Battling Bovine Respiratory Disease

University of California plays integral role in research

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Despite millions of dollars spent on research, prevention and treatment, diseases of the respiratory system or pneumonia are a major cause of illness and death in cattle from 6 weeks to 2 years of age.

Sadly, this is as true today as it was 30 years ago despite development of new and improved vaccines, new broad spectrum antibiotics and increased fundamental knowledge as to the cause of disease.

Bovine respiratory disease (BRD) accounts for 29 percent of U.S. cattle industry deaths and causes annual losses of more than one million animals and $692 million. In the United States, 1.4 percent of all feedlot cattle perish before reaching harvest weight and of those, the majority are due to respiratory disease. Indeed, more feedlot cattle die from BRD than all other diseases combined, and this trend is increasing.

To address this issue, a multi-institutional team led by James Womack, Ph.D., W. P. Luse Endowed and Distinguished Professor at Texas A&M, College Station, Texas, and involving researchers from Washington State University, Pullman, Wash.; University of Missouri, Columbia, Mo.; Colorado State University, Fort Collins, Colo.; New Mexico State University, Las Cruces, N.M.; and University of California, Davis (UC Davis), was recently selected to coordinate a large five-year research, education and outreach project to address BRD in beef and dairy cattle. This project is being funded by the U.S. Department of Agriculture National Institute of Food and Agriculture, based in Washington, D.C.

This ambitious project seeks to use recent advances in bovine genomics and deoxyribonucleic (DNA) technology to enable approaches to reduce the incidence of BRD in beef and dairy cattle. The proposed outcomes of the five-year project include improved diagnostics of BRD, identification of genetic markers associated with resistance and the implementation of DNA testing and management approaches to effect a sustained decrease in the incidence of BRD in both beef and dairy cattle.

The research component of this proposal will identify genetic loci and genomic rearrangements associated with BRD, and use these data to develop BRD diagnostic tests and DNA-based selection tools to identify BRD-resistant animals.

A lot of the research in the first year of this project is going to be carried out in California. A large dairy calf trial will be occurring in the San Joaquin Valley this summer under the direction of Terry Lehenbauer, DVM, associate director of food systems at UC Davis’ Veterinary Medicine Teaching and Research Center in Tulare.

Diagnostic support for the project

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is going to be provided by the California Animal Health and Food Safety (CAHFS) Laboratory System under the directorship of Richard Breitmeyer, DVM, and in later years of the project researchers plan to work closely with CAHFS personnel to develop DNA-based test for BRD diagnostics.

A trial designed to challenge steers at the UC Davis feedlot with each of the various pathogens that are known to cause BRD and examine the host gene expression response will also be carried out this summer. This study will be led by UC Davis' Laurel Gershwin, DVM, a professor in the Department of Pathology, Microbiology and Immunology in the School of Veterinary Medicine.

In a related study, Cassandra Tucker, Ph.D., an assistant professor of animal behavior in the Department of Animal Science will be examining how non-steroidal anti-inflammatory drugs might be used to modulate the severity of BRD and enhance disease recovery with associated improvements in both feedlot performance and animal welfare.

I will be heading the extension component of the project. This will involve the development and delivery of educational programs on animal health management, genomic and animal breeding approaches to reduce the incidence of BRD, both in California and throughout the United States.

This project will be done in conjunction with the National Cattlemen's Beef Association, Centennial (NCBA), Colo.; NCBA's weekly television show, Cattlemen to Cattlemen; and the Beef Quality Assurance Program. In fact, Tom Field, Ph.D., director of producer education at NCBA is serving on the industry and scientific advisory board for this BRD project.

Other familiar beef cattle industry figures on the advisory board include Mike Engler, Ph.D., president and chief executive officer of Cactus Feeders, Amarillo, Texas, which is the second largest feeding company in the United States.

Another member is Heather Burrow, Ph.D., chief executive officer of the Cooperative Research Centre for Beef Genomics in Armidale, Australia.

Recently appointed UC Davis Vice Chancellor for Research, Harris Lewin, Ph.D., a well-known scientist in bovine genomics, is also a member of this advisory board.

Over the coming year, I plan to work in collaboration with John Mass, DVM, UC Extension Beef Veterinarian and Jim Olijen, Ph.D., UC Animal Management Systems Extension Specialist to develop curriculum on BRD for inclusion in the Beef Quality Assurance Program.

We also are planning a BRD session as part of Pfizer's Cattlemen's College taking place during the Cattle Industry Convention and NCBA Trade Show coming up in February of 2012 in Nashville, Tenn.

As a geneticist with an interest in animal breeding, one area of particular interest to me is the value associated with the development of an expected progeny difference (EPD) for BRD resistance. The costs to treat an animal for BRD in the feedlot have been reported to average $44.

Additionally, the illness results in reduced average daily gain and increased days on feed. I have been working with Mike MacNeil, Ph.D., research geneticist at the USDA Agricultural Research Service at Miles City, Mont., to determine the “relative economic value” of decreasing the incidence of BRD in the feedlot by 1 percent. Relative economic value is defined as the change in expected profit per progeny when changing the EPD of a bull for a trait by one unit (i.e. decreasing BRD incidence by 1 percent).

Our preliminary data, based on a retained ownership production system, suggest that the relative economic value of decreased BRD incidence is several times that associated with improvement in weight trait EPDs, suggesting considerable value would be associated with the successful development of DNA tests to enable selection for BRD resistance.

Clearly this is a large, multifaceted research and outreach project. The ultimate goal of the project is to advance novel research findings stemming from the new genomic technologies that have become available to the cattle research community; and deliver science-based knowledge and management tools to enable a sustained reduction in the incidence of BRD in the beef and dairy cattle industries.

Finally, a notice about the upcoming 2011 Beef Improvement Federation Annual Research Symposium and Annual Meeting. This year's event will be held June 1 through June 4, 2011, at Montana State University, Bozeman, Mont.

Registration closes May 25. To register, visit https://toto.msu.montana.edu/cs/bif/registration.