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# NUTRITION'S EFFECT ON BREEDING

## Macro and micro elements of nutrition greatly affect reproductive success.

by Kasey Brown, associate editor

Imagine having to shoot an arrow into a soda can from across your largest pasture. You have only two arrows with which to hit the bull's-eye. There are plenty of things that can affect your success, like wind speed, birds, arm strength and more. Now imagine that the success of this shot determines whether you get a paycheck for the year.

Reproduction is the most important aspect to a cow-calf operation. Essentially, to stay within a yearly calving interval, a cow has 21-25 days to come back into estrus; and a cattleman has two chances to get her bred, notes Dusty Abney, cow-calf nutritionist with Cargill. There are many factors that affect reproduction, but nutrition plays a major role in achieving success.

### Intake

In this goal, Abney notes the difference between calories vs. protein. Protein supports caloric intake, but it won't overcome a major caloric deficit.

"Just because there is 'plenty to eat' doesn't mean a cow has access to enough calories. There is a difference in intake versus energy density," he explained. "Intake drives the bus."

Intake drops with low-quality forages because the cow fills up and can't eat more to get more calories. So, if a cow is eating low-quality forages, she needs to still be able to meet her own and her calf's needs.

"Fetal programming research is confirming what we already know — taking care of a cow pays dividends for the lifetime of her progeny," Abney notes.

It has been common thought that a cow's second trimester had the least nutrition requirements. However, he counters, a calf gains 70% of its final weight in the third trimester, essentially adding about 50 pounds (lb.) of calf in those last three months. If a cow hasn't been getting enough calories, then those

pounds for the calf are going to come from mama's body.

"This is not an excuse to rough that cow through her third trimester to try to get lower birth weights," he emphasizes. "Bull selection is the number one cause of lighter birth weights. Five weeks before birth, that cow starts making colostrum, which will affect that calf's immune system for 21 days. Plus, she'll soon be in peak lactation and have 65-70 days of high demands on her body. We need to position her for success."

Don't forget that when a cow is lactating and feeding her calf, she's actually feeding two calves. That calf in gestation is laying major developmental framework during that first trimester, so make sure her nutrition meets the demand, he cautions.

He also emphasizes that your calving season should be in sync with your environment to ensure adequate nutrient availability.

He shares the nutritional requirements of a September-calving cow in the South means grass is at its highest quality during the early second trimester and lowest during peak lactation.

“You can be out of sync with your environment,” Abney notes, “but only if there is a compelling economic result to justify feeding her through this.”

### Vitamin and mineral needs

While calories are of paramount necessity, the type of nutrients is also crucial to reproductive success. Brandon Koch, beef nutritionist with Kent Nutrition Group, explains that several vitamins and minerals play a large role in reproductive success. Trace minerals account for less than 0.01% of the diet, but they are mighty in usefulness.

Trace minerals influence a good deal of the cow-calf production cycle, says Shelby Roberts, a research scientist at the Alltech Center for Animal Nutrigenomics and Applied Animal Nutrition research facility. This includes reproduction and pregnancy status; placental growth and development; *in utero* trace mineral transfer and fetal development; postnatal calf nutrition; and calf growth, immunity, performance and sexual development.

Specifically, Koch says copper (Cu), selenium (Se), manganese (Mn) and zinc (Zn) play a role in reproduction, as do vitamins A and E. Forages are generally deficient in these minerals and vitamins, so it's important to supplement them correctly.

For instance, Koch shares research on how phosphorus (P) and trace minerals affect days to conception. Cows who received no supplementation conceived in 45 days; cows fed crude protein (CP) conceived in 35 days; cows fed crude protein plus phosphorus conceived in 29 days; and cows fed crude protein, phosphorus,

zinc, copper and manganese conceived in 22 days. He shares that the study also indicates no mineral supplementation results in increased weaning weight variance, as well as the longer calving window.

In addition to simply needing vitamins and minerals, the type of each also affects reproduction.

Roberts adds that inorganic minerals are reactive. They can react with negatively charged plant components, and they can get tied up by these compounds. This means more of the beneficial minerals pass straight through to the manure. She puts it simply: No absorption equals no benefit to the animal.

Because of this, she recommends feeding organic minerals instead

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of inorganic minerals. While more expensive, organic minerals provide performance benefits instead of expensive manure.

She shares data showing that replacing all inorganic minerals with organic minerals improved levels of immune-boosting immunoglobulin (IgG) antibody levels in cows' colostrum. In the first 12 hours postcalving, IgG levels in cows fed organic minerals were 307.3, compared to 267.5 in cows fed inorganic minerals. In the first 24 hours, organic-mineral-fed cows' IgG levels increased to 308.4, compared to 265.1 in those fed inorganic minerals.

That's all well and good, but does the benefit actually transfer to the calves? Yes. Calves of the cows fed organic minerals had calf serum immunoglobulin A (IgA) levels that improved from 203.6 to 286.9 in a 24-hour period.

“This is important because IgA is responsible for mucosal



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with an average of 25 lb. total in calves fed organic minerals.

### Immune function

A female can't reproduce if she isn't healthy, and nutrition also affects cattle health.

“We don't normally associate the gut and the immune system as the same thing, but in all actuality, the largest population of immune cells resides in the gut,” says Roberts.

The gut's microbial population is filled with good bacteria — like *Lactobacilli*, *Bifidobacterium* and others — that are constantly fighting bad bacteria like *E. coli* and *Salmonella*. The immune system and the good bacteria work together to keep the cow healthy.

“If we're continually having to address gut health problems, we're going to decrease overall animal performance because more

immunity, so when we think about respiratory pathogens, they come in through the mucosa. If we improve mucosa immunity, perhaps we can improve protection against respiratory pathogens,” Roberts explains.

Additionally, IgG concentrations on Day 30 were 1,667 in calves of organic-mineral-fed dams, compared to 1,272 in calves of inorganic-mineral-fed dams.

One thing to note, these benefits are purely from the dam being fed organic minerals. So, what happens when they are fed to the calf?

Calves fed organic minerals showed significant increases in 205-day adjusted body weight (498 lb. vs. 478 lb.), Roberts says. Pregnancy rates for a commercial cow herd fed organic minerals increased by 3%-4%. Adjusted weaning weights increased by 31 lb. in heifers and 18 lb. in steers,

nutrients are having to be diverted to the immune system rather than growth,” Roberts explains.

So, she says, feeding prebiotics and probiotics can help the gut fight off these bad bacteria and block colonization. They can promote good gut bacteria, support the immune system, optimize colostrum quality, and support healthier calves and cows.

For more information on prebiotics and probiotics, read “3 P's: Probiotics, Prebiotics and Profit,” from the September 2019 issue of the *Angus Beef Bulletin*, available at <http://bit.ly/ABB3Ps>.

All of these nutrition factors affect reproductive success. You can't guess how the wind will blow at breeding time when you have to shoot that metaphorical arrow; however, with proper nutrition, you can install some windbreaks for that paycheck-ensuring shot. ■

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