# Mixing Tips for Milk Replacer

- **Follow the manufacturer's instructions for mixing temperature, amount of powder and volume of water.**
- **Have a written recipe [so many calves = so much powder and water].**

- **Use scales to measure milk replacer powder.**
- **Calibrate containers rather than estimating water volume.**

- **Make a calibrated measuring stick for mixing.**
- **Use a thermometer to get the right temperature mix.**

Let's start out our conversation about this topic by reminding ourselves that calves thrive on consistency. One element of this consistent care is their milk replacer. How do we arrange our work to produce high quality consistent milk replacer every feeding, every day?

**Follow the manufacturer's instructions**

Each manufacturer has options for both ingredients and processes when making milk replacer. Depending on the choices that are made by the manufacturer an individual milk replacer will have relatively unique mixing requirements to achieve the best quality reconstituted product.

**The most important of these recommendations is the mixing temperature for the powder.** Recommendations may be as low as 110° and as high as 150°. Using excessively cold water may result in incomplete mixing and uneven dispersion of nutrients. Using excessively hot water most often results in uneven mixing of the fat. At extremely high temperatures the denaturing of whey protein could affect digestibility of the product.

Unfortunately, some manufacturers have confusing mixing instructions about how much water and powder to use. For example, let's say your feeding program is set up for the dry matter in milk replacer at 12.5 percent. That delivers about one-half a pound of powder in two quarts of milk replacer. [125 g/liter delivers 500 grams in two liters].

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Some instructions correctly tell you to mix the powder with some water and after blending add enough more water to arrive at the desired volume. This works well – you end up with about 12.5 percent solids. The incorrect directions tell you to add the powder to the final volume of water. For example, add 8 ounces of powder to 2 quarts of water. Instead of ending up with two quarts of 12.5 percent solids you get more than two quarts of an 11.6 percent mix [116g powder per liter rather than 125g].

If you are mixing milk replacer for one calf at a time using either mixing method the difference in concentration doesn't matter since the calf drinks the entire batch anyway.

However, if you are mixing in bulk using incorrect instructions and then feeding by volume (e.g., two-quart feeding) the calves get less than the eight ounces of powder that was the intended amount. And, if more than one person mixes milk replacer there is a good chance that they may not use the same mixing methods which results in inconsistent feeding.

**Make Mixing Easy**

- **Have a written recipe.** This is simple and easy. For so many calves, use so much powder and add water to "x" level. Many folks have a dry-erase board where the mixing amounts for the next feeding are marked down at the end of each feeding along with the numbers of the calves that didn't eat right and need special attention.

- **Use scales to measure milk replacer powder.** I am guilty of not using scales back in the 1990's. However, the past fifteen years of farm visits has convinced me that there is no easier way to measure milk replacer powder than with a scale.

    1. Hang pail on the scale.
    2. Scoop in powder.
    3. Stop when the needle hits the right place.
    4. Dump contents of pail into water. Using a scale has the added benefit of being much more accurate than estimating powder by volume (that is, using a cup or scoop).

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- **Calibrate containers rather than estimating water volume.** If you use a tank, take time one day to fill it with water in graduated known quantities – mark the tank at each step. Choose steps that experience shows make sense on your operation.

- **Make a calibrated measuring stick for mixing.** If you use large garbage pails, find a piece of 1.5-inch PVC pipe that is about one foot longer than the pail is tall. Glue a cap on each end. Put it into the garbage pail. Now, add water in graduated known quantities – mark the pipe at each step (for example, in two-gallon steps).

  In order to get permanent marks on the pipe at each level use a file to roughen the PVC pipe surface slightly so that an ear-tag pen will make a permanent black line. Now, if you have a twenty-gallon pail but only need twelve gallons of mix you can mix your powder-water slurry and fill to the twelve-gallon line on your homemade calibration stick. Remember to wash the stick after each use.

  I often had to make up small batches of milk replacer for sick calves and such. I made a calibrated PVC stick from 1-inch pipe for a five-gallon pail calibrated by one- gallon steps. Even if I was not the person doing the job I knew that anyone could run water into a pail up to the desired level on the stick without too much guessing.

- **Use a thermometer to get the right temperature mix.** If you have a temperature gauge on your mixer faucet that's great. If you don't have one and you use a garden hose or milker hose from the parlor to transfer water from your mixer faucet try inserting a rapid read thermometer into this line at a 30 degree angle. That way at least you start with the right temperature water.

  Especially in cold weather avoid using your hands to estimate temperature – hands are notoriously inaccurate due to the environmental chill factor.

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