Effect of 1,25-dihydroxycholecalciferol-glycosides given as a rumen bolus on blood pharmacokinetics in dry dairy cows

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Abstract: A single oral application of the biologically active metabolite of vitamin D3 (1,25-dihydroxycholecalciferol ($1,25(OH)_2D3$) as glycosides form from Solanum glaucophyllum) prior to calving represents a novel approach to hypocalcaemia prevention at the onset of lactation. The aim of this study was to determine the response time-window of blood parameters following the application of $1,25(OH)_2D3$ containing boluses with different concentrations and physical properties. Thirty dry and pregnant dairy cows were allocated, per bloc of 5, to the following 6 treatments: one bolus containing uncoated tablets with either 191, 310 and 501 µg $1,25(OH)_2D3$, one bolus containing coated tablets with either 310 and 501 µg $1,25(OH)_2D3$, and 2 boluses containing uncoated tablets with 501 µg $1,25(OH)_2D3$. Nineteen blood samples were collected at regular intervals between 96 hours before and 336 hours after bolus application. Serum samples from each treatment were pooled and determined for the $1,25(OH)_2D3$. Data were analysed using a mixed model procedure for repeated measurements. Preliminary results showed increased ($P<0.001$) serum $1,25(OH)_2D3$ concentrations between 24 and 72 hours after bolus application. Serum Ca concentration was increased ($P<0.001$) between 12 and 264 hours after bolus application and the maximal value was obtained 72 hours after bolus application with a mean increase of 22%. In conclusion, the time-window of the serum Ca response after oral application of $1,25(OH)_2D3$ in pregnant dry cows was determined, further investigations are now necessary to evaluate the treatment effect on Ca status during the peripartum period.

How are my results improving/affecting future agriculture?

Milk fever is an important issue for the dairy industry. The present results suggest that a single oral bolus containing 1,25$(OH)_2$D3 may be used for prevention of hypocalcaemia in the periparturient period.