SmartLine™

Why feed methionine post-partum?

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Parturition is a natural, yet stressful event for dairy cows. In a very short period, cows produce a substantial amount of milk, adapt to new pens, and are introduced to new diets. From the physiological point of view, cows kick their metabolism into high gear to meet not only the mammary gland demands for nutrients, but to go through the process of uterine involution, and to do so while their immune system is suppressed.

At parturition, dry matter intake cannot satisfy nutrient demands for a short time period. The resulting energy and nutrient deficiency can have a negative effect in the short term (metabolic diseases) as well as long term (reproduction). Methionine, now recognized as an essential nutrient, must be supplemented to meet dairy cow needs, particularly during this critical period in the lactation cycle.

University Research

Researchers at the University of Illinois conducted trials between 2013 and 2016 to evaluate the impact of feeding rumen-protected methionine sources during the transition period. The trials consisted of evaluating the impact of feeding a rumen-protected methionine source on top of a basal diet. Rumen protected methionine was added in a 2.8:1 Lys:Met ratio.

The researchers reasoned that due to the many functional actions of methionine, the cows would benefit if fed extra during this critical time in the lactation cycle. It is well documented that cows should be fed diets with a Lys:Met 3.0:1 ratio. This follows the recommendations of the 2001 National Research Council (NRC) publication *Nutrient Requirements of Dairy Cattle*. Yet, when cows were fed diets with a 2.8:1 Lys:Met ratio during the transition period, they responded with higher-than-expected milk production during the first 28 days in milk. In part, this was due to higher dry matter intake, but also, cows fed the methionine-enriched diet were healthier than the control cows.

In the trial, there was no difference in dry matter intake (DMI) in pre-fresh cows. However, cows fed the methionine-enriched diets increased their pre- and post-partum DMI. Cows fed the methionine-enriched diet in all trials increased the milk production with higher milk protein and fat.

Additional research compared the effects of feeding a controlled-energy diet versus a higher energy diet during the close-up period on DMI, milk production, somatic cell count and polymorphonuclear neutrophils which are associated with immune function.

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Methodology

During the close-up period, cows were randomly assigned to either a moderate-energy diet (OVE), a moderate energy diet plus Smartamine® M (OVE+SM) or continuously fed the same controlled-energy diet (CON). The same lactation diet was fed to all animals postpartum until 30 days in milk.

Results

- Prepartum DMI was not affected by diet.
- Postpartum there was lower DMI in OVE than CON and OVE+SM. No differences were observed between CON vs. OVE+SM.
- Milk production was also lower in OVE than OVE+SM. The greater milk yield for OVE+SM than OVE could be attributed to the better health status of the liver which may have allowed the greater DMI.

Parameters	Treatment[1]			
	CON	OVE	OVE+SM	Diet
Log-transformed Somatic Cell Count[3]	4.95[a]	4.92[a]	4.63[b]	0.06
Polymorphonuclear phagocytosis (%)	77.35[a]	41.81[c]	51.28[b]	< 0.01

- The somatic cell count was lower in cows fed OVE+SM than CON and OVE, while CON vs. OVE had similar somatic cell count.
- Greater phagocytosis occurred in polymorphonuclear neutrophils of CON cows than OVE and OVE+SM. The OVE+SM cows had greater phagocytosis than OVE. The greater polymorphonuclear phagocytic capability in OVE+SM than OVE provides evidence that methionine supply could alleviate the negative effects of high non-esterified fatty acid mobilization on neutrophil function.
- The lower somatic cell count in cows fed OVE+SM compared with CON and OVE could be attributed to greater glutathione concentration which prevents severe inflammatory response. Therefore, methionine supplied via the OVE+SM diet enhanced dairy cow immunity and prevented incidence of subclinical mastitis.

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Conclusion

The authors concluded that the livers of the cows enriched with methionine during the last three-to-four weeks prepartum were better prepared to metabolize liver fat. Feeding the methionine enriched diets led to faster recovery from negative energy balance due to healthier liver function and decreased inflammation, resulting in higher DMI and milk production.

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