Dynamics of dry matter intake in livestock production systems in the Netherlands

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Abstract
Pasture-based dairy systems have several advantages. However, the number of grazing dairy cattle in the Netherlands is decreasing, partly as a result of scaling. Therefore, grazing research focuses on providing farmers, students and advisers with tools to optimize grazing whilst also improving efficiency. The aim of this study was i) to estimate the dry matter intake (DMI) from grazing on commercial dairy farms and the variation of this DMI throughout the season, ii) to estimate the associated feeding costs, and iii) to present this in a practical way. A DMI-dashboard was developed to get day-to-day insight in DMI and feeding costs. It was tested on nine commercial dairy farms. Data show that there was a huge difference in DMI by grazing (800 to 1900 kg DM cow^{-1} yr^{-1}). The between-farm variation in feeding costs was much larger than the within-year variation and is a good reflection of the differences in DMI by grazing between the different individual farms. By comparing results of individual farms in a network setting, the insight in the effect of grazing increased. This led to increased skills of farmers, students and advisers in optimizing grazing systems.
Keywords: Dry matter intake (DMI), feeding costs, grazing, pasture, skills

Introduction

The number of grazing dairy cattle in the Netherlands has decreased in recent years, from 90% the total in in 2001 to 70% in 2012 (CBS, 2013). In 2012, the 'Convenant Weidegang' ('Treaty Grazing') was therefore initiated. The aim of the Treaty is to stabilize the percentage of farms that practise grazing. At the end of 2013 almost 60 parties in the Netherlands had signed this Treaty, including dairy farmers, dairy industry, feed industry, banks, accountant, semen industry, veterinarians, cheese sellers, retail, NGOs, nature conservation, government, education and science. As a result of the Treaty, many research activities have been initiated to optimize grazing and grassland management. In the last few years, the theme 'grazing' has also become more dominant in education. The interaction between education and science increasingly leads to participation of lecturers and students in scientific research on grazing, which in turn leads to an improved educational programme.
Grazing is, on average, economically attractive (Van den Pol-van Dasselaar, 2014) and is preferred by society. However, dry matter yields are lower, nutrient losses are higher and often farmers experience grazing as difficult. This is especially true in the Netherlands with its mixed dairy systems that use relatively high levels of supplementation. Most farmers and advisers lack the necessary skills to manage grazing properly in such high-output systems. Support is needed and this support should be robust, simple and appealing (Van den Pol-van Dasselaar *et al*., 2012).
The focus of grazing research in the Netherlands is to provide farmers, students and advisers with the tools to optimize grazing under Dutch conditions whilst also improving efficiency. The aim of this study was i) to estimate the dry matter intake (DMI) from grazing on commercial dairy farms and the variation of this DMI throughout the season, ii) to estimate the associated feeding costs, and iii) to present this in a practical way. Currently, these data are not available on commercial dairy farms in the Netherlands. And if one does not measure, one cannot manage.

Materials and methods

In 2012 and 2013, participatory research on nine commercial dairy farms of the network 'Dynamisch Weiden' (Dynamic Grazing) was carried out to study the dynamics of grazing and to develop practical management tools. Researchers, advisers and dairy farmers together searched

for suitable grazing systems. Farmers were encouraged to optimize their grazing system and to gain new knowledge and skills. The work was supported by students. The farms differed in scale, soil type, grazing intensity (cows ha^{-1}, hours day^{-1}, days on one paddock). Grazing and supplemental feeding was recorded in a grassland calendar. A DMI-dashboard was developed to get insight in day-to-day DMI and feeding costs. Total feed demand was estimated using characteristics of the herd, like number of cows, milk yield per cow, fat and protein content of the milk. The grass intake was calculated by subtracting the supplemental feed from the total feed demand. The feeding costs were calculated using the actual feed costs for supplemental feeding and estimated feed costs for home-grown forage.

Results and discussion

The dairy farmers in the network were eager to get insight in the results. They confirmed that for them the difficulty of grazing is the variation in milk production due to the unknown variation in grass growth, grass quality and DMI. A tool to get insight in more accurate grass intake was therefore considered to be very useful. An example of such a tool is the DMI-dashboard, which has been developed in the project (Figure 1).

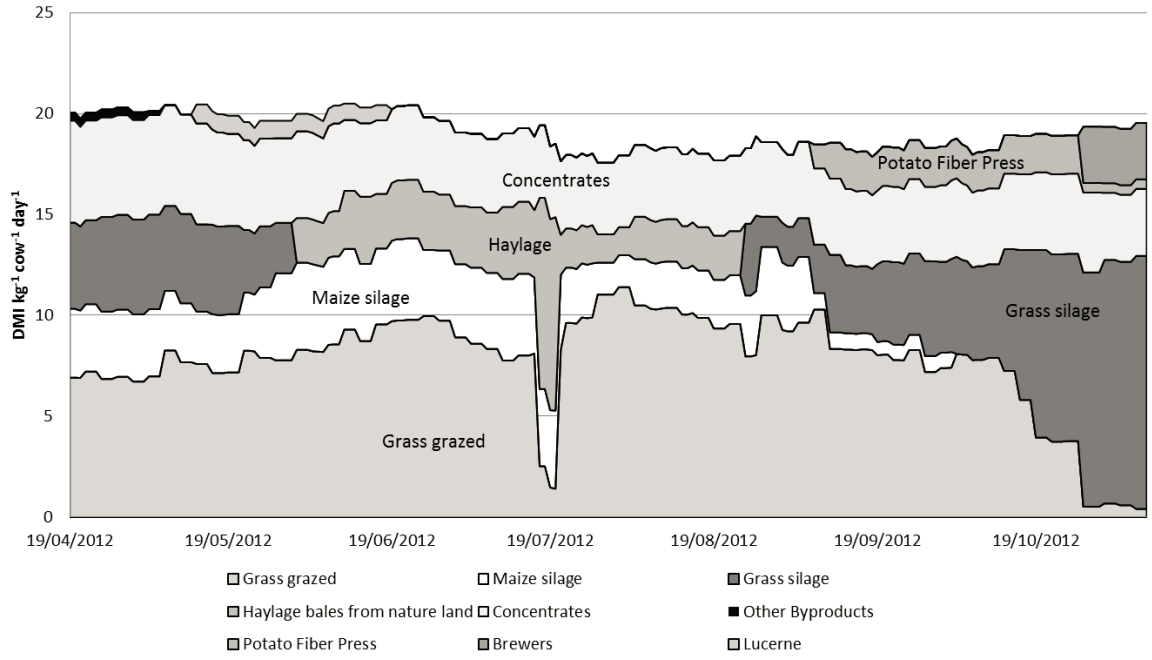

Figure 1. The DMI-dashboard for an individual farm in the growing season 2012.

The DMI-dashboards of the nine commercial dairy farms showed that the DMI from grazing varied between 800 and 1900 kg DM cow^{-1} yr^{-1}. A recent Dutch study into the economics of grazing has shown that grazing is financially attractive if the cows eat sufficient amounts of fresh pasture grass (> 600 kg DM cow^{-1} yr^{-1}). If the intake of fresh grass is very low, grazing is not profitable (Van den Pol-van Dasselaar *et al*., 2014). The feeding costs were determined for the nine farms throughout the season. Figure 2 shows that the between-farm variation in feeding costs was much larger than the within-year variation. The between-farm variation reflects the differences in DMI by grazing between the different individual farms. The dairy farmers in the study experienced these results as extremely valuable even though the costs of some individual feed components were only estimated. The within-year variation and the between-farm variation provided an opportunity for them to benchmark their individual farm results, which contributed to overall improvement of the grazing system.

The effect of management options, e.g. ration changes, was immediately visible and operational management could be adjusted accordingly.

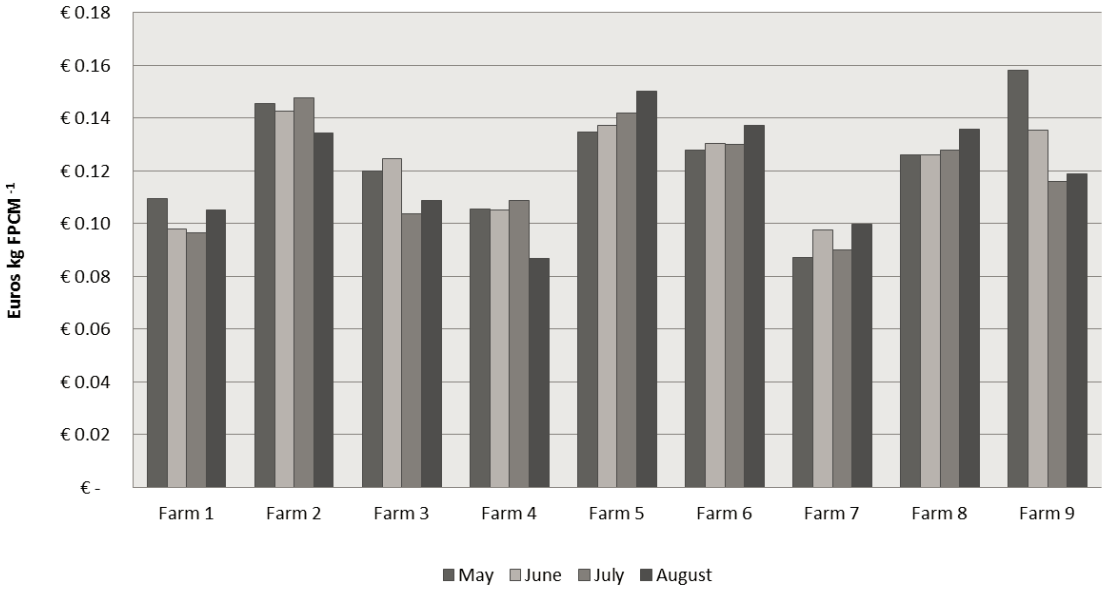

Figure 2. Feeding costs in May, June, July and August 2013 for nine commercial dairy farms.

Conclusion

Today, many farmers in the Netherlands do not focus on grassland in their operational farm management. By comparing results of individual farms in a network setting, the insight in the effect of grazing increased. This has led to increased skills of farmers, students and advisers in optimizing grazing systems.

Acknowledgements

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