

YOGURT JOURNEY THROUGH THE MANUFACTURING PROCESS



Yogurt is a semisolid fermented dairy product, made from milk that contains the characteristic of bacterial starter cultures *Lactobacillus bulgaricus* and *Streptococcus thermophilus*¹. Yogurt is known with their health benefits, particularly from the addition of probiotics. Studies suggested that yogurt not only helps maintain a healthy gut, but can also help with certain gastrointestinal conditions, such as lactose intolerance, constipation, diarrheal diseases, colon cancer⁴.

Yoghurt is usually classified into the following groups⁶:

Set yogurt

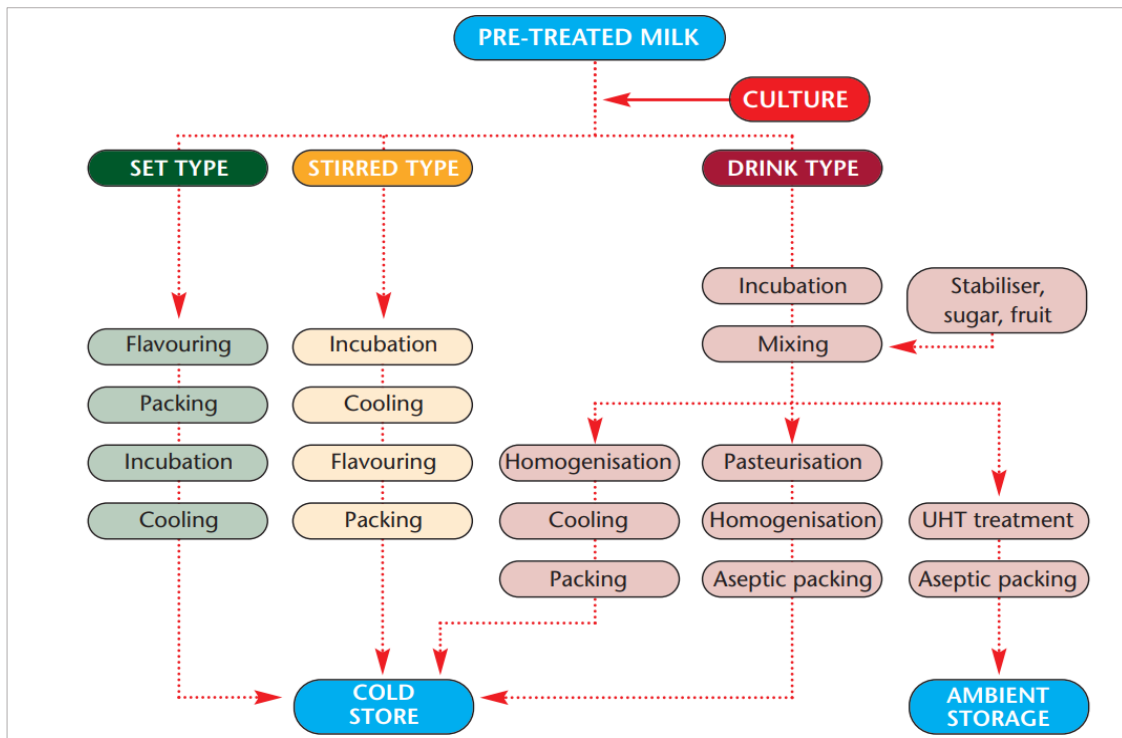
- Incubated and cooled in the final package (fermentation carried out in retail container)
- Has a firm "jelly" like texture

Stirred yogurt

- Incubated in a tank, gel structure is broken by stirring prior to cooling and packaging
- Less firm than set yogurt

Drinking yogurt

- Similar to stirred yogurt (coagulum broken before cooling)
- Diluted and mix with fruit juice and other flavouring compounds to a thick liquid using high speed mixers



Source: Teagasc, 2020

General Manufacturing Process

Milk Standardization

This standardization process typically involves reducing the fat content and increasing the total solids¹. Standardization of the composition of a milk product is needed because it is legally required or for the manufacturer to set a standard for their product⁷.

Pasteurization and Homogenization

After the solids composition is adjusted, stabilizers are added, and the milk is pasteurized at 90°C⁵. Pasteurization will destroy all the microorganisms in the milk that may interfere with the controlled fermentation process. It will also denature the whey proteins in the milk which will give the final yogurt product better body and texture. Besides, it helps to release the compounds in milk that will stimulate the growth of the starter culture⁶.

Homogenization is the process where the size of fat globules is reduced. This step prevents creaming (separation of a fat enriched layer from the aqueous phase). Thus, it will give a uniform and smooth texture¹. The homogenization pressure for yogurt is 20-25MPa².

Inoculate with starter cultures

After the heat treatment and homogenization stage, the milk will be ready for the addition of the starter culture from the blend of *Streptococcus thermophilus* (ST) and *Lactobacillus bulgaricus* (LB).

They consume the milk sugar (lactose) and convert it to lactic acid and distinctive yoghurt flavour compounds⁵.

Incubation/Fermentation

Once the milk has been inoculated, it will be filled into cartons for incubation. This is for the optimum growth of bacteria, where the temperature should be held uniformly for four to six hours to ensure a nice, thick flavoursome product⁵.

Cooling

The fermentation is stopped by rapid cooling at the desired level of acidity. The cooling temperature for yogurt is from 30-45 °C to <10 °C and reached the optimum temperature range of bacteria growth. This step is critical in obtaining a product with the desired textural quality. Cooling too quickly can cause a weak texture and stimulate whey separation during cold storage³.

Packaging and Storage

The packaging forms of yogurt mainly packed in plastic cups or tubs, but for some luxurious and high-quality products are packed in glass jars or bottles¹. Packed yoghurt should be stored and transported at less than 10°C, but preferably below 5°C. This is to slow down the biological and biochemical reactions, and avoid the growth of potential contaminants, such as yeasts and mould⁵.

Important factors that define yogurt quality

Rheological properties - Textural attributes, including the desired oral viscosity, are very important criteria that determine the identity, quality and consumer acceptance of yogurt³. For example, higher the fat level in the yoghurt the creamier and smoother it will feel in the consumers mouth⁶.

Whey separation - Whey separation such as syneresis negatively affects consumer perceptions of yogurt, as consumers think there is something microbiologically wrong with the product. Therefore, by adding components such as stabilizers will help to prevent whey separation³.

Clusters formation – Numerous manufacturing parameters, such as severe heat treatments, excessive whey protein to casein ratios, high incubation temperatures, certain types of starter cultures and the use of excessive amounts of starter culture, are associated with textural defects of stirred yogurt like graininess (particles) or surface roughness (irregularities in the yogurt matrix)³.

Conclusions

The production behind yogurt is well understood, allowing for improvements and advancements in both the quality and efficient manufacturing of the product. However, to deliver to the consumer yogurt with most desirable attributes of flavour and texture, a well-planned manufacturing quality control program must be executed to ensure repeatability of the productions and maximal levels of quality and food safety of the products.

References:

1. Abayneh, S. (2020). Review on Set Yogurt Production Process. Nutrition and Dietetics, 1-31. <https://doi.org/10.13140/RG.2.2.22098.99520>
2. Fruit Processing Machine. (n.d.). Yogurt Processing Line. Retrieved from <https://fruitprocessingmachine.com/portfolio-items/yogurt-processing-line/>
3. Lange, I., Mleko, S., Tomczyńska-Mleko, M., Polischuk, G., Janas, P., & Ozimek, L. (2020). Technology and factors influencing greek-style yogurt – a review. Ukrainian Food Journal, 9(1), 7–35. <https://doi.org/10.24263/2304-974x-2020-9-1-3>
4. Prasanna, P. H. P., & Rastall, R. A. (2017). Potential applications of prebiotics to yogurt and impact on health. Yogurt in Health and Disease Prevention, 171–182. <https://doi.org/10.1016/b978-0-12-805134-4.00009-2>
5. Teagasc. (2020). Production Of Yoghurt. Fact Food Sheet. Volume 1. Retrieved from <https://www.teagasc.ie/media/website/rural-economy/rural-development/diversification/1-Production-of-Yoghurt.pdf>
6. Watson Dairy Consulting. (n.d.). Yoghurt Yogurt Manufacturing and Production. Retrieved from <https://dairyconsultant.co.uk/yoghurt-yogurt-production.php>
7. Shwetnisha and Nongmaithem Mangalleima, R. S. (2021). The product and the manufacturing of Yoghurt. International Journal for Modern Trends in Science and Technology, 7(10), 48–51. <https://doi.org/10.46501/ijmtst0710007>