

Behavioural and physiological responses of fast growing broilers in relation to ambient temperature

E.A.M. BOKKERS¹, W.B.E. SCHOLZ^{1,2} and H. VAN DEN BRAND²

¹Animal Production Systems Group;

²Adaptation Physiology Group, Wageningen University, Department of Animal Sciences, P.O. Box 338, 6700 AH Wageningen, the Netherlands..

E-mail: eddie.bokkers@wur.nl

Broiler growth has increased dramatically during the last decades and therefore heat production (HP) must have increased as well. Consequently, broilers may demand a lower ambient temperature (T_a) than actually used. When T_a is not adapted to the needs of broilers, their welfare may be impaired. The aim of this research was to study behavioural and physiological responses of broilers in relation to T_a . Eighty one-day old broilers (Ross 308, male) were equally allocated to two identical respiration chambers with four pens each ($1\text{m}^2/\text{pen}$). At 4, 5 and 6 weeks of age, T_a was decreased by 1°C per 4 hours (h) until a total decrease of 12°C . Thereafter, T_a was increased again with the same steps. Every 4 h body temperature (T_b) of each bird was measured via a subcutaneous inserted sensor. HP of the birds was measured in a respiration chamber. Furthermore, 3 h after a temperature step 30 min video recordings were made. Every 5 min, behaviour, posture (stand, sit) and physical contact with other bird (yes/no) of each individual was noted. Data were analysed with a GLM procedure using a split plot model. HP increased when T_a decreased from 21 to 9°C (812 to 919 kJ/kg $0.75/\text{day}$ (d) at week (wk) 4; 840 to 912 kJ/kg $0.75/\text{d}$ at wk 5; 817 to 862 kJ/kg $0.75/\text{d}$ at wk 6). HP remained at a higher level when T_a returned to starting value (839, 910, 836 kJ/kg $0.75/\text{d}$, respectively). T_b showed an increase of 0.2°C after T_a nadir ($F_{24,350}=11.53$, $p<0.001$). Body weight developed normally (2,741 g at d 39). A decreasing T_a resulted in less comfort ($F_{24,344}=6.73$, $p<0.001$), eating ($F_{24,344}=2.27$, $p<0.001$), and foraging ($F_{24,344}=3.14$, $p<0.001$) behaviour and resulted in more sitting together (huddling) ($F_{24,344}=4.42$, $p<0.001$). Birds got less active when T_a decreased, which is reflected in the increasing amount of sitting idle (together and alone) ($F_{24,344}=3.48$, $p<0.001$). All behavioural changes were gradual and became significant around nadir. No effect of T_a was found on locomotion, dust bathing and drinking water. A week effect was found for all behaviours, except for dust bathing, locomotion, comfort, drinking and foraging behaviour. In conclusion, broilers are able to respond physiologically and behaviourally to rather rapid T_a changes. More research is needed to understand why HP remained high with increasing T_a . Behavioural and physiological responses of the broilers indicate that a lower T_a in practice may be considered.

Keywords: broilers, behaviour, ambient temperature, heat production, body temperature