

Effect of D-Calcium Pantothenate Administered Between 20 Days Antepartum and 70 Days Postpartum on the Postpartum Adrenocortical and Ovarian Functions in Dairy Cows

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Introduction

D-Calcium pantothenate (Calpan) is known to improve reproductive performance in dairy cattle. However, the mechanism of action on the reproductive system is not well understood. Aim of the present study is to clarify the effects of 10% Calpan powder on the recovery of adrenocortical and ovarian functions and uterine involution in postpartum cows.

Materials and Methods

Fifty-six Holstein Friesian cows in late pregnancy were divided at random into 2 groups, a Calpan group and a control group, with 28 cows per group. Cows in the Calpan group were given per os 20 g of Pancal powder containing 2 g of D-calcium pantothenate by daily mixing with concentrated feed from 20 days before the due date until 70 days after parturition. Adrenocortical function was examined by Adrenocorticotropic hormone (ACTH) challenge test in all cows on the 1st, 8th, and 15th days postpartum. The cows were injected intramuscularly with 0.25 mg synthetic ACTH. Blood was sampled at 15 minutes and immediately before the ACTH challenge, and at 30 and 60 minutes after ACTH administration. Plasma cortisol concentrations were measured by an enzyme immunoassay.

Milk samples were collected 3 times weekly from day 7 until day 60 postpartum. Progesterone concentrations in milk were determined by an enzyme immunoassay. The day of first ovulation was estimated by postpartum milk progesterone profile. Uterine involution was monitored by palpation of the genital tract per rectum once a week from day 7 to day 60 postpartum.

Results and Conclusion

The plasma cortisol concentrations before and 30 minutes after ACTH administration on the 1st day after calving were 15.8 ± 10.7 standard deviation (SD) ng/ml and 47.2 ± 19.2 ng/ml in the Calpan group and 15.3 ± 9.2 ng/ml and 58.2 ± 20.2 ng/ml in the control group, respectively. Basal and ACTH-stimulated plasma cortisol concentrations on the 8th day postpartum were 5.7 ± 3.4 ng/ml and 38.7 ± 15.9 ng/ml in the Calpan group and 5.2 ± 5.7 ng/ml and 50.8 ± 36.4 ng/ml in the control group, respectively. On the 15th day after parturition pre- and post-ACTH plasma cortisol values in the Calpan-treated group and control group were 4.3 ± 3.0 ng/ml and 41.8 ± 19.3 ng/ml, and 4.2 ± 2.6 ng/ml and 45.8 ± 26.6 ng/ml, respectively.

Enhanced adrenocortical response to ACTH in control cows 1 and 8 days after calving, and comparatively lower plasma cortisol concentrations after ACTH challenge in the Calpan group after calving, indicate that the postpartum recovery of adrenocortical function was more prominent in the treated group than controls.

The percentage of animals having the first ovulation within 20 days after calving, based on milk progesterone profile, was 64% in the Calpan group, which was significantly higher than 36% in the control group, ($P < 0.05$). Time required for completion of the postpartum uterine involution was 35 ± 12 days in the Calpan group and 39 ± 13 days in the control group. It may be concluded that the oral administration of Calpan powder is effective in facilitating recovery of adrenocortical function and resumption of ovarian cyclicity in cows after parturition. The treatment also seems to have positive effects on uterine involution in postpartum cows.