



PHOTOS BY SHAUNA ROSE HERMEL

# Does Drought Affect Beef Quality?

Due to ‘fetal programming,’ drought-stressed cows may deliver calves with impaired performance and carcass quality.

by *Troy Smith*

**F**or most producers plagued by drought, the biggest management challenges come in the form of reduced forage production. Those who depend on runoff to charge stock dams and ponds face water quantity and quality issues, as well as short pastures and diminished hay crops. With the return to favorable rainfall patterns and good management, range and pastures can return to health, and water supplies can be refreshed. However, drought may have a long-term effect on cattle performance and carcass merit.

Many cattle feeders and animal scientists suspect that drought stress takes a toll later, hindering calf performance and genetic potential for carcass quality grade. We’re not necessarily talking about how those outcomes are affected when suckling calves are exposed to drought. Rather, it’s the health, performance and profitability of the next calf crop that may be at greater risk.

## Compensatory response

According to University of Wyoming

Extension beef specialist Steve Paisley, effects of drought on the current calf crop will vary. In most cases, however, they are negligible. In fact, many cow-calf producers with spring-calving herds report heavier weaning weights in dry years.

“Ranchers refer to this phenomenon as the ‘dry grass’ or ‘short grass’ response, with the theory that increased quality, or concentration of nutrients, results in increased weaning weights of calves — assuming there is adequate forage available,” Paisley says.

“There is probably some truth to this, as we will see our crude protein (CP) and TDN (total digestible nutrient) values of grasses actually increase during dry years, while total grass production is reduced.”

Of course, nursing calves also receive much of their protein requirement from milk, further explaining why weaning weights may not suffer. Calves stressed to a greater extent, due to reduced milk production and reduced availability of forage, often show improved performance — a compensatory response — once they

receive adequate forage. However, Paisley says this response may be masked by increased health problems. These are most likely to occur when cattle are forced to eat plants closer to the ground and consume less desirable plants, resulting in mineral and vitamin imbalances. Mineral imbalances may also be attributable to water quality issues.

Studies have repeatedly shown how animals with health problems exhibit a diminished immune response to subsequent disease challenges. Their potential for gain, feed efficiency and carcass merit are compromised. However, there is no hard data documenting the direct postweaning effects resulting from drought stress during the suckling phase.

Nor has research undeniably shown how the drought-stressed gestating cow’s next calf is affected. Several universities are studying the issue now, including the University of Wyoming, North Dakota State University and the University of Nebraska.

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► **Above:** While there is less grass under dry conditions, the grass that is available is usually higher in nutrient content. This sometimes creates a “short grass” or “dry grass” response realized in heavier calf weaning weights, assuming there is adequate forage available, Steve Paisley says.



### **The 'Barker Theory'**

Animal scientists have taken their cue from human research of the "Barker Theory." David Barker based his work on pregnant women who suffered malnutrition in Nazi-occupied Holland during World War II. While these women delivered apparently

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► **Left:** What appears dry to some is lush to others. These pictures were taken in June 2005 at Bradley 3 Ranch, Memphis, Texas, after some rain had actually greened up the Texas countryside.

normal, healthy babies, the children later developed health problems at a much higher rate than the remainder of the population.

The concept of the gestating female's nutrition affecting the health of the offspring is now more commonly referred to as "fetal programming." To date, there have been multiple studies focused on cow nutrition during late gestation (the last 90-100 days). The work has demonstrated that providing adequate protein to gestating cows results in heavier weaning weights and heavier carcass

weights among their steer calves harvested at similar end points. Heifer calves saved as herd replacements showed improved pregnancy rates. Studies also indicate lighter birth weights, a substantially higher incidence of scours, and higher mortality rates among calves born to dams whose nutrition was restricted during late gestation.

“There seems to be good data indicating good nutrition during late gestation is important,” Paisley says. “However, I’m beginning to think nutrition during early gestation may be as important if not more important, especially in drought years.”

In most April-calving herds, for example,

this would be during July and August when forage quality is declining. But, Paisley says, this also is a critical time for fetal growth and particularly for internal organ development. A Wyoming study limiting cows to 60% of protein and energy requirements during early gestation resulted in calves with smaller organ size and impaired glucose metabolism. The number of skeletal muscle cells was reduced and muscle fiber diameter was increased, raising questions about how beef tenderness might be affected. Effects on feedlot performance and carcass quality were small.

Paisley says the limited studies with beef cattle suggest that early gestation is a critically

important period for fetal development and may have a significant effect on subsequent calf performance. More years of data are needed to fully understand the situation and, perhaps, explain some of the year-to-year variability in feedlot performance and carcass quality exhibited by different calf crops representing the same genetics and produced on the same ranch.

“Fetal programming may not answer all questions,” Paisley offers, “but it may be an important piece of the puzzle when we are trying to improve overall herd health, steer performance and meat quality.”

