

Role and Effect of Selenium and Vitamin E Supplementation in Dairy Ruminant Livestock Production

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Milk and dairy products are part of a healthy Mediterranean diet which, besides cow milk, also consists of sheep and goat milk as raw material. For promoting the dairy products there is a clear need to know the quality and technological aspects of milk produced. There are many qualitative differences between goat and sheep in milk composition and these are strongly different from cow milk. As a consequence, these milks have unique properties and specific technological destinations. Since the diet is the fastest way to modify the milk production and quality in animals, even if the relations between the feeding and milk composition are quite complex, previous and present studies hypothesize that modifying dietary vitamins and trace elements supplementation should increase the quality of dairy production.

Trace elements, along with vitamins, are extremely essential nutrients which operate in every animal body in the same manner. They are critical components of almost every aspect of how a body grows, develops, functions and reproduces. In recent years, there has been an ongoing review of the level of supplementation of vitamins and trace elements for dairy cows on the basis of their production and genetic line [1]. Nowadays, significant advances have been made in understanding the effects of vitamins and trace element supplements, and in particular selenium (Se) and vitamin E on the milk production from dairy species. The Se is an essential element required in small amounts by animals and humans for the basic functions of life. It has several structural and enzymatic roles, of which, the best known are as an antioxidant through the enzyme glutathione peroxidase and as a catalyst for the production of active thyroid hormone [2]. Glutathione peroxidase is believed to be an important enzyme in human body contrasting cellular oxidative damage. The enzyme, in combination with vitamin E, catalyses the reduction of hydrogen peroxide and a range of lipid hydroperoxides to protect biological membranes from oxidative degradation. Vitamin E is a significant lipid soluble membrane antioxidant that increases the efficiency of neutrophils by preserving them from oxidative damage following intracellular killing of ingested bacteria [3]. The best understanding of the function of vitamin E on mastitis and milk yield is that it works as a lipid soluble cellular antioxidant, free radical scavenger and defends against lipid peroxidation. It has been stated that the administration of pharmacological doses of vitamin E might decrease plasma oxidative stress indices and diverse pro-inflammatory cytokines [4]. The antioxidant capacity of vitamin E, supplied alone or together with Se, has been reported in some studies of dairy species on milk yield and quality [5,6].

To date, research on the effects of Se and vitamin E supplementation on production and quality of caprine milk are limited if compared with the considerable works conducted on bovine and ovine milk [2]. There are studies on cow concerning the supplementation of vitamin E and Se in no-deficient animals, albeit the results are questionable. Some Authors observed an increase in the milk production of cows supplemented with vitamin E during a short term, the reason being fewer udder infections [7]. Further, others indicated that the usually observed beneficial effect of vitamin E and Se is indirect, by means of an improvement of the immune system and a reduction of infections in the mammary gland [8]. As reported in a recent review, the effects of vitamin E and Se supplementation on milk yield and components

are not unified due to the optimum dose, route, and timing of vitamin E administration in lactation dairy cows [9]. A recent research of dairy goats showed a favorable influence of the administration of vitamin E and Se on milk yield and fat and protein contents, which was attributed to a better utilization of nutrients in diet [6]. Previous studies indicated that, after vitamin E and Se supplementation, the milk production was significantly increased and somatic cell count decreased [10,11] in cow as well as in sheep [12]. Conversely, was also observed that dietary Se and vitamin E concentration had no effect on cow milk yields and components [13].

Due to the important Se and vitamin E functions in organisms, the choice of increasing Se reception in both humans and animals are studied. Apart from direct Se and vitamin E supplementation, interest has also been devoted to the option of increasing the nutrition value of food by increasing the concentrations of trace elements. However, questions still remain on the benefit, optimum dosage, route and timing of Se and vitamin E administration in dairy species.

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