

Blame it all on mom?

Fetal programming isn't a new concept in the health-care community; expecting mothers are quickly advised to take prenatal vitamins and stick to a healthy diet. Gestating cows might not be any different.

by Lindsay King, assistant editor

Amanda Blair, South Dakota State University (SDSU), and Janna Block, North Dakota State University (NDSU), shared the stage in one of the first sessions of the 26th Annual Cattlemen's College at the 2019 Cattle Industry Convention and National Cattlemen's Beef Association (NCBA) Trade Show in New Orleans, La., Jan. 30-Feb. 1, 2019.

"Programming Your Cow Herd for Success" dove into the finer details of how the environment might play a bigger role in phenotype than originally theorized in the $E + G = P$ equation. Most equations only give environment credit for 50% of the resulting animal, research is revealing that it might be more than that.

"Evolving research focuses on the idea that what mom eats matters and what she encounters while gestating has an impact on the calf for life," Blair said. "All strategies for optimizing the life of cattle currently are for after the calf hits the ground."

The Dutch influence

After World War II, the Dutch hunger winter began. Populations ate fewer than 800 calories per day, if they were lucky. Medical and military records reveal how much this changed the lives of children both born and carried during this period.

"These children developed a thrifty phenotype because of the decreased

nutrition they received in the womb," Blair said. These children had lower birth weights as a result. The intriguing part of the records was the higher incidence of obesity, diabetes and heart disease later in life for those children when food was more readily available.

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That thrifty phenotype would be comparable to animals considered "easy keepers." No matter the animal, the uterus prepares the fetus for the environment it will be born into based on nutrition, stress levels, hormone or metabolic changes, and placental development.

"These factors during gestation lead to changes in gene expression in the phenotype without actually changing the DNA," Blair said. "In the Dutch hunger winter, more nutrients were going to external fat development than muscle. This ultimately led to the health issues of those children that was connected to weight."

Where is the cow in this?

A cow worth her weight in gold is one that never eats solely for herself. In a typical production cycle, a cow will either be milking for a calf, carrying one or developing one in

her uterus. Her nutrition is always going towards the next generation. Researchers are beginning to realize the long-lasting impact of nutrient restriction on cattle.

"No time during gestation is a good time to restrict nutrients, but the worst time is during early development," Block added. "Development of the organs begins as soon as the fetus is recognized as a pregnancy from implantation in the uterine wall."

The heart, limbs, lungs and brain are high on the priority list for receiving nutrients during early gestation. If nutrients are restricted, the other developing organs — specifically the sex organs — will be lower on the priority list for nutrients.

"When we think about growth and the carcass outcomes of a feedlot steer, gestation accounts for about 40% of their life cycle," Blair said. "If they are harvested at 15 months old, these steers spend almost half their life cooking."

Though the mechanisms of how fetal programming impacts a calf are complex, it should be an important consideration in a production setting for steers and heifers.

"We have not been in this area of research long enough to sort everything out just yet," Blair said. "However, we have started to see trends that tell the same story about fetal programming." **AJ**