Prevention of Milk Fever by Oral Administration of Encapsulated Ca-Salts

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Introduction

It has earlier been shown that oral administration of calcium ($CaCl_2$) in a water solution 2-3 times in close relation to calving will have a prophylactic effect on parturient paresis (milk fever). Because of the risk of aspiration the method is, however, unsuitable for use in practice. By mixing the salt with hydroxycellulose into a gel ("Paregel") it was possible to decrease the risk of aspiration, and a good prophylactic effect was achieved after administration of the $CaCl_2$-gel daily from 3-7 days before, to 2 days after calving (5). The incidence of milk fever among cows which had contracted the disease at their last calving was reduced by 50 per cent when a modification of this method was performed, implying administration of the gel 3-4 times during the period 24 hours before, to 24 hours after calving (4).

The "Paregel" method is commonly used by the farmers in Sweden. It has, however, certain disadvantages. The most evident is the unpleasant taste of the salt, which brings struggling efforts from the cow at administration. Besides, there are still certain risks of aspiration.

The aim of the present investigation was to test the prophylactic effect on milk fever of orally administered Ca-salts, which were compressed and encapsulated according to a patented method which totally masks the sharp taste of the salts.

Materials and Methods

Only cows which according to the Swedish central disease registration system had been treated for milk fever at their last calving were included.

Trial I.

The cows in this trial were from herds in which "Paregel" regularly was used for prevention of milk fever to animals which at their earlier calving(s) had contracted the disease. Since it was not considered ethically justifiable to use a placebo group in such herds, every second cow was given Ca-capsules (group 1A), whereas every second cow got "Paregel" as should have been done if no trial had been executed (group 1B). Altogether 135 cows from 114 herds were included. Except for the administration of Ca-capsules or "Paregel" no preventive measures against milk fever were used.

Trial II.

The cows were from herds in which the farmers did not intend to give prophylactic medicine at all to their milk fever-prone cows. Every second cow got Ca-capsules (group IIA) and every second placebo capsules containing sand instead of Ca-salts (group IIB). Altogether 107 cows from 84 herds were included. This trial was a double blind test.

Administration of treatments.

One dose of "Paregel" was recommended to be given 4 times in a conventional way; that is about 24 hours before calving, in close relation to calving, 10-14 hours after calving and about 24 hours after calving. The same time schedule was recommended for administration of the capsules - once at each time. The actual time for the administration of "Paregel" and capsules were recorded by the farmer. The capsules were given with a balling gun.

Each dose of "Paregel" contained 54 g of Ca as $CaCl_2$ in a hydroxycellulose gel. Each Ca-capsule contained 46 g of Ca as $CaCl_2$ in a hydroxycellulose gel. Each Ca-capsule contained 46 g of Ca as $CaCl_2$ and $CaSO_4$ surrounded by a mixture of fatty acids. This capsule has been shown to be dispensed in the rumen fluid within 10-20 minutes.

The time for first treatment of cows with milk fever was recorded by the veterinarian, who also was asked to take blood samples before treatment for Ca-analyses.

Only the cows in the groups IA, IB and IIA which got the first dose earlier than 2 hours after calving were included in the statistical evaluation. Cows in these groups which did not get milk fever were included only if they received at least 3 out of 4 recommended doses at the correct times. Cows in group IIB were excluded if they got milk fever earlier than 2 hours after calving.

A cow was considered to have milk fever if she exhibited paretic symptoms within a week after calving.

The statistical evaluation was made by chi-square analysis.

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Results

Of the 242 cows selected for the experiment, 49 were excluded (15 in group IA, 17 in IB, 9 in IIA and 8 in IIB); 46 of them because of not fulfilling the above-mentioned criteria and 3 because of suffering primarly from other diseases than milk fever (1 coliform toxemia in each of group IB and IIB, and 1 extensive muscular injury in group IA).

Among the 193 cows which were included in the final evaluaton, 63 got milk fever. Hypocalcemia (<2 mmol Ca/l serum) was confirmed in 43 cases. In the remaining 20 cases the clinical picture clearly indicated a classical milk fever. In 17 of these 20 cases no blood samples were taken, whereas in 3 the serum-Ca levels were close to 2.00 mmol/l (2.01; 2.03 and 2.16, respectively).

No clinical side effects of any of the treatments were reported.

The incidence of milk fever in the different groups are in Table 1. The placebo cows (group IIB) had significantly higher incidence than the cows in the other groups. No significant difference existed between "Paregel"-treated cows and those who got the Ca-capsules in trial I. The disease incidence was higher in group IA than in Group IIA, both of which got Ca-capsules. However, the difference was not significant.

There were no significant differences between treatment groups in regard to age or milk production the year before the experiment ($\bar{x} = 7.7$ years and 7.265 kg 4% FCM, respectively, in the total material). The breed distribution was equal within each trial but somewhat different between them (Table 1).

Table 1 Incidence of milk fever and breed distribution in cows given Ca-capsules (IA and IIA), Paregel (IB) and placebo (IIB). Different letters indicate significant differences ($p < 0.05$). SRB = Swedish Red and White Cattle. SLB = Swedish Holsteins.

Group	Number of cows	Incidence of milk fever, per cent	Breed distribution, per cent		
			SRB	SLB	Others
I A	52	28.8[a,b]	65.4	26.9	7.7
I B	51	35.3[a]	62.7	25.5	11.8
II A	48	14.6[b]	52.1	43.8	4.1
II B	42	54.8[c]	54.8	40.5	4.7

Discussion

The prophylactic effect of administration of the Ca-capsules was evident. The disease incidence in the placebo group was of the same magnitude as reported earlier in similar studies (2,3,4). On the other hand the incidence was somewhat higher in the "Paregel" treated group than earlier reported (4). This discrepancy can probably be explained by differences on the herd level, as can the great difference in disease incidence between the two groups that got Ca-capsules (IA and IIA). Since there were no significant differences regarding age or productivity between groups, and since the different breed distribution hardly can explain more than a negligible part of the differences in disease incidence, the explanation must be found in other herd factors. The farmers in trial I had earlier used "Paregel" as prophylactic treatment more or less as a routine. Some cows in that trial had, therefore, probably got milk fever at their last calving despite being "Paregel"-treated. Thus, the cows in trial I might be supposed to be more disposed to milk fever than the cows in trial II and also, in some cases, more refractive to prophylactic treatment with Ca-salts. If this is correct, the incidence of milk fever should have been even higher in a hypothetic placebo group from trial I than that found in group IIB. Therefore, the conclusion from earlier experiments (4) that prophylactic treatment with "Paregel" eliminates every second case of milk fever in cows which had the disease at their last calving, may not be contradictory to the results from the present investigation.

Comparable amounts of Ca were given at the same times with the Ca-capsules and with "Paregel". Even if the difference was not significant, the disease incidence in trial I was somewhat lower in the capsule-treated cows than in the "Paregel"-treated cows (28.8 and 35.3 per cent, respectively). Besides, the capsule-treated cows in trial II had a lower disease incidence than "Paregel"-treated cows in an earlier comparable experiment (14.6 and 22.6 per cent, respectively; ref. 4). This may be interpreted as an advantage from the slow release effect of Ca caused by the gradual dissolution of the capsula within the rumen. Anyhow, it seems evident that the prophylactic effect of the Ca-capsules was at least as good as that of "Paregel". The most evident advantages with the capsule-method are that the risk of aspiration is eliminated and the sharp taste of the Ca salts is masked.

Summary

The prophylactic effect on milk fever by repeated oral administration of encapsulated Ca-salts in close correlation to calving was tested in comparison with both a commercially available Ca-gel ("Paregel") and placebo capsules. Two trials involved a total of 193 cows which had contracted milk fever at their last calving. In trial I 28.8 per cent of the cows treated with Ca-capsules got milk fever compared to 35.6 percent of the "Paregel"-treated cows. In trial II 14.6 percent of the cows in the capsule-treated group got the disease compared to 54.8 per cent in the placebo group.

References

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