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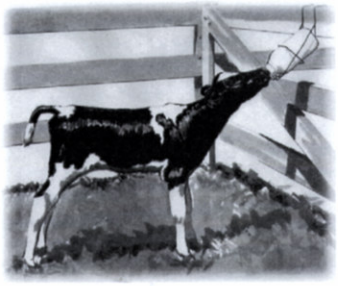

# Maximizing Colostrum Quality: Collection and Storage

## Introduction

Colostrum management is a critical determinant of calf health, growth, and perhaps future lactation potential; however, a 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 article 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 of opportunity for improvement in calf management 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, which can contribute to inadequate immunoglobulin intake and absorption (Godden, 2008). In addition, suckling of 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 and colostrum should be administered by bottle or esophageal feeder as soon as possible after calving. 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, although proper use of an esophageal feeder is essential.

## Colostrum Collection

Harvesting colostrum as soon as possible after calving 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 per interval), and reported that colostral IgG concentration was 113, 94, 82, and 76 g/L, respectively. Colostral IgG concentration for each interval, expressed as a percentage of the control (2-hour sample), is illustrated in **Figure 1**. Colostrum was of acceptable quality at all intervals in this study, but the rapid decline in colostral IgG concentration underscores the importance of harvesting colostrum as soon as possible after calving.

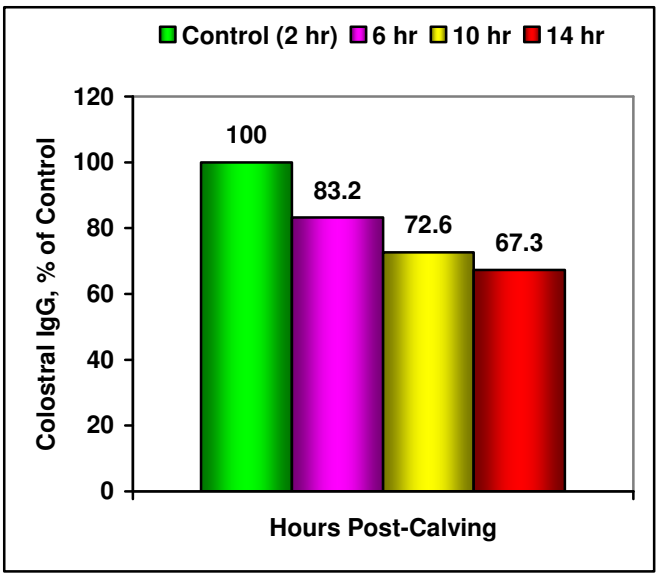


**Figure 1.** Effect of delayed colostrum collection relative to calving on colostral IgG concentration (% of control) in Holstein cows (Moore et al., 2005).

A notable observation from this study is that the quantity of colostrum collected from each quarter remained constant over time. However, the decline in colostrum quality would have likely been 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 Ig 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 (60°C 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, proper colostrum collection procedures require attention. 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), the milking unit and collection bucket introduced significant bacterial contamination (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 (Grusenmeyer et al., 2006) 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, but colostrum quantity was reduced (19.6 vs. 15.0 lbs, respectively). Dairies that implement ~40-day dry periods should be aware that colostrum quantity may be decreased.

## Colostrum Storage

The primary goal for storing quality colostrum is to cool it rapidly. Store colostrum 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 Ig's.

## Take-Home Messages

- Calves should not be allowed to nurse the cow in order to limit disease exposure and ensure adequate colostrum intake.
- Harvesting colostrum as soon as possible after calving is a key step toward maximizing immunoglobulin concentration.
- Bacterial contamination of colostrum has been shown to interfere with IgG absorption.
- The cow's teat skin, 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.
- 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.

## References

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