

## The effect of high levels of zinc supplementation on concentration of leptin, insulin and some blood parameters of Holstein cow during transition period

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### Abstract

Zinc, insulin, and leptin play an important role in energy metabolism. Zn increases appetite. Increased serum Zn concentration increases leptin and insulin concentrations. However, leptin and insulin decrease appetite. Regarding the importance of serum levels of metabolites associated with food intake, this study aimed to evaluate the effect of high levels of zinc supplementation and its effect on leptin and insulin and metabolic-related metabolites such as NEFA and BHBA. The diet of Holstein cows as a control group contains 75 and 150 mg/kg and second treatment 110 and 250 mg/kg Zn before and after parturition respectively. Diets were isocaloric and isonitrogenous and the only difference was the proportion of Zn. Blood samples collected via tail vein of 24 cows per treatment on days -25, -5, 7, and 21 relatives to parturition. Serum concentrations of Zn, leptin, insulin, glucose, NEFA, and BHBA were measured. High level of Zn in the diet increased the serum concentration of Zn, leptin, and insulin before and after parturition but the concentration of glucose was constant. NEFA concentration affected by Zn level and increased but BHBA decreased on the 7th day of postpartum. In all probability, increase in serum Zn concentration caused to increase leptin and insulin level, and increased insulin signaling pathway enhances 'ob' gene expression. Due to insulin resistance in the transition period and increased leptin level because of increase in Zn concentration in blood, serum concentration of NEFA increased. Reduction in BHBA concentration was due to increase in insulin concentration and a greater consumption of triglycerides in the liver. In conclusion, increased level of Zn in diet caused to increase its serum concentration and consequently increased leptin, insulin and NEFA concentration in serum before and after parturition.

**Key words:** Zinc, Leptin, Insulin, Transition period, Holstein cow

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