

# Mid-West Cattlemen News

## Fetal Programming or Good Nutrition?

The term fetal programming comes up a lot in nutrition discussions on cow-calf operations. It seems to be the new buzzword in the research community, but I think we can get lost in all specific methods and results and forget its true meaning. Fetal programming is simply applying good nutrition and management practices all the time. In a cow-calf operation, there is rarely a time when our nutrition program can slack off without long-term impact.

### Calving to Breeding

Calving to breeding is the only time a cow is not pregnant, but to have a fetus to program, our focus needs to start here. To maintain calving within a 12-month interval, a beef cow has 80 days between calving and conception. This occurs at the same time the cow is peaking in milk and has maximum demand for protein and energy. For example, TDN requirement for a third period cow weighing 1,200 lbs. is 13.7 lbs. per day. When this same cow calves and begins producing 20 lbs. of milk per day, her TDN requirement jumps to 17.6 pounds, a 30 percent increase in energy requirement!

Furthermore, it is critical to maintain Body Condition Score (BCS) around 6 prior to calving to increase breeding success. If the cows are thin

at calving, it is near impossible to correct BCS prior to breeding.

### First Trimester

Nutrition during the first trimester (first three months of gestation) is most often overlooked. Nutrient requirements of the calf are minimal since most calf growth occurs in the final third of pregnancy. However, the first trimester of pregnancy is when the placenta develops and most organ tissues are created. Development of the placenta in the first trimester is responsible for nutrient supply to the calf for the remainder of the pregnancy. Nutrient deficiencies in the first trimester have been shown to reduce fetal blood flow for the duration of the pregnancy. Severe nutrient deficiencies during the first trimester can result in reduced

From a practical standpoint, it is most important to avoid a severe nutritional deficiency during the first trimester and focus on keeping the cow in good body condition to maintain the pregnancy.

### Second Trimester

During the second trimester (3-6 months of gestation), muscle and fat tissues are being synthesized and organs are continuing to develop. Research has shown that nutritional stress during the second trimester can have a negative impact on weaning weight, carcass weight, and tenderness. In addition to direct economic impacts of weaning and carcass weight, nutrient deficiencies during the second trimester can influence ovary size and reproductive performance of the female fetus. This will increase her time to first estrus over a year down the road!

### Potential Impact of Nutrient Insult By Period

	1st Trimester	2nd Trimester	3rd Trimester
Growth Rate	↓	↓	↓
Immunity			↓
Organ Size/ Function	↓	↓	
Reproductive Performance		↓	↓
Marbling		↓	↓
Carcass Weight			↓
Tenderness		↓	↓

organ size and function, impacting that calf for the remainder of its life.

### Third Trimester

The final trimester (6-9 months of gestation) is the most critical in impacting the growth

and development of the calf long term. Interestingly, 75 percent of fetal growth occurs in the final two months of pregnancy. The factor that makes this time especially challenging from a nutritional standpoint is forage consumption of the cow. The fetus is growing at the fastest rate the same time the cow is consuming the least amount of nutrients because she physically does not have room. In a spring calving herd, the third trimester falls in the late winter, early spring when hay is being fed. In a fall calving herd the third period cow is often consuming mature pasture in the end of summer. In both scenarios, energy and protein intake may be limiting. This is when a supplementation program for the cow will pay the most!

Supplementing protein and energy to the cow during this rapid phase of fetal growth has shown to increase rate of gain and final carcass weight. Supplementing protein and energy during the third trimester can also increase tenderness and quality grade in finished cattle by increasing the number of muscle fibers in utero.

In most research, supplementing the cow at 1-2 lbs./day for the final 60 to 90 days of pregnancy resulted in a 10 to 15 pound increase in weaning weight and carcass weight. Proper nutrition during the final third of pregnancy can also impact reproductive performance of female offspring. Additional nutrients for the cow in the final trimester can also

improve colostrum quality which improves offspring immunity for years down the road. In one study the incidence of scours was 19 percent higher in nutrient restricted cows compared to cows fed at requirement in the final third of gestation.

Supplementation during the final third of gestation also makes sense as you look at managing cow body condition in her reproductive cycle. The third trimester is the perfect time to intervene if additional body condition is needed prior to the next breeding cycle. A supplementation program can provide benefits for the calf and the cow.

**Heat Stress**

Fescue toxicity and heat stress are environmental issues that can impact nutrient supply to the fetus. Both negatively impact blood and nutrient flow to the fetus even if the cow is consuming adequate protein and energy. This difference is most often observed with the difference in calf size from fall to spring calving herds. Using tools available to manage heat stress and fescue toxicosis like our I.C.E.™ or Fescue EMT™ technology can improve nutrient flow to the fetus in times of heat or fescue stress.

**Additives**

When forage availability or quality limits the ability to meet the cows nutrient requirements, it is often a good idea to incorporate additives which improve nutrient utilization. Monensin or CinnaGar™ would

be examples of products that modify rumen fermentation and improve nutrient utilization in the animal.

**Economics**

<b>Cow Supplementation Third Trimester</b>	
Feed Cost, \$/ton	\$175.00
Feed, lbs/day	2.0
Feed Cost, \$/head/day	\$0.18
Feed Cost, \$/head/90 days	\$15.75
Additional Weaning Weight, lbs	12.5
Calf Value, \$/cwt	\$150.00
Value of Additional Gain, \$/head	\$18.75
Net Return, \$/head	\$3.00

Determining economic return for fetal programming can be difficult. For the cow-calf operation the largest economic impacts are weaning weight, cow pregnancy rate, calf health, and reproductive performance of replacement heifers. Pregnancy rates, calf health and replacement heifer performance can be difficult to quantify because they vary by environmental conditions and management. I have summarized the return on fetal programming for 2017 in the table above based solely on weaning weight benefit.

**Summary**

Research in the area of fetal programming is lacking but it all points to the fact that a good nutrition and management program is essential all the time and there is never a good time to “let the cow go.” With fetal programming we have the potential to influence offspring productivity for a lifetime.



Contact your Cargill representative for cow nutrition options.