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CORRELATION BETWEEN THE USE OF MINERAL SALT AND ELECTROLYTE IMPACTS IN THE EQUINE DIET

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INTRODUCTION

Equine farming is directly related to qualified nutritional management, as aligned nutrition is essential to guarantee the maintenance of the vital functions of these animals.

In this context, the diet is mainly composed of a source of fiber (roughage), a source of macronutrients (concentrate) and a source of minerals, which are divided into macro elements such as calcium (Ca), potassium (K), sodium (Na), chlorine (Cl), phosphorus (P), magnesium (Mg) and sulfur (S) and micro elements such as iron (Fe), zinc (Zn), cobalt (Co), iodine (I), copper (Cu), fluorine (F), manganese (Mn), molybdenum (Mo), selenium (Se), chromium (Cr), tin (Sn), nickel (Ni), vanadium (Vi) and silicon (Si), for example[1].

It is noteworthy that the macro elements are directly related to the animal's structure, that is, muscles, bones, etc., and their main means of loss are the animal's motor activities. Micro elements, in turn, are directly related to the metabolic functions of animals[1].

In this sense, mineral deficiencies are among the factors that most contribute to the low productivity of the national equine herd, when kept under pasture conditions. Tropical soils and forages normally have a deficiency or excess of minerals, providing nutritional imbalance to animals, which is a factor responsible for the low work production and performance of horses, as well as reproductive problems.[8].

Therefore, the supply of mineral salt at will in the food formulation of these animals stands out as a key point, since the physiological electrolyte demand is achieved due to this supply.[2].

MATERIAL

To carry out this summary, scientific articles, literature reviews, course completion works (TCC) and books published from 1999 to 2023 were used as research sources, in the databases Scopus, Web of Science, SciELO and Google Scholar. The material selection criteria were their relevance, quality and timeliness, as well as their suitability for the objective and approach of this study. Based on the analysis of the selected materials, we prepared a synthesis of the main theoretical and practical aspects related to the topic.

THEME SUMMARY

The mineral composition in the equine organism is notable, since the sites of electrolytic action are found, for example, at the vascular and bone level. In this context, this electrolyte dynamic occurs mainly through the dissociation and junction of these electrolytes in the blood fluid and through bone mineral deposition followed by joint osteoclastic and osteoblastic activity, respectively. Therefore, due to this requirement, the physiological mineral supply in the equine diet directly impacts the homeostatic dynamics of the animal.[3].

Regarding electrolyte impacts, it is inferred that mineral deficiency is an impasse in the equine diet. In this context, if the physiological demand is not met, vascular disorders such as volumetric drop and delay in the development of red blood cells due to iron and copper deficiency, respectively, are evident in the equine clinic.[3,5].

Regarding reflexes linked to bone activity, skeletal development disorders stand out, a fact that compromises the dynamics of the locomotor system in a homogeneous and synchronized way. [4].

Still from this perspective, due to mineral deficiency, other reflexes are notable. Therefore, mainly due to poor calcium intake (associated with potassium overload), pathologies such as fibrous osteodystrophy can develop. Therefore, its pathophysiology

is summarized in the removal of the macro element from the adjacent bone tissue and its deposition in the facial tissue, a fact that promotes chronic tissue degradation of the removed extension.[6] (Fig. 1)[9].

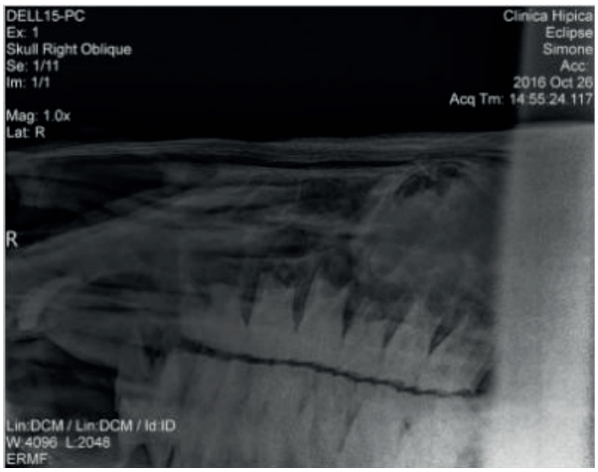

Figure 1: Facial radiography linked to loss of alveolar and maxillary bone density due to fibrous osteodiatrophy in an adult horse. Lateral oblique projection. (Source: Equinovet, 2020).

It is important to highlight that the electrolyte balance in horses depends on the ratio of 2 to 1, related to calcium and potassium, respectively. Therefore, offering mineral supplements to these animals indirectly helps in regulating their metabolism, mainly in relation to reaching the aforementioned proportion.[6].

Furthermore, it is essential to highlight that in addition to the mineral maintenance requirement, future electrolyte losses, due to intense sweating, for example, also have great relevance to this demand.[7].

Nutrients	Growing horses	Adult horses, pregnant and lactating mares [1]	Working horses and athlete[1]
Calcium (g)	4,2	4,4	3,0
Phosphor (g)	2,4	3,5	1,8
Magnesium (g)	1,3	0,75	0,9
Sodium (g)	1,6	1,4	3,0
Potassium (g)	2,1	3,5	4,5
Sulfur (g)	1,5	1,5	1,5
Ca:P Ratio	1,1:1 a 2:1	1,1:1 a 3:1	1,1:1 a 3:1
Iron (mg)	70,0	70,0	70,0
Copper (mg)	10,0	10,0	10,0
Zinc (mg)	45,0	45,0	45,0
Manganese (mg)	40,0	40,0	40,0
Cobalt (mg)	0,1	0,1	0,2
Selenium (mg)	0,2	0,2	0,2
Iodine (mg)	0,1	0,1	0,2

[1] Compiled and adjusted from the NRC (1989) e INRA (1990)

Table 1: Mineral subdivision linked to electrolyte requirements in different age groups and stages in horses [3]

FINAL CONSIDERATIONS

Therefore, given the above, mineral imbalance due to electrolyte deficits and/or overload, helps in the development of metabolic disorders1. From this perspective, the mineral supply, through the implementation of mineral salt in the equine diet, is extremely important for the qualified development of these animals.

Furthermore, mineral supply is fundamental not only in relation to the physiological demand for maintenance, but also linked to the electrolyte replacement of minerals lost in physiological processes, such as sweating, for example.

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