EARLY WARNING SYSTEM TO DETECT PIG BEHAVIORAL CHANGES ASSOCIATED WITH HEALTH AND WELFARE CHALLENGES

WP3 Early detection / Pigs / Deep learning-based feeding detection method

HEALTHY LIVESTOCK

Using antimicrobials in animals contributes to the rise and spread of antimicrobial resistance. By doing so it reduces the availability of safe and effective medicines against infectious diseases for both humans and animals. HealthyLivestock is a research project aiming to find ways to reduce the use of antimicrobials in livestock by improving the health and welfare of the animals.
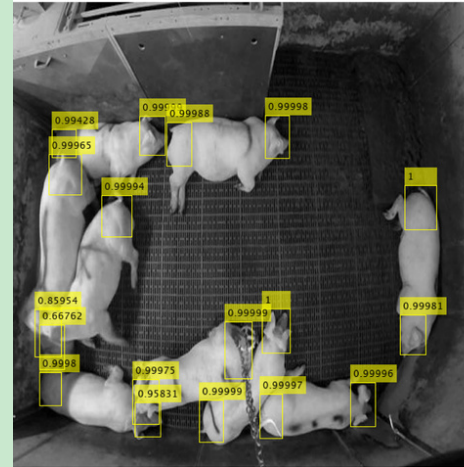
EARLY DETECTION

Continuous monitoring of changes in animal behaviour that occur during the onset of diseases can have great value for the early detection of health issues. Several techniques applying the principles of precision livestock farming can be used to detect at an early stage the emergence of health problems, like digestive or respiratory diseases. The earlier the deteriorations in the animals' health status are detected, the earlier mitigating measures to prevent further escalation of the problem, can be implemented. This will reduce the need to use antimicrobials for the treatment of infectious diseases. In addition, it will benefit the welfare of the animals and their performance. It will also lead to clear financial advantages, as the diagnosis can be established before the costs of treatments rise and animals are lost.

Automated recording of feeding behaviour can potentially be a useful tool for the early detection of health and welfare challenges of commercial pigs. Several methods can be used to record feeding behaviour such as Radio Frequency Identification with electronic ear tags, video or audio surveillance.

Why is Early Detection important?

It is essential for timely intervention to enhance treatment success, reduce the impact on welfare, and promote sustainable pig production. Behavioural changes that precede or accompany subclinical and clinical signs may have diagnostic value. Often referred to as sickness behaviour, this encompasses changes in feeding, drinking, elimination behaviours, social behaviours, and locomotion and posture.

a) AFBI Experimental Dataset   b) AUF Experimental Dataset
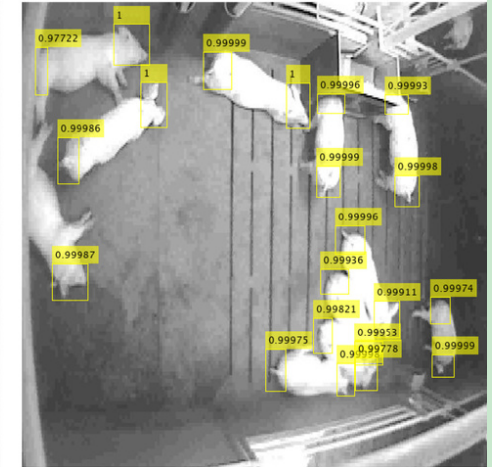
HEALTHYLIVESTOCK ON DETECTION OF DIARRHOEA EARLY IN WEANED PIGS

Automated, vision-based early warning systems have been developed to detect behavioural changes in groups of pigs to monitor their health and welfare status. In commercial settings, automatic recording of feeding behaviour remains a challenge due to problems of variation in illumination, occlusions, and similar appearance of different pigs. Additionally, such systems, which rely on pig tracking, often overestimate the actual time spent feeding, due to the inability to identify and/or exclude non-nutritive visits (NNV) to the feeding area.

To tackle these problems, HealthyLivestock developed a robust, deep learning-based feeding detection method that does not rely on pig tracking and is capable of distinguishing between feeding and NNV for a group of pigs.

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RESULTS

- The method showed to be robust enough to apply under a variety of circumstances, e.g. fluctuations in natural lighting and pig body size.
- The method was capable of distinguishing between feeding and non-nutritive visits (NNV) to the feeding area. With respect to other video surveillance systems, the present method is faster.
- The fast prediction time with Google Net data architecture facilitates on-farm deployment.
- The value of changes in NNV behavior has shown to be a sensitive indicator of declining health and welfare problems of pigs.
- The automated video recording of feed and NNV behavior was able to identify subtle changes that are impractical to quantify manually and therefore early detection, through automation, allows for timely intervention to prevent a further reduction in animal welfare and associated economic losses.
- The video can detect interactions between multiple pigs using only video surveillance and it's suitable to be used in commercial settings.
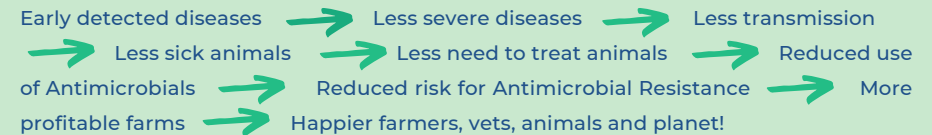
WHAT CAN YOU DO YOURSELF?

HealthyLivestock survey identified that from 600 farmers in 4 different EU countries, more than 35 % of the farmers found the Real Time Warning System innovation useful and more than 30% would likely adopt it

Camera sensors are cheap, commonly available, have a simple implementation, and are easily used to collect information compared to other sensor systems in precision pig farming. Cameras have ample chance to monitor pigs with high precision at an affordable cost. Changes in the frequency and duration of drinking behaviour are frequently an indicator of infection.

- Video surveillance is therefore a suitable technology to identify drinking and feeding behaviour in pigs, it may help farmers and veterinarians to focus on specific individuals that need particular attention at a given time.

Early detected diseases → Less severe diseases → Less transmission → Less sick animals → Less need to treat animals → Reduced use of Antimicrobials → Reduced risk for Antimicrobial Resistance → More profitable farms → Happier farmers, vets, animals and planet!

If you want to know more about this topic **visit** https://rebrand.ly/WP3EarlyDetection or **scan** this QR code