the phenomenon of EPIGENETICS

Written by Ciara Mattheis

Epigenetics, in literal translation, means "on top of genetics." It deals with gene expression and genetic traits being presented both within and across generations due to external factors, without direct mutations in the DNA sequences.

What does this mean to me, you might ask? It means that you can more fully express the genetics you already possess in the years to come through management practices, balanced nutrition, and environmental factors that accentuate desirable traits to maximize the value and quality of your cattle.

The first time I heard about epigenetics, I wasn't convinced it was a real thing. How do you wrap your head around the fact that genetics are not set in stone, as we were always taught, but that environment and experiences can actually affect the expression of genes and determine which ones are more prevalent? I was instantly hooked and needed to know more. The research is fascinating and certainly worth taking note of for the knowledge, experience, and opportunity to present the best genetics possible in the livestock produced on your farm or ranch.

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During the developmental process, both prior to birth and early in life during rapid development, the DNA that makes up our genes accumulates chemical markers that bind to the polynucleotide chains. These markers determine how much or how little of a specific gene is expressed. This collection of chemical markers is known as the "epigenome."

The health and welfare of your breeding stock are therefore essential to producing the best possible offspring. Fetal and early life experiences, such as malnutrition, exposure to toxins, and high stress before birth or during early development, are not forgotten but instead built into the architecture of the developing brain through the epigenome. This can impair certain aspects of optimal or full potential development in the calf as it grows. The bull and cow each provide half of the calf's genetics, but the cow has 283 days of additional influence before birth, along with several months during critical development after birth.

Epigenetics and linear measurement tools should be at the top of any progressive breeding program

Steve Campbell is an extremely intelligent man who has built a modern-day program to help producers "make your herd's genetic code fit your zip code." If ever given the opportunity, his presentations are an absolute pleasure to attend and will leave you excited and energized to go home and implement some of the practices learned. Steve introduced the cattle world to the idea of the "Red Solo Cup Cow." These cows have a big belly and a wide, angled slope from hook to pins, which assists in optimal digestion of feed intake and easier calving. To learn more, I encourage you to visit taylormadecattle.com and watch some of his recorded videos that explain the benefits of having cows that work for you to maximize the genetic potential of your herd.

Prior to the current scientific research being conducted in some of the most respected labs and institutions internationally, cattle biologists noted this phenomenon in the 1960s and 1970s. Dr. Jan Bonsma of South Africa noted in many of his research papers that efforts to breed larger cattle in environments where smaller-framed cattle had previously thrived led to a genetic decline. Cattle efficiency, quality, and the taste and texture of the meat reached an all-time low.

Gerald Fry studied many of these teachings from Bonsma and other renowned researchers. He was inspired to spend much of his career in the mid-1990s working across the USA to help cattlemen get "back to the basics" of ranching and create a more symbiotic relationship between cattle and the land they lived and produced on. Remembering Dr. Bonsma's teachings on how cattle naturally adapted to their environment, Mr. Fry began searching for the proper genetics for moderately framed cattle with good intramuscular fat and the ability to consistently reproduce offspring equal to or better than their sire and dam.

A story shared by Steve Campbell on his website about Burl Winchester, who reintroduced linear measurement back into North America, shows that epigenetics and linear measurement tools should be at the top of any progressive breeding program. These tools can help select for the traits you want your cattle to exhibit, especially as a seedstock producer. We, too, can use this tool in developing the cattle that populate our pastures to breed for a more efficient cow on grass.

"Burl Winchester was a curious man from a curious family. He grew up on a very poor farm outside of Clovis, New Mexico, where he and his brothers took care of the family livestock. As I remember the story, when they were raising 4H sheep in the 1930s, they decided to start measuring them and recording the measurements in a little notebook. They found strong correlations between many of the traits and started organizing them around the edges of the pages (for each animal) so they could easily compare the measurements to the general condition of different individuals. This led to making the marks on 3 x 5 cards instead of notebook pages so they could easily sort the cards by different traits and compare that to what they were seeing when they looked at the animals. This was the genesis of the spectrofan© cards that are still used today.

Burl extended the use of these cards to cattle and became easily convinced that by selecting and culling based on traits that correlated with results such as grade of meat cuts in carcasses, mothering ability, and winter survivability, one could easily build a herd of very high quality (however one defined that) within just a few generations. By selecting herd bulls and breeding females to meet one's criteria, the results were demonstrated repeatedly to be dramatic and unquestionable." –Steve Campbell

Epigenetic changes play a role in determining which genes are turned off or on and influence the proteins produced within specific cells. Some of these modified traits can also be inherited across generations. This is why we want to bring forward the most desired traits by facilitating proper diet and exposure to environmental factors and stressors in which we wish these cattle to thrive. I encourage you to take some time to consider the epigenetic repercussions, both good and bad, in your practices and to look for ways to encourage the traits you desire in your cattle and how you can get there.

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