

EFFECT OF DRY MATTER INTAKE RESTRICTION ON ENERGY BALANCE, RUMINAL FERMENTATION, AND NUTRIENT RETENTION BY BEEF STEERS

Jonathan H. Clark

Dr. KC Olson, Thesis Supervisor

ABSTRACT

Two studies were conducted to determine the effects of DMI restriction on digestion and metabolism by feedlot steers. In Trial 1, 12 Angus X steers (BW = 450 ± 18 kg) were assigned randomly to one of three diets that were formulated to promote a 1.6 kg ADG at intake levels corresponding approximately to 100% (AL), 90% (IR90), or 80% (IR80) of ad libitum DMI. In Trial 2, 12 crossbred steers (BW = 445 ± 56 kg) fitted with ruminal cannulae were randomly assigned to one of two diets that were formulated to promote a 1.6 kg ADG at either AL or IR80. All diets delivered similar total NE, MP, Ca, and P per day. During both trials, fecal DM output by IR80 was less ($P \leq 0.03$) than that of AL; IR90 was similar ($P > 0.10$) to AL during trial 1. Digestion of DM by IR80 cattle was greater ($P \leq 0.01$) than that of AL during both trials; IR90 was similar ($P > 0.10$) to AL during trial 1. Metabolizable energy intake (MEI) was similar ($P \geq 0.20$) between treatments during both trials, whereas P retention was similar ($P = 0.46$) between treatments during trial 2. Total VFA and the molar proportion of acetate of AL were greater ($P \leq 0.03$) than that of IR80 during trial 2; however, IR80 had a greater ($P = 0.03$) molar proportion of propionate. Fluid dilution rate was similar ($P = 0.42$) between treatments during trial 2. Under the conditions of these studies, restricting DMI while holding energy and protein intake constant decreased manure production and changed ruminal fermentation patterns in finishing steers. Improvements in performance associated with programmed-feeding regimes of the type studied here do not appear to be related to changes in diet digestion or MEI.