

Sound Analysis of Dairy Cows

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The ambition of modern farming is to have a productive, healthy and happy livestock. To achieve this, there is a growing demand for information about the individual animal as well as the group. However, because of the growing number of livestock per farm there is less time for the farmer to observe each individual animal [1, 6].

Precision Livestock Farming (PLF) supports the farmer in giving each individual animal sufficient attention. PLF is technology which is used to continuously measure parameters such as activity, feed intake or oestrus activity. Examples of PLF using sound sensors are found in pig farms. In 2001 Vandermeulen et al. examined the correlation between image and sound recordings from pigs. He concluded that the use of video and audio data has potential as a tool to improve livestock welfare. The use of sensors can facilitate monitoring large livestock groups [5].

The use of sound analysis in cows was studied by Temple Grandin [3]. She showed that cows vocalised significantly less when they were not pushed with electrical sticks to the place where they got slaughtered. This may indicate that the mooing is generated by stress or pain caused by the electrical stick. It is interesting to investigate whether the behaviour of a cow can be predicted by their uttered sounds. Noise analysis could be used as an early warning tool, for example to detect anxiety or oestrus.

In this study, we recorded sound and behaviour from dairy cows by audio and video recordings. Four cameras and microphones were placed in a modern dairy farm in Herwijnen, The Netherlands. Three cameras and microphones recorded dairy cows, one camera and microphone recorded heifers between four and ten months of age. First a 5-days period of 10 recording hours per day was used to test the technical installation and to adjust microphones and cameras. Dampers were installed for noise reduction. Next, recordings were made for 17 days, 10 hours per day. Two days of recordings were discarded due to technical problems, and the remaining 15 days of 10 hours of synchronised audio and video recordings were analysed.

After the background noise was filtered out, the calls of cows were traced and if possible linked with the simultaneously expressed behaviour. The behaviour was determined with the use of an ethogram. Video analysis was conducted using The Observer XT 11.5 (Noldus Information Technology B.V.). The calls were classified into different groups based on frequency, amplitude and wavelength using UltraVox 3.0 (Noldus Information Technology B.V.). Statistical analysis will demonstrate whether there is a significant resemblance between the classified groups and behaviours.

This study is the first step towards using sound analysis as a tool for dairy cattle management. If behaviour can be predicted with sound sensors, dairy farmers can be alerted quickly when stress calls are detected. Welfare, health and growth of young cattle is strongly influenced by stress [2, 4]. With the use of sound detectors, management of these problems will become more easy.

References

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