

Dairyland Veterinary Service

Using Brix Refractometers to Evaluate Calf Nutrition

While colostrometers are more effective than evaluating colostrum visually, they present challenges. They are temperature sensitive and require one cup of colostrum to test. In addition, the glass float breaks easily and is expensive to replace.

A new method to measure colostrum quality is the Brix refractometer. Refractometers are optical instruments that measure the amount of light refracted or bent as it passes through a liquid. A “Brix” scale is commonly used for measuring the sugar content of fruits, vegetables, maple syrup, honey and wine.

For about 10 years, it has been used to measure the quality of horse colostrum, and new research is demonstrating its use for bovine colostrum. In addition, the Brix scale has been used to measure the solids content of pasteurized milk fed to calves.

Because antibodies represent a large portion of the protein in colostrum, the level of antibodies in the sample is highly correlated to the amount of light refracted.

Brix refractometers are sufficiently accurate, affordable, durable and results are almost instantaneous. They can be used with colostrum of any temperature and require only a few drops. Brix refractometers can be either optical or digital. Digital refractometers are more expensive, but they are more convenient and easier to use and give an exact number reading.

Preliminary research indicates that a Brix score of 22% or higher indicates a good quality of colostrum.

Readings of 18% to 21% indicate colostrum that can be used for second feedings and those 17% and lower should not be used without colostrum supplements.

The Brix refractometer can also be used to evaluate milk being fed to older calves to insure that it is of a consistent quality. Normal milk should 12.5% to 13% total solids. Although the Brix refractometer measures the amount of sugar in a sample, the result can be converted to estimate total solids in milk.

The equation developed by Penn State is:

$$\text{Total solids} = (0.9984 \times \text{Brix reading}) + 2.077$$

A Brix reading of 10.4 equals 12.5% total solids.

A Brix reading of 10.9 equals 13% total solids.

Pasteurized waste milk can be checked before feeding it and solids concentration can be adjusted by adding powdered milk if necessary.

Penn State has developed a spreadsheet to help with the calculations. It can be obtained at das.psu.edu/dairynutrition.calves.

Powdered milk can also be checked to insure that it was mixed to the proper concentration. Due to the packing of the powder, it is common to find mixing errors if volume of powder instead of weight of powder is used to make the milk. A Brix refractometer can be used to detect these variations.

Sources:

“Start life with new ways to measure colostrum quality” by Andy Skidmore for Progressive Dairyman March 2, 2010

“Managing Total Solids in Nonsalable Milk” by Coleen Jones and Jud Heinrichs Penn State



→ Atago Brix Refractometer 3810 PAL-1
- Type used @ Dairyland Veterinary Service-

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THE NATIONAL DAIRY FARM PROGRAM: FARMERS ASSURING RESPONSIBLE MANAGEMENT™

The National Dairy FARM Program is a nationwide, verifiable animal well-being program designed to demonstrate that the U.S. milk producers are committed to the highest quality standards. Open to all producers, the National Dairy FARM program brings consistency and uniformity to on-farm animal care and production practices. This effort helps build confidence in consumers who, now more than ever, want to know that animals are well cared for and that the dairy products they consume are safe, wholesome and nutritious.

The Milk processors wanted to develop a uniform approach that would be fair and consistent to all purchasers. The following milk processors have implemented the program: Grande, DFA, Land O Lakes, Swiss Valley, and Foremost. As a whole 50-65% of milk processors are endorsing this program.

The program consists of 3 main steps; Education, On-farm evaluation, and Third-Party Verification. There are many educational resources for you to explain the process you will need to follow to participate in this program. The participants will be provided training materials.

One of the most important is the Animal Care Manual which is your handbook for best practices in the following areas:

- Animal Health
- Facilities and Housing
- Animal Nutrition
- Transportation and handling

This manual will provide you with more specific details on each area and Tables and charts to use as reference. This manual is located on the website: www.nationaldairyfarm.com. Also, on this website is key information on the program and many resources.

Once a producer completes the education component, an on-farm evaluation will be done. The producer then receives a status report and, if necessary, an action plan for improvement. Please discuss with your veterinarian the results of your evaluation so we can help you improve any areas that you may be weak in and help to prepare you for the next step.

The next and last step is a third – party verification will be done randomly and serves as a quantifiable validation that producers are meeting their ethical obligation for on-farm animal care.

The veterinarian's role is to be supportive, helpful, provide guidance, and develop these areas as needed.

