Changing towards a seasonal low-input pastoral dairy production system in mountainous regions of Austria – results from pilot farms during reorganisation

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Abstract

In order to obtain novel management and economic information on pastoral milk production in mountainous regions a research project with six pilot dairy farms (5 organic, 1 low input) was carried out in Austria. The farms were supervised during the reorganisation period aiming at a seasonal milk production system with a calving period in the winter-spring season. Within the observation period of three years a strict annual cycle in milk production and reproduction was only realised on two farms. An average pasture proportion of 42% (range 26 to 61%) of the total DM intake y^{-1} was realized. On four farms, which fed low amounts of supplementary feed during the grazing period, a pasture proportion of 50% of the total DM intake per year was realized in the last project year. With an input of only 470 kg cow^{-1} y^{-1} DM concentrate (8% of DM intake) a milk performance of 5542 kg with 4.02% fat and 3.34 % protein was achieved on those four farms. The results indicate that the full grazing strategy with seasonal calving is feasible for animal health reasons in Austria. Despite lower milk yield per cow, lower marginal costs per unit milk are possible under well managed grazing systems.

Keywords: grazing, dairy cows, seasonal milk production, alpine regions

Introduction

Farms in regions with seasonal dairy production from pastoral systems achieve low production costs. Increasing costs of energy, supplementary feed and labour can also enhance the competitiveness of low-input grazing strategies in regions with disadvantaged pastoral conditions (Durgiai *et al.*, 2004). However, most of the milk produced in Austria is based on preserved pasture in combination with cereal grains as feedstuff (all year-round) with dairy cows bred for high daily milk yields. A research project was initiated by AREC Raumberg-Gumpenstein to provide novel management and economic information on seasonal low-input pastoral milk production in mountainous regions. Based on the experiences in Switzerland ('OPTI-Milch'-project; Durgiai *et al.*, 2004; Kohler *et al.*, 2004; Thomet *et al.*, 2004) dairy farms were supervised during the reorganisation period aiming at a seasonal milk production system on pastures.

Materials and methods

In a research project six dairy farms (5 organic, 1 low input) in different mountainous regions of Austria were accompanied for three years (1 October 2004 to 30 September 2007) during the change-over to a seasonal low-input dairy production system based on pastures (Table 1). Every project farmer intended to maximise the proportion of fresh forage in the total yearly feed ration, and to minimise concentrate and supplementary feeding during the grazing

period. Another goal was to shift the calving period into the winter-spring season. Each farmer could define the speed and intensity of implementing the low-input strategy on his own responsibility, and the project team consulted and accompanied them and recorded the results and experiences. The pilot farmers had to keep daily records about the composition of the feed ration in the stable, input of concentrates, milk yield per herd, grazing management and about animal health and fertility parameters. Yearly feed intake and pasture proportion were calculated considering the energy content of the feedstuffs and the net energy requirements of the dairy cows for milk production, live weight change, maintenance (+15 % in grazing season) and pregnancy (GfE, 2001). Economically relevant data according to the Austrian federal extension programme (BMLFUW, 2004) were collected during the whole project period.

Table 1. Data of pilot farms (beginning of project)

pilot farm[1]	altitude (m a.s.l.)	Dairy cows (cows farm^{-1})	milk yield (kg cow^{-1} y^{-1})	concentrate (kg cow^{-1} y^{-1})
1	400	32	7300	1000
2	650	30	6800	700
3	1060	13	5000	800
4	700	30	7000	1200
5	700	14	6500	1100
6	550	14	6400	1200

[1] pilot farm 1 – 5: organic farm management

Results and discussion

Within the observation period of three years a strict annual cycle in milk production and reproduction was only realised on farms 1 and 4. Depending on the farm specific conditions and the implementation level of the low-input strategy, an average pasture proportion of 42% (26 to 61%) related to the total DM intake per year could be determined. The duration of the grazing season varied between 155 and 215 days. Dry weather conditions in summer and fertility problems of cows resulted in higher amounts of supplementary feeds on two farms (farms 5 and 6). On the other four farms (farms 1-4) the average proportion of grazed pasture was 50% (41 to 61%) of the total dry matter intake per cow and year in the last project year. Under more favourable grazing conditions in Switzerland, Ireland, Australia and New Zealand pasture proportions between 60 and 90% are possible (Thomet *et al.*, 2004; Dillon, 2006). Despite the high standard deviation, the forage quality was high (6.3 MJ NEL and 21% crude protein kg^{-1} DM). On farms 1-4 the concentrate input decreased to 470 kg DM (8% of DM intake) cow^{-1} year^{-1} during the total project period. The milk yield decreased from 6475 kg (3.94% fat; 3.38% protein) in the year 2003 to 5837 kg cow^{-1} (4.06% fat; 3.33% protein) in 2007. Because of the enhancement of the number of dairy cows the milk production per farm increased by about 6-7%. Despite the lower milk yield the data based on a federal extension programme reveal lower marginal costs and higher production efficiency per unit milk for the four pilot farms in comparison to the average results of the organic and conventional farms (Table 2). The culling results, the incidence of diseases and disorders, the expenses for animal health and the conception rate contradict the claim that the full grazing strategy with seasonal calving is not possible for animal health reasons. During the adjustment of the calving season by delaying the insemination of inappropriate cows the average calving interval was extended to 415 days. On those farms where a strict seasonal milk production was implemented quickly an average calving interval of 379 days was achieved, but nevertheless these results still indicate repeated fertility problems of some cows.

Table 2: Results of pilot farms 1 – 4 in comparison to average results of organic and conventional farms of the federal extension programme (triennial means; BMLFUW, 2004)

	pilot farms 1–4	federal extension programme (means)	
	means (min-max)	organic farms	conventional farms
Cows per farm	29.1 (12.9-36.2)	22.5	24.0
Milk yield (kg cow^{-1})	5542 (5076-6263)	6320	6973
Milk fat (%)	4.02 (3.85-4.18)	4.16	4.28
Milk protein (%)	3.34 (3.25-3.40)	3.38	3.48
Grazed pasture (% of annual DM intake)	47 (41-54)	n.a.	n.a.
Concentrate (kg cow^{-1} y^{-1})[1]	581 (257-976)	1291	1787
Herd complementation (%)	23 (13-31)	32	34
Non return rate – 90 days (%)	73 (50-86)	64	61
Insemination rate (cow^{-1})	1.4 (1.3-1.5)	1.5	1.6
Calving interval (days cow^{-1})	419 (407-432)	393	394
Expenses for animal health (Euro cow^{-1} y^{-1})	33.1 (18.3-40.3)	58.2	63.4
Marginal income (Euro cow^{-1} y^{-1})	1640 (1310-1939)	1645	1720
Marginal income (Euro cent per kg milk)	29.4 (26.6-31.8)	25.9	24.6

[1]energy corrected (7.8 MJ NEL kg^{-1} in concentrate)

Conclusions

With optimal and site-specific seasonal grazing systems, a grazed pasture proportion of 45 to 60% (max. 65%) of the total dry matter intake of dairy cows seems to be attainable under disadvantaged mountainous conditions. Despite lower milk yield per cow, lower marginal costs per unit milk are possible under well managed grazing systems. Getting cows in calf within a short period is a big challenge in strict seasonal dairy programmes.

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