

TOWARDS BETTER CLAW HEALTH REGISTRATIONS USING CAMERAS AND ARTIFICIAL INTELLIGENCE

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Introduction and Objectives

Valid recordings of claw lesions are important. The farmer gets an overview of claw health status in the herd forming the basis for prophylactic actions and follow up on lame cows. Breeding organizations can incorporate claw recordings in breeding cows more resistant to claw lesions. Although claw lesions are often recorded using electronical systems, claw trimmers record lesions very differently (Capion et al., 2021). The objective of this project is to improve the validity of claw recordings using cameras and artificial intelligence (AI).

Materials and Methods

Within a four-year project, 2023-2026, we aim at developing an automatic system consisting of a computer connected to ear tag readers mounted on a trimming chute and to four cameras mounted above the brackets fasten each foot at trimming. Videos of all claws are recorded during trimming and stored in the computer. Using computer vision technology, a combined sequence of three AI algorithms to i) detect dirt and other elements covering the camera lenses, ii) identifying trimmed claws and iii) identifying eventual lesions and treatments are developed and installed in the computer. Cow ID-data from the reader are merged with the recorded trimming, lesions, and treatments. The combined data are shown in real time on a monitor on the chute enabling the trimmer to evaluate the automatic recordings and make corrections if needed. Finally, recordings are uploaded to a central database.

Preliminary results

By April 26th 2024, four cameras have been mounted on one chute. Plans have been made for placing cameras on three more chutes to collect data to further improve the AI algorithms. More than 1000 hours of videos of claw trimming have been stored. During trimming of the first 450 cows only 83 percent of the ear tags have been read as the metal construction of the trimming chutes interfered with the electromagnetic field created by the readers. A method using a handheld reader, which can be pointed at the ear tags more precisely, is being developed. Thus far, we have developed and tested the algorithms for i) and ii) with a preliminary accuracy of 100 and 97,5 pct, respectively. Further testing is needed. From one of the authors (NYC) pre-project photo-database, 537 pictures of 22 different claw diseases have been annotated and used for training the third algorithm. The stored videos will be used later for further training of the algorithms. We expect to have preliminary results regarding lesion detection ready in early summer 2024.

Conclusions

When finished, valid claw recordings at trimming will automatically be transferred to a central database. From here the farmer can extract the recordings and evaluate the claw health status. Also, breeding

organizations, with access to the central database, can use the data for breeding cows more resistant to claw lesions.

References

Capion N, Raundal P, Foldager L, Thomsen PT. 2021. Status of claw recordings and claw health in Danish dairy cattle from 2013 to 2017. *The Veterinary Journal* 277, 105749.

