

# Research Could Reap 'Residual' Benefits



Texas A&M researchers hope to measure residual feed intake (RFI) of cattle on pasture.

by Robert Burns

Texas AgriLife Research scientists hope to develop a means to select cattle that gain the same weight — or more — on less feed than cattle of the same breed type and history.

At the heart of the subject is a measurement technique called “residual feed intake,” or “RFI” in research shorthand. What makes this study different is it is designed to develop a means of measuring RFI of cattle on pastures, says David Forbes, AgriLife Research animal nutritionist and lead researcher based in Uvalde, Texas.

The project involves AgriLife Research scientists from across the state and different disciplines. These scientists include Monte Rouquette, forage management; Gordon Carstens, animal nutritionist; Ron Randel, animal physiologist; and Thomas Welsh, reproductive physiologist.

“We will test cattle on pasture so that we can use this technique to clarify and validate the residual feed intake data we’re obtaining from feedlots,” Forbes says.

RFI is not to be confused with feed conversion, a measurement used by animal scientists and agricultural producers for decades to improve net efficiency in poultry and swine operations, Forbes says.

Feed conversion is a relatively simple calculation that measures how much feed an animal consumes to gain a pound, Forbes explains. It’s simple mathematics: weight of the feed consumed daily divided by the weight gained daily.

The math behind RFI, however, is more complicated. RFI compares the difference between an animal’s actual feed intake and its predicted feed intake. Predicted feed intake is the amount of feed the animal is expected to consume based on its weight, growth rate and the performance of its contemporaries. For example, steers that weigh more and gain faster would be expected to consume more

than steers that weigh less and gain more slowly.

“Residual feed intake is better than feed conversion as it (RFI) is independent of growth and body weight,” Forbes says. “Residual feed intake measures the variation in feed intake that remains after the requirements for maintenance and growth are accounted for, and is calculated as the difference between an animal’s actual feed intake and the feed an animal is expected to consume based on its body weight and average daily gain.”

For either measurement, keeping track of an animal’s feed intake in a confined feeding operation is relatively simple. Computerized equipment tracks an animal’s intake by various measures, usually involving feeding stations that are keyed to an electronic device either hung around the neck or clipped to the ear.

## Taking research to the pasture

All such measures used to date have been done in some kind of confined feeding operation or another, Forbes says.

But unlike chickens and swine, beef cattle spend more time in pastures than in confinement. As valuable a research tool as RFI is for feedlots and researchers, questions remained: Can RFI of cattle on pasture be measured? And if it can be measured, how would pasture RFI match up with RFI data collected in feedlots?

Forbes and his research partners are trying to find answers to both questions. “(With this method), when they’re on pasture, we can measure forage intake,” Rouquette says. “And the question we’ll be asking is does that RFI pasture rating hold true to what we measure in the feedlots?”

If the data compare, then the easier-to-acquire feedlot data can be used to select animals that perform better in the pasture, Rouquette says.

The project is an example of research only an agency such as AgriLife Research is equipped to do, Forbes says.

“A private individual, if he knew half his animals were more-efficient, he’d get rid of the others pretty quickly,” Forbes says. “But as scientists, we’re interested in the less-efficient animals, too, because we want to understand the biology.”

Through understanding the biological processes behind residual feed intake, it may one day be possible to identify less-efficient animals via a simple test, Forbes says. “But that’s a long way off. Right now, we are just trying to solve basic measurement problems.”

The researchers are near to having solved the first problem, that of developing the methodology of measuring RFI of animals on pastures.

Twice a day, the animals are fed a corn gluten supplement containing alkane, a waxy substance similar to paraffin. Forages also contain alkanes. Using an instrument called a gas chromatograph, fecal samples from the test animals can be analyzed for amounts of the different alkanes.

“Using the ratio of those two different alkanes, we can determine how much (grass) the animals have eaten,” Forbes explains.

Forbes says he is confident that the methodology he and his research team have chosen will work. There are details yet to be resolved, however, before the actual test can proceed.

“What we don’t know yet is how many fecal samples we need to get to adequately describe intake over these long periods. We’ll dose these animals for periods up to 70 days, which is an incredible undertaking in itself,” Forbes says.

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**Editor’s Note:** This adapted release was provided by Texas AgriLife Extension Service. Robert Burns is a communications specialist for Texas A&M University Agricultural Communications.