

Research Proposal for COST DairyCare Short Term Scientific Mission February – May 2016 in collaboration with SRUC

Background

At present, a dry period before next calving is an integral part of the lactation cycle of most dairy cattle. A dry period of 6 to 8 weeks has been recommended for over a century to maximise milk yield in the next lactation. However, the conventional dry period has negative consequences related to this high milk yield. In the first three months of lactation, highly productive dairy cows experience a negative energy balance, because energy intake fails to match the increase in energy required for milk production and maintenance. The negative energy balance is related to an increase in infectious diseases, metabolic disorders and reduced fertility. Therefore, maximum milk production may not be the optimal strategy for overall productivity.

Omitting or shortening the dry period have been suggested as management strategies to reduce the negative energy balance in early lactation. Both strategies result in reduced milk yield after calving and improve the energy balance in early lactation (see van Knegsel et al., 2013 for a review).

Not much is known about the effect of dry period length and energy balance on lying and feeding behaviour. It has been speculated that a negative relationship between milk yield and daily lying time exists due to a longer time spent feeding to meet higher energy requirements. To our knowledge, large datasets of individual lying and feeding behaviour have never been combined. Moreover, some cows may be more capable of adapting to their level of milk yield in early lactation than other cows, by adjusting their feeding behaviour.

Scope

This study seeks to give insight on the effect of dry period length on dairy cow lying and feeding behaviour. It will provide insight in the interactions between behaviour and energy balance, and individual variation therein between cows.

This study will focus on the weeks around calving, because these are expected to be the most affected by dry period management. In the weeks before calving, management differences due to a dry period or continuous lactation are expected to influence lying and feeding behaviour. In the weeks after calving, negative energy balance is the most severe and differences in energy balance are expected to relate to behavioural differences.

Aims and Objectives

Aim: to determine how patterns of feeding and lying behaviour relate to energy balance and dry period length.

The objectives of the proposed STSM are

- to learn how to process and analyse the large dataset of individual feeding behaviour
- to analyse individual feeding patterns of cows with different dry period lengths
- to analyse relations between feeding patterns, lying behaviour and energy balance
- to publish research results (possibly at a Dairy Care conference)

in collaboration with Dr Marie Haskell and Prof Dr Bert Tolcamp at Scotland's Rural College (SRUC) in Edinburgh, UK.

Proposed methodology

In 2014-2015, 120 Holstein Friesian dairy cows were subjected to ‘no dry period’ or a ‘short dry period’ at a research farm in Lelystad (The Netherlands). This experiment was carried out to assess effects of dry period length on energy balance, udder health and metabolic health. For all cows, visits to the feeder, feed intake and feeding duration were measured with Roughage Intake Control (RIC, Insentec, Marknesse, the Netherlands) boxes. Simultaneously, we equipped two thirds of the experimental cows with accelerometers (IceQube, IceRobotics, South Queensferry, UK) to assess whether daily lying time was altered by dry period length. Activity data was collected before and after calving and in mid-lactation. Also, a validation study of the accelerometers was performed to separate false from true lying periods (Kok et al., 2015, accepted). The two separate experiments on lying behaviour, feeding behaviour and energy balance will be combined to analyse feeding behaviour and assess the interactions between individual behaviour and energy balance.

Expertise of project team

The applicant has already developed a threshold to filter false lying periods from the lying behaviour dataset (Kok et al., 2015, accepted). Dr Haskell and Dr Tolkamp have previously analysed patterns of lying behaviour recorded with similar accelerometers (Tolkamp et al., 2010).

Dr Tolkamp is highly experienced with data processing and analysis of feeding behaviour (e.g. Tolkamp et al., 2002). Dr Haskell has been involved in multiple projects on dairy cattle welfare, and her knowledge and expertise will greatly add to the integrative analysis of (feeding and lying) behaviour and energy balance.

Applicant for the STSM

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References

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