

## Maine Dairy Calf Chronicles: Colostrum Quality and Management

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### Introduction

This bulletin highlights how focusing on colostrum harvest, post-harvest management, and measuring colostrum quality will help set your calves up for success. We recommend making storing high-quality colostrum on your farm a priority in case dams can't produce colostrum. A recent study reported that 2.65% of the Jersey cows enrolled could not produce any colostrum. Calf success must result from enforcing best management practices, vaccination, biosecurity, and cleaning protocols. If you still have concerns about your colostrum management, consider blood testing your calves for antibody levels.

Colostrum is the first milk produced by a dam right after birth and contains antibodies and nutrients that support the newborn calf's immune system and help with growth development. Calves are born with naïve immune systems because maternal antibodies, like immunoglobulin G (IgG), are unable to cross the placenta. Therefore, dairy calves must get

enough high-quality colostrum as soon as possible after birth to obtain passive immunity and reduce the risk of morbidity and mortality in the preweaning period. Ideally, colostrum should be fed within 2 hours, but colostrum absolutely must be fed within 24 hours. This is critical because the gut wall of the calf starts maturing, resulting in decreased absorption of larger proteins. From an economic perspective, calves that are fed enough colostrum are more profitable. Previous research indicated that Brown Swiss calves fed four quarts of colostrum had lower veterinary costs, grew 29% faster, and produced 11% more milk during the first lactation, and 17% more during the second lactation compared with calves that were only fed two quarts of colostrum.

**Antibodies** – Proteins that can recognize and eliminate pathogens. Immunoglobulin G (IgG) is the most common antibody, and it protects against bacterial and viral infections. Measured in g/L or mg/mL.

## Colostrum harvest

Sanitize your colostrum harvesting equipment and use stainless steel colostrum harvesting equipment to reduce the chances of bacterial growth. Some service providers have ATP meters which can help measure the organic matter present on the surface of colostrum feeding bottles and harvesting buckets. Implementing an acid-based wash will help remove milk solids residue and ensure clean feeding equipment between calves.

**Table 1: Color-code interpretation for colostrometer.**

| Color-Code | Interpretation      |
|------------|---------------------|
| Green      | >50 g/L of IgG      |
| Yellow     | 20 to 50 g/L of IgG |
| Red        | <20 g/L of IgG      |



Figure 1. Colostrometer

## Measuring colostrum quality

Feeding low-quality colostrum is ineffective; therefore, it is recommended to test colostrum from all cows and store any colostrum from dams that have higher quality. Colostrum quality is not impacted by lactation number, and high-quality colostrum from primiparous cows should be fed.

If your colostrum must be discarded, if cows are not producing enough colostrum, or if you have disease transmission concerns (such as Johnes) you should use a lacteal-based colostrum replacer.

Below are two methods that can help assess colostrum quality on farms.

**Colostrometer** – a hydrometer with a color-coded scale that measures specific gravity calibrated in milligrams per milliliter (mg/mL) of IgG. We also measure in g/L. To use, place the colostrometer into a cylinder containing room temperature colostrum (72° F). If the colostrum is not the correct temperature, you may over or underestimate the IgG concentration.

**Brix refractometer** – measures the amount of sucrose in colostrum as well as total solids. The brix values are expressed in percentages, and a value of 22% corresponds to 50 g/L of IgG which indicates excellent quality colostrum. Colostrum that tests with values below 18% should be discarded. To use a refractor follow the instructions below:

1. Calibrate it and put 2–3 drops of colostrum on the glass surface.
2. Lower the cover over the sample so the milk spreads across the entire surface without any air bubbles or dry spots.
3. Wait 15 seconds before taking a reading –the sample adjusts to room temperature.
4. Hold the refractometer up to natural light while looking down at the eyepiece. Avoid fluorescent light sources.
5. As you look down at the eyepiece (shown in the photo), you will see a circular field with graduations down the center. The scale should

read zero where the light and dark areas meet. If not, adjust using the calibration screw.

6. Read the brix value of the colostrum sample.



Figure 2. Using a refractometer.

## Colostrum post-harvest and storage

- Consider a pre-chilling method such as an ice bath before storing the colostrum in a refrigerator or freezer to quickly cool down the colostrum after harvest.
- Colostrum can be stored in a clean refrigerator (at least 40°F to slow down bacterial growth) and can be refrigerated for 4-6 days.
- Freeze colostrum immediately after harvesting or pre-chilling if you are not feeding it soon. Use clean bottles or bags and label the colostrum containers with cow ID, date of collection, and state the IgG level or some indicator of colostrum quality. Storage temperatures should be -5°F. Colostrum can be frozen for up to a year with minimal loss in quality (best if used by 6 months).
- Effectively storing colostrum is important to maintain lower levels of bacteria in milk fed to calves. Spot checking colostrum bacterial counts may help pinpoint areas of opportunity.

## Feeding

- Optimal colostrum feeding temperature is 102°F (range 100 to 106°F). Consider where you are warming and where/when you are feeding so the temperature doesn't drop drastically.
- Feed fresh colostrum within one-half hour after it is harvested.
- Frozen colostrum should be thawed slowly, and the temperature of the water should not reach above 140° F, as the absorption of antibodies by the calf will be compromised. Use a thermometer or a controlled warming unit such as a water bath. If using a water bath, set temperature between 120 to 125 degrees F for at least 30 minutes.
- Refrigerated colostrum should be slowly heated at 105 to 110°F for at least 15 minutes.

## Summary

The “3 Qs” of colostrum are critical for newborn calves’ health and their success as a future lactating dairy cow. **Quantity**– calves need to drink at least 10% of their body weight in colostrum to receive essential nutrients and passive immunity. **Quality**– colostrum should contain at least 50 g/L of IgG to obtain passive immunity. **Quickly**– colostrum should be fed right away (ideally within 2 hours) to ensure absorption of IgG.

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