Cortisol in faeces of fattening bulls: effect of housing conditions, temperature, and behavior

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Cortisol is an indicator of distress but is also known to be higher in animals which behave more active. In this study the effects of floor type, stocking density (SD), temperature, and behavior on faecal cortisol were tested in cross breed bulls. In 4 batches a total of 224 bulls were kept in groups of 7 either on concrete (CON) slatted floor at SD of 2.5 and 3.0 m^2/bull or on rubber (RUB) topped slatted floor at SD of 2.5, 3.0, 3.5, 4.0, 4.5 and 5.0 m^2/bull. At a weight of 450 kg and 600 kg individual behavior was video-recorded over 72 h (number and duration of lying periods, number of mounting). Directly after observations rectal derived feaces were sampled at 10 to 12 a.m. (A) and 2 to 4 p.m. (B) on 2 days /week for 4 weeks. Based on mean outdoor temperature of the 8 sampling days temperature classes were defined: <8 °C, 8-18 °C, and >18 °C. Cortisol was measured using a saliva ELISA kit validated before. Linear mixed model (SAS 9.2 GLIMMIX) was used to analyze the effect of sampling time, weight period, temperature, floor, SD and of the 3 behavioral variables on cortisol, mean differences were tested by TUKEY test ($P<0.05$). Sampling time ($F_{1;40}=13.71$, $P<0.0006$), floor × temperature ($F_{2;33}=7.15$, $P<0.0026$) and mounting ($F_{1;33}=4.65$, $P<0.0384$) significantly affected cortisol concentrations whereas lying did not. Mean cortisol (±se in ng/g) was higher at 8-18 °C on RUB compared to CON for A (CON 12.9±1.4; RUB 21.9±1.0) and B probes (CON 13.5±1.2; RUB 27.0±0.9). In addition, values in RUB pens were also higher at 8-18 °C compared to <8 °C and >18 °C. The effect of floor type on cortisol at 8-18 °C is likely to reflect the increased activity on RUB rather than a stress response. The significant effect of the interaction floor × temperature demands to consider environmental effects when interpreting physiological data.

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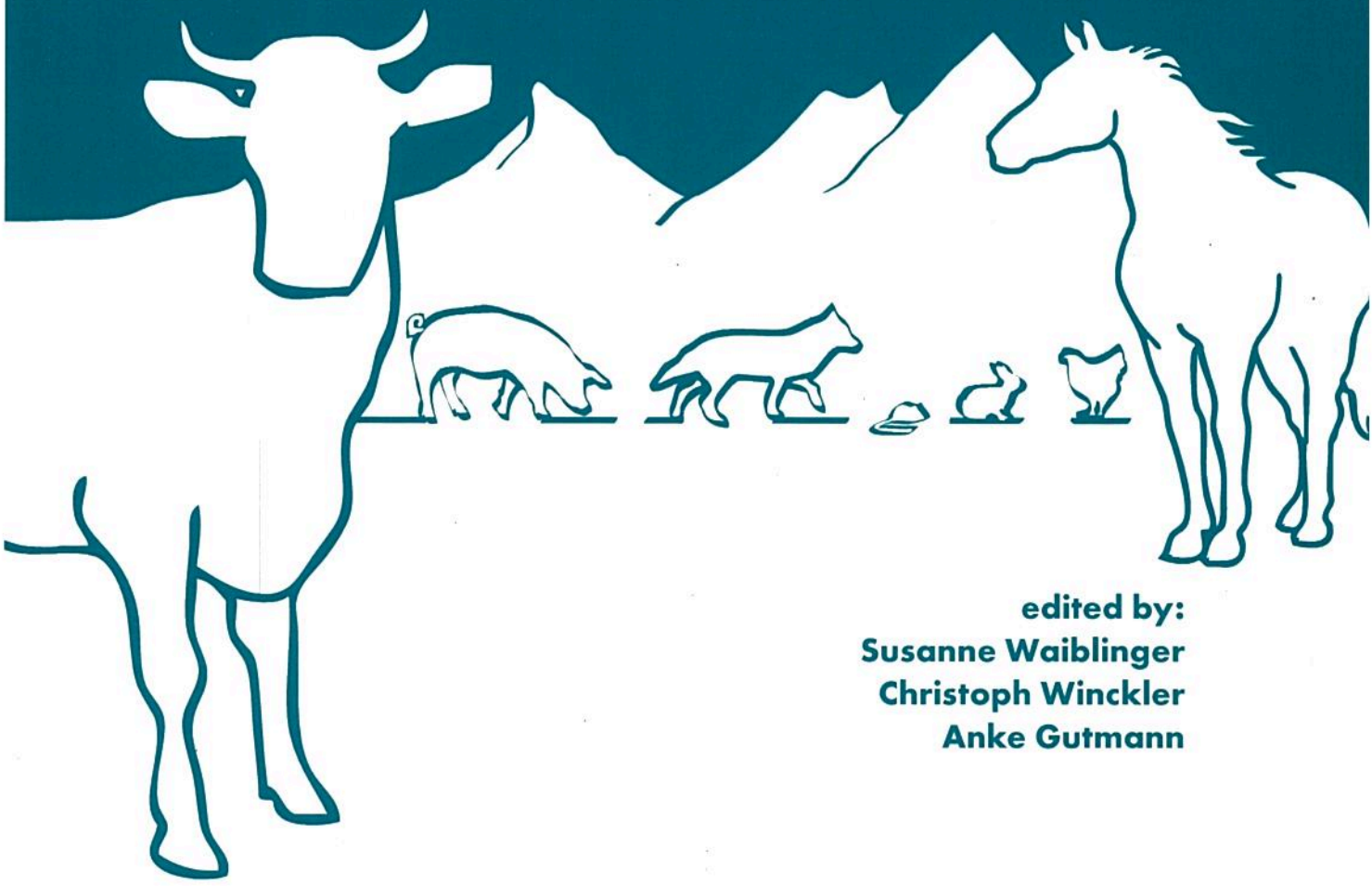

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