ASPA 26th Congress

Turin (ITALY), June 17–20, 2025

#ASPA2025

ASPA 26th Congress Book of Abstract

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ranging from 0.5 to 0.95, along with precision and recall values of 0.88 and 0.90, respectively. These metrics highlight the model's ability to accurately detect individual cows while minimising false positives and negatives. Moreover, the system maintained an inference speed of 7.57 milliseconds per image, making it suitable for real-time applications on commercial farms. The findings underscore the transformative potential of computer vision systems in monitoring and improving the welfare of dairy herds. This study represents a significant advancement in integrating non-invasive, scalable monitoring technologies in Precision Livestock Farming, paving the way for data-driven interventions that enhance both animal welfare and economic sustainability.

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O046

Computer vision for monitoring feeding behavior of dairy cow

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Monitoring the feeding behavior of dairy cows is an important aspect of managing herd health and optimising productivity. This study investigates the application of computer vision techniques to analyze the time dairy cows spend at the feeding lane. Using an artificial vision system, 19 Holstein dairy cows were monitored continuously in an experimental barn located in Ozzano, Bologna. RGB images were captured using a camera connected to a personal computer. The video was annotated by assigning unique IDs to each cow based on their morphological characteristics. The dataset adopted in the study consisted of 7,200 frames, used 70% for training, 10% for validation, and 20% for testing. Before training the model, data augmentation techniques including changes in geometry and alterations in lighting and contrast have been applied. For this study, the pre-trained YOLO(v.8) weights were used and then has been refined with a training process of 100 epochs applied to the collected dataset. The codebase was developed using Python 3.10.12 with OpenCV 4.8.0 for image processing. PyTorch(v2.2.1) serves as the fundamental deep-learning framework. The trained model was used to identify the region of interest (ROI) at the feeding lane. The feeding behavior was analyzed by comparing the times spent by individual cows at the feeding lane, as predicted by the model, with the ground truth annotations. This comparison validated the approach's accuracy and demonstrated its potential for practical livestock managements applications. Key metrics such as Precision, Recall and mAP50 were calculated, revealing an average accuracy of about 67% for animal identification. The outcomes highlight the potential of automated systems for providing accurate and continuous monitoring of certain activities which can be used as indicators of individual animal health and welfare. Moreover, the research uses computer vision technology to demonstrate an innovative method for advancing precision livestock farming and offers a system for improving dairy herd management practices.

O068

Environmental changes and hen spatial distribution in cage-free systems: A preliminary study

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This study aimed to evaluate hen distribution and changes in environmental conditions within a multi-tiered aviary system, considering the effects of tier height and hen genotype. Additionally, the relationships between hen distribution and environmental conditions were assessed. Environmental variables, including CO_2, NH_3, and particulate matter (PM_1, $PM_{2.5}$, PM_4, PM_{10}), as well as hen distribution at the different levels, were monitored at three heights, i.e. ground floor (10 cm), mid-tier (180 cm), and upmost tier (270 cm). Data were collected in winter over a three-week period (31 to 33 weeks of hen age) in two aviary pens (225 hens per pen), each housing a different genotype (white or brown; Novogen Layers). Hen distribution (% of observed hens through video-recordings) was influenced by genotype, with a higher proportion of white hens observed on the mid-tier (13% vs. 8%; $p < 0.001$) compared to brown hens, while a lower proportion of white hens were observed on the ground floor (26% vs. 28%; $p < 0.05$). Environmental conditions changed with genotype and tier height. Higher air values of CO_2, NH_3, $PM_{2.5}$, PM_4, and PM_{10} (ranging from +9% to +38%; $p < 0.001$) were recorded in the pen with brown hens compared to the pen with white hens. Then, significantly higher CO_2 and particulate matter (ranging from +17% to +48%; $p < 0.001$) were observed on the mid-tier compared to the upmost tier and ground floor, whereas NH_3 concentration were highest on the ground floor (+53%; $p < 0.001$) compared to

the tiers. The concentrations of CO_2 and NH_3 showed weak correlations with hen distribution on the ground floor ($r = 0.16$; $p < 0.05$) and at the tiers ($-0.09 < r < -0.28$; $p < 0.05$). In contrast, concentrations of $PM_{2.5}$, PM_4, and PM_{10} were moderately correlated with hen presence on the ground floor ($r = 0.37$; $p < 0.001$) and mid-tier ($-0.43 < r < -0.40$; $p < 0.001$), while weaker correlations were found at the upmost tier ($-0.29 < r < -0.25$; $p < 0.001$). In conclusion, hen genotype and tier height significantly influenced hen distribution and environmental conditions within the aviary. Brown hens showed a preference for the ground floor, where higher NH_3 concentrations were recorded, while white hens primarily occupied the aviary tiers. Elevated levels of CO_2 and particulate matter were observed in the mid-tier.

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O184

Development of an image analysis system at the slaughterhouse to assess laying hens' welfare on farm

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In the poultry sector, artificial intelligence could be a valuable means to ensure better farm welfare conditions and meet consumers' demands, which are increasingly directed towards the choice of 'welfare-friendly' products. Much of the research in the field is focused on farm welfare where systems have been developed to detect behaviours, health or sounds automatically. However, some evaluations conducted directly on animals at the slaughterhouse may be iceberg indicators of poor on farm welfare conditions. The slaughterhouse represents a crucial and strategic point where evaluations can be carried out efficiently and quickly as it receives many animals daily, processed under standardised conditions. Last but not least, technological innovation and automation could support and facilitate veterinary inspection in monitoring such large numbers. In farmed laying hens, one of the main animal welfare consequence is bone lesions, including keel bone fractures, which, in addition to causing pain and suffering in the animals, can affect production performance and consequent economic damage. The causes for keel bone lesions are many and complex. Despite commonly linked to high egg production, husbandry systems, genetic lines and management practices also play fundamental roles in the onset and frequency of this problem. To gain an understanding of the welfare conditions on the farm and hypothesise corrective actions in the situations of most significant risk, the present research project focused on the development of an image analysis system that allows the automatic recognition and classification of keel bone lesions in laying hens. To this purpose, laying hens of brown genotypes in the slaughter line of a commercial plant in north-eastern Italy were filmed using a smartphone. 600 frames containing approximately five hens each were extracted from the videos obtained. On video, keel bone detection and lesion assessment were carried out by three different annotators using a three-score scale (0;1;unclassifiable). A total of 1443 images were obtained by applying the preprocessing and data augmentation steps. Finally, a YOLO11 model was trained. A mAP@50 value of 0.74 was obtained for the keel bone detection phase and an F1-score of 0.71 for the classification phase. The results obtained are preliminary and subject to improvement. The following steps will involve improving of the image dataset.

O495

Evaluating infrared thermography for early detection of subclinical mastitis in dairy cows: the impact of *Staphylococcus aureus* infections on udder skin temperature

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Mastitis is regarded as the most significant technopathy affecting the overall sustainability of dairy cow farms, as it causes economic losses and is a common cause of antibiotic consumption in dairy cows. Early detection of subclinical intramammary infections is essential to mitigate antibiotic dependency, reduce milk loss, and enhance animal welfare. Among the new technologies that are seen with increasing interest is infrared thermography as its application may help identify early changes in superficial skin temperature in the mammary gland that could predict the occurrence of clinical mastitis. In this study, we aimed at evaluating the effect of intramammary infection by