New concepts in colostrum feeding for dairy calves

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Abstract

Successful transfer of passive immunity (TPI) is essential for calf health and well-being. The current first-milking colostrum feeding guidelines for newborn dairy calves were established more than two-decades ago. The implementation of these guidelines has led to a marked improvement in calf health. Since the guidelines were established a great deal of additional knowledge has accumulated about bovine colostrum and the benefits of transition milk feeding to newborn calves particularly for the first 5-7 days of life. In addition, the Brix refractometer has been validated as a useful on-farm tool to estimate colostrum quality. One of the limitations of the current colostrum feeding guidelines is that colostrum with higher Brix scores is fed to calves the same way than colostrum with a lower Brix score (≥22%). This prevents calf care providers and managers from taking advantage of colostrum that contains more than 50 g/L of IgG. Identifying colostrum with an IgG concentration of ≥75 g/L enables the establishment of colostrum feeding programs that feed a smaller volume of first-milking colostrum but still delivers a sufficient mass of immunoglobulin to have successful TPI. It will also increase the farm supply of colostrum.

Keywords

Brix Refractometer, Transfer of Passive Immunity, Strategic Colostrum Feeding

1. Introduction

Newborn calves are born agammaglobulinemic and are dependent onsuccessful transfer of passive immunity (TPI) for optimal health and well-being(1, 2).Current best practices recommendthat a 80-95 lb.calf be fed at least 200 grams (4 quarts) of bovine colostral immunoglobulin G(IgG)within 2 hours of birth followed by an additional feeding of 100 grams of IgG (2 quarts),10-12 hours after birth (3). Dairy operationstesting first-milking colostrum with a Brix refractometer often use a single threshold of ≥ 22% to ensure that the concentration of IgG is at least 50 g/L (3, 5, 6). The 50 g/Lthreshold has become the gold standard for first-milking colostrum (2-4).Very few calveswill voluntarily drink4 quarts of colostrum for the first feeding which necessitates the use of an esophageal tube feeder for delivery(5, 6).A recent study established four different %Brix thresholds for 25, 50, 75 and 100 g/L of bovine colostral IgG. The thresholds were 19%, 22%, 25% and 30%, respectively (7). This information can be used to develop strategic colostrum feeding programs in which calf care providers can feed a smaller volume of colostrum that contains a sufficient mass of immunoglobulin to have successful TPI.

Discussion

Some dairy calf-care providers and veterinarians are unhappy with current first-milking colostrum feeding guidelines. On-farm observations by calf-care providers of calves with abdominal distension causing discomfort and/or colic when coupled with the fact that newborn calves often refuse to nurse for an extended period of time, post-colostrum feeding, has caused concerns for calf health and well-being. A previous study has shown

that first-milking-colostrum feedings can form a large curd that may be retained in the abomasum for more than 8 hours after ingestion(8).It has also been reported that the volume of colostrum fed to newborn calves had less influence on the efficiency of immunoglobulin absorption than did the colostral IgG concentration itself (9). Calves fed 1 liter of high-quality colostrum had more efficient immunoglobulin absorption than calves fed the same mass of immunoglobulin in 2 liters of colostrum (21). Based on these observations, calf-care providers and veterinarians should consider feeding newborn calvesa smaller volumeof first milking colostrum (2-3 liters) that contains at least 75-100 g/L of IgG. The first feeding should be followed by a second feeding of 1.0-1.5 liters of colostrum that contains at least 75-100g/L of IgG. Colostrum that contains less than 75-100 g/L of bovine IgG can be fortified with a high-quality colostrum replacement product(10,11). The concept is to feed a smaller but more concentrated volume of colostrum to newborn calves that delivers an adequate mass of immunoglobulins to have successful TPI. Feeding asmaller colostrum volume will reduce the number of newborn calves that refuse tonurse for at least 18-36 hours post-colostrumfeeding. Smaller colostrum volumes mayalso reduce the incidence of aspiration pneumonia, improve forestomach as well as abomasal health and perhaps eliminate colic that is caused by over-distension of the abomasum with the formation of a large colostrum curd (20).Lastly,it will increase the farm supply of colostrum that can be used to fortify newborn calf liquid feed diets for the first 2-14 days of life. Daily feeding of small volumes of first-milking colostrum for the first 2-14days of a calf's life has been shown to improve gut health, increase average daily gain, and reduce the incidence of neonatal calf diarrhea and pneumonia (12,13).

5.Conclusion

Models that use digital Brix refractometrycannot accurately predict first-milking colostrum IgG concentration (sockett). Knowing this, calf-care providers and veterinarians should be aware that they should only use%Brix predetermined cutoffs when managing colostrum feeding programs.First-milking colostrum with higher%Brix scores (≥25%)when used to feedsmallervolumes of colostrum to newborn calves is an intriguing concept that warrants further study.

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