

Eureka Journal of Agricultural Science & Bio-Innovation (EJASB)

ISSN 2760-4969 (Online) Volume 2, Issue 4, April 2026



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THE IMPORTANCE OF CALCIUM AND PHOSPHORUS MINERALS IN THE BODY OF SHEEP

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Abstract:

This article discusses the importance of calcium and phosphorus minerals in the body of sheep, as well as pathological conditions that arise due to their deficiency in feed or impaired absorption in the organism.

Keywords: Sheep, calcium, phosphorus, vitamin D, hypocalcemia, osteodystrophy, rickets, minerals, cachexia, geophagia, tetany

Relevance of the Topic

The development of sheep farming and the increase in the quality and quantity of production are directly related to metabolic processes occurring in the animal's body. Disorders of mineral metabolism, their deficiency in feed, or imbalance in the body lead to cachexia in sheep, decreased productivity and reproductive performance, as well as increased susceptibility to secondary diseases. [1]

In sheep, calcium and phosphorus deficiency leads to the intensification of osteodystrophy symptoms in pregnant animals. These clinical signs include pica, loosening of incisor teeth, and resorption of the last caudal vertebrae. [2]

Alimentary infertility is caused by disturbances in calcium and phosphorus metabolism and imbalance in their ratio within the body. Calcium deficiency leads to reduced fertilization rates, abortions, and retained placenta. Additionally,

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calcium deficiency reduces the intestinal absorption of manganese and zinc, resulting in metabolic disorders. [3]

Insufficient levels of calcium and phosphorus salts in the diet, as well as their imbalance, lead to the development of vitamin D hypovitaminosis. [4]

Calcium is an essential biogenic element, with about 99% of its total amount located in bone tissue and approximately 1% in blood and lymph. Its deficiency leads to the development of various diseases. [5]

Calcium and phosphorus are the main structural components of bone tissue. Their deficiency causes bone deformities, rickets, and tetany. Osteodystrophy also develops as a result of disturbances in calcium and phosphorus metabolism. According to data from Oregon State University, the calcium content in sheep diets should be 0.20–0.82%, and phosphorus content should be 0.16–0.38%.

Calcium deficiency leads to osteomalacia, difficulty standing, muscle tremors, rickets in young animals, increased vascular permeability, and pathological parturition. Phosphorus deficiency causes slow growth, bone fragility, geophagia, uterine subinvolution, thyroid hypofunction, kidney damage, decreased muscle tone, and the birth of weak lambs. [6]

According to Levchenko V.I. and Chumak G.V. (1990), in vitamin D hypovitaminosis, the concentration of vitamin D, calcium, and phosphorus metabolites in blood serum decreases, while the activity of alkaline phosphatase increases. In rickets, due to the deficiency of active forms of vitamin D, the absorption of calcium and phosphorus from feed is impaired, resulting in disrupted mineralization of growing bones. [7]

Parathyroid hormone accelerates the formation of calcium-citrate complexes in bone tissue; once these complexes enter the bloodstream, calcium ions are released. It also enhances calcium reabsorption in renal tubules and reduces phosphorus excretion in urine. [8]

A dietary calcium-to-phosphorus ratio higher than 2:1 leads to impaired phosphorus absorption in the digestive system. A similar effect is observed when

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phosphorus levels are excessive. Under the conditions of Uzbekistan, the main causes of alimentary osteodystrophy in ewes are deficiencies of digestible protein, phosphorus, copper, cobalt, and iodine, as well as an imbalance in the calcium-phosphorus ratio. [9]

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