topic in reindeer husbandry research is the phenomenon of global warming causing changes in weather patterns and the flora. Researchers point out a need for more knowledge in the field, and the importance of cross disciplinary studies in order to understand the collective environmental, social, and financial factors sustaining reindeer husbandry.

In this study I present the status quo of reindeer husbandry in southern Norway as well as identify how it is being impacted by external factors. It is based on the qualitative methods participant observation and interviews. I participated during Fram Reinlag’s yearly seasonal gathering and harvesting of reindeer and conducted interviews with stakeholders from all four reindeer companies from September to November 2021. The data was processed and analysed by applying principles from thematical analysis and content analysis. I organized the results through six overall themes: *reindeer’s ecological impact and resource utilization; herding and practical management; grazing rights and landowner relations; finances and market; stewardship and tradition; & political will.*

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## Introduction

Mountains and tundra make up more than one third of the terrestrial landmasses in Norway and have been of great importance to people since the last glacial period ended some ten thousand years ago (SSB, 2020). Reindeer (*Rangifer tarandus*) are believed to be amongst the first mammals to set foot on the virgin land primed by the process of ecological succession after glaciers retreated. Humans followed in their footsteps and widespread archaeological findings of settlements, animal graves and other hunting equipment indicates the importance and abundance of reindeer as a resource for the early human settlers (Pilø et al., 2018, p. 6-7). Over time, the practice of traditional hunting and harvesting developed along with domestication of wild reindeer. Reindeer husbandry became gradually established, creating pastoralist societies, traditions, and ways of life (Bjørklund, 2013, p 186).

Today, reindeer husbandry is practiced on around 40% of Norway's land surface and is a significant part of the economy for many communities. Reindeer husbandry is often associated with the indigenous Sami people and the northernmost parts of Norway. This is not surprising, as by far the majority of Norway's 250 000 semi-domestic reindeers are kept by Sami people in Finnmark county (Regjeringen, 2019). What few people are aware of, however, is that the second largest reindeer county in Norway is located in the mountain regions of Jotunheimen in southern Norway. Reindeer husbandry in southern Norway is unique relative to that in the northern parts as it is not tied to indigenous Sami culture but organized by private shareholders with its own legal paragraph in the reindeer law (Reindrifstloven, 2007, § 1-8).

Reindeer husbandry is based on managing semi-domesticated reindeer primarily for meat production, through utilization of pasture resources (Skjenneberg & Slagsvold, 1968, p 249). Reindeer husbandry in Norway since the 1900s can be described historically as a subject of controversy with the main conflict drivers relating to rights for traditional harvesting and use of natural resources versus state control and societal development (Benjaminsen & Svarstad, 2021, p 167; Ivsett Johnsen, Benjaminsen & Gaup Eira, 2015, p 230). Over the last five decades, reindeer husbandry and indigenous rights in general may have obtained a stronger political anchoring, but reindeer husbandry is still experiencing pressure and disturbances.

Researchers and social movements report on these challenges occurring on multiple levels, from extortion and exploitation of natural resources and land areas to drastic changes in climate and primary ecological production. This takes place throughout the northern hemisphere (Nord, 2021, p 10).

The most common topics that characterize the discussion and fields of research regarding reindeer husbandry (mentioned below), arise from multiple disciplines, for example ecology, sociology, and politics. Reindeer herders are experiencing loss of land and pasture due to fragmentation, disagreements over legal rights to land, and competition from other industries using the same land areas (Ivsett Johansen, 2016, p 75-76). The long-lasting conflict between livestock (both semi-domestic and domestic) and predators is still relevant (Næss, Bårdsen, Pedersen. *et al.*, 2011, p 500-501). Questions are raised regarding the sustainability of reindeer husbandry, as poor management and overgrazing by the reindeer husbandry practitioners themselves leads to depleting resources and are threatening the entire ecology in grazed areas (Johansen & Karlsen, 2005, p 969-984; Pape & Löffler, 2016, p 185-186). At the same time, a changing climate is impacting the ecological primary production in the mountains and tundra and covering winter pastures with impenetrable ice (Rees, Stammer, Danks & Vitebsky, 2007, p 213-214). Diseases are spreading across the northern hemisphere, threatening both wild and domestic ungulates (Tryland, 2010, p 44).

A general consensus within the reindeer husbandry research community is that there is a large knowledge gap concerning reindeer's ecological impact as well as socio-political aspects, making it difficult to create policies and practices which ensure a sustainable future in these regions. Adequately filling this knowledge gap will most likely be achieved by cross-disciplinary, participatory, and collaborative research with stakeholders and communities across the product chain and connected geographical regions (Ivsett Johnsen, *et al*, 2015, p 425-426; Pape & Löffler, 2012, p 430).

Adding to the discussion is the paradox that the reindeer husbandry around the arctic is often generalized and homogenized, and research often focuses on reindeer husbandry connected to indigenous cultures, with little emphasis on non-indigenous practitioners like the reindeer husbandry practitioners in southern Norway. To my knowledge, most available information on southern reindeer husbandry in Norway is from unpublished anecdotal and historical texts.



My research objective is to contribute to the development of a sustainable future for reindeer husbandry and the people involved in it. Through an explorative case study, I attempt to give a holistic understanding and presentation of the current situation and what challenges reindeer husbandry practitioners are experiencing. My research questions are:

- ❖ *What is the status quo for reindeer husbandry in southern Norway?*
- ❖ *How is reindeer husbandry impacted by external factors?*

## Methods

### Case Introduction

In this study, southern Norway is defined as south of Trøndelag county, comprising the county Innlandet. Reindeer husbandry in southern Norway is practiced within “Jotunheimen” mountain range. The region is varied and ranges from high barren alpine landscapes to lower boreal woodlands. In the high mountains the weather can be extreme with temperatures reaching minus 30° Celsius and strong winds. The flora in the mountain regions consists mostly of sedges, salix and betula brush, whilst lichen and mosses are common ground cover (Fremstad 1997, p. 147-148). In the lower woodland’s the flora is more diverse with trees like spruce, pine and birch, and other vegetation such as grasses, herbs, and heather (Fremstad, 1997, p. 10-11).

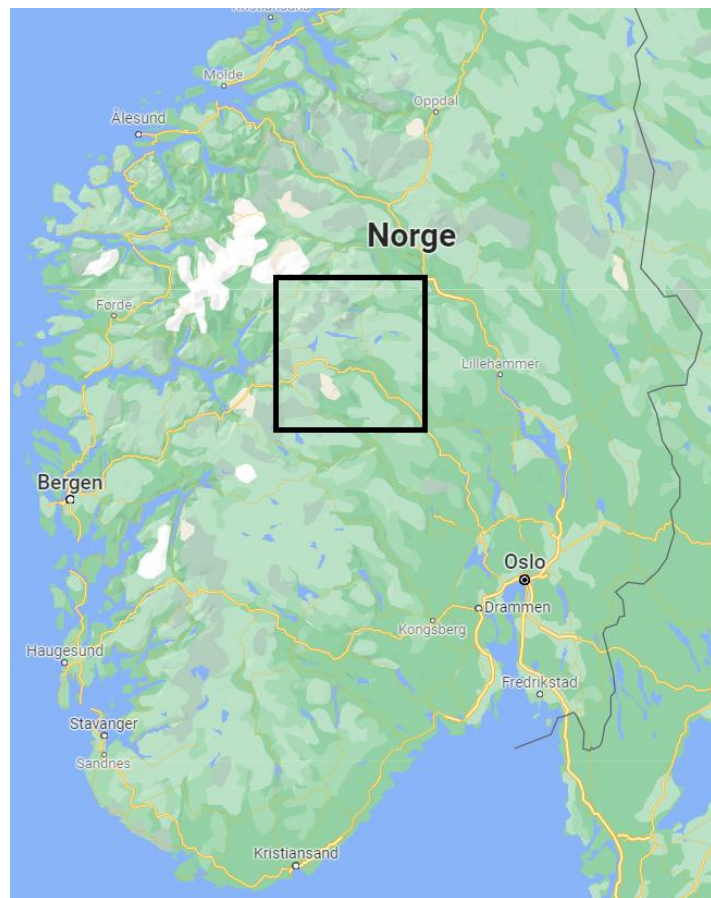


Figure 1. Map of Southern Norway. The black square marks the area around Jotunheimen where reindeer herding is practiced in southern Norway (ref Google maps).

Reindeer husbandry is believed to have been practiced in southern Norway for a long time and can be dated in chronicles back to late 1700s (Kolden, 1996, p. 14). Throughout the 1900s however, few practitioners of reindeer herding were left in the south. Today only four reindeer companies are left in the region who practices “traditional” reindeer husbandry. These four companies produce cumulatively around 200-tons of meat per year. The companies are organized as private businesses owned by shareholders.

Production of semi-domestic reindeer by people that are not of the indigenous Sami people is regulated by the state through concessions. To be granted concession the practitioners must prove that they have access to sufficient pastures and present a long-term management plan (Reindriftsloven, 2007, § 1-8).

### Case Participants

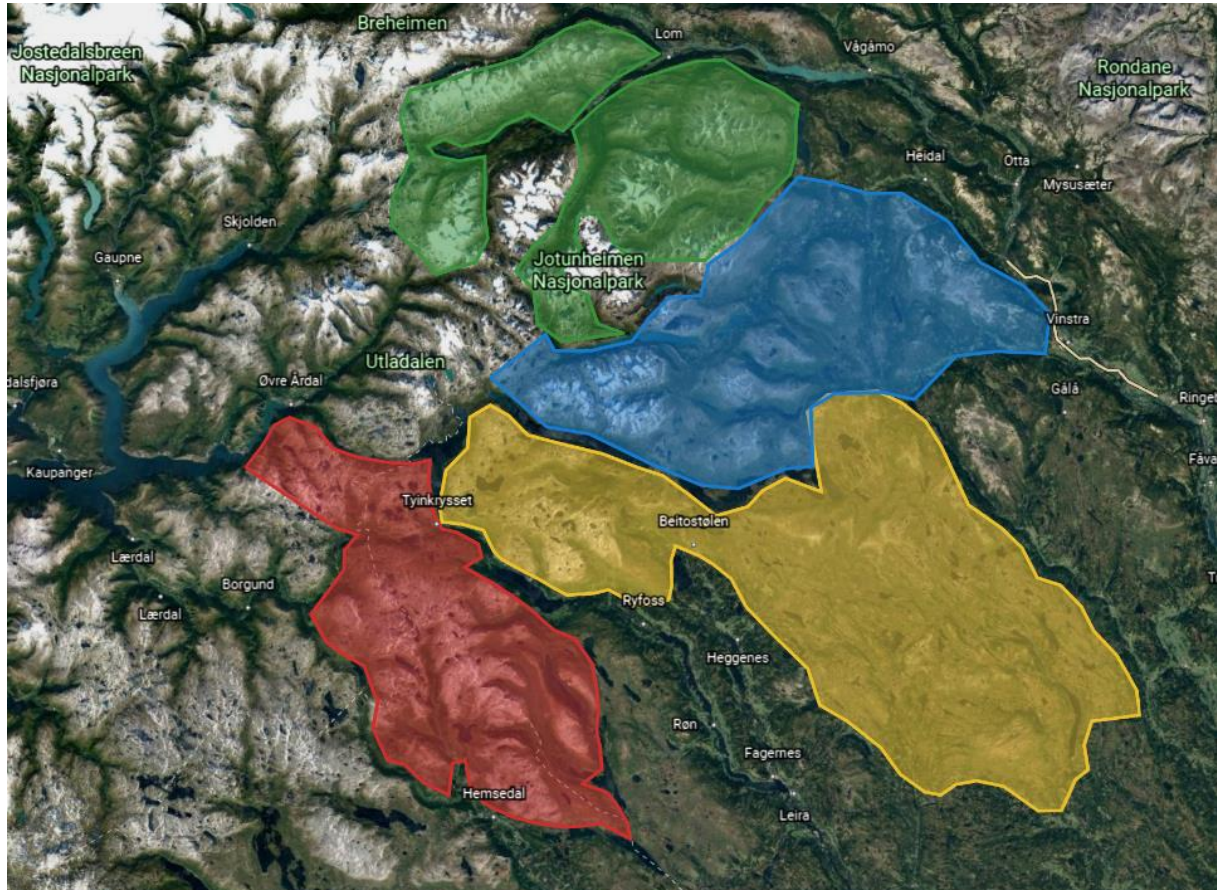


Figure 2. Map showing the territories of the four reindeer companies in southern Norway. Green: Lom, Blue: Vågå, Yellow: Fram, and Red: Filefjell (Google Earth).

#### Case study #1: Fram Reinlag

Fram Reinlag; was first founded as Fram Rensselkap in 1925 by four local landowners in Vang municipality. They bought a herd of 400 semi domestic reindeer from Sweden. After a period of difficulties during the Second World War, the company's ownership became fragmented and was declared shut down in 1963. The remaining reindeer and equipment were sold to Ola Kaasa who founded and established Fram Reinlag, putting into place the ownership structure that remains to this day. Fram Reinlag's reindeer winter herd today consists of roughly 3000 animals (Reindriftsplan Fram Reinlag, 2016-2021; Fram Reinlag, n.d.).

### Case Study #2: *Vågå Tamreinlag*

Vågå Tamreinlag; was founded in 1942. Historically, reindeer herding was not practiced in Vågå before this time, but the area consists of vast mountain areas and already contained wild reindeer and local entrepreneurs saw the potential for reindeer herding. The company bought their first herd of roughly 600 semi-domestic reindeer from Trøndelag in 1943. Vågå Tamreinlag has 1026 shares divided on 221 shareholders. Unique to Vågå Tamreinlag is that all shareholders must be residents and live in Vågå municipality. The winter herd consists of roughly 2000 animals (Reindriftsplan Vågå Reinlag, 2016-2022; Vågå Reinlag, n.d).

### Case study #3: *Lom Tamreinlag*

Lom Tamreinlag; was founded in 1926. Before this, reindeer husbandry had been conducted by individuals in the region since the turn of the 20th century. Lom Tamreinlags's first herd of semi domestic reindeer consisted of roughly 400 animals from another local company.

The company consists of 1068 shares divided by 225 shareholders.

Today the winter herd consists of roughly 2500 animals (Reindriftsplan Lom Reinlag, 2016-2018; Lom Reinlag, n.d; Kolden, 1996, p. 16-20)

### Case study #4: *Filefjell Tamreinlag*

Filefjell Tamreinlag; Filefjell is one of the oldest reindeer husbandry regions in southern Norway, where several private reindeer owners and organized companies have existed since the 1700s. The only remaining practitioner today is Filefjell Tamreinlag, which was founded in 1945, when three herds were merged to a total of roughly 800 animals. Today the winter herd consists of around 3000 animals. Filefjell Tamreinlag has five owners and shareholders (Reindriftsplan Filefjell Reinlag, 2016-2022; Filefjell Reinlag, n.d).

## Fieldwork

The aim of this study was to enter the field of reindeer husbandry in southern Norway with an exploratory approach and gain a holistic understanding of the current situation regarding reindeer husbandry. To maintain an exploratory and inductive approach, I attempted to keep an open mind and limit my prior judgements and predictions when entering the field. Given the study objective, I decided to use a qualitative research approach to identify themes and patterns emerging from the data gathered among the study population as a way of describing the current status (Bernard, 2006). From the beginning phases I emphasized adaptability and openness with the use of research and data gathering methods to follow the unpredictable nature and evolvement of reindeer husbandry.

## Data Gathering

The two main data gathering methods I used in this study were participant observation and semi-structured interviews. The period I conducted participant observation was intended to give me insight into the world of reindeer husbandry in southern Norway and laid the groundwork for the construction of the semi structured interview guide. By gaining this insight I did not only gather valuable data for direct analysis, it also provided valuable knowledge and experience which were applied during the preparation and conduction of the more formal interviews.

All conversations and field notes made during the data gathering period were communicated in Norwegian and later translated into English by myself.

During the participant observation phase I joined Fram Reinlag for one week from august 30th until September 5th, 2021, during their yearly autumn gathering and slaughter at Seksin, in Vang municipality.

The objective of the participant observation was to gain a holistic understanding of the case by gathering insight directly from the field in various forms and from various sources. The data gathered during the participant observation phase was mainly an outcome of verbal communication between me and the practitioners, but also as personal observations of non-verbal origin, such as visual and other sensory experiences (Kawulich, 2005; Bernard & Gravlee, 2015, p. 185-191).

See the appendix for a description of the week along with Fram Reinlag, and some personal reflections from the participant observation phase (appendix x).

The second phase of the data gathering consisted of conducting interviews with one representative from each of the four reindeer companies. The interviews were conducted individually in the period between September 5th and October 10th, 2021. Three of the interviews were conducted in person; two of them took place at their slaughter facility, and one was done in the home residence of the representative. The fourth interview was conducted over the phone. The interviews lasted between 1-2 hours each. I took notes during the interviews and expanded on these later the same day.

An interview guide was made before conducting the interviews. The initial questions were aimed at gathering general information such as herd size, regional boundaries, and number of shareholders. The interview guide also consisted of topics that I expected to emerge and

that I wanted further elaboration on, such as for example pasture quality, predators, and market. The interview questions consisted of some close-ended questions about more formal matters, but most questions were open-ended and included follow-up questions. An example of such a question is: Are you experiencing any challenges to your operation regarding climate and weather?

I tried to facilitate for a natural conversation to occur so that the interview participant would feel safe to share his insights, thoughts, and perspectives on the matter. To create this atmosphere, I tried to be calm, updated, interested, and engaged in the conversation.



*Figure 3. The participate observation phase allowed for many conversations. This photo is of Eivind Vangenstein (left) a shareholder in Fram Reinlag and Gunnar Storeli (right) a retired reindeer herder along with me (centre). Photo: author (with permission from all participants).*

## Analysis

As the overall aim of this study is to identify and describe the status quo on reindeer husbandry in southern Norway with emphasis on how the practitioners are being impacted by external factors, I used methods for analysis suited to categorize and organize the data material for a thorough and detailed exploration and presentation of the content; content analysis and thematical analysis (Graineheim & Lundman, 2003; Guest, MacQueen, & Namey, 2012).

The text for analysis consisted of the expanded notes from the semi-structured interviews, as well as the data material noted down during the participant observation phase.

The process of analysing started with reading the expanded notes from the interviews and participant observation phase thoroughly several times in their original form, in order to gain familiarity and an understanding of the content.

After this, six main themes were extracted from the data material. In this case the main themes can be described as: "A unit of meaning that is observed in the data by the reader" (Guest, MacQueen & Namey, 2012, p. 71). Organizing the data into themes was the first step of categorizing and understanding the content. The texts were then sorted according to how the content related to the respective main themes.

This process was repeated by reading the content within each main theme, separately, and then again identify and categorize the emerging themes. This allowed for each sub-theme's content to consist of a more detailed presentation and description. A total of 29 sub-themes were extracted from the data material.

Condensed meaning units with broad and generic descriptions of the content of each sub-theme were made before the final step of the process. At last, I made meaning units which describe the content in each sub-category, based on my interpretation from reading the transcripts. The meaning units were written by me, but I tried to stay as close to the language used in the text, to stay true to the original communicated content and avoid impacting the meaning of the words.

It should be mentioned that the main themes, sub-themes, and meaning units are the outcome of my interpretations as the researcher. Personal perceptions may have influenced the process and the outcome could vary depending on the person conducting the research.

Other factors that may have influenced the results is that the text, including the analysis, was done in Norwegian and not translated into English until presented in the methods or results part. Occurrence of misconceptions in language and translation during the process could be a factor impacting the outcome.

## Validity & Reliability

In terms of considering the validity and reliability of this study, it is likely that further things could have been covered besides what will be mentioned here. Covering the topic of the credibility of this research is a process touching upon considerations and awareness in all stages of the research process such as the case selection, research population/participants, data gathering, data analysis, discussion, and last but not least the underlying elements of personal influence (Norris, 1997, p. 174).

When addressing the validity of this study I refer to its accuracy and trustfulness, and whether the study answers what it is supposed to answer with the use of suited methods. Whilst reliability in this case refers to the consistency, stability, and repeatability of the collected data, as well as the researchers' application of these elements throughout the process (Brink, 1993, p. 35).

In terms of validity and whether the study answers the overall objective, I would argue that the overall aim of identifying and describing the status quo on reindeer husbandry in southern Norway with emphasis on external impacting factors, is a broad objective that allows for several interpretations of whether the objective was achieved. I would argue that my approach to answering the question was based on a humble and neutral approach to the topic with the use of acknowledged methods such as in the field experience and familiarization with the world of reindeer husbandry and its practitioners through participant observation, followed up by interviews with core representatives in an eased and focused setting.

The setting and relationship between the researcher (me) and the participants are other important aspects involving qualitative research. I believe I made the people involved during the data gathering period and interviews aware of the nature of the research and the intention behind my presence and inquiries, and it was my experience that they behaved natural, were open and honest, and were little affected by the situation. The fact that I could



build up a relationship and establish a certain degree of trust with the participants during the participant observation phase may have contributed to what I experienced as natural and productive interviews.

The methods themselves (participant observation & semi-structured interviews) are well known within the field of qualitative research. These methods are widely used for different purposes, including studies of an explorative nature like mine (Patton, 1999, p.1195). How the methods were implemented and performed reflects the importance of how the researcher's personality may influence the process. I admit that I probably could have been more focused and put more attention on the formalities around the methodological tools before and during implementation of them. On the other hand, one could point out the positives of being present with attention on the situation at hand and the people involved.

There are several challenges of conducting research solo. From a practical perspective, all the workload is on one person, which like in this case restricted the boundaries for the project. In addition, when the capability and creativity for conducting the project is restricted to one mind, things can easily be overseen. Therefore, I made sure to share my thoughts and work with my supervisors, classmates, and friends throughout the process from preparations to analysis and discussion. Sharing and testing your work with other people also ensures credibility to your study (Brink, 1993, p. 36).

The influence of the researcher on the study is a topic widely discussed in research. This influence happens on several levels but in this case, I will focus on the importance of reflection and personal judgements.

When we are exposed to a new impulse through our senses it triggers a chain response that determines your perception of the experienced phenomenon. What we experience and how we interpret it is through this process being influenced by our existing knowledge and beliefs (Kolb, 1984, p. 21-22). Taking the time to take in information with presence and focus as well as stopping to think and reflect upon the topic is a crucial, but perhaps often not highlighted part of all phases of the study (Mortari, 2015, p. 1-3). Suspending judgements is another aspect that builds further on the same topic. As the nature of many social science studies decreases the boundaries between researcher and the study population or participants, the awareness of how one's personal judgements can influence the study is crucial in all phases (Brink, 1993, p. 37). Throughout this study I tried to take

time for reflection and question my decisions. During the data gathering period I tried my best to obtain a neutral role towards the participants and focused on listening to their message from a neutral perspective.

## Results & Discussion

### Chapter introduction

In this chapter I will be presenting the results based on the analysed data shared by stakeholders from the four reindeer companies in southern Norway. Throughout this chapter I will be presenting how reindeer husbandry practitioners in southern Norway describe the present circumstances and how they are impacted by them. The categories will be presented and discussed separately according to the order in Table 1.

Table 1 shows the six themes that were extracted through the analysing process. The main themes are: *reindeer's ecological impact and resource utilization; herding and practical management; grazing rights and landowner relations; finances and market; stewardship and tradition; political will* (Table 1).

*Table 1. Results from data analysis, including themes and sub-themes.*

Theme	Sub-Theme
Reindeer's ecological impact and resource utilization	<ul style="list-style-type: none"> <li>• Grazing &amp; trampling</li> <li>• Bush encroachment</li> <li>• Increased biodiversity</li> <li>• Carbon sequestration</li> <li>• Wild reindeers</li> <li>• Migration</li> <li>• Chronic Waste Disease (CWD)</li> <li>• Climate</li> <li>• Resource utilization</li> <li>• Animal condition &amp; health</li> <li>• Predators</li> </ul>
Herding and practical management	<ul style="list-style-type: none"> <li>• Herding</li> <li>• Pasture assessments</li> <li>• Weather</li> <li>• Tourists/hikers</li> <li>• Cabins, roads &amp; infrastructure</li> <li>• Territories &amp; borders</li> <li>• Hired work &amp; services</li> </ul>
Grazing rights and landowner relations	<ul style="list-style-type: none"> <li>• Access to pasture</li> <li>• Relations to landowners</li> </ul>
Finances and market	<ul style="list-style-type: none"> <li>• Demand</li> </ul>

	<ul style="list-style-type: none"> <li>• Marketing</li> <li>• Expenses</li> </ul>
Stewardship and traditions	<ul style="list-style-type: none"> <li>• Social bonds</li> <li>• Ethics</li> <li>• Tradition</li> <li>• The stewardship responsibility</li> </ul>
Political will	<ul style="list-style-type: none"> <li>• Politics</li> <li>• Reindeer husbandry's development</li> </ul>

## Presentation & discussion of themes

### Reindeer ecological impacts and resource utilization

I found a large focus on ecological factors of reindeer husbandry among the participants. They had a strong focus on the acknowledgement of reindeer as a natural and important part of the ecosystem in the mountains. The importance and focus on this theme is reflected in of the amount of conversation and data dedicated to the topic, as it was by far the theme that had the most amount of data and sub-themes. It was also my experience that this theme was the one the representatives talked most freely and dedicated about.

I will be focusing on the sub-themes that emerged most frequently and received most attention by the stakeholders from all four companies. These sub-themes are: grazing & trampling, bush encroachment, carbon sequestration, climate, resource utilization (Table 2). The sub-category Chronic Wasting Disease (CWD) was considered of special importance and is addressed separately later in the paper.

Table 2. Overall theme and sub-themes addressed in the discussion.

Theme	Sub-Theme
Reindeer's ecological impact and resource utilization	<ul style="list-style-type: none"> <li>• Grazing &amp; trampling</li> <li>• Bush encroachment</li> <li>• Carbon sequestration</li> <li>• Climate</li> <li>• Resource utilization</li> </ul>

A statement from all representatives was that the reindeer plays a crucial role in establishing and maintaining desirable plant communities, and that in areas where reindeer are absent or grazing pressure is low, the ground gets covered with moss and lichen and plants struggle to grow. One representative claimed that “some areas where there have not been reindeer for a thousand years, the lichen has made a thick carpet in which no other vegetation is able to establish.” The idea is that reindeer trample and disturb the lichen exposing the soil for new plants to establish. Another interesting statement on the topic came from a stakeholder who said that; “The first non-indigenous reindeer herders in southern Norway started herding reindeer to improve mountain pastures for other livestock, because they saw the decline of pasture in the mountains after the reindeer had been absent for a long time”.

As reindeer husbandry is a production based on harvesting natural resources from primary production through foraging and rumination by reindeer, stakeholders placed a large emphasis on natural processes. Reindeer, and ungulates in general, are believed to have great top-down effects on their ecosystem through the combined impacts from grazing/browsing, trampling, and defecating (Figure 4) (Elby et al, 2014).



*Figure 4. Picture of reindeer pasture in Jotunheimen. Much of the pastures are above the treeline and vegetations is dominated by graminoids. Photo: author.*

In the alpine regions of southern Norway, primary productivity is relatively marginal, weather conditions are harsh, and availability and quality of forage varies greatly through the seasons. Thriving on these resources requires great seasonal adaptability, which is reflected in the big differences between reindeer's utilization of summer and winter pasture. During summer, plants are in a productive state and reindeer forage on a broad selection of plants. During winter, most plants are in dormancy and buried underneath the snow and the reindeer shift to a diet dominated by lichen and moss (Ophof, Oldeboer & Kumpla, 2013, p 194).

From the reindeer husbandry perspective, grasses, sedges, and herbs are seen as desired plant species in the summer pastures as they are highly productive and good quality forage. The reindeer herders are experiencing that these plants are more abundant and thrive when they are being stimulated by the reindeer. In addition to grazing and browsing, the reindeers trampling hooves are also seen as an important factor for impacting vegetation composition. The topic of how reindeer impact their ecosystems have been relatively well studied but results vary and research projects studying the collective impacts from grazing, trampling, and defecating on the soils and vegetation are difficult to conduct and therefore few. There is also great variation in results among the conducted studies which can indicate highly context dependent factors and/or differences in research methodology (Bernes, Bråthen, Forbes, Speed & Moen, 2015, p. 22-24).

The literature clearly indicates that grazing and trampling by reindeer can alter and maintain certain vegetation characteristics, and there are several cases where vegetation has shifted from moss and lichen domination to graminoids (Van Der Wal & Brooker, 2004, p. 82-84; Van Der Wal, 2006, p. 183-184; Egelkraut et al, 2018, p. 1555-1561 & Olofsson, 2006, p. 437-439).

One of the topics focused most on regarding reindeer husbandry in the 21st century is the effects of climate change on pasture quality and especially forage availability on winter pasture (Rees, Stammler, Danks & Vitebsky, 2008, p. 214-215). The reindeer companies in southern Norway have not experienced mayor problems related to this. They point out that the mountain regions around Jotunheimen are varied in terms of topography and microclimates, meaning they usually have access to suitable winter pasture. The representatives also point out that the animal numbers are based on the available winter

pasture and that the herd sizes are conservative to avoid overgrazing and make sure they will not be in the situation where they do not have enough forage and must bring in supplemental feed.

When I asked if the reindeer companies experience any effects of climate change, the response was usually focused on brush encroachment and the rising treeline in the mountains. What used to be pasture consisting of graminoids is now taken over by brushes and trees which create dense impenetrable areas of little grazing value. They say that bush encroachment happens especially fast where grazing pressure from domestic and semi-domestic livestock are low and they see it as important in order to maintain the mountain grasslands. On the topic of grasslands and bush encroachment, carbon sequestration was also mentioned as a potentially important consequence.

Researchers indicate that the treeline has had a positive exponential increase in altitude and that populations of trees and shrubs have increased in alpine regions. The cause for this increase is believed to be a combination of warmer climate and changes in cultural impact such as animal husbandry and deforestation (Rössler, Bräuning, & Löffler, 2008, p. 125-127; & Bryn, 2008, p. 265). Regarding carbon sequestration in soil, the alpine region in Norway is considered a substantial carbon storage and recent research have indicated that alpine heaths sequester more carbon than brushes (Bartlett, Rusch, Kyrkjeeide, Sandvik & Nordén, 2020, p. 21-26; & Sørensen, Strimbeck, Nystuen, Kapas, Enquist & Graae, 2018, p. 327).

Many of the statements and perceptions presented by the reindeer companies regarding “Reindeer’s ecological impact and resource utilization” can be found and in some cases supported in the existing literature and research. For example, there are strong evidence that grazing by reindeer promotes a grass dominated flora, but when it comes to evaluating the overall and collateral consequences of reindeer’s impact on their ecosystem the research is vaguer. The conclusion regarding the topic of reindeer’s ecological impact and alpine/tundra ecology is like many other fields within natural sciences, still an area where we need more knowledge and research before broad conclusions can be drawn.

## Chronic Waste Disease (CWD)

One of the most serious and concerning topics my participants brought up was the potential spread of Chronic Wasting Disease (CWD). CWD is a prion disease which is infectious for ungulates. It affects the production of proteins in the brain and the central nervous system, causing abnormal behaviour and ultimately death, usually from starvation and exhaustion. The disease spreads fast and can survive in most environments even without a host for decades (Williams, 2005, p. 530-531). In North America, the disease has caused drastic declines in wild populations of several different species of ungulates (Mysterud & Edmunds, 2019, p. 4). In 2016, the first case of CWD in Europe was reported in a population of wild reindeer in Nordfjella in Norway, resulting in the controversial decision of killing and destructing the entire population of 2200 wild reindeer (Benestad, Mitchell, Simmons, Ytrehus & Vikøren, 2016, p. 1; & Mysterud & Rolandsen, 2018, p. 1343-1345). The wild reindeer population in Nordfjella borders one of the southern reindeer husbandry company's pastures, but no contamination of semi-domestic reindeer has yet been discovered.

The reindeer companies in the south take the disease very seriously. All representatives expressed that they were updated on the topic and want to be open, helpful, and proactive in dealing with the situation. Filefjell Reinlag's representative said that; "We have been involved since day one of the outbreak and have had close dialogue with the County Governor to take measures in order to control the situation".

Ever since the outbreak in 2016, there has been a lot of focus on the disease and several measures have been taken to prevent the spread of the disease. The state declared that all animals except from calves shall be tested for CWD during slaughter, as well as potential animals that are found deceased out on pasture. They have also banned the use of salt and mineral supplements in the form of licking stones. Although expenses related to the testing for CWD are covered by the state, the additional measures add complexity to management practices and their true cost is difficult to measure. In addition to state policies, the reindeer companies have taken several measures on their own initiative. All the four reindeer companies are taking genetic samples from the male calves and testing them for a specific genotype which is supposedly less susceptible for the disease, in hope that that individuals with this genotype can be used in breeding. The test comes at a high cost of 1 million NOK for the four reindeer companies combined as well as significant workload during sample

taking and in the processing of the test results. The reindeer companies are taking a big risk with this investment, but the payoff can be of immense value for the reindeer companies as well as wildlife if it can be used to prevent spread and managing the disease.

Perhaps the greatest impact CWD has had on the southern reindeer companies is the uncertainty and fear of the consequences of another outbreak in the region. Stakeholders expressed fear that if they find one positive test the state will demand the slaughter and destruction of their entire herd, and that it would be an easier decision for policy makers to order the eradication of semi-domestic reindeer herds rather than populations of wild reindeer.

It should be added that not everyone is as convinced about the threat this disease poses. During the participant observation phase of my fieldwork, I had conversations with people from the trade who think that CWD is something that has come and gone naturally for as long as there has been reindeer around. The decision by the state to eradicate the wild reindeer population in Nordfjella caused a lot of controversy. Some think it was a rushed decision and have questioned how the state handled the situation.

The threat exposed by CWD is certainly still present, but the apparent stop in spread of the disease in Norway is reassuring. Questions are still raised regarding the consequences for reindeer husbandry and wildlife of a potential new outbreak. For now, the reindeer companies themselves feel that they are doing all that they can and are ready to act if necessary.

#### Herding and management

The art and act of herding is an essential part of reindeer husbandry as it brings together the physical and practical production elements between the reindeer and humans. Herding reindeer can be defined as monitoring the animals and their surroundings, whilst protecting them from potential threats and making sure the reindeer are at the right place at the right time.

The reindeer companies in the south each have five or six full time herders that are herding the reindeer every day all year long. During summer, the herders usually walk on foot, whilst during winter, snowmobiles are used for transportation. During slaughter, helicopters are often being used to gather the herd into the corals. Shepherd dogs and in recent years, drones, are useful aids used when herding. Representatives from the reindeer companies



described their herders as: *“Very dedicated and good at their jobs... they are willing to walk many miles if they can avoid using helicopters.”*



*Figure 5. Herding animals is a fundamental part of reindeer husbandry. Here 5 000 reindeer are being herded by helicopters into a corral. Photo: author.*

The mountain regions around Jotunheimen are relatively fragmented by roads, cabins, dams, and other infrastructure, in addition to being one of the most used hiking regions in Norway (Nedrelo & Sveen, 2020, p. 9-11). A representative from one of the reindeer companies called Jotunheimen *“Norway’s most touristified mountain region”*.

Reindeer have strong instincts when it comes to migration routes and habitat use, and small disturbances in the environment can have profound impact on the animal’s behaviour. An example of disturbances in migration due to habitat use is when one of the reindeer companies had to change their spring calving area because of too much disturbance by hikers. It took ten years or one entire generation of reindeer before they adapted to the new location. With so many different disturbances, such as people, roads and other infrastructure, being able to control and manage the animals are absolute necessities for the reindeer herders in the south. Developing the level of domestication and routines required of the animals for herding in these regions takes time, patience, and a lot of work. If the

animals are too wild and scared, they will not utilize all the available pasture and can drop in performance due to stress (Skjenneberg, 1965, p. 146).

An important factor which heavily impacts the herding is weather conditions. Weather conditions like fog or heavy snow can cause reduced sight and overview. During summer, warm weather can make the animals dozy and prefer staying in high altitudes. It is also important not to put too much stress on the animals during high temperatures as it can cause exhaustion or heat strokes. In winter, snow conditions can cause difficulties in movability both for animals and people. For example, crossing ice-covered waters can be risky. Perhaps the most important weather-related factor shaping herding management is wind. Reindeer have strong instincts causing them to prefer moving with their nose towards the wind (Palmer, 2017, p. 2). This can cause difficulties like it did during my fieldwork with Fram Reinlag when the entire herd took off after a change of wind direction over-night and walked several kilometres in the opposite direction of the corrals.

One can say that reindeer herding is a balance between managing the animals' seasonal needs and productivity whilst taking into consideration external factors such as people, infrastructure, geographical borders, and weather conditions (Skjenneberg, 1965, p 171). My impression after conversations with representatives from the reindeer companies is that these external factors have increased in southern Norway over the last decades, adding to the complexity, challenge, and costs of herding reindeer. An example of a factor that has emerged only the last years is the consequences of winter-road maintenance. During winter, road-salt is applied on public roads to prevent them being covered with ice, with the intention of increasing traffic safety. The reindeer are attracted to the salt, resulting in them standing in the middle of the road licking the salt from the asphalt. Unfortunately, this results in several collisions each year, loss of reindeer, and threatening human lives. During this season, the reindeer herders are using a lot of resources and working night and day to keep the animals away from the roads. Questions can be raised as to whether the roads actually have become safer or not. This was not a problem until in recent years, because it was not allowed to use road salt in these regions. Adding to the herders' frustration is the fact that the reindeer companies and farmers have been banned from using salt and mineral supplements in the form of licking-stones, due to fear of CWD spread, whilst the road maintenance companies have no restrictions in the use of road salt which attracts wildlife,

like deer, moose, and foxes to mention a few, from miles away. The problem of road salt attracting domestic animals and wildlife is recurring every year all over the country and causes reactions in media from the public who questions the safety and environmental impacts of applying road salt (Sandven, 2020).

One of the oldest and perhaps most controversial discussions regarding free ranging domestic and semi-domestic livestock is that of predation by large carnivores. For centuries, scouting for- and protecting the herd from predators was one of the main tasks of reindeer herding (Rasmus et al., 2020, p.135). Through the early and mid1900's, the official state policy for managing large predators was largely with the aim of extermination, but since the turn of the 21st century, policies have changed with the focus now being on conservation and establishing stable predator populations within certain regions. The consequences of increased predator populations have been tough for reindeer herders in certain parts of Norway with confirmed losses due to predation to be around 20 000 semi-domestic reindeer each year. The reindeer companies in southern Norway, however, are located in regions with relatively few large land-living predators and losses due to predation by wolf, bear and lynx are relatively few with some exceptions from year to year. Most losses to predation in southern Norway are from king eagle and wolverine, which has been an increasing problem (Miljødirektoratet, nd). Predation is especially a problem during calving season in spring when calves are young and vulnerable. This offers some challenges and increased workload for the herders as they wish to disturb the reindeer as little as possible while the calves are young, but still have to be present with the herd and watch out for predators. Although the reindeer companies yearly is experiencing losses and increased workload due to predators, it is not the most influential external factor. A very experienced, retired reindeer herder I talked with during the participant observation phase put it this way: "The predators have to eat as well".

The reindeer companies in southern Norway are operating within geographical borders where agriculture, recreation, harvesting of natural resources and reindeer husbandry are prioritized through the Planning and Building Act (Plan- og bygningsloven, 2009, § 11-7). Most of the companies are neighbouring nature reserves where wild reindeer have legal prioritization. The mixing of wild- and semi domestic reindeer is undesired from the perspectives of both conservation authorities and the reindeer husbandry profession. The

reindeer companies have spent generations breeding and taming their herds and mixing in genes from wild reindeer can bring undesired consequences in terms of animal traits and behaviour in addition to the practical challenges of separating individuals in case of merged herds. From a wild reindeer conservation perspective, it is said to be genetic differences between wild reindeer and semi-domestic reindeer meaning that breeding between the subspecies will threaten the genetic uniqueness of the wild reindeer (Røed, 1985, p. 203-205). It is worth mentioning that the genetic differences between wild- and semi-domestic reindeer have been questioned, and that there is evidence of large similarities between certain populations of wild- and semi-domestic reindeer (Kvie, Heggenes, Bårdsen, & Røed, 2019, p. 1416-1417). The shared geographic borders and thereby neighbouring herds of wild- and semi-domestic reindeer adds another element of consideration and workload for the reindeer herders. The herders are in most cases able to keep their herds within their territory, and seasonal migration of wild reindeer crossing the borders is more common.

The herding and practical management of reindeer in southern Norway is a complex decision-making process that requires a holistic approach to balance the animals' needs and productivity as well as other external factors such as people, infrastructure, climate, and predators. The reindeer companies and their herders have long experience in managing the reindeer herds and their collective complexities, but a changing climatic, geographic- and social-environment is adding to the complexity and requires adaption, flexibility, and rigidity from the reindeer husbandry practitioners.

#### Grazing Rights and Access to Pasture

The very foundation of reindeer husbandry is converting plants, which are producing proteins and sugars through the process of photosynthesis, into animal proteins in the form of reindeer out on pasture. Having access to forage and pasture is therefore a necessity for the reindeer companies and stood out as another important topic during our conversations.

Unlike the Sami reindeer herders in the north, who often have legal rights that grant them access to pasture, the non-indigenous reindeer husbandry companies in southern Norway are depending on renting access to land from private or state landowners. Private landowners are often organised as "landowner-teams" for making management and communication easier. The state-owned land is usually organized as public commons or national parks. The agreements and relationships between landowners and the reindeer

herders vary between the companies. Some companies only rent pasture from one or a few private landowners, while others are renting from more than 30 organized landowner-teams. Common for all companies is that state-owned land makes up big percentages of the rented land.

Rental agreements usually extend from six months to 10 years at a time. This is relatively short, considering that reindeer husbandry in many ways require a long-term management approach.

The state has also demanded that the reindeer companies have legally binding agreements with landowners, ensuring that there is sufficient access to pasture.

The reindeer companies are dependent on having a good relationship with landowners in order to have access to pasture. It is my impression after talking to stakeholders from the reindeer companies, that the relationship between the reindeer companies and the landowners is generally stable and good. During the participant observation phase I talked with several landowners who are proud to be associated with the reindeer companies and see it as a positive thing that the pasture resources are being harvested.

There are some circumstances which can cause tension between the parties, however. For example, in addition to renting out pasture to the reindeer companies, landowners are also renting out hunting licenses, mainly for moose, on the same land. Moose and reindeer have little problem with sharing the land, but during hunting season, the dogs used to track the moose can pick up the scent of the reindeers instead, making them confused and disturbing the hunt. This causes frustration with the hunters who pay large sums of money for hunting licenses. Landowners usually make more money selling hunting licenses than renting out pasture for the reindeer companies. In contradiction to this claim, there are also examples of landowners who see the reindeer as beneficial when it comes to attracting wildlife. The representative of Filefjell Reinlag shared that: *"We are even being contacted from landowners outside of the regional boundaries that want us to bring our reindeer onto their land because they see that the pastures improve and attracts more wildlife like moose and grouse"*.

Another issue between landowners and reindeer companies arises over timing. For some of the reindeer companies, there are deals in the contract saying that they are not allowed to access certain areas outside set dates. This causes problems for the reindeer companies as

the reindeer migrate to these areas by instinct, and the herders must work hard to keep them away until they are granted access.

Another thing that can cause conflict is if reindeers are grazing on cultivated land. According to the reindeer companies this is not a big problem, however, and is usually quickly settled between the involved parties.

Establishing and maintaining good and predictable relationships between the reindeer companies and the landowners are crucial in order to sustain reindeer husbandry in southern Norway. As one of the representatives stated: *“We are balancing on a knife edge. ... If a landowner wants to establish 40 new cabins on his land and we speak out our true thoughts about it, he may cancel the rental contract with us, and we will lose access to his land completely”*.

At this time, the reindeer companies all have access to substantial pasture and grazing rights in order to maintain their production, but this topic appears to be a great concern with potential drastic consequences for the reindeer companies in southern Norway. Like one representative stated: *“This is a huge stress factor and a fear we walk around with constantly”*.

#### Finances and market

Like any other enterprise, reindeer husbandry is depending on balancing expenses and income and making a profit. The main source of income comes from selling meat. Most of the meat is sold in bulk to processors who do further processing before it eventually ends up on the consumer market. In addition to selling in bulk, the reindeer companies also sell whole carcasses directly to consumers at the slaughter site. Sales of other products such as hides and antlers makes up minor shares of the income.

The market for reindeer meat has been stable and increasing over a long period of time, and there are no immediate signs of a decrease in the demand. One example of minor fluctuations in the market is the demand and price of hides. Since the outbreak of the Covid19 pandemic there have been fewer tourists and demand for hides has decreased, resulting in a 50% reduction in the value of hides. Reindeer meat is often more expensive than other meat, and is regarded as high-end by most consumers. One representative from the reindeer companies stated on the topic of market and demand that; *“As long as the loan*

interests do not rise, and people are still willing and can afford to treat themselves with reindeer meat products, we should be ok”.

As consumers are becoming increasingly more aware and focused on the origin and quality of the products they are buying, especially when it comes to meat and animal products, the reindeer companies see the importance of active marketing of their products (Henchion, McCarthy, Resconi & Troy, 2014, p. 20-21). The reindeer companies have recently developed their own “food label” which states the regional origin of the product. In the future, they are hoping to earn more “food labels” that express and guarantee the quality and animal welfare behind the product. By more actively marketing their products, they are hoping to educate consumers about reindeer husbandry in southern Norway.

The reindeer companies have relatively few but high-cost expenditures. Wages, land rental, slaughtering costs and helicopter costs are among the highest. To put this into perspective, the costs of renting helicopters for herding during the slaughter for one company can be as much as half a million NOK. Prices of all these expenditures are constantly rising and the reindeer companies must keep up in order to stay in business. Increasing productivity and animal performance on marginal resources is challenging and continuously reducing production-related expenses is a challenge. With no subsidies and little financial support from the state they are depending on meat prices to follow general economic trends. *“We cannot continue with reindeer herding unless we are able pay a decent wage to our employees and make a profit”*, a representative from one of the reindeer companies stated.

#### Stewardship and tradition

Almost one hundred years have passed since the reindeer companies in southern Norway were founded. Throughout this time, the reindeer husbandry practitioners have fostered strong relationships to the mountains, animals and people involved. The term “stewardship” was commonly used as an expression of the responsibility, humbleness, and respect involved with reindeer husbandry. People living in rural parts of Norway and especially landowners and farmers, often have strong connections to the surrounding land and its resources. There are sayings amongst the farmers and landowners such as: *“You are only borrowing the land from the next generation”*, and: *“It’s your duty to make sure the farm/land is in a better state when you pass it on”*. These ways of thinking and ethics regarding the land and all its content were also expressed during my conversations with the stakeholders and people

connected to the reindeer husbandry. They see it as their duty to make sure that the production is done in a way that does not degenerate but rather regenerate the resources, enhances wildlife and the overall productivity in the mountains, as well as respect the nature of the reindeers and their needs. One representative expressed that: *“Animal welfare is our number one priority. Of course, we must take finances and other things into consideration, but the animals come first”*.

Another aspect that is often deeply rooted in people managing land is the topic of *utilizing the available resources*. It is often seen as a waste and shame when natural resources are not being managed and harvested. This was expressed many times through the example of brush and tree encroachment where what once was grass pastures now are overgrown. *“There are way too few animals in the mountain these days and it’s a shame to see the pastures turning into brush and brambles”*, one representative stated.

The topic of ethics and moral regarding reindeer husbandry and management of natural resources in the mountains in southern Norway is something that was often mentioned, but on what I would describe as a “shallow level”. It would have been very interesting to focus more on the topic of ethics, but unfortunately I did not have capacity to go deeper into it in this research, it will have to be for another study and another time. I end this section with a quote from one of the representatives: *“I am immensely proud of what we are doing and to be a part of this”*.

#### Political will

Like for so many other businesses, the faith of reindeer husbandry in southern Norway lies in the hands of the market and politics. Decisions made on a higher level can bring great consequences in different ways. The non-indigenous reindeer husbandry companies in southern Norway are completely dependent on being granted concession from the state for practicing the profession, and the relatively weak legal positioning of non-indigenous reindeer husbandry causes concerns (Reindriftsloven, 2007, § 1-8).

There are several areas where political decisions may impact the reindeer companies, and I will focus on the ones that emerged during my talks with the representatives.

Land development and the infrastructure that follows which causes fragmentation in the landscape and disturbances for the reindeer are perhaps one of the biggest threats to the reindeer husbandry practitioners. In the areas where reindeer husbandry is being practiced



in southern Norway, the law states that the interest of reindeer husbandry must be considered, and supposedly protected, during the development of regional development plans. An example of this is if a private landowner wants to build a new road through his property, the state processors are supposed to take into consideration how this will impact reindeer husbandry in the area. At some point there will be a decision to make whether or not the benefit of planned development outweighs the benefits from reindeer husbandry, and if this decision reaches the political level the experiences are that development (also known as progress) often outweighs the benefits of practicing reindeer husbandry. A representative from the reindeer companies acknowledged that: *“We simply have to trust that we are being heard by people, state, and politicians who are processing and deciding the development. But at the same time, we cannot be too loud about it as it could damage our relationship with the landowners”*. It should be mentioned that development and infrastructure is not always bad seen from the reindeer companies’ perspective. An example of this is from Filefjell Reinlag where the state wanted to develop a hydropower plant and redirect a river into pipelines. It was expected that the reindeer company would oppose the plans, but instead they supported them in this case because it would make the problematic river-crossing easier.

The development of our country and resources ultimately comes down to the question of: what do we want the development to be, and are the consequences of our actions taking us towards such an outcome? For the reindeer companies in southern Norway, they are utterly dependent on a public and political desire to maintain the production of reindeer and then being heard during the never-ending development of our mountain regions.

## Conclusion

In this thesis I have tried to present the current situation regarding reindeer husbandry in southern Norway and how it is impacted by external factors.

Reindeer husbandry in southern Norway builds on ancient traditions and practices for harvesting and managing natural resources in regions where plant productivity is marginal and the climate can be extreme. In addition to caring for the semi domestic reindeer, the reindeer husbandry trade is directly impacted by and correlated to the consequences of human and natural impacts in the alpine region.

The results were presented and described through six main themes; *reindeer's ecological impact and resource utilization; herding and practical management; grazing rights and landowner relations; finances and market; stewardship and tradition; political will* (Table 1).

From the perspective of *reindeer's ecological impact and resource utilization* my main findings were the reindeer companies' acknowledgement of the fundamental ecological processes of which their production is dependent upon. Animal numbers and grazing pressure is carefully managed to avoid overgrazing and depletion of the grazing resources. Emphasis was made on reindeer's ability to utilize forage and pasture that is of little value to other livestock, as well as the crucial role reindeer play in maintaining a productive and open landscape. The exponential expansion of trees and brushes was mentioned several times as a negative consequence of low grazing pressure by livestock and a warming climate.

The findings of chronic wasting disease in a population of wild reindeer in Nordfjella has been a major threat to the reindeer companies. Several costly measures have been made by the reindeer companies to prevent the spread and to be prepared in case of new findings, but there are still great concerns for what the consequences of a new outbreak will be for reindeer husbandry practitioners in southern Norway.

Considering *herding and practical management*, reindeer husbandry requires careful management and considerations on several aspects. The health, welfare, and productivity of the reindeer are crucial aspects of reindeer husbandry, and decades of breeding and active monitoring of the animals are amongst efforts that have led to good animal performance in the form of calf weights, minimal disease and injuries, and high calf survival rates.

The herders are an essential part of reindeer husbandry as they are the ones who are watching out for potential threats and controlling the movement and behaviour of the

animals. They are focusing on developing reindeer herds that behave predictably when herded and who are familiar with the land, infrastructure, and people within the grazing areas.

Reindeer are sensitive when it comes to changes and disturbances in the landscape. The companies are experiencing that people and human infrastructure offer challenges for the performance and migration of reindeer as well as utilization of pasture.

The reindeer companies in southern Norway are dependent on *grazing right and access to pasture* through rental contracts with the state and private landowners. The reindeer companies are also required by law to guarantee access to sufficient pasture resources for them to be granted concession for conducting reindeer husbandry.

The timespan of the rental contracts varies between six months and 10 years. A good relationship between the reindeer companies and landowners is crucial for maintaining leases and ensuring a long-term management perspective. Although this relationship was generally described as “good” from the reindeer companies’ perspective, there are some examples of conflicting interests, like reindeer interfering during seasonal moose hunt and landowners prioritizing development of cabins, roads, and other infrastructure. Balancing the relationship with landowners, state, and public interests whilst speaking their opinion from the perspective of reindeer husbandry is an important and challenging part of the reindeer companies’ current situation.

Reindeer husbandry is ultimately a business model based on producing reindeer meat for a profit where *finances and market* determine the economical outcome.

Most of the reindeer companies’ income comes from sale of meat in bulk to processors before it eventually ends up on the consumer market. The market and demand for reindeer meat has been stable and gradually increasing, with few signs of declining at current times. The companies see opportunities in marketing and “food labelling” as consumers are becoming more aware of the products they are buying.

The expenditures in reindeer husbandry can be described as few but high-cost, where land rent, wages, helicopter-herding, and slaughter costs are the most significant. Concerns of gradually increasing costs were raised amongst the reindeer companies.

Emphasis was made on the responsibility of *stewardship and traditions* related to reindeer husbandry. The people involved in reindeer husbandry used “stewardship” as a term to

describe the practitioners' responsibility for the animals' welfare as well as the health of the land. Utilizing the mountain resources by maintaining a productive landscape in the mountains in a long-term perspective are core elements for reindeer husbandry in southern Norway.

Decisions made on a higher level based on *political will*, can have great impacts on reindeer husbandry in southern Norway. The reindeer companies are dependent on concession by the state in order to practice the reindeer husbandry, and their legal positioning can be described as relatively weak. The continuous infrastructural development of the alpine regions is from the reindeer companies' perspective causing fragmentation of the landscape, degraded pasture resources, and disturbances for the reindeer. In the planning processes the state is bound to consider the impacts development will have on reindeer husbandry, but unfortunately the outcome is often that the market forces and political will of development often outweighs the ones of the reindeer husbandry practitioners. The reindeer companies themselves find it difficult to express themselves in the discussion, as they are utterly dependent on a good relationship with the landowners to secure land leases.

Through conversation with stakeholders and participation during seasonal work with the reindeer companies in southern Norway I have become acquainted with many aspects of the trade that can help with describing the status quo and how they are impacted by external factors.

From an ecological perspective I would say that the reindeer husbandry is an efficient and unique way of utilizing primary production in the mountains, whilst maintaining a productive and diverse landscape. The practitioners are through considerate management dedicated to doing what is best for the animals and the land while at the same time run a profitable business and produce a quality product. The products provided by the reindeer companies seem to be appreciated by consumers as the demand is high and the market has been stable.

For the external factors that are beyond the control of the reindeer companies I would describe the situation as more challenging. The reindeer companies are dependent on their relationship with private and state landowners to secure lease agreements for pasture. At the same time private landowners, the state, and the public, all have different interests in

the same region. Tourism and infrastructural development driven by strong financial and political forces are threatening the function of “untouched” nature which reindeer husbandry is based upon. And it is for reindeer husbandry like many other trades who are based on primary production for their livelihood, a challenge to keep up with exponentially increasing input costs.

I mentioned above that my first acquaintance with reindeer husbandry in southern Norway was a conversation that generated mixed emotions. After many more conversations and first-hand experience, I still come to the same conclusion. My opinion now is that for reindeer husbandry to continue to be practiced in southern Norway, the public needs to be more exposed and acquainted with the trade. This way they may support the companies by buying their products, and a stronger relationship between the public and the companies may develop so that more people speak the reindeer companies’ case. It is also crucial that the state strongly consider the interests of reindeer husbandry when processing development plans.

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## Appendix

Experiences from the field: A short summary with personal reflections from a week with Fram Reinlag.

*I was privileged to spend a week along with Fram Reinlag during the seasonal autumn reindeer gathering and slaughter. Throughout the period I spent up to 12 hours a day along with company shareholders, shepherds and other hired workers, as well as visitors with all sorts of interests for participating in the event. I slept in my trusted Caravan at Beitostølen Camping and commuted the roughly 18 km distance to fram's facilities at Seksin.*

*The week started off with a gathering at Fram Reinlag's slaughtering facility at Seksin. The facility consists of a large enclosed area where the reindeer will be gathered and sorted, a processing facility that handles the animals from killing to processed animals ready for sale, and food barrack for eating and relaxation.*

*After a short introduction with the workers present at the site that day, I was thrown straight into work. The first two days consisted of preparations like fencing and cleaning of the facility before the animals were gathered. During these initial days I had time to talk to the fellow workers as well as shareholders and other people involved. These conversations gave valuable insight into the practicalities around reindeer husbandry, but there were also conversations on a more personal and social level. For instance, one of the hired seasonal workers that had contributed for 25 years, shared with great emotions how important this arena had been for him over the years, and that for him it was the highlight of the year. In addition to being the most important chore from a production perspective, I experienced the slaughter as a great arena for the community to gather and foster relationships between themselves, the reindeer, and the mountains.*

*On day three the reindeer had been gathered from the mountains and was brought into the enclosure. Seeing 5000 reindeer cover the mountain landscape was a magnificent spectacle I will bear with me for the rest of my life. I was not alone in having this experience as many the happening had gathered a large crowd of people. Also, during this phase I was very much partaking in the practical management as I helped herding the animals and putting up the fence behind them.*

*On the fourth and fifth day the processing the slaughtering and processing went on. Many people were involved as it was important to operate and efficiently in order to avoid stress on the animals and be cost-efficient. I participated at several stations like leading the animals*

*from the corrals into the handling section, but my main station was at the station where calves were weighed and selected for production animals or to be slaughtered, where I was put in charge of collecting ear-tags for genetic analysis. Although I was doing a lot of practical work, I had plenty of time to take a more spectator role by observing and talking to people.*

*The two following days after all the animals had been either processed or put back out on pasture, we started packing and washing down the facility.*

### Interview Guide.

Interview guide for Vågå Tamrein.

<b>Themes</b>	<b>Main questions</b>
General information	<ul style="list-style-type: none"> <li>○ How many reindeer do you have?</li> <li>○ How many shareholders is there in the company?</li> <li>○ How large are your pastures and where does it border?</li> </ul>
Ecology	<ul style="list-style-type: none"> <li>○ What impacts does the reindeer have on the land?</li> <li>○ What characterizes your available pastures?</li> <li>○ Has CWD had any impacts on your operation?</li> <li>○ Have you had any problems with predators?</li> <li>○ Are you effected by the climate and are you experiencing any changes in climate?</li> </ul>
Practical management	<ul style="list-style-type: none"> <li>○ Can you tell me about your strategies for herding?</li> <li>○ Are you experiencing any challenges regarding animal &amp; human interactions?</li> </ul>
Preconditions	<ul style="list-style-type: none"> <li>○ What are the fundamental bases for your operation?</li> </ul>
Financial factors	<ul style="list-style-type: none"> <li>○ Can you describe your financial situation?</li> <li>○ How is the market now and for the future?</li> </ul>



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