MINERALS IN FORAGES

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INTRODUCTION

Minerals are required for virtually all vital processes in the body. A deficiency of each essential macro or micromineral in animals results in abnormalities that can only be corrected by supplementation of the deficient mineral. In addition to requirements for mammalian functions, ruminants fed forages are dependent on an adequate supply of a number of minerals to optimize rumen microbial activity and, thus, forage utilization.

In the past 25 years, considerable progress has been made in understanding the function of minerals, particularly trace minerals. However, in ruminants fed forage diets, our knowledge of requirements and factors affecting availability of minerals is extremely limited for a number of minerals. With the exceptions of copper and magnesium, little is known regarding dietary factors that affect mineral requirements of ruminants.

Forages provide an important source of minerals for ruminants. In some instances, forages may provide adequate quantities of all essential minerals required by ruminants. However, in other situations, forages are deficient in one or more mineral and supplementation is required for optimal animal performance and(or) health. Severe mineral deficiencies still occur to some degree, but marginal mineral deficiencies are probably much more widespread. Marginal mineral imbalances or deficiencies may result in no clinical deficiency signs and only small decreases in metabolic functions, but the overall impact on growth, reproduction, or health of ruminants can be substantial.

DISTRIBUTION AND CHEMICAL FORMS OF MINERALS IN FORAGES

Bioavailability of forage minerals to ruminants may be affected by the distribution of minerals within the forage and the chemical form of the elements present. Information regarding the chemical form of minerals in forages is sparse for many minerals. Table 1 shows the major forms of minerals believed to exist in plants. Information in Table 1 was compiled from reviews by Butler and Jones (1973) and Hazell (1985). The form and distribution of minerals in plant tissue also was reviewed by Little (1982).