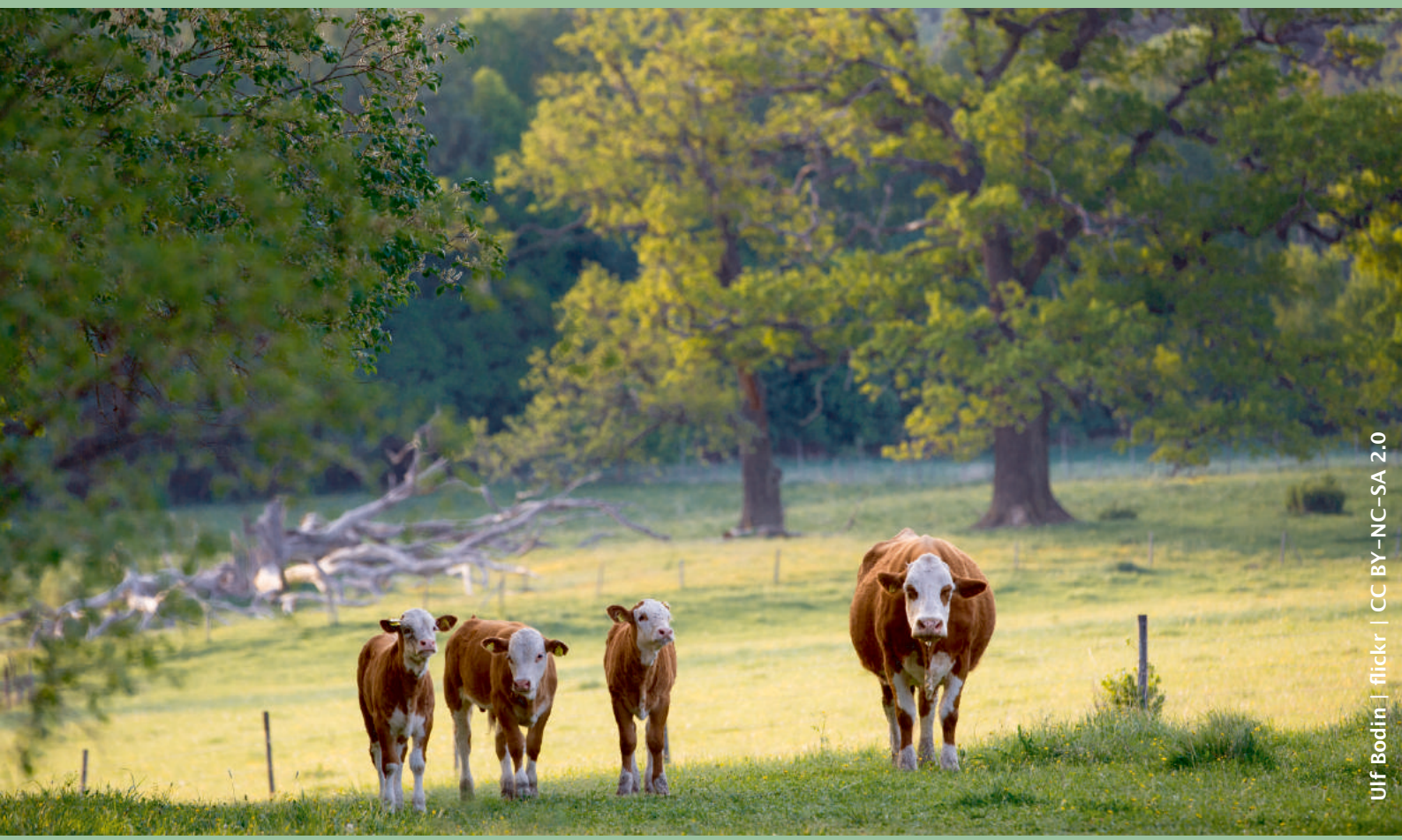
Conference Summary

Grazing in a changing Nordic region



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NordGen

Soil Conservation Service of Iceland

Nordic Council

The conference *Grazing in a changing Nordic region* was held in Reykjavík, Iceland, 12-15 September 2016.

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The members of the scientific committee are thanked for their contributions in planning the scientific contents of the conference.

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1 Conference

1.1 Introduction

An international conference, funded by the Sustainable Development program of the Nordic Council of Ministers, was held in September 2016. The objective of the conference was to provide an integrated assessment of grazing, its potential for contributing to food security, factors of sustainability including environmental impact, role relative to climate change adaptation and mitigation, biodiversity, socio-economic effects and contribution to ecosystem services.

This policy brief provides a summary of the conference and the main recommendations obtained from the presentations and discussions held during the scientific program. The recommendations are directed towards stakeholders involved in shaping the future multifunctional role of grazing in the Nordic countries. We refer the reader to the appendix for a detailed scientific background for the conference.

1.2 Conference summary

Grazing in a changing Nordic region, a 3-day multi-disciplinary conference, was organized by The Nordic Genetic Resource Center (NordGen) in collaboration with the Soil Conservation Service of Iceland. The conference gathered 98 participants from 17 countries, of which 81 were from the Nordic countries (35 from Iceland, 19 from Norway, 10 from Denmark, 10 from Finland, and 7 from Sweden). During the first day, four invited speakers set the scene by introducing the main themes of the conference:

- **Grazing – Contribution to food security**
- **Linking sustainability with support policies**
- **Grazing – History and Future**
- **Grazing, environment and climate – friends or foes?**

During the afternoon's field trip participants were able to see both sustainably managed landscapes and landscapes shaped by overgrazing and erosion. The second day of the conference, in addition to one invited talk, offered 24 contributed talks and 13 posters in the four sessions. Each session was followed by a session-wise discussion. During the last day, four invited speakers shared their insights during the session **Perspectives, Ideas, Needs & Policies**. Additionally, the main conclusions of session-wise discussions were forwarded by the rapporteurs to the common discussion session at the very end of the conference.

The contents of this document aim to reflect the findings of the conference, including contentious topics and the need for geographically tailored solutions. Therefore the statements made in this document do not necessarily reflect a consensus, but instead outline the presentations and discussions held at the conference. The current situation in and challenges faced by each of the participating countries vary greatly. Iceland has large areas that are overgrazed, resulting in land degradation, whereas many of the other Nordic countries experience abandonment of grazing areas and thus a change in vegetation cover. Due to the number and complexity of topics and a lack of clear scientific results in some research areas, a consensus was not reached in all cases. This demonstrates a clear need for continued cross-disciplinary meetings, including practitioners, policy makers and scientists. This document is intended to be a first step in synthesizing knowledge and outlining topics that require further investigation and discussion.

2 Findings

Grasslands should be viewed as a resource

Historically, grazing played a large role in vast areas of the Nordic countries, thus leading to cultural landscapes shaped by grazing animals. Not only can these cultural landscapes be used for food production in a fashion that least competes with the production of human-consumable vegetable matter, but it can also contribute to increasing the degree of self-sufficiency in livestock production. Naturally the degree of self-sufficiency is dependent on the grassland areas available and the amount and type of animal product demanded. One question raised was whether we have a moral obligation to use our available resources for food production in light of a growing global population. In contrast, others felt that grass-based meat production in the Nordic countries could never be a matter of food security, due to the amounts produced in this system. In addition, these cultural landscapes are important, for example, in maintaining biodiversity and for recreational purposes. This highlights that:

- The importance of open grassland landscapes as a part of our cultural heritage should be acknowledged
- The multifunctional role of grassland landscape should be valued

Grazing contributes to landscape management

The Nordic region is characterized by cultural landscapes, which represent unique ecosystems, harboring a large number of red listed species. Grasslands are highly valued, since they are an integral part of our cultural heritage. Maintaining these cultural landscapes has in the past largely been a by-product of food production. Some of these cultural landscapes are threatened due to overgrazing, while others are disappearing due to decreased grazing activity. In both cases, the management of the land should today be seen as an important output, which should be valued correspondingly. Some measures supporting grazing as an integral component in landscape management are:

- Value-based payments for the landscape: amendment of policies to support ecologically sound grass-based animal production
- Financial and knowledge-based support for fencing and restoration of buildings for use as animal shelters
- Gathering knowledge on how wild species may be used in grazing and provisioning of ecosystem services
- Evaluate the impact of regulations on extensive grass-based production for example in regard to animal welfare and recording schemes

The sustainability of grazing based production requires suitable grazing management

Farmers have to decide when to let how many animals out on which land and for how long. These decisions have consequences which go far beyond the condition of the grasslands and the grazers themselves. Impacts include altered presence and abundance of wild plant and animal species, changed soil composition and structure, and restricted access to land for recreational purposes. These impacts vary with local conditions and differing management decisions and their interactions are not fully understood.

In order to design sustainable grazing management strategies, the following should be noted:

- Grazing management has to be tailored to the specific local conditions, which includes disease pressure and large predator occurrence
- Management strategies should respect the history and culture of the people and their economy
- The desired stocking rate and density has to be defined in relation to the respective environmental conditions and species/breeds

Regional solutions are required for specific challenges ■

Given the differences in agricultural, environmental and rural characteristics between countries and regions, many issues can be addressed more efficiently at a local level. An example are the Dutch territorial co-operatives of both public and private stakeholders that within the Common Agricultural Policy (CAP) have adapted agri-environment schemes to local conditions. This allows for the establishment of regional strategies and adoption of management tailored to specific local conditions. Regional solutions also contribute to linking food production to local natural resources, thus increasing local use of local resources. Regional governance would require:

- Establishment of regional fora of public and private stakeholders, including the development of a framework for establishing these fora
- Development of regional strategies
- Increased autonomy for regional solutions to achieve common objectives within the agri-environment schemes
- Re-inventing co-operatives that take responsibility for regional development

Grazing can contribute to rural development ■

Nordic agriculture is characterized both by structural and demographic changes: farm size is increasing and farmers are getting older. The increase in farm size is often associated with intensification of livestock production and fewer farmers overall. The ongoing depopulation of rural areas has an effect on other livelihoods in the rural areas. A diversification of the livestock production sector, including grazing based production, can contribute to rural development through vitalizing livelihoods other than those directly connected to agriculture. The following measures can be adopted to promote this development:

- Develop incentives to support diversification in the agricultural sector aiming at e.g. restoration and use of semi-natural grasslands
- Support for restoration/modernization of old farm buildings
- Promote successful farmers that use grasslands as good examples for other farmers
- Increase the attractiveness of livestock production especially amongst young people

Niche production can be an economically viable option for farmers ■

Farmers can set their product apart from the mainstream market by focusing on quality and selling a story along with their product at a higher than average price. Communicating the added value due to the production method to the consumer is imperative for the success of these niche products. The added value can range from the conservation of high-biodiversity landscapes, better animal welfare, product quality, regional origin, to the conservation of local breeds. Third party certification is a useful tool for reassuring the consumer of the products' authenticity and the claims made regarding the products' added value. Some points to consider for successfully implementing niche production are:

- Establish and/or shorten supply chains for niche products, thus making locally produced products available to the customer
- Make edible niche products available through restaurants or canteens – customers are more likely to pay a higher price in such circumstances
- Add value to meat by processing, thus in particular making less valuable cuts more profitable

- Evaluate the impact of regulations on the possibilities for local small scale niche production

Technological innovation has the potential to increase the sustainability of grazing & management of grasslands ■

Technological innovations have particularly focused on intensive farming systems and less on extensive grazing-based farming. Advances are conceivable that could contribute to economic as well as environmental sustainability of grassland utilization and management. Potential developments include the use of GPS technology for animal monitoring, drone surveillance of animals and pastures, and improved harvesting technology for wetlands. Increased technological innovation would be stimulated by:

- Support schemes for innovation with a focus on extensive production systems and management of natural resources
- Direct valuation of grasslands, their ecosystem services and their management
- Valuation of products from extensively grazed animals, their product quality and their contribution to biodiversity, landscape management and other ecosystem services
- Support for use of abandoned agricultural buildings for the management of grazing animals

The ecological footprint of grazing varies among ecosystems ■

The ecological footprint of grazing activities is a complex interaction between characteristics of the ecosystem, the species and breeds of grazers considered and how grazing is managed. These factors include the ecosystems resilience, its capacity to adjust to disturbances, depending on biodiversity and species richness, the feed preference and weight of grazers and timing and intensity of grazing. Generally, island and arctic ecosystems are more sensitive to disturbances, such as grazing. It is evident that there is a need for increased understanding of these complex interactions. Presentations and discussions particularly highlighted that:

- Grazing is generally assumed to contribute to increased biodiversity and carbon sequestration when well managed
- In sensitive ecosystems, grazing can have a negative effect on biodiversity and carbon sequestration
- Ecosystem processes such as carbon sequestration are poorly understood across ecosystems
- Well-informed choice of grazers and their management is important to realise positive and avoid negative effects of grazing
- Carbon cycle models should be developed to take grazing animals into account

The overall effect of grazing animals on climate change is unclear ■

Methane emissions from grazing animals are undoubtedly fueling climate change. One way to reduce the methane emissions per unit of meat product is to use efficient breeds that are fed large proportions of concentrate. However, the production of those concentrates compete with the production of human-consumable crops. Moreover, concentrates are to a large degree produced overseas, leaving little control over their direct climate impact. In contrast, the lack of grazing especially at the tree line, has been hypothesized to lead to an overall increase in temperature. This is due to the reduction in methane emissions being offset by increased shrub growth which leads to less uninterrupted snow cover, in turn leading to less light being reflected and thus an overall increase in temperature. Moreover, carbon sequestration has been advocated as a potential positive effect of grazing. However, there are contrasting results regarding all of these processes, highlighting the need for a better understanding of the effect of grazing on climate change:

- More knowledge is required on net benefits/losses of grazing with regard to climate change

Education and knowledge transfer are instrumental in ensuring the sustainability of grazing and management of grasslands ■

Farming has over the years become a more complex task. Besides the practical work on the land, farmers nowadays have to navigate complicated regulations, find ways of producing sustainably with minimal environmental impact and potentially engage in tasks concerning the whole value chain of their product. In light of this situation, education and knowledge transfer between all involved actors has become ever more important. To ensure maximal effect the following points should be considered:

- Develop science-based technical applications for decision making for farmers, for instance in regard to timing and intensity of grazing
- Strengthen the role of institutions representing grassland farmers, such as grazing associations, as these could serve as a link between public institutions and farmers
- Provide advice and support to farmers to navigate the whole production chain, including marketing, transport and legal matters
- Promote successful grassland farmers as good examples for others
- Include high nature value farming and especially grass-fed animal production in agricultural school curricula
- Value local traditional knowledge as a resource
- Ensure that farmers' experiences, needs and suggestions are used in policy making

Stakeholders should influence EU and National policy ■

For members of the EU the Common Agricultural Policy (CAP) provides the framework for management of agricultural lands. In addition, national policy regulates regional activities. At the conference, it was acknowledged that for example high nature value farmland approaches and increased cross-compliance between regulations represent progress for the management of (semi) natural grasslands. Presentations and discussions focused on the following options to influence policy development:

- Faster dissemination of research knowledge to policy makers within a political cycle
- Research focusing on the reform of agricultural policies, particularly the reform of the CAP of the EU
- Supporting the development of the CAP and national policies to meet the different needs of diverse agricultural conditions of different regions
- Increase awareness of the need of support policies to respond to growing environmental and sustainability requirements
- Encourage the development of rewarding, as opposed to penalizing, support schemes
- Support farmer economy by valuing management of grasslands and the derived biodiversity and other ecosystem services
- Establishing certification of pasture meat

The following background document was written in March 2015 to define the focus of the conference.

A.1 Background document

Livestock production and grazing have had a significant effect on ecosystems in the Nordic countries. Such impacts span from shaping valuable cultural landscapes to irreversible plant and soil losses. Changes primarily in agriculture, but also societal changes reflected in land use have resulted in a dramatic decline in grazing during the past decades in certain regions of the Nordic countries, while other regions face severe land degradation due to unsustainable grazing practices. This decrease is particularly pronounced in the utilisation of traditional biotopes, such as heathlands, meadows, rangelands and woodlands, which are mainly managed by grazing and cutting. The need to improve the cost-effectiveness of the livestock production has created a transition from extensive to intensive production systems. This has increased the area needed for cereal feed production, and diminished the use of traditionally managed biotopes.

In contrast to the above described trends, there currently is a renewed focus on the potential and need for sustainable utilisation of areas suitable for grazing. This growing interest is a result of the realization that agriculture has to take into account aspects others than production volume and efficiency, e.g. mitigation of and adaptation to climate change, protection of endangered and restoration of damaged ecosystems, maintenance of biotopes high in biodiversity, and enhancement of food security. Moreover, farmed landscapes have an inherent cultural and historical value. All these are key elements requiring attention according to the Nordic Strategy for Sustainable Development. To meet these challenges, we propose to gather experts and policy-makers for a multi- disciplinary conference on grazing in a changing Nordic region and its contribution to climate change adaptation, food security, biodiversity and environmental issues, regional livelihoods, and other ecosystem services.

Climate change is expected to limit feed availability and increase prices of feed. Currently livestock production in the Nordic region increasingly relies on imported feed from regions that are predicted to be adversely affected by climate change. One strategy to increase self-sufficiency in feed production in the Nordic countries is to promote more extensive production systems, thus increasing grazing in general, and in particular on marginal land, which otherwise would not be used for food production. At a national level the Norwegian Farmers Association, for example, calls for the evaluation of self-sufficiency in an attempt to adapt to climate change [9]. Regionally, a recent report from the Nordic Council of Ministers points at grazing as an important part of adaptation to and potentially also mitigation of climate change while simultaneously increasing food production for a growing regional and global population [1]. A recent Nature paper by Eisler et al. [5] points to ruminants being globally essential for future food production due to their ability, e.g. through grazing, to convert plant material not suitable for human consumption to high quality food. None the less, current intensive ruminant production systems, in particular those for beef, largely depend on high quality fodder that is produced on farmland suitable for human food production. Grazing on marginal land could use areas not suitable for cultivation of cereals into food production.

Generally, greenhouse gas emissions (GHG) from ruminant production have a negative impact on climate change. Extensive production results in larger GHG emissions than intensive systems per unit production. On the other hand, emissions arising from e.g. production and application of chemical

fertilizers and pesticides, loss of soil organic matter and use of fossil fuels in transport of animal feed [6] are likely to be lower in extensive than intensive production systems.

There is controversy whether grazing has unambiguously favourable effects e.g. on carbon sequestration and storage. While some authors have reported adverse effects of grazing on soil organic carbon [4; 7], others have measured significantly higher soil carbon in grazed pastures compared to non- grazed exclosures [16]. Comparison of the rates of soil organic carbon sequestration vary with soil texture and structure, climatic conditions such as rainfall and temperature, farming system and soil management [8; 11].

Research on the impact of grazing on biodiversity of both flora and fauna has been ambiguous. It is recognized that conservation of European biodiversity is dependent on the continuation of low-intensity farming systems, which makes semi-natural pastures, meadows and orchards a cornerstone for European farmland biodiversity [13]. Farming practices typical for cultural landscapes support biological diversity both on habitat and species level by maintaining the genetic variability of domesticated plants and animals, wild biodiversity, life support systems, as well as protecting cultural diversity [3; 13; 15]. Lack of management of traditional rural biotopes results in endangerment and loss of these habitats, and the diversity within. For example, approximately 44% of the endangered species on the Norwegian red list in 2010 are connected to cultural landscapes [12]. While unsustainable grazing results in ecosystem degradation and loss of biodiversity, appropriate grazing management can restore traditional biotopes, thus halting and even reversing biodiversity loss. Areas where soil and functioning of the ecosystem is severely degraded may have to be protected from grazing to restore native shrubs and trees that protect the sensitive land. Increasing the proportion of pasture area covered by shrubs or trees would increase the heterogeneity of the grasslands and have a positive effect on the species richness [21; 14]. Traditional biotopes together with buildings and other elements typical for this farming landscape (e.g. pollarded trees, stone fences, summer barns) have an intrinsic value, as they represent our cultural and historical heritage. Loss of these historical landscapes will result in less knowledge and understanding of the interaction between humans and nature [3]. Valuation of protection of biodiversity and other ecosystem services could be an important component of economically sustainable landscape management. It is important to create a biological knowledge basis to be able to assess the potential of revising national policies relative to e.g. re-distribution of subsidies to support both ecologically and financially sustainable food production operations.

Whether grazing is a suitable tool in nature management depends on the perspective (agricultural vs. pristine nature), type of habitat and grazing management, e.g. stocking density. For example, light to moderate stocking densities might have a favourable effect on biodiversity whereas high densities would decrease the plant diversity [reviewed by 16]. Globally, overgrazing by livestock is a major factor in land degradation creating low production ecosystems and barren wastelands [19].

Control of vegetation structure and composition of grazed landscapes may be controlled by the choice of the livestock species and breeds [18]. Different species (cattle, sheep, horses, goats) have different grazing strategies relative to their diet and habitat use preferences. Within species, increased grazing, restoration of ecosystems or traditional biotopes and increased use of marginal land may enhance the competitiveness of the native breeds of grazing livestock. Native cattle breeds are more suitable for grazing in demanding terrain than commercial breeds, tend to cover longer distances while grazing and may provide better management of other vegetation types than grass-dominated pastures [10]. Cattle breeds have been suggested as a tool for obtaining specific grazing effects [20; 10], although these differences can largely be explained by differences in body size and consequent relationships with feed intake, digestibility and selectivity in grazing behaviour [17]. Steinheim et al. [18] found significant differences in foraging characteristics in three Norwegian sheep breeds grazing on mountain pastures. Short-tailed Spæl and Norwegian Fur sheep grazed more on woody plants compared to Dala sheep [18], making them more suitable than Dala sheep in habitats rich in heather or tree and bush encroachment. Accordingly, guaranteeing food production in changing production systems may call for re-ranking of the importance of different breeds, or even species. An increase of extensive production systems may

thus assist the conservation of native breeds, the launch of new niche products, and the enhancement of tourism in rural areas, as well as play a role in the education of the general public.

In addition to the above-mentioned controversies, the effects of grazing and its management on soil degradation, e.g. compaction, reduced water infiltration, erosional processes due to trampling and removal of vegetation cover and climate change have been reported in the scientific literature [e.g. 2], but needs more investigation in the Nordic region. Some of these effects are undeniably global, such as GHG emissions, whereas some effects might be less relevant in the Nordic production systems. Nevertheless, it is imperative to identify the most important knowledge gaps through discussions and knowledge exchange between the different scientific disciplines studying these themes.

The objective of the conference is to provide an integrated assessment of grazing, its potential for contributing to food security, factors of sustainability including environmental impact, role relative to climate change adaptation and mitigation, biodiversity, socio-economic effects and contribution to ecosystem services.

Topics of the conference will cover:

1. Nordic ecosystems and their responses to grazing under climate change
2. historical and cultural values of traditional landscapes (conservation and restoration, biodiversity)
3. grazing management in Nordic conditions
4. environmental impact of grazing on biodiversity and ecosystem services
5. sustainable use and conservation of animal genetic resources in grazing and
6. socio-economic effects of grazing in rural areas (tourism, rural livelihoods) and linking goals of sustainability with support policies for grazing based agriculture.

There is a need for a "Nordic-Baltic conference on "Grazing in a changing Nordic region".

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