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FARMERS' APPROACHES TOWARDS INCREASED SELF-SUFFICIENCY WITH FEED ON ORGANIC DAIRY FARMS

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Abstract: Self-sufficiency with feed (SSF) is a basic principle in organic animal production. The current regulations do not impose strict requirements for SSF at farm level, but further restrictions are expected in future. The aim of the present work was to quantify SSF on a range of organic dairy farms in Norway and study farmers' strategies to produce milk with a high degree of SSF. Nine farms were selected for interview and data collection. On farm level, the proportion of SSF varied between 66 and 99 %. SSF increased to 88-100 % when expressed on national level. Land area is among the limiting factors for famers to reach higher SSF while maintaining the milk production level. A lower proportion of concentrates in the diet seems to have as strong impact on SSF as using own cereals and protein crops as feed, but milk production per total feed production area was highest for the latter. The farmers' goals and actions are important driving forces to develop more SSF in dairy production systems.

Introduction: Self-sufficiency with feed (SSF) is a goal in organic dairy production (EC, 2008). Reduced environmental impact due to less transportation and development of local food products are possible benefits of dairy production with high degree of SSF. However, policies, subsidies, regulations and agricultural structures supporting the development of intensive dairy production can drive the SSF in the opposite direction. Norwegian regulations for organic farming require that 60 % of the feed derives from the farm or other organic farms in Norway or nearby regions in neighbouring countries (Norwegian Food Safety Authority, 2019), illustrating the scale-dependency of the SSF concept. Furthermore, the motivation and goals of the farmers are an important driving force to develop more self-sufficient dairy production systems. The aim of the present work was to quantify SSF on a range of organic dairy farms in Norway and study farmers' strategies to produce milk with a high degree of SSF.

Material and methods: Nine out of a total of 281 organic dairy farms in Norway in 2018 (DEBIO, 2019) were selected for a case study. The nine farms were not randomly selected but represent a wide spectre of management types including farmers that have previously expressed focus on SSF in farm management. The dairy farms were located in three climate zones with great variation in growing day degrees (Table 1). Also the variation in land area and number of dairy cows was large.

We visited the farms for an interview, collected data from the farmers' notes, the dairy company's database (TINE SA, Norway), the Norwegian agricultural extension service and other sources (DEBIO, 2019) in 2018. The collected data include information about land use, crop yields, animal husbandry, feeding, purchased and sold products, nutrient contents and the proportion of edible food. Data about commercial feeds, supplements and additives were collected from feed companies (Felleskjøpet, Lillestrøm, Norway) and other producers. We also asked farmers about their goals, actions and what they perceive as hinders for increased SSF.

Each case was analysed by mapping the flow of nutrients between the farm and other regions, divided into county, Norway, Europe and world. Feeds were divided into forages, cereals, protein crops and other ingredients. The degree of SSF was calculated for the entire farm including the dairy cow herd including recruitment animals.

The data were analysed to describe the current level of self-sufficiency of the farm, to estimate the total farm area used to produce all feeds used on the farm and to calculate the amount of animal products sold from the farm.

Results: Most farmers aimed to maintain the milk production, and all farmers wanted to either increase SSF or maintain it at a high level (Table 1). On one farm (C), the goal was to produce milk without concentrates and even accepting milk yield reduction. Most farmers considered actions to increase forage yields and quality. One farmer (A5) aimed to maintain a high SSF through extensive production. Farmers perceived land area, feed quality, previous investments and support from the industry as limiting factors.

The proportion of forage production on the farm plotted against concentrate proportion in the herd diet, showed two main groups of farms, A and B (Figure 1). The A farms produced only forage crops or had very limited production of cereals (A4). The B farms had a significant production of cereals (B3) or protein crops (B1, B2) as well. Farm C did also produce various crops for consumption.

The SSF on farm level was highest on farm C (0.99) and varied between 0.66 and 0.85 on the other farms. On national level, the SSF was high on farm C (1) and in group B (0.91 to 0.98), and on farms with low concentrate level in group A (0.91 and 0.94). Milk and meat production per total farm area were higher in group B than A, and lowest on farm C.

Table 1. Farm characteristics, farmer's perception of SSF and delivery of milk and meat per area, including area from imported products, on 9 organic dairy farms in Norway.

Farm ID	A1	A2	A3	A4	A5	B1	B2	B3	C
Farm characteristics									
Climatic conditions[1]	Subarctic	Humid oceanic	Humid oceanic	Subarctic	Subarctic	Humid oceanic	Humid continental	Humid continental	Humid continental
Growing day degrees[2]	1667	1953	1953	1287	1231	1960	2279	2111	1988
Farm land area, ha	34.6	39.7	32.0	117.5	40.8	54.2	110.0	104.9	111.3
Dairy cows, No.	13	21	10	47	15	50	58	56	29
Faermer's perception									
Goal for milk production	Maintain	Maintain	Increase	Maintain	Maintain	Maintain	Maintain	Maintain	Maintain, accept decrease
Goal for SSF	Increase	Increase	Maintain	Increase	Maintain	Increase	Maintain on 100% local	Maintain on 100% local	100%, no concentrates

							feed	feed	
Actions	Increase forage yields; grow cereals	Improve manure utilisation	Increase forage yields; grazing management	Increase forage yields	Permanent grasslands; agronomy	New crops to improve feed value	Grow cereals and protein crops	Grow cereals and protein crops	Improve forage feed value
Limiting factors	Land area	Land area	None	Land area; investments	None	Land area; investments	Industry support	Industry support	Feed requirements; manure
Animal products									
Milk, tonnes/ha[3]	1.75	2.61	1.29	2.38	2.06	4.55	3.24	3.30	1.15
Meat, kg/ha[4]	55	51	35	38	52	127	66	48	30

[1] Kottek et al. (2006).

[2] Sum of mean day degrease above 5 °C, 1960-1990.

[3] Including milk for cheese processed in the farm.

[4] Assumed meat proportion in the living animal: 0.30.

Figure 1. Share of concentrates in the feed ration vs. proportion of forage crops in the farms' total crop production, both on dry matter basis, on nine organic dairy farms in Norway. For each farm, the self-sufficiency with feed on farm (SSF-F) and national (SSF-N) scale are included.

Discussion: Reducing concentrate level in the diet and growing concentrated feeds were the main strategies to increase SSF on the farms. If concentrated feeds cannot not be grown, different agronomic actions and feeding strategies can be applied to reduce concentrate level in the diet and increase SSF. If cereals and protein crops can be grown, farmers can maintain high milk yield per farm area and a high degree of SSF. Commercial concentrates contain both domestic and imported cereals (roughly 50:50), but most of the protein ingredients are from other countries, while the concentrates used on B2 contained 98 % Norwegian ingredients. However, this strategy makes less farmland available for food crops. When assessing the strategy of maximising food crops on the farm it is necessary to include vegetable food products and nutrient balances. The strategy of feeding ruminants on forages from permanent grassland may have additional benefits by contributing with ecosystem services.

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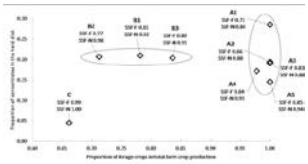
Image:



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