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Information for the Dairy Industry

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Maternal Mepron® supplementation enhances growth performance of calves

Epigenetic processes involve modification in gene expression following an external event without changes in DNA sequence. Methylation of DNA is one biological mechanism of epigenetics, which consists of adding methyl groups to nucleic bases (cytosine and adenine). Gene transcription is typically repressed by methylation, inducing changes in subsequent metabolic pathways.

As a methyl donor, methionine (Met) may act on DNA methylation. Until today, the in-utero impact of enhanced methionine supply on the metabolism and performance of calves after birth has never been considered. We assumed that increased methionine availability to the fetus induces a specific fetal programming by an epigenetic process that modifies metabolic functions of the calves, and that these changes are maintained after birth. Therefore, the objective of this work was to assess the effect of feeding Mepron® to gestating cows on the growth rate from birth till weaning of their calves.

Materials and Methods

This study was conducted by the research group of Dr. Juan Loor at the University of Illinois (USA; Alharthi et al., 2018; Batistel et al., 2019). Four weeks before expected parturition, 2 balanced groups of 30 Holstein cows were fed the same corn silage based-diet (15.6% CP) without (**CON**; LYS:MET = 3.71:1) or with 0.9 g Mepron® per kg DM (**MET**; LYS:MET = 2.81:1; eq. 10-15 g Mepron® per day). Upon birth, all calves followed a common feeding management program until weaning (56 d). Body weight (BW) of calves were measured at birth and every week until weaning. Weekly fecal and respiratory scores, daily rectal temperature and starter intake were also recorded.

Higher birth body weight of calves from Mepron® supplemented dams

Body weight of calves at birth was impacted in a sex-dependent manner by supplementation of cows with Mepron® during the last month of gestation, when fetal growth rate is the highest (Table 1). Indeed, males from MET-fed dams were 3.3 kg heavier than males from CON-fed dams. Despite a numerical increase of 0.6 kg, no statistical difference was found between groups for female calves. Overall, increased Met availability during fetal stage increased the BW of calves by 2.0 kg. This result demonstrates the impact of maternal nutrition on the metabolism of the offspring.

Table 1: Effect of Mepron® fed to dams on body weight (kg) of calves at birth.

	CON	MET	SEM	P-Value
Males	43.4	46.7	0.97	**0.02**
Females	41.1	41.7	1.04	0.67
Overall	42.1	44.1	0.70	**0.04**

Increased growth rate of calves from Mepron® supplemented dams

Calves from MET-fed cows were 3.1 kg heavier than calves from CON-fed cows from birth to weaning (Table 2 and Figure 1). This enhanced growth rate was confirmed by the higher average daily gain (ADG; +50 g/d) of calves. This result is particularly promising as preweaning ADG is significantly and positively correlated with first-lactation yield, with preweaning ADG accounting for 22% of the variation in first-lactation milk yield (Soberon et al., 2012).

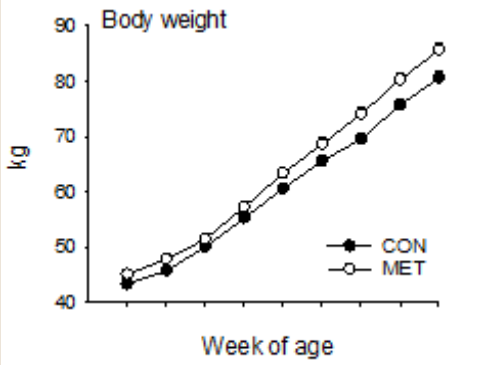

Figure 1: In-utero effect of enhanced methionine supply from Mepron® on body weight of calves from birth till weaning

It must be noted that improved performances were not related to a modification in starter intake, supporting the fact that differences in performances are related to metabolic changes following in-utero supply of methionine.

Increased methionine availability during fetal stage also improved health status of calves, as indicated by the tendency for lower fecal score (1.83 vs 1.71 for calves from CON- and MET-supplemented cows, respectively). Respiratory scores and rectal temperatures were not impacted by maternal treatment.

Table 2: Effect of Mepron® fed to dams on average body weight (kg), starter intake (kg) and daily gain (kg/d) of calves from birth till weaning

	CON	MET	SEM	P-Value
Body weight	59.3	62.4	1.90	**0.02**
Starter intake	0.79	0.85	0.09	0.19
Daily gain	0.67	0.72	0.02	**0.03**

In conclusion, Mepron® supplementation during fetal stage can positively impact the metabolism and performance of calves after birth. The fetal programming effect of methionine is a new area of research in dairy cattle which can help to unlock the genetic potential of the calf.

Reference

- Alharti AS et al (2018): Maternal supply of methionine during late-pregnancy enhances rate of Holstein calf development in utero and postnatal growth to a greater extent than colostrum source. J Anim Sci Biotechnol Sci 9: 83
- Batistel F et (2019): Methionine supply during late-gestation triggers offspring sex-specific divergent changes in metabolic and epigenetic signatures in bovine placenta. J Nutr 149: 6-17
- Soberon F et al (2012): Preweaning milk replacer intake and effects on long-term productivity of dairy calves. J Dairy Sci 95(2): 783-793

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