

Summary:

According to the new legislation in Israel in the area of cowshed, barns are required to reduce saline concentrations and especially sodium in wastewater to prevent soil salinization by saline effluent. The problem is that there are no cheap industrial solutions to reduce the level of salts effluent. Therefore, it is necessary to examine feeding regimes and mineral requirements to reduce the sodium concentrations in secretions at the individual cow level. According to the literature sodium requirements for high producing dairy cows fed under heat conditions is about 0.22% of the feed. Thus, the administration of NaCl salt in the TMR and chlorine is 0.29% of the dry matter TMR consumed, which is a minimal level essential for satisfying all milk and sodium requirements of the dairy cow. Potassium is found in high concentrations in the feeds, therefore it is not necessary to add it to the diet. About 85-90% of the sodium and chlorine supplied to the cow is absorbed into the body through the digestive system and only 10-15% of it is excreted in the urine. The excess sodium, chlorine and potassium found in the body are excreted in the urine. Lack of this basic level of Na and Cl might cause loss of appetite, decreased feed consumption, weight loss, reduced blood tonus and flux, restlessness and nerve disorders. In extreme cases of Na deficiency, weakness, fluid loss, and cardiac arrhythmias can occur.

In accordance with the NRC (2001) recommendations, Cows in the Israeli dairy farms consume about 0.46% NaCl salt, about 0.18% sodium, supplemented to the TMR to meet the needs of the cow's and the secretion of sodium in the milk. Nutritionists in Israel do not consider sodium concentrations in the individual feeds of their TMR because of the low sodium concentrations in most feeds. At the same time, throughout Israel, the feeds fed to dairy cows contain about 0.7-1% of baking soda (NaHCO_3) as buffer, which provides about 0.18-0.27% extra sodium in the diet. Thus, the amount of sodium available to the Israeli cow is twice than the animal's requirements. Therefore, it is necessary to examine whether the sodium concentration in the diet can be reduced either by reducing the baking soda buffer content or by reducing the NaCl added to the TMR. In the case of salt, the chlorine ion can be supplied in appropriate quantities by replacing part of the calcium supplied to the TMR as CaCO_3 by CaCl_2 .

The results of this study show that reducing sodium concentration in a TMR fed to cows either by reducing the baking soda buffer or by reducing NaCl added, significantly reduced sodium excretion by the cow in feces and urine without reducing milk and components production. Consequently, the level of sodium that reaches cowshed effluents were dramatically reduced to improve the dairy barn environment and reduce excess salts in irrigation with recycled water.