The effects of feeding finishing cattle benzoic acid and/or live active yeast (*Saccharomyces cerevisiae*) on feeding behaviour, growth performance, and carcass characteristics

PSXII-11

M.S. Williams*[1], I.B. Mandell[1], B.M. Bohrer[2], and K.M. Wood[1]

[1]Department of Animal Biosciences, University of Guelph, Guelph, Canada, [2]Department of Food Science, University of Guelph, Guelph, Canada

BACKGROUND

- Increasing consumer preferences for beef raised without the use of antimicrobials are causing producers to consider alternatives to maintain performance and health in the feedlot.
- Organic acids have shown to exert an antifungal affect in beef cattle[1] however there is limited research on their effects on animal performance.
- One study has examined benzoic acid supplementation[2] in comparison to positive and negative control groups on animal performance, carcass characteristics and sensory attributes. However, there is limited research in the use of benzoic acid in feedlot diets.
- Live yeasts have shown promising animal responses such as a reduction of lactic-acid build-up in the rumen, and improved growth performance and feed conversion.[3,4] However there remains large variability in reported efficacy of yeast in beef feedlot diets[5].

OBJECTIVES

- The objectives of this experiment were to investigate the effects of supplementing benzoic acid (DSM Nutritional Products), active dry Saccharomyces cerevisiae yeast (Vistacell, AB Vista), or both supplements on feedlot performance, feeding behaviour, and carcass characteristics in beef steers fed diets containing monensin.

MATERIALS & METHODS

- 59 steers were used in a randomized complete block experiment fed a standard corn based high-grain finishing diet (containing monensin) and assigned to one of 4 treatments:
  - Control (CON): no additives
  - Acid (ACD): 0.5% of DM benzoic acid
  - Yeast (YST): 3 g/head/d active dry *Saccharomyces cerevisiae*
  - Acid and Yeast (AY): 0.5% of DM benzoic acid, and 3 g/head/d active dry *Saccharomyces cerevisiae*
- Steers were fed ad libitum using Insentec Feeders (Hokofarm Group BV, Marknesse, Holland) to record intake and feeding behavior for 106 d, weighed every 14 d.
- A spot sample of rumen fluid was collected via oral gavage once approximately 1 month before slaughter to measure rumen pH.
- Slaughter was on the same day for all steers at a commercial facility where carcass characteristics (HCW, longissimus muscle area, marbling score, quality grade, yield grade, liver score) were measured and recorded.
- Data were analyzed using the GLIMMIX procedure in SAS (SAS Institute Inc. Cary, NC). The data were treated as a randomized complete block design with weight block as the random effect, treatment as a fixed effect, and steer as the experimental unit. Initial BW was used as a covariate. Significance declared at P ≤ 0.05.

Table 1: Animal performance, feed intake and behavior, and carcass characteristics of steers fed a high-grain finishing diet with or without yeast and/or benzoic acid treatment

	Treatment					
Item	CON (n=15)	ACD (n=14)	YST (n=15)	AY (n=11)	SEM	*P*-value
Animal Performance						
ADG	2.07	2.21	2	2.17	0.077	0.12
Final BW	707	737	705	705	8.1	0.11
F:G	4.92	5.08	5.18	4.74	0.226	0.37
Feed Intake and Feeding Behaviour						
DMI, kg/d	9.97^{b}	11.18^{a}	10.21^{b}	10.25^{ab}	0.206	0.002
DMI SD2	4.12^{b}	4.63^{a}	4.22^{b}	4.26^{ab}	0.084	0.001
Time at feeder, min/day	80	88	89	86	11.7	0.88
Visits to feeder, visits/day	80	67	62	68	6.3	0.17
Time per visit, min	3.1	2.5	2.8	2.5	0.42	0.4
Visit size, gDM	45	37	37	33	3.9	0.13
Meals per day	9.6	10.5	9.9	11.1	0.58	0.22
Time per meal, min	8.5	8.2	8.9	7.9	0.82	0.79
Meal size, gDM	122	127	121	106	7.2	0.35
Eating rate, gDM/min	16^{b}	18^{a}	17^{b}	17^{ab}	0.4	0.002
Carcass Characteristics						
HCW, kg	389	396	385	383	6.8	0.75
LM area, cm^2	94.8	94	93.1	89.4	3.53	0.68
Marbling score	481	518	475	501	32.8	0.74
Liver score						
O	11	11	9	8	-	-
A	2	1	3	2	-	-
A+	2	2	3	1	-	-

RESULTS

- Benzoic acid supplementation increased (P = 0.002; Table 1) overall DMI in comparison to YST and AY steers, which was shown to be a result of a faster eating rate (*P* ≤ 0.008).
- Variation of DMI was increased (*P* = 0.001; Table 1) for both ACD and AY steers.
- Animal performance measures of BW, ADG, feed conversion, and fat depth were not different (*P* ≥ 0.11; Table 1) between treatment groups.
- Carcass traits did not differ (*P* ≥ 0.68; Table 1) between treatment groups.
- Aspartate aminotransferase concentration in blood was highest (*P* = 0.009; data not shown) for YST steers, which was reflected in greater proportions of abscessed livers at slaughter.

RESULTS

- Rumen pH was higher (P = 0.006; Figure 1) for ACD steers compared to CON and AY steers (pH 6.16 vs. compared to 5.84, and 5.66, respectively).

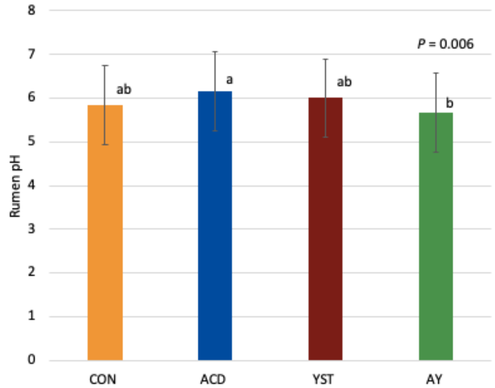

Figure 1: Rumen pH of steers fed a high-grain finishing diet with or without yeast and/or benzoic acid treatment

CONCLUSIONS

The results of this experiment suggest that steers fed a high grain finishing diet supplemented with benzoic acid, *Saccharomyces cerevisiae* or both had similar growth performance and carcass characteristics compared to those without supplementation.

The addition of benzoic acid increased DMI and increased eating rate, and elevated rumen pH and may be positive indicators of improved gut health.

REFERENCES

[1]Castillo et al., 2004. Anim. Feed Sci. Technol. 115:101–116.
[2]Wang et al., 2020. Appl. Anim. Sci. 36:145–156.
[3]Marden et al., 2008. J. Dairy Sci. 91:3528–3535.
[4]Rossi et al., 2006. Feedstuffs. 12–13.
[5]Jiao et al., 2018. Can. J. Anim. Sci. 98:477–487.

Financial and in-kind support provided by:

Ontario Ministry of Agriculture, Food and Rural Affairs; Beef Farmers of Ontario; Weston Seeding Stronger Communities; DSM; ABVista