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METHODS TO CONTROL THE MATURATION OF SOFT MOULD RIPENED CHEESE

A thesis submitted in partial fulfilment of the requirements of a Master of Technology
(in Food Technology), at Massey University

Shannon Swan
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Summary

Soft mould ripened cheeses such as Camembert, typically have a short shelf life in comparison to other cheese varieties, therefore restricting the opportunity to exploit new and developing markets. Preliminary trials were carried out to investigate the freezing point of Camembert cheese and the rate of freezing and thawing that could be achieved using the facilities at Massey University; Albany. Using the results from these trials, a freezing/ thawing protocol and an experimental plan was developed to increase the shelf life by altering the standard storage and maturation profiles of Camembert cheese.

Firstly the effect of three storage temperatures and time (for up to four weeks) on the maturation at +4°C (for eight weeks) of Camembert cheese was investigated. Maturation indicators included: extent of moisture loss of wrapped cheese samples; change in pH of the inside and outside portion of the cheese; change in the release of proteolytic products; change in the viable yeast and mould cells present on the surface of the cheese; and change in texture (uniaxial compression and puncture testing) following storage and throughout maturation. From these results it was found that storing the cheese samples below the freezing point (between -3 and -3.5±0.1°C) had a detrimental effect on the maturation of the cheese. The freezing process and time killed the cheese microflora, therefore inhibiting the release of enzymes which promoted the biochemical reactions within the cheese. As a result the cheese did not follow the same maturation trend as the control sample that was matured at only +4°C for eight weeks. Cheese that was stored at below zero, but above the actual freezing point followed the same maturation trend as the control sample following storage for up to four weeks, therefore showing the most potential in controlling the maturation of the Camembert cheese.

The effect of storage at -2°C on Camembert cheese was then investigated, both throughout the storage of the cheese (for up to six weeks) followed by maturation at +4°C for eight weeks. Maturation indicators included: change in pH of the inside and outside portion of the cheese; change in the moisture content of the cheese; change in the release of proteolytic products; change in texture (uniaxial compression and puncture testing); and Quantitative Descriptive Analysis using a panel of nine

screened and trained panellists. Statistical analysis showed that at the 99% level of confidence, the storage temperature (and time) had no significant effect on the ripening of the cheese throughout maturation at +4°C of the cheese for all maturation indicators. Therefore, storing Camembert cheese at -2°C can be used to control the maturation of Camembert cheese, allowing for longer distribution chain delivery times.

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Glossary

Below is a glossary of terms used throughout various stages of this Masters report:

| Term | Definition |
|-------------------------------|---|
| <i>Case</i> | Preliminary trials: A cardboard box (70 x 300 x 200mm; HWD) containing 12 units of 210g Puhoi Valley Ltd. Camembert cheese; six units on the bottom layer, and six units on the top layer |
| <i>Controlled maturation</i> | The effect of manipulating the storage time and temperature to optimise the potential shelf-life of Camembert cheese |
| <i>Control sample</i> | Stage ONE trials: Camembert cheese samples were held at +4°C maturation for up to seven weeks Stage TWO trials: Camembert cheese samples held at -2°C for up to 14 weeks |
| <i>Maturation temperature</i> | The temperature Camembert cheese samples were held at +4°C, as recommended in Puhoi Valley Cheese product specification |
| <i>Maturation time</i> | The time (weeks) that the Camembert cheese samples were held at +4°C |
| <i>Maturation properties</i> | The rheological/ textural, compositional, biochemical, sensory and microbiological changes that are characteristic to Camembert cheese |
| <i>Reference sample</i> | Stage TWO QDA trials: Camembert cheese samples were picked up fresh from Puhoi Valley Cheese Ltd. prior to sensory evaluation |
| <i>Storage temperature</i> | The temperature that Camembert cheese samples were held at prior to maturation For example: Stage ONE Trials (+1°C, -2°C and -10°C), Stage TWO Trials (-2°C) |
| <i>Storage time</i> | The time (weeks) that the Camembert cheese samples were held at each respective storage temperature treatment |
| <i>Total holding time</i> | The sum amount of time (weeks) that the Camembert cheese samples were held during storage and maturation |
| <i>Week</i> | The unit of time used in this study. One week = seven days |