

## Short-term diurnal heat stress modulation of growing gilt and barrower growth and feed intake

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During summer months, the increase in temperature and humidity can lead to heat stress conditions that have negative impacts on the growth performance of pigs. The objective of this study was to characterize the effects of diurnal heat stress (dHS) on gilt and barrow growth, daytime and nighttime feed intake. Twelve gilts and 12 barrows ( $46.5 \pm 2.47$  kg BW) were individually housed in metabolism crates over two experimental periods. For Period 1, all pigs were housed at thermoneutral (TN) conditions (20-21°C and 40-60% humidity). Immediately following the TN period, period 2 consisted of four days of dHS (6 h at 32°C, 18 h at 27°C, 40-60% humidity). The conditions in the dHS period were designed to replicate summer, industry-applicable cyclical heat stress conditions. In each period lasting 4 days, pig BW and feed disappearance were recorded and ADG, ADFI and G:F calculated. Additionally, within each day, 0700-1700 h (day-time) and 1700 – 0700 h (night-time) feed intake was recorded. Changes in pig body temperatures (BT) and respiration rates (RR) were measured daily at 0800, 1200 and 1800 h. Pig was considered the experimental unit, and all data were analyzed for the fixed effects of period (TN vs. HS), sex, and period-by-sex interaction. There were no period-by-sex interactions observed for any analyzed variable ( $P > 0.05$ ). As expected, dHS markedly increased pig 3 day average BT and RR compared to their TN values ( $P < 0.05$ ). Compared to TN, dHS BT measurements at Noon, PM, and overall were on average 1.0°C higher ( $P < 0.001$ ). The RR was also increased by 200-300% for AM, Noon, PM, and overall, for the dHS period as compared to TN ( $P < 0.001$ ). Within the dHS period, BT was highest at the Noon and PM recordings, and RR was highest at the Noon recording ( $P < 0.0001$ ). Pigs tended to have reduced ADFI during dHS compared to TN period (1.54 vs 1.70 kg/d,  $P = 0.051$ ). During the TN period, pigs consumed 61% (1.03 kg) of daily total feed consumption during the daytime and 39% (0.67 kg) in the PM period ( $P < 0.001$ ). The opposite effect was found during dHS, in which pigs consumed 33.3% (0.52 kg) of their total daily feed during the peak heat conditions (day-time) and 66.7% (1.02 kg) consumed in the cooler nigh-time period ( $P < 0.001$ ). Compared to barrows, gilts tended to have higher overall ADFI (1.61 vs. 1.48 kg/d;  $P = 0.079$ ). Within both the TN and dHS period, gilts had a lower average Noon BT ( $P < 0.05$ ), and lower morning RR ( $P < 0.05$ ). Altogether, three days of dHS increased pig RR and BT, and decreased ADFI. However, day and night-time feed intake patterns changed compared to the TN period. Diurnal heat stress has similar impacts on both gilts vs. barrows.