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Neutrophil bactericidal impairment in dairy cows around parturition: supportive effects of dietary organic selenium

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Neutrophils are the most pivotal part of the first line of immune defense against invading pathogens in high yielding dairy cows. Their quality and quantity in the body is important. Several pathogens invoke diverse mechanisms to evade the immune defense and facilitate their invasion. The impairment of cellular immunity of dairy cows is one of the fundamental reasons why early lactation-related infections occur. An increased susceptibility of dairy cows to infections has been attributed to a low status of selenium (Se). Selenium, a versatile and essential micronutrient that not only acts as an antioxidant but also participates in redox reactions, is believed to enhance neutrophil functions. This study was, therefore, aimed to determine whether supplemental dietary organic Se (Sel-Plex®) affects on neutrophil function and quality immediately after calving. We fed Holstein cows supplemental Sel-Plex® during the peri-partum period; at 30 d before anticipated calving, the cows were fed diets that provided no Se supplementation (n = 5) or 0.5 mg/kg DM/d (n = 5) of supplemental Sel-Plex®. Treatments continued until approximately 30 d after parturition. The flow cytometry technique was used to measure phagocytosis, respiratory burst, apoptosis and necrosis of neutrophils. Neutrophil phagocytosis did not significantly differ between the two groups. However, organic Se significantly increased the respiratory burst of neutrophils when compared to the control group. Neutrophil apoptosis was decreased remarkably when cows were fed organic Se, but the rate of necrosis only tended to be lower in the treated group. In conclusion, the improved neutrophil functional capacity in peri-partum dairy cows with supplemental dietary Sel-Plex® could lead to a better protection of early lactating dairy cows from infections. These effects could consequently improve the immune and health status of their respective calves as well. Though still remains inconclusive, the application of Sel-Plex® would be further examined in dairy cows for prevention and treatment of especially clinical mastitis.

Keywords: neutrophil, respiratory burst, flow cytometry, organic selenium, dairy cow

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Pharmacokinetics Parameters Comparison of a Closantel Tablet Produced in Iran and a Closantel Suspension as a Reference Product in Sheep

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In the present study, the pharmacokinetics parameters of closantel tablet produced by Tolid- Darouhai-Dami-E- Iran was compared with the closantel suspension produced by Janssen Company as a reference. A single oral dose of test closantel, 10 mg/kg, was administrated to a group of 10 sheep and the same was done by the reference drug to another group. Blood samples were collected before administration and 4,8,12,24,48,96,246,432 and 624 hours after administration from both groups of sheep. The serum levels of closantel were extracted by liquid phase and C18 cartridges, and high-performance liquid chromatographic procedures with UV detector was used. To measure the concentrations, the areas under the peaks were used and pharmacokinetics parameters obtained using non-compartmental analysis. Although al the paramiters of the test samples were a bit higher than the reference samples but statistical investigations by t-test showed non significant differences ($P \leq 0.05$) in the area under the concentration-time curve, peak serum concentration, time to peak serum concentration, consist of elimination and elimination half-life between test and reference drug. The results showed that the closantel tablet pharmacokinetics parameters produced by Tolid- Daru-Dami-E- Iran Company, was similar to the reference product. further investigations seem to be needed for evaluation the bioavailability of veterinary drugs produced in Iran.

Keywords: closantel, sheep, pharmacokinetics parameters, HPLC