

Food and Agricultural Products Center



February 17, 2004

Probiotics Provide Benefits for Livestock

STILLWATER, Okla. – A growing interest is evident in the use of probiotics in livestock feed supplements as a replacement for subtherapeutic levels of antibiotics in animal rations.

A primary benefit of probiotics is to control intestinal infections in livestock, said Stanley Gilliland, food microbiologist for the Oklahoma Food and Agricultural Products Research and Technology Center. Some properly selected probiotic bacteria also can increase nutrient utilization by providing enzymes in the gut capable of converting certain components of the diet into more digestible nutrients for the host animal.

“Studies have suggested the possibility of feeding selected probiotic bacteria to produce certain changes in the body composition of the animals or their products such as altering the lipid composition,” Gilliland said. “The specific function of probiotics might be different depending on the host animal and, more importantly, on the characteristics of the probiotic.”

The most widely studied livestock species with respect to the use of probiotics is poultry. Much of the attention in this area has been focused on the control of salmonella in chickens.

Properly selected cultures of probiotics, such as *Lactobacillus* species, can overcome those lactobacilli found in the natural flora of the birds and exert inhibitory action toward salmonella in the intestinal tract of chickens.

Another approach has been to culture the intestinal bacterial flora from a healthy chicken and use this preparation to inoculate one-day-old chicks in order to

establish a healthy, normal flora, which helps control salmonella.

The problem with this approach is possible lack of consistency in the organisms making up the preparation from one batch to another, Gilliland said. Some refer to the use of probiotics in poultry to control pathogens as competitive exclusion; however, the mechanism by which probiotic preparations are able to inhibit intestinal pathogens in poultry and in other animals has not been clearly defined.

There is interest in the swine industry to find ways to control salmonella during the feeding phase to reduce the occurrence of the pathogen in fresh pork products.

“Not much scientific research has been reported on this with regard to the potential for using probiotic cultures,” Gilliland said. “However, the feeding of a mixture of *Bifidobacterium pseudolongum* and *Lactobacillus acidophilus* to piglets decreases the frequency of mortality.”

Lactobacilli are prevalent in the duodenum, jejunum and ileum of healthy piglets; as a result, lactobacilli represent a part of the natural flora. Feeding a culture of *L. acidophilus* selected for amylase activity to weaning-age piglets on a high starch diet results in increased growth and feed efficiency.

Currently, efforts are underway to establish whether or not a selective culture of *L. acidophilus* would exert inhibitory action on salmonella in pigs.

A major benefit of feeding *L. acidophilus* NPC 747 to cattle has been a significant reduction in the frequency

of occurrence of *Escherichia coli* O157:H7 in feedlot cattle, Gilliland said.

“This is considered a very important intervention step in the feedlot cattle industry in order to reduce the occurrence of this pathogen on fresh meat,” he said.

“Probiotics, including *L. acidophilus* NPC 747, also have been shown to increase daily gain and feed efficiency in feedlot cattle. Feeding a mixture of selected probiotic cultures results in a trend toward reduced acidosis in feedlot cattle.”

Studies show feeding dairy cattle a probiotic containing *Enterococcus faecium* plus a yeast culture results in increased milk yield. Other studies also indicate that feeding selected cultures of *L. acidophilus* increases milk yield in dairy cattle.

The exact mechanism of the benefits provided by the probiotics in improving feed efficiency, growth and milk production has not been determined.

Gilliland said probiotics have potential for providing a number of benefits for livestock; however, strains to be used for probiotics should be carefully selected for the ability to provide the desired benefit in the host animal.

Host specificity is important for probiotics that are required to grow and function in intestinal tracts. Probiotics should be tolerant to bile and to other material in the digestive system such as stomach acids.

“To be successfully marketed, probiotics should be easy to grow in commercial culture production facilities,” Gilliland said. “Additionally, probiotics must be able to survive production, processing, storage and delivery to the animal.”

###

Stanley Gilliland is a food microbiologist at the Food and Agricultural Products Center. He may be contacted at (405) 744-6071 or seg@okstate.edu .
--

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 laws and regulations, does not discriminate on the basis of race, color, national origin, sex, age, religion, disability, or status as a veteran in any of its policies, practices or procedures. This includes but is not limited to admissions, employment, financial aid, and educational services.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Sam E. Curl, Director of Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Dean of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of \$155.40 for 1110 copies. 0204 MHG.