Grazing and difficult circumstances: economic benefits depend on milk price and grazing efficiency

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Abstract

Dairy herds in the Netherlands will increase in size in the coming years, due to the imminent abolition of milk quotas. Also more farms will make use of automatic milking systems (AMS). Both trends mean less opportunity for grazing. As the grazing area itself will not increase it has become a priority to explore new ways of grazing. At Dairy Campus – a Dutch experimental farm – two distinct grazing systems were tested: strip grazing with AMS and one-day rotational grazing with a fixed paddock area and a standard growing period of 23 days. The grazing time was restricted to daytime. At night the cows were fed silage and concentrates. In the one-day rotational grazing, the grass allowance depended on what was grown in 23 days on the fixed paddock. The silage feeding was adapted to the allowed amount of grass. The total allowance of grass and roughage for both systems was 16 kg dry matter cow^{-1} d^{-1} supplemented with concentrates. The strip grazing system had a fixed allowance of 8 kg DM grass cow^{-1} d^{-1} supplemented with 8 kg TMR cow^{-1} d^{-1}. Model calculations showed a relation between grazing efficiency, milk price and income. Grazing will be more profitable than an indoor system at lower milk prices. At higher milk prices a high grazing efficiency is necessary to make a grazing system profitable.

Keywords: grazing, grazing efficiency, large herds, AMS, income, new grazing system

Introduction

Grazing provides lots of economic opportunities, including less contract work for making silage and for applying manure. Furthermore, in the Netherlands farmers can obtain a premium for grazing. Farmers, however, often consider grazing and grassland management as difficult, time consuming and less efficient. Due to the abolition of the milk quota, herd size is expected to increase as stocking density on the grazing platform. Furthermore, the number of farms with an automatic milking system (AMS) is expected to increase. Those aspects are causes for a decline in grazing. To address these challenges, a novel simple grazing system for farms with high stocking rates has been developed on the research farm 'Dairy Campus' in Leeuwarden, the Netherlands. The aim of this study is to show the effect of grazing efficiency on the economic results at different milk prices. Grazing efficiency is described as the percentage of produced grass which is actually eaten by the cows.

Materials and methods

In 2014 two grazing experiments were set up at the research farm 'Dairy Campus' in the Netherlands. The first one was a strip grazing system with 60 cows on 18 ha of grassland. This experiment was part of the European AutograssMilk project. The cows had free access to the paddock during daytime (about 12 hours), where every 6 hours a new strip was offered. The total grass allowance was 8-9 kg DM cow^{-1} d^{-1}. At 17:00 h the cows were fed 8 kg DM TMR (total mixed ration) silage (70% maize and 30% grass silage) indoors. The second experiment tested a new grazing system at high stocking rates (6 cows ha^{-1}). A 45-cow herd grazed on 7.5 ha grassland, which was divided into 24 equal paddocks. A fresh paddock was offered daily. In both experiments, grass production, feed intake and milk production were measured. The results of the grazing systems were compared with a fully housed herd with summer feeding, which was also present at the Dairy Campus experimental facility. The data from both grazing experiments and the 'indoor herd' were used in model calculations using DairyWise (Schils *et al.*, 2007) to compare

three systems. The data collected from the grazing experiments were used as inputs to parameterize the model and to extrapolate the economic results to farm level year around. The model farm was scaled up to 150 cows on 51 ha grassland and 12.8 ha maize all with an AMS. On the first model farm, the grazing platform was 25 ha for the 24 paddock system (and 26 ha grassland for cutting only) and on the second model farm 45 ha for the strip grazing system (plus 6 ha for only mowing), to compare economic effects of grazing on a small (restricted) grazing platform with grazing on a larger platform.

Results and discussion

The measured grass intake in the 24-paddock system was, on average, 4.9 kg DM cow^{-1} day^{-1}, and the strip grazing system reached 5.6 kg DM. The grazing efficiency on the 24-paddock system was with 50-60% lower than on the strip system (70-80%). The milk yield was 8,000 kg milk cow^{-1} $year^{-1}$ for the 24-paddock system and 8,050 kg milk cow^{-1} $year^{-1}$ for the strip-grazing system. The year -ound indoor system had a milk yield of 8,500 kg cow^{-1} $year^{-1}$. The net grass production was 8,870 kg DM ha^{-1} for the paddock system, 10,800 for the strip system and 10,900 for the year round indoor system. These collected data were used as input for DairyWise to calculate the economic results, based on standard prices (Vermeij, 2013) and a milk price of € 0.35. Results are presented in Table 1.

Due to the low grassland production and low grazing efficiency, especially in the 24-paddock system, a lot of roughage had to be purchased. On the other hand the costs for contract work decreased a lot. This is in accordance with former research (Van den Pol *et al.*, 2013; Reijs *et al.*, 2013). There are two main factors that strongly influence the economic balance: the net grass production (grassland production × efficiency) and the milk price. Table 2 shows a sensitivity analysis for these factors based on DairyWise calculations; the income is compared to the income at year-round summer feeding. The sensitivity for milk price is presented horizontally and varies from 25 to 40 cents kg^{-1} milk. Grazing efficiency is presented vertically and varies from 50 to 90%. Experts assume that a 24-paddock system will not reach an efficiency above 70%, so no figures are given for higher efficiencies. Strip-grazing systems can reach a higher efficiency. Changes of 10% in grazing efficiency or 5 cents in milk price have a strong effect on income. The results of the 2014 experimental design (Table 1) can be found in Table 2 (paddock

Table 1. Economic effects (€ $farm^{-1}$) of the grazing experiments (high stocking rate on 24 paddocks and strip grazing combined, compared to year round indoor (at a milk price of € 0.35 l^{-1}), all with automatic milking systems.

	24 paddock system	Strip graze system
Milk revenues (A), incl. grazing premium	-14,250	-11,550
Direct costs (B)	+12,927	-3,459
concentrates	-4,136	-4,136
purchased roughage	+18,039	+4,975
other cattle costs	-1,275	-1,193
fertiliser costs	+299	-3,105
Indirect costs (C)	-21,454	-6,544
contract work	-19,043	-10,076
grassland equipment (fences etc)	+1,825	+3,285
fuel	-634	-518
installations (incl. selection box)	+0	+1,573
energy	-113	-101
manure disposal	-3,289	-539
diverse small costs	-201	-167
Total income (A – B – C)	-5,723	-1,547

Table 2. Effect of grazing efficiency and milk price on income for two grazing systems (calculated with DairyWise and compared to year round indoor summer feeding), € farm^{-1}.

Grazing efficiency	Milk proce – high stocking rate on 24 paddock system				Milk proce – strip grazing with AMS[1]			
	40 ct	35 ct	30 ct	25 ct	40 ct	35 ct	30 ct	25 ct
50%	-9,500	-5,723	-2,000	+1,800	X	X	X	X
60%	-3,800	-100	+3,700	+7,400	X	X	X	X
70%	+1,800	+5,600	+9,300	+13,100	-4,900	-1,547	+1,800	+5,200
80%	X	X	X	X	-1000	+2,400	+5,700	+9,100
90%	X	X	X	X	+2,900	+6,300	+9,700	+13,000

[1] AMS = automatic milking system.

system: € 5,723 less income at 50% grazing efficiency and strip grazing: €1,547 less income at 70% grazing efficiency, and a € 0.35 l^{-1} milk price).

Table 2 shows that the grazing systems of 2014 would have been profitable compared to summer feeding at lower milk prices. The 24 paddock system for example would have been profitable at a 50% grazing efficiency and a milk price of € 0.25 l^{-1}. Higher grazing efficiencies also lead to an increase in income compared to summer feeding.

Conclusions

Grazing will be more profitable than a year-round indoor system at low milk prices. At higher milk prices, a high grazing efficiency is important to make a grazing system more profitable.

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