

The Effect of Ascorbic Acid on Hematology, Serum Biochemistry and Health of Dairy Calves

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Introduction

Ascorbic acid is synthesized by most domestic animals and is not an essential dietary requirement in any of these species. However, calves do not synthesize endogenous ascorbic acid until approximately 3 weeks of age, making them dependent on dietary ascorbic acid during this period. However, cow's milk is a poor source of ascorbic acid and the amount of ascorbic acid in milk is not adequate to fulfill the requirements of 1-week old calves. It was shown that calves that did receive tablets of ascorbic acid were 2.8 times more likely to develop diarrhea. The experiment was conducted to evaluate the effect of oral administration of ascorbic acid on hematology parameters, biochemical metabolites, disease occurrence and serum immunoglobulin concentrations of newborn dairy calves.

Materials and Methods

Ninety calves were used in the present study. All of the calves were housed in individual cement boxes from birth to 45 days of age. They were fed adequate amount of colostrum (2.5 kg of the dam's colostrum was bottle-fed to the calf and continued every 12 h for 48 h) after birth and herd milk was used for feeding twice daily (2 kg every 12 h) until the calf was 10 days old. After that time, concentrate and high quality alfalfa and water were allowed ad libitum. The animals were divided into two groups (test, n=46; control, n=44). The two groups of calves were homogeneous for parity of dams, sex and month of birth. The test group was supplemented with ascorbic acid as follow: 3 g/day for first week, 2 g daily for second week and 1 g daily for third week. Sampling was conducted from the jugular vein at day 1, weeks 2, 3 after birth and at end of first and second month of age. The blood was added to EDTA-containing tubes for hematological measurements and plain tubes for serum extraction. The PCV, RBC, WBC, he-

moglobin and fibrinogen levels and differential count were determined in EDTA-containing blood and total protein, glucose, cholesterol, albumin and alkaline phosphatase enzyme were determined in serum. Gamma globulin and beta globulin concentrations of serum samples of first day and the end of first and second month were measured by electrophoresis on cellulose acetate papers. Weight, length and height were measured at first day, and at the end of the first and second month of age.

Results

The weight gain of female calves of the test group at the end of the second month of age was significantly higher than the weight gain of female calves of control group. The length of male calves of the control group was significantly higher than length of male calves of the test group at the end of second month. There was no significant difference in gamma and beta globulins, and the ratio of albumin to globulins at the first day and at the end of first month of age between the test and control groups. The incidence of diarrhea and pneumonia did not differ significantly between two groups. The results showed that in the test group lymphocytes in second week, monocytes and fibrinogen level at the end of first month were significantly less and albumin concentrations in second month of age were significantly higher than the controls.

Significance

Our results showed that ascorbic acid supplementation at first 3 weeks of age has no significant effects on calf health and hematological and biochemical parameters. It is highly likely that significant results would be obtained in colostrum-deprived calves or in stressful conditions.