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# Manage for Climate

## Feeding strategies, water quality and genetic selection all play into the cow herd thriving in your chosen climate.

*by **Kasey Brown,** senior associate editor*

Much of agriculture is dependent upon Mother Nature. If you're going to curse the weather, though, make sure you're cursing the right thing. Are you angry with the weather or the climate?

Keep in mind that weather is what's going on in the atmosphere at a certain point in time. Weather varies locally and short-term. Climate includes long-term conditions, but they can be variable. Megan Rolf, assistant professor of animal science at Oklahoma State University (OSU), says cattlemen should consider both of these phenomena in their breeding programs, especially in terms of drought planning, culling plans, stocking rates and breeding objectives.


### Feeding strategies

Within those plans, consider feed resources for the mature size, milking capability and feed efficiency of your cattle, she recommends. Cattle need energy for maintenance, growth, gestation and lactation, so how do you determine how much feed your cattle need? Maintenance can represent 70%-75% of the total energy consumed annually by the cow herd, Rolf says. This can be managed genetically by direct selection and with selection for optimums in mature size and milk production potential.

There can be a considerable difference in outputs and input requirements by changing the mature cow size. In an ideal environment where feed resources are unlimited, larger cows should be able to wean larger calves. However, how many cattlemen have unlimited feed resources? Rolf adds that literature suggests the annual cow cost increases by about $42 for each 100 pounds (lb.) of additional cow body weight as a cow increases in size from 1,100 lb. to 1,300 lb.

However, the added weaning weight in calves doesn't always pay for the added cost for the cows, nor is it guaranteed or necessarily consistent. She cites research that showed Alabama herds gained an average of 4.9 lb. in weaning weight per 100 lb. of cow body weight. North Central Oklahoma herds gained 10 lb. of weaning weight per 100 lb. of body weight. Western Oklahoma herds gained 2.3 lb. per 100 lb. of body weight, and eastern Oklahoma gained 17 lb. per extra 100 lb. of cow body weight.

Additionally, cows with higher milking potential can wean those heavier calves, but it is important to realize that they require more maintenance energy due to having larger visceral organs, even when they are not lactating.

It is possible to make genetic selections based on mature weight and milking potential using expected progeny differences (EPDs). She also suggests weighing cows when the calves are weaned and grouping the cows into similar weights. Calculate the average calf weaning weight in these like groups to see which cows are essentially dining and dashing.

This is one of the few ways to determine efficiency in the cow-calf sector. There is much more feed efficiency data from feedlots simply due to ability to measure and record it in a more controlled environment on a non-forage based diet. Research looking at how much less low-residual-feed-intake (RFI) cows eat reported that there was

CONTINUED ON PAGE 56

a nonsignificant numeric difference in forage intake between low- and high-RFI lactating cows on pasture. Low-RFI cows consumed an average of 16% less forage, but she admits that was numeric data only and not significant. Low-RFI nonlactating cows showed a 4.5% less dry-matter intake compared to their high-RFI counterparts.

However, she notes that RFI may not be the best way to calculate efficiency in cows. Indexes are more efficient selection tools because they combine measures of productivity in cows with maintenance energy demand and other important profit factors, she says.

"Always remember that one way to make your cows efficient is to make sure they have a calf every year! Fertility and reproduction should be components of any selection objective if you're keeping replacements," Rolf suggests.

## Water quality and climate tolerance

Water is an often-forgotten essential nutrient that is incredibly important. Water transports nutrients between cells; is necessary for metabolism; regulates body temperature; affects digestion, absorption and use of all other nutrients; and makes up 60% of most mammals' body composition. Rolf adds that access to clean drinking water is imperative to performance factors like growth, reproduction and milk production.

Despite the importance of water to an animal's well-being and performance, many cattle are in areas of the country in which ample precipitation does not fall. This makes water efficiency important at all times, not just during drought.

Rolf notes that while a few pen studies of water intake have been conducted, water efficiency is a relatively new area of study. Water intake varies by an animal's size and weight, lactation status, and environmental parameters such as heat and humidity.

A pen study looking at 8,000 animals over four years showed that the previous day's temperature, daily temperature, change in temperature, wind speed and temperature-humidity index all related to water-intake levels. However, there was significant variation that was not explained, which she says may be attributed to genetics.

In another study where animals were watered in pens, average water intake per animal was 32.4 liters (L) per day in the summer, 17.3 L per day in the winter, with a yearly average of 26.4 L per day. In another study that measured individual cattle in a water-intake system, growing cattle had an average intake of about 30 L per head per day when cattle were under thermoneutral conditions, though there was no difference between bulls, steers and heifers in the study.

Is it possible to select cattle for increased water-use efficiency to conserve water resources on the farm or ranch? Rolf and a team of researchers are aiming to find out in a five-year integrated USDA project. The team hopes to develop beef cattle selection and management tools that address conservation of water resources and adaptation to climate variability.

The study is about one-third of the way finished, and preliminary data show that the average water intake for 235 animals in the summer was about 83 lb., and the average feed intake was about 30 lb. She explains that 80K genotyping data is still to come, which will be used to identify genetic markers associated with differences for water intake and efficiency in cattle and heritability estimates for these traits. That metagenomic sequencing will be used to look at how the rumen is affected by water availability, because the rumen's microbes generate more than 60% of an animal's protein requirement.

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At the end of the five-year USDA research project, she says, they hope to create tools for producers like a cattle water-demand tool and expand the Cattle Comfort Advisor in collaboration with the Oklahoma Mesonet maps. These tools will help producers make management decisions regarding water and climate in their herds. They plan to have the expansion of the Cattle Comfort Advisor available on a test basis later this summer.

There are no existing EPDs that directly address thermotolerance, or the ability to handle heat and cold. However, there are still ways to select for thermotolerance traits.

PHOTO BY KASEY BROWN

►**"Always remember that one way to make your cows efficient is to make sure they have a calf every year! Fertility and reproduction should be components of any selection objective if you're keeping replacements," suggests Megan Rolf.**

Hair shedding is a heritable trait. To score hair shedding, she says cows should be scored around May on a 1-5 scale. A score of 1 represents a slick summer coat, and a score of 5 represents a thick winter coat. Rolf said cows with hair-shedding scores of 3 or less had calves that weighed about 24 lb. heavier at weaning. There is a moderate genetic correlation with calves' 205-day adjusted weaning weight. It is important to note that hair-shedding scores do not affect body condition scores.

Research is showing that heat tolerance is a heritable trait, and it can be selected for especially in environments with a high average temperature-humidity index. There is a correlation between performance and heat tolerance, but that correlation is not at 1, so it is possible to make progress in both performance and heat tolerance. She added that one study showed that heat and cold tolerance also appear to be largely uncorrelated, so it is possible to select for both.

"Using genetics is a viable option for matching cattle to the climate and weather conditions," she asserted. Trait optimums should be considered when selecting cattle in your specific climate to efficiently use natural resources like feed and water. Keep in mind your cattles' thermotolerance when making selection decisions. She predicts that more selection tools for feed and water intake efficiency will be available in the future due to ongoing research efforts.

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