Mathematical Model To Evaluate The Rheological Behavior Of Dairy Beverages Obtained From Ultra High Pressure Homogenization (Uhph)

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Two facts motivated this study: one was the increased consumer demand for natural and healthy foods, and the other was new technologies, such as UHPH, that are an alternative to usual thermal processes because of their potential benefitsto favorably modify yoghurt characteristics. This study is about a dairy base (raw skim milk and whey) processed by UHPH. Based on an experimental design, it was chosen variables, such as pressure: 150, 200 and 250 MPa and inlet temperature: 10, 15 and 20 °C. Pressurized dairy base was inoculated (lactic culture), incubated and fermented, to prepare formulations according to another experimental design. Quantitative Descriptive Analyze was applied to identify an appropriate formulation to continue the study. The objectives were to compare the effects of thermal and UHPH processes on the rheological properties of dairy beverages and to propose a mathematical model for the rheological behavior of these products. To evaluate rheological properties, tests were performed under steady state and on dynamic conditions. The flow behavior was measured using a shear rate (0 to 300 s^{-1}, in 300 s, and return to 0 s^{-1}). The strain-controlled rheometer (AR-G2) with concentric cylinders was used. The temperature was 10°C and stabilization time was 10 min. Tests occurred in a dynamic condition to observeG', G" and η*. These parameters were obtained by subjecting the samples in a linear viscoelasticity region. The Power Law was the model used to fit experimental results, and for temperature influence, acorrection factor Arrhenius type was used. To consider the pressure influence, it was used a correction factor similar to that used for temperature, explained by the similar appearance of the response surfaces. The influence of pressure can be conceived as temperature, because there is a relationship between the pressure imposed and the temperature reached inside the homogenizer.

Keywords: UHPH, mathematical model and dairy beverage.