

Research: Supplemental Methionine Supports Dairy Reproductive Performance



The reproductive efficiency of dairy cows is at the very heart of successful dairying. Timely calvings are critical to herd performance.

The first-service conception rate of dairy cows was approximately 65 percent in 1951 but dropped to 40 percent by 1996. The decrease was widespread, having been documented in the United States, Ireland, United Kingdom, and Australia by the turn of the century.

In recent years to improve dairy pregnancy rates, updates to insemination protocols were designed to better synchronize heat. Yet, less than 50 percent of cows become pregnant at the first insemination, and a second insemination is required. Given the availability of many successful heat detection/ synchronizing protocols, a healthy uterine environment ultimately is required to ensure the embryo reaches term.

Research shows that the supplementation of cows with methionine for at least the first 100-150 days of lactation, including breeding, results in dramatic differences in gene expression in the embryo. Cows fed methionine-enriched diets have lower pregnancy losses which suggests that methionine favors embryo survival, at least in multiparous cows.



Research also indicates that:

- The lipid profile of oocytes and early embryo can be influenced by the environment of the cow. Cows receiving supplemental methionine produce embryos with higher lipid. This higher lipid concentration could serve as an important source of energy for the early developing embryo. (Acosta et al.)
- Methionine has an essential role in the development of the bovine embryo from morula to blastocyst. (Ikeda et al.)

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- Methionine can have effects on the epigenome of the embryo. Cows not fed a diet balanced for methionine may experience a methionine shortage. The shortage may not warrant normal early embryonic development. (Lobos)
- Small differences in circulating methionine produce a substantial difference in gene expression in the embryo. Methionine supplementation seems to change gene expression in a way that may lead to improved pregnancy outcomes and improved physiology of the offspring. (Penagaricano et al.)
- In a commercial dairy trial, multiparous cows receiving rumen protected methionine had a lower pregnancy loss from 28 to 61 days after artificial insemination. Pregnancy losses for the cows receiving supplemental methionine was 6.1% versus 19.6% for unsupplemented cows. (Toledo et al.)
- When parallel trials were conducted at the University of Wisconsin and at Cornell, the embryonic death losses in the 32-to-67-day interval were reduced to 6.7% for the cows receiving supplemental in spite of the low level of loss (10.8) by industry standards being already achieved in the unsupplemented animals.

