ZINC IN FORAGES FOR DAIRY COWS

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ABSTRACT

Major changes have occurred in the dairy industry in the past decade. Firstly, the profitability of pasture-based systems, relative to "total mixed ration" type systems, has come to the fore. This has resulted in a significant expansion of dairy farming in the higher-rainfall eastern and southern areas of the country, and more than 64 percent of total milk production is now pasture-based. Secondly, economy of size has become a major factor, with the number of cows on farms increasing markedly and scores of smaller producers closing down. Whereas in the past herds of more than 500 cows were the exception, currently many herds comprise 500 to 1000 cows.

In recent years, research has demonstrated the crucial importance of optimal Zn supplies for the health and sustained productivity of high-producing dairy cows. For this reason, Zn uptake by major dairy forage crops such as the ryegrasses, kikuyu and maize is of particular concern to dairy nutritionists.

In their virgin state, the majority of agricultural soils in South Africa are deficient in plant-available Zn supplies. Fast-growing fodder crops such as silage maize are particularly sensitive to Zn deficiency, and frequently display marked Zn-deficiency symptoms where soil supplies of this nutrient are limiting. Correction of deficiencies using Zn-containing fertilizers such as bulk blends may be ineffective because of the large size and poor solubility of the zinc oxide granules used. There is a need for the fertilizer industry in South Africa to follow the example of overseas countries by introducing Zn sources that are more plant-available.

Pasture species such as ryegrasses, kikuyu and white clover appear to be somewhat less sensitive to Zn deficiencies than the cereal crops. In a number of field trials on highly-weathered soils in KwaZulu-Natal, only annual ryegrass was found to respond to Zn applications. In field lime x Zn trials, soil test Zn values decreased significantly with increasing pH, while large P applications (as double superphosphate) had no effect on soil Zn tests, or on plant uptake of Zn. The AMBIC (ammonium bicarbonate / EDTA / ammonium fluoride at pH 8.0) extract has been found to provide a reliable indication of plant-available Zn supplies in the soil.

Zinc plays a number of important functions in the metabolism of dairy cows. Particularly noteworthy is its role in strengthening the immune system and in the regeneration of keratin, a fibrous protein which lines the teat canals and is a constituent of hooves. Researchers have found that optimizing the Zn supply to dairy cows serves to counteract udder infections and to reduce lameness, both of which are major problems in many dairy herds. Increasing fodder Zn concentrations through fertilization is an effective method of supplying Zn to cows. Significantly, organic forms of Zn have been found to be less antagonistic to Cu absorption in the gut than inorganic forms (such as zinc sulphate). Information extracted from the Cedara Plant Analysis Database reveals that median Zn concentrations in ryegrass, kikuyu and maize samples from farms in the eastern half of South Africa are two to three-fold higher than critical levels for plant growth; clearly, therefore, through repeated applications of Zn-containing fertilizers, the majority of dairy farmers are inadvertently exploiting the benefits of elevated fodder Zn levels.