



PHOTO BY SHAUNA ROSE HERMEL

Guard Against Embryo Loss

Nutritional management affects embryo development, pregnancy.

by **Troy Smith**, field editor

Contrary to what most cattlemen may think, fertilization rates among beef cows and heifers bred by artificial insemination (AI) are quite high. According to South Dakota State University Reproductive Physiologist George Perry, fertilization is successful about 90% of the time when animals are detected in estrus and semen is present at the time ovulation occurs. So why is it that most well-managed AI programs result in just 70%, or even fewer, AI-sired calves?

According to Perry, the reason is early embryonic mortality. In a presentation to the Applied Reproductive Strategies in Beef Cattle (ARSBC) Symposium last fall, he explained that much of the loss is due to natural causes — things like poor oocyte quality, disease or genetic abnormalities — but management practices that place

nutritional stress on cows and heifers also decrease embryo survival. To understand why requires some understanding of how an embryo develops.

“What a lot of people don’t realize is that it takes two weeks (following fertilization) to achieve maternal recognition of pregnancy. Until then, the female (her body) doesn’t even know she’s pregnant,” explained Perry. “Definitive attachment of the embryo to the uterus doesn’t occur until Day 42.”

During this time, an embryo is vulnerable to the dam’s biological responses to stress created by environmental factors, shipping or a negative shift in nutritional status. Focusing on the latter, Perry said nutritional limitations can trigger nutrient partitioning, whereby the dam’s body takes care of its own needs first. Only the leftovers, of which there may be none, go toward maintaining pregnancy.



PHOTOS BY TROY SMITH

► “What a lot of people don’t realize is that it takes two weeks (following fertilization) to achieve maternal recognition of pregnancy. Until then, the female (her body) doesn’t even know she’s pregnant,” explained George Perry. “Definitive attachment of the embryo to the uterus doesn’t occur until Day 42.”

Perry said maintaining adequate energy intake is particularly important. When energy intake is limited at or immediately after insemination, this lack of energy may perturb fertility through direct or indirect regulation

of the uterine environment. This may include changes to components of uterine secretions or by influencing the circulating concentrations of progesterone that regulate uterine environment.

Perry said abrupt changes in diet around the time of AI, such as moving heifers with little or no grazing experience to pasture, can result in inadequate energy intake.

“Even when ample forage for grazing is available, naïve animals may not eat enough to meet energy requirements,” warned Perry.

Citing studies involving drylot-developed heifers that were turned out to graze forage without supplementation, Perry said they exhibited increased activity (steps per day), lost weight, and had decreased conception rates compared to heifers that had prior grazing experience.

He explained that nutritional stress from decreased intake does not have to last long to prompt a negative response. Research suggests that restriction of intake for only six days immediately after AI can result in decreased embryo quality and delayed embryo development.

“Any big changes in diet around the time of AI can have negative impacts,” emphasized Perry. “Consistency of diet is important, especially during the first month following AI.”

Perry also talked about shipping stress as related to early embryo mortality. For producers needing to haul animals from the site where AI is performed to pasture, he advised transporting them as soon after AI as possible and certainly within four days. He explained that until Day 5, the embryo remains in the oviduct and should not be subjected to uterine hormonal changes brought on by shipping stress. Alternatively, animals may be shipped after the time of embryo attachment to the uterus (Day 42).

The period between Day 5 and Day 42 is the time of greatest risk of embryonic loss due to shipping. However, Perry said animals typically can be trailed a reasonable distance during this time without negative effects. Driving animals does not appear to prompt the stress response that occurs as a result of loading and hauling them to a different location.

Editor’s Note: The 2016 ARSBC was hosted in Des Moines, Iowa, Sept. 7-8. Perry spoke during a session featuring nutritional effects on reproduction. Visit the Newsroom at www.appliedreprostrategies.com to view his PowerPoint, read the proceedings or listen to the presentation. Compiled by the Angus Media editorial team, the site is made possible through sponsorship by the Beef Reproduction Task Force.

Protein’s Effect on Reproduction

Research indicates differences in effects of excess protein on dairy and beef cattle reproduction.

by **Kasey Brown**, special projects editor

Nutrition and reproduction go hand in hand. Researchers have documented that excess protein has a negative impact on fertility in dairy cattle as increased concentrations of plasma urea nitrogen and milk urea nitrogen are associated with suppressed fertility. Patrick Gunn, assistant professor and beef cow-calf extension specialist from Iowa State University, explained how protein affects beef cow fertility at the 2016 Applied Reproductive Strategies in Beef Cattle (ARSBC) Symposium last fall.

He highlighted the relationship of nutrition and fertility in beef cattle, saying protein is a key nutrient that may be overlooked in rations, especially when cows are grazing low-quality forages.

Protein is a key nutrient that may be overlooked in rations, especially when cows are grazing low-quality forages.

Dietary crude protein is broken into rumen degradable and rumen undegradable protein. Gunn explained that degradable proteins are those that can be absorbed as amino acids for microbial protein synthesis. Undegradable protein is that which is left over and passes to the intestine.

Essentially, the goal of protein supplementation is to supply rumen degradable protein to feed the rumen’s microbial population to support production. While the *Nutrient Requirements of Beef Cattle* (NRC) was recently updated, he said protein requirements for reproduction have not been fully characterized, and the impacts of excess supplementation on reproduction have not been established in beef cows.

While data showed a poor relationship



▶ “When metabolizable energy is not a limiting factor, excess dietary protein does not negatively impact reproductive processes and fertility in beef cattle,” said Patrick Gunn, extension beef specialist for Iowa State University.

between dietary protein and fertility in dairy cattle, beef cattle research does not support the dairy data. Blood urea nitrogen concentrations don’t appear to be linked to fertility in beef cattle. He suggested that the relationship in dairy cattle has to do with metabolic stressors and negative energy balances during peak lactation, which often fall during breeding season.

“When metabolizable energy is not a limiting factor, excess dietary protein does not negatively impact reproductive processes and fertility in beef cattle,” he explained, adding that more research should be conducted.

Editor’s Note: The 2016 ARSBC was hosted in Des Moines, Iowa, Sept. 7-8. Gunn spoke during a session featuring nutritional effects on reproduction. Visit the Newsroom at www.appliedreprostrategies.com to view his PowerPoint, read the proceedings or listen to the presentation. Compiled by the Angus Media editorial team, the site is made possible through sponsorship by the Beef Reproduction Task Force.