## 1. Animal Welfare Workshop

## Title presentation

Use of a respiration rate sensor in dairy cows as an animal-based welfare indicator

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## Abstract

The present investigation was a pilot study to test the usability of a new developed sensor for respiration rate (RR) as an animal-based indicator in dairy cows. The measurement of RR in cattle is an important and essential indicator to monitor health and well-being. A common method to record the RR is to count the flank movement visually. This method is time-consuming, labor-intensive and not constantly possible. In addition, the presence of the observer can cause stress and hence affect the RR of the animal, which can falsify the measurements. Thus, we developed a sensor device to measure RR continuously and automatically. During the pilot study, data were collected from 6 lactating Holstein Friesian dairy cows (1st to 5th lactation) housed in a naturally ventilated barn in Groß Kreutz (Germany). The system consisted of a differential pressure sensor, a microcontroller and software to analyse the data. A halter positioned the sensor on the jaw, fixed on the right side of the head. A flexible silicon tube connected one port of the pressure sensor with the left nostril and ended in the nasal cavity. Data collection for the pilot study took place on two days and one night (five cows 0800h to 1800h the same day and one cow 0800h to 0800h the following day). Cow body posture (standing vs. lying) was documented during the data collection and videos were made regularly for the visual counting of RR afterwards. The results showed a positive correlation between visual and automatic counted RR (in beats per minute, bpm) in lying (r=0.98) and standing cows (r=0.99). Ongoing studies with an evolved RR sensor during summer showed the influence of heat stress on the RR. With increasing temperature and temperature humidity-index (THI≥68) the RR increased from 35±0.99 to 75±1.39 bpm (MW±SE). The RR of lying cows was higher than that of standing cows. By continuously measuring the RR, it is possible to react early to an increasing RR (for example due to heat stress or disease) and to promote the welfare of the animals individually or on a herd basis. In conclusion, the results of the study showed that a continuous measurement of RR is possible without disturbing the cows. The behaviour of the animals was not influenced during the trial. Further tests and developments with the software and the sensor device are already in progress.