



## Use of the Brix Refractometer for Monitoring Milk Total Solids and Colostrum Quality

In the past, monitoring colostrum quality on-farm has required the use of imprecise and fragile diagnostic tools (i.e., colostrometer), whereas measuring total solids in pasteurized waste milk has required submission of milk samples to laboratories. In recent years, dairies and calf ranches are turning to use of Brix refractometers to estimate immunoglobulin G (IgG) concentration in maternal colostrum and/or measure and monitor total solids in pasteurized waste milk.

### Refractometer Basics

The refractometer used by calf facilities is designed to measure the Brix value of a solution. The Brix scale is used to indicate the sugar content of a solution, but this scale has been adapted for on-farm use on dairies. Here are some examples of refractometers that are appropriate for dairies:

[Reichert Brix/RI-Chek](#)

[Misco Palm Abbe Digital Refractometer 0 to 56 Brix](#)

### Colostrum Quality

Colostrum IgG concentration is the most common measure of colostrum quality. IgG concentration can vary considerably from cow to cow, and ideally, colostrum should be tested for quality to avoid feeding poor quality colostrum. A colostrometer can be used to screen for and segregate low quality colostrum but results can be inaccurate due to colostrum temperature. In addition, the colostrometer itself is not very durable. A Brix refractometer offers significant advantages over a colostrometer because instrument accuracy does not appear to be affected by sample temperature [Bielmann et al., 2008, J. Dairy Sci. 91(E-Suppl. 1):354] and is considerably more durable.



Reichert Brix/RI-Chek Digital Refractometer

Research by Bielmann et al. (2010, J. Dairy Sci. 93:3713) determined that **a Brix value of 22% is the proper cut-off for determining whether colostrum is of adequate quality (colostrum should measure ≥22%)**. A Brix value of 22% is equivalent to 50 grams/liter IgG, which is where the green (i.e., good quality) zone begins on the colostrometer.

### Managing Total Solids in Pasteurized Waste Milk

Nutrient composition (e.g., total solids, fat, protein) of pasteurized waste milk can be highly variable from day-to-day due to variation in cow population (proportion of fresh vs. treated cows) or inadvertent addition of wash water, thus leading to inconsistent nutrient intake and potentially depressed growth and health in preweaned calves. While monitoring actual fat and protein concentrations is difficult, a Brix refractometer can be used to estimate total solids percentage of waste milk. Subsequently, desired total solids of the liquid feed can be achieved through the addition of milk replacer powder.

For determining total solids with a Brix refractometer, the Brix value needs to be converted using an equation established by Moore et al. (2009, J. Dairy Sci. 92:3503). **The equation is  $TS\% = 0.9984(Brix\%) + 2.077$ , or essentially  $Brix\% + 2$ .**

**Example scenario:** A calf ranch is feeding waste milk from source dairies. The pooled pasteurized waste milk is assumed to have 12.5% total solids, but frequent sampling and analysis has revealed significant day-to-day variation. The Brix refractometer can be used daily to monitor milk total solids, and in turn, corrections can be made by adding milk replacer powder. The table below shows how much milk replacer powder is required to achieve 12.5% total solids.

Brix Value, %	Total Solids of Waste Milk, %	Total Solids Desired, %	Total Solids from Milk, lbs/gal	MR Powder Needed, lbs/gal	Batch Size, gal	MR Powder Needed, lbs
8.5	10.5	12.5	0.90	0.18	100	18
9.5	11.5	12.5	0.99	0.09	100	9
10.5	12.5	12.5	1.08	0	100	0