Operational strategies for optimizing grazing when using automatic milking systems in organic dairy production

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Implications

Successful grazing when using AMS is possible without having to devote a great deal of time to organize and fetch cows every day. However, a careful strategy and good infrastructure, and observation of cow behaviour and pasture are necessary, and the herd has to adapt to the chosen design and routines. In practice, sectional permanent grazing, part-time grazing and structured rotational grazing have been shown to be successful, in terms of allowing outdoor grazing while still maintaining milking frequency and milk yield. In addition, part-time grazing can be combined with either of the other two systems.

Background and objectives

Automatic milking systems (AMS) are often procured with the aim of saving time on the farm, making the working hours more flexible and relieving physical constraints. The financial investment in an AMS can be considerable and the intended advantages do not directly contribute extra revenue, with economic analyses showing no or negative effects on gross margin (Bijl et al., 2007). This puts pressure on farmers that invest in AMS to increase efficiency, or at least avoid a milk yield decrease through milking frequency falling below two or insufficient feed intake. One of the strategies adopted by many farmers is to reduce grazing and provide more feed in the barn. For not compromising the beneficial effects of grazing on cow health (Burow et al., 2011), they should seek different strategies to ensure that milking frequency is sufficiently high (>2) and not fluctuating too much from day to day. Stable milking frequency per cow is necessary to avoid high somatic cell counts (SCC) and stress in the herd (Svennersten-Sjaunja and Pettersson, 2008). Strategies to secure acceptable milking frequency and stability together with grazing should not result in extra labour requirements or costs. The essential features of three successful strategies for grazing with AMS are described below.

Key results and discussion

Sectional permanent grazing
The grazing land is divided into three or four sections, with the size being dependent on grass growth rate and projected grass intake. After a milking session the cow is guided to a smart gate, which guides her on to a paddock, e.g. paddock A from 3:00 until 9:00 h, then paddock B from 9:00 to 15:00 h, etc. The cows are free to enter the barn, but are only allowed to leave if they are not due to be milked within e.g. 5-6 hours (this is a management choice). When the farmer comes out at e.g. 12:00, the cows from paddock A can be fetched inside, at e.g. 18:00 the cows from B should be fetched, etc. With only daytime grazing only two paddocks need to be used, so as to ensure that cows are not staying out for longer than their optimal milking interval. Without this system, the herdsman would have difficulties in identifying the right cows to fetch (not milked within 12 hours), and all cows would have to be fetched irrespective of the time they had spent outside. Grass intake per cow is generally higher in this system, while still giving a stable milking frequency and little stress. The system stimulates cow traffic.

Part-time grazing
Variations in pasture quality and supply over the season can be a problem, especially for high-yielding cows. A solution to this problem is part-time grazing, where cows have access to the pasture during a fixed part of the 24-h period daily and are restricted to the house and offered indoor feeding during the remaining hours. The system aims to combine the positive effects of grazing with the security of indoor feeding to ensure sufficient nutrient supply to high-yielding cows at all times. It is a flexible system that can be adapted to the pasture conditions of the specific farm and the prevailing weather conditions by varying the hours on pasture and amounts of feed offered in the house. The beneficial effects of pasture and grazing with regard to cow health and milk composition are maintained and the economic benefit of incorporating a low-cost, high-quality feed such as pasture into the diet is achieved. In an recent experiment performed in an AMS barn, a group of cows with access to part-time pasture for 9.5 h, with no indoor roughage during the first 8 h of the pasture period and *ad libitum* silage during the remaining part of the 24-h period, were compared with a group of cows with access to an exercise field 9.5 h and *ad libitum* silage 24 h per day (Andersson, 2012). The silage offered in the house and the pasture ley had a similar content of metabolisable energy (ME), 10.9 and 11.0 MJ ME per kg dry matter, respectively. It was found that the cows with part-time grazing had significantly higher milk yield than the cows in the exercise field (35.6 and 33.3 kg milk, respectively).

Rotational grazing
In rotational grazing, the pasture is divided into many paddocks, each of which can be extended daily using mobile fencing to supply the cows with some hours of new grass, whilst still allowing them to graze on the previous parts of the paddock. This means that the herd is stimulated to come outside and graze, has access to a known amount of fresh grass, but also is stimulated to go back to the house for supplementary feeding. The system can be intensified by splitting the daily access into two paddocks. This intensifies the cow traffic, and can increase the milking frequency if needed. The system needs a well-designed track pattern, which can lead the cows to and from the paddocks, each time passing the milking robot. In some herds a tendency to return to pasture, without passing through the AMS, needs to be counteracted. The advantage of the system is good, uniform grazing of the pasture with a rest period, which guarantees good ley yield. The main drawback of the system is the need for extensive infrastructure and the risk of creating stress in the herd. The system is very attractive for areas that can support grazing without ploughing and reseeding.

How was the work carried out ?

During the past 10 years of experience with AMS, different strategies have been tested in research and in practice. Farmer experience groups and farm experiments in Denmark and Sweden are background for the described systems and can be found in the authors' published work.

References

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