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Content

This NewsLetter is dedicated a project in the development of automatic and manual technologies for early identification of production diseases in dairy cows – a project under DaNet supported by the program “Bæredygtig Teknologi i Jordbruget”, Ministry of Food, Agriculture and Fisheries.

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The structural developments in dairy farming have led to increased farm size. Farm staff therefore has to identify production diseases and other problems on a considerably larger number of animals than before. Further, the frequency of health and reproductive problems appears to be greater in modern, high yielding herds. The need for equipment capable of identifying ”risk cows”, with developing diseases, is consequently increasing.

Early identification of production diseases in high-tech barns

Vision

The vision of the project is to develop automatic and manual technology for early identification of production diseases in dairy cows in future high-tech barn systems with the overall aim to reduce the incidence and severity of production diseases and improve production of dairy cows. Further, the developed technology is expected to improve animal welfare, product quality, food safety and profitability to benefit both producers and consumers. The success of the project will be secured by maintaining a strong biological basis in the developed system combined with state-of-the-art technology and statistical methods and further development of dynamic collaboration between technical and biological research groups and the dairy industry.

Focus

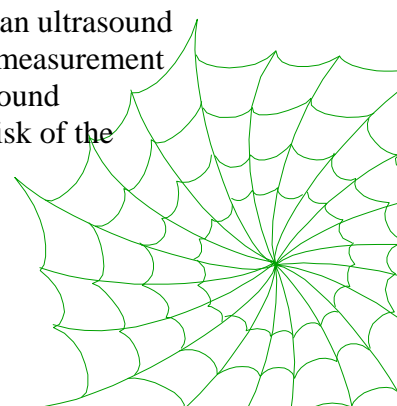
The focus is on fatty liver, liver abscesses and lameness in dairy cows. Early identification will be pursued through research in:

- ❖ an experimental ultrasound method for quantification of liver fat content and diagnosis of liver abscesses
- ❖ an automated system for early identification of lameness in cows based on locomotion characteristics and claw pressure distribution



Ultrasound for quantifying liver fat content and identification of liver abscesses

The experimental set-up will include a number of ultrasound transducers and an ultrasound instrument capable of storing all recorded data in each individual pulse-echo measurement and collecting the signal information of the entire frequency spectrum. Ultrasound measurements and liver biopsies will be collected around calving where the risk of the

A decorative spiderweb graphic in the bottom right corner of the page.

disease is highest. A detailed analysis of the microstructure in the echo signal of the liver will be conducted using advanced multivariate statistics. The experimental set-up for measuring liver fat content will be calibrated against liver fat content based on laboratory analysis of liver biopsies and information on the micro structure. Ultrasound measurement has been initiated and the time signals analyzed, and the development of software for frequency analysis is started.



Steen A. Nielsen from Force Technology performing ultrasound measurements in the experimental set-up, April 2005

Currently, ultrasound equipment is used to study the anatomical characteristics necessary for the determination of liver abscesses. Further, a method has been developed for systematic scanning of fattening bulls and dairy cows and data from a number of animals has been stored for later comparison to macroscopically findings. Further studies will be conducted to clarify the diagnostic ability of the system.

Identification of lameness in cows

State-of-the-art sensor technology is used for measurement of force and pressure distribution in the design, construction and calibration of an experimental set-up for automatic computerised analysis of locomotion characteristics of standing and walking cows and detection of lameness. Software will be developed for the acquisition of sensor signals, pre-processing of the data and extraction of force and pressure parameters to detect changes in locomotion characteristics for automatic identification of lameness. The locomotion characteristics will be described in healthy cows and cows with diagnosed lameness for identification of the most significant force and pressure indicators of the diseased state and the optimal set of ground reaction force and pressure parameters for automatic identification of lameness. In 2005 a pilot study will initiate the calibration of equipment for the detection of lameness in cows and the design of trials for quantification of the variation in locomotion characteristics.

Topics of coming newsletters

ISAC – Intelligent Sensor for Autonomous Cleaning in livestock buildings
Robotics in agriculture

