

Acoustic monitoring of ingestive and rumination behaviour in ruminants and the amalgamation with the RumiWatch system.

Introduction

Monitoring of ingestive and rumination behaviour performed by ruminants is important for the early detection of health problems, for the timely detection of oestrus, for the detection of impaired welfare, as well as for the estimation of intake. Depending on the conditions, direct observation is difficult to realize and always time consuming. Therefore, different systems have been developed to record and analyse behavioural characteristics automatically. Two of these systems are the acoustic monitoring system (AMS) (Ungar and Rutter, 2006) and the RumiWatch System (RWS) (Itin & Hoch GmbH, Liestal, Switzerland), which allow automatic recording and subsequently differentiation of jaw movements performed by ruminants. The AMS, consisting of a microphone, fixed with a halter on the head of the ruminant, allows measuring of the ripping and grinding sound generated by the ruminants while grazing, and of the grinding sounds generated during rumination. The RWS is based on a pressure sensor and a triaxial accelerometer embedded in a halter. This allows automatic recording and evaluation of individual, ingestive and rumination behaviour of ruminants. The pressure sensor provides a record of jaw movements performed while eating or ruminating and the triaxial accelerometer records the acceleration of head movements in the three axes.

Currently, I work with the RWS to detect the ingestive and rumination behaviour of ruminants with high accuracy. In addition, I try to estimate the intake of grazing dairy cows with the aid of the RWS records. Nevertheless, until now the RWS is not able to differentiate between mastication and prehension bites during grazing, what seems to reduce the precision of the intake estimation with the RWS data. In contrast, the AMS allows a differentiation between mastication and prehension bites based on acoustic signals. With the intended STSM I would gain knowledge of the AMS and how to use it. Further, I would learn how the problem of the differentiation of jaw movements during eating is solved. Finally, I will see which approach was used to estimate feed intake. In return, the team of Dr. Eugene David Ungar will gain knowledge about RWS, its strengths and weaknesses, and our approach to estimate intake of grazing dairy cows. In the light of the wide spectrum of the behavioural elements performed by ruminants during grazing, a combination of both systems might be beneficial. Therefore the objectives of the intended STSM are:

- Learn the utilisation of the AMS by the evaluation of already measured data of grazing sheep by manual sequencing. Moreover, try to improve the evaluation software of the AMS.

- Combine the AMS and the RWS to measure ingestive and rumination behaviours in the barn. At the same time, the accuracy of the AMS will be tested by aid of visual observation.

Besides the objectives mentioned above, further objectives are to receive an insight in another working group, institute, culture and scientific way of working. Moreover, to building up connections between Agroscope, the University of Bonn and the Department of Agronomy and Natural Resources in Bet Dagan.

Chronological sequence

Date	Proceed
04.09.2016	Arrival
05.09.2016	Learn to work with the AMS.
06-13.09.2016	Manual sequencing of data, already measured by the AMS.
14.09.2016	Equip the experimental cows with the combined AMS and RWS.
15-16.09.2016	Detect the accuracy of the AMS/RWS system by the aid of visual observation.
19-23.09.2016	Evaluate the raw Data measured by the AMS/RWS combination.
24.09.2016	Departure

References

Ungar, E. D. and S. M. Rutter. 2006. Classifying cattle jaw movements: Comparing IGER Behaviour Recorder and acoustic techniques. Applied Animal Behaviour Science 98(1-2):11-27.