

Simulation of the effect of grass intake on the farmer's income

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Abstract

Grazing affects people, planet and profit. In general, the farmer's income will be higher when grazing of dairy cows is applied. We studied the economic effects of grazing for situations where we expect that grazing is difficult to apply. These situations could result in lower incomes for grazing. Farms with automatic milking systems, a small grazing surface, a large herd and/or a high milk yield per cow were studied. For the situations with automatic milking systems, large herds and high milk yields per cow, the farmer's income remained the highest for grazing. The difference between grazing and zero-grazing, however, was smaller than for farm situations without restrictions. In situations with more than 10 dairy cows ha⁻¹ grazing surface, zero-grazing was more profitable than grazing. There was a strong relationship between intake of grass in pasture, on a typical farm, and the difference in income between grazing and zero-grazing. The more grass the cows eat in the pasture, the larger the income profit from grazing compared to zero-grazing.

Key words: economy, grass intake, grazing, income

Introduction

In northwest Europe, grazing is a matter of public concern (Van den Pol-van Dasselaar *et al.*, 2008). Main reasons for this are animal welfare, biodiversity and the positive image of grazing. Grazing has both positive and negative effects on the environment, the most obvious being nutrient loss. In the end, personal motivations and habits of the farmer will be decisive in the choice between grazing and zero-grazing. Next to labour input, economy is thought to be one of the most important components of these personal motivations. In general, grazing is more economic for farmers than zero-grazing (Kennedy *et al.*, 2005; Van den Pol-van Dasselaar *et al.*, 2008). However, an average situation will not be applicable to all farms. Certain conditions may be less favourable for grazing.

The current trends in livestock farming in northwest Europe may have caused a shift from economic advantage of grazing to economic advantage of zero-grazing. Average herd sizes increased during the last years and the number of automatic milking systems increased. Grazing of large herds is difficult to manage. Even though grazing in combination with an automatic milking system is possible, it is experienced as difficult. The average milk production per cow has increased, and farmers with high yielding cattle like to control rations. Again, control of rations is more difficult in grazing situations. Finally, reasons for zero-grazing may be better grassland utilisation, the need to reduce mineral losses and labour efficiency. In northwest Europe the popularity of grazing is declining. Even though the number of grazing cattle is still relatively high (80-90%), it is decreasing.

Materials and methods

We studied the economy of farms in the Netherlands with less favourable conditions for grazing. We used the model DairyWise (Schils *et al.*, 2007). The DairyWise model is an empirical model that simulates technical, environmental, and financial processes on a dairy farm. The central component is the FeedSupply model that balances the herd requirements, as

generated by the DairyHerd model, and the supply of homegrown feeds, as generated by the crop models for grassland and corn silage. The GrassGrowth model predicts the daily rate of dry matter accumulation of grass, including several feed quality parameters. The final output is a farm plan describing all material and nutrient flows and the consequences on the environment and economy.

First, the economy of average farms on sand and clay soil with 15000 kg milk ha⁻¹ and 20000 kg milk ha⁻¹ was calculated for grazing and zero-grazing. Second, the economy of grazing and zero-grazing was calculated for non-average farms with less favourable conditions for grazing:

1. Automatic milking (including additional selection equipment prior to grazing for € 7000),
2. Small grazing surface (25% of total farm area instead of 75%),
3. A large herd (150 animals instead of 75),
4. A high milk yield per cow (9500 instead of 8000 kg cow⁻¹ yr⁻¹).

Finally, the difference, in economical performances, between grazing and zero-grazing was calculated.

Results and discussion

In situations without restrictions, the farmer's income was higher for grazing than for zero-grazing (Figure 1). However, the difference varied between 0 and 2.5 € per 100 kg milk produced. For grazing, the costs of e.g. concentrates, contract work for harvesting grass and feed, and feed storage remain low, leading to a higher income per kg milk produced. The range in farm income can be explained by variation in individual farm situations.

For the situations with automatic milking systems, large herds and high milk yields per cow, the farmer's income is also on average highest for grazing. However, the average profit of grazing was smaller than for situations without restrictions.

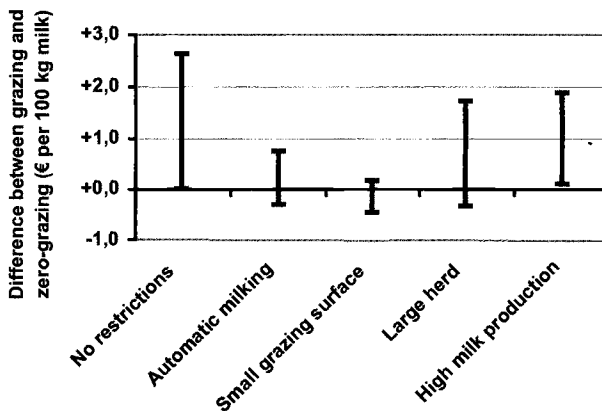


Figure 1. Range in effect of grazing on the farmer's income. Positive numbers indicate an economical advantage for grazing.

The above implies that for most farm situations, grazing is economically attractive. There is one exception, however. If the area available for grazing becomes too small, the grass intake will be limited. If the grass intake is too low, the economical profit of grazing will disappear. Figure 2 shows the strong relationship between intake of grass in pasture, on a typical farm, and the difference in income between grazing and zero-grazing. The break-even point is at a dry matter grass intake of approximately 600 kg cow⁻¹ yr⁻¹. This translates to situations with

approximately 10 dairy cows ha⁻¹ grazing surface. In situations with more than 10 dairy cows ha⁻¹, zero-grazing becomes more profitable than grazing.

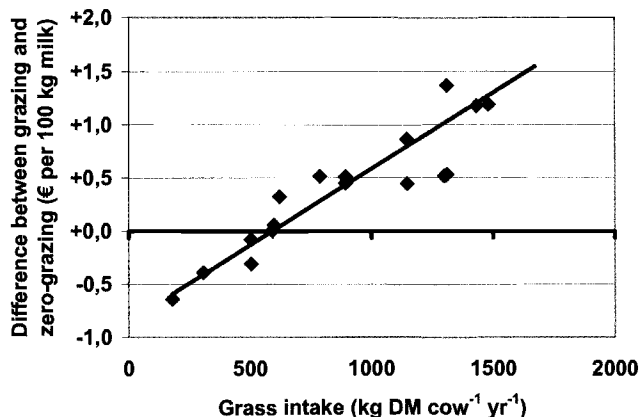


Figure 2. Effect of grass intake on the farmer's income at an average milk production of 8000 kg cow⁻¹ yr⁻¹. Positive numbers indicate an economical advantage for grazing.

Conclusions

Model simulations showed that in general grazing is economically more attractive than zero-grazing, even under unfavourable conditions. The only exception is when the available grazing area is too small in relation to the number of animals in the field. Increasing the grass intake can enlarge profits. It was shown that the more grass the cows eat in the pasture, the larger the income profit from grazing compared to zero-grazing. These results were confirmed by on-farm participatory research on 60 dairy farms in the Netherlands with less favourable conditions for grazing (www.koenwijn.nl). We conclude that economy is not the most important influencing factor for grazing in northwest Europe.

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