

## A meta-analytical approach to broiler performance and welfare

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**Abbreviated Title:** Meta-analysis on broiler performance and welfare

### Summary

With the larger aim of developing a model for optimal broiler management, that considers welfare and sustainability aspects, the impact of main management factors on broiler welfare and performance reported in the scientific literature between 2000 and 2016 was quantified through a meta-analysis. Predictive equations of effects of gender (female/male/mixed), genetics (A/B/A×B/C/other), initial age (days), density (SD; kg/m<sup>2</sup>), group size (GS; n), bedding material (yes/no), hours of light (HL; h), scotoperiod division (yes/no), feeding phases (1/2/3/>3), environmental control (EC; yes/no), environmental enrichment (yes/no), medication (yes/no) and significant interactions on average daily gain (ADG; g/day), average daily feed intake (ADFI; g/day), feed conversion ratio (FCR; ADFI/ADG), mortality (%), behaviour (% of time) and gait score (mean value/treatment) were developed using multiple regression, linear mixed models on 75 experiments. At higher SD and smaller GS, ADG and ADFI were higher (P<0.001) and time resting longer (P=0.022). FCR was higher at high SD, although increase with SD was more apparent at larger GS (P=0.027). The increase of ADG (P=0.002), ADFI (P<0.001) and FCR (P=0.042) when SD increased was less apparent when more HL were provided. Gait score was worst with increased SD and with higher light hours (HL; P=0.006). With no EC, an increase of ADG and ADFI (P<0.001), and a decrease of FCR (P<0.001) were detected when SD was higher, while effects were much smaller with EC. Moderately high SD appeared to increase bird growth, but also FCR, thus not necessarily leading to economic profit. In addition, welfare indicators such as gait score and behaviour were negatively affected by SD. These results also showed that the impact of SD is modulated by management aspects such as GS, HL or EC. Thus these aspects have to be considered jointly with the effects of SD.

**Key words:** Meta-analysis, broiler, welfare, performance, management.