

## **Setting your Calves for Success before They’re Born**

Dr. Brandi B. Karisch – Extension Beef Cattle Specialist, Mississippi State University

For a long time, we’ve known that nutrition and in turn a cow’s body condition scores (BCS) can have big impacts on pregnancy rates. Cows that are in poorer condition at calving (i.e. BCS 4 and below) have consistently been shown to have lower pregnancy rates. These cows may be relying on body fat reserves prior to calving to meet some of their nutrient needs. In Mississippi, we can rely on forages for much of the diet for our cowherds, but especially as we enter the winter months we can see drastic shifts in both quantity and quality of forages. This means that there may be times where cows may not be receiving 100% of their nutritional requirements over the course of a pregnancy. Recent research has demonstrated that poor nutrition can harm more than just pregnancy rates. This concept is often referred to as fetal programming or developmental programming, and is the idea that during critical periods a maternal stimulus or insult can have long term impacts on offspring (Funston et. al., 2010).

Most producers understand that during the last trimester of gestation, the most fetal growth occurs (approximately 75%). Since during the first 2 trimesters of gestation, the nutrient requirements of the calf are relatively lowly many producers and researchers believed that cow nutrition was only impacting calf growth during the last trimester when the calf was doing the majority of its growth. However, we’ve learned that the early and mid -phase of fetal development is also of critical importance as it can affect subsequent growth, health and reproduction of the offspring.

For many cattle producers, a focus is selling pounds of beef whether it be on the hoof or on the rail. The impact of fetal programming on growth and muscle demonstrated in several studies. There are 2 phases of muscle synthesis during development that can be affected. The first wave begins at mid gestation, while the second occurs from 6-9 months of gestation. So, we can expect that when cows are nutrient restricted we may see decreased muscle fiber formation, which in turn leads to lower birth weights and decreased weaning weights. Since skeletal muscle is a lower priority when the fetus is divvying up nutrients compared to vital organs like the brain or heart, it is often more vulnerable to situations where nutrients are deficient. In a University of Wyoming study, calves from cows grazing lower protein pastures during pregnancy had almost 30 lb lighter weaning weights (533 lb on 6% protein native pastures vs. 564 lb on 11% protein average improved pastures). This weight difference even carried through to harvest weights for these steers (Underwood et al., 2010)!

Future reproductive performance can be impacted by early nutrient restriction. Testicular development in bulls begins at just day 45 of gestation, and perhaps more importantly for many producers, ovarian development in the female begins at just day 50. In a University of Nebraska study, heifers born from dams supplemented with added protein had not only increased weights at weaning and pre-breeding, but also had a decreased age at puberty and improved pregnancy rates (Martin et. al., 2007 and Funston et al., 2010).

Health can also be impacted by fetal programming, and is certainly an important factor to consider to set calves up for success. Respiratory disease is a costly factor for the beef industry, and providing calves proper nutrition from the start is important for keeping cattle healthy.

Previous research has shown increased sickness and death in calves born to energy restricted dams, and in addition lighter birth weights, which may also be a contributing factor.

So what does all of this research come down to for beef cattle producers? Essentially it boils down to the importance of nutrition throughout pregnancy. When cows are deprived of nutrients, we will see negative impacts on not just the cow herself, but also her calves throughout their productive lives. When all of the costs associated with nutrient restriction during pregnancy are added together, it sure makes that feed bill look a lot cheaper. Balancing supplementation programs around forage quantity and quality is an important part of good herd management that should not be overlooked.

For more information about beef cattle production, contact an office of the Mississippi State University Extension Service, and visit [extension.msstate.edu/beef](http://extension.msstate.edu/beef).

#### References:

Funston, R. N., D. M. Larson, and K. A. Vonnahme. 2010. Effects of Maternal Nutrition on Conceptus Growth and Offspring Performance: Implication for Beef Cattle Production. *J. Anim. Sci.* 88:E205-E215.

Funston, R. N., A. F. Summers, and A. J. Roberts. 2012. Implications of Nutritional Management for Beef Cow-Calf Systems. *J. Anim. Sci.* 90:2301-2307.

Martin, J. L., K. A. Vonnahme, D. C. Adams, G. P. Lardy, and R. N. Funston. 2007. Effects of Dam Nutrition on Growth and Reproductive Performance of Heifer Calves. *J. Anim. Sci.* 85:841–847.

Summers A.F., Funston R.N. 2011. Fetal programming: implications for beef cattle production. In: Proceedings, The Range Beef Cow Symposium, December 3-5, 2013, Rapid City South Dakota

Underwood, K. R., J. F. Tong, P. L. Price, A. J. Roberts, E. E. Grings, B. W. Hess, W. J. Means, and M. Du. 2010. Nutrition during Mid to Late Gestation affects Growth, Adipose Tissue Deposition, and Tenderness in Cross-bred Beef Steers. *Meat Sci.* 86:588–593.