



Other Dairy Products Manufacturing

2. Yogurt:

Yogurt is fermented milk, which has its origins in **Eastern Europe** but is now consumed throughout the world. Although **consistency, flavor, and aroma** may vary from one region to another, the basic ingredients and manufacturing are essentially consistent. The milk used for yogurt production should be **good quality** and tested **antibiotic-free** otherwise. **The antibiotics in the milk can kill the starter cultures.**

The main ingredient in yogurt is milk. **The type of milk used depends on the type of yogurt—whole milk for full-fat yogurt, low-fat milk for low-fat yogurt, and skim milk for non-fat yogurt.** Other dairy ingredients are allowed in yogurt to adjust the composition, such as cream to adjust the fat content and nonfat dry milk to adjust the solids content. **The solids content of yogurt** is often adjusted above **8.25%** to provide a better texture to the finished yogurt.

Manufacturing Method

The milk is filtered and separated into cream milk and skim milk, then standardized with other dairy ingredients to achieve the desired fat and non-fat solids content in the milk. The various ingredients are then blended together in a mix tank equipped with an **agitation system**. The mixture is then **pasteurized** using a **continuous plate heat exchanger** for 30 min at 85° C or 10 min at 95° C. These heat treatments, which are much more severe than milk pasteurization, are necessary to achieve the following:

- **Produce a relatively sterile and conducive environment for the starter culture.**
- **Denature and coagulate whey proteins to enhance the viscosity and texture of the yogurt.**

The mix is then homogenized using high pressures of 2000-2500 psi. Besides thoroughly mixing the **stabilizers** and other ingredients, **homogenization** also **prevents** creaming and whey off during incubation and storage.

Stability, consistency and body are enhanced by homogenization. Once the homogenized mix has cooled to an optimum growth temperature, **the yogurt starter culture is added.**

Starter Cultures:

The starter cultures used for **most yogurt** production are a mixture of ***Streptococcus thermophilus*** (ST) and ***Lactobacillus bulgaricus*** (LB). Although they can grow independently, they are symbiotic, and the growth rate and acid production are better if they are grown together. These bacteria are ultimately responsible for the flavor and aroma of the final product.

Fermentation:

The milk is cooled to **between (43-46° C)** and the fermentation culture is added in a concentration of **about 2%.**



Hold:

The milk is held at (42°C) until a **pH 4.5** is reached. This allows the fermentation to progress to form a soft gel and the characteristic flavor of yogurt. This process can take several hours.

Cool:

The yogurt is cooled to 7°C to **stop** the fermentation process.

Package:

The yogurt is pumped from the fermentation vat and packaged as desired.

3. Butter:

The first step in making cream, butter, etc., is to **separate** cream from fresh milk. This can be done by **gravitational** separation or **centrifugal** separation.

- **Gravitational separation:** allow the milk to settle. The cream is lighter than the other milk components. It rises to the top and can be separated.
- **Centrifugal separation:** this requires a simple machine called a centrifuge. The centrifuge can be driven (rotated) by hand, or by an electric motor.



Farm made butter uses the **cream directly from whole milk** whereas **commercially** made butter by **extracting small amounts of cream from whey**, a by-product of cheese-product, using large centrifuges.

To produce butter, you have to make the butterfat more concentrated. **Butter** should contain **80% fat, 16% moisture, and 2% milk solids nonfat (SNF)**. It may contain a small amount of **salt (2%)** to improve shelf life and taste. However, excess moisture (more than 20%) reduces the quality of butter.

Separating the Cream:

The cream should be sweet (pH greater than 6.6), not rancid, not oxidized, and free from off flavors. The cream is **pasteurized at a temperature of 95°C** or more to destroy enzymes and micro-organisms.



Ripening: Optional

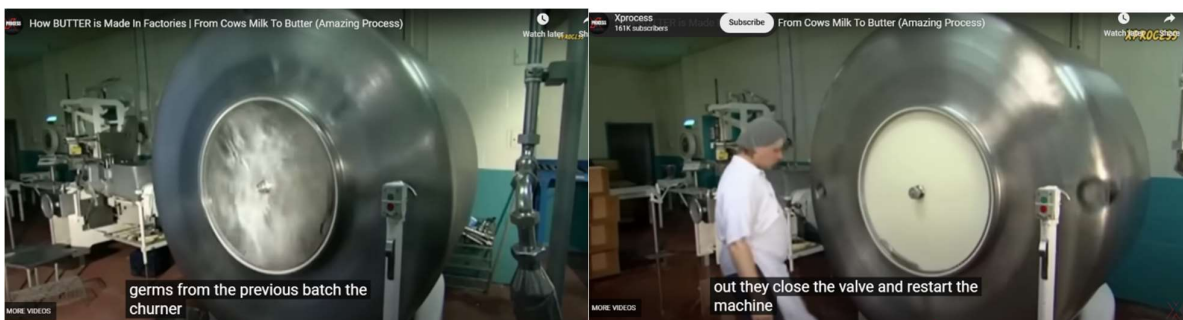
Cultures (starter) are added to cream (22 °C) to lactic acid and desirable flavor and aroma formation for cultured butter. This is more common in European butters.

Aging:

Cream is held at cool temperatures (5-10 °C) to crystallize the butterfat globules, ensuring proper texture of the butter. In the aging tank, the cream is subjected to a program of controlled cooling designed to give the fat the required crystalline structure. **As a rule, aging takes 12 - 15 hours.**

Churning:

Cream is agitated, and eventually butter granules form, grow larger, and coalesce. In the end, there are two phases left: a **semisolid** mass of butter, and the **liquid** left over, which is the buttermilk.



Draining & washing:

The cream is split into two fractions: butter grains and buttermilk. In traditional churning, the machine stops when the grains have reached a certain size, whereupon the buttermilk is drained off.



After draining, the butter is worked to a continuous fat phase containing a finely dispersed water phase. It used to be common practice to **wash** the butter after churning to remove any residual buttermilk. The **washing process** would ensure that all the buttermilk is washed out of the butter. Otherwise, the butter would not keep and **go rancid**.





Salting:

Salt is used to **improve** the **flavor** and the **shelf-life**, as it acts as a **preservative**. Further, the butter is worked to improve its consistency.



Packing & Storage:

The butter is finally patted into shape and then wrapped in waxed paper and then stored in a cool place. As it cools, the butterfat crystallizes, and the butter becomes firm.

