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New discovery: *Fusobacterium varium* in liver abscesses of beef cattle

*In a special issue of Applied Animal Science, researchers report on the first isolation of Fusobacterium varium in beef cattle liver abscesses*

Champaign, IL, June 17, 2024—A new study published in *Applied Animal Science* is the first reported isolation and characterization of *Fusobacterium varium* from liver abscesses of feedlot cattle, announces David K. Beede, PhD, editor in chief of the journal. The study appears in a special issue of the journal with intensive focus on beef cattle liver abscesses, aiming to deepen understanding, and thereby promote reduction, of this costly disease.

The leading cause of liver condemnation at slaughter, liver abscesses are also detrimental to live cattle growth performance and carcass yields and quality. *Fusobacterium necrophorum*, a normal inhabitant of the bovine stomach, has previously been identified as the primary infectious agent in the development of liver abscesses. “However,” points out the lead investigator and senior author T. G. Nagaraja, BVSc, PhD (College of Veterinary Medicine, Kansas State University, Manhattan, KS, USA), “research has established that liver abscesses are polymicrobial infections, with many bacterial genera and species identified.”

Since the 1950s, the prevailing understanding has been that liver abscesses in cattle form due to damage to the ruminal wall from overly acidic conditions, allowing migration of ruminal bacteria into the bloodstream and from there into the liver. But with a surprising recent report that *F. varium*, rather than *F. necrophorum*, is the dominant species of *Fusobacterium* in the bovine rumen, what implications might this have for the cause and pathology of liver abscesses?

An active invader, *F. varium* is a known human and animal pathogen that has been found to have a role in a variety of infections, including abscesses and necrotic infections, in which infected tissues die. Nagaraja further notes that “There is some evidence that ruminal strains of *F. varium* are resistant to tylosin,” an antibiotic commonly provided to cattle in feed for the prevention and treatment of liver abscesses. With rising concerns over the use of antibiotics in food animals and increasing antibiotic resistance, this discovery merits thorough investigation.
Taking samples from bovine liver abscesses as well as samples of cattle stomach and intestinal tissues and contents, Alyssa Deters, a PhD student in pathobiology, working under the guidance of T. G. Nagaraja, found rather low levels of *F. varium* in the abscesses. Nagaraja states, “Cultivation in an enrichment medium yielded *F. varium* from only 3.1% of the liver abscess samples, and DNA testing via PCR analysis revealed 10.4% of liver abscess samples containing *F. varium.*” Levels of *F. varium* were considerably higher in the gastrointestinal tissue samples, as well as in ruminal and colonic contents, across all methods of detection.

The team concluded, “The increased frequency of isolation and high prevalence of *F. varium* in ruminal and colonic tissue confirms its ability to invade tissues and possible association with bacterial inflammation of the rumen. However, the relatively low prevalence and low concentrations of *F. varium* in liver abscesses sampled in this study suggest that it is likely not a main cause of liver abscesses in cattle.”

These findings mark an important step in solving the puzzles surrounding cattle liver abscesses and managing their economic as well as animal and potential human health effects. Editor-in-Chief Beede states, “Future study of the prevalence of *F. varium* in tylosin-fed cattle is of interest.”

The article appears in the June 2024 Special Issue of *Applied Animal Science.*

Funding sources for the Special Issue: Agri Research Center, Elanco Animal Health, Kemin Industries, Merck Animal Health, Midwest PMS, Plains Nutrition Council, Phileo Lesaffre, and Texas Tech University Davis College of Agricultural Sciences and Natural Resources. Arm and Hammer was a financial supporter of the ARPAS Symposium on Liver Abscesses in Cattle, July 20, 2023, which was, in part, an impetus to develop this Special Issue. Thank you.

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**Notes for editors**


This article is openly available at https://doi.org/10.15232/aas.2023-02512.

To schedule an interview with the author(s), please contact T. G. Nagaraja at tnagaraj@vet.k-state.edu.

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