

ACTIVE IMMUNIZATION OF STEERS AGAINST ACTH SUPPRESSES PLASMA CORTISOL
BUT HAS NO EFFECT ON METABOLIC RATE

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Grazing cattle in dry areas of the world are frequently subjected to low-quality pasture which may not supply sufficient maintenance energy for the animal. Trenbolone acetate has been used to reduce metabolic rate and hence energy demands in cattle (Hunter and Vercoe 1987), an effect which may in part be due to its suppressive influence on the release of the glucocorticoids (i.e. cortisol) (Sillence *et al.* 1987). A study to reduce circulating cortisol, by immunizing against adrenocorticotrophin (ACTH), the hormone which triggers its release, formed the basis of the present work aimed at reducing energy demands of steers under nutritional stress.

Brahman (*Bos indicus*) steers, 9 months old, with an initial live weight of 175 ± 3.0 kg (mean $\pm$ s.e.m.) were housed in individual pens in a roofed animal house and fed long-chopped hay (0.2 g N/kg DM) at the rate of 16 g DM/kg live weight. Steers were injected subcutaneously, each side of the neck, with Freund's complete adjuvant alone (controls; n=6) or with ACTH:human serum albumin antigen (treated; n=6) in a saline emulsion (2.5 ml). A primary and booster vaccinations were administered, 3 months and 2 weeks (resp.) prior to the commencement of the measurements. At the time of boost and 7 days post-boost, blood samples were collected to test the efficacy of ACTH antibody development (titre). Steers were moved into metabolism crates after 18 days on the experimental diet and fed equal portions of the day's feed allotment at hourly intervals by an automatic feeding device. After 3 days, blood (5 ml) was collected via jugular catheters at 20 min intervals for 26 h and plasma stored at -15°C prior to cortisol analysis. At the conclusion of blood sampling, 3-methylhistidine excretion was determined in urine collected for 5 days. Steers were then returned to their pens for a further 11 days and after a 72 h fast, metabolic rate was measured by the procedure described by Hunter and Vercoe (1987).

The treated group had a mean ($\pm$ s.e.m.) ACTH titre of 2500 ± 1800 at the time of the serial bleed, which resulted in a significant ($P < 0.05$) lowering of blood cortisol (1.9 ± 1.2 ug/l) compared with controls (6.4 ± 2.6 ug/l) for the group mean ($\pm$ s.e.m.) concentration over 24 h. There was no significant difference in fasting metabolic rate (treated, 76.83; control, 73.26 kJ/kg/d) or 3-methyl histidine excretion (treated, 310.8; control, 349.7 $\mu\text{mol/day}$).

The results show that cortisol levels in cattle can be lowered by immunizing against ACTH. However, metabolic rate and rate of skeletal muscle breakdown were not affected by ACTH immunization. Further, in a subsequent experiment in which the steers were nutritionally stressed for 6 weeks, there was no effect of immunization on the rate of weight loss.

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