Fetal Programming Series

Fetal Programming in the Third Trimester

Research shows increased productivity of a calf crop if attentive to third trimester nutrition.

by ***Grace Vehige***

The number one priority on the radar for many cattle producers is ensuring a live, healthy calf crop. Often times, a producer may not worry about a calf until it hits the ground.

Continued research on fetal programming indicates a calf's productivity depends on its dam's condition during pregnancy. With both positive and negative outcomes at risk during pregnancy, it is important to understand the role of all three trimesters.

The majority of fetal growth occurs in the third trimester, making this period critical for a calf's future performance, according to Elizabeth Backes-Belew, Ph.D., nutritionist with Purina Beef Technical Solutions.

Third trimester breakdown

Traditionally, producers place a lot of weight on the third trimester of pregnancy, and rightfully so. If there is one thing we know about pregnancy, it is the maternal environment plays a key role in the health and productivity of the fetus after birth.

Undoubtedly, the sheer percentage of calf growth during the third trimester is enough to make a producer attentive to maternal environment. In fact, as Backes-Belew explains, "The third trimester is the time period where 75% of the fetal growth occurs."

However, there is another key development affecting a fetus during the third trimester: the final stages of lung development. Without adequate attention to a fetus' maternal environment, a calf's lungs may develop improperly, leaving a greater chance for the calf to develop asthma and other respiratory complications.

Aside from physiological developments affecting a calf at birth, essential nutrients and colostrum are produced.

"Colostrum is produced in the last trimester, so keeping the cow in good shape during this time period helps produce better colostrum for the calf," Backes-Belew says.

Optimum nutrition

Perhaps the most important aspect of fetal programming, especially in the third trimester, is providing proper nutrition. After all, Backes-Belew says nutrition affects stayability, longevity and reproductive performance.

Third trimester nutrition is far more important than just weight gain. Studies show strong correlations between nutritional supplementation for a dam and increased productivity for a calf.

"A female's nutrient requirements will go up significantly during the last trimester of pregnancy and through lactation," says Doug Hawkins, PhD., technical support specialist with Purina.

While the logic seems clear, what is the actual influence of optimum nutrition in the third trimester?

Backes-Belew cites a three-year study[1] of improved nutrition during the last 90 days of gestation in a cow. The study breaks down simply: Half of the cows did not receive supplements and half of the cows received one pound of supplements per day. The females that received supplementation during the third trimester produced calves with heavier finishing weights than that of their nonsupplemented counterparts.

The results do not stop there. This same study found the calves out of supplemented females had improved quality grade. Calves out of dams receiving proper mineral supplementation were less likely to be pulled for health treatments in feedyard environments.

As if those findings do not speak volumes, Hawkins reports adequate or preferably optimum nutrition is critical to reproductive success in the bovine female.

"Proper nutrition is critical to meeting the nutritional requirements of protein, energy and trace mineral needs for the female in order for the reproduction process to occur. Inadequate nutrition can have short-term and long-term consequences that can inhibit or alter reproduction," he confirms.

The producer's role

With this information on nutritional requirements in mind, it is important to understand your role as a producer.

"I think a lot of people could argue one [trimester] is more important than the next, but they are equally important when it comes to fetal development," Backes-Belew says.

Think of it this way: If the target is to get one calf per cow every year, logistically, the cow is eating for two to three every day because she is either pregnant, nursing, pregnant and nursing or culled. Nutrition affects the outcome of the pregnancy — plain and simple.

For producers, the goal is to get the female adequately prepared, reduce the number of bad days and provide consistent nutrition. Backes-Belew explains this is best achieved by monitoring body condition in the herd.

"A prime body condition score is sure to promote positive fetal development," she says. "A score between one and four is bad for calf development. On the other hand, a body condition score between seven and nine affects a cow's reproductive ability."

Hawkins confirms, "Maintaining a year-round body condition score of 6 through supplementation can lead to increased reproductive efficiency, heavier weaning weights and also longevity of the cow."

More information about fetal programming and the first and second trimesters of gestation can be found in previous issues of the *Hereford World*. In future issues of *Hereford World*, learn more about nutritional effects on reproductive performance in replacement females. HW

A review of the second trimester

Providing the right resources and mineral supplements to your cow herd in their second trimester of pregnancy can help their calf crop achieve higher weaning weights, more gain at finishing and improved marbling and tenderness.

"By not feeding mom to meet her nutrient requirements, you are giving up pounds at weaning and finishing, and leaving positive attributes in terms of carcass quality on the table," shares Elizabeth Backes-Belew, Ph.D., nutritionist with Purina Beef Technical Solutions.

She points out a calf is born with every muscle cell it will ever have in its life. During the second trimester, muscle tissue is developed, as well as the liver, heart, brain and other vital organs. Attentiveness to maternal environment in the second trimester is sure to pay off in the long run.

"Producers must understand that an animal's productivity begins at its conception and that every day is important. A producer's goal is for that animal to have more good days than bad days. That is why nutrition, herd health and management are so critical every day," says Doug Hawkins, PhD., technical support specialist with Purina. HW

[1]Stalker, L.A., Adams, D.C., Klopfenstein, T.J., Feuz, D.M. & Funston, R.N. (2006). Effects of pre- and postpartum nutrition on reproduction in spring calving cows and calf feedlot performance. *Journal of Animal Science,* 2006, 84(9): 2582-2589.