Session 2.1: Advances on monitoring welfare at group and individual level.

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EXPLORATION OF USING ANIMAL-BASED PARAMETERS (ACTIVITY LEVEL AND RESPIRATORY HEALTH STATUS) COLLECTED BY SENSORS TO MONITOR PIG WELFARE ON FARM

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Using sensor technology to support monitoring the environment and animal welfare on farm is becoming a common practice. An EU-funded project, ClearFarm, aims to use the data collected by PLF (Precision Livestock Farming) sensors to build an algorithm to assess animal welfare continuously across the value chain, with the focus on pig and dairy cattle farming. To achieve this, parameters collected by PLF sensors should first be contrasted with reference indicators reflecting the welfare status of the animals. The objective of the present study was to investigate the potential of animal-based parameters (in pigs) calculated by PLF sensors, by contrasting them against aggression-related lesions and physiological biomarkers. The study was conducted in two Spanish commercial pig farms, one nursery farm and one fattening farm. Two commercial PLF sensors were used on both farms: Peek Analytics (Copeeks SAS, France) and SoundTalks (SoundTalks NV, Belgium). Peek Analytics collected environmental (temperature, humidity, NH_3, and CO_2) and animal-based data (activity level, and number of active/inactive animals). SoundTalks collected environmental (temperature) and animal-based data index on respiratory health (ReHS: respiratory health status). Activity level was calculated by tracking the movement of each pig per unit of time. ReHS is a score from 0 to 100: <40 indicates high risk of respiratory health problem; 40-60 indicates potential respiratory health problem; and >60 indicates healthy animals. Sixty males and females (30+30) of each farm were randomly selected for skin lesion scoring (ear, head to fore legs, and trunk) and saliva sampling. There were two sampling points (beginning and end of the stage) in the nursery farm, and three (beginning, middle, and end of the stage) in the fattening farm. Stress (cortisol, sAA: salivary α-amylase, BChE: butyrylcholinesterase, and oxytocin), inflammatory (Hp: haptoglobin), and immune system biomarkers (ADA: adenosine deaminase) were analyzed from the saliva samples. Preliminary results showed that when temperature, humidity, or NH_3 increased, pigs increased their activity ($P<0.05$). On the other hand, ReHS was higher when humidity decreased, or when CO_2 increased ($P<0.05$). The increase of activity was linked to the increase of ear lesion counts ($P<0.05$), total lesion counts ($P<0.07$), Hp ($P<0.05$) and BChE ($P<0.05$), and the decrease of oxytocin ($P<0.05$). ReHS was positively associated with Hp ($P<0.05$) and sAA ($P=0.06$). Overall, the change of activity or ReHS may reflect the change of the environmental conditions, which can affect the aggression level and the physiological status of the pigs. In conclusion, continuously recording animal-based parameters collected by PLF sensors, such as activity level and ReHS, may be useful to monitor animal welfare. Nonetheless, exploring more relevant animal-based parameters by sensor technology, especially covering parameters reflecting other welfare domains, will provide a better picture of the real-time welfare status of the animals.