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Popular Article

The Crucial Role of Microminerals in Animal Diets: Vital for Health and Productivity

Gourav Biswas^{1*}, Palak Gupta¹, Gudaghe Hrishikesh Balasaheb² and Atul Pratap Singh³

¹Ph.D. Scholar, Animal Nutrition Division, ICAR-Indian Veterinary Research Institute, Izatnagar, U.P., 243122.

²M.V.Sc. Scholar, Animal Nutrition Division, ICAR-Indian Veterinary Research Institute, Izatnagar, U.P., 243122.

³U.G. Internship, ICAR-Indian Veterinary Research Institute, Izatnagar, U.P., 243122.

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Abstract

Microminerals, though required in trace amounts, are indispensable for the health and productivity of animals. These essential nutrients, including iron, copper, zinc, selenium, iodine, manganese, cobalt, and molybdenum, play critical roles in a myriad of biological processes. They are fundamental for enzyme functions, hormone production, immune response, and bone health. Adequate intake of microminerals ensures optimal growth, reproduction, and overall well-being, thereby enhancing the efficiency and profitability of animal production systems. Effective management of micromineral nutrition is identified as a crucial component of successful livestock farming, promoting improvements in animal health, productivity, and overall agricultural sustainability.

Introduction

Microminerals, also known as trace minerals, are essential nutrients required in minute quantities yet play a pivotal role in the health, growth, and productivity of animals. Despite their necessity in only small amounts, their impact on physiological functions, immune response, and overall well-being is profound. Understanding the importance of these micronutrients and their effects can help optimize animal diets, enhancing health and productivity.

What Are Microminerals?

Microminerals, also known as trace minerals, are essential nutrients required by animals in small quantities, typically measured in milligrams or micrograms per kilogram of body weight.



Despite their necessity in only trace amounts, microminerals are critical for the proper functioning of numerous biological processes. These microminerals are fundamental for maintaining cellular integrity, supporting metabolic processes, and ensuring overall health and productivity in animals. Ensuring that animals receive adequate amounts of these nutrients through their diet is crucial for optimal physiological functioning and disease prevention.

The Importance of Microminerals

1. Enzyme Function and Metabolism:

- **Zinc (Zn):** Integral for over 300 enzyme systems involved in metabolism, protein synthesis, and immune function. Deficiency can lead to poor growth rates and impaired immune responses.
- **Copper (Cu):** Essential for the activity of enzymes involved in iron metabolism, energy production, and the development of the nervous system. Insufficient copper can result in anaemia, bone disorders, and compromised immunity.

2. Hormone Production:

- **Iodine (I):** Crucial for the synthesis of thyroid hormones, which regulate metabolism, growth, and development. Iodine deficiency can lead to goitre and hypothyroidism, severely affecting growth and reproductive performance.

3. Immune System Support:

- **Selenium (Se):** Functions as a component of glutathione peroxidase, an antioxidant enzyme that protects cells from oxidative damage. Adequate selenium levels are necessary for a robust immune system and prevention of diseases such as white muscle disease in livestock.

4. Bone Health and Development:

- **Manganese (Mn):** Vital for bone formation, reproduction, and the functioning of the nervous system. Deficiency can lead to skeletal abnormalities and reproductive issues.

5. Blood Health:

- **Iron (Fe):** Critical for the formation of haemoglobin in red blood cells, facilitating oxygen transport throughout the body. Iron deficiency can cause anaemia, leading to fatigue, poor growth, and decreased resistance to infections.

Impact of Micromineral Deficiency

Micromineral deficiencies can have significant negative effects on animal health and productivity. Symptoms of deficiencies vary by mineral but can include poor growth, reduced feed efficiency,



reproductive problems, and increased susceptibility to disease. For instance:

- **Zinc deficiency** in pigs can result in parakeratosis, a skin condition, while in cattle, it can lead to impaired wound healing.
- **Copper deficiency** in sheep may cause swayback, a neurological disorder, and in cattle, it can result in reduced fertility and weakened bones.
- **Selenium deficiency** often manifests as muscle degeneration in livestock, leading to weakness and difficulty moving.

Optimizing Micromineral Intake

Balancing micromineral intake is crucial for preventing both deficiencies and toxicities. Providing a diet that meets the specific micromineral requirements of each species and production stage is essential. This can be achieved through:

- **Feed Formulation:** Incorporating balanced mineral supplements tailored to the needs of the animal species and production goals.
- **Regular Monitoring:** Periodic testing of feed and animal tissues to ensure adequate micromineral levels.
- **Bioavailability Considerations:** Using forms of minerals that are easily absorbed and utilized by the animal's body.

Conclusion

Microminerals, though needed in trace amounts, are indispensable for maintaining the health and productivity of animals. They influence a wide range of biological functions, from enzyme activities and hormone production to immune response and bone health. Adequate intake of these essential nutrients ensures optimal growth, reproduction, and overall well-being, thereby enhancing the efficiency and profitability of animal production systems. Proper management of micromineral nutrition is thus a cornerstone of successful animal husbandry. By ensuring a balanced intake of microminerals through well-formulated diets and supplements, farmers can prevent deficiencies that lead to health issues, support the animal's physiological functions, and maximize their productivity. This holistic approach to nutrition not only improves the quality of life of animals but also enhances the sustainability and profitability of livestock operations, ultimately contributing to a more efficient and resilient agricultural industry.

