RESEARCH**ABSTRACT**

ANIMAL WELFARE

Title: Evaluation of the Kinect v2 motion-sensing camera to develop a rapid and effective tool for identifying compromised pigs. – **NPB #16-122**

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Scientific Abstract:

Ensuring the health and wellbeing of pigs is of the utmost importance to the swine industry. As such, there is a need for a real-time system that can identify changes in pig activities, as well as activity patterns to accurately identify compromised pigs prior to observance of visible clinical symptoms by facility personnel during daily checks. Therefore, a novel computer vision system (depth-sensing camera coupled with multi-ellipsoid fitting and deep learning detection) which automatically identifies, maintains identity and continuously tracks the activities of group housed pigs was evaluated. Within a commercial nursery, the system was installed over a single pen with 15 newly weaned pigs (24 d of age) and continuously collected data upon introduction of pigs for a period of 4 d. Within the Animal Science Complex at the University of Nebraska – Lincoln (UNL), 28 newly weaned pigs (21 d of age) were stratified by gender/litter and randomly assigned to one of two mixed gender pens. The system was installed over each pen and continuously collected data for 15 d. Evaluation of 1,020 randomly selected frames indicated an 99.8% accuracy rate for correctly identifying pigs' location, body orientation and identity when classified by the system as standing/walking. When classified as lying, orientation/identity accuracy was reduced to 92.5%. Classification accuracy for activities was 99.1, 93.6, 97.3, and 80.0% for lying, standing/walking, at the feeder and at the waterer, respectively. Activity data generated from the UNL trial indicated that during the first 15 d of the nursery phase, the average time spent 78.3, 17.5, 6.5, and 0.6% of time lying, standing/walking, at the feeder, or at the waterer, respectively. Average daily distance traveled was 1,213.6 m (range: 876 - 1,438 m). Results indicated that time associated with each activity changed over time ($P \leq 0.001$). On d 15, time lying and time at the feeder were greater ($P \leq 0.001$) than d 1 (8.0 and 6.0%, respectively). Time standing/walking and time at the waterer were less on d 15, when compared to d 1 (9.6 and 0.7%, respectively). Gender had no effect ($P \geq 0.25$) on time lying, walking, at the feeder, or total distance traveled. Gilts spent less ($P = 0.007$) time standing and more ($P = 0.03$) time at the waterer than barrows. Results suggest that the novel computer vision system has the capability and sensitivity to accurately identify, maintain identification, and track the activities of group housed nursery pigs.