Animal behaviour and animal nutrition science working together to support livestock production

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Within livestock production and welfare science, many of the interesting and important questions lie at the interface of traditional fields of study and benefit from an interdisciplinary approach. The effects of nutrition on the behaviour of animals have been widely studied. They range from the basic influence of diet quantity and quality on foraging motivation, and its role in modulation of other important behavioural domains and in abnormal behaviour development in restricted environments, through the more nuanced effects of dietary imbalances on food choice and the effect of specific nutrients on mood and cognition. The effects of behaviour on nutritional questions have perhaps been less well appreciated, though the importance of feeding behaviour and intake patterns on the efficiency of nutrient utilisation are receiving increasing study. New precision farming technologies, which allow large-scale automated monitoring of feeding and drinking patterns, not only facilitate such studies, but also the use of knowledge of these behaviours in health monitoring and in optimising feeding systems and grazing management. Another important area of research relates to the behaviourally-mediated social constraints and facilitators of feed intake. This includes not only influences from the immediate social environment, but also learnt responses with long term developmental implications and even transgenerational effects. Given these diverse interactive effects of animal behaviour and animal nutrition on livestock production, collaborations between ethologists and nutritionists will continue to be important for future improvements in both efficiency and animal welfare.

Measurement and analysis of drinking behaviour traits in broilers

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According to the European Food Safety Authority (EFSA), there is increased interest to identify risk factors associated with drinking behaviour traits that could improve bird health, such as prevalence of foot-pad dermatitis and overall improvement in bird water use. For this study, a novel system was utilised that automatically measures the individual bird drinking behaviour in large groups. Records of visits to a water station were obtained for two chicken genetic lines (a) line 1 from 1,878 birds from 15-35 days of age (n=1,577,530 events) and (b) line 2 from 2,048 birds from 13-32 days of age (n=2,641,233 events). It was identified that behaviour associated with drinking activity occurs as separate visits to drinkers, which can be clustered into bouts. A bout criterion was estimated by fitting a probability mixture model (PMM) to the natural log transformed interval length between drinking visits. The best PMM was a truncated log normal distribution for within bout intervals and a log normal distribution for between bout intervals. The bout criterion was estimated where the two distributions crossed and resulted in different estimates for the two genetic lines: 846 seconds for line 1 and 566 seconds for line 2. Based on this, eight drinking behaviour traits were identified (medians for line 1 and line 2, Kruskal-Wallis test): (1) number of visits per bout (2.12; 1.99, $P<0.01$), (2) water usage per bout (ml) (22.64; 11.91, $P<0.01$), (3) drinking time per bout (s) (175.30; 132.55, $P<0.01$), (4) bout frequency (12.42; 18.78, $P<0.01$), (5) drinking rate (ml/min) (7.78; 5.51, $P<0.01$), (6) total drinking time per day (min) (36.17; 40.84, $P<0.01$), (7) total bout duration time per day (min) (62.90; 66.91, $P<0.01$), (8) total water usage per day (ml) (282.48; 221.15, $P<0.01$). Overall, birds showed differences in the organisation of drinking behaviour, which can form the basis for further genetic selection analysis.