

## Importance of Magnesium in animal health and production

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### Abstract

For the proper health and high production in animals along with Calcium and phosphorus, magnesium is also essential macromineral and it is found upto 70% in the skeleton. It is useful for skeleton formation as well as performs various important functions in the animal body that are needed for proper animal health and better production. Magnesium absorption is an energy-dependent process. The presence of other minerals like Ca, P, Mn, Sulphur and Volatile fatty acids, ammonia, lactic acid, fat in rumen hampers magnesium absorption in an animal body. It is also required for the normal reproductive life of an animal. Its deficiency leads to hypomagnesium tetany in ruminants and decreases egg production, egg hatchability, and live weight gain in poultry. It is found in bran, cakes, oilseeds, cereal grains, meat in a good amounts. Magnesium oxide and Magnesium sulphate are the available commercial sources of magnesium for animals. It is inferred that magnesium plays important role in animal health and production and it is necessary to supply the magnesium in the animal along with calcium and phosphorus.

**Keywords:** Animal, Health, Magnesium, Production

### Introduction

Magnesium is the constituent of the chlorophyll molecule in the plant, bone and teeth in the animal.

- ▶ Roughages(0.1%)-vegetable
- ▶ Concentrate-bran, cakes, oilseeds, cereal grains and their products.

- ▶ Animal products- meat
- ▶ Commercial-MgO, MgSO<sub>4</sub>(Schonewille, 2013)

**Distribution:**It is closely associated with Ca and Phosphorus for its distribution and function. 70% of Mg is found in the skeleton and remaining in soft tissue and body fluids. It accounts for 2-3 mg% in blood serum, 16-20 mg/100 gm in muscles, 1-3 % in bone and Ca: Mg ratio in the body is 55:1.

**Absorption:** In ruminant: It is mainly absorbed through the rumen wall and little through the small intestine (colon). High NH<sub>3</sub> concentration reduces the rate of absorption due to the formation of a complex with phosphorus. It is energy-dependent process deficiency of energy reduces absorption. The rate of absorption is highest at a low level of feeding at the early age of the animal. But the presence of Ca, K, Phosphorus, citrate, Mn, S, Fat, rumen metabolites VFA, NH<sub>3</sub>, Co<sub>2</sub>, lactic acid, long chain-fatty acids reduce the rate of Mg absorption (Matsui, 2007).

**Inter-relations of Ca, Phosphorus, Magnesium:** On Mg inadequate diet, high concentration of calcium, phosphorus or both results in deficiency of Mg in laboratory animals. A high dose of Mg interferes with calcification and increase the urinary loss of calcium. On the normal Ca, P diet, Mg supplement will not disturb the normal calcium retention but it may increase the requirement of Ca and phosphorus.

### Requirement

- ▶ 0.35 percent Mg in dry cows and in lactating cows it is 0.28 percent Mg.
- ▶ 5.0 g/100 kg body weight.

### Functions:

- ▶ Nutrition: Take an active part in CHO metabolism
- ▶ Physiology-Essential for activation of phosphatase, kinase, enolase, nucleic acid, polymerase, ATPase enzymes. It is a prosthetic group of 300 enzymes reactions (Pinotti *et al.*, 2021).

- ▶ Helps to regulate most of the reactions in protein synthesis.
- ▶ It maintains confirmation of nucleic acid and helps in stabilization of t-RNA-complex to maintain the structure of ribosomal particles.
- ▶ It is an important cation in extracellular body fluids to maintain acid-base balance.
- ▶ It has an antagonistic effect with calcium and provides relief/protection from calcium toxicity.
- ▶ Circulatory: To maintain normal health of the vascular system.
- ▶ Skeleton: Constituent of bone and teeth in animals and central atom in the chlorophyll molecule.
- ▶ Skin: It takes part in muscular contraction and helps to reduce tissue irritability.
- ▶ Nerve: helps to maintain neuro-muscular activity.
- ▶ Reproduction: Potential for normal, efficient reproduction.
- ▶ Production: Essential in growth, milk egg production.
- ▶ Improves weight gain in broilers and hatching of eggs in layers.

### **Deficiency Symptoms**

In adult ruminants, low blood levels of magnesium (hypomagnesaemia) resulted in a condition known as hypomagnesaemic tetany (Schonewille, 2013) also called magnesium tetany, lactation tetany and grass staggers. Hypomagnesaemia in animals may occur due to Mg deficiency in the ration or low Magnesium utilization in the gut. Deficiency of magnesium may also found because of increased requirement of Mg during parturition and early lactation (Cazim and Aida, 2012).

Typical symptoms of tetany are nervousness tremors, twitching of the facial muscles, staggering gait and convulsions.

### **Deficiency Symptoms in poultry**



In poultry decreased egg production and eggshell thickness, reduced growth rate etc. (Gaal *et al.*, 2004).

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