Range Beef Cow Symposium XX

Dec. 11-13, 2007 • Larimer County Fairgrounds and Events Complex, Fort Collins, Colo.

Nutrition During Gestation and Fetal Programming

by ***Troy Smith***

FORT COLLINS, Colo. (Dec. 13, 2007)— The concept of fetal programming suggests that environmental stimuli during pregnancy establish permanent responses by the fetus, which are likely to be expressed at birth and even later in life. The study of long-term effects on offspring due to a mother's nutritional status began in the human health arena, but it also has application for livestock production.

During Wednesday's Range Beef Cow Symposium discussion of reproductive management topics, North Dakota State University animal scientist Kim Vonnahme said the theory of fetal programming has been challenged and verified using multiple animal models. From the earliest stages of embryonic life, an unborn calf is sensitive to the dietary intake of its dam. A nutrient-restricted diet results in an undernourished fetus, which may be "programmed" for susceptibility to disease and poor performance at birth and later in life.

"While variations in the duration and severity of maternal undernutrition do not always result in a reduced birth weight, physiologic alterations such as glucose intolerance, skewed growth patterns and even alterations in carcass characteristics have been reported," Vonnahme said.

In a pregnant bovine, development of the fetal/placental vascular system begins around Day 90 of gestation. Subjecting the cow to nutritional insult during this early development period can affect the ability of the fetus to acquire proper amounts of nutrients and oxygen. While it is true that 75% of the growth of a ruminant fetus occurs during the last two months of gestation, Vonnahme said the early phase of development is critical to growth of the placenta and subsequent fetal development.

Studies suggest a low-protein diet can result in lifelong elevations in blood pressure of offspring, which may compromise lung development in late gestation. Reduced lung function could then make calves more susceptible to respiratory disease. Vonnahme said that while the timing and the exact nutrients involved are not yet clearly delineated, it appears that multiple physiological systems, including skeletal muscle development, may be affected at different times during pregnancy. Further research is needed to better explain how maternal nutrition affects economical traits in beef cattle.

The cooperative extension services and animal science departments of Colorado State University, South Dakota State University, the University of Wyoming and the University of Nebraska hosted the 2007 Range Beef Cow Symposium at the Larimer County Fairgrounds and Events Complex, Fort Collins, Colo., Dec. 11-13. Additional coverage of the symposium is available at *www.rangebeefcow.com.*

Editor's Note: *API coverage of the Range Beef Cow Symposium XX is made available for distribution to all media via an agreement with the Range Beef Cow Symposium Committee and API. Headquartered in Saint Joseph, Mo., API publishes the* Angus Journal *and the* Angus Beef Bulletin, *as well as providing online coverage of events and topics pertinent to cattlemen.*