
15 CFD Simulation of Stirred Yoghurt Processing in Plate Heat Exchangers

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15.1 INTRODUCTION

Yoghurt is a dairy food obtained by promoting the growth of the lactic acid bacteria *Streptococcus salivarius* subsp. *thermophilus* and *Lactobacillus delbrueckii* subsp. *bulgaricus* in milk at a temperature between 40°C and 43°C until a desired acidity level is reached. These bacteria are responsible for the production of lactic acid from milk lactose. The manufacturing methods employed vary considerably depending, for instance, on the type of product being manufactured and raw materials used; but there are some common principles that determine the nature and quality of the final product. Among these are the fortification of milk solids, the thermal treatment of the milk, the inoculation of the thermally treated milk with the bacterial culture, the incubation of the inoculated milk, and the cooling of the coagulum and the packaging, and chilled storage [1–3].

Yoghurt is usually classified as set yoghurt or stirred yoghurt depending on its physical state in the retail container. Set yoghurt is fermented in a retail container, which is filled after milk inoculation and is incubated for approximately 2.5 to 4 h at a temperature around 40°C to 43°C. In the manufacturing process of stirred yoghurt, milk is inoculated and incubated in a fermentation tank and the gel of yoghurt is broken up during the stirring, cooling, and packing stages [3].

The rheology of stirred yoghurt is complex and depends on some physical properties of the raw material such as the solids concentration and the physical state of fats and proteins present in the milk and type of starter culture and, at the same time on some process conditions-related, such as homogenization, thermal pretreatment of the milk, and postincubation.