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P.G. Reddy

J.L. Morrill

H.C. Minocha

See next page for additional authors

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Effect of serum from Vitamin E-supplemented calves on Infectious Bovine Rhinotracheitis Virus replication

Abstract

Blood serum from Holstein calves supplemented with vitamin E at levels of 2800 mg orally or 1400 mg by injection at weekly intervals inhibited replication of Infectious Bovine Rhinotracheitis Virus in tissue cultures. Supplementing typical calf diets with vitamin E may increase protection against pathogens, at a time when they are more vulnerable to problems such as respiratory diseases.; Dairy Day, 1985, Kansas State University, Manhattan, KS, 1985;

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Authors

P.G. Reddy, J.L. Morrill, H.C. Minocha, and R.A. Frey

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EFFECT OF SERUM FROM VITAMIN E-SUPPLEMENTED

S

CALVES ON INFECTIOUS BOVINE RHINOTRACHEITIS

U

VIRUS REPLICATION

P. G. Reddy, J. L. Morrill, H. C. Minocha¹, and R. A. Frey²

Summary

Blood serum from Holstein calves supplemented with vitamin E at levels of 2800 mg orally or 1400 mg by injection at weekly intervals inhibited replication of Infectious Bovine Rhinotracheitis Virus in tissue cultures. Supplementing typical calf diets with vitamin E may increase protection against pathogens, at a time when they are more vulnerable to problems such as respiratory diseases.

Introduction

Under present, intensive-management conditions, calves on typical diets may not receive adequate amount of alpha-tocopherol, which is the biologically active form of vitamin E. Recent studies have indicated that supplemental vitamin E can enhance the immuno-competency of several species of animals, including calves.

Respiratory diseases continue to be a serious problem affecting dairy calves. Infectious Bovine Rhinotracheitis Virus (IBR) is one of the principal causes of these respiratory diseases. The present experiment was conducted to study the effect of supplemental vitamin E on serum factors of calves, which in turn may influence the replication of IBR virus in tissue cultures.

Procedures

Twenty-eight Holstein heifer calves at 24 hrs of age were allotted to one of four treatments: 1) 0 mg 2) 1400 mg 3) 2800 mg of dl- α -tocopherol acetate fed orally at weekly intervals or 4) 1400 mg of dl- α -tocopherol given by intramuscular injection at weekly intervals.

Calves were fed colostrum for the first 3 days and then milk at 8% of birth weight until weaning at 6 wk. Water and a complete high fiber calf starter were always available to all calves. Calves were housed in fiberglass hutches until the end of the experiment at 12 wks of age.

Serum samples, collected at alternate weeks starting from 1-2 days of age, were used to study the replication of IBR virus in tissue cultures.

¹Dept. of Laboratory Medicine.

²Dept. of Anatomy and Physiology.

Results and Discussion

Virus titers as influenced by serum from experimental calves at different weeks are shown in Table 1.

Serum samples obtained after 6 wks of age from calves given supplemental vitamin E showed a trend toward inhibiting IBR virus replication and at week 12 the inhibition was significant with serum from calves given the high level of oral supplementation and injected calves, as compared to that from unsupplemented calves. Viral titers were similar for all groups of calves until week 6, probably because passive transfer of antibodies through colostrum was similar in all calves and/or because vitamin E did not alter other serum factors until week 6.

Results of the present experiment suggest that during the transition period between the loss of maternal antibody and the production of antibodies by the calf, supplemental vitamin E alters serum factors in such a way that there may be less morbidity caused by a pathogen.

Table 1. Effect of serum from experimental calves on IBR virus titers (Log TCID₅₀ × 10³).

| Treatments | Weeks | | | | | | |
|--------------|-------|-----|-----|-----|-----|-----|------------------|
| | 0 | 2 | 4 | 6 | 8 | 10 | 12 |
| 0 mg | 0.2 | 0.4 | 0.6 | 1.2 | 1.6 | 2.6 | 3.6 ^a |
| 1400 mg ORAL | 0.4 | 0.3 | 0.5 | 0.9 | 1.7 | 0.9 | 2.1 ^a |
| 2800 mg | 0.2 | 0.6 | 0.3 | 0.5 | 0.6 | 1.3 | 1.7 ^b |
| 1400 mg INJ. | 0.3 | 0.3 | 0.5 | 0.9 | 0.9 | 1.4 | 1.4 ^b |

^{ab} Means within a week with different superscripts differ (P<.05).