Feed intake and live weight gain of Brahman steers fed diets containing cassava in the Northern Territory

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Cassava is cultivated throughout the tropical regions of the world and is an important tropical crop for human consumption, biofuel production and livestock feed through-out Asia, South America and Africa. The energy value of its edible starchy tuberous root is comparable to feed grains while the leaf has a high protein content, making the whole plant an attractive feed for livestock (Wanapat and Kang 2015). For these reasons, cassava has been identified as a potential crop that could be incorporated into rations for cattle fattening in northern Australia. The objective of this study was to test strategies to adapt growing steers to cassava-based rations.

Twenty *Bos indicus* weaner steers (178 kg mean live weight [LW]) were allocated to one of four nutritional treatments (n=5 steers/treatment) to evaluate the effect of different cassava rations on feed intake, live weight gain and rumen function. The base ration included: 97% cassava tuber, 2% urea and 1% trace mineral mix (on a dry matter basis). The four treatments were: base ration + 0.5% LW hay (T1), 80% base ration + 20% soybean meal + 0.5% LW hay (T2), 77% base ration + 19% soybean meal + 4% molasses + 0.5% LW hay (T3), 77% base ration + 19% soybean meal + 4% molasses + 1.0% LW hay (T4). The study was conducted at the Katherine Research Station, Northern Territory, and steers remained in the same individual pens throughout the experiment with water available at all times. Treatment diets were fed at 0.5% of LW initially and incrementally increased by 0.5% LW every three days until day 15 after which cassava rations were fed *ad libitum* until the end of the experiment (29 days). Treatment rations and hay intakes were measured daily. Live weight gain (LWG) was calculated by the difference in LW between start and end of the experiment, which was recorded following a 12 h feed and water curfew. Rumen pH was measured before feeding on the final day of the experiment.

Differences between treatment means for LWG and pH were compared using an analysis of variance. All analyses were performed using R Studio, Version 1.2.5019.

The daily concentrate, hay and total feed intake were monitored over the experiment with total dietary intake tending to decrease with diets containing increasing cassava tuber content. Cassava tuber represented 67%, 56%, 52%, and 48% of the diet for each of the treatments while total dietary intakes (% LW) were 1.6, 1.7, 1.7 and 2.2 for T1, T2, T3 and T4 treatments, respectively. The significantly higher total dietary intake observed for T4 ($P<0.001$), when compared to each of the other treatments, was partly explained by the increased amount of hay included for that treatment. Hay intake averaged 0.80% LW/d for T4 and between 0.49% and 0.50% LW/d for the remaining treatments. Total dietary intake was a strong predictor of LWG ($P<0.0001$), explaining 74% of the variance for LWG when assessed in a simple regression model. Steers fed the T4 (1.41 kg/d) treatment expressed significantly higher LWG than steers fed the T1 (0.16 kg/d; $P<0.0001$), T2 (0.57 kg/d; $P<0.01$) and T3 (0.37 kg/d; $P<0.001$) treatments.

Overall, the impact of treatment on concentrate intake tended towards significance ($P=0.08$). T1 consumed the least amount of concentrate (1.1% LW/d), while T2 (1.3% LW/d) and T3 (1.2% LW/d). Interestingly, a 0.2% LW/d higher intake of concentrate was observed for T4, compared to T3, with the only difference between the two treatment diets being increased access to hay. This difference in intake was not significant, however ($P=0.13$). There was no evidence of treatment effects on rumen pH, with mean values of 6.9, 6.8, 6.8, and 6.7, for T1, T2, T3, and T4, respectively.

This experiment was successful in adapting yearling steers to diets differing in cassava tuber content and ration formulation and further demonstrated that cattle fed high-energy diets based on dried cassava tuber can perform well. The results from this experiment are also consistent with the anecdotal reports that intake and LWG are suppressed when inclusion rates of cassava exceed 50% of the total diet. The cause of this association is not well understood and requires further investigation.

References

Wanapat, M, Kang, S (2015) Cassava chip (*Manihot esculenta Crantz*) as an energy source for ruminant feeding. *Animal Nutrition* 1, 266-270.

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