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Modern assessment of trace mineral status in ruminants

Appropriate measurement criteria of trace mineral status and factors that affects these measurements are presented in a recent invited review in Applied Animal Science

Champaign, IL, June 6, 2022—In ruminants, health and production are optimized when the animals have ideal amounts of trace minerals in their diets. However, determining adequate amounts of trace minerals to provide is difficult because there are many variables. A team of scientists from North Carolina State University (Raleigh, North Carolina, USA) and Micronutrients (Indianapolis, Indiana, USA) thoroughly examined copper, zinc, manganese, and selenium status in ruminants and factors that can affect measurement of these trace minerals. Their recommendations are presented in a new [invited review](#) in [Applied Animal Science](#).

The amounts of trace minerals available to ruminants and what they require can vary considerably and can change throughout the lifetime of an animal. According to the review, a good first step in assessing mineral status is determining the concentrations of trace minerals in diets, forages, and even water being offered to the animals. A next step would be determining trace mineral requirements. “Trace mineral requirements are not static but can be affected by such factors as bioavailability of trace minerals from feedstuffs or supplemental sources, genetics, physiological status, and antagonists,” said lead author J. W. Spears, PhD, Department of Animal Science, North Carolina State University. Spears mentions that textbooks, scientific literature, and diagnostic laboratories differ regarding what values indicate deficiency or marginal trace mineral status and that measurements reported in older literature are less likely to be accurate. “This review captures the latest information and provides recommendations for the assessment of deficiencies and excesses of copper, zinc, manganese, and selenium,” said David K. Beede, PhD, Editor in Chief of *Applied Animal Science*.

The review then looks at copper, zinc, manganese, and selenium individually and provides recommendations to avoid deficiencies. For each mineral, the scientists discuss the most appropriate measurement criteria, often concentrations in liver and plasma or serum but also concentrations in tissue, milk, blood, or hair. They point out that no reliable indicators of manganese status or marginal zinc

deficiency are known at this time. The article also discusses other factors, such as certain elements and enzymes, that can affect the measurement of trace minerals in ruminants.



Caption: Calculating adequate amounts of trace minerals to offer ruminants can be a challenge (Credit: J. W. Spears).

It is important to remedy, often through supplementation, apparent clinical signs of trace mineral deficiency, but marginal deficiency can be less apparent and affect ruminant production and health. “Supplementation practices in the United States include (1) no supplemental trace minerals, (2) free-choice mineral supplements (containing trace minerals), (3) trace mineral additions to the total mixed ration, and (4) injectable trace minerals,” said Spears. The review examines the many factors that need to be considered to optimize trace mineral nutrition and supplementation for ruminants.

The article appears in the June issue of *Applied Animal Science*.

Notes for editors

“Invited Review: Assessing trace mineral status in ruminants, and factors that affect measurements of trace mineral status,” by J. W. Spears, V. L. N. Brandao, and J. Heldt (<https://doi.org/10.15232/aas.2021-02232>), *Applied Animal Science*, volume 38, issue 3 (June 2022), published by FASS Inc. and Elsevier.

This article is openly available at <https://doi.org/10.15232/aas.2021-02232>.

Full text of the article is also available to credentialed journalists upon request; contact Brittany Morstatter at +1-217-356-3182 ext. 143 or ARPAS@assoqh.org to obtain copies. To schedule an interview with the author(s), please contact Jerry Spears at Jerry_Spears@ncsu.edu.

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