

EFFECTS OF NaCl AND NaHCO₃ ON DIGESTION IN THE STOMACH OF WEANED CALVES

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Previous studies indicated that the dietary inclusion of NaCl or NaHCO₃ at 11, 20 and 29 mg Na/g DM significantly influenced the food intake and growth rate of young calves (Kellaway *et al.* 1976). After weaning, NaCl addition to the diet (11 mg/g DM) increased food intake (g/kg^{0.75}) by 16% and growth rate by 14% compared with the control diet (2 mg Na/g DM) but at higher levels of NaCl inclusion, no further improvements were noted. Addition of NaHCO₃, however, increased food intake by 20%, 36% and 34%, and growth rate by 32%, 44% and 35% at each level of Na inclusion respectively, indicating a substantially greater response, and an optimum level of 20 mg Na/g DM. To elucidate the mechanisms involved, a digestion study involving 12 Friesian calves fitted with rumen and duodenal cannulas was carried out. The calves were fed a similar basal diet containing a low level of sodium (2 mg/g DM) (C), or high levels of sodium (20 mg/g DM) as NaCl (S) or NaHCO₃ (B). The effects of treatments on rumen digestion and nutrient flow to the small intestine were measured 2 and 4 weeks after weaning using non-radioactive ruthenium phenanthroline (Tan *et al.* 1971; MacRae and Evans, 1974) and Cr EDTA (Downes and McDonald, 1964).

All diets plus a small amount of chopped straw were fed to appetite by means of continuous belt feeders, but intake was held constant for a period of 10 days during measurement. Total VFA concentrations and molar proportions were unaffected by treatment, as was rumen osmotic pressure. Rumen volume was 16% less on diet B, whilst rumen dilution rate was 26% higher on this diet, compared with diets C and S where no treatment effect was noted.

Expressing the duodenal flow of nutrients against nutrient intake for the 48 observations of daily flow (16 per treatment) revealed no significant differences due to treatment for organic matter (48% of intake digested in rumen) or modified acid detergent fibre (9% of intake digested in rumen). With total amino acid supply, a significant interaction due to diet B was revealed compared with diets C and S, indicating a substantial improvement in the flow of amino acids to the small intestine when dry matter intake was low (< 1500 g dry matter/day). A similar interaction with the flow of starch was identified, with a substantial improvement being observed at high intakes of diet B.

From a more detailed knowledge of the supply of nutrients to the host animal and certain rumen parameters, it would appear that the responses in intake and growth rate noted by Kellaway *et al.* were related more to a reduced rumen residence time, so facilitating a greater voluntary consumption of feed, than to a significant improvement in the nature and amount of the end products of digestion.

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