



balchem®

AminoShure®-XM

Precision Release Methionine

Balchem Research Summary

Estimating Relative Metabolizable Methionine Content of AminoShure®-XM and Timet® by Dilution of Selenium Concentration in milk

A summary of a study conducted and presented by Michigan State University and Perdue Agribusiness at the 2022 ADSA Annual Meeting (2146M): "Determining the relative metabolizable methionine content of rumen-protected products and their effect on production responses."

Background

At the 2022 ADSA Annual Meeting, a research study was presented by Michigan State University and Perdue Agribusiness related to rumen-protected methionine (RP-Met). This study evaluated the relative metabolizable methionine content of different RP-Met products using the seleno-methionine technique.

The seleno-methionine technique is an *in vivo* method that uses changes in milk seleno-methionine concentration to determine how much of an RP-Met product bypasses the rumen, is absorbed in the small intestine and is then utilized in the mammary gland.

In this technique, milk selenomethionine (Se-Met; provided by dietary Se-yeast) is used as a tracer of Met in milk (Weiss and St-Pierre, 2009). When Se-yeast is fed, milk Se concentrations increase due to the incorporation of Se-Met into milk (Se-Met and Met are indistinguishable by cells). When supply of MP-Met increases, Se concentrations in milk decrease because of competition between Se-Met and Met. This *in vivo* technique has previously been proven accurate in estimating the relative supply of MP-Met by measuring the concentration changes of milk Met relative to milk Se (Weiss and St-Pierre, 2009).

The objective of this experiment was to determine the relative MP-Met supplied by several RP-Met products, one being AminoShure-XM (Balchem Corp) and another being Timet (Vetagro), utilizing the seleno-Met technique.

Materials and Methods

Thirty-six multiparous Holstein cows averaging 42.7 kg/d (94.1 lbs) of milk were fed a common basal diet that was deficient in Met and contained 0.4 mg/kg added selenium from Se-yeast. After 14 days, cows were randomly assigned and fed the basal diet plus one of four RP-Met treatments in a 4x4 Latin square with 14-day periods. AminoShure-XM and Timet were supplemented to supply 15 g/d of metabolizable Met according to manufacturer recommendations. Production responses and milk samples were collected on the last 4 days of each period and were analyzed for nitrogen (N, proxy for Met) and Se (proxy for Se-Met), and the Se/N ratio was calculated.

Results and Discussion

There was no effect of treatment on DMI or milk yield. Milk Se remained consistent across treatments, but milk N concentration varied when different RP-Met supplements were fed. Based on the changes in the milk Se/N ratio, the estimated bioavailability for AminoShure-XM and Timet was 54.1% and 37.4%, respectively.

The bioavailability of AminoShure-XM as determined from this experiment was consistent with Balchem's stated bioavailability value of 54.25%. However, the estimated bioavailability for Timet was dramatically less than the manufacturer's stated bioavailability of 61%.

References

J. Perales-Giron, J. de Souza, P.S. Yoder, and A.L. Lock. 2022. Determining the relative metabolizable methionine content of rumen-protected products and their effect on production responses. *J. Dairy Sci.* 105, Suppl. 1, abstract 2146M.
Weiss, W.P., and N.R. St-Pierre. 2009. A method to quantify changes in supply of metabolizable methionine to dairy cows using concentrations of selenium in milk. *J. Dairy Sci.* 92:2835-2842.

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Summary

The seleno-Met technique can directly measure the efficacy of an RP-Met product in supporting milk and component production by quantifying the changes in milk Se and Met pools. Based on concentration changes of milk N relative to milk Se, the bioavailability of AminoShure-XM closely matched Balchem's stated bioavailability value of 54.25% while the bioavailability of Timet was estimated to be 23.6 percentage units lower than the manufacturer's claim. This discrepancy can have important implications for field application, especially when determining supplementation rates and the costs to adequately support milk and component production.

Table 2 calculates and compares the cost of supplementing 10 g/h/d of MP methionine from AminoShure-XM and Timet using the bioavailability values established in this study. When considering the lower methionine content and lower bioavailability values for Timet, it was found that Timet is significantly more expensive (\$0.1417/h/d) to feed as compared to AminoShure-XM. In this example, a 1,000 cow dairy would realize an annual savings of approximately \$43,220 when feeding AminoShure-XM instead of Timet.

Table 1.

Product bioavailability according to manufacturer information and estimated from the Se-Met experiment.

Treatment	Met (%)	Manufacturer stated bioavailability (%)	Estimated bioavailability from experiment (%)
AminoShure [®] -XM	70	54.25	54.1
Timet	55	61.00	37.4

Table 2.

The economics of feeding AminoShure-XM or Timet to provide 10 grams/cow/day of metabolizable methionine (MP-Met) based on the results of the Perales-Giron study.

Parameter	AminoShure [®] -XM	Timet
Methionine (%)	70.0	55.0
Estimated Met bioavailability (%)	54.1	37.4
Metabolizable Met (%)	37.9	20.6
Product needed to provide 10 g/cow/day MP-Met (grams)	26.38	48.54
Estimated cost/lb of product (\$)	4.00	3.50
Cost/g of product (cents)	0.881	0.771
Cost/g of MP-Met (cents)	2.32	3.74
Cost to provide 10 g MP-Met (cents)	23.25	37.42
Savings/cow/day from AminoShure [®] -XM (cents)	14.17	