

DIETARY NITROGEN AND PHOSPHORUS INTERACTIONS IN BOS INDICUS CATTLE

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Previous experiments with lambs have shown that the feeding of N and P deficient diets results in depressions in feed intake and liveweight gain but the effects are not additive (McLachlan and Ternouth 1985). This experiment investigated N and P deficiencies in Bos indicus cross cattle.

The 24 cattle (initial weight 155 - 244 kg) were randomly assigned to dietary treatments containing high (H), medium (M) and low (L) quantities of N and P. The diets were based upon barley straw fed ad libitum + fixed quantities of molasses (900 g) and minerals, including calcium carbonate. The barley straw contained 27.0 g CP and 0.36 g P /kg DM. The 6 treatments (HN-HP, HN-LP, MN-MP, MN-LP, LN-MP and LN-LP) were formulated by the addition of urea and formaldehyde treated gluten and two levels of Na₂HPO₄. The MN and HN diets had urea added at the rate of 72 g /day to supply adequate rumen degradable N, assuming an intake of 4 kg straw /day. A further 50 g gluten was added to achieve the HN diets. The P intakes of the cattle fed the MP and HP diets were increased by 4.0 and 8.0 g P /day. Food intake was recorded daily for 15 weeks, liveweight fortnightly and jugular blood samples collected fortnightly for analysis.

Feeding the low N diet resulted in an immediate decrease in plasma urea N (<10 mg /dl) and the low P diet in a similar decrease in plasma inorganic P (<3 mg /dl) except for the LN-LP diet (<4 mg /dl). The effects of feeding N and P deficient diets to growing cattle, after adjustment by covariance for initial liveweight, are shown in the table.

| weeks | HN-HP | HN-LP | MN-MP | MN-LP | LN-MP | LN-LP | LSD |
|-------------------------------------|-------|-------|-------|-------|-------|-------|--------|
| <u>Liveweight change (kg)</u> | | | | | | | P<0.05 |
| 15 - 0 | 46.0 | 4.3 | 24.5 | -4.0 | -11.5 | -23.3 | 15.1 |
| <u>Daily dry matter intake (kg)</u> | | | | | | | |
| 1 - 5 | 4.32 | 4.07 | 4.05 | 3.75 | 2.81 | 2.58 | 0.21 |
| 6 - 10 | 4.70 | 3.76 | 4.17 | 3.10 | 2.93 | 2.47 | 0.25 |
| 11 - 15 | 4.70 | 3.27 | 4.21 | 2.79 | 2.48 | 2.23 | 0.30 |

Reductions in the food intake of the cattle fed the two LN diets were evident immediately but reductions in the intake of the HN-LP and MN-LP diets were not apparent until the 5th week of feeding. These results are similar to those previously observed in growing lambs (McLachlan and Ternouth 1985) except that the dry matter intake and loss of weight of the LN-LP fed cattle were significantly different from the MN-LP and LN-MP cattle.

As previously reported in sheep (Ternouth and Sevilla 1983), there was a significant relationship between intake (DMI, g /kg LW) and blood inorganic P (Pi, mg /dl) during weeks 5 - 10. However, because intake was also being depressed by a N deficiency, the relationship was greatly strengthened if the plasma urea N (PUN, mg /dl) is added to the equation:

$$\text{Intake} = 11.22 + 0.790 (+ 0.180) \text{ Pi}^{***} + 0.120 (+ 0.027) \text{ PUN}^{***}$$

McLACHLAN, B.P. and TERNOUTH, J.H. (1985). Proc. Nutr. Soc. Aust. 10:148.
 TERNOUTH, J.H. and SEVILLA, C.C. (1983). Proc. V World Conf. Anim. Prod. 2:379.

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