Scientific Report of Short Term Scientific Mission

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COST Action FA1308

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Period:	19/01/2016 to 30/04/2016
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STSM host:	Dr Marie Haskell and Prof Dr Bert Tolkamp, Scotland's Rural College (SRUC), Edinburgh, UK.

Background

Scientific

This project originated from increasing interest in shortening or omitting the dry period in dairy cows to improve energy balance, health, and fertility after calving. This study sought to assess the effect of dry period length on lying and feeding behaviour in the period around calving, and to provide insight in interactions between behaviour and energy balance.

The project built on the 'Customized Dry Period' project. 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 which feed intake was measured with Roughage Intake Control boxes (RIC, Insentec, Marknesse, the Netherlands). Simultaneously, two thirds of the experimental cows were equipped with accelerometers (IceQube, IceRobotics, South Queensferry, UK) to assess whether daily lying time was affected by dry period length. The COST funded STSM enabled a detailed analysis of feeding behaviour and a combined analysis of relations between behaviour and energy balance.

Practical

SRUC was considered highly suitable for the STSM because of the expertise of Prof Dr Bert Tolkamp (analysis of feeding patterns) and Dr Marie Haskell (animal behaviour and welfare).

Aims and Objectives

The aim of this STSM was to determine how patterns of feeding and lying behaviour relate to energy balance and dry period length in dairy cows. The main objectives were 1) to learn to process a large dataset of visits to the feeder from its raw form into feeding bouts, 2) to analyse individual feeding behaviour, and 3) to analyse relations between feeding and lying behaviour, dry period length and energy balance.

Description of the work carried out during the STSM:

The project started with one-to-one tuition about meal criteria by Bert Tolkamp. Raw data consisted of more than 300,000 visits to the RIC feeders, and a meal criterion was required to convert this data into feeding bouts, or meals, to analyse feeding behaviour most effectively. We

first spent a considerable amount of time on data quality (erroneous measurements). Then we switched from recorded visits to intervals between visits. After checking model assumptions, we applied three-population models to assess the distribution of these intervals, to separate them into visits within and between meals. A meal criterion was calculated to cluster visits into meals with maximum accuracy. When the interval between visits was shorter than the meal criterion, visits were part of the same meal. Meal data was aggregated per cow per week. Number of meals per day, meal size, feeding rate, and feeding duration within the meal were computed from -6 to 7 weeks relative to calving, for cows with a short or no dry period. Mixed models were used to analyse differences between dry period treatments and weeks relative to calving.

Subsequently, the feeding rhythm over the day was visualised in week -4 and 4 for both dry period treatments, and combined with accelerometer data collected in these weeks. These rhythms, together with known milking times, allowed a detailed analysis of the time budgets of dairy cows with and without a dry period. Finally, correlation analyses were performed between individual feeding, lying and walking data, milk yield, and energy balance in week 4.

The analyses were the basis of an abstract submitted to ISAE 2016 and a journal article for a peer-reviewed journal.

Main activities and outcomes:

- Working together with Bert Tolkamp to learn how to establish and use meal criteria (using Minitab, Genstat, Excel)
- Developing a template to calculate meal criteria from individual feed intake data in SAS
- Discussion about the relevance of a dry period and its possible implications for cow welfare with Marie Haskell and Bert Tolkamp
- Insight in cow lying, walking, and feeding behaviour in the weeks around calving, and their association with dry period length and energy balance
- Development of my international scientific network at SRUC and during conferences
- Attendance of the SRUC research postgraduate conference 2016 (Edinburgh, UK), and of the British Society of Animal Science conference 2016 (Chester, UK)
- Visit to IceRobotics company to discuss IceQube data and possible collaboration
- Abstract submitted to ISAE 2016 (International Society of Applied Ethology)
- Finalized draft of a paper, to be submitted to Applied Animal Behaviour Science

Confirmation of the successful execution of the STSM:

Confirmation letter from the host institution is enclosed in this report.

Acknowledgements

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