

## **Automated activity recordings throughout life in broilers: heritability of activity and the relationship with body weight**

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Broilers are commonly housed in large groups and have a uniform appearance, which makes it difficult to collect health, welfare and performance data at the individual level. However, individual activity levels of broilers have been suggested to be related to different health, welfare and performance traits and may therefore have potential to serve as a proxy for these traits. In the current study, we recorded broiler locomotor activity, i.e. distances moved, throughout life using a passive high frequency radio frequency identification (RFID) tracking system. The aim of this study was to estimate genetic parameters for locomotor activity in broilers and to investigate the relationship between body weight and activity over time. The RFID system consisted of a grid of 30 antennas underneath the bedding of the home pen, that could detect the presence of individual birds wearing an RFID leg tag. This tracking system provided information on birds' locations, i.e. antenna grid cells, over time, allowing for estimation of distances moved by individual broilers. In our previous work, we compared the recorded distances from the RFID system to distances on video and observed a correlation of  $r_s = 0.82$  (95%-CI 0.61-0.92,  $p < 0.001$ ). In the current study, 387 purebred broilers, originating from 31 sires and 96 dams, were fitted with an RFID leg tag at one-day-old and their activity in the home pen was recorded continuously until slaughter age. Furthermore, we recorded the individual birds' body weight every week. The study was performed on a broiler farm in the Netherlands and data were collected under control of Cobb Europe. This study was not considered to be an animal experiment under the Law on Animal Experiments, as confirmed by the local Animal Welfare Body. To estimate genetic parameters for activity, a linear animal model was implemented using the average activity from day-old until slaughter. The overall average activity in broilers is moderately heritable ( $h^2 = 0.32 \pm 0.11$ ), suggesting a potential to select for increased activity. Moreover, a decrease in heritability was observed as the broilers aged. Furthermore, we studied the relationship between body weight and activity over time. The results indicate that selection for increased activity early in life does not directly result in selection for a reduced average daily gain. Given the expected relationship between activity early in life and leg health, the results of this project can potentially help to improve welfare of broilers.