

# Real World Research

Lowering production costs and increasing profitability are research goals at New Mexico State University's Corona Range and Livestock Research Center.

Story & photos by **Troy Smith**

**L**and-grant university research facilities have often been targets of criticism. You'll hear it during field days and tours of beef cattle research sites as visiting cattle producers talk among themselves. Even



► Mike Rubio routinely monitors rain gauges, but precipitation has been scarce in recent years. Even during years of average rainfall, the high-desert range offers green forage for only 10-12 weeks.

producers with genuine appreciation for the management tools and technology born of scientific research may harbor a little envy.

"This ain't the real world," one of them might say. "They couldn't keep a place like this going if the university didn't have deep pockets."

The accusation is that these college field laboratories don't suffer the same financial pressures common to privately operated farms and ranches. It may be true in some cases, but visitors to the New Mexico State University (NMSU) Corona Range and Livestock Research Center had better bite their tongues. The Center is self-sustaining, relying on income from its beef, sheep and hunting enterprises to pay for operating costs and capital improvements, as well as providing support for research projects.

Together with the Center's manager, Shad Cox, a steering committee comprised of 18 research scientists sets the course for production and the pursuit of research. An active 12-member advisory committee, consisting of ranchers and agency personnel, also has influence. They like the idea of running the outfit as a working ranch and, according to Cox, making it stand on its own financial merits lends greater credibility to the Center.

"Just like other ranchers, we have to operate within our means. We have to manage this ranch's livestock production and its natural resources to improve sustainability and profitability," Cox states.

"And like most ranchers, we struggle with the

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effects of drought, rising costs of labor, fuel and other inputs, and fluctuating markets. Many of the research projects conducted here, and particularly those related to cattle management and nutrition, have a common theme — lowering production costs and increasing net income."

The Center is located in central New Mexico, about 190 miles north of NMSU's Las Cruces campus. Located near the village of Corona, the 28,866-acre property stretches some 18 miles in length and about 2½ miles in width. Cox hangs his hat at the Center's headquarters, which includes a residence, office, shop, feed

storage areas, barn and corrals. North Camp, located several miles to the northeast, is the site of handling facilities for cattle and sheep, a laboratory, accommodations for part-time help, and the residence of research technician Mike Rubio.



► Not fancy, but functional, the Center's facilities resemble many private ranches in the Southwest. Pictured is North Camp, which includes research technician Mike Rubio's residence, bunkhouse to accommodate temporary help, laboratory, shop/barn and working pens for cattle and sheep.



### Animal units, females

In years past, the Center had five full-time employees, but Cox and Rubio comprise its current crew of two. To meet occasional demands for extra help and support for research projects, NMSU students are hired temporarily. The Center currently manages registered Angus and commercial cows, totaling 160 head, plus 67 replacement heifers. A flock of white-faced ewes tallies 220 head.

“Traditionally, this ranch ran about 500 animal units. Due to drought that set in about six years ago, we de-stocked both cattle and sheep to about 140 animal units,” Cox explains. “We’re now grazing about 250 animal units and continuing to rebuild our breeding herd and flock with ranch-raised replacements.”

Recent years also brought changes in the way the Center's grazing resources are used. Originally huge and few in number, pastures have been crossfenced with pipeline-fed watering sites added to accommodate controlled grazing practices. Handling



► The only full-time personnel at the 27,886-acre research ranch are manager Shad Cox (left) and research technician Mike Rubio (right). University graduate students assist with specific research projects, and temporary employees are hired to supplement seasonal labor demands.

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facilities — seven for cattle and one for sheep — have been strategically located to complement a variety of research projects. Facilities aren't fancy, but each includes scales, squeeze chutes, palpation cages and sorting pens.

The registered and commercial cows are managed alike. And like the high-desert environment, that management is unforgiving. Females unable to conceive during a 45-day breeding season and deliver a calf year after year are shown the gate. NMSU animal scientist Neil Burcham, who guides genetic selection at the Center, says the process is about building females that fit. Generally, those are females of moderate mature size [averaging frame score 5.5 and 1,100 pounds (lb.) at body condition score (BCS) 5].

"In our environment, massive calf weaning and yearling weights lead to open cows, as does heavy milk production. Reproduction is most important, so that receives the most emphasis," Burcham states. "We're all about females. They do all the work, while the bull's job is to change gene frequency in the population. So we use bulls that have as many good females in their pedigree as possible."

Burcham believes good females have to be efficient. In the pursuit of efficiency, Burcham calls cow energy value (\$EN) one

of the best selection tools he has seen. These values predict cow energy requirements in terms of the expected dollars saved on feed energy expense. According to Burcham, the average \$EN for NMSU's registered herd is \$19.76, which ranks among the top 15% of current dams in the breed according to the Spring 2007 *Sire Evaluation Report*. Their mothers' feed efficiency is passed on to the calves, as indicated by performance of steers entered in the New Mexico Ranch to Rail program.

"Our steers have had the best feed efficiency and cheapest cost of gain — 10¢ to 20¢ less — compared to the other New Mexico and West Texas cattle in the program," Burcham adds.

#### **Protein supplementation**

The goal of keeping cow feed costs low has driven some of the Center's most meaningful beef cattle research. NMSU range livestock nutritionist Mark Petersen has focused on lowering costs through strategic supplementation of protein. Cattle at the Center graze throughout the year — as do cow herds on most New Mexico ranches. However, because effective precipitation is

scarce and generally occurs only in late summer, cattle usually graze dormant forage during at least 40 weeks of the year. This forage is low in crude protein (CP) — less than 7% — and contains a high

concentration of slowly digestible fiber.

Protein supplementation will increase the digestibility and intake of the grazed forage by enhancing the rumen environment, so energy nutrition, as well as protein nutrition, is improved. Petersen's work has demonstrated how the level of nutrition for acceptable reproductive performance may be achieved by feeding just

enough supplemental protein at just the right time.

The kind of protein fed also makes a difference. Rumen-degradable protein from an oilseed source, such as soybean or cottonseed meal, is digested in the rumen. Nondegradable (bypass) protein, from sources such as corn gluten meal or fish meal, bypasses the rumen and is digested in the small intestine. Nonprotein nitrogen (urea) can also be a source of protein as rumen microbes use it when digesting fiber.

**Each of the three types of protein, and combinations of different types, were used to develop a multilevel supplementation strategy for cows at the Center.**

► NMSU researcher Mark Petersen says cattle at Corona ranch receive minimal but strategic supplementation. Reliance on stored body fat during certain times of the year means cows may appear thin to producers in other parts of the country. Still, reproductive performance is very acceptable.



Petersen says each of the three types of protein, and combinations of different types, were used to develop a multilevel supplementation strategy for cows at the Center. The mineral mix that is fed year-round is the foundation for the range nutrition program, Petersen adds, and it is used in combination with the high-protein (about 36%) supplements.

“Mineral supplementation is fundamental, and cows also need to have access to all the forage they want, every day, as the source of energy. We don’t provide supplemental energy. That has to come from the grazed forage,” Petersen states.

For the first level of protein supplement, a combination of 50% mineral mix and 50% bypass protein is provided in self-feeders. Consumed at the rate of 0.25 lb. per head per day, Petersen says it is effective when cows need a little supplement to optimize the rumen environment.

The second level involves feeding a 36% CP supplement consisting of 65% rumen-degradable protein and 35% bypass protein. It is fed at the rate of 0.5 lb. per head per day, but is most effective when fed to cows one day each week, supplying 3.5 lb. per head per feeding. This level is appropriate for use after weaning and during mid-gestation.

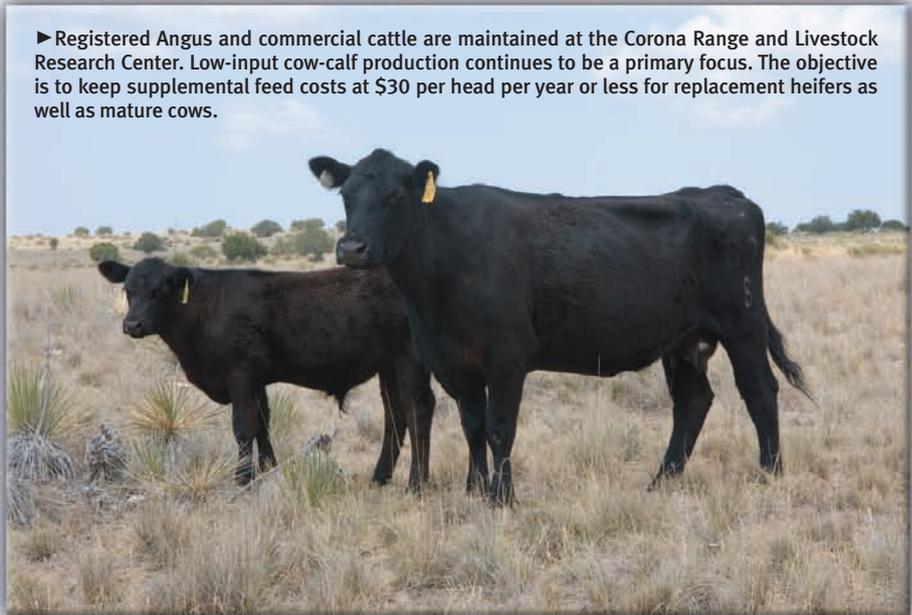
The third level involves feeding a mixture of 65% rumen-degradable protein and 35% bypass protein at the rate of 1 lb. per head every other day during the winter.

The highest level of protein supplementation, fed at the rate of 2 lb. per day, is a 50:50 blend of rumen-degradable protein and bypass

protein. Also fed every other day or twice per week, this level of supplementation is best-suited to cows undergoing nutritional stress during the period after calving and prior to breeding. For an extra boost, calcium propionate can be added to this supplement. Studies show that a synergism between calcium propionate and bypass protein can hasten the return to estrus

among 2- and 3-year-old females.

“Our goal has been to develop a supplementation program that keeps cows grazing low-quality forage from losing weight and enhance reproductive performance with the least out-of-pocket cost,” Petersen says. “In



► Registered Angus and commercial cattle are maintained at the Corona Range and Livestock Research Center. Low-input cow-calf production continues to be a primary focus. The objective is to keep supplemental feed costs at \$30 per head per year or less for replacement heifers as well as mature cows.

three out of five years, we’ve limited supplemental feed costs to \$30 per cow, and we’re still able to get 80% of the cows bred in the first 30 days of the breeding season.”

### Heifer development

Working with Petersen, NMSU reproductive physiologist Dean Hawkins has also sought a low-cost approach to replacement heifer development. According to Hawkins, 10 years of study suggests heifers weaned in October can be developed on range for the same \$30-per-head supplemental feed cost when feeding of supplement containing bypass protein is delayed until February.

The Center’s heifers will reach 55% of their mature body weight by breeding time in May. After being synchronized for one round of artificial insemination (AI) and then turned out with cleanup bulls for 45 days, pregnancy rates of range-raised replacements are comparable to feedlot-developed heifers weighing 200 lb. more. Hawkins says range-raised heifers make up the difference in weight, benefiting from compensatory gain when grazing green forage in late summer.

“We’re seeing pregnancy rates of 85% to 88%, and fewer range-

raised heifers are culled as 2’s and 3’s for failing to breed back,” Hawkins offers, adding that it costs considerably less to develop replacements on grass. “We’re continuing to watch and compare culling rates and lifetime productivity. The evidence suggests heifers

developed in the production environment are better adapted and will stay in the herd longer.”

Cox says producer feedback indicates approval of the Center’s search for methods of cutting costs of production, but studies also target ways to improve ranch profitability through innovative management of natural resources. Included are studies of the most effective and economic methods of controlling invasive plant species such as broom snakeweed and juniper. Another relatively new project is looking at wildlife populations, habitat and harvest, and the interrelationships with brush control and livestock production.

“That’s significant, considering the increasing numbers of ranches that are interested in managed hunting as an enterprise to increase profitability,” Cox notes. “We’re doing that here at the Center, with mule deer and antelope, and bringing in additional income.”

During the past several years, the number of research scientists involved at the Center has doubled, with research projects and graduate student involvement increasing by nearly 300%. To better share the resulting information, planning and fundraising are under way for construction of an education facility at the Center. Included will be classrooms for on-site instruction and distance education courses, as well as an improved laboratory. According to Cox, such a facility will enhance this NMSU research ranch’s role in serving students and its outreach to managers of southwestern native grazing lands.

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**— Mark Petersen**