

Pharmacokinetics of 1,25-dihydroxycholecalciferolglycosides given in a rumen bolus and the effect on serum Ca concentrations in pregnant dry dairy cows

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Introduction

A novel approach in the prevention of puerperal hypocalcaemia in dairy cows is the single oral application prior to calving of glycosides extracted from *Solanum glaucophyllum* and containing 1,25-dihydroxycholecalciferol (1,25(OH)₂D₃), the biologically active metabolite of vitamin D₃.

Aim: Determine the response time frame of blood parameters, mainly calcium, following the application of 1,25-(OH)₂D₃ containing boli differing in concentration and physical properties.

Material and Method

- Treatments: **200u** µg 1,25-(OH)₂D₃ (u = uncoated)
300u µg 1,25-(OH)₂D₃
300c µg 1,25-(OH)₂D₃ (c = coated)
500u µg 1,25-(OH)₂D₃
500c µg 1,25-(OH)₂D₃
2*500u µg 1,25-(OH)₂D₃

- Method: all treatments applied as a single oral bolus
- Animals: 30 pregnant dry Holstein cows allocated into 5 groups according to parity and days after successful insemination
- Blood samples at certain intervals from bolus application (n = 19/cow) for 14 consecutive days
- Blood serum analyses: Ca in all 19 samples and 1,25-(OH)₂D₃ in 7 samples until 216h

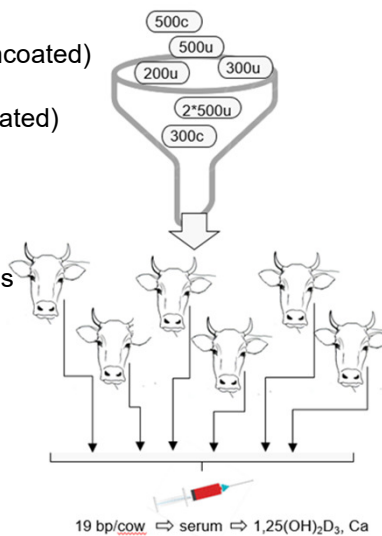


Image 1: two different boli containing different amounts of 1,25-(OH)₂D₃



Image 2: one of five groups with six dry dairy cows

Results

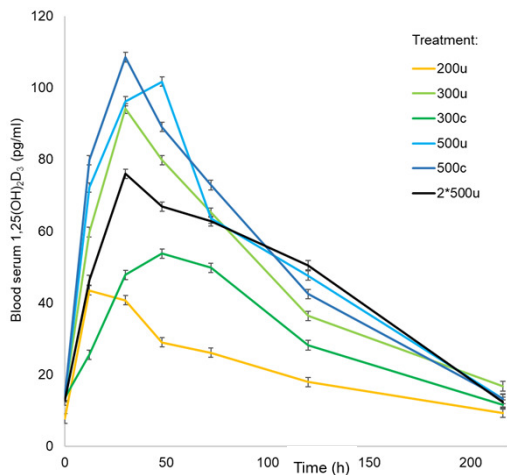


Figure 1: 1,25-(OH)₂D₃ concentration in blood serum after bolus application

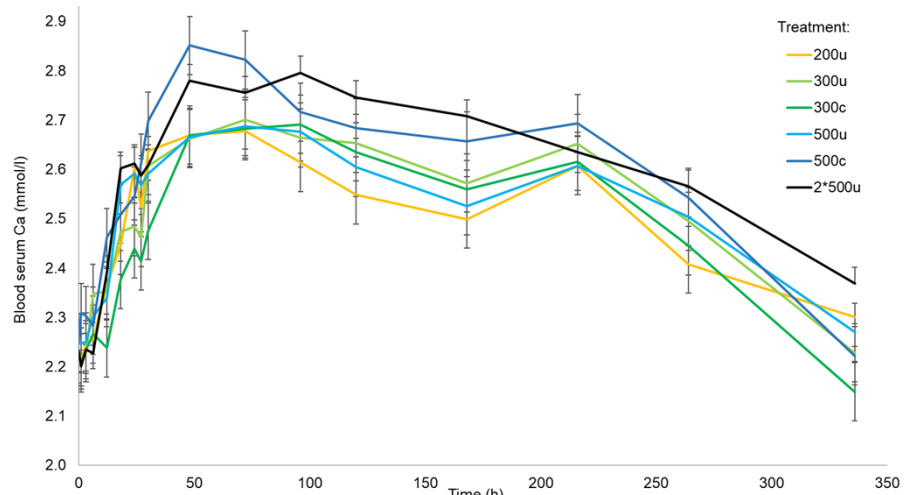


Figure 2: Calcium concentration in blood serum after bolus application

- Time effect: raised serum 1,25-(OH)₂D₃ levels between 12-120h (P<0.001); peak at 30h with an increase of 480%
 raised serum Ca levels between 12-264h (P<0.001); peak at 72h with an increase of 22%
- Treatment effect: serum 1,25-(OH)₂D₃ levels higher with 300u, 500u, 500c and 2*500u than with 200u (P<0.001), serum Ca levels higher with 500c and 2*500u than with 200u, 300u and 300c (P<0.001)

Conclusion

- The optimal bolus application time-frame to obtain an increased blood serum Ca for at least 2 days after calving is 9 to 0.5 days before calving
- A single application of boli 500u and 500c resulted in highest responses on serum Ca levels
- The application of 2*500u did not lead to an excessive response on serum Ca levels

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