EFFECT OF FINISHING DIETS ON *ESCHERICHIA COLI* NUMBERS AND FERMENTATION CHARACTERISTICS IN THE FAECES OF CATTLE

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A study on enterohaemorrhagic *E. coli* (EHEC) contamination of beef carcases at slaughter concluded that faecal and carcase levels of EHEC are positively correlated and that there was a role for control of EHEC in live cattle (Elder *et al*. 2000). In this current study we examined the effect of dietary inclusion of molasses (simple sugars), grain (starch) and roughage (structural carbohydrate) on the shedding of *E. coli* in cattle faeces.

Six Brahman crossbred steers (350-450 kg) were housed in individual pens and fed three diets consecutively at 30 d intervals. On a dry matter basis the diets fed *ad libitum* were (a) 50 % molasses, 28 % Rhodes grass (*Chloris gayana)* hay, 15.0 % whole cotton seed, 4.5 % cotton seed meal, 1.5 % urea and 1 % mineral/vitamin premix (M+R); (b) 2 kg Rhodes grass plus a commercial grain based feedlot diet (Better Blend Beef expandat; Better Blend Stockfeeds, Oakey) which contained primarily 57% sorghum, 15% barley, 10% wheat and 2% cotton seed meal (G); and Rhodes grass plus 200 g/d urea (R). A fresh faecal sample (100g) was collected from each animal prior to feeding on 3 separate days during the final week of each dietary treatment. An aliquot (5 g) of each faecal sample was homogenised and serially diluted before pipetting on EMB plates for enumeration of *E. coli* after incubation at 35 C for 24 h. Faeces was also analysed for pH, VFA and ammonia levels.

Table 1. Faecal *E. coli* numbers, pH, ammonia and volatile fatty acid concentration in cattle fed either roughage hay, molasses or grain diets

	Diet		
	R	M+R	G
E coli (log_{10}/g digesta)	4.5[a]	5.2[a]	6.3[b]
Faecal pH	7.7[a]	7.1[b]	6.5[c]
Ammonia (mM)	3.6[a]	5.9[b]	4.4[a]
Volatile fatty acids			
Total (mg/ml)	0.94[a]	2.23[b]	3.55[c]
Acetate (mg/ml)	0.74[a]	1.74[b]	2.61[c]
Propionate (mg/ml)	0.131[a]	0.348[b]	0.385[b]
Butyrate (mg/ml)	0.026[a]	0.085[a]	0.482[b]
Acetate: Butyrate	29.0[a]	20.6[b]	5.5[c]
Acetate: Propionate	5.7[a]	5.1[a]	7.3[b]

Values that do not have a common superscript letter are significantly different ($P < 0.05$)

Faecal *E. coli* numbers and VFA patterns were similar in the roughage and molasses diets whereas increased *E. coli* numbers, decreased pH and enhanced butyrate fermentation were associated with the grain diet. This would indicate a shift in the microbial population of the hindgut. Factors other than available carbohydrate are probably also having a significant effect on the growth of *E. coli* because faecal VFA concentration on the molasses diet was intermediate between the other diets. Several other studies have shown that *E. coli* populations tend to be lower in the digestive tract of ruminants fed roughage compared with grain-based diets (Russell *et al*. 2000). Further studies are required to determine whether diet will also effect the population of pathogenic *E. coli* and acid resistant strains of EHEC in the digestive tract of cattle. Recent studies by Hunter (2000) have shown that feeding molasses as a substitute for grain under feedlot conditions can achieve commercially attractive live weight gains and acceptable eating quality of beef.

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