

# New Liver Vaccine Approved

Liver abscesses in feeder cattle have long been a problem, but that may change thanks to a vaccine developed by Kansas State University (K-State) professors.

T.G. Nagaraja, a professor of diagnostic medicine and pathobiology in

K-State's College of Veterinary Medicine, and M.M. Chengappa, professor of microbiology and department head of diagnostic medicine and pathobiology, have developed a vaccine that prevents liver abscesses in cattle. The vaccine was

recently given approval by the U.S. Department of Agriculture (USDA).

The K-State Research Foundation and Schering-Plough, a global science-based health care company, have a licensing agreement to market the vaccine.

Schering-Plough Animal Health further developed the product and worked with USDA to get a license approval for the vaccine.

Nagaraja says abscesses are a common malady found mostly in grain-fed cattle as the result of an aggressive feeding program. He said about 20%-40% of the grain-fed cattle in feedlots are afflicted with abscesses, which cannot be detected until the animals are harvested. While the organ is condemned and not used for sale, in most instances the remainder of the carcass is approved for sale.

"If you look at the animal you can't tell if they're abscessed or not," Nagaraja says. "They look normal, so they don't show any clinical signs. The only time we see the problem is when animals are slaughtered."

The abscesses are caused by bacteria that are present in the rumen, the first of four compartments forming a cow's stomach. That compartment contains numerous microorganisms that are beneficial in assisting the animal with digestion of food.

Nagaraja, who began researching the vaccine 14 years ago, says the liver is a very well-defended organ, so much so that he calls it the "Pentagon" because it has "so many systems" of defense to protect it. However, under certain conditions, when this bacterium crosses the stomach wall and gets into the bloodstream, it is trapped inside the liver and produces a toxin that kills white blood cells, or leukocytes, which generally defend the body from germs or infections.

The vaccine prevents abscesses from occurring by neutralizing the toxin, which is a protein. Once injected into the animal, antibodies are produced that act on the protein. When the bacterium goes into the liver and produces the toxin, antibodies would neutralize it and allow the leukocytes to survive. These white blood cells can, in turn, kill the bacterium.

"That's not a new concept; it's been done with other bacteria," Nagaraja says. "But it was new for this organism that we were able to identify strains that are able to optimize conditions for production of large amounts of leukotoxins."

Nagaraja says abscesses are a significant economic liability to producers, packers and consumers. Liver condemnation, which he estimates to cost about \$5 per head, is just one of the economic losses of the disease.

Occasionally, the entire carcass must be condemned when an abscess adheres to other organs or ruptures and contaminates other organs. In addition to liver condemnation, economic effects include reduced feed intake, reduced weight gain, decreased feed efficiency and decreased carcass yield. Nagaraja says reduced animal performance is a main economic hazard associated with the problem.



**Editor's Note:** This article was written by Keener Tippin II, from K-State, which supplied this article.