

COMPARISON OF TWO METHODS FOR
ADMINISTERING COLOSTRUM TO NEWBORN CALVES

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Story in Brief

Over a period of three years, a comparison was made of the immune globulin (IgG) concentration in the serum of calves to which colostrum was administered by nipple bottle or an esophageal tube. Pooled batches of colostrum were given by the designated method soon after birth and at 12 and 24 hr thereafter. Blood samples to measure serum IgG concentration were taken before initial feeding and at 4-hour intervals thereafter through 32 hr. The rate of increase in serum IgG concentration following feeding was essentially the same for calves given colostrum by the two methods and the level attained by 20 hr after initial feeding was similar for the two groups and adequate for high calf survival.

Introduction

The importance of consumption of colostrum by calves soon after birth has been well established. Immunity to infectious agents is known to be conferred from the cow to her calf by means of the colostrum. This protection occurs in a two-fold manner. Immune globulins in the colostrum either destroy or render some infectious agents inactive within the intestine, and immune globulins absorbed into the blood during the first day of life provide an effective defense against systemic infection.

Some calves do not nurse their dams when they are left together after birth and some will not consume colostrum from a nipple bottle. Thus, the practice of administering colostrum to calves that are weak, or for some reason reluctant to nurse, by means of an esophageal tube has been advocated.

The majority of the colostrum administered by esophageal tube would be expected to be deposited in the rumen, rather than the abomasum as in the case of consumption by nursing. The purpose of this research was to determine the extent to which absorption of immune globulins might be affected by mode of administration.

Materials and Methods

Over a period of three years, a total of 51 newborn dairy calves (25 Holsteins; 16 Ayrshires; 6 Guernseys) in the OSU dairy herd were obtained at birth before nursing their dams. Calves were allotted to groups (blocks) based on breed and the batch of colostrum to be used. Colostrum

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from the first two milkings of the cows calving at a given time was pooled to make a batch of colostrum. There were 4, 5 and 4 batches of colostrum available for use during the first, second and third years, respectively.

Treatments consisted of administering colostrum within an hour after birth and at 12 and 24 hr afterwards either by nipple bottle or esophageal feeder (Diamond Laboratories, Des Moines, IA). Colostrum was given by the appropriate method at the rate of 10 percent of metabolic size per feeding. Blood samples were taken from the jugular vein of each calf before the initial feeding and at 4, 8, 12, 16, 20, 24, 28 and 32 hr thereafter for analysis of immune globulin (IgG) concentration in the serum by radial immunodiffusion.

Results and Discussion

The method by which colostrum was administered to newborn calves had no effect on the rate of absorption of immune globulin (fraction IgG) during the first day of life (Figure 1). The concentration of IgG in blood serum increased rapidly following colostrum consumption in calves given colostrum either by nipple bottle or esophageal tube.

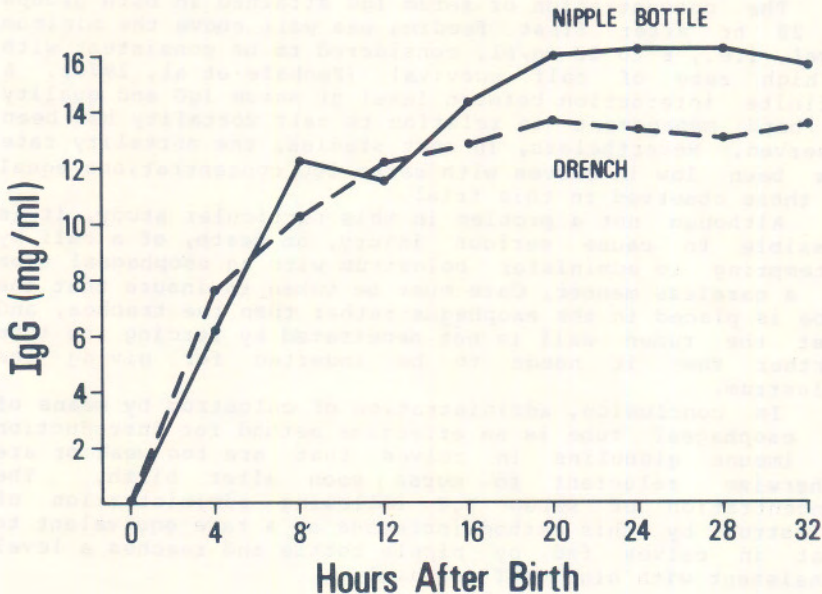


Figure 1. Concentration of IgG in blood serum of calves following administration of colostrum by different methods.

This is important because newborn calves are especially vulnerable to infection during early life and because absorption needs to occur prior to closure of the intestinal epithelium to intact proteins. Evidently, the liquid portion of the colostrum containing IgG passed quickly from the rumen of calves given colostrum by means of drenching to the small intestine where absorption occurred. An adequate concentration of immune globulins in the intestine also has been observed to be especially important in providing resistance to certain infectious agents, especially viruses.

Although the average concentration of IgG was slightly higher in the blood of calves given colostrum by nipple bottle than in the other group of calves from 20 through 32 hr after first feeding, this difference was not considered to be of practical importance. In fact, there was very little difference between the groups in serum IgG concentration during this interval in the third year of the trial.

The concentration of IgG in the blood attained by 20 hr after first feeding was typical of that found in calves consuming colostrum having a high concentration of immune globulins. There was variation in average IgG concentration from one year to another; however, this was likely just a reflection of different concentrations of IgG in the colostrum. A definite positive relationship between the amount of IgG consumed by calves and subsequent serum concentration of IgG was observed in earlier work.

The concentration of serum IgG attained in both groups by 20 hr after first feeding was well above the minimum level, i.e., 8 to 10 mg/ml, considered to be consistent with a high rate of calf survival (Penhale et al, 1970). A definite interaction between level of serum IgG and quality of herd management in relation to calf mortality has been observed. Nevertheless, in most studies, the mortality rate has been low in calves with serum IgG concentrations equal to those observed in this trial.

Although not a problem in this particular study, it is possible to cause serious injury, or death, of a calf by attempting to administer colostrum with an esophageal tube in a careless manner. Care must be taken to insure that the tube is placed in the esophagus rather than the trachea, and that the rumen wall is not penetrated by forcing the tube farther than it needs to be inserted for giving the colostrum.

In conclusion, administration of colostrum by means of an esophageal tube is an effective method for introduction of immune globulins in calves that are too weak or are otherwise reluctant to nurse soon after birth. The concentration of serum IgG following administration of colostrum by this method increases at a rate equivalent to that in calves fed by nipple bottle and reaches a level consistent with high calf survival.

Literature Cited:

Penhale et al, 1970. Brit Vet. J. 236:30.