

KAJIAN TRANSFER PANAS SELAMA *PRE-HEATING* DALAM PRODUKSI KEJU DAN KARAKTERISASI FISIK KEJU CHEDDAR ORGANIK DENGAN STARTER PROBIOTIK SELAMA PEMERAMAN

INTISARI

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Seiring berjalannya waktu, meningkatnya kepekaan konsumen terhadap manfaat dari pangan yang dikonsumsi menjadikan pangan fungsional sebagai salah satu area pertumbuhan yang patut untuk dieksplorasi. Keju merupakan produk turunan susu yang tergolong sebagai pangan fungsional dengan kandungan probiotik didalamnya. Hal tersebut, mendorong untuk dikembangkannya produk keju probiotik organik yang selain mengandung probiotik yang bermanfaat untuk kesehatan juga dihasilkan menggunakan bahan baku organik yang menjunjung prinsip kesejahteraan lingkungan.

Produk tersebut perlu dikaji proses produksinya dan kualitas akhirnya agar ditemukan pemahaman yang lebih mendalam mengenai karakteristik produk tersebut. Oleh karena itu penelitian ini bertujuan untuk mengkaji proses produksi yang meliputi proses thermal pada tahap *pre-heating*, perubahan pH dan densitas pada tahap *pre-heating*, efisiensi proses pemanasan, rendemen yang dihasilkan serta pemodelan perubahan karakteristik fisik keju yaitu perubahan pH, kadar air, dan densitas selama masa pemeraman dengan variasi suhu 4°C, 7°C, dan 10°C. Diperoleh nilai koefisien transfer panas pada tahap *pre-heating* yaitu 10,171658 W.m⁻².C. Diperoleh energi transfer panas yang terserap 11967,51 kJ, energi yang dihasilkan oleh bahan bakar adalah 126042,33 kJ, dan efisiensi pemanasan sebesar 9,49%. Diperoleh bahwa pH keju cenderung turun selama proses *pre-heating*. Rendemen keju yang dihasilkan adalah sebesar 9,68%. Secara umum, selama proses pemeraman keju mengalami penurunan pH, kadar air dan densitas. Selama proses pemeraman, perlakuan variasi suhu pemeraman tidak memberikan perbedaan yang signifikan atau hanya terdapat sedikit perbedaan pada pH, kadar air, dan densitas

Kata kunci: Keju cheddar, probiotik, pangan organik, pangan fungsional, perpindahan panas, pemeraman, karakteristik fisik keju, pemodelan

**STUDY OF HEAT TRANSFER DURING PRE-HEATING IN CHEESE
PRODUCTION AND PHYSICAL CHARACTERIZATION OF ORGANIC
CHEDDAR CHEESE WITH PROBIOTIC STARTER DURING AGING**

ABSTRACT

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As time passes, increasing consumer awareness of the benefits of the food they consume makes functional food one of the growth areas worth exploring. Cheese is a derivative product of milk classified as functional food with probiotic content. This has prompted the development of organic probiotic cheese products, which not only contain beneficial probiotics for health but are also produced using organic raw materials that uphold environmental welfare principles.

These products need to be studied in terms of their production process and final quality to gain a deeper understanding of their characteristics. Therefore, this research aims to examine the production process, including the thermal process in the pre-heating stage, pH changes in the pre-heating stage, heating process efficiency, yield produced, and modeling of physical characteristics changes of cheese, namely pH changes, moisture content, and density during the aging period with temperature variations of 4°C, 7°C, and 10°C.

The heat transfer coefficient in the pre-heating stage was found to be 10.171658 W.m⁻².C. The absorbed heat transfer energy was 11,967.51 kJ, the energy generated by the fuel was 126,042.33 kJ, and the heating efficiency was 9.49%. It was observed that the pH of the cheese tends to decrease during the pre-heating process. The yield of cheese produced was 9.68%. Generally, during the cheese aging process, there was a decrease in pH, moisture content, and density. During the aging process, variations in aging temperature did not result in significant differences or only minor differences in pH, moisture content, and density were observed.

Key words : cheddar cheese, probiotic, organic foods, functional foods, heat transfer, aging, cheese physical characteristic, model