



# BEEF CATTLE RESEARCH UPDATE

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

---

November 2017

---

## **Effects of Liver Abscess Severity and Quality Grade on Meat Tenderness and Sensory Attributes**

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 Report<sup>1</sup>, 30.8% of livers were condemned at slaughter as compared to 20.9% reported in the 2011 National Beef Quality Audit.<sup>2</sup> In the 2011 audit, liver abscesses accounted for approximately two-thirds of liver condemnations. Brown and Lawrence (2010) estimated that liver abscesses (used 18.1% incidence rate) cost the United States' cattle feeding industry \$15.9 million annually in liver condemnation, trim losses, and reduced carcass weights and quality grades.<sup>3</sup> Although the effect of liver abscesses on carcass characteristics has been researched, no research has evaluated the effect of liver abscess status on meat tenderness and sensory attributes. Therefore, Kansas State University research evaluated the association between liver abscess severity and USDA quality grade and meat tenderness and sensory attributes of steaks from finished feedlot cattle.<sup>4</sup>

In this study, 119 strip loin steaks from carcasses of cattle sourced from a single feedlot and fed a common diet that did not include tylosin phosphate were used in a 3 × 2 factorial treatment structure. Treatments were USDA quality grades of Select and Low Choice and liver abscess scores of normal (healthy liver, no abscesses), mild (1 abscess less than 2 cm or ~0.8 inches in diameter to 4 abscesses less than 4 cm or 1.6 inches in diameter), and severe (1 abscess greater than 4 cm in diameter or greater than 4 small abscesses). Carcasses were chilled for approximately 36 hours post-mortem before grading and strip loin steaks were collected and cut from the left side of the carcass. The steaks were then vacuum-packaged and aged at 37.4°F for 14 days post-mortem. Tenderness of the steaks was measured using Warner-Bratzler Shear Force (WBSF) and Slice Shear Force (SSF) analyses. In addition, all steaks were cooked and evaluated by a trained taste panel for initial juiciness, sustained juiciness, myofibrillar tenderness, connective tissue, overall tenderness, beef flavor intensity, and off-flavor intensity.

These researchers reported that there were no differences among liver abscess scores for WBSF or SSF. However, Warner-Bratzler Shear Force was lower for steaks from Low Choice-severe abscess carcasses than from Select-severe abscess carcasses ( $P = 0.04$ ). Sensory attributes of initial and sustained juiciness, and overall tenderness were all greater for Low Choice than for Select steaks ( $P < 0.04$ ) and connective tissue amount was less for Low Choice steaks when compared to Select ( $P = 0.03$ ). Liver abscess score had no effect on any sensory attributes; however, there was an interaction between quality grade and liver score for myofibrillar tenderness ( $P = 0.03$ ). Within Low Choice steaks, liver abscess score had no effect on myofibrillar tenderness ( $P > 0.05$ ), however, in Select steaks, mild abscess steaks were more tender than severe abscess steaks ( $P < 0.03$ ).

These authors concluded that this data suggest that liver abscesses do not impact meat tenderness, flavor, or other sensory attributes within quality grade. However, they also noted that “although there were no differences in meat tenderness due to liver abscess score, liver abscesses still have a significant impact on margins in the beef industry due to decreased feedlot performance and marbling”.

---

<sup>1</sup> NBQA. 2017. National Beef Quality Audit Executive Summary. Available:  
[http://www.bqa.org/Media/BQA/Docs/2016nbqa\\_es.pdf](http://www.bqa.org/Media/BQA/Docs/2016nbqa_es.pdf).

<sup>2</sup> 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.

<sup>3</sup> Brown, T. R. and T. E. Lawrence. 2010. Association of liver abnormalities with carcass grading performance and value. *J. Anim. Sci.* 88: 4037-4043.

<sup>4</sup> McCoy, E. J., T. G. O'Quinn, E. F. Schwandt, C. D. Reinhardt, and D. U. Thomson. 2017. Effects of liver abscess severity and quality grade on meat tenderness and sensory attributes in commercially finished beef cattle fed without tylosin phosphate. *Transl. Anim. Sci.* 1: 304-310.

Oklahoma State University, U.S. Department of Agriculture, State and Local Governments Cooperating. The Oklahoma Cooperative Extension Service offers its programs to all eligible persons regardless of race, color, national origin, religion, sex, age, disability, or status as a veteran, and is an equal opportunity employer.