EFFECT OF CHROMIUM (III) ON MICROBIAL BIOMASS AND HYDROLYTIC ACTIVITIES IN THE BULLS RUMEN

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Despite the proven positive effect of chromium as an essential micronutrient, the mechanisms of its action have not been studied sufficiently, and its recommended content in the animal diet is not yet standardized. Chromium affects glucose and fatty acid metabolism, immune resistance, antioxidant status, and performance of cattle. However, chromium has antimicrobial properties and can cause damage to the plasmid DNA and violation of protein metabolism. Because the diet of ruminant is previously fermented in the rumen, it is important to know the influence of dietary chromium to the rumen microbiota. Therefore, the study of metabolic action of chromium for ruminants needs not only investigations of effects on the animal body but actions on the rumen microbiota too.

The content of the rumen from the fattening bulls of Ukrainian dairy black-and-white breed, with a body weight of 330–340 kg, at the age of 24 months was taken. All animals received similar nutritionally balanced diet. The incubation of the rumen filtrates were performed in anaerobic conditions at a temperature of 38 °C for 24 hours. Chromium chloride (III) was added to the incubation in the amount of 0.5; 1.0; 1.5 and 2.5 μM. The amylolytic and cellulolytic activities and the mass of rumen microorganisms were determined.

Important parameters that characterize the processes of digestion in the rumen and the degree of provision of ruminant with the microbial protein is the quantity and mass of microorganisms. *In vitro* studies, we found that the addition to an incubation medium with a rumen content of chromium chloride (III) in a dose of 1.0 μM had a pronounced stimulating effect on the proliferation of microbial cells and metabolic activity, and led to increasing of microbial mass and elevation of activities of the hydrolytic enzymes in the rumen. Our results have shown that the addition of chromium chloride (III) to the incubation medium has led to the activation of anabolic processes in microorganism cells, resulting in an increase in their mass. The most intense growth of rumen microorganisms after 24 hours of incubation *in vitro* observed when chromium chloride (III) was added to the incubation medium for 0.5 μM concentration. Adding to the medium low doses of chromium (III) stimulated the enhancement of cellulolytic activity of the rumen microorganisms. Under the influence of inorganic chromium (III) in doses of 0.5 and 1.5 μM, the amylolytic activity of the rumen microorganisms increased also. The highest investigated concentration of chromium chloride (III) at a dose of 2.5 μM did not change the rate of growth of microorganisms and somewhat suppressed the cellulolytic activity of rumen microorganisms.

Chromium chloride (III) added to the rumen content in amount of 0.5 μM, positive affects some microbial enzymes what lead to increase in the microbial mass and higher hydrolytic activity in the rumen. So, chromium chloride (III) is an activator of metabolic processes in microbial cells of the rumen microbiota.

Keywords: BULLS, RUMEN, CHROMIUM CHLORIDE (III), MICROBIAL MASS, CELLULOLYTIC AND AMYLOLYTIC ACTIVITIES