
Provisioning of live black soldier fly larvae (*Hermetia illucens*) benefits broiler activity and leg health in a frequency- and dose-dependent manner

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Fast-growing broilers spend most their time inactive and are therefore prone to experience leg problems. Environmental enrichment which facilitates intrinsically motivated behaviours can potentially promote activity and reduce leg problems, thereby improving broiler welfare. A promising environmental enrichment method is the scattering of desired feed items, such as insects which are highly attractive to broilers. We studied the effect of providing live black soldier fly larvae (BSFL) scattered on the litter on broiler behaviour, leg health and performance. One-day-old male broilers were assigned to one of five treatments (eight pens/treatment, nine broilers/pen): a control without BSFL and four treatments with BSFL in different amounts (5% or 10% of estimated dietary dry matter intake; A5 and A10 respectively) and frequencies (two or four times a day; F2 and F4 respectively). All broilers were fed diets formulated to ensure a similar energy and nutrient intake. Broiler weight and leg health were determined on day 42. The behavioural time budget was determined weekly by observations for 7 h per day using 12-min scan sampling, and activity around larval provisioning was determined by 3-min scan sampling from 9 min before, until 30 min after larval provisioning on day 15/16, 29/30 and 40/41. Broilers in all larval provisioning treatments had a different behavioural time budget than controls, with higher levels of foraging behaviour, walking, standing idle and general activity during at least three of the five observation days ($p < 0.05$ compared to controls). Generally, active behaviours were most profoundly increased in A10F4 broilers. Time spent active and in standing posture declined from week 4 onwards in A10F4, whereas for all other treatments this decline occurred already in week 2. Activity during 30 minutes after larval provisioning was higher for A10 than A5 treatments ($p < 0.05$ for all days) but overall not affected by frequency of larval provisioning. Hock burn occurred less in A10 birds than in controls ($p < 0.05$), and lameness occurred less in A10 and A5F4 birds than in controls ($p < 0.01$). Only A10F2 birds had a lower final weight than controls ($p < 0.05$). In conclusion, the largest amount combined with the highest frequency of larval provisioning applied in this study resulted in a prolonged increase in activity and better leg health, without significantly affecting broiler performance.