

The relation between impaired gait and automated monitoring of broiler flock activity levels

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Leg deformities and lameness cause a major welfare concern in the European poultry industry. In this study, the aim was focused on the relation between bird activity, measured from camera images, and broiler gait score. Within the EUPLF-project, broiler gait was manually assessed on a discrete [0-5]-scale according to the Welfare Quality Protocol by trained local human experts in five commercial broiler farms spread over four European countries. Assessments (n=88) on 129±37 birds were done in week 3, 4 and 5 of the rearing period. Flock Gait Score (FGS) was calculated as the mean gait score value of the flock during the assessment. Bird activity was automatically monitored with a Precision Livestock Farming tool, four cameras of the eYeNamic™ system mounted at the ridge of the house in top-down perspective. Flock activity level was calculated from the difference between the two consecutive (697±120 millisecc. interval) snapshot images of the floor space below. Flock activity level (ACT) was calculated as the mean value of all daily measured activity samples. Data analysis showed a significant Spearman correlation ($r=-0.76$; $P<0.001$) between FGS and ACT, and we may conclude that there is a significant negative correlation between activity level and gait score in broiler flocks. The significant linear regression equation $FGS = 2.85 - 0.21 \times ACT$ was found ($F_{(1,86)}=104.59$, $P<0.001$), with an R^2 of 0.55. Higher activity levels are associated with lower gait scores, i.e. better animal gait. The linear trend is clear in all farms ($R^2=[0.53-0.74]$). Both the activity level and gait score are influenced by the age of the birds. The Bland-Altman plot showed that both measurements were unbiased with a mean difference of 0.00 ± 0.42 . The 95% lower limit of agreement is -0.83, and the higher limit of agreement is 0.83. This might indicate that the activity level of the flock is a rather weak single predictor for flock gait score. These results suggest that there is potential for the continuous automated assessment of gait scoring through the fully automated and continuous measurement of flock activity levels in the broiler house.