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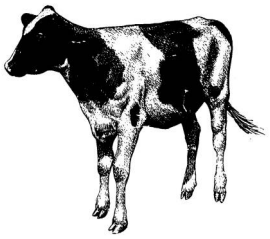

MAXIMIZING COLOSTRUM QUALITY THROUGH PROPER COLLECTION AND STORAGE

INTRODUCTION

Colostrum management is a critical determinant of calf health, growth, and perhaps future lactation potential; however, the recent report published by the National Animal Health Monitoring System (NAHMS, 2007) as well as other publications (Godden, 2008) have identified opportunities for improvement related to colostrum management and passive transfer of immunity to newborn calves. The objective of this Frontline is to highlight key collection and storage practices to maximize colostrum quality in order to optimize the impact of colostrum on calf health.

METHOD OF COLOSTRUM DELIVERY

The recent data published by NAHMS (2007) identified areas that are opportunities for improvement in the US dairy industry. One of the most striking statistics presented is that 35.4% of heifer calves born and alive at 48 hours receive their colostrum by nursing the dam. This practice is problematic because of delayed suckling as well as inadequate voluntarily consumption, both of which can contribute to inadequate immunoglobulin absorption and intake (Godden, 2008). In addition, suckling the dam is a route by which the calf can ingest pathogens that may cause enteric disease. Calves should be removed from the dam and placed in a clean and dry environment as soon as possible after calving. Colostrum should be administered by bottle or esophageal feeder as soon as possible. The NAHMS (2007) data indicates that 52% of calves are fed colostrum by bucket or bottle, whereas 12.4% of calves receive colostrum via esophageal feeder. Either method is acceptable for delivering colostrum to the calf.

COLOSTRUM COLLECTION

Harvesting colostrum as soon as possible is a key practice to maximize colostrum quality. Immunoglobulin (Ig) concentration steadily declines as hours pass from calving to 1st milking. Moore et al. (2005) collected colostrum from individual quarters at 2, 6, 10, and 14 hours post-calving (one quarter/time-point), and reported that colostral IgG concentration was 113, 94, 82, and 76 g/L, respectively. Colostral IgG concentration for each time-point, expressed as a percentage of the control (2-hour sample), is illustrated in **Figure 1**. Colostrum was of acceptable quality at all time-points in this study, but the rapid decline in colostral IgG concentration underscores the importance of harvesting colostrum as soon as possible after calving.

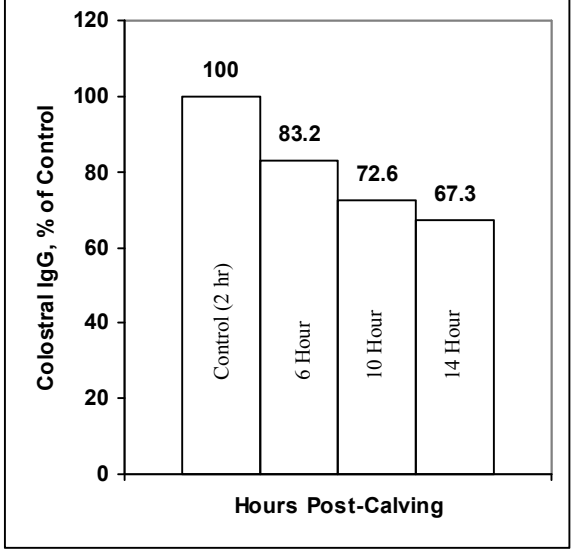

Figure 1. Effect of delayed colostrum collection relative to calving on colostral IgG concentration (% of control) in Holstein cows (Moore et al., 2005).

A notable observation from this study is that the amount of colostrum collected from each quarter remained constant over time, suggesting that the decline in IgG concentration was possibly due to IgG reabsorption rather than dilution with newly synthesized milk. However, the decline in colostrum quality would likely be greater if the cow was leaking colostrum and/or replacing colostrum with transitional milk of lower IgG concentration. Likewise, producers should refrain from administering oxytocin at first milking because the milk ejection reflex may lead to reduced IgG concentration due to dilution.

COLOSTRUM CLEANLINESS

Bacterial contamination of colostrum can be detrimental to the calf through inoculation with pathogenic bacteria or interfering with intestinal IgG absorption, thereby increasing the risk for disease transmission or failure of passive transfer (Godden, 2008). Heat treatment has been studied recently as a technique to reduce colostral bacteria counts. Heat treatment of colostrum (140°F for 60 minutes) decreased bacterial load without altering colostral IgG concentration (Johnson et al., 2007); in turn, calves fed heat-treated colostrum had greater serum IgG and total protein at 24 hr post-feeding.

Independent of whether heat treatment of colostrum is implemented on-farm, sanitation during colostrum collection and proper colostrum storage are critical procedures for minimizing bacterial contamination. A study conducted on a commercial dairy (Stewart et al., 2005) found that although total bacteria counts in colostrum sampled directly from each quarter was very low (geometric mean, total plate count = 27.5 CFU/mL), whereas the milking unit and collection bucket introduced significant bacterial contamination of colostrum (geometric mean, total plate count = 97,274 CFU/mL). Therefore, proper udder preparation as well as adequate sanitation and maintenance of milking equipment and storage containers are very important practices on which to focus to minimize bacterial contamination of colostrum.

COLOSTRUM QUANTITY

Average dry period length has been trending downward based on NAHMS data of 2002 and 2007. A field study that involved 334 cows on 3 commercial dairies with dry periods of either 60 or 40 days reported that colostrum quality was not affected by dry period length (Grusenmeyer et al., 2006). Colostrum yield was affected; a 40-day dry period reduced colostrum quantity compared with a 60-day dry period (15.0 vs. 19.6 lbs, respectively). Dairies that implement ~40-day dry periods should be aware that colostrum quantity may be decreased.

COLOSTRUM STORAGE

The primary goals for storing quality colostrum are to store it in volumes (2 to 4 quarts) that allow for rapid cooling/freezing as well as rapid thawing and warming. The shelf life of unpasteurized colostrum is a maximum of 3 days in the refrigerator or up to 1 year in the freezer. Heat treatment extends shelf life of refrigerated colostrum to up to 6 days (Godden, 2008). Be certain to avoid overheating (> 140°F) when preparing stored colostrum to be fed in order to avoid destroying IgG's.

TAKE-HOME MESSAGES

- Harvesting colostrum as soon as possible after calving is a key step toward maximizing immunoglobulin concentration
- The cow's teat skin, the milking unit, collection bucket, and storage containers can lead to unacceptable levels of bacteria in colostrum.
- Udder preparation and equipment sanitation practices are important considerations for minimizing colostrum bacteria counts.
- Bacterial contamination of colostrum has been shown to interfere with IgG absorption.
- Shortening the dry period from 60 to 40 days does not affect colostrum quality but decreases colostrum yield.
- Colostrum should be stored in 2 to 4 quart quantities to allow for rapid cooling/freezing and warming/ thawing.
- Calves should not be allowed to nurse the cow in order to limit disease exposure and ensure adequate colostrum intake.

LITERATURE CITED

Godden, S. 2008. Colostrum management for dairy calves. Vet. Clin. Food. Anim. 24:19.

Grusenmeyer, D. et al. 2006. Shortening the dry period from 60 to 40 days does not affect colostrum quality but decreases colostrum yield by Holstein cows. J. Dairy Sci. 89(Suppl. 1):336.

Johnson, J. L. et al. 2007. Effects of feeding heat-treated colostrum on passive transfer of immune and nutritional parameters in neonatal calves. J. Dairy Sci. 90:5189.

Moore, M. et al. 2005. Effect of delayed colostrum collection on colostral IgG concentration in dairy cows. J. Am. Vet. Med. Assoc. 226:1375.

National Animal Health Monitoring System. 2007. Part I: Reference of Dairy Cattle Health and Management Practices in the United States. Accessible at: http://nahms.aphis.usda.gov/dairy/dairy07/Dairy2007_PartI.pdf

Stewart, S. et al. 2005. Preventing bacterial contamination and proliferation during the harvest, storage, and feeding of fresh bovine colostrum. J. Dairy Sci. 88:2571.