PHOTO BY SCOTT BAUER

# Stakeout

## Agricultural researchers are using high-tech methods of surveillance to reveal hidden threats to animal health and well-being.

*by* ***Don Comis***

The feds pull up in a surveillance van and park in a nearby alley. Walking carefully in the dark, they place a special, remote-controlled camera on a 12-foot-tall tripod. From inside the van, they use a joystick to turn the camera almost 360 degrees, to zoom in and pick out individuals in the nighttime crowd.

They can also look out of the vehicle's windows with the latest generation of night-vision scopes — or use them to spy from the security of a platform on top of the van. They still find it difficult to pick out a dozen or so suspects from the hundreds in the crowd.

They've tried marking them with the same tape and paint used to mark vehicles of friendly forces in combat. The coded symbols made with the tape or paint were then visible under infrared lights. However, the tape didn't stick to their bodies, and the paint's use raised safety concerns over the long run.

These feds aren't in a military — or even a police — operation. Instead, they're a U.S. Department of Agriculture (USDA) team of farm animal behaviorists in action. Their "suspects" are individual bovines in a herd they are observing at a commercial feedlot in the Texas Panhandle — the feedlot capital of America, if not the world.

### Hidden stresses

Julie Morrow-Tesch has set up livestock behavior studies units at West Lafayette, Ind., and at Lubbock, Texas, for the USDA Agricultural Research Service (ARS). She is one of a handful of farm animal behaviorists in the country. Another is Don Lay, formerly at Iowa State University (ISU) and recently hired to lead the West Lafayette unit. Soon his unit will be hiring a swine behaviorist.

These hires are part of the ARS research drive to find objective ways of measuring stress in farm animals to improve animal handling practices.

"The stresses we're talking about can cause real problems — slower growth, illness, injury, and sometimes death to livestock," Morrow-Tesch says. "Besides the humane concerns, we're talking about stresses that cost real money in reduced production. Just as an indicator of the costs involved, increasing survival by just one piglet per litter can provide the livestock industry an extra $100 million or more in sales. And that doesn't include the savings that can come from better quality meat, faster growth, bigger animals, and less use of medicine and veterinary services."

Morrow-Tesch and colleagues bring the mobile lab to the large outdoor feedlots for a 24-hour surveillance once each

►Above: Atop a mobile animal-surveillance laboratory, technician Adam Lewis and support scientist Jeff Dailey record data on animal behavior. This laboratory on wheels is equipped with remote-controlled cameras and night-vision scopes so the animals can be observed 24 hours a day.

season, year-round. They use the remote camera or sit on the van's roof platform to observe, using binoculars by day and night-vision scopes by night. They check on the behavior of individual cattle every 15 minutes.

There are 200 to 250 head of cattle in each 100-by-100-foot (ft.) pen. Morrow-Tesch can survey several of the side-by-side pens from the mobile lab.

All surveillance is designed to be discreet, so cattle can be observed in a normal setting. The mobile lab keeps her out of sight of the cattle, and the cattle are accustomed to the van's presence. The night-vision scopes are used to avoid the need for bright lights that could distract the animals.

PHOTO BY ADAM LEWIS

►Postdoctoral research associate Frank Mitloehner, of Texas Tech University, places an identification mark on a steer to help keep track of the animal during observation.

## Noticeable benefits

The feedlot research has already shown that feeding the animals at dusk, instead of mainly at dawn, significantly cuts down on animal roughhousing and attendant injuries. "We noticed that switching the main meal from morning to just before sunset cut the number of aggressive incidents by almost half," Morrow-Tesch says.

These observations convinced her that animals were less restless when their main meal was at night rather than at dawn. It seemed that if they couldn't indulge their instinctive desire to munch at dusk, they looked for other activities. These include mounting (or bulling) and just plain bullying — pushing and shoving.

"When we recorded the frequency and duration of this type of behavior, we saw a definite change for the better when they were fed at dusk," Morrow-Tesch says.

For the study, Morrow-Tesch and her colleagues — ARS technicians and Texas Tech students — recorded the following behaviors: feeding, drinking, standing, lying, walking, being aggressive, bulling and socializing. They observed a total of 5,565 steers in 31 pens.

Injuries from the bulling behavior cost feedlots an average of $70/head. And that figure doesn't include injuries from other aggressive behaviors or from the dust kicked up by the extra activity.

## Noninvasive techniques

"As a measure of stress, behavior is critical to our studies in commercial feedlots," Morrow-Tesch explains. "We can't go to these feedlots and take weekly blood samples to look for stress indicators as we do in the lab. Here we have to use noninvasive detection methods, so observing behavior is the best way we can do that.

"The characterization of the behavior of feedlot cattle in West Texas has never been done before," she continues. "This is applied research in a commercial setting. It requires a high level of cooperation between the feedlot owners and operators and researchers. Plus we had to develop the techniques for observing the undisturbed behavior of commercial cattle over a 24-hour period."

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It is only through such voluntary cooperation that Morrow-Tesch can analyze a feedlot's production records for data that will put her findings in the context of practical economics.

"For example, our next task in this study is to analyze industry data and see if it makes economic sense to add a new shift of workers to feed the cattle in the evening," she says.

Another of her feedlot studies showed the value of shading cattle over misting them to cool them on hot days. The study was conducted with 80 feedlot heifers. The shaded heifers reached their market weight 20 days earlier than unshaded heifers and were about 60 pounds (lb.) heavier at slaughter. The results need to be analyzed to see if it would be practical to build shades to reduce production losses due to heat stress.

## More to come

"We need to develop an up-to-date stress model for livestock," Morrow-Tesch says, "one that uses the new knowledge that farm animal behaviorists are developing. This model will save a lot of wear and tear on livestock handlers, as well as on livestock. And that translates into higher efficiency and profits, healthier and happier animals, and possibly a safer food supply for people."

In the future, she says she and her colleagues will study the effects of stress on behavior, physiology, microbiology and production. In one study soon to be under way, Morrow-Tesch and colleagues will artificially manipulate stress hormones produced in the brains of pigs, as a model of stress.

"We'll then be able to identify how stress affects behavior, immune response, and pathogen levels in these animals," she says.

**Editor's Note:** *Don Comis is with the Agricultural Research Service (ARS) information staff, which supplied this article. The research is part of Animal Well-Being and Stress Control Systems, an ARS national program described on the Internet at* www.nps.ars.usda.gov.