



Effects of Replacing Antibiotics in Finishing Cattle Diets with Plant-Based Additives on Meat Quality and Sensory Attributes

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Objectives

Limited research has investigated the effects of plant-based additives fed to feedlot cattle beyond cattle growth performance and carcass characteristics. Thus, the objective of this study was to investigate the effects of feeding antibiotic supplements versus essential oils and/or benzoic acid to finishing cattle on meat quality and sensory attributes of the longissimus thoracis (LT) muscle.

Materials and Methods

Crossbred steers ($N = 63$) were placed into 3 blocks based on initial weight. Within each block, 1 of 5 treatments were randomly applied using an Insentec feeding system for 98 d: (1) control (CON) diet (no supplement); (2) monensin/tylosin (M/T) diet (monensin supplemented at 33 mg/kg on dry matter (DM) basis; tylosin supplemented at 11 mg/kg on DM basis); (3) essential oils (EO) diet (supplemented at 1.0 g/steer/day); (4) benzoic acid (BA) diet (supplemented at 0.5% on DM basis); and (5) combination (COMBO) diet (essential oils supplemented at 1.0 g/steer/day and benzoic acid supplemented at 0.5% on DM basis). Beef rib (IMPS#107) sections from the right side of carcasses were collected from a commercial processing facility and transported to the U of Guelph meat science laboratory and processed into 2.54 cm LT steaks. pH and objective color were collected for the LT steaks at 6 d post-mortem. Samples for cooking loss and shear force were aged for 7 d and 14 d post-mortem. Samples for sensory were aged for 7 d post-mortem. Duplicate 5 to 6 g homogeneously blended LT samples were analyzed for moisture content by forced-air convection oven drying at 100°C for 24 h (Method 950.46, AOAC). Lipid content of the dried samples were determined by Soxhlet extraction with petroleum ether, followed by 24 h of oven drying at 100°C. Cooking loss

was measured after cooking samples to an internal temperature of 72°C. Warner-Bratzler shear force (WBSF) was measured on 1.3 cm diameter cores that were cut parallel to muscle fibers. Meat quality results were analyzed as a randomized complete block design (RCBD) with fixed effects of treatment, block and their interaction using PROC GLIMMIX of SAS. For sensory analysis, 8 highly trained panelists evaluated the tenderness, juiciness, chewiness, beef flavor intensity, and off-flavor intensity of steaks using a 15-cm line scale. Each steak was cooked to 68°C and served to each panelist as two 1-cm cubes. Results were analyzed as a RCBD with the fixed effects of treatment, panelist, and their interaction and the random effect of session.

Results

There were no significant differences ($P > 0.07$) among treatments in this study for pH, objective color, % moisture, WBSF, or cooking loss of LT samples. Ribeye from the CON diet had significantly less % crude fat ($P = 0.05$) compared to other treatments. There was an effect of diet on the tenderness, chewiness, juiciness and beef flavor intensity of steaks as determined by the panelist. Specifically, CON and COMBO steaks were tougher, chewier and less juicy. All steaks had strong beef flavor, especially the BA steaks. Off-flavors were barely detectable.

Conclusion

Results showed that EO and BA when fed to finishing cattle do not affect meat quality. Trained panelists reported steaks in the M/T, EO, and BA diet were tender, juicier, and had stronger beef flavors. Potential off-flavors and off-aromas in finishing feed did not translate to beef products.