Research Update

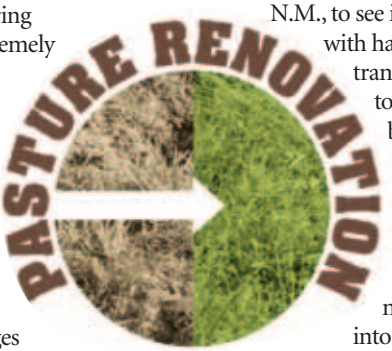
►**Summaries** of current **beef cattle** research

Hydrogels help grasses grow on remote, arid rangelands

The arid conditions in the southwestern United States make restoring degraded rangelands extremely difficult, but a USDA scientist has found a way to help native grasses survive there so they can be closely studied as restoration tools.

Residential development, mining operations, recreational activities and other changes to the landscape have stripped many southwestern rangelands of their native vegetation. That reduces habitat for wildlife and forage for grazing, makes soils more susceptible to erosion and even increases dust along highways, reducing visibility.

Mary Lucero, a molecular biologist with the Agricultural Research Service (ARS), is conducting long-term studies at the ARS Jornada Experimental Range in Las Cruces, N.M., to see if microbes associated with hardy woody shrubs can be transferred to native grasses to fortify them so they are better equipped to restore degraded rangelands.



As part of Lucero's efforts, she is evaluating the competitive abilities of grasses treated with various microbes and transplanted into disturbed, arid rangeland sites. Temperatures in the area can exceed 100° F for days at a time, and rainfall is scarce and highly variable, so the transplants need to be irrigated to become established. But irrigating on such remote sites can be labor-intensive and costly.

To enhance the ability of a native bunch grass to establish in such hostile environments, Lucero and her colleagues filled tubes fashioned out of PVC pipes with hydrated gels, buried them alongside the roots of the grass, and positioned the pipes so that moisture would be available to the grass roots.

Hydrogels are already used in some commercial products for helping establish grass seedlings and for cutting back on how often a gardener has to water a garden. Lucero wanted to see if the hydrogel-filled tubes would provide enough moisture to enhance the survival rates of the grasses she is studying.

Her results show that 1 liter (L) of hydrogel-bound water was sufficient to support black grama grass (*Bouteloua eriopoda*) transplants through reproductive maturity. The results, published in the *Journal of Arid Environments,* show that hydrogels can be used to irrigate native grasses transplanted into harsh desert environments, and that they may be useful for restoration of rangeland habitats.

In a more recent study, nearly 700 greenhouse-propagated native plants hydrated with the gels have survived transplanting. They became established on remote, disturbed field plots in the Chihuahuan Desert, and have even produced offspring.

— by Dennis O'Brien, ARS

ARS PHOTO BY STEPHEN AUSMUS

►The number of daughter plants associated with each transplant is an important measure of the transplant's reproductive success. Here, linear stolons emerging from the transplants at the base of each PVC tube produce chains of daughter plants that appear as islands of grass surrounded by bare soil.

Cleaning cows from inside out

USDA scientists and their collaborators have conducted a series of studies that explore non-antibiotic methods to reduce foodborne pathogens that are found in the gut of food animals.

The team consists of ARS microbiologist Todd Callaway, with the agency's Food and Feed Safety Research Unit in College Station, Texas; ARS animal scientist and project leader Jeffery Carroll with the agency's Livestock Issues Research Unit in Lubbock, Texas; and John Arthington at the University of Florida in Ona.

Early studies showed that citrus products provide cows with good roughage and vitamins, and the essential oils in such products provide a natural antibiotic effect.

Callaway's early data showed the feasibility of using orange pulp as a feed source to provide anti-pathogenic activity in cattle. He also showed that consumption of citrus byproducts (orange peel and pulp) by cattle is compatible with current production practices, and the byproducts are palatable to the animals.

Callaway then shed light on how to exploit the essential oils inside the peel and pulp that are natural antimicrobials. Collaborations with researchers Steven Ricke and Philip Crandall at the University of Arkansas in Fayetteville also have identified specific essential oils that kill the pathogenic bacteria.

From the time Callaway began studying citrus as an animal gut cleanser, he recognized that citrus peel can be heavy and expensive to ship long distances, so his latest studies have investigated the use of processed orange peel pellets.

For one study, the team fed dried orange peel pellets to sheep as a model for cows for eight days. They found a tenfold reduction in Salmonella populations in the animals' intestinal contents. Callaway received a grant from the National Cattleman's Beef Association (beef checkoff funds) to help fund the study. Results from the 2011 study were published in *Foodborne Pathogens and Disease.*

— by Rosalie Marion Bliss, ARS