# Efficiency Makes a Difference

## Researchers, producers gain experience with systems to monitor feed efficiency.

*Story & photos by* ***Ed Haag***

Selecting animals that are efficient feeders is not a new concept, but for Rod Hill, University of Idaho (UI), and Gordon Carstens, Texas A&M University (TAMU), the practice is essential to keeping U.S. beef competitive.

If you think you know which traits have the greatest effect on your net income per beef cow, be prepared to have your universe turned upside down. The most recent Standardized Performance Analysis (SPA) data from Texas, Oklahoma and New Mexico indicate that grazing and feed costs per cow have a greater effect on net income per cow than weaning weight and pounds of calf weaned per cow exposed.

For researchers like Hill and Carstens, this isn't new information. They have watched, with growing interest, feed efficiency research being done in Australia and Canada. Hill, who participated in feed efficiency research in Australia prior to accepting his current position, says the U.S. beef industry has a lot of catching up to do.

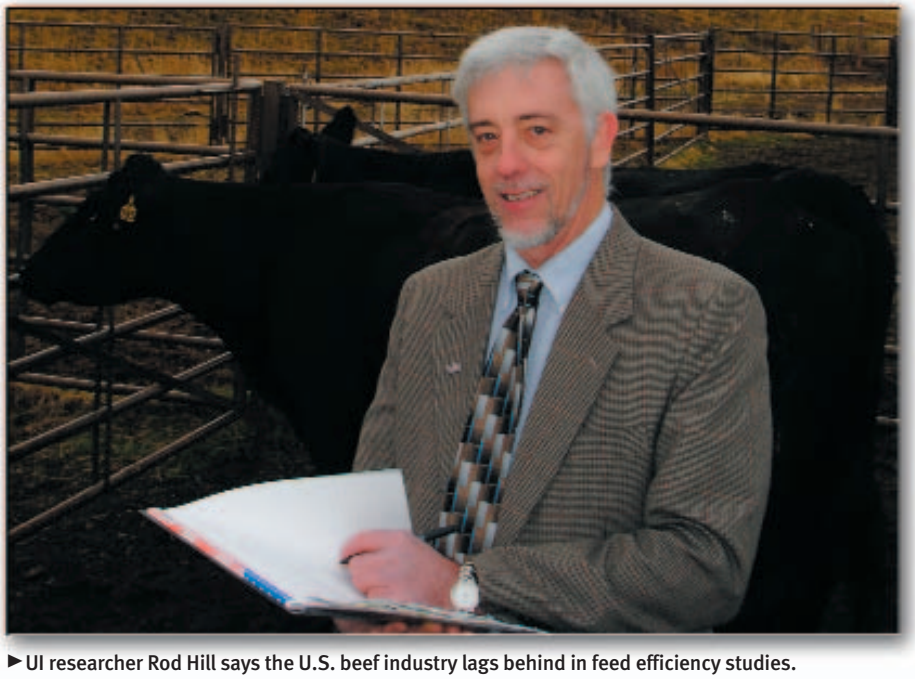
Carstens agrees. "The Australians have been at it for over 10 years," he says. "They have created enough of a database for the Angus breed association in Australia to now report estimated breeding values for net feed intake."

Hill notes that two important facts have emerged from this research. The first fact is that feed efficiency traits are moderately heritable. In other words, animals that have a tendency to be more efficient feeders are likely to pass that trait on to their progeny.

Secondly, from the data accumulated so far, feed efficiency appears to be an independent trait. "This means that net feed efficiency shouldn't interfere with existing EPDs (expected progeny differences)," Hill says. "There is no reason why it should not be included in a selection index."

### Proof in the studies

For both Hill and Carstens, the major challenge U.S. researchers now face is to gather enough net feed efficiency data from specific bloodlines to develop a comprehensive EPD.



► UI researcher Rod Hill says the U.S. beef industry lags behind in feed efficiency studies.

Hill notes that UI and TAMU are only two of several institutions across the country contributing their research results to the U.S. net feed efficiency data bank. Others include the Roman L. Hruska U.S. Meat Animal Research Center (MARC) at Clay Center, Neb.; University of Missouri; University of Illinois; University of Florida; and West Virginia University.

He adds that the growing body of evidence emerging from U.S. net feed efficiency research supports both the Australia and Canada findings that the feed intake of efficient feeders can be dramatically lower than that of inefficient feeders. Hill found in a study that the difference in feed intake for equal weight gain can vary as much as 30% between the most efficient feeders and the least efficient ones. In an on-farm study that measured the daily feed intake of each animal in a grouping of 50 purebred Angus steers, feed intake for equal weight gain ranged from 20.94 pounds (lb.) per day for the most efficient feeder to 29.76 lb. per day for the least efficient.

Working with grants funded by the Texas Legislature through the Texas Beef Initiative, a program designed to help Texas beef producers improve the profitability and quality of their product in a sustainable manner, Carstens has conducted feeding trials with up to 169 steers of the same breed in a single study group.

In spite of the numerous similarities in the animals — all were of the same breed and from the same commercial herd — there were considerable differences in the consumption rates of feed between efficient feeders and inefficient feeders.

The nine steers that displayed the lowest net feed intake (NFI) ate 17% less feed than the nine animals that displayed the highest NFI. "In terms of profitability, that's a significant difference," Carstens says. "If we use a ration cost of $120 a ton, and if efficiency could be improved by 10% through selection, we can save about $25 per animal in feed costs to put 600 pounds of gain on a feedlot steer."

### How it works

The obvious question to arise from results of the research conducted by UI and TAMU

CONTINUED ON PAGE 206

## Efficiency Makes a Difference CONTINUED FROM PAGE 205

is, "What allows some cattle to maintain themselves on less feed than other cattle despite the fact that they all share the same outward characteristics?"

As for the actual physiological mechanism that controls feed efficiency in cattle, Hill points out that researchers in Australia have isolated an insulin-like growth factor in cattle that has a direct link to feed efficiency. Named growth factor one, or IGF-1, the substance, which is produced in the liver, improves protein accretion by inhibiting breakdown. This has major significance for manipulation of muscle growth and fat deposition in livestock. The implication is that domestic animals could be managed to be more metabolically efficient, producing more muscle tissue for an equivalent food intake.

He notes that beef researchers in Australia and Canada have already developed correlations between their extensive NFI feeding trial databases and levels of IGF-1 in the blood. This has allowed them to start using IGF-1 blood tests to help determine feed efficiency.

Hill explains that although IGF-1 blood tests could eventually be used in the U.S. to help determine net feed efficiency in cattle, researchers in this country have a great deal of NFI testing to do before they have accumulated the volume of data that the Australians and Canadians found necessary to develop their blood test criteria.

### Three competing systems

Carstens notes that one of the few advantages of being latecomers to the feed efficiency race is that U.S. researchers have a selection of proven monitoring technology to choose from.

Until recently, the most commonly used device for monitoring individual feed intake in cattle was the Calan gate system. Hill used this system, which involves single-stall feeding pens with gates to control access, in his most recent study.

Each animal involved in the project has a transponder that functions as an electronic key and hangs around the animal's neck, he explains. When an animal approaches the correct stall, a computer chip in the gate recognizes the passive radio signal emitted by the transponder and releases the locking mechanism on the gate. The animal can then push the gate open and reach its feed. When it leaves, the gate closes and locks, preventing any other animals from accessing the feed.

Because each animal, and no other, has access to its own stall, an accurate account of what it eats is possible. The limitations of the system are the labor involved in weighing the feed and the sometimes difficult task of training each animal to access its own specific feedbunk.

Recent advances in radio frequency identification (RFID)-based technologies have led to the development of two feeding systems that are capable of measuring feed intake and feeding behavior traits of individual animals — the Pinpointer system developed by the Australians and the GrowSafe system out of Airdrie, Alta., Canada. The systems have overcome some of the limitations inherent in the early Calan gate systems. Both technologies continuously measure individual consumption of feeds under commercial feeding conditions without disrupting typical feeding behaviors. They monitor the frequency and duration of individual feeding events each day, as well as the amount of feed consumed by each animal.

The principal difference between the Pinpointer and GrowSafe systems is their feed-delivery systems. The Pinpointer's feed storage bin sits above the feedbunk. When the bunk is empty, more feed is metered in from the storage bin. This works well for pellet diets, but is limited when forages and roughage-based rations are used. The GrowSafe system is designed the same as a conventional feedbunk that can accommodate a broader range of feedstuffs, including forages.

"You can't put a corn silage-based diet through the Pinpointer system," Carstens says. "With the GrowSafe, the feed truck just dumps it into the bunker and you are set to go."

In this system, load cells under each feedbunk continuously weigh the contents, allowing the computer to extrapolate feed intake, while antennae, also in the feed-intake bunks, activate RFID ear tags to link individual animals to measurements of feeding events and meal intakes. All data is transferred from the bunk to a central computer using wireless technology. A special software program is used to translate the data points into feeding patterns displayed by each individual animal.

Carstens notes that this design allows calves to be commingled in group pens equipped with multiple feedbunks, as data can be recorded for individuals regardless of from which feedbunk they eat.

Consequently, this feed-intake system does not impose social disruptions in typical feeding behavior like standard intake-monitoring systems. A typical 70-animal pen is equipped with nine GrowSafe feedbunks.

### Angus breeders see results

Whether researchers use the Calan gate system or the GrowSafe system, producers who have seen the results of net feed efficiency testing firsthand come away with a new respect for the feed efficiency quotient.

Jim Kast, co-owner and operator of 101 Ranch Inc. of King Hill, Idaho, is an Angus seedstock producer who provided Hill with 50 steers for a net feed efficiency study. He found the preliminary data eye-opening. With a 30% difference in intake between his most feed-efficient steers and his least feed-efficient steers, the feed cost difference amounted to more than 50¢ per day per animal.

"If you can identify a sire group that will produce calves that get to their weight on way less feed, you are going to make more money," Kast says.

Robert Bruner from Huntsville, Texas, is one of the first Angus seedstock producers to recognize the importance of feed efficiency to the U.S. cattle industry. Three years ago, he, along with Carstens and several other producers, traveled to Olds, Alta., Canada, to see firsthand the GrowSafe system at Olds College, one of Canada's foremost beef research centers.

As Bruner explains, what emerged from the tour was the realization that cost of production would play an increasingly important role in global beef markets and that feed efficiency was a key to remaining competitive.

"The world wants our beef, and that is a plus," he says. "Now, if we can develop the ability to move from 6 pounds of feed to put on 1 pound of weight gain to 5 pounds of feed to get 1 pound of weight gain using just genetics, we will definitely be ahead of the game."

He notes that the beef industry in the U.S. has been slow to embrace feed efficiency in comparison to other meat production industries. "The hog and chicken people have been working on it for years," Bruner says. "We need to do that as well."

**Feed intake for equal weight gain can vary as much as 30%.**