



Merge DMI with Other Desirable Traits

Selecting feed-efficient cattle can reduce costs and increase outputs.

by **Bruce Derksen**

It is critical all types of cattle producers not only provide the right volume of feed to their animals but also provide the correct amount of essential nutrients. One way to understand and calculate this is to reference dry matter intake (DMI).

When 30 pounds of feed is provided and eaten, 30 pounds is the total intake. When moisture is removed by conditioning and drying, the DMI portion remains. If the 30 pounds is a generic silage ration of two-thirds moisture and one-third dry matter, the actual DMI is 10 pounds. While the 30 pounds would be bulky and rumen filling, only a third of it would contain the essential nutrients required.

If a similar animal is fed 30 pounds of a high-grain ration containing only 20% forage, when conditioned and dried, this ration

might equal 25 pounds of nutrient-rich dry matter.

Both animals received 30 pounds; but one is being sustained, and the other is deficient.

DMI also relates to individuals with a higher or lower consumption than their counterparts, while maintaining the same health and body conditioning.

Daniel Loy, professor of animal science at Iowa State and director of the Iowa Beef Center, says the ability to select dry matter and residual feed intake has shown a gradual increase in DMI, matching a higher trend in yearling weights. A typical feedlot closeout 35 years ago might have shown a 20-pound DMI. Now, it's not unusual to see anywhere from 25 to as high as 29 pounds per animal.

Individual measurements can be obtained by using manufactured smart feed efficiency testing

systems from companies such as C-Lock Inc. or GrowSafe Systems®. Electronic scanners mounted on scaled systems identify animals with a radio frequency identification tag (RFID) and calculate consumption, average daily gain, conversion and other measurements.

Using DMI selection in conjunction with other traits

Loy believes it is a valuable piece of data broken down to an individual basis, but it needs to be spread out over numerous other trait measurements. "If just selecting for low dry matter intake, we're probably going to reduce growth rate and perhaps some other production values. We need to keep those in mind as every herd has a different starting point."

Generally, the most efficient cattle will eat slightly less than their

counterparts, but it is a fine line on which to focus. "There must be enough intake to maintain body condition and do the business of reproduction. It's not something to single-trait select, but with the knowledge of where we are with individuals we can make progress."

Jeff Clark, business development and sales representative for C-Lock Inc. agrees and says his time working on the commercial side of the fence opened his eyes to benefits of DMI and feed conversion when combined with other desired phenotypical traits.

"For the cow-calf guy, paying attention to this can be very profitable because there are genetics proven to maintain on less input. But it's important we're still selecting females with fleshing ability. As we select for feed-efficient animals, we're inadvertently selecting for those putting muscle on quicker than fat, because fat weighs less than muscle. They're gaining weight with less feed."

For Clark, it's a combination of traits and data to be assessed. Check the weaning and yearling weights, calving ease of the bull and milk production of the cows. Numerous factors create a balancing act.

"Just selecting for lower DMI can lead to the loss of performance cattle. Weaning weight might go down along with other things of that nature."

Variability between diet, breeds and individuals

According to Loy, DMI's relation to diet is another critical aspect to consider. For example, he points out common Midwestern finishing diets might consist of 10% or 15% roughage. When increased to 20%, it is likely the cattle will simply eat more and gain the same weight. When roughage levels are increased exponentially, physical fill will begin to restrict intake. In high-grain rations, energy content will become the upper boundary.

"On the high-energy diets, there are really two signals for when cattle stop eating. One is the physical ability to consume the feed and could be limited by fiber in the diet, digestive rate or moisture, and the other is a chemical factor that says, 'I'm full.' It's like having a plate of candy bars and a plate of salad. We're probably going to stop eating the candy bars before we stop eating the salad."

While Loy believes DMI and conversion vary between breeds, more deviation occurs between individuals. In a 5-year, 10 U.S. university study, he participated in examining the genetics of feed efficiency and intake. Their geneticists found genes involved in separating variations in DMI and conversion were different from breed to breed, and it was important to evaluate on this basis.

Clark explains the Hereford breed is already known for fertility and longevity, and when females within the breed display these desired genetics, there is a great opportunity. Adding heterosis gained from crossbreeding provides a subsequent increase in feed productivity.

“When using an efficient Hereford bull on Angus cows, the potential is tremendous with the added heterosis. If added into the mix, it plays well into multiple traits.”

Research and trials

In a 2018 trial, Oklahoma Cooperative Extension Service beef cattle specialist with the Division of Agricultural Sciences and Natural Resources (DASNR) Dave Lalman said he and other scientists from Oklahoma State University (OSU) set out to determine if they could reduce annual maintenance costs with Hereford-sired, black baldy cows compared to straightbred Angus females.

In a crossbreeding system, the second breed could be chosen for traits and characteristics to reduce costs or improve income. This is known as “breed complementarity.” In this trial, black baldy cows, the result of Hereford sires (known for lower feed intake) and Angus females were measured against straightbred Angus cows.

Research and trials had previously indicated an improvement in longevity and fertility plus weaning weights in simple two-breed crossbreeding systems, but Lalman was curious whether input costs could be reduced by using two complementary breeds.

Results showed the black baldies averaged a better body condition score than the straight Angus cows plus maintained better body condition. “On average, we measured just under 2 pounds per day less moderate quality forage intake in the crossbred cows. On an annual basis, the black baldies would be expected to consume about 725 pounds less forage.” As a result, he believes simple, planned crossbreeding systems using complementary breeds can reduce the cost of maintaining a herd and increase ranch output through improved longevity and fertility.

Combining displayed phenotypes with genomics

Clark explains DMI productivity can be added to a commercial herd by selecting bulls high in efficiency balanced with other desired traits such as longevity and fertility. If the capability is available to run potential heifers through a tester, he recommends this practice as well, as he believes genomics will only go so far.



“True displayed phenotypes are the best way to make decisions, so if we’re buying feed-efficient bulls, and have heifers to put on test every year for about 76 days, that’s ideal. Bulls on these tests vary by up to 25% in conversion from top to bottom. If we can spread it out over the cows and reduce consumption by 25% a year, it adds up quickly to increase stocking rates.”

Loy agrees the variation between animals can be large which opens the door for capitalization from a selection and management standpoint. He likens it to how early

selection for improved marbling in carcasses by using ultrasound significantly increased the percent in Choice and Prime grades.

“Having the same knowledge for DMI will eventually [improve] our feed conversion in the same manner. To get there, we have genomic tests, but they must be informed by a phenotype such as weaning weight or marbling score. The genetics will continually evolve and change with the help of seedstock producers collecting the needed individual phenotypes.” **HW**