3. MATERIALS AND METHODS

3.1 MILK

3.1.1 Procurement

Raw full cream cow's milk was collected from the University of Pretoria's experimental farm and pasteurised at 72°C for 15 s, while goat's milk was obtained already pasteurised from the goat herd of the Medical University of South Africa (Medunsa). Since the goat's milk could only be obtained on Friday's, the two batches of milk were stored at 4°C over the week-end prior to cheesemaking.

3.1.2 Sampling

The batches of milk were stirred thoroughly and representative samples of each was collected into sterilised bottles. The chemical and microbiological tests were done in triplicate on each sample.

3.1.3 Fat content

The Gerber method was used to determine the fat content of the milk as outlined by the Food and Agriculture Organization (1986).

3.1.4 Protein content

The protein content of the milk was determined by the Kjeldahl method (Triebold & Aurand, 1963), using a Buchi 430 (digestion equipment), Buchi 322 (distillation unit), Buchi 343 (control unit) and dosimat (Metrohm, Herisau, Switzerland).

3.1.5 pH

The milk samples were shaken thoroughly after which the pH was measured as outlined in Kosikowski (1978) using a "Mettler DL25 titrator" pH meter (Mettler-Toledo, Switzerland)

3.1.6 Titratable acidity

The amount of titratable acidity was determined by titrating 9 ml of the milk with a 0.1M sodium hydroxide solution in presence of phenolphthalein indicator (Richardson, 1985).

3.1.7 Lactose

The lactose content was determined according to the International Dairy Federation (1974).

3.1.8 Total solids/ Moisture content

An oven drying method in which the milk was heated at 100°C until a constant weight was obtained, was used (Triebold & Aurand, 1963).

3.1.9 Total plate count

The standard plate count was carried out according to Marth (1978). The Plates were incubated at 30°C for 72 ± 3 h.

3.2 FETA CHEESE

3.2.1 Starter culture preparation

The starter culture preparation started about 7 days before cheese manufacturing. The culture used was a commercial culture CHN 22 (a mixed culture *of Lactococcus lactis, Lactococcus lactis* ssp. *cremoris, Lactococcus lactis* ssp. *lactis biovar diacytilactis* and *Leaconostoc mesensteroides* ssp. *cremoris*). The stock

cultures were supplied in a freeze-dried form by CHR Hansens Lab (Denmark), and were cultured in sterilized skim milk and incubated at 22°C for about 16 h (Kosikowski, 1978).

3.2.2 Manufacturing of the Feta cheese

Four different proportions of goat's milk and cow's milk were mixed as follows:-

Treatment 1: 100% cow's milk and 0% goat's milk

Treatment 2: 65% cow's milk and 35% goat's milk

Treatment 3: 35% cow's milk and 65% goat's milk

Treatment 4: 0% cow's milk and 100% goat's milk

The milks were processed to Feta cheese as shown in Figure 3.1 (modified from Prinsloo, 1997).

3.2.3 Sampling

Two packaged cheeses were picked randomly from each of the four treatments. The packages were opened, water drained, a sample for microbiological analysis taken from each cheese and excess water blotted from the surface of the remainder of each cheese with a paper towel. The individual cheeses, after removal of the sample for microbiological work, were then ground into paste-like form using a pestle and a mortar. The ground sample was then used for chemical analyses.

On each of the eight samples, representing four treatments, tests were done in duplicate, except for pH measurements. All the tests except sensory evaluation (see section 3.2.14) were done on weekly basis (for three weeks) beginning the second day after the milk was renneted.

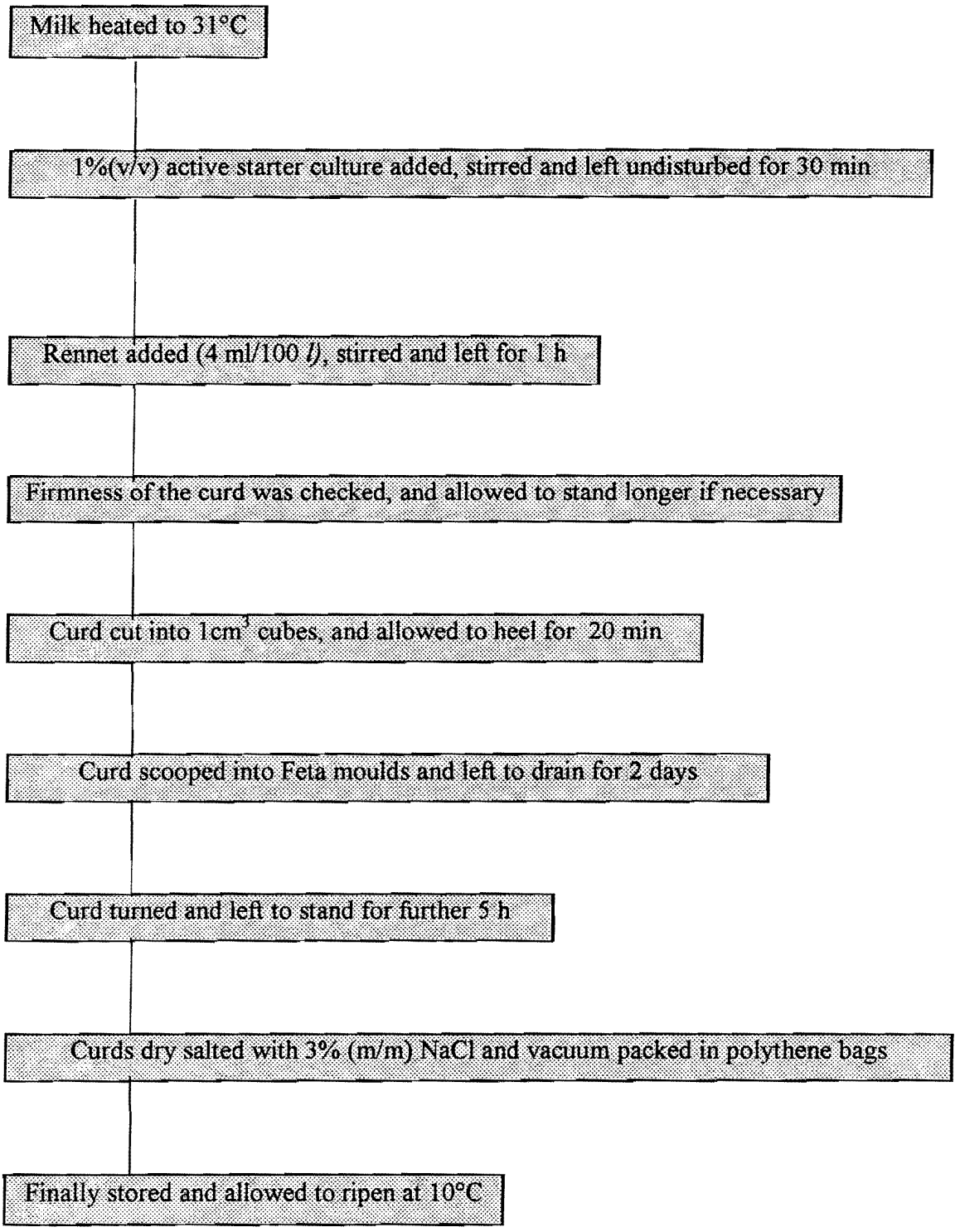

Figure 3.1: Summary of Feta cheesemaking

3.2.4 Fat content

The fat content of the cheeses was determined according to a modified Babcock method (Kosikowski, 1978).

3.2.5 Free fatty acids

Free fatty acids were extracted into a neutralised mixture of benzene-ethanol and titrated with 0.1N sodium hydroxide solution in presence of an indicator (Triebold & Aurand, 1963).

3.2.6 Total Proteins

The Kjeldahl method (Triebold & Aurand, 1963; Kosikowki 1978) was used to determine the protein content of the cheese using the Buchi apparatus (subsection 3.1.4).

3.2.7 Soluble proteins

Soluble proteins were extracted with hot water and subjected to digestion, distillation and titration in a similar manner to total protein in milk and cheese (Kosikowski, 1978).

3.2.8 pH

pH of the cheese samples was measured introducing the pH meter electrode directly into the ground, undiluted cheese samples (Kosikowski, 1978), using a "Mettler DL25 titrator" (Mettler -Toledo, Switzerland).

3.2.9 Moisture content and total solids

The determination of total solids was done by oven drying at 100°C (Kosikowski, 1978).

3.2.10 Salt

Salt (sodium chloride) was extrated into hot water, then titrated with standard solution of 0.171 N silver nitrate according to the Australian Society of Dairy Technology (1966).

3.2.11 Lactose

The lactose in the cheeses was determined according to the International Dairy Federation (1967).

3.2.12 Total Plate Count

The primary dilutions ($^{1}/_{10}$) were made by mixing cheese with sterilised peptone water and macerating in stomacher bags (Art Medical Equipment, Johannesburg). Further dilutions were prepared and plated using the pour plate method (Marth, 1978; International Dairy Federation, 1987).

3.2.13 Texture Analysis

Two representative samples were picked randomly from each of the four cheese treatments and cut into 2 x 2 x 1.5 cm pieces for analysis. An automatic texture analyzer TA-XT2 (Stable Microsystems, England), fitted with a conical probe was used. The machine was programmed to operate using the following settings:-

Mode: Measure force in compression

Option: Return to start

Pre-test speed: 2.0 mm/s

Test speed: 1.0 mm/s

Distance: 10 mm

Trigger type: auto (3 g)

Accessory: P/45 conical probe

3.2.14 Sensory Evaluation

The acceptability of the cheeses was evaluated by 62 panelists 21 days after cheese manufacturing. A Nine-point Hedonic scale evaluation sheet (Figure 3.2) was used to rate the preference of the panelists (Piggott, 1988).

SENSORY EVALUATION OF FETA CHEESE

Date.....

Name.....

Please taste and evaluate 4 samples from left to right, and make a mark (x) in the block that best describes how much you like the specific sample. Drink water between samples.

Degree of Liking	**Codes**			
Like extremely				
Like very much				
Like moderately				
Like slightly				
Neither like nor dislike				
Dislike slightly				
Dislike moderately				
Dislike very much				
Dislike extremely				

Comments

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Figure 3.2: Evaluation sheet used for sensory evaluation

3.3 STATISTICAL ANALYSIS

The whole experiment was repeated three times with batch 1 processed in June, batch 2 in September and batch 3 in November 1998. The results were analysed statistically using Statistica version 5.0 (Statsoft, United States of America) and evaluations were based on a 5% significance level