NOVEL POUR-ON TECHNOLOGY IN CATTLE

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GENERAL ABSTRACT

To date the majority of commercially available pharmaceutical pour-on formulations have been used for the control of internal and external parasites in cattle. The objective of this research was to design pour-ons with novel applications, using cattle as the model species.

Serum and liver α-tocopherol concentrations following topical application of α-tocopherol were investigated using 30 mixed age non-lactating Friesian cows. Cows were randomly allocated to 1 of 5 groups and were treated on day 0 with 1 of 4 formulations or left untreated. Formulations were designed using combinations of permeation enhancers that have been shown to promote the absorption of lipophilic substances. All formulations contained equal quantities of α-tocopherol and were applied at a dose of 0.95 g dl-α-tocopherol acetate / 50 kg live weight. Concentrations of α-tocopherol in serum and liver were monitored for 20 days following treatment. Serum α-tocopherol concentration was significantly increased in 1 group on day 2 and in 2 groups on day 6. It is concluded that α-tocopherol can pass through the skin into the systemic circulation when applied topically.

Thirty Hereford yearlings were used to investigate the concentration of vitamin B_{12} in plasma and liver following the topical administration of 2 vitamin B_{12} pour-ons. Animals in the 2 treatment groups received a dose of 6mg cyanocobalamin per 50 kg live weight of their allotted pour-on on the first and seventh days of the trial. Control animals received no treatment. Blood samples were collected from all cows on days 0, 2, 7, 9, and 14 for assay of plasma vitamin B_{12} concentration. Liver samples were collected from 5 of the cows in each group on days 0, 7, and 14 and were also analysed for vitamin B_{12} concentration.

Differences between treatment groups in plasma and liver vitamin B_{12} concentrations were not significant. It was concluded that cyanocobalamin did not cross the skin in high enough concentrations to elicit a statistically significant blood or liver response.

The dermal permeability of 3 selenium pour-on formulations was examined over 24 hours using an *in-vitro* calf skin permeation model. Pour-on formulation A, made up of selenium dioxide and butyl dioxitol, had a statistically greater rate of absorption than formulations B (made up of sodium selenate, butyl dioxitol and water) or C (made up of selenium sesquistrato, butyl dioxitol and water) for the entire 24 hour period. The absorption rates of formulations B and C were not statistically different. The results obtained from the *in-vitro* experiment were then compared with those from an *in-vivo* experiment using the same pour-on formulations, each applied to 6 cattle. Comparison of the 2 data sets indicates that the *in-vitro* model was useful in ranking the formulations in terms of *in-vivo* permeability.

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