



BEEF CATTLE RESEARCH UPDATE

Britt Hicks, Ph.D., PAS
Area Extension Livestock Specialist
Oklahoma Panhandle Research & Extension Center

October 2018

Effect of Alpha-Tocopherol Acetate and Ascorbic Acid on Feedlot Cattle

Liver abscesses in feedlot cattle are a cause of decreased performance and reduced carcass value. Loss in carcass value is due to not only to the abscessed liver being condemned, but also due to trim loss associated with the condemned liver. According to 2016 National Beef Quality Audit Report¹, 30.8% of livers were condemned at slaughter as compared to 20.9% reported in the 2011 National Beef Quality Audit.² Tylosin phosphate (Tylan, Elanco Animal Health) is an antibiotic that is commonly fed to feedlot cattle to decrease the incidence of liver abscesses. Due to regulatory changes pertaining to the use of in-feed antibiotics in cattle production, there is growing interest in alternatives to antibiotics for liver abscess control. Thus, Kansas State university research determined the effect of antioxidants on feedlot performance, carcass characteristics, and the incidence and severity of liver abscesses in feedlot heifers fed a finishing ration that contained no tylosin.³ The antioxidants used were crystalline ascorbate (Vitamin C) and alpha-tocopherol acetate (Vitamin E).

In this study, 362 head of yearling crossbred heifers (1060 lb initial weight) were fed finishing diets consisting of 60% steam-flaked corn, 30% wet corn gluten feed, 8% alfalfa, and 2% supplement (dry matter basis) that provided 300 mg/d monensin, and either 200 IU/d alpha-tocopherol acetate (controls) or 2,000 IU/d alpha-tocopherol acetate plus 500 mg/d crystalline ascorbate. The heifers were fed once daily ad libitum for 94 days, then weighed and transported 280 miles to a commercial packing plant for harvest.

These researchers reported that feeding antioxidants compared to controls tended to decrease dry matter intake (DMI (23.64 vs. 22.84; P = 0.08) and improve gain efficiency (Gain:Feed ratio: 0.1201 vs. 0.1251; P = 0.07), but did not impact average daily gain (2.86 lb/day). Carcass characteristics were not effect by treatment. In addition, no differences in liver abscess incidence (25.7 vs. 23.6% for controls and antioxidants, respectively) or severity were detected between treatments. In conclusion, feeding antioxidants is not a viable alternative to decrease the incidence and severity of liver abscesses in finishing cattle. However, these antioxidants tended to improve feed efficiency.

Consumer Acceptability of Angus Ground Beef vs. Grass-Fed Ground Beef

Ground beef is considered one of the major sources of animal protein in the U.S., accounting for approximately 40% of beef consumption per capita (USDA, 2011). Consumers' concern about animal welfare, sustainable production, and low fat products has influenced purchasing decisions, resulting in an increased demand for grass-fed ground beef. Grass-fed cattle are fed natural based forages or grass-hay resulting in a higher deposition of omega-3 fatty acids in meat than that found in traditional grain-fed ground beef. However, there is no evidence to support that grass-fed ground beef is a healthier choice for consumers than traditional ground beef.⁴ A high content of omega-3 fatty acids accelerates oxidization of meat, and consequently causes potential adverse effects on meat palatability traits.

Thus, Kansas State University research determined consumer palatability ratings of grass-fed ground beef in comparison to Angus and commodity ground beef.⁵ In this study, fresh grass-fed ground beef, Angus ground beef, and commodity 80/20 ground beef were obtained from local retail stores and a commercial meat processing facility. For each treatment 14 distinct production lots were used to manually form 4 oz patties using a stainless steel and acrylic template. Patties were cooked using a clam shell grill to obtain an internal temperature of 165°F after a post-cook temperature rise. A total of 98 consumers evaluated the cooked patties for tenderness, juiciness, flavor liking, texture liking, and overall liking using 100 point line scales and each palatability trait was rated as either acceptable or unacceptable.

These researchers reported that overall, consumers preferred ($P < 0.05$) Angus ground beef, with an overall acceptability of 94.9% compared to grass-fed ground beef with an overall acceptability of 82.5%, while commodity ground beef had similar ($P > 0.05$) overall acceptability of 91.8% to Angus and grass-fed ground beef. The consumers indicated no difference ($P > 0.05$) for tenderness acceptability, juiciness acceptability, and texture acceptability among the three ground beef treatments. Commodity ground beef had the highest ($P < 0.05$, 90.6%) flavor acceptability, while Angus (83.3%) and grass-fed ground beef (73.9%) had similar ($P > 0.05$) acceptability percentages for flavor.

The authors concluded that these data show that Angus and commodity ground beef were liked overall more than grass-fed ground beef, and Angus ground beef was more acceptable overall to consumers than grass-fed ground beef. In addition, consumer's acceptability for ground beef flavor was higher for commodity ground beef than grass-fed ground beef. They also noted that ground beef palatability and acceptability are influenced by the source and diet of the beef.

¹ NBQA. 2017. National Beef Quality Audit Executive Summary. Available: http://www.bqa.org/Media/BQA/Docs/2016nbqa_es.pdf.

² McKeith, R. O., G. D. Gray, D. S. Hale, C. R. Kerth, D. B. Griffin, J. W. Savell, C. R. Raines, K. E. Belk, D. R. Woerner, J. D. Tatum, J. L. Igo, D. L. VanOverbeke, G. G. Mafi, T. E. Lawrence, R. J. Delmore, L. M. Christensen, S. D. Shackelford, D. A. King, T. L. Wheeler, L. R. Meadows, and M. E. O'Connor. 2012. National Beef Quality Audit-2011: Harvest-floor assessments of targeted characteristics that affect quality and value of cattle, carcasses, and byproducts. *J. Anim. Sci.* 90: 5135-5142.

³ Müller, H. C., C. L. van Bibber-Krueger, and J. S. Drouillard. 2018. Effect of alpha-tocopherol acetate and ascorbic acid on performance, carcass traits, and incidence and severity of liver abscesses in feedlot cattle. *J. Anim. Sci.* 96: 3878-3883.

⁴ Smith, S. B. 2013. Ground beef from grass-fed and grain-fed cattle: Does it matter? Available at: <https://animalscience.tamu.edu/2013/12/07/ground-beef-from-grass-fed-and-grain-fed-cattle-does-it-matter/>.

⁵ Najjar, F., E. A. Boyle, T. G. O'Quinn, R. Danler, S. Stroda, L. N. Drey, K. R. Vierck, and G. D. McCoy. 2017. Angus Ground Beef Has Higher Overall Consumer Acceptability than Grass-Fed Ground Beef Kansas State Univ. Beef Cattlemen's Day Beef Cattle Research Kansas Agricultural Experiment Station Research Reports: Vol. 3: Iss. 1: 120-122.

Oklahoma State University, U.S. Department of Agriculture, State and local governments cooperating. Oklahoma Cooperative Extension Services offers its programs to all eligible persons regardless of race, color, national origin, gender, age, religion, disability, or status as a veteran and is an equal opportunity employer. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Oklahoma Cooperative Extension Service is implied. Oklahoma State University, U. S. Department of Agriculture, State and Local governments cooperating. Oklahoma State University in compliance with Title VI and VII of the Civil Rights Act of 1964, Executive Order 11246 as amended, Title IX of the Education Amendments of 1972, Americans with Disabilities Act of 1990, and other federal and state laws and regulations, does not discriminate on the basis of race, color, national origin, gender, age, religion, disability, or status as a veteran in any of its policies, practices, or procedures.