Does Nutrition Impact Reproductive Performance?

Cooperative Extension Service

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Reproductive performance impacts milk production and, therefore, profitability of a dairy herd. Recently, improvements have been noted in 21-day pregnancy rates for dairy cows. These improvements have been the result of increased genetic selection for fertility traits, refined reproductive management programs, improved cow comfort and facilities management, and redefined nutritional programs for dry and lactating dairy cows. In a DAIReXNET webinar, Dr. Milo Wiltbank from the University of Wisconsin-Madison discussed the role nutrition plays in improving reproductive efficiency. A summation of his discussion is the basis for this article.

- Reproductive performance is influenced by genetics, physiology associated with reproductive management, general cow management such as cow comfort, and nutrition. All of these factors influence reproductive performance, and as such, we should not overplay the role any one area has on influencing reproduction performance. In other words, one magic bullet, such as feeding a particular feed additive or ingredient, alone will not improve reproduction. Implementation of all aspects are important to achieve excellent reproductive performance.

- Dr. Wiltbank discussed 4 critical time periods when nutrition impacts reproductive performance. These time periods include:
    - close-up dry period (within 3 weeks of calving),
    - the 3 weeks post-fresh,
    - one week prior to AI, and
    - early pregnancy.

  For each of these time periods, Dr. Wiltbank described in his webinar examples of how nutrition or changes in nutritional status could impact reproductive performance.

- Close-up dry cows: Nutritional programs that prevent nutrient deficiencies or excessive feeding of energy can improve reproductive performance. Dr. Wiltbank reviewed a research study where *vitamin E deficient*, close-up dry cows were injected with vitamin E. Close-up cows injected with 1000 IU of Vitamin E had a lower rate of retained placenta, stillbirth and pregnancy loss from day 31 till 62 compared to the vitamin E deficient, close-up dry cows.

  In another study (summarizing 7 research studies) he described the effects on reproductive performance when close-up dry cows were fed pre-calving either a lower controlled-energy diet versus a high-energy diet. The close-up cows fed the lower energy diet lost less body condition in early lactation and had fewer days from calving to pregnancy. Again, illustrating that nutritional programs before calving can impact reproductive performance after calving.

- Fresh cows: Body condition at the time of AI and changes in body condition score (BCS) within the first 21 days after calving can impact reproductive performance. Dr. Wiltbank shared the results from a research study where cows were synchronized and then bred AI. In those cows synchronized with Ovsynch, the probability of conception was lower for cows with a BCS less than 2.75 around the time of AI versus cows with a BCS of 2.75 or greater. With the use of double Ovsynch versus just Ovsynch, cows with BCS of less than 2.75 had a greater probability of becoming pregnant, but pregnancy rates were still lower than cows with higher BCS around the time of AI.

  Dr. Wiltbank also showed data which illustrated changes in BCS within the first 21 days after calving can impact embryo quality and overall fertility. Cows that gained BCS within the first 21 days of milk had greater pregnancy rates (78% pregnancies/AI) versus cows which either maintained BCS (36%) or lost BCS (23%). These researchers showed that early embryonic quality was reduced in cows losing more BCS within the first 21-days in milk which explained the reductions seen in pregnancy rates 70 days post-breeding.

- Week before AI and early pregnancy: Although more research is needed, it appears that improperly balanced diets, for example feeding high amounts of carbohydrates, may negatively impact reproductive performance. Whereas, feeding certain types of fats or amino acids may positively impact reproductive performance. One very interesting study Dr. Wiltbank presented involved balancing diets for the amino acid, methionine, using a ruminally-protected product. Methionine is involved in the regulation of gene expression whereby “genes are turned off and on” and, as a result, embryo development can be impacted. In a study where methionine was supplemented, the researchers saw a reduction in pregnancy losses from days 28 to 61 in mature cows, but not first lactation heifers. As Dr. Wiltbank also indicated, more studies are needed but the results show promise as we look for ways to decrease embryo losses early in a pregnancy.