Ultra Filtration (UF) Process Development for the Production of Camembert Cheese

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ABSTRACT

The application of UF technology in cheese production has several potential advantages; product consistency, yield, lower costs and more automation. This study investigated the effects of four processing variables in the manufacture of Camembert cheese using UF and their impact on cheese quality. Using an incomplete block design, sixteen unique treatments were produced with combined processing variables (high-fat or low-fat; brine-salted or retentate-salted; acidified to pH 5.2 or pH 4.9; set in tubular moulds and small moulds). The cheeses were matured for seven weeks at 4±1 ºC and were analysed for total solids, fat, salt, non-protein nitrogen (NPN) and soluble nitrogen (SN) contents during the maturation period (seven weeks). Major defects were evaluated by experienced cheese graders in the fourth week. pH was measured and instrumental analysis was also conducted. Sensory evaluation on consumer acceptance was also conducted in the fourth week.

All the cheese samples exhibited similar increases in rind and core pH, NPN/TN and SN/TN ratios, and were generally characterised by thick rind and softness. The low-fat cheese samples had significantly lower NPN/TN ratio and higher overall acceptance in sensory evaluation. The salt content was also significantly higher. The retentate-salted cheese samples had significantly lower NPN/TN ratios and more defects in rind discolouration and deformation, and saltiness. The cheese samples acidified to pH 5.2 had significantly lower NPN/TN ratios and fewer defects in rind discolouration, softness, sourness, and bitterness. The cheese samples made using tube moulds were significantly firmer with fewer defects in rind deformation, core unevenness, and softness.

The level of fat and extent of acidification was found to have a profound effect on cheese quality, and cheeses produced with low-fat retentate and/or acidified to pH 5.2 generally had superior shelf-life with lower levels of proteolysis. The preference of the two salting methods may be debatable, but considering labour and time, retentate-salting is preferable. Tube mould generally produced better cheese with fewer defects.

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LIST OF ABBREVIATIONS

HB4.9S	High-fat, brine-salted, pH 4.9, small mould treatment
HB4.9T	High-fat, brine-salted, pH 4.9, tube mould treatment
HB5.2S	High-fat, brine-salted, pH 5.2, small mould treatment
HB5.2T	High-fat, brine-salted, pH 5.2, tube mould treatment
HR4.9S	High-fat, retentate-salted, pH 4.9, small mould treatment
HR4.9T	High-fat, retentate -salted, pH 4.9, tube mould treatment
HR5.2S	High-fat, retentate-salted, pH 5.2, small mould treatment
HR5.2T	High-fat, retentate-salted, pH 5.2, tube mould treatment
LAB	Lactic acid bacteria
LB4.9S	Low-fat, brine-salted, pH 4.9, small mould treatment
LB4.9T	Low -fat, brine-salted, pH 4.9, tube mould treatment
LB5.2S	Low -fat, brine-salted, pH 5.2, small mould treatment
LB5.2T	Low -fat, brine-salted, pH 5.2, tube mould treatment
LR4.9S	Low -fat, retentate-salted, pH 4.9, small mould treatment
LR4.9T	Low -fat, retentate -salted, pH 4.9, tube mould treatment
LR5.2S	Low -fat, retentate-salted, pH 5.2, small mould treatment
LR5.2T	Low -fat, retentate-salted, pH 5.2, tube mould treatment
MF	Microfiltration
N	Nitrogen
NF	Nanofiltration
NPN	Non-protein nitrogen
RO	Reverse osmosis
SN	Soluble-nitrogen
TCA	Trichloroacetic acid
TN	Total nitrogen
UF	Ultrafiltration
UHT	Ultra-high temperature