APPENDICES

Appendix. 4.1 A sample score card for evaluation of sensory qualities.

SENSORY EVALUATION PROFORMA

Name of the judge: ---------- Date :----------

(Note: Please tick (_/) mark the appropriate attirbute.)

Attributes	Scores	Sample Numbers 1	2	3	4	5	6	Remark
Flavour								
1. Desirable cheese flavour								
a) Pronounced	30							
b) Definite	35							
c) Mild	40							
2.Uncharacteristic flavour								
a) Pronounced	15							
b) Definite	20							
c) Mild	25							
3. Off-flavour								
a) Pronounced	0							
b) Definite	5							
c) Mild	10							
Body and Texture								
a) Smooth	30							
b) Pasty	25							
c) Coarse	20							
d) Granular	15							
e) Lumpy	10							
Spreadability								
a) Spreads smoothly	30							
b) With sl.resistance	25							
c) With moderate resistance	20							
d) With high resistance	15							
e) Non-spreadable	10							
Over all acceptability								
a) Most liked	100							
b) Moderately liked	80							
c) Slightly liked	60							
d) Neither liked nor disliked	40							
e) Positively disliked	20							

Appendix -9.5.1 Effect of Bean/water ratio on the curd strength of soymilks

Replication	Bean level (g) per litre of water		
	200	150	100
R 1	82.0	67.5	66.2
R 2	82.0	70.0	66.5
R 3	73.7	72.0	65.6
R 4	84.5	74.0	67.0
R 5	86.0	68.9	69.0
R 6	80.0	69.0	69.0
Mean	81.4[a]	70.2[b]	67.6[b]
SD	3.93	2.16	1.36
F' value	36.64		
SEm	3.59		
CD	13.21		

Appendix 9.5.2 Effect of bean/water ratio of soymilks on the quantity and rate of whey expulsion (ml)

Duration (mts.)	Solids level of soymilks (%)					
	5.5		7.5		8.2	
	Quantity	Rate	Quantity	Rate	Quantity	Rate
30	47.67	47.67	45.30	45.30	43.67	43.70
60	52.67	5.00	48.17	2.84	45.67	2.00
90	53.83	1.26	48.67	0.50	46.23	0.56
120	54.27	0.44	49.17	0.50	46.50	0.27
150	54.33	0.06	50.00	0.83	46.83	0.33
180	54.67	0.34	50.00	0.00	47.07	0.24
110	54.67	0 00	50.00	0.00	47.07	0.00
140	54.67	0 00	50.00	0.00	47.07	0.00

Appendix - 9.5.3 (a) Composition of cheese blended maska spread

cheese in 100 parts	cheese solids (g%)	soy solids (g%)	cheese solids (%TS)	soy solids (%TS)	total solids (g)	cheese fat (g)	soy fat (g)	cheese protein (g)	soy protein (g)
40	28	10.8	72.2	27.8	38.8	12	3.1	11.2	37.0
30	21	12.6	62.5	37.5	33.6	9	3.7	8.4	43.2
20	14	14.4	49.3	50.7	28.4	6	4.2	5.6	49.3
10	7	16.2	30.2	69.8	23.2	3	4.7	2.8	55.5
5	3.5	17.1	17.0	83.0	20.6	1.5	4.9	1.4	58.6

Appendix - 9.5.3 (b) Correlation co-efficients

Variables	r' value
Cheese solids x Flavour	0.92
Cheese solids x OAA	0.97
Cheese solids x B&T	0.93
cheese solids x spreadability	0.97
Cheese fat x flavour	0.92
Cheese fat x OAA	0.97
Cheese fat x B&T	0.93
Cheese fat x spreadability	0.91
Cheese protein x flavour	0.92
Cheese protein x OAA	0.98
Cheese protein x B&T	0.93
Cheese protein x spreadaiblity	0.91
Total score x OAA	0.99

Appendix - 9.5.4 Effect of cheese solids levels on the sensory scores of maska based spreads.

Amount of cheese blended (g)	Sensory scores				
	Flavour (40)	B & T (30)	Spreadability (30)	Total (100)	OAA (100)
72.2	38.0[a] (35-40)	28.3[a] (25-30)	27.5[a] (25-30)	93.8 -	90.0[a] (80-100
62.5	35.3[a] (25-40)	26.7[a] (20-30)	26.7[a] (25-30)	88.7 -	78.6[ab] (60-100
49.3	34.7[a] (20-40)	24.2[a] (20-30)	24.2[a] (20-25)	83.0 -	66.0[b] (40-80)
30.2	20.7[b] (10-35)	10.8[b] (5-20)	12.5 (5-20)	44.0 -	34.1[c] (20-60)
17.0	18.5[b] (3-35)	5.8[b] (5-10)	5.5[c] (5-10)	29.4 -	14.0[d] (10-20)
F' value	31.49*	2.70*	9.51*	-	58.52*
CD	5.73	6.21	4.91	-	15.93

Note: Non-identical letters denote significant difference between two means at 5% level. * - Significant at 5% level.
Figures in parentheses indicate range of scores

Appendix. 9.5.5(a) Composition of cheese blended slurry spreads

Amount of cheese in 300 g slurry	Soy solids (%TS)	Cheese solids (g)	Cheese solids (%TS)	Cheese fat (g)	Soy fat (g)	Soy protein(g)	Cheese protein (g)	Total TS (g)
40	76.5	28.0	23.5	12.0	18.0	35.0	11.2	119.0
30	81.3	21.0	18.8	9.0	18.0	35.0	8.4	112.0
20	86.7	14.0	13.3	6.0	18.0	35.0	5.6	105.0
10	92.9	7.0	7.1	3.0	18.0	35.0	2.8	98.0
5	96.3	3.5	3.7	1.5	18.0	35.0	1.4	94.5

Appendix 9.5.5 (b) Correlation co-efficients

Variables	r' value
Cheese solids x Flavour	0.98
Cheese solids x OAA	0.89
Cheese solids x B&T and spreadability	0.92
Cheese fat x flavour	0.96
Cheese fat x OAA	0.89
Cheese fat x B&T	0.93
Cheese fat x spreadability	0.92
Cheese protein x flavour	0.88
Cheese protein x OAA	0.89
Cheese protein x B&T	0.93
Cheese protein x spreadaibility	0.92
Total score x OAA	0.96

Appendix - 9.5.6 Effect of cheese solid levels on the sensory scores of slurry spreads.

Amount of cheese blended (g)	Sensory scores				
	Flavour (40)	B & T (30)	Spreadability (30)	Total (100)	OAA (100)
23.5	37.0^{a} (30-40)	27.5 (20-30)	28.0 (25-30)	92.5 -	80.0^{+a} (80)
18.8	36.0^{a} (25-40)	26.5 (20-30)	27.5 (25-30)	90.0 -	78.0^{a} (60-80)
13.3	34.5^{a} (25-40)	26.5 (20-30)	27.5 (25-30)	88.5 -	74.0^{ab} (40-80)
7.1	30.0^{ab} (20-40)	26.0 (25-30)	25.5 (20-30)	81.5 -	62.0^{b} (40-80)
3.7	28.0^{b} (15-40)	25.0 (15-30)	25.5 (20-30)	78.5 -	44.0^{c} (20-60)
F' value	3.86^{*}	0.46^{NS}	1.23^{NS}	-	16.17^{*}
SEm	2.81	0.30	0.50	-	5.25
CD	7.23	-	-	-	13.45
Table F' (5%)	2.57				

Note: Non-identical letters denote significant difference between two means at 5% level. * - Significant at 5% level. NS - Not significant Figures in parentheses indicate range of scores

Appendix - 9.5.7 (a) Composition of milk solids blended slurry spreads.

milk solids (g%)	soy solids (g%)	milk solids (%TS)	soy solids (%TS)	total solids (g)	milk fat (g%)	soy fat (g%)	milk protein (g%)	soy protei (g%)
31.5	23.3	10.7	68.4	34.0	7.1	4.6	2.9	14.4
26.2	25.3	9.0	73.8	34.3	6.7	5.0	2.3	15.6
24.0	26.7	8.4	76.0	35.0	4.4	5.3	2.1	16.5
16.2	28.4	5.5	83.8	34.0	1.9	5.6	1.7	17.5
7.6	30.0	2.5	92.4	33.0	1.3	6.0	1.1	18.7
5.7	33.1	2.0	94.3	35.0	0.8	6.6	0.8	20.4
0.5	34.3	-	98.6	34.8	0.0	6.8	0.5	21.2

Appendix - 9.5.7 (b) Correlation co-etficients values

Variables	r' value
Milk solids x Flavour	0.95
Milk solids x OAA	0.80
Milk solids x B&T and spreadability	0.92
Milk fat x flavour	0.97
Milk fat x OAA	0.83
Milk fat x B&T	0.93
Milk fat x spreadability	0.92
Milk protein x flavour	0.92
Milk protein x OAA	0.97
Milk protein x B&T	0.91
Total score x OAA	0.92

Appendix - 5.8 Effect of milk solid levels on the sensory scores of slurry spreads.

Milk solids blended in slurry	Sensory scores				
	Flavour (40)	B & T (30)	Spreadability (30)	Total (100)	OAA (100)
31.5	36.3^{a} (30-40)	28.7^{a} (25-30)	30.0 (30)	95.0 -	85.3^{a} (80-100)
26.2	34.7^{ab} (30-40)	28.3^{a} (25-30)	30.0 (30)	93.0 -	80.0^{a} (80)
23.8	34.0^{ab} (30-40)	28.0^{a} (25-30)	30.0 (30)	92.0 -	72.0^{ab} (60-80)
16.1	33.3^{b} (25-40)	26.7^{ab} (20-30)	30.0 (30)	90.0 -	70.7^{ab} (60-80)
7.5	32.3^{b} (25-40)	26.7^{ab} (20-30)	30.0 (30)	87.0 -	68.0^{ab} (60-80)
5.7	28.7^{c} (25-35)	22.3^{c} (20-30)	30.0 (30)	81.0 -	61.3^{b} (60-80)
0.5	24.2^{d} (20-30)	22.0^{c} (20-30)	30.0 (30)	76.3 -	60.0^{b} (40-60)
F'value	13.11*	14.93*	-	-	12.45*
CD	3.52	2.27			20.42

Note: Non-identical letters denote significant differences between two means at 5% level. * - Significant at 5% level
Figures in parentheses indicate range of scores.

Appendix - 9.5.9 Effect of extent of curing on TA (% lactic) and pH in soy cheese spreads

Duration of curing (days)	Cheese blended in				Milk solids blended slurry	
	Maska		Slurry			
	pH	TA	pH	TA	pH	TA
0	4.86	1.42	5.3	0.78	5.3	0.8
1	4.81	1.4	5.52	0.91	5.21	0.92
2	4.99	1.18	5.11	0.92	5.41	0.99
3	5.08	1.2	5.23	0.99	5.5	1.01
4	5.04	1.5	5.22	1.02	5.3	1.18
5	5.10	1.06	5.33	1.2	5.46	1.14
6	5.16	1.2	5.31	0.94	5.30	1.18
7	5.25	0.7	5.41	0.8	5.39	1.24
8	5.34	1.0	5.6	1.3	5.47	1.3
9	5.26	1.08	5.62	2.2	5.66	1.38
10	5.43	1.02	5.69	2.1	5.74	1.4
11	5.45	0.96	5.74	1.9	6.12	1.38
12	5.58	0.90	5.92	1.4	6.25	1.3
13	5.48	0.70	6.01	1.6	6.47	1.0
14	5.43	0.74	6.34	1.2	6.58	0.92
15	5.34	0.82	6.41	0.7	6.60	0.87
16	5.32	1.16	6.47	0.71	6.61	0.87
17	5.29	0.92				
18	5.48	1.0				
19	5.52	1.4				
20	5.56	1.2				
21	5.51	0.7				
22	5.47	0.78				
23	5.38	0.72				
24	5.37	0.72				

Appendix 9.5.1e Changes in nitrogenous fractions (g%) during curing in cheese blended maska spreads.

Nitrogen fractions	Replication	Ripening period (Days) 0	4	8
Total nitrogen	1	2.4130	2.4460	2.4989
	2	2.4130	2.4461	2.4990
	3	2.4129	2.4460	2.4988
	Average	2.4130	2.4460	2.4989
Water soluble nitrogen	1	0.1739	0.3543	0.3833
	2	0.1742	0.3541	0.3833
	3	0.1747	0.3544	0.3834
	Average	0.1747	0.3543	0.3833
Non-protein nitrogen	1	0.3787	0.3950	0.4245
	2	0.3784	0.3952	0.4244
	3	0.3792	0.3948	0.4244
	Average	0.3788	0.3950	0.4244
Amino acid nitrogen	1	0.3364	0.3431	0.3628
	2	0.3368	0.3431	0.3529
	3	0.3372	0.3433	0.3628
	Average	0.3368	0.3432	0.3628

Appendix 9.5.11 Changes in nitrogenous fractions (g%) during curing in cheese blended slurry spreads

Nitrogen fractions	Replication	Ripening period (Days) 0	4	8
Total nitrogen	1	2.6436	2.6400	2.6401
	2	2.6437	2.6402	2.6404
	3	2.6432	2.6398	2.6406
	Average	2.6435	2.6400	2.6404
Water soluble nitrogen	1	0.2605	0.3761	0.7011
	2	0.2607	0.3761	0.7014
	3	0.2606	0.3761	0.7012
	Average	0.2606	0.3761	0.7012
Non-protein nitrogen	1	0.1390	0.2214	0.2608
	2	0.1370	0.2216	0.2607
	3	0.1390	0.2212	0.2609
	Average	0.1380	0.2214	0.2608
Amino acid nitrogen	1	0.1061	0.1573	0.2367
	2	0.1061	0.1576	0.2365
	3	0.1061	0.1572	0.2368
	Average	0.1061	0.1573	0.2367

Appendix 9.5.12 Changes in nitrogenous fractions during curing in milk solids blended slurry spreads.

Nitrogen fractions	Replication	Ripening period (Days) 0	4	8
Total nitrogen	1	1.678	1.655	1.638
	2	1.680	1.655	1.640
	3	1.678	1.655	1.638
	Average	1.679	1.655	1.638
Water soluble nitrogen	1	0.216	0.218	0.273
	2	0.214	0.218	0.274
	3	0.218	0.218	0.273
	Average	0.216	0.218	0.273
Non-protein nitrogen	1	0.138	0.253	0.276
	2	0.139	0.253	0.276
	3	0.138	0.252	0.277
	Average	0.138	0.253	0.276
Amino acid nitrogen	1	0.157	0.194	0.370
	2	0.157	0.195	0.370
	3	0.157	0.194	0.3696
	Average	0.157	0.194	0.370

Appendix 9.5.13 Computed values of nitrogen fractions during curing (g%).

Nitrogen fractions	N (% of TN) during curing period (days)		
	0	4	8
Cheese blended in Maska			
Total protein nitrogen (TN - NPN)	2.07	2.06	2.03
Water soluble nitrogen	7.12	14.45	15.63
Non-protein nitrogen	15.44	16.11	17.30
Amino nitrogen	13.73	14.00	14.79
Cheese blended in slurry			
Total protein nitrogen (TN - NPN)	2.41	2.33	2.29
Water soluble nitrogen	10.21	14.74	27.48
Non-protein nitrogen	5.41	10.22	11.68
Amino nitrogen	4.16	6.17	9.28
Milk solids blended in slurry			
Total protein nitrogen (TN - NPN)	1.52	1.40	1.38
Water soluble nitrogen	7.60	13.16	16.48
Non-protein nitrogen	8.33	15.27	16.66
Amino nitrogen	9.47	11.71	22.33

Appendix 9.5.14 Changes in SN/TN during curing

Types of soycheese	Replication	Ripening period (Days) 0	4	8
Cheese blended in maska	1	0.0721	0.1468	0.1588
	2	0.0712	0.1448	0.1567
	3	0.0700	0.1418	0.1534
	Average	0.0711	0.1445	0.1563
Cheese blended in slurry	1	0.0985	0.1425	0.2656
	2	0.0986	0.1425	0.2656
	3	0.0986	0.1425	0.2655
	Average	0.0986	0.1425	0.2656
Milk solids blended in slurry	1	0.0750	0.1298	0.1626
	2	0.0749	0.1317	0.1656
	3	0.0781	0.1331	0.1672
	Average	0.0770	0.1315	0.1651

Appendix 9.5.15 Changes in NPN/TN during curing

Types of soycheese	Replication	Ripening period (Days) 0	4	8
Cheese blended in maska	1	0.1569	0.1637	0.1588
	2	0.1547	0.1616	0.1567
	3	0.1517	0.1580	0.1534
	Average	0.1544	0.1611	0.1531
Cheese blended in slurry	1	0.0526	0.0839	0.0988
	2	0.0518	0.0839	0.0987
	3	0.0518	0.0838	0.0988
	Average	0.0521	0.0838	0.0988
Milk solids blended in slurry	1	0.0750	0.1155	0.1644
	2	0.0840	0.1129	0.1668
	3	0.0842	0.1538	0.1685
	Average	0.0811	0.1274	0.1666

Appendix 9.5.16 Changes in AN/TN during curing.

Types of soycheese	Replication	Ripening period (Days) 0	4	8
Cheese blended in maska	1	0.1394	0.1422	0.1504
	2	0.1377	0.1403	0.1484
	3	0.1349	0.1374	0.1452
	Average	0.1373	0.1400	0.1480
Cheese blended in slurry	1	0.0401	0.0596	0.0897
	2	0.0401	0.0597	0.0896
	3	0.0401	0.0596	0.0896
	Average	0.0401	0.0596	0.0896
Milk solids blended in slurry	1	0.0935	0.1155	0.2204
	2	0.0949	0.1178	0.2236
	3	0.0958	0.1184	0.2256
	Average	0.0947	0.1172	0.2232

Appendix - 9.5.17 (a) Changes in microbiological counts in cheese blended in maska.

Ripening period (Days)	Replications	Microbiological counts (10^{-3})				
		Lactic count	Proteolytic counts		Lipolytic counts	
			Soymilk	skimmilk	Soy oil	Butter
0	1	90.9	48.7	60.1	134.7	50.1
	2	91.7	46.0	101.7	63.3	63.3
	3	94.4	46.2	89.1	79.9	79.9
	Average	**92.4**	**47.0**	**83.6**	**92.6**	**64.4**
4	1	102.8	47.5	23.2	238.6	299.4
	2	153.3	46.0	50.2	173.6	269.4
	3	141.0	39.0	72.2	205.0	251.0
	Average	**132.4**	**44.2**	**48.5**	**205.7**	**273.3**
8	1	49.1	9.5	7.1	66.7	104.9
	2	45.2	9.0	8.1	67.6	69.8
	3	70.2	27.9	13.4	68.8	79.0
	Average	**54.8**	**15.2**	**9.5**	**67.7**	**84.6**

Appendix - 9.5.17 (b) Correlation values.

Variables	r^1 values	
	Soymilk	skim milk:
AN / TN	- 0.89*	- 0.91*
SN / TN	0.09	0.37
NPN/ TN	- 0.57*	0.83*
	Soy oil	Butter
TVFA	0.89*	0.99*
FFA	0.87*	0.98*

Note: * - Significant at 5% level.
Table r^1 value - 0.468 (5% level).

Appendix - 9.5.18 (a) Changes in microbiological counts in cheese blended slurry spreads.

Ripening period (Days)	Replications	Microbiological counts (10^{-3})				
		Lactic count	Proteolytic counts		Lipolytic counts	
			Soymilk	skimmilk	Soy oil	Butter
0	1	32.2	3.9	70.8	9.4	20.8
	2	39.9	12.5	21.3	12.3	37.7
	3	36.8	6.4	59.6	12.4	32.0
	Average	**36.3**	**7.6**	**50.6**	**11.4**	**30.2**
4	1	246.3	15.7	43.9	61.0	124.9
	2	160.0	37.4	42.5	95.0	259.8
	3	184.7	20.7	47.7	88.0	241.0
	Average	**197.0**	**24.6**	**44.7**	**81.3**	**208.6**
8	1	50.9	150.0	160.0	310.0	230.0
	2	56.0	360.0	300.0	240.0	210.0
	3	59.0	240.0	274.1	294.0	227.0
	Average	**55.3**	**250.0**	**244.7**	**281.3**	**222.3**

Appendix - 9.5.18 (b) Correlation values.

Variables	r' values	
	Soymilk	skim milk:
AN / TN	0.86*	0.84*
SN / TN	0.89*	0.86*
NPN/ TN	0.72*	0.68*
	Soy oil	Butter
TVFA	0.98*	0.63*
FFA	0.97*	0.79*

Note: * - Significant at 5% level.
Table r' value - 0.468 (5% level).

Appendix - 9.5.19 (a) Changes in microbiological counts in milk solids blended in slurry spreads.

Ripening period (Days)	Replications	Microbiological counts (10^{-3})				
		Lactic count	Proteolytic counts		Lipolytic counts	
			Soymilk	skimmilk	Soy oil	Butter
0	1	122.7	88.2	26.6	9.6	121.3
	2	76.7	73.7	81.3	13.3	53.3
	3	69.6	100.3	54.0	9.4	110.4
	Average	89.7	87.4	54.0	9.6	95.0
4	1	155.8	91.2	258.0	57.8	258.8
	2	209.0	64.2	191.7	56.6	199.3
	3	182.4	132.1	206.4	83.7	198.4
	Average	182.4	95.8	218.7	66.0	218.8
8	1	102.7	124.1	238.7	36.5	147.5
	2	117.3	117.4	224.0	31.0	156.1
	3	198.1	151.3	194.9	44.3	124.7
	Average	139.4	130.9	219.2	37.3	142.8

Appendix - 9.5.19 (b) Correlation values.

Variables	r' values	
	Soymilk	skim milk:
AN / TN	0.71*	0.61*
SN / TN	0.64*	0.89*
NPN/ TN	0.79*	0.81*
	Soy oil	Butter
TVFA	0.50*	0.39
FFA	0.90*	0.88*

Note: * - Significant at 5% level.
Table r' value - 0.468 (5% level).

Appendix 9.5.20 Changes in FFA (mcq/g) during curing.

Types of soycheese	Replication	Ripening period (Days) 0	4	8
Cheese blended in maska	1	22.01	70.60	31.77
	2	22.04	71.00	31.74
	3	22.02	70.90	31.76
	Average	22.02	70.80	31.75
Cheese blended in slurry	1	15.86	51.20	102.96
	2	15.89	52.60	102.90
	3	15.82	51.00	102.87
	Average	15.86	51.27	102.91
Milk solids blended in slurry	1	30.57	64.98	384.79
	2	30.57	64.99	384.79
	3	30.57	64.97	384.79
	Average	30.57	64.98	384.79

Appendix 9.5.21 Changes in TVFA (0.01N NaOH per 10 g) during curing.

Types of soycheese	Replication	Ripening period (Days) 0	4	8
Cheese blended in maska	1	20.07	69.10	27.33
	2	20.12	69.10	27.33
	3	20.17	69.11	27.34
	Average	20.12	69.10	27.33
Cheese blended in slurry	1	14.85	17.42	29.73
	2	14.86	17.44	29.74
	3	14.84	17.41	29.77
	Average	14.85	17.42	29.75
Milk solids blended in slurry	1	9.08	20.89	377.40
	2	9.08	20.92	377.42
	3	9.08	20.88	377.40
	Average	9.08	20.89	377.40