

# Defining an Efficient Female

Research funded by the Angus Foundation aims to better understand cow efficiency and generate more profitability for seedstock and commercial producers.

Story & photos by **Katie Allen**, Angus Foundation

**W**hat is an efficient cow? How do you best determine if one cow in the herd is more efficient than another?

Some people describe efficiency as pounds of calf weaned per cow exposed. Others might say it is pounds of calf weaned per unit of feed intake of the whole herd. Still, others might consider reproduction the major determinant of efficiency. A cow that doesn't have a calf is not very efficient.

Dan Shike, an assistant professor in the Department of Animal Sciences at the University of Illinois (U of I), specializes in cow-calf nutrition and management. At cattle producer meetings he attends, he constantly hears producers talking about efficiency, particularly as it relates to females.

"In the feedlot, efficiency is defined as feed-to-gain," Shike says. "I don't think there's much debate on what an efficient feedlot steer is. An efficient cow gets a little more complicated. What's the best way to measure that? How do we describe that?"

Shike, along with Doug Parrett, professor emeritus and extension specialist at the U of I, and Joe Cassady, former associate professor of animal science at North Carolina State University (NCSU) and now animal science department head at South Dakota State University, are working on finding answers to these questions.

The researchers are collaborating on a study funded by the Angus Foundation titled, "Improvement for beef cow biological efficiency." The \$350,000 project is a five-year project to be completed by 2015. The American Angus Association Research Priorities Committee has named feed efficiency, with a cow emphasis, as a top priority for Angus producers.

Regardless of the varying thoughts and definitions of efficiency, Shike says he thinks most people would agree that intake has to have some part of it.

"I don't think people can tell by looking which one eats more and which one eats less," he says.

## The current environment

Feed efficiency has become a hot topic the past few years, mainly due to high feed prices and drought effects in much of



► The University of Illinois and North Carolina State University are collaborating on a five-year project, with funding by the Angus Foundation, to identify traits in females to better understand cow efficiency.

the United States that have caused a shortage in feed supplies. Cattle producers and feedlot managers alike are facing hardships.

Shike says producers and the industry are aware of the little progress made in feed efficiency in general. More progress has been made on the feedlot side the past few years, but the cow side is lagging behind.

"A lot of our resources go to the cow side," Shike says. "About 70% of the feed that's utilized in the beef industry is for the cow herd, and 70% of that is just for maintenance.

You put that together, half of

all the feed is just to maintain the cow herd. If we can impact efficiency and utilization of that feed in the cow herd, I think in terms of an industry standpoint there is tremendous opportunity."

Cow efficiency research at the U of I started six years ago, when researchers began recording intake data on replacement heifers for 70 days of their postweaning phase. The GrowSafe feed-intake monitoring system recorded intake for each individual heifer. The heifers were weighed throughout the period every two weeks.

Next, the females were bred, calved and were brought back in as 2-year-old cows 60 days postpartum, close to peak lactation, to be evaluated again for feed intake. Over a two-week period, intake was evaluated, and the cows

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were weighed, assigned a body condition score, evaluated for milk production and were measured by ultrasound scan for backfat thickness. After the calves were weaned, 240 days postpartum, the same data was collected.

The cows were then brought back in as 5-year-old mature cows to record the same data at 60 days and 240 days postpartum.

So began the cycle of evaluating cow efficiency.

Shike says this year marks the second set of 5-year-olds that has returned to the GrowSafe facilities to be evaluated.

### Collaborative efforts

The U of I and NCSU are recording data on Angus cows into one shared database. Right now the database includes data on more than 800 replacement heifers and more than 500 2-year-olds that have returned for

evaluation at both universities.

Cassady explains that it makes sense for his data collected at NCSU to be combined with the U of I data into one large database.

“Instead of small data sets from each university, we can get better answers based on a combination data set, which really helps the American Angus Association,” he says.

Some differences exist in the two locations, but the two universities are trying to maintain as much consistency as possible. They are following the same guidelines on how to evaluate heifer intake, based on recommendations of the Beef Improvement Federation (BIF). Regional differences on forages used to feed the cows exist, as well as year-to-year variations on available forages at the same university. Again, BIF guidelines are used for energy values needed in those rations.

Although each university uses different sires, the universities are working with Select

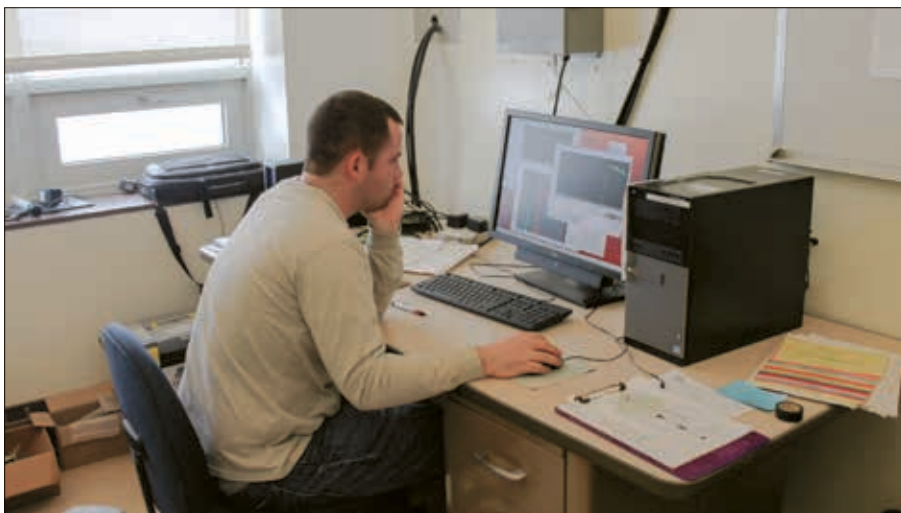
Sires to identify and use two common sires as tie sires each year. Finding those sires that produce efficient daughters is another goal of this research.

“I’m interested in evaluating sires based on performance of their daughters on feed intake,” Cassady says. “I want to predict which sires will produce daughters that will be the most efficient cows.”

When the data is analyzed statistically, differences in forages and sires used will be accounted for.

“The location effect will come out in the contemporary groups, just like any other evaluations we do,” Shike says. “What a heifer does here can’t be compared directly to what a heifer does there because of the differences in environment. That will certainly be accounted for in the statistics in terms of contemporary groups.”

One main concept further understood



► Chris Cassady, a former NJAA board director, is a graduate student at the U of I working on the cow efficiency research project. Cassady regularly analyzes intake data on the cows and heifers collected by the GrowSafe system.

### Growing up Angus

Chris Cassady has witnessed Angus cattle production from many different angles. The Ancona, Ill., native is a current graduate student in animal sciences and the livestock judging coach at the University of Illinois (U of I). He is working with Dan Shike, assistant professor in the Department of Animal Sciences at U of I, on the cow efficiency research funded by the Angus Foundation.

What has led him to this point is quite a story.

“When I was a kid, my dad actually had a diverse operation,” Cassady says. “We had some Shorthorns and Angus. I bought my first show heifer in 2000, and we enjoyed going to the junior shows, junior nationals and some of the opportunities that afforded us. On the flip side, too, from a marketing perspective, it was very easy for us to market the calves we had every year and just an experience we enjoyed.”

Cassady and his family enjoyed their involvement in the Angus breed and now have a purebred Angus herd. He says the more competitive they became with their show-cattle operation, the more he wanted to be involved and give back to the Association.



“So I became president of the Illinois Junior Angus Association and then went on to become vice chairman of the junior board, which was by some margin the most beneficial thing I gained from the Angus junior association,” Cassady says.

Being a member of the National Junior Angus Board from 2008 to 2010 allowed Cassady to witness the impact of the Angus Foundation in many ways. It instilled in him how donations are the driving force to allow so many activities — from junior activities to adult educational events to research projects — to happen.

“From a research perspective, considering where we are technologically, we can never stop improving with efficiency and what’s going to drive our bottom line,” Cassady says. “So all of the funding the Angus Foundation does put forth toward research is only helping improve the beef industry as a whole from an efficiency standpoint and overall profitability.”

When Cassady completes his master’s degree, he plans to continue his education by pursuing a doctorate. He says working as the livestock judging coach has brought out a passion for teaching. He plans to remain involved at home with his family’s Angus operation, as well.

because of this research is that producers must understand that matching phenotypes to the right environment and the feed sources that are available is important when it comes to efficiency. The researchers believe that genotype-by-environment interactions should be examined more closely.

“The concept of more moderate-framed, easier-fleshing cattle still has value,” Shike says. “But, one of the things that has probably been as interesting as anything in the early years is seeing the amount of variation we have. Certainly, as you increase milk production and increase cow size, requirements go up. But that doesn’t mean there are not exceptions.”

Shike says even though traits such as birth weight and growth are correlated, the breed has been able to identify curve benders and outliers — those bulls that are low-birth-weight, but also high-growth. Outliers can also be found when it comes to cow efficiency.

“I think there are probably cows, and we’ve seen it in our evaluation, that are larger-size and have higher milk production, but still don’t eat that much,” Shike says. “There’s also the opposite of that. There are small cows that don’t milk very much that eat a lot. Obviously, those are the cows that aren’t very efficient. Whenever there’s variation and you can measure a trait, then that gives you the opportunity to select for it, and there’s an opportunity for improvement.”

### Selection for the future

Female efficiency data will likely improve selection indexes and expected progeny differences (EPDs) in existence at the American Angus Association.

The residual average daily gain (RADG) EPD has served as an excellent tool for cattle heading to the feedlot, and prior research also funded by the Angus Foundation at the U of I and Iowa State University led to the data collection and development of that EPD.

The \$Value index for cow energy (\$EN) in the Angus breed is a start to understanding cow efficiency, and the current cow efficiency research being conducted can help progress that tool. \$EN, expressed in dollar savings per cow per year, assesses differences in cow energy requirements as an expected dollar savings difference in daughters of sires. A larger value is more favorable when comparing



► “Certainly, as you increase milk production and cow size, requirements go up. But that doesn’t mean there are not exceptions,” says Dan Shike, noting outliers can be found.

two animals, because more dollars are saved on feed energy expenses.

“\$EN obviously assesses the cost savings on the cow side related to feed cost,” Shike says. “Currently, that’s based off of lactation requirements and maintenance

energy requirements related to milk production and mature cow size, which certainly have an impact on feed requirements; but, I think the opportunity still exists to incorporate some intake data into that.”

More importantly though, cow efficiency results can be imported into the weaned calf value (\$W) index, which is the expected average difference in future progeny performance for preweaning merit. Expressed in dollars per head, \$W includes both revenue and cost adjustments associated with differences in birth weight, weaning direct growth, maternal milk and mature cow size.

Shike says he believes genomics and intake data will be working hand-in-hand in the future.

“We need them both. We have to have the individual phenotypes, so we can have the information that’s necessary to find those genes and have the tools for the genomically enhanced EPDs,” Shike says. “We will

continue to need to collect new phenotypes to continue to improve and validate those genomic tools.”

Furthermore, because conception rates, calving intervals, milk production and longevity are recorded alongside intake, the researchers can look more closely at how heifer efficiency may affect other traits and a cow’s overall lifetime productivity.

### Use of funds

The funds provided by the Angus Foundation are used for updates on the GrowSafe technology, data collection and processing, transportation of the cows to and from the GrowSafe facilities, and personnel, including graduate students and lab technicians.

As state and federal government funding has become more scarce for agricultural research, the fact that industry partners like the Angus Foundation are stepping up to financially support research is crucial.

“Resources and the availability of funding is much more challenging, and departments have gotten smaller,” Cassidy says.

Cassidy says it will take multi-disciplinary collaboration to answer all of the questions out there in the cattle industry. This would include the work of geneticists, nutritionists and physiologists alike.



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The most challenging part about the cow efficiency study specifically, Shike says, is that it takes patience. The project has been ongoing for several years, and the researchers are just now getting numbers to evaluate. Shike says researchers and producers alike are ready for answers, but it can't happen fast. The Angus breed can't move forward too quickly before knowing potential implications on selecting for efficiency.

The great part about having the Association and Angus Foundation involved in this with the research team, though, is that it eliminates the concern of how to get the research information into the hands of the breed associations and producers so that it can be applied to help the breed. Shike says directly working with the breed association as a partner makes the transfer easier.

"As I've talked to producers out there, when they know the Angus Association understands the importance of this and is willing to put the money out there to get this work done, I think it makes them pretty proud that's the breed they are working

with, that they have the vision and the foresight to know that this is a top priority for the producers and that the funding is not necessarily available other places to allow this work to be done," Shike says.

Those with concerns about cow efficiency should rest assured that everyone from the researchers behind the study to the staff and board of directors of the American Angus Association and Angus Foundation are

striving to find answers for producers and are working through the challenges. It is a collective hope that further research and understanding findings will help seedstock producers use the best tools available to generate superior-trait bulls for their commercial customers, so the entire beef industry, from the top down, can be more profitable as a whole.



### More information you can use

- ▶ Choosing the right sire is important, and breeders should select for efficient sires to make more efficient replacement females.
- ▶ Producers must know their inputs. Being focused on weaning and postweaning performance is important, but producers must know the economics of their operations to determine if they are reaching that performance in an efficient and cost-effective way.
- ▶ Maintenance and body weight are related. The increase in cow size must be accompanied with an increase in calf performance to maintain efficiency.
- ▶ Research at North Carolina State University (NCSU) has found that calmer heifers have lower feed intakes but similar average daily gains (ADGs) compared to more excitable heifers. Therefore, calmer heifers have a better feed conversion ratio. Selecting for more docile cattle will help herd efficiency.
- ▶ NCSU researchers also found that feed intake can be determined for total lactation (112 days) in a 42-day window. This finding has allowed for intake data to be analyzed on more cows during calving season.