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Information for the Dairy Industry

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Relative bioavailability of Mepron® compared to Smartamine® M measured with the milk selenomethionine method

There is no general consensus about a method to assess the bioavailability of rumen-protected methionine (RPM). Measuring methionine (MET) concentrations in blood can be misleading because of differences in the coating technology, which impacts the release of MET. Indeed, MET from Mepron® (85% DLM; Evonik) is protected with ethylcellulose and is released during intestinal "abrasion" of the coating, leading to its slow release into the blood. Conversely, Smartamine® M (75% DLM; Adisseo) has a pH-sensitive coating which results in a fast MET release in the abomasum. Therefore, Smartamine® causes a very marked but short-lived peak of MET in the blood, while Mepron®'s gradual release leads to a steady and medium rise of MET concentrations in the blood over time. Besides, published meta-analyses showed the absence of relationship between MET concentrations in blood and performance (Patton et al., 2022). In addition, higher milk protein production was observed for Mepron® supplemented cows compared to Smartamine® (Patton, 2010).

Assessing bioavailability of RPM sources with a matrix that requires and uses MET, such as milk, may scientifically be more reliable. Therefore, **the aim of the present work was to assess the bioavailability of Mepron® relative to Smartamine® M with the milk selenomethionine (Se-Met) assay (Weiss and St Pierre, 2009).** The principle of this method is based on the dilution of Se-Met in milk in response to changes in the entry rate of Met.

Experimental design and measurements

The trial was conducted at Ohio State University. A total of 20 mid-lactating cows were used in a randomized block design. Cows were blocked by parity, days in milk, and milk yield. The experiment consisted of 3 periods: basal period, backgrounding period, and experimental period. All cows received the basal diet for 10 days without Se-yeast during the basal period. Then, cows received the same diet but enriched in Se from Se-yeast (DiaMune Se; Diamond V Mills, Cedar Rapids, IA) for 14 days during the backgrounding period. During the experimental period, cows received the backgrounding diet with either Mepron® or Smartamine® M (eq. 0.1% DLM). All diets were prepared daily in the morning and fed to cows once daily for ad libitum intake (about 5% refusal). Cows were milked twice daily.

Individual dry matter intake (DMI) and milk yields were recorded daily during the entire experiment. Milk samples for components (fat, protein, lactose and urea) were collected from individual cows on 2 consecutive days in each period. The relative bioavailability of Mepron® over Smartamine® M (assumed at 80%) was calculated as shown in Weiss and St-Pierre (2009). Briefly, specific tracer activity (SA, the ratio of Se to N in milk) for individual cows was used to calculate bioavailability.

Production data were averaged by cow in each period (n = 10/treatment). The averages during the experimental period were analyzed using the MIXED procedure of SAS. The model included block and treatment as random and fixed effect, respectively. Also, the model included covariate which was the measures during the backgrounding period.

Higher feed efficiency with Mepron®

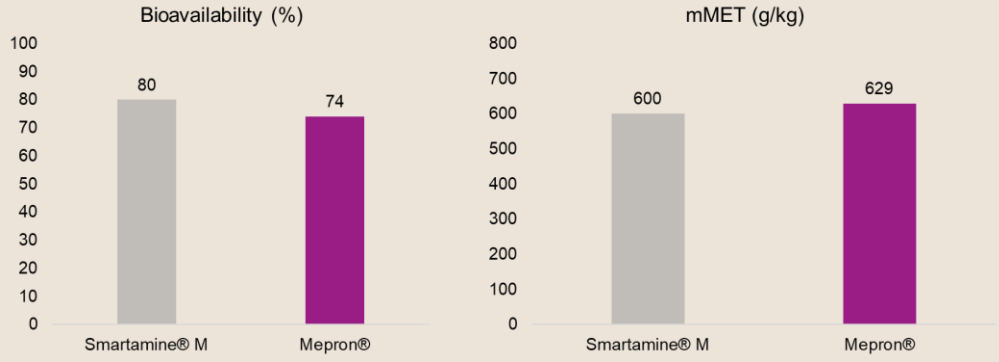
Mepron®-supplemented cows had a higher feed efficiency than those fed Smartamine® M (Table 1), despite the short supplementation time. Numerically, milk yield and energy corrected milk (ECM) were 1.1 and 1.4 kg higher, respectively, with Mepron®. Milk components were similar between diets.

Table 1: Effect of Mepron® and Smartamine® M on performances of mid-lactating cows

Variable	Mepron®	Smartamine® M	SEM	P-value
Milk yield (MY), kg/d	42.0	40.9	0.57	0.20
DMI, kg/d	27.1	27.1	0.30	0.93
MY/DMI, kg/kg	1.56	1.50	0.019	0.04
ECM, kg/d	43.6	42.2	0.75	0.20
Fat, kg/d	1.44	1.46	0.050	0.82
Protein, kg/d	1.40	1.37	0.025	0.50
Fat, %	3.56	3.69	0.169	0.54
Protein, %	3.35	3.38	0.044	0.73
Milk urea-N, mg/dL	15.3	13.7	0.511	0.04

Mepron® has a higher metabolizable methionine content than Smartamine® M

Assuming an absolute bioavailability of Smartamine® M of 80%, Mepron®'s bioavailability was calculated at 74%. Knowing the MET content of the respective products, the metabolizable MET content of Mepron® was higher (629 g/kg) than Smartamine® M (600 g/kg), showing that **Mepron® is the RPM source with the highest metabolizable MET content on the market.**



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Evonik Operations GmbH
Nutrition & Care
Animal Nutrition Business Line

animal-nutrition@evonik.com
www.mepron.com