



New analysis techniques may speed information on changing range conditions to ranchers like Robert Noon of Oro Blanco Ranch in Santa Cruz County, who seek to maintain peak nutrition for their herds. Noon raises registered Charolais cattle. *Michael Stoklos photos*

## High-Tech Offers New Solution to Old Ranching Problem

*By Susan McGinley*

A RANCHER SURVEYING THE RANGE KNOWS THAT SMALL changes — some too subtle to be detected by the eye — can make the difference between a good calf crop and a poor one.

The protein levels in range grasses are vital to this outcome, but these change constantly during the growing season. Wildlife managers and land management agency personnel likewise need to know the nutrient conditions of rangelands grazed by both domestic and wild animals in order to manage the land's resources well.

Neither the range nor the herd signals immediately when grasses are supplying less than the 7 percent protein needed by a cow for efficient digestion. Traditional lab tests haven't been

useful, either, because results, which typically take 2 to 4 weeks, are outdated by the time they reach the rancher's mailbox.

But a new approach to testing now under development at the University of Arizona in Tucson promises to close that gap dramatically for Arizona ranchers and land managers. The procedure uses near infrared spectroscopy (NIRS) to analyze forage grasses, producing results that are cheaper and faster than traditional methods currently used, explains Robert Kattnig, UA assistant livestock specialist.

"Let's say a rancher collects a grass sample and ships it to us," Kattnig says. "We put it in a dryer, dry it overnight and then grind the sample. We put it in the NIRS analyzer and in



**UA livestock specialist Robert Kattnig and assistant Wilma Renken can deliver results on range conditions in a matter of hours using near infrared spectroscopy (NIRS). Ken Matesich photo**

30 seconds we have an answer.”

Turn-around time is about 3 days, including shipment time from the rancher to the lab, and that can make a lot of difference, Kattnig explains. “Rangeland is like your yard,” he says. “The grass changes continually over the season. If you take a sample and get it back in 30 days, the situation may have changed considerably [from when the sample was collected.]”

(Traditional protein analysis usually involves running chemical tests on dried grass samples, and may take up to a month to return results.)

Because it takes a while for cows to show physical symptoms when they’re suffering from poor diets, too often livestock are grazed beyond the protein threshold of range grasses in the spring, Kattnig says. But if a rancher knows the range is insufficient, he or she can supplement with protein and the cows will use the low-quality forage better.

“It will encourage the cow to eat more,” Kattnig says.

Although NIRS has been used extensively to analyze grains and forages in other parts of the U.S., the method has never been applied to grasses in the Southwest, particularly those in Arizona.

NIRS uses a narrow band of infrared light focused on a dried, powdered grass sample. Each sample absorbs and reflects the light differently, indicating the level of protein present in the grass when it was cut. NIRS technology can also determine phosphorus and digestible fiber content, although this is not currently part of Kattnig’s project.

The equipment is simple. The spectrometer, slightly larger than a microwave oven, attaches to a computer and

printer. Together they occupy one end of a laboratory bench once filled entirely with monitors and glassware used in the wet-chemistry method.

Kattnig and his coworkers will test grasses in various stages of growth at different times of the year. Right now they are calibrating the equipment using protein values for Arizona grass species.

“We need to have samples of these grasses throughout the growth phase of the plant because animals eat the plants at all stages of growth,” Kattnig says. “Hay and grain in storage don’t change. The range does.”

In Arizona, grasses normally show a high protein content during the growing season when the moisture is high. As moisture recedes and the plant goes dormant, the protein curve declines. Sampling during target times when the forage is changing will allow ranchers to stay ahead of this downward curve.

Once the system is fully calibrated and a database has been developed, UA researchers will be able to handle a large volume of samples from all over the state, Kattnig says.

Eventually NIRS could be used for a wide range of grasses, legumes and other plants serving as forage. In Kattnig’s opinion, multiple-use areas grazed by both wildlife and livestock could be analyzed to see the effect grazing has had on an area.

By developing a reliable, inexpensive method of range grass analysis, Kattnig hopes to assist ranchers, wildlife managers and land management personnel in monitoring livestock and wildlife use of forage resources on both public and private lands in Arizona.