

THE IMPACT OF SATIETY AND HEAT STRESS ON FEED INTAKE AND ENDOCRINE STATUS IN GROWER PIGS

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Heat stress is associated with an increase in body temperature and a decrease in voluntary feed intake (VFI) as the animal attempts to decrease energy expenditure. Cortisol plays an important compensatory role in animals exposed to stress to favour their survival. Part of this role is achieved by re-directing essential nutrients to maintain the function of essential tissues particularly when they are limiting. In this study we have investigated the effect of previous satiety level on subsequent VFI, rate of change of body temperature and plasma cortisol concentration of growing pigs maintained at high ambient temperature. Cortisol status was assessed to determine if this parameter can be used as an indicator of heat stress.

Female pigs (n=5; Pig Improvement Co. hybrid; mean live weight, 80kg) were housed at 22°C in metabolism crates which prevented wetting of the skin. The pigs were offered a commercial pelleted diet adequate in protein and containing 13.5MJ digestible energy per kg (air-dry basis); water, at room temperature, was freely available from nipple drinkers. Pigs were surgically implanted with a catheter (Opticath; Abbot Laboratories, North Chicago) into the right heart via the jugular vein to record body temperature and for blood sampling. Following recovery VFI was recorded at 22°C for each pig for 24 hours (Day 0). At 2300h on Day 1 pigs 1-4 were offered 25, 50, 75 and 100% respectively of their individual intake on Day 0. However, Pig 5 was offered 125% of the intake of Pig 4 on Day 0. Feed was offered in equal amounts hourly until 1100 hours on day 2. Ambient temperature was then increased to 31 °C for 24 hours. Food was offered *ad libitum* to each pig once body temperature reached 40°C. Ambient temperature was reduced to 22°C at 1100 hours on day 3 and maintained for 24 hours. Blood samples were collected at 15 minute intervals for 2 hours (0900- 1100 hours) on days 1-3 and assayed for cortisol.

Pigs fed at the 5 levels 25, 50, 75, 100 and 125% of VFI attained a peak body temperature of 40.7± 0.1 °C by 13, 11, 10, 7 and 5 hours respectively after the increase in ambient temperature to 31 °C.

Table 1. Effect of satiety at 22°C on subsequent mean (± SEM) voluntary feed intake and plasma cortisol level of 5 female pigs maintained at 31°C and then 22°C

Day	0	1	2	3
Ambient temperature (°C)	22	22	31	22
Voluntary feed intake (kg/day)	2.6 (0.56)	6.0 (1.22)	0.5 (0.27)	2.3 (0.76)
Plasma cortisol (ng/mL)	-	-	4.7 (0.81)	5.1 (1.63)

^a Pigs 1-5 were fed 25, 50, 75, 100 or 125% (see text above) of VFI on day 1 from 2300 hours to 1100 hours.

The ability to maintain body temperature in the presence of a heat load was compromised by previous increased feed intake, with animals that had consumed more feed showing an accelerated rise in body temperature at 31°C. This effect did not persist once the ambient temperature fell to thermoneutral levels again. The increase in body temperature was not associated with any significant change in plasma cortisol levels. Thus acute heat stress does not persistently decrease feed intake, nor is cortisol an indicator of heat stress *per se* in the pig.