KEY CONCEPTS FOR COLOSTRUM COLLECTION, STORAGE AND PREPARATION

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This fact sheet is the second in a series of four explaining proper colostrum management techniques. The objective of this fact sheet is to discuss how cow management, collection protocols, and colostrum storage affect colostrum. This publication also includes techniques on evaluating colostrum quality and preparing colostrum for feeding.

COLOSTRUM COLLECTION

Calves are born with limited exposure to bacteria in the environment. Protocols to prevent consumption of contaminated colostrum are essential for maximum antibody absorption. Emphasis on cow management and proper colostrum collection, storage and feeding techniques can minimize unwanted bacterial growth on equipment and in the calf's gastrointestinal tract. Proper planning of colostrum management in the beginning can heavily influence the success of calves in the future.

COW MANAGEMENT AFFECTS COLOSTRUM

- Management Prior to Calving
    - Vaccinate cows when entering the dry period to maximize the effect of colostrum.
        - Vaccine-generated antibodies against viruses/bacteria will be transferred to calf via colostrum.
        - Killed vaccines that include IBR, BVD, PI^3 and BRSV are recommended and safe for pregnant cows.
        - Core vaccines to include for future replacements: clostridials (blackleg), IBR/BVD/PI^3/BRSV and leptospirosis.
        - Modified live vaccines are not recommended for pregnant heifers or cows who have not been exposed to a modified live vaccine previously.
    - Consult with your veterinarian on a vaccination protocol that best suits the needs of your farm.
    - Adequate nutrition of the dam provides nutritional benefits to the calf.
        - The University of Minnesota found when feeding increased energy and protein 21 days prior to calving, there was an increase in quality of colostrum.
        - According to the University of Florida and the New York State College of Veterinary Medicine, maintaining a body condition score 3.0-3.5 resulted in higher quality colostrum.

- Management at calving
    - After at least two calvings, clean out the calving pen to limit pathogen exposure between dams and calves.
    - Maternity areas should be well-bedded and well-ventilated to prevent health issues.

PROPER COLLECTION TECHNIQUES

- Prepare teat ends of fresh cows by stripping and pre-dipping prior to collecting colostrum.
    - In cows treated with teat sealant, strip the teat until sealant has been cleared prior to collection.
- Ensure milking equipment is clean prior to collection.
- Have a collection bucket (Photo 1) designated for colostrum collection only.
    - Rinse milk bucket with lukewarm water prior to use (less than 120 degrees F).
    - Collect colostrum.
    - After use of collection equipment, rinse equipment again with lukewarm water, followed by wash out with hot water and soap (120 degrees F; similar to parlor cleaning technique).

Photo 1. Stainless Steel Bucket Milker Assembly used to collect colostrum.

QUALITY CHECKING COLOSTRUM

- Check colostrum with a hydrometer/colostrometer or digital refractometer.
    - Colostrum should be roughly 60-72 degrees F for accurate quality determination.
    - Colostrum temperature lower than 60-72 degrees F = overestimating IgG concentrations.
    - Colostrum temperature higher than 72 degrees F = underestimating IgG concentrations.
- Do not leave colostrum at room temperature after quality check.
    - According to the University of Minnesota, bacteria counts can double if colostrum is left at room temperature for more than 30 minutes.
- Test bacterial counts of colostrum quarterly at the University of Tennessee DHIA lab in addition to testing colostrum quality (Jeff Mitchell: jmitchel@utk.edu).
    - Bacteria counts should be less than or equal to 100,000 CFU per mL.

- Hydrometers/colostrometers (Photo 2) measure specific gravity of colostrum and use a coloring scale to indicate Ig antibodies (mg/mL).
    - Pour colostrum into a 250 mL flask (Photo 2) prior to placing hydrometer into the flask.
    - Place hydrometer into colostrum and observe color quality:
        - Green quality: Greater than 50 mg/mL of Ig's.
        - Yellow quality: 20 to 50 mg/mL of Ig's.
        - Red quality: Less than 20 mg/mL of Ig's.
    - Green colostrum should be first choice if plentiful.
        - Feed the best quality colostrum to replacement heifers or seed stock bull calves.
    - Use yellow as secondary source to green-quality colostrum or to bull calves.
    - Never use red quality for colostrum meals.
- Hydrometer colostrometers are relatively economical (around $30).
- Digital Colostrum Refractometer (Photo 2).
    - Calibrate refractometer with distilled water prior to each use.
        - Calibration instructions will come with each refractometer kit.
    - Add a few drops of colostrum on the prism of the refractometer and close the lid.
        - A Brix percent reading will follow.
    - A Brix value of 22 percent is similar to 50 mg/mL, and colostrum above this percentage is the best quality colostrum for newborn calves.
    - Digital refractometers are moderately expensive ($112 or more).

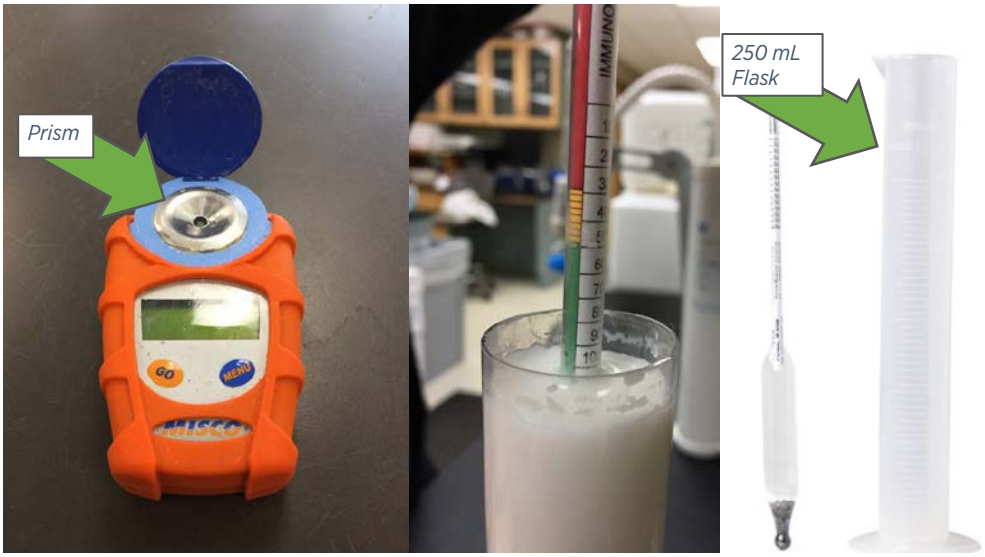

***Photo 2**. Left: A digital refractometer. A few drops of colostrum are placed on the prism and the percent sugar in aqueous solutions is provided to determine colostrum quality. Middle: A hydrometer colostrometer measuring colostrum quality using color. In the pictured example, this colostrum is green quality (greater than 50 mg/mL of Ig). Right: Be sure to use an appropriate 250 mL flask to measure colostrum quality.*

PROPER STORAGE TECHNIQUES

- McGuirk and Collins from the University of Wisconsin suggest feeding colostrum to calves or cooled down within 2 hours of collection.
    - Only refrigerate colostrum for 24 hours.
        - Refrigeration for more than 24 hours can initiate bacterial growth (i.e., *Salmonella*).
    - Freeze storing colostrum after collection is the best practice to prevent bacterial growth.
        - Dividing colostrum into individual bags after collection works well for freeze storing.
    - Thawing and re-freezing colostrum can further reduce colostrum quality.

PREPPING COLOSTRUM TECHNIQUES

- Thoroughly thaw colostrum prior to feeding with lukewarm water.
    - Thawing colostrum in hot water (greater than or equal to 120 degrees F) can denature antibodies.
        - Thawing should take less than 3 hours depending on volume of colostrum.
- Feed colostrum to calves using clean equipment.
- Clean feeding equipment (bottles, nipples, esophageal tubes) after each use.
    - Use chlorine and soap (1 cup of household bleach and 5 gallons of hot water).
    - Use acid-based wash and lukewarm water to remove milk solids.
- It is important to plan prior to calving season.
    - Colostrum absorption begins to decline greater than 6 hours after birth; thus, thawing needs to occur quickly after parturition.
    - A colostrum preparation plan can prevent the loss of immune development to the calf.

CONCLUSION

- Killed vaccines are safest for cows and heifers during gestation.
- Calving areas should be clean to reduce exposure to pathogens and increase colostrum effectiveness.
- Feeding good quality colostrum is only one part of the colostrum management puzzle: Collection and storage are key components to consider for maximum immune efficiency.

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