



The intelligent barn - FBN scientists set new standards

Measurement accuracy of tracking systems for livestock has been significantly improved - for stable management with animal welfare in focus

Everyone knows them, many wear them on their wrist - fitness tracking devices. But tracking systems have also long been established in the field of livestock husbandry. Increasingly, video or indoor tracking systems are being used to record individual parameters, such as how long the animals lie down. However, the information could also be used to research the social behaviour of farm animals, such as dairy cows - but this requires a particularly high measurement accuracy and time resolution.

Efficient and intelligent barn management that puts the welfare of the animals first is a highly complex challenge for farmers. With the help of a real-time tracking system, also called RTLS, they can track the activities of their animals in the barn. To do this, sensors are installed in the barns that communicate with tags attached to the cows' collars (Fig. 1). These tags provide data every second about where the animal is in the barn and can be used to find out when and how long it stays in one place. These results provide clues as to where the animals prefer to stay, how long they are busy feeding or how many hours they spend in their cubicles. Based on these observations, farmers can draw conclusions about the health and well-being of their animals and adjust the housing conditions.

More accurate tracking data for improved animal welfare

An important aspect for the welfare of farm animals is their social relationships with each other. In order to be able to study the social behaviour of animals, it is necessary to record how long and how often two animals spend time together. To study social behaviour using RTLS, high data quality is necessary. Researchers at the FBN were able to show that the RTLS data quality is significantly optimised when the barn is measured with pinpoint accuracy, which in turn led to an improved allocation of zones (e.g. lying zone, feeding zone) in which the animals stayed and moved. The much higher measurement accuracy due to more precise calibration of the RTLS provides more accurate data that require fewer steps for data processing. In addition, the researchers were able to show that a zone approach offers advantages over a distance-based approach: It can be applied more easily in different barn concepts and is thus much more practice-oriented.

Follow-up project: Can cows make "friends"?

A first possible application will be tested in a follow-up project to find out whether dairy cows prefer positive relationships with each other and how group dynamics develop. "Important information can be read from the social behaviour of the animals, which can be used to improve their well-being and health," explains Dr Jan Langbein from the Institute of Behavioural Physiology at the FBN. "If we find out which dairy cows prefer to stay together, i.e. maintain close 'friendly' relationships, this

can be taken into account in future herd management. As a result, the stress level of the animals will be lowered and their health will be promoted."

The study on the improved measurement accuracy of the RTLS was funded by the BMBF and published in the journal "Computers and Electronics in Agriculture"* under the project management of Dr Nina Melzer from the Institute of Genetics and Biometry at the FBN. "We have developed detailed recommendations for the installation and validation of an RTLS and were able to show that this is particularly important for studies of social behaviour," explains Dr Nina Melzer, "This not only opens up new fields of research in the field of behavioural research, but also enables farmers to improve barn management with a focus on animal welfare."

***Original publication**

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Photo: FBN/Nina Melzer



Dr. Borbála Fóris puts a collar with tags on a cow to record movement data. In the barn, measurements are based on ultra-wideband (UWB), while grazing animals are recorded by GPS data.

Suggestion: Simplified graphic or other cow photo