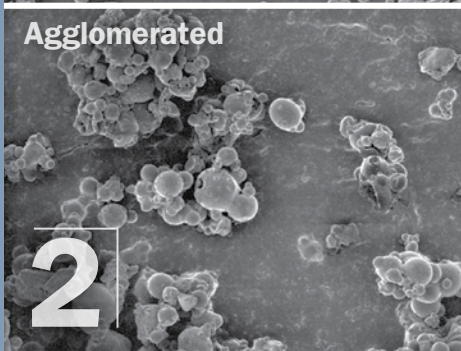
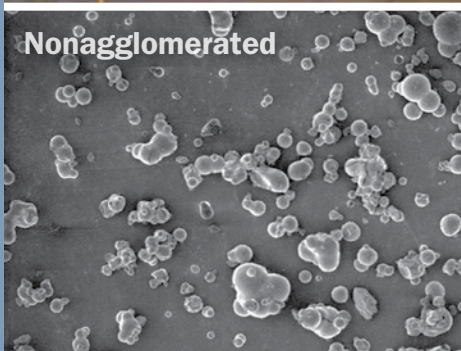


# HOW MILK REPLACER IS MADE

by Hoard's Dairyman staff



**T**HE sweet smell of milk replacer is easy to identify if you grew up feeding it. We traveled to a Land O'Lakes Animal Milk Products plant in Black River Falls, Wis., to see and smell the process for ourselves. The 65,000-square-foot facility opened in 2001 and needs 40 employees to create the milk replacer.

Milk replacer originated at Land O'Lakes around 1950, after University of Minnesota graduate student Frank Crane invented the concept and went on to work for the company. Crane and the cooperative both sought an outlet for the portion of milk not being used for butter. According to the 2012 Hoard's Dairyman Continuing Marketing Study, 63.6 percent of farms use some level of milk replacer.

Land O'Lakes uses the agglomeration method to make its milk replacer. To create larger particles, the manufacturer starts with a dry blend of ingredients and then adds steam or water to an agglomeration chamber, and dries it back into a powder. During the drying process, the mixture is first dried with warm air, followed by cold air. This process is similar to the human-grade milk powder and also the process used to make powdered laundry detergent.

**1.** Ingredient handling is a process in itself, since most products come to the plant at 3 percent moisture or less. Many are also very similar in color and texture. Keeping the products dry and separated is of the utmost importance to ensure a correct blend for each product.

Prior to arriving at the plant, fat is homogenized to ensure an even mix throughout the entire batch of milk replacer. The fat is wrapped in protein, much like an M&M candy is wrapped in milk chocolate coating. The proteins protect the fat and keep it dry and flowable until the calf utilizes it.

**2.** The ingredients are selected from their storage bin or bag and brought to the preagglomeration mixer to make a base for the end product. Ingredients are tested for fat and protein to ensure consistency before they enter the mixer. The three-ton capacity preagglomeration mixer blends the ingredients for 3 minutes using its horizontal ribbon design. Then the base mix moves to the agglomeration chamber to buildup the particle size. Agglomeration is defined as, "Building of porous particles through wetting and drying of particles."

**3.** After the agglomeration process, the mixture is dried a final time. In the picture, you're seeing the mixture being dried as it flows on a cushion of air.

**4.** At the conclusion of step 3, ingredients are tested again. The powder moves to a one-ton dual shaft paddle mixer for 36 seconds of gentle mixing. The milk replacer is tested for "flowability," wettability, disbursement of ingredients and any sediment. In the picture, a sample is being tested for moisture.

**5.** One of the most recognizable parts of the process was the packaging of the replacer. Flat bags are assembled on a rotating machine, allowing a suction cup machine to pick up one bag at a time and set them upright for filling. A blast of air opens the bags for the milk replacer to fall from piping above. While a cup is included so you can easily measure the amount of replacer for each batch, weighing the powder you use is always more precise.

Milk replacer bags are quickly filled, heat sealed and stitched shut, including a packing slip that contains the ingredients inside each bag. The Land O'Lakes plant can fill 15 bags per minute.

A unique feature of the bags is that air can leave through microscopic holes in the plastic but cannot come back in. Each bag is double-checked for weight as it heads to the shipping room.

Each pallet of bags is moved with a forklift to a warehouse where it can be shipped to customers via truck or rail. 