

A COMPARISON OF THE EFFECTS OF TWO β -AGONISTS IN UNDERFED CATTLE

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In a previous study, ketoclenbuterol (KETO) was shown to increase weight gain in rats, in the same way as clenbuterol (CLEN), but without adverse effects on the heart (Silence et al. 1992). In the present work, Brahman heifers (8-10 months-old) were used in two experiments to test the effects of CLEN and KETO on heart rate and on nitrogen metabolism. The cattle were underfed to simulate tropical dry-season pasture conditions.

In both experiments the cattle were fed twice daily at 0745 hours and at 1545 hours with a restricted quantity of a poor-quality roughage diet (13g pangola hay/kg liveweight). At each feeding, groups of animals were given either 4 mg CLEN, an equimolar amount of KETO (3.5 mg), or a placebo. In experiment one, heart rate was measured at 30 min intervals between 0900 hours and 1530 hours on each of two consecutive days ($n =$ four per group). In experiment two, cattle were housed in metabolism crates ($n =$ 6 per group) and urine was collected continuously for 12 days commencing two days after initiating treatment. Urea synthesis was measured on day 12 by ^{14}C -urea infusion.

Parameter	Control	CLEN	KETO	SEM
Mean heart rate day 1 (beats/min)	56 ^a	122 ^b	63 ^a	3.0 ^{***}
Mean heart rate day 2 (beats/min)	54 ^a	103 ^c	69 ^b	2.2 ^{***}
Urea synthesis (g/d)	20.2 ^a	9.4 ^b	16.2 ^a	1.61 ^{***}
Plasma urea concentration (mg/l)	113 ^a	53 ^b	87 ^{ab}	12.4 [*]
N intake (g/d)	15.6	14.3	15.5	0.71
Urinary N output (g/d)	7.62	6.96	8.77	0.48 [†]

a,b,c Means with different superscripts differ ($^{\dagger}P < 0.1$, $^*P < 0.05$, $^{***}P < 0.001$).

The results confirm that KETO has a smaller effect on the heart than CLEN, however the effects of KETO on urea metabolism were similarly weak. In addition, the effects of KETO on urinary N output suggest that this compound is unlikely to reduce protein loss in underfed cattle. The results obtained with CLEN are equivocal. The observed reductions in plasma urea concentration and rate of synthesis suggest that CLEN may have a protein-sparing effect, but the failure of CLEN to cause a substantial reduction in urinary N excretion does not support this finding. Thus, further studies are required to establish whether CLEN will be useful in preventing muscle wasting in tropical cattle, when feed supply is limited.

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