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# HEREFORD WORLD

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PHOTOS BY ANGIE STUMP DENTON

## Taking Efficiency to the Next Level

*Hereford leaders and breeders pursue data to document and build feed efficiency.*

by *Teresa Oe*

Some things in life are just plain true — hard to test, document or prove with scientific evidence, but generally understood via experience. In the cattle business, one such truth is that Herefords and Hereford-crosses are efficient converters of grass and grain. Generations of cattlemen have told it true. Still, we've come to an age where a man's word often just isn't enough. Data is demanded. Answering this call, the Hereford breed is seeking data to confirm what has been noted for years by the man on the range, and

more recently, the man in the feedlot. Herefords are efficient critters, and efficiency directly affects profit.

Securing feed efficiency data is no small task. In decades past, related trials have been few and far between due to the difficulty and expense of measuring individual inputs. Even the most renowned researchers in the livestock industry have struggled with what is the correct way to measure such a critical trait.

Animal scientists estimate feed costs account for more than 50% of

total production expense, with some allocating as much as 70%. These figures can't be ignored. A more efficient animal means dollars saved.

So, what the industry has started to see is the development of a variety of methods and formulas designed to identify the degree of feed efficiency in a particular animal or pen of animals. Although experts don't claim these methods and formulas to be perfect, they have created a foundation for beginning to identify and select for the feed efficiency trait.

The following provides a look at how Herefords have measured up so far, how the breed is pursuing genetic progress and what the industry has to look forward to in terms of ongoing efficiency research.

### **Australian trial shows Hereford advantage**

Herefords were the leading British breed for net feed intake (NFI) in a trial completed last July as part of the Co-operative Research Centre for Cattle and Beef Quality trials in Australia. NFI is the amount of feed an animal eats, more or less than, what's expected for its weight and gain. The trial cattle were fed at the Tullimba Research Feedlot, near Armidale, New South Wales.

Researchers compared the daily feed intake, live weights and NFI of 469 animals by sires from nine breeds bred to Brahman cows. The Herefords proved to be significantly more efficient than the other two British breeds on test, Angus and Shorthorn.

Starting from similar entry weights of about 979 lb., the Herefords gained the most at 3.45 lb. per day. Angus gained 3.43 lb. per day and the Shorthorns came in at 3.34 lb. per day. As you can see, the difference in gain between the breeds wasn't much. What's impressive, however, is that the Herefords gained slightly more eating considerably less.

Bob Freer, technical consultant to the Australian Hereford Society, explains the difference demonstrated in efficiency throughout the trial, as determined by NFI. He says, "Given that the sires were representative of their breeds and NFI results obtained under feedlot conditions carried through to on-pasture (as confirmed by Trangie results), then pure Angus would consume 1.2 kg feed/day (2.64 lb. feed/day) more than purebred Herefords of the same body weight and daily gain. That is, an extra 61 tonnes (134,481.94 lb. or about 60 long tons) of feed per year

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for a 100 cow unit." Trangie is a government agricultural research station in the town Trangie, which is located in west-central New South Wales.

Freer continues to explain the Herefords' efficiency, noting that they had an 8.4% better adjusted feed conversion ratio and 6% lower actual daily feed intake than Angus. He again puts the 6% in perspective, saying "...that is, you could run 106 Herefords on the same ground/feed supply as 100 Angus, or in a feedlot Herefords would eat 6% less feed than Angus for the same weight gain.

"Low NFI is the equivalent of getting more miles to the gallon. With lower NFI the producer is able to produce more beef from the same feed source. It just confirms what a lot of practical cattlemen have known for years."

**U.S. trials show efficiency economics, utilize Herefords** NFI as described in the previous section is also referred to as residual feed intake (RFI). Monty Kerley, University of Missouri-Columbia animal scientist and professor, explains how RFI, or NFI, dramatically affects production economics.

Researchers at the University of Missouri Beef Research and Teaching Farm fed a group of calves that originated from a single herd and were produced

as artificial insemination (AI) progeny from one sire. Measuring intake and efficiency during lean growth (up to 950 lb.), the three most inefficient calves had an average intake of 3.7 lb. of feed to 1 lb. of gain, compared to the three most efficient calves with an average feed to gain ratio of 2.1. The inefficient calves consumed 814 lb. of feed compared to the efficient calves, consuming only 462 lb. Estimating \$145 per ton of diet, the efficient calves consumed \$25 less feed up to 950 lb.

In another experiment at the Missouri farm, the most efficient calf gained 550 lb. in the feedlot with a 5.6 feed to gain ratio. The most inefficient calf also gained 550 lb., but had a feed to gain ratio of 7.9. Using again a diet cost of \$145 per ton, the efficient calf consumed \$92 less feed. "The potential for improvement in feed efficiency can be greater than the potential profit margin of feeding the calf," Kerley says.

He adds, "Researchers have shown that the range in RFI among animals is large, and that it is a moderately heritable trait similar to growth and carcass traits. Thus, with selection pressure substantial improvements (in efficiency) can be made."

While little formal research has been done in the U.S. to compare RFI across breeds, Kerley says that

**Residual feed intake (RFI) definition:** Unlike feed conversion ratio measurements, RFI is not correlated to gain by the animal. RFI is measured by subtracting the animal's predicted intake from its actual intake. An animal's predicted intake is based on the average intake of its contemporary group at an equal body weight and rate of gain. A negative RFI indicates that the animal is more efficient than the group on test, and a positive RFI indicates that the calf is less efficient than the group on test. The RFI measurement allows cattle to be ranked based upon their metabolic efficiency.

future studies may well document a Hereford advantage.

The Green Springs Bull Test in Nevada, Mo., is equipped with GrowSafe® individual intake equipment, making RFI measurements possible. The test conducted last fall included approximately 80 bull calves, nine of which were Herefords. By calculation, the average RFI for a group of calves is 0. (See "Residual feed intake (RFI) definition"). The group of bulls tested represented six breeds: Hereford, Angus, Red Angus, Charolais, Gelbvieh and Limousin. The average Hereford RFI was the best of all breed groups with a value of -3.5.

"Compared to the group average, the Hereford bulls consumed 3.5 lb. less feed (per day) to achieve the same level of performance," Kerley says. "While the data from this bull test is generated from too small a population to draw breedwide conclusions, it is in the right direction for the Hereford breed. Most importantly the data points to the potential for genetic progress."

The American Hereford Association (AHA) now has the unique opportunity to pursue genetic progress through information gathered from a feed efficiency trial composed solely of Hereford cattle. Kerley is utilizing Hereford cows in a study designed to explore the possibilities of selecting for feed efficiency, as well as to understand the physiology that determines RFI. Kerley has begun to select for efficiency in the cow herd. Eventually he will look at the effects of selection pressure on other performance traits, calf efficiency and pasture carrying capacity.

On the physiology side, Kerley is particularly interested in an apparent correlation between RFI and the respiration rate of

energy-producing mitochondria — organelles of the cell. He notes former research findings in which the difference in respiration rate of the mitochondria, 1.4 fold, was the exact same as the difference in RFI among test animals. The Hereford cow herd will be used to further examine this relationship.

Researchers at Texas A&M University are also interested in the biological basis for RFI. Texas A&M and Mizzou are working together to determine the reasons for RFI individual animal differences. While Kerley is focusing on mitochondrial respiration, Gordy Carstens, Texas A&M associate professor of animal nutrition, is investigating the relationships, if any, between RFI and processes such as digestion and heat production. Carstens says that studies indicate that RFI appears to reflect variation in these biological processes related to feed efficiency, but not growth.

While the science is detailed and too complex for many a mind, Kerley says the bottom line is that efficiency will be a major component of breeding programs in the near future. The technology to test for the trait is available and will increasingly be incorporated into research facilities, sire testing stations and feedlots, enabling progeny testing. Carstens adds that already a GrowSafe feed-intake system has been installed at the Beef Development Center in Millican, Texas.

"The impact of this trait is great and represents a significant advantage to beef producers who are able to incorporate it into their programs," Kerley says.

**Producers use feedout to advance efficiency**

While researchers are formally testing selection for efficiency under controlled experiments,



PHOTO BY TERESA O'NEILL

Jack Ward, AHA chief operating officer and director of breed improvement, says that efficiency is becoming more valuable as drought conditions prevail and the push to feed more cattle on less ground grows each year. The AHA is working closely with Monty Kerley, University of Missouri-Columbia, to track residual feed intake (RFI), a measure of efficiency, in Hereford cattle.

Hereford breeders have been conducting their own experiments to advance efficiency in their herds and throughout the breed. The National Hereford Feedout, formerly the Genetic Outreach Program, allows producers from across the country to consign whiteface cattle to be fed out at Royal Beef Feedyard in Scott City, Kan. The Kansas Hereford Association (KHA) organizes the program in such a way that Hereford and Hereford-English cross pens can be entered in the test with just a minimum of five head.

The cattle are tagged and individually weighed, and ultrasound data is collected. Then at harvest they are individually weighed again, and final carcass information is gathered. The feed efficiency of each steer is calculated based on a Cornell University formula that breaks down pen stats into individual feed efficiency figures by accounting for maintenance and growth requirements of different sized animals.

Tom Granzow, KHA secretary and chairman of the feedout, makes sure that each participant gets a graph analysis of his or her cattle ranked in comparison to the others in cost of gain, as well as other performance and carcass data measures. For producers who consign sire groups, this service

provides for genetic selection and rapid herd progress.

Ron Kramer is the customer service director for Irsik and Doll Company, of which Royal Beef is a division. Kramer says that the National Hereford Feedout attracts a wide genetic base, with cattle from a number of states and bloodlines. "Some producers consign five or six (head) to a potload," Kramer says. "With the genetic differences, there's one thing they have in common. They're efficient. And that's a pretty good indicator the trait is across the breed."

Kramer adds that for the three years the test has been at Royal Beef, the feedout cattle have averaged 20% better feed conversion on a dry matter basis than the Kansas yard average. The average, assembled at Kansas State University, is based on closeout figures of nine Kansas yards. The feedout cattle have also topped the yard average in conversion at Royal Beef alone.

"Feed efficiency is just inherent in the Hereford breed," says Ken Stephens, National Hereford Feedout participant from Valentine, Neb. Still, he says there's always room for progress. "It's the only trait that I think we can't carry too far."

Consequently, Stephens winters his cows at only 92% of National Research Council (NRC) feed

requirements. "The cows that can rebreed on less feed are more efficient," he says. "We've forced efficiency into our cow herd over the past 20 years, and contribute that as the reason why we're doing well in the feedlot."

Tom Krauss, Russell, Kan., is another Hereford breeder who utilizes the National Hereford Feedout to evaluate his breeding program. Krauss has registered and commercial Hereford cows, and registered Angus as well. He feeds all of his steer calves — Hereford, Angus and baldie — at Royal Beef, then compares the data returned from the Hereford feedout and a Kansas Angus Association feedout to determine areas of improvement and to originate his own breed comparisons. With his 2005 calf crop, Krauss notes that his Hereford calf feds required an average 4.9 lb. feed/1 lb. gain, while the Angus calves required 5.8 lb. under the same management, breeding and feeding practices. Average daily gain (ADG) was similar with the Hereford calves posting 3.93 lb./day and the Angus calves 3.85 lb./day. The Herefords had a cost of gain at 41 cents, and the Angus at 45.59 cents. Referring to the cost, Krauss says, "This is where the rubber meets the road."

While users of Hereford genetics have long appreciated the efficiency the breed provides, leaders and breeders

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**— Ron Kramer**

are increasingly documenting and selecting for this trait that will continue to lower input costs for seedstock producers and their commercial customers. After all, as Kerley says, "The impact of this trait is great and represents a significant advantage to beef producers who are able to incorporate it into their programs." **HW**

**Editor's Notes:** *The information and quotes for the Australian trial shows Hereford advantage section was provided courtesy of the Australian Hereford Magazine.*

*For more information on the National Hereford Feedout, contact Tom Granzow at (785) 466-2247.*