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Calves: Are They What Their Mamas Eat?

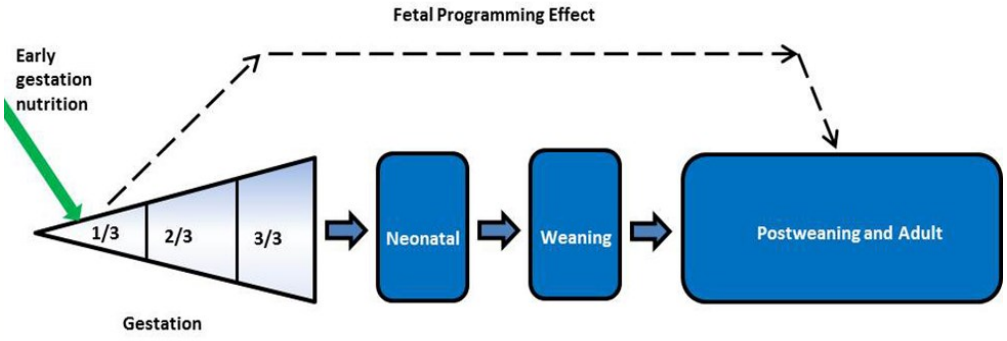
By: Kristy Oatway

As all cattle producers know there are a number of factors that play into having a healthy calf crop. Everyone is well aware of the effects that genetics, summer grazing conditions and disease can have on the growth of their calves, however, one thing that many of us don't think about is the effect that late summer and fall cow nutrition has on next year's calf crop. New research into the topic of fetal programming in beef cattle is showing that it may be more important than we thought to make sure our cows' nutritional needs are met at all times of the year. We've all heard the saying that 'you are what you eat,' so from a cattlemen's perspective, are your calves what their mamas eat?

Fetal programming is a relatively new concept in the cattle industry, it was originally studied in human medicine. It can be defined as maternal stimuli that can affect fetal development as well as postnatal health and growth *(source: Washington State University Extension)*. In humans, fetal programming is linked to a number of serious chronic diseases including heart disease and stroke, hypertension, obesity and Type II diabetes *(thebarkertheory.org)*.

Fetal programming has only recently been studied in cattle, but in a short period of time some important discoveries have been made. For many years maintaining an adequate level of nutrition during the last third of gestation has been emphasized. This time period was emphasized because 75% of the fetus' growth occurs in the last two months of gestation so it was thought that this was the most important period to ensure cows are receiving adequate nutrition from their rations. It has also become well known that large changes in the energy and protein levels of cows in late gestation can affect the birth weight, vigour and health status of calves as well as affecting the dams' return to estrus. *(Tom Hamilton, Ontario Ministry of Agriculture*). However, more recent studies have shown it is important to pay close attention to the nutrition of our cows during the first and second trimesters as well.

In order to understand how fetal programming works, one first needs to understand why the first and second trimesters are important.



Source: Ontario Ministry of Agriculture & Food

Many researchers believe that the key to fetal programming lies with how the placenta develops. As Kimberly Vonnahme, a reproductive physiologist with North Dakota State University, explains "Vascularity of the caruncles [the maternal attachment to the placenta] begins at day 90 with a marked increase in blood flow and vascular density by day 120… Any detrimental effects of maternal nutrition during this critical establishment of maternal-fetal vascular systems would impact the ability of the fetus to acquire proper amounts of nutrients and oxygen". This lack of oxygen and nutrients can then affect the developing organs leading to liver enlargement, reduced muscle growth, thickening of heart walls, hypertension, and insulin resistance in calves as young as eight months of age *(angusjournal.com)*. Two organs that are particularly affected are muscle and fat. When the fetus has insufficient nutrients it will direct nutrients to essential organs, like the heart and brain, and away from less important ones like muscle and fat. Animals are born with a set number of muscle cells with most muscle cells being laid down between the 2nd and 8th months of gestation. After birth, animals can only increase their muscle mass by increasing the size of each individual muscle cell. Fat cells are also primarily laid down during gestation and only increase in size after birth. This means that calves who did not receive adequate nutrition in utero, will have less muscle and less marbling than calves whose dams received adequate nutrition (*Steve Parsley, University of Wyoming*).

The protein content of the dam's feed during early gestation has been found to play a particularly important role in a calf's future performance. University of Idaho researchers have found 15-45 % of calves born to cows fed inadequate amounts of protein in the first trimester will suffer from Bovine Respiratory Disease (BRD) due to poor lung development as opposed to 1-5% of calves whose dams had adequate protein. This indicates we may be able to prevent BRD, the leading cause of death in feedlots, by simply ensuring our pregnant cows get adequate amounts of protein.

EVENTS

Don Campbell
Rancher from Meadow Lake, SK
"How to Have More Grass, More Profit & a Better Quality of Life"
June 17: Valleyview, Bill Hanson's Ranch
June 18: Fairview, Neil Boyd's farm
June 19: LaGlace, Peter Eggers' farm

Jim Gerrish
of
American GrazingLands Services
Improving the Productivity & Longevity of Grazing Land
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Inadequate protein in the second trimester has been shown to lead to calves with lower average daily gains; less back-fat, decreased marbling scores and carcasses which were an average of 60 pounds lighter than calves fed in the same feedlots whose dams had adequate protein (*Jim Church, University of Idaho*). In today's market, 60 pounds could result in a $100 smaller paycheck for each and every calf.

Interestingly, not only are feeder animals affected by fetal programming, replacement heifers are as well. Heifers born to dams with adequate protein levels during gestation had greater weaning and pre-breeding weights, and had a 13% higher pregnancy rate than heifers with inadequate protein *(Tom Hamilton, Ontario Ministry of Agriculture).* Heifers born to dams that received adequate nutrition throughout their pregnancy were also more likely to calve in the first 21 days of calving and calved unassisted more often than heifers that received inadequate nutrients while in utero (*beefmagazine.com*).

It is important to remember that not every poor doing calf has experienced fetal programming due to inadequate maternal nutrition during pregnancy, but it is something that producers should consider for whole groups of underperforming animals. Questions producers can ask themselves to determine if fetal programming is affecting their herds include: Are your calves growing as you would normally expect them to? Do you have more open heifers in the fall than you would normally expect? Are you having far more problems with BRD than normal that can't be otherwise explained? Producers should also look back to the previous year's weather and environmental conditions to determine if their feed may have been of lower quality or if cows had less access to feed than normal.

What can producers do to limit the negative effects of fetal programming in their herds? The first step is determining the nutrient content of your forages. A forage quality test will allow you to evaluate both the energy and protein content of your feed. The next step is determining the nutrient requirements of your cows at each stage of production, and this information can be obtained from beef nutritionists, extension specialists, veterinarians, or from online resources like www.merckmanuals.com and Alberta Agriculture's online database of resources. If your forages will not meet the needs of your cows at each stage of gestation, supplementing with pellets or grain could be considered. Another option that could be considered would be cutting a portion of hay earlier when protein and energy will be high, so that poorer quality hay can be fed with higher quality hay to properly meet nutrient requirements. If producers find grain or other supplements at a good price this summer it may also pay off to purchase now and save it for supplementation this fall and winter. An important step producers should take at this time of year is to ensure their cows are in good body condition before they go out to pasture to limit the amount of energy they will have to spend this summer to regain their body condition, leaving more nutrients for both this year and next year's calf.

The research being done in fetal programming is very interesting, and worth keeping an eye on. It could change the way we feed our cow herds, as well as what we consider and look for when purchasing new breeding stock to add to our herds. Going forward, fetal programming will be an important concept for all sectors of the cattle business to pay attention to, from cow-calf producers all the way to the processing level. The biggest challenge of course, will be for each sector, especially the cow-calf producer, to be able to realize upon the added value and profits that a concept like fetal programming can provide to the industry.

Introducing our 2014 Summer Student: Kristy Oatway!

I am very excited for the opportunity to work with the Peace Country Beef and Forage Association as the summer technician this year. I grew up on a small purebred and commercial cattle farm just north of Rycroft. I spent much of my childhood showing bulls, heifers and steers at local purebred association shows and at local 4-H sales. I was a member of the East-West Woking and Eaglesham 4-H beef clubs for 9 years. As a 4-H member, I was able to travel to the Northern International Livestock Exhibition in Billings Montana as a member of the Alberta 4-H Livestock Judging Team and I also served as a Provincial Ambassador for two years. After high school I studied Biological Sciences at the University of Calgary for two years before applying to veterinary school. I am currently in my 3rd year of veterinary school at the University of Calgary's Faculty of Veterinary Medicine and will graduate as a member of the Class of 2016. I have a strong interest in large animal medicine and I currently serve as the President of the school's Production Animal Health Club. After graduating I hope to return to the Peace Country to work as a large animal veterinarian. My primary interests lie with beef industry and I hope to work closely with primarily cow-calf and feedlot clients to improve the health and productivity of their herds. At some point in the future I would like to be able to own my own large animal veterinary clinic somewhere in the Peace Country. Throughout the summer I hope to broaden my experience and learn more about the production side of the beef industry and more about some of the unique challenges producers in the Peace Country face in order to better serve my future clients. I hope to meet many of you out at the research sites and at the field days this summer.

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