

Programming Reproduction

What do we know about fetal programming of reproduction and how can we manage it?

by Kasey Brown, special projects editor

What affects the cow affects her calf, but what kind of management is necessary for optimal performance of both? Robert Cushman, research physiologist at the U.S. Meat Animal Research Center (USMARC), explained that when cattlemen talk about this phenomenon, they are really discussing developmental programming, which includes fetal programming and nutritional programming. These have events that occur both before and after birth.

“If we are going to use it for management, it is important that we understand this,” he noted.

He spoke to attendees of the 2016 Applied Reproductive Strategies in Beef Cattle (ARSBC) symposium in Des Moines, Iowa, last fall.

Cushman shared part of the Barker Hypothesis: “Numerous animal experiments have shown that poor nutrition during periods of rapid growth in early life may permanently change the structure and



PHOTO BY TROY SMITH

► Poor maternal nutrition during early pregnancy decreases the daughter's follicle number, said Robert Cushman, research physiologist at the U.S. Meat Animal Research Center.

physiology of a range of organs and tissues.”

Often, cattlemen think of developmental programming in a negative sense, as in what happens to the calf when the female has a nutrient-restricted diet. He suggested they look at it to improve management in health,

productivity and reproduction.

Female reproductive traits expressed early in life have the greatest heritability. A high antral follicle count correlates to increased fertility and has an average heritability of 0.4, he said. While genetic selection for these females with a larger ovary reserve is an option to increase reproductive production, he said several studies have shown that developmental programming — including targeted feeding — can increase or decrease the size of this ovarian reserve.

Poor maternal nutrition during early pregnancy decreases the daughter's follicle number.

In theory, he granted, there may be ways to feed a dam in the first trimester during drought

or negative environmental situations to increase the daughter's antral follicle count. Conversely, he shared data showing maternal nutrition during late pregnancy did not alter the daughter's follicle count.

Therefore, he said, third-trimester nutrient intake can positively influence the unborn heifer's conception date, but it does not alter the antral follicle count. So, drought conditions occurring in the first trimester could potentially decrease the daughter's ovarian reserves, but he adds that an earlier calving day could lead to increased reproductive longevity in the absence of a change in follicle number. Having a controlled calving season with more females calving earlier will help the reproductive rate of the daughters.



Editor's Note: Cushman spoke during the ARSBC session focused on genetics. Also presenting during that session, Alison Van Eenennaam of the University of California–Davis discussed the use of genetic marker information in beef cattle selection and Matt Spangler of the University of Nebraska–Lincoln spoke on more traditional selection tools for fertility. Visit the archived 2016 Newsroom at www.appliedreprostrategies.com, to read summaries of their presentations, view their PowerPoints, read the proceedings or listen to the presentations. Compiled by the Angus Media editorial team, the site is made possible through sponsorship by the Beef Reproduction Task Force.