Fetal Programming Series

What is Fetal Programming?

A discovery in human health has led to research about the effects of maternal environment on calf longevity and performance.

by ***Grace Vehige***

When it comes to pregnancy, one thing is certain. Lifetime performance is influenced by all the events leading up to the birth. Both positive and negative outcomes are possible throughout a pregnancy and after a birth depending on the maternal environment.

A famished discovery

One historical event paved the way for a key scientific discovery about maternal reproduction. During World War II, a blockade caused a detrimental decline in the Dutch food supply. Over 4.5 million people were impacted by the food shortage, a crisis later named the "Dutch Hunger Winter."

From the famine, it was later noted nutritionally deprived pregnant women birthed children with different diseases based on the trimester of that deprivation. Those children developed cardiovascular issues, high cholesterol, asthma, kidney disease and various other health implications.

The Dutch Hunger Winter clearly displayed how the environment affects fetal development, a phenomenon now known as fetal programming. According to Elizabeth Backes-Belew, Ph.D., nutritionist with Purina Beef Technical Solutions, fetal programming is true for all mammals.

Maximizing genetic potential

Backes-Belew says fetal programming was first recognized in cattle about 20 years ago, and research continues to this day. This is why managing nutrition and weight is as vital as ever during a cow's gestation.

In a traditional sense, many cattlemen and women do not worry about a calf until it hits the ground, but as Backes-Belew explains, "the calf's future performance is affected throughout all three trimesters."

Of the many factors and stressors that can potentially affect the health of the cow, the leading setback for fetal development is depriving the cow of her nutritional requirements.

"Lack of nutrition as a fetus develops can impact growth, fertility, carcass merit and organ development once a calf hits the ground," Backes-Belew says.

While the calf's DNA cannot change, the way genes are expressed can change depending on environment factors. This is called DNA methylation. Offering adequate nutrition is the best way to maximize genetic potential and to help prevent DNA methylation.

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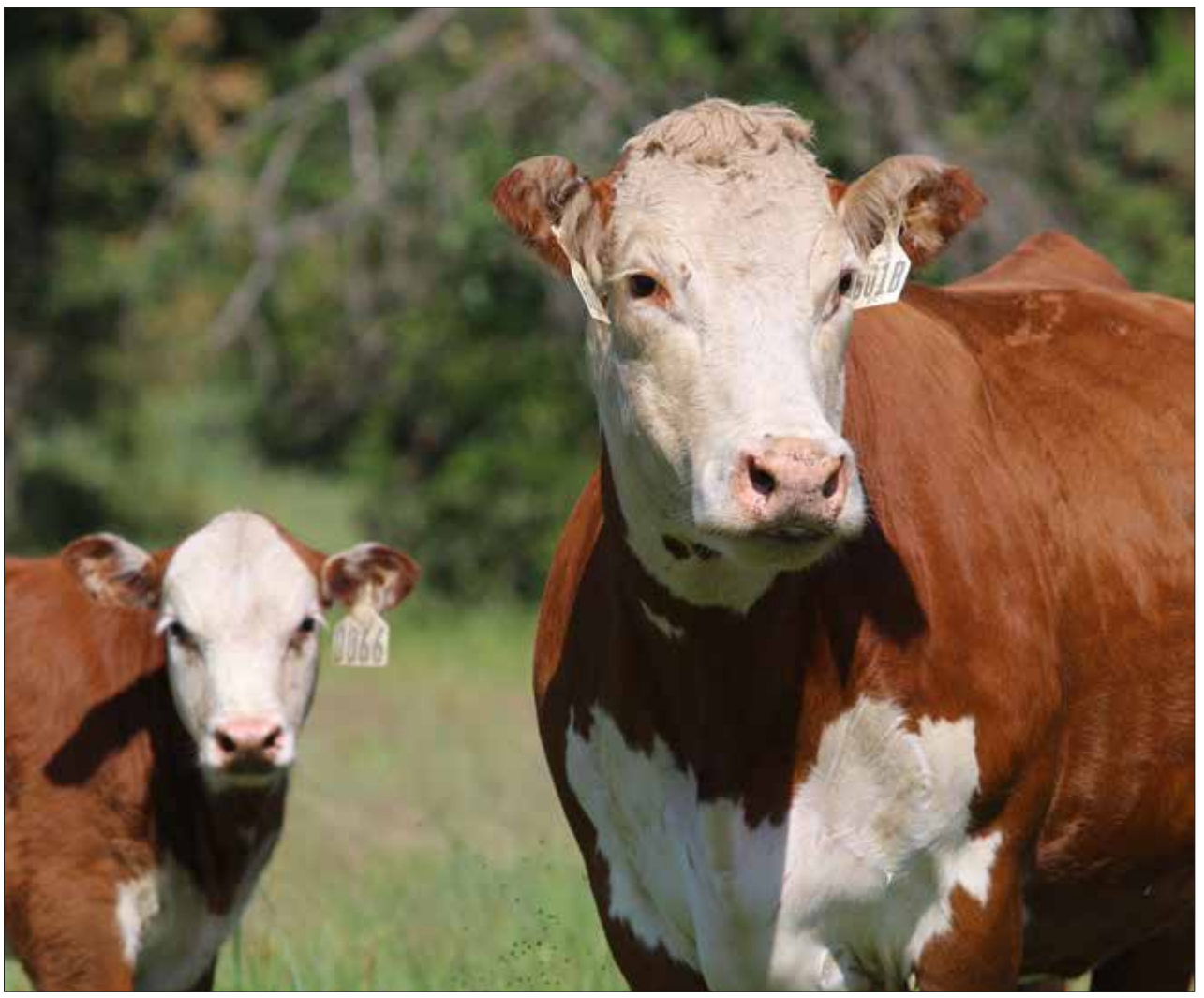
Replacement females are meant to stay in the herd a long time. Depending on a dam's nutrition, stayability can be positively or negatively impacted.

"Short-term challenges can be linked to decreased health following calving and weaning, due to lower-quality colostrum production, and into the weaning phase, where the calf can be challenged with respiratory challenges because of the development of the lungs," Backes-Belew says. "Long-term challenges can be affected in terms of heifer development, reproductive performance and longevity in the herd."



Ensure positive fetal development

When it comes to ensuring positive fetal development, the producer's role is simple: monitor body condition.

"When you see your cattle every day, it is hard to recognize weight loss right away. It is important for producers to measure and record body condition scores to promote cow health and good fetal development," Backes-Belew notes.

Body condition scores are numbers used to estimate fat and muscle deposition in cattle. Scoring for body condition ranges from one to nine, with one being a very thin animal and nine representing an obese animal. According to Backes-Belew, a prime body condition score that promotes positive fetal development is a body condition score between five and six.

"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," Backes-Belew says.

By providing the right nutritional supplements — vitamins, minerals, protein and energy — producers can position both the cow and her developing fetus for future success. Learn about the effects of fetal programming throughout each trimester of pregnancy in future issues of the *Hereford World*. HW