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Abstract. The aim of this project was to develop scientific based recommendations to functional and simple management systems for beef production in northern Norway. The specific focus is on cheap housing, pasture utilization and animal welfare in the Arctic region. Twelve "top league" beef farms (located 66-70°N) within the three northern counties of Norway were visited. Two of 12 farmers were dual purpose combined dairy- and beef producers, one had bulls for fattening and nine kept suckler cows. Animal based parameters as well as environmental factors were recorded and semi-structural interviews with the farmers were performed. In addition, an internet based questionnaire was distributed to all beef producers in the region. In this presentation, we focus on pasture utilization: 9 out of 12 farmers started beef production to utilize the farm's resources (land and buildings) and to keep the farm in good condition. Six of the farmers provided outdoor running yards or areas during winter, although the climate can be harsh and involves ample amounts of snow. All animals, except the fattening bulls, had access to summer pasture and seven of nine suckler cow farms used rangeland/forest/mountain pastures for grazing. In Norway, steer production is uncommon because the profit depends on access to huge grazing areas and cheap housing during winter. However, specialized steer production might in future be a way of increasing the Norwegian beef production based on natural resources.

Keywords. Cattle – Rangeland pasture – Questionnaire – Animal welfare.

Augmenter la production bovine arctique

Résumé. *Le but de ce projet était d'élaborer des recommandations, établies sur une base scientifique, pour des systèmes fonctionnels et simples de production de viande bovine dans le nord de la Norvège. Un accent particulier a été porté aux stabulations bon marché, à l'utilisation des pâturages et au bien-être des animaux dans la région arctique. Douze fermes bovines de pointe, situées entre 66 et 70° N dans trois comtés du nord de la Norvège, ont été visitées. Deux des 12 agriculteurs ont un double objectif de production de lait et de viande, un seul avait des taureaux d'engraissement et neuf des vaches allaitantes. Les facteurs zootechniques et environnementaux ont été enregistrés et des entretiens semi-structurés avec les agriculteurs ont été réalisés. En outre, un questionnaire sur Internet a été distribué à tous les producteurs de viande bovine de la région. Dans cette présentation, nous nous concentrons sur l'utilisation des pâturages. Neuf éleveurs sur 12 ont commencé la production de bœuf afin d'utiliser les ressources locales (terre et bâtiments) et de garder l'exploitation en bon état. Six des agriculteurs ont prévu des aires de détente en plein air pendant l'hiver, bien que le climat puisse être rude et impliquer de grandes quantités de neige. Tous les animaux, à l'exception des taureaux d'engraissement, ont eu accès à des pâturages en été. Sept des neuf exploitations de bovins allaitants ont utilisé des pâturages boisés de montagne. En Norvège, l'élevage des bœufs est rare, car elle dépend de l'accès à de vastes zones de pâturage et de conditions de logement bon marché pendant l'hiver. Cependant, à l'avenir, une spécialisation dans cette voie pourrait être un moyen d'augmenter la production de viande bovine norvégienne basée sur les ressources naturelles.*

Mots-clés. *Bovins – Pâturages marginaux – Enquête – Bien-être animal.*

I – Introduction

Beef production in Europe is to a large degree based on pasture and cattle utilize a range of pasture types and plant species to produce tender and healthy meat (Varela *et al*., 2004). There is a shortage of 10,000 tons of beef meat in Norway (Animalia, 2015). A superior political goal for the Norwegian agriculture is to increase the food production based on national grassland resources

to improve the food self-sufficiency as well as to maintain and manage the cultural landscape (Stortingsmelding 9, 2011-2012). Currently, approximately 3.2% of the Norwegian land area is in use for intensive food production, while approximately 50% of the land area has a potential as culture- and rangeland pastures (Rekdal, 2013). In order to increase the Norwegian beef production, the number of suckler cows must increase from 40,000 to 80,000 heads (Ekspertgruppen, 2013; Hageberg *et al*., 2014). Due to the harsh Arctic climate and high costs of labour, a large amount of total costs in beef operations are linked to farm buildings and mechanization. The profitability of the production in this region is therefore marginal.

The aim of this study was to develop science-based recommendations for functional and simple management systems for beef production in the Arctic region. The project focused on animal welfare and the potential for cheap but functional housing as well as pasture utilization.

II – Materials and methods

1. Selection of "top league" farms

The Norwegian Cattle Health Service (Animalia), practicing veterinarians, The Norwegian Food Safety Authority (Mattilsynet) and the Norwegian Beef Cattle Control (Nortura -Storfekjøttkontrollen) provided contact information to top league producers from the three counties Nordland, Troms and Finnmark. Top league farms were defined as farms that had produced beef of high class during the last year and, at the same time, showed profitability. Out of these, we selected twelve example farms that were willing to welcome us for an on-farm visit and interviews. Two to three researchers visited six farms in Nordland, four farms in Troms and two farms in Finnmark County during April and May 2015. From these, one farm was specialized in finishing of calves acquired elsewhere, two farms were oriented on dairy production and finished calves from their own production as well as acquired calves, three farms had suckler cows with finishing of own and acquired calves while six farms had suckler cows and either sold or fattened their calves for finishing (Table 1).

Table 1. The importance of pasture and grazing practices among the four different production systems visited

Production system/ Interview result	Finishing acquired calves (1)	Combination with dairy production (2)	Suckler cows and finishing calves (3)	Suckler cows, calves are sold (6)
Access to outdoor exercise pen during winter	No	1 only for heifers, 1 no	2 yes, 1 no	2 yes, 4 no
Access to summer grazing	No access. Mainly bulls	No access for fattening bulls. Heifers may be grazed	2 rangeland, 1 improved	6 yes, improved and rangeland pastures according to season
Importance of pasture	No comment	Not so important	3 high, essential for production	6 high, essential for profitability and animal welfare

2. Farm visits and interviews

Before each visit, the farmers received the interview questions and a written agreement, allowing NIBIO to use anonymized data from their farm in presentations and economic analysis. Interview lasted between 2 and 2.5 hours and was followed by a guided tour on the farm. We recorded an-

imal welfare, facilities and any smart solution the farmer brought to our attention by taking pictures. Registrations of space per animal, animal cleanliness, health, temperature, drafts (by using smoke ampoules) were performed. Tips and factors that might be regarded as bottlenecks for the present production were discussed with the farmers. Results from the semi-structured interviews were saved as electronic records for further analysis according to acknowledged qualitative methods.

3. Questionnaire

An electronic link to a Quest Back questionnaire was distributed by e-mail to all registered members of the Norwegian Beef Cattle Control with help from their advisors. The questionnaire consisted of 90 questions including buildings, management, feeding routines, use of pastures, production economy and animal health. Only questions dealing with pasture utilization and related farmer attitudes are presented in this paper. Data are presented descriptively and calculated as percentage of total number of answers for each question and production form.

III – Results and discussion

Farm visits. Nine of the twelve farmers started the beef production in a way to utilize the farm's resources (land and buildings) and to keep the farm in good condition. Farms specialized in finishing of acquired calves had little focus on outdoor access and utilization of pastures in their production (Table 1). This is mainly because bulls are difficult and dangerous to keep in fences and the Norwegian "male animal act" §3 states that it is prohibited to release intact bulls on joint rangeland pastures where other cattle are present (LMD, 2003). The strict regulation that should ensure free exercise and grazing for Norwegian cattle is thus not in force for bulls (LMD, 2004). None of the farms we visited practiced steer production, although the questionnaire revealed that there are some farmers interested in it.

Farming systems with beef production in combination with dairy cattle also seemed to put little emphasis on grazing and in one of the two farms visited, only heifers had access to pasture (Table 1). This may be explained by the fact that the adult dairy cows are given priority if pastures close to the farm are limited.

Operations with suckler cows were highly oriented on pasture resources and utilized both improved and rangeland pastures according to season (Table 1). All farmers with suckler cows used natural mating with a bull, of which one used about 50% artificial insemination. Some farms used two different bulls. For better control, the herds were divided and typically kept on improved pastures until mating was over. Rangeland pastures were utilized during mid-summer and additional roughage was provided on improved pastures during autumn to extend the grazing season and thus save winter feed. Some farmers mentioned the costs of fence maintenance and conflicts with neighbours, tourists and the community in general as limiting factors for further utilization of rangeland pastures.

Questionnaires. The e-mail based questionnaire gathered information from a total of 144 farms, including 83 suckler cow farms, 19 farms with suckler cows in combination with additional finishing calves, 21 farms with beef production in combination with dairy and 20 farms only with finishing calves acquired elsewhere (Fig. 1).

When asked how important access to pasture is for their production, the farmers answered according to the type of system they had (Fig. 1). The majority of the farms with suckler cows argued that access to good quality pasture was of upmost importance for their production (78%), whereas operations specializing in fattening of calves tended to argue that pasture access was important but difficult (10%) or even impossible to handle (20%) as a large percentage of their herd consisted of bulls. Only one farm had steers as main production (Fig. 1), while three farmers mentioned that castrating of bulls was performed, but their main production was listed as one of the four farming systems given in Fig. 1.

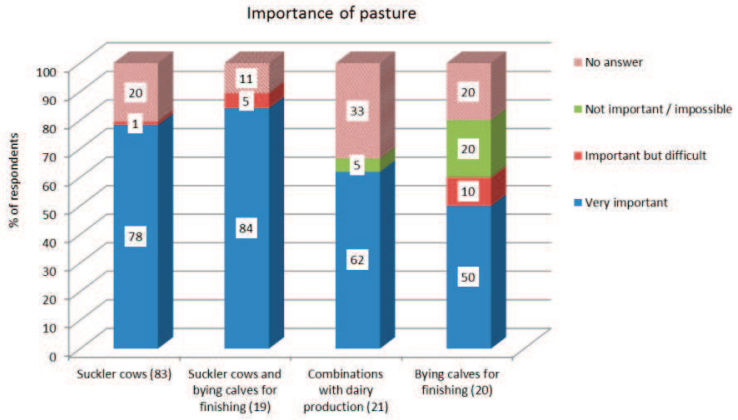

Fig. 1. The importance of pasture in four different types of beef production systems. Numbers are given in % of total number of respondents.

Almost half of the respondents (48.3%) offered outdoor enclosures for their beef cattle during winter. As also found during farm visits, all respondents with suckler cows in the survey used pasture during summer and argued that access to good quality pasture was an important prerequisite for profitability. Only 3.5% of the farms included steers and used pasture for their entire herd during summer.

IV – Conclusions

There is a large potential for increased beef production in the northern parts of Norway based on rangeland pastures, and steer production might prove to be an important operation practice for future utilization of this valuable resource. Upgrading of proper fences may however involve large costs for each producer. Moreover, conflicts with tourists and neighbouring property owners have been emphasized as the two major limiting factors to a wider implementation.

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