Effect of mineral source on fiber utilization in 48-h in vitro digestion

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Abstract #: W244

BACKGROUND

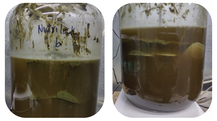
It has long been established that high producing dairy cows benefit substantially from the supplementation of trace minerals. A common source of these trace minerals is sulfate trace minerals (STM). In more recent years, hydroxy trace minerals (HTM) have been shown to have benefits over STM. One major benefit of HTM over STM is the increase in NDF digestibility (NDFD), which was demonstrated in multiple studies presented in a recent meta-analysis (Ibraheem et al., 2023).

OBJECTIVE

The objective of this study was to evaluate Nutrilock® HTM (Chemlock Nutrition), STM, and Nutrilock® HTM plus Na_2SO_4 on 48-h in vitro digestibility of a lactating-cow TMR.

MATERIALS & METHODS

- TMR samples were prepared using alfalfa hay, corn silage, corn grain, and soybean meal.
- Samples were ground to 1 mm and weighed equally in acetone-rinsed filter bags (25-µm porosity).
- Media was added to jars and then placed in a 39°C warm room.
- Rumen contents were collected from 6 rumen-fisulated cows.
- Rumen contents were then processed to create a composite ruminal inoculum and added to jars.
- Filter bags were soaked in 39°C warm DI water for 15 min.
- Then, filter bags were incubated for 48 h in vitro.
- Incubations were conducted in 15 jars (5 per treatment).
  - 5 jars per treatment.
  - 5 filter bags per jar + 2 blank bags.



TREATMENTS

Minerals were added to create 3 separate treatments

- STM
- Nutrilock® HTM
- Nutrilock® HTM + Na_2SO_4

- Zn, Mn, and Cu concentrations of the all diets were 61.5, 63.4, and 21.6 ppm as DM, respectively.
- Nutrilock® HTM were added to the TMR directly.
- STM were mixed into water and added into the jars at equivalent concentrations.
- Na_2SO_4 was added to 5 of the Nutrilock® HTM treated jars to match the S concentration of the sulfate minerals treatment.

Ingredient Composition of TMR

	%DM
Alfalfa hay	20
Corn silage	45
Corn grain	18
Soybean meal	17

Chemical Composition of TMR

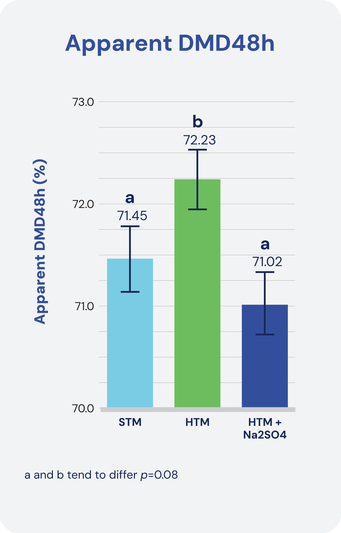
	%DM
CP	16.2
aNDFom	30
EE	3.28
ASh	7.54
Starch	28.7

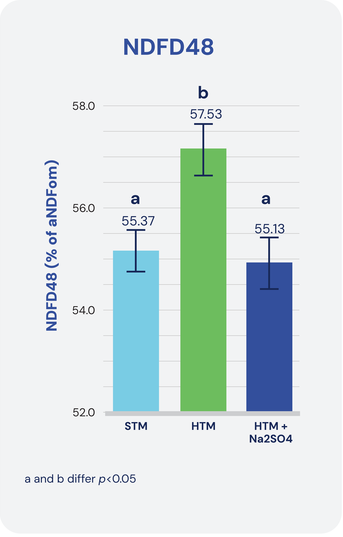
After 48 h incubation, bags were rinsed, dried (55°C), and weighed to determine DMD. Residual NDF was determined following neutral detergent extraction with an ANKOM A200.

DATA ANALYSIS

Data were analyzed using the *lm* function in R, with Type III tests (car::Anova) and least squares means and differences among means evaluated using *emmeans*.

RESULTS





CONCLUSION

Nutrilock® HTM improved 48-h in vitro NDF digestibility relative to STM, and addition of Na_2SO_4 attenuated this response.

REFERENCES

Ibraheem M, S. K. Kvidera, R. S. Fry, and B. J. Bradford. 2023. Meta-analysis of the effects of sulfate versus hydroxy trace mineral source on nutrient digestibility in dairy and beef cattle. J. of Dairy Sci. 106, 2386-2394.