Grazing with a mobile milking robot

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Abstract

The size of dairy cow herds in Europe is increasing. Farmers have to manage larger herds but want, at the same time, to benefit from a normal social life. So, the milking robot can bring solutions. Its use can reduce physical labour and allow flexibility. During the past 10 years, the number of milking robots has been increased in Europe. In farm practice, this technology has resulted in a reduction in the amount of grazing, even though grazing appears as a natural practice which is appreciated by the consumers. At the experimental farm of the University of Liège we are developing the concept of a mobile milking robot in collaboration with a private company. This prototype will allow cows to graze and could be moved to different locations on pastures during the grazing season. The prototype will be used indoors during the end of the winter season and will be moved outdoor during the 2010 grazing season. The feasibility of this prototype has to be tested in the field. Milk production and quality, the number of visits and the grazing parameters will be recorded. Different equipments in view to attract the cows to the robot as the presence of a cow brush, the location of the drinking point, will be compared. The behaviour of animals will be also assessed.

Keywords: grazing, dairy cows, mobile milking robot, behaviour

Introduction

The increase in size of the dairy herds in Europe leads to reduced grazing practice. In Wallonia, in the southern part of Belgium, dairy cows still graze on most of the farms but the number of dairy farmers is decreasing and the milk quota per farm is becoming larger. Thus, grazing practice is likely to be reduced within the next years. However, grazing is associated with positive aspects such as improvements in animal health – the grazing period means generally a period of recovery (Hopster, 1996) – and in reduced labour requirements (Troxler *et al.*, 1992). The feeding costs are reduced with grazing as the harvest has not to be conducted by machines. The grazing system provides, therefore, cheaper feed than the roughage given in the barn. Regarding animal behaviour, Redbo (1990) reported a decrease of stereotypies and Miller and Wood-Gush (1991) a decrease of aggression in the herd at grazing. Furthermore, grazing is perceived positively by consumers and the picture of a grazing dairy cow on the milk carton is often used as a marketing strategy.
This project aims to develop strategies to use milking robots in pasture in order to benefit from advantages regarding feeding costs as well as animal welfare and health.

Milking robot and grazing

The number of farms equipped with milking robots is rising and the use of this system will probably increase in the next years because it allows labour costs to be reduced. On most farms, the cows remain in the barn without any grazing opportunity resulting in loss of benefits from grazing practice.
There are, however, some experiences carried out with grazing cows milked by a robot. The frequency of milking with a robot available throughout a 24-h period, the effect of different grazing routines and factors affecting the milking frequency and the behaviour were evaluated by Ketelaar-de Lauwere *et al.* (1999) on cows in the barn with an access to the pastures. They

also investigated the effects of sward heights and the distance between the barn and the pasture on the cows' visits to the milking robot (Ketelaar-de Lauwere *et al.*, 2000). They concluded that milking grazing dairy cows by using a milking robot was possible; however, the cow behaviour can be affected by the weather. The cows preferred to lie in the pasture rather than in the cubicles when they had the choice. The number of milkings increased when sward height decreased and a distance of 360 m between pasture and barn did not affect the visits of cows. Conversely, some authors obtained negative effects of the distance on milking frequency (Wredle, 2005).

The location of drinking water points is used by the farmers to attract the cows to the milking robot. Spörndly and Wredle (2005) did not find any significant difference in milk yield and milking frequency between cows offered drinking water both in the barn and in the pasture, compared to drinking water only in the barn.

The high degree of synchronisation of cows' behaviour is a problem as the cows tend to visit the barn as a group and usually enter in the milking robot in close succession (Ketelaar-de Lauwere, 2000). To counteract this problem, there is a need to use individual signals to stimulate the cows to go to the milking robot: rotation between paddocks several times a day and selection gates in the pasture can be carried out to increase visits of the robot (Woolford *et al.*, 2004).

A mobile milking robot has been used in Denmark since 2007 by an organic farmer (Oudshoorn, 2007), in Netherlands in Wageningen University in 2008 and in Germany in 2009 by an organic farmer. Oudshoorn (2007) reported an average of 1.8 milkings per cow, and observed that cows visited the milking site individually, mostly during daytime.

Description of the mobile milking robot

A prototype of a mobile milking robot that will be placed in the pasture is currently developed. The milking robot and equipments – compressor, milk separator, computer (Lely) – are located on a trailer that can easily be moved to different places by a tractor and can be lowered to ground level (Fig. 1). The milk tank is placed on another trailer designed as a conventional trailer. The two trailers are allowed to use the traffic road. The places where the robot will be operated have to be equipped with electricity points, water and facilities to collect the washing water. The trailer with the milk tank needs an easy access for milk collection by lorry.

The prototype will be used indoors at the end of the 2009-2010 winter season, and will be moved in the field during the 2010 grazing season. The feasibility of this prototype has to be tested in the field. The main challenge will be that cows visit the robot by themselves for milking. We will investigate different equipments to increase cows' welfare and to attract them to the robot area: presence of a shelter, a cow brush, drinking water near the robot, feed, lights during the night. The milk production and quality, the number of visits and the grazing parameters and the weight of cows will be recorded. The weather conditions will be also taken into account. The economy in labour and in feed costs will be calculated.

Conclusion

First results about the feasibility of the prototype in the field are expected in the summer 2010.

Figure 1. Design of mobile milking robot

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