INDUSTRY NEWS

Research Update

►**Summaries** of current **beef cattle** research

Vaccines, *E. coli* and wheat

The following items represent a collection of releases provided by the Agricultural Research Service (ARS) and universities.

Getting livestock vaccines past a maternal block

Use of a virus linked to the common cold is among the novel approaches ARS scientists in Iowa are using to bypass maternal defenses that thwart vaccination of very young livestock.

Maternal antibodies are crucial to the offspring of animals such as cattle and swine, which are born with no protective antibodies of their own. These young get their immunity to disease from suckling colostrum during the first 24-36 hours after birth.

But these maternal antibodies also fight off virus strains that are placed in vaccines to initiate immunity against disease.

In one study, veterinary medical officers Ronald Wesley and Kelly Lager of the ARS National Animal Disease Center (NADC) in Ames, Iowa, immunized — against swine flu — recently born piglets that had suckled maternal influenza-fighting antibodies. They did this by getting the flu strain past the antibodies piggybacked aboard a genetically engineered virus made with weakened adenoviruses.

The ability of adenoviruses to infect cells makes them good conduits for carrying genetic material into animals. Since adenoviruses originate from humans — causing respiratory ailments such as the common cold, pneumonia and bronchitis in people — livestock have no maternal antibody resistance to them.

This is a potentially major breakthrough that may close a window of vulnerability during which the maternal antibodies' waning powers still repel vaccines but leave young animals open to contracting diseases.

In another project, testing led by NADC virologists Julia Ridpath and John Neill indicated that exposing suckling calves to bovine viral diarrhea virus (BVDV) generates a T-cell response, or immune response, that will repel that virus. BVDV costs U.S. cattle producers millions of dollars in losses each year and induces diseases affecting animal reproduction and nutrition, milk output, and digestive and respiratory function.

Read more about this research in the November/December 2006 issue of *Agricultural Research* magazine, available online at *www.ars.usda.gov/is/AR/archive/*.

— by Luis Pons, ARS public affairs specialist

Chlorate compound found to quell microbes in meat animals

A patented compound developed by ARS scientists could help reduce the risk of salmonella and *E. coli* O157:H7 infection from meat or poultry products.

Researchers led by microbiologist Robin Anderson at the ARS Food and Feed Safety Research Unit (FFSRU) in College Station, Texas, mixed a chlorate-based compound into livestock feed or water two days before harvest. When fed at roughly 0.5%-5% of an animal's diet, this powder-like additive was very effective in reducing salmonella and *E. coli* O157:H7 in the animal's gastrointestinal tract.

In studies with cattle, levels fell from 100,000 *E. coli* cells per gram of fecal material to 100 cells per gram. Anderson's team obtained similar results in reducing the amount of *E. coli* and salmonella bacteria in tests with 100 swine and 100 sheep.

Anderson developed this experimental chlorate five years ago at the urging of the National Cattlemen's Beef Association (NCBA). ARS has patented the technology, and FFSRU researchers are working to further develop it to make it ready for approval by regulatory agencies. More about this research may be found in the October 2006 issue of *Agricultural Research* magazine.

— by Alfredo Flores, ARS public affairs specialist

Creek studied for rangeland effects on water quality

Elevated levels of bacteria in streams can affect water quality, the health of the aquatic ecosystem and activities such as fishing, swimming and wading, a Texas Agricultural Experiment Station researcher said.

John Sij, Experiment Station agronomist in Vernon, and his team are measuring water quality of a rangeland watershed.

"This may be one of the first efforts on small streams such as this to get scientific involvement from Step 1, the impairment, through the entire process of identifying the sources of nonpoint pollution and looking for solutions through a watershed management plan," Sij said. Working on the project with Sij are Phyllis Dyer, research technician; Mark Belew, research associate; and Cody Pope, research technician.

As a part of the Texas Commission on Environmental Quality's Clean Rivers Program, limited testing was conducted on Buck Creek in the southeast corner of the Texas Panhandle. Tests showed bacterial levels (*E. coli*) in the water there were sometimes elevated, indicating a potential water quality problem, Sij said.

Landowners and the Soil and Water Conservation District were concerned that possible government regulations could affect agriculture without knowing the source and scope of the contamination, Sij said.

The Texas Soil and Water Conservation Board and Texas Water Resources Institute were contacted. The two entities requested the Experiment Station at Vernon conduct a three-year study to determine the degree of impairment and possible solutions, he said.

Any pollution of the water would be regulated under the Clean Water Act, enforced by the Environmental Protection Agency (EPA).

The first steps were to define the problem, Sij said. The creek is spring-fed from a rural watershed, which includes crops and grazing lands. Buck Creek is part of the Red River

PHOTO COURTESY OF TEXAS AGRICULTURAL EXPERIMENT STATION

►**Phyllis Dyer, Texas Agricultural Experiment Station research technician, shows T.J. Helton, (center) Texas State Soil and Water Conservation Board nonpoint source grant coordinator, and Kevin Wagner, Texas Water Resources Institute project manager, how samples are taken.**

Basin. Located in the sub-watershed of the Lower Prairie Dog Fork of the Red River, it is an unclassified freshwater stream. The watershed is 289 square miles.

No identifiable point sources of pollution have been determined, Sij said, so any contamination would come from the watershed itself or nonpoint sources.

According to EPA guidelines, a single sample for *E. coli* should not exceed 394 colonies per 100 milliliter (mL) and a geometric mean of not more than 126 colonies per 100 mL, he explained.

In the Buck Creek samples collected prior to the Experiment Station's involvement, the allowable level of *E. coli* was exceeded in three different samples and the fecal coliform samples exceeded allowable rates in eight different samples, Sij reported.

"People swimming or wading in the creek might have been at risk," he said.

"Our objective is to determine the load of the pollutant that a body of water can receive and still maintain its beneficial uses," Sij said. The load must be allocated among all potential sources of pollution within the watershed, and measures to reduce pollutant loads will need to be developed as necessary.

Agriculture should not be considered the only source of pollution, Sij said. Wildlife could be a significant contributor of contamination.

"We know cattle can be a problem, but we have turkey, hogs, deer, beaver, raccoons, birds and other animals using this stream as their water source," he said.

The study established 13 monitoring sites along the creek in Donley, Collingsworth and Childress counties. In 2004, the *E. coli* numbers were high, exceeding water quality standards in many samples. During the drought of 2005-2006 stream flow was greatly reduced, as were bacteria numbers, Sij said. Numerous sites were dry for months at a time.

Phase I, the bacterial monitoring phase, is essentially complete and Phase II is concentrating on bacterial-source tracking, he said. The Phase II study will identify the animal sources contributing to the contamination, as well as their relative contribution to the total bacterial load.

The ultimate goal is to educate stakeholders and to develop a Watershed Protection Plan so water quality will be able to support a healthy aquatic ecosystem and recreational activities, Sij said.

— by Kay Ledbetter, Texas A&M University

K-State researcher finds new wheat virus

Kansas State University (K-State) scientist Dallas Seifers has found a virus never before detected in wheat.

"We just found it in this year's growing season," said Seifers, who is a wheat researcher at the university's agricultural research center in Hays, Kan. Although the virus was found in multiple locations around the state last spring, including university fields and privately-owned land, there was no indication that it had a significant yield effect on the 2006 wheat crop, he said.

Once Seifers discovered the disease, he worked through several processes to rule out other known diseases before reaching the conclusion that this was a new one. The virus, which Seifers is calling triticum mosaic virus, seems to have affected cultivars that have been developed for their resistance to wheat streak mosaic, he said.

Visually, the virus's disease symptoms resemble several other viruses, including wheat streak mosaic.

There are still many unknowns about the disease, Seifers said, including what effect it might have on yields in coming years, how widespread it was in 2006, and what sort of weather conditions it favors.

"We're looking for answers to those questions and more," he said.

— by Mary Lou Peter-Blecha, K-State Research & Extension