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APPENDICES

APPENDIX A.

Quantities of cows which feed in each major countries

Table A: Quantities of cows which feed in each major countries.

Country	Quantities of cows (x1000 units)				
	1995	1996	1997	1998	1999
Canada	1244	1237	1253	1242	1240
Maxico	6440	6440	6540	6600	6700
America	9466	9372	9252	9158	9130
Argentina	2350	2300	2400	2500	2550
Brazil	17500	17100	17067	16900	16750
France	4754	4672	4567	4476	4432
Germany	5273	5229	5195	5026	4833
Italy	2167	2100	2100	2100	2100
Netherland	1709	1664	1660	1600	1590
England	2268	2130	2090	2153	2030
Poland	3715	3442	3550	3496	3400
Russia	18400	17450	15900	14500	13000
Ucrean	7818	7200	6265	6250	6220
India	3300	33500	34500	35000	35500
China	2252	2071	2120	2170	2220
Japan	1034	1035	1032	1022	1008
Australia	1786	1822	1977	2002	2032
New zealand	2994	3153	3260	3270	3285
Others	10810	10554	10383	10445	10329
Total	105280	132471	131111	129910	128349

Source : Dairy, Livestock and Poultry Division, FAS USDA, August' 1999.

APPENDIX B.

Quantities of fresh milk production in each major countries

Table B : Quantities of fresh milk production in each major countries.

Country	Quantities of fresh milk production (x1000 Tons)				
	1995	1996	1997	1998	1999
Canada	7920	7890	8100	8200	8340
Maxico	7399	7586	7850	8366	8500
America	70440	69857	70802	70886	73450
Argentina	8500	8900	9060	9400	9750
Brazil	18375	19480	20600	21630	22495
France	25413	25083	24893	24793	24700
Germany	28621	28776	28702	28500	28500
Italy	10500	10800	10818	10800	10800
Netherland	11294	11013	10922	11200	10895
England	14700	14640	14857	14637	14575
Poland	11420	11690	11980	12100	12550
Russia	39300	35800	34100	3300	31000
Ucrean	17181	1600	13650	13700	13600
India	32500	33500	34500	35500	3600
China	5764	6296	6674	7200	7600
Japan	8382	8657	8642	8566	8480
Australia	8433	8957	9274	9711	10174
New zealand	9684	10405	11500	11640	1140
Others	44903	44449	44252	43960	43968
Total	380729	365379	381176	354089	344117

Source : Dairy, Livestock and Poultry Division, FAS USDA, August' 1999.

APPENDIX C.

Quantities of fresh milk consumption in each major countries

Table C.1 : Quantities of fresh milk consumption in each major countries.

Country	Quantities of fresh milk consumption (x1000 Tons)				
	1995	1996	1997	1998	1999
Canada	2851	2724	2820	2820	2820
Maxico	3357	3412	3552	3745	3800
America	26619	26890	26844	26811	26850
Argentina	2100	2140	2220	2275	2320
Brazil	11025	11400	12100	12826	13467
France	4426	4363	4001	4098	4000
Germany	5815	5602	4292	5293	5200
Italy	3709	3704	3692	3652	3652
Netherland	1723	1701	1672	1670	1669
England	7330	7270	6955	6948	6925
Poland	5781	5829	5640	5300	5400
Russia	14625	14300	14515	14765	14100
Ucrean	3500	3200	2800	2800	2800
India	28500	30500	3200	32500	3300
China	2590	2840	3136	3397	3597
Japan	5143	5187	5156	5042	4690
Australia	1879	1958	1904	1920	1950
New zealand	440	4400	400	400	400
Others	16753	17043	16656	16582	16601
Total	148166	154463	121555	152844	123541

Source : Dairy, Livestock and Poultry Division, FAS USDA, August' 1999.

Table C.2 : Quantities of fresh milk consumption in each major countries.

Country	Quantities of fresh milk consumption (Kg/person/year)				
	1995	1996	1997	1998	1999
Canada	100.27	98.26	97.13	96.18	95.28
Maxico	35.72	35.63	36.41	37.69	37.57
America	100.9	100.91	99.76	98.7	97.94
Argentina	61.24	61.72	63.33	64.2	64.77
Brazil	68.59	70.08	73.55	77.14	80.18
France	76.17	74.75	68.24	69.6	67.66
Germany	71.49	68.7	64.74	64.61	63.35
Italy	63.66	63.44	63.1	62.29	62.16
Netherland	111.5	109.52	107.13	106.52	106.02
England	125.74	124.39	118.71	118.32	117.69
Poland	149.02	149.72	144.33	135.12	137.14
Russia	97.56	95.2	96.44	97.91	93.3
Ucrean	67.48	61.68	53.95	53.94	53.93
India	30.43	32	33	32.96	32.93
China	2.15	2.34	2.55	2.74	2.88
Japan	40.98	41.2	40.82	39.78	39.01
Australia	102.55	105.51	101.38	101.09	101.6
New zealand	129.14	128.49	116.29	115.82	115.42
Austria	156.01	156.11	158.84	159.97	160.14
Denmark	109.43	109.39	109.34	110.83	110.6
Island	189.84	190.57	167.48	169.56	168.5
Spand	110.39	108.42	104.49	103.93	103.63
Sweden	158.02	159.57	158.12	156.73	156.17
Switzerland	99.22	98.53	98.84	97.22	95.37
Romania	172.64	173.01	162.79	156.73	156.83
Total	2430.14	2419.14	2340.76	2329.58	2320.07

Source : Dairy, Livestock and Poultry Division, FAS USDA, August' 1999

APPENDIX D.

Increasing rate of cows, fresh milk quantity and fresh milk production

Table D : Increasing rate of cows, fresh milk quantity and fresh milk production

Year	Total cows	Increasing rate (%)	Cows-female	Increasing rate (%)	Fresh milk production (Tons)	Increasing rate (%)
1992	218457		125538		215457	
1993	235833	7.95	127893	1.88	287164	33.28
1994	259450	10.01	138481	8.28	320894	11.75
1995	281297	8.42	147953	6.84	348212	8.51
1996	303886	8.03	160968	8.8	380101	9.16
1997	319195	5.04	170693	6.04	406000	6.81
1998	342660	7.35	185030	8.4	431000	6.16
1999	360435	5.19	194630	4.86	455000	5.57
2000	397090	10.17	214430	10.17	469000	3.08

Source: Information department of Thai agricultural

APPENDIX E.

Production cost of fresh milk and price

Table E : Production cost of fresh milk and price

Year	Production cost of fresh milk (Baht / Kg)	Selling cost (Baht / Kg)	Net profit (Baht / Kg)	Cost of concentrate food (Baht / Kg)	Secretion of cow (Kg / cow / day)
1992	6.20	7.51	1.31	3.68	6.47
1993	6.54	7.98	1.44	3.66	7.76
1994	6.57	7.96	1.39	3.80	8.25
1995	6.55	7.96	1.41	4.41	8.33
1996	7.25	9.07	1.82	4.40	8.43
1997	7.74	9.39	1.65	4.83	8.38
1998	7.72	10.66	2.94	5.29	8.30
1999	7.47	10.94	3.47	5.30	8.01
Average of increasing rate (%)	3.300	5.764	14.205	6.275	2.275

Source : Information department of Thai agricultural

APPENDIX F.

Quantity and price of import milk and milk products.

Table F : Quantity and price of import milk and milk products.

Year	Skimmed milk		Milk & Milk products		Total	
	Ton	x 1000 Baht	Ton	x 1000 Baht	Ton	x 1000 Baht
1990	47536	211823	41050	2063330	88586	4180153
1991	50905	1880757	45630	2150330	96535	4031153
1992	62147	2768240	51866	2802026	114013	5570265
1993	52375	2484852	53918	2678407	106293	5163259
1994	71749	2913894	71642	3288325	143391	6202219
1995	79919	4123193	74915	4119674	154834	8242867
1996	67174	3895201	92559	5476047	159733	9371248
1997	70990	4029921	121799	7442111	192789	11472032
1998	53041	4073959	86527	7530205	139568	11604164
1999	46568	2760457	82592	5505748	129160	8266205

Source : Information department of Thai agricultural

APPENDIX G.

Capacity, friction loss and velocity of flow stainless

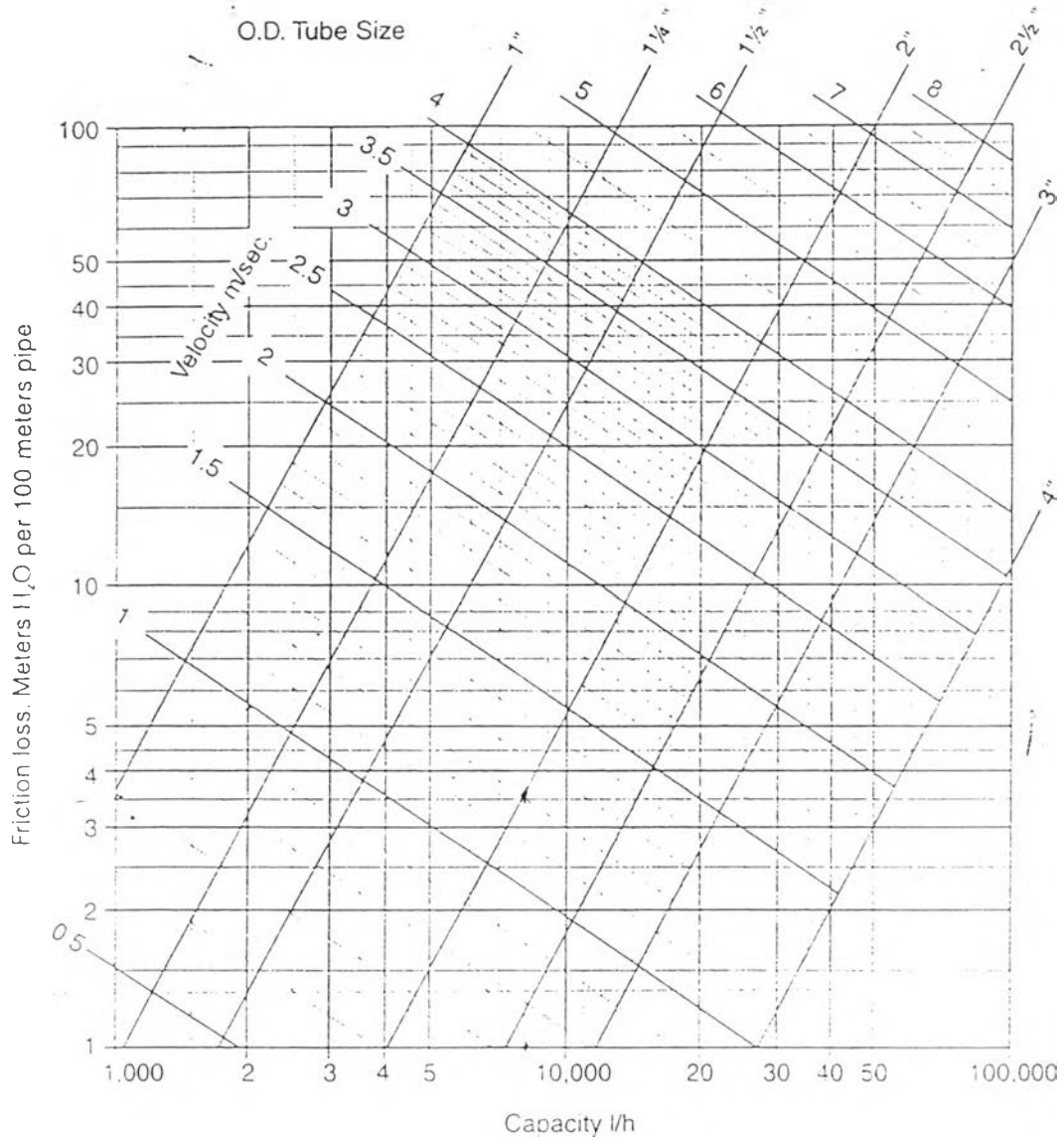


Figure G: Capacity, friction loss and velocity of flow stainless steel pipe
Source: Fluid Handling component book, APV.

APPENDIX H.

Incremental cost analysis by varied production
Volume

Incremental cost analysis
By increase 5% production volume

Maximum capacity :

60000 Tons/year

Calender year	0 2002	1 2003	2 2004	3 2005	4 2006
Production volume -Tons		43050	46924.5	50913.45	56208.6
Investment cost 7641.11					
Cost					
-with whole milk powder; 9.55 Baht/Kg		411127.5	448128.98	486223.45	536792.13
-with fresh milk; 8.73 Baht/Kg		375826.5	409650.89	444474.42	490701.08
Incremental Net cashflow ;Thousand Baht	-7641.11	35301	38478.09	41749.029	46091.05
Break-event point		9318.43 Tons			
NPV		108271.14 Thousand Baht			
Payback period		2.60 Months			
IRR		470%			

Table H.1: Incremental cost analysis by increase production volume 5%

Incremental cost analysis**By increase 10% production volume**

Maximum capacity :

60000 Tons/year

Calender year	0 2002	1 2003	2 2004	3 2005	4 2006
Production volume -Tons		45100	49159	53337.9	58885.2
Investment cost 7641.11					
Cost					
-with whole milk powder; 9.55 Baht/Kg		430705	469468.45	509376.95	562353.66
-with fresh milk; 8.73 Baht/Kg		393723	429158.07	465639.87	514067.80
Incremental Net cashflow ;Thousand Baht	-7641.11	36982	40310.38	43737.08	48285.86
Break-event point		9318.43 Tons			
NPV		113757.69 Thousand Baht			
Payback period		2.48 Months			
IRR		492%			

Table H.2: Incremental cost analysis by increase production volume 10%

Incremental cost analysis**By decrease 5% production volume**

Maximum capacity :

60000 Tons/year

Calender year	0 2002	1 2003	2 2004	3 2005	4 2006
Production volume -Tons		38950	42455.5	46064.55	50855.4
Investment cost 7641.11					
Cost					
-with whole milk powder; 9.55 Baht/Kg		371972.5	405450.03	439916.45	485669.07
-with fresh milk; 8.73 Baht/Kg		340033.5	370636.52	402143.52	443967.64
Incremental Net cashflow ;Thousand Baht	-7641.11	31939	34813.51	37772.93	41701.43
Break-event point		9318.43 Tons			
NPV		97298.04 Thousand Baht			
Payback period		2.87 Months			
IRR		426%			

Table H.3: Incremental cost analysis by decrease production volume 5%

Incremental cost analysis**By decrease 10% production volume**

Maximum capacity :

60000 Tons/year

Calender year	0 2002	1 2003	2 2004	3 2005	4 2006
Production volume -Tons		36900	40221	43640.1	48178.8
Investment cost 7641.11					
Cost					
-with whole milk powder; 9.55 Baht/Kg		352395	384110.55	416762.96	460107.54
-with fresh milk; 8.73 Baht/Kg		322137	351129.33	380978.07	420600.92
Incremental Net cashflow ; Thousand Baht	-7641.11	30258	32981.22	35784.88	39506.62
Break-event point		9318.43 Tons			
NPV		91811.48 Thousand Baht			
Payback period		3.03 Months			
IRR		404%			

Table H.4: Incremental cost analysis by decrease production volume 10%

APPENDIX I.

Incremental cost analysis by varied raw material
Cost

Incremental cost analysis

By increase 5% raw material cost

Maximum capacity :

60000 Tons/year

Calender year	0 2002	1 2003	2 2004	3 2005	4 2006
Production volume -Tons		41000	44690	48489	53532
Investment cost	7641.11				
Cost					
-with whole milk powder; 9.55 Baht/Kg		391550	426789.5	463069.95	511230.60
-with fresh milk; 9.11 Baht/Kg		373510	407125.9	441734.79	487676.52
Incremental Net cashflow ;Thousand Baht	-7641.11	18040	19663.6	21335.16	23554.08
Break-event point		17366.16 Tons			
NPV		51933.61 Thousand Baht			
Payback period		5.08 Months			
IRR		243%			

Table I.1: Incremental cost analysis by increase raw material cost 5%

Incremental cost analysis

By increase 10% raw material cost

Maximum capacity :

60000 Tons/year

Calendar year	0 2002	1 2003	2 2004	3 2005	4 2006
Production volume -Tons		41000	44690	48489	53532
Investment cost 7641.11					
Cost					
-with whole milk powder; 9.55 Baht/Kg		391550	426789.5	463069.95	511230.6
-with fresh milk; 9.49 Baht/Kg		389090	424108.1	460160.61	508018.68
Incremental Net cashflow ;Thousand Baht	-7641.11	2460	2681.4	2909.34	3211.92
Break-event point		127351.83 Tons			
NPV		1082.64 Thousand Baht			
Payback period		32.57 Months			
IRR		17%			

Table I.2: Incremental cost analysis by increase raw material cost 10%

Incremental cost analysis

Maximum capacity :		60000 Tons/year				
By decrease 5% raw material cost						
Calendar year	0	1	2	3	4	
	2002	2003	2004	2005	2006	
Production volume -Tons		41000	44690	48489	53532	
Investment cost	7641.11					
Cost						
-with whole milk powder; 9.55 Baht/Kg		391550	426789.5	463069.95	511230.6	
-with fresh milk; 8.35 Baht/Kg		342350	373161.5	404883.15	446992.2	
Incremental Net cashflow ;Thousand Baht	-7641.11	49200	53628	58186.8	64238.4	
Break-event point		6367.59 Tons				
NPV		153635.56 Thousand Baht				
Payback period		1.86 Months				
IRR		653%				

Table I.3: Incremental cost analysis by decrease raw material cost 5%

Incremental cost analysis

By decrease 10% raw material cost

Maximum capacity :

60000 Tons/year

Calender year	0 2002	1 2003	2 2004	3 2005	4 2006
Production volume -Tons		41000	44690	48489	53532
Investment cost 7641.11					
Cost					
-with whole milk powder; 9.55 Baht/Kg		391550	426789.5	463069.95	511230.6
-with fresh milk; 7.97 Baht/Kg		326770	356179.3	386457.33	426650.04
Incremental Net cashflow ;Thousand Baht	-7641.11	64780	70610.2	76612.62	84580.56
Break-event point		4836.15 Tons			
NPV		204486.54 Thousand Baht			
Payback period		1.42 Months			
IRR		857%			

Table I.4: Incremental cost analysis by decrease raw material cost 10%

APPENDIX J.

Incremental cost analysis by varied investment
Cost

Incremental cost analysis

By decrease 10% investment cost

Maximum capacity :

60000 Tons/year

Calender year	0 2002	1 2003	2 2004	3 2005	4 2006
Production volume -Tons		41000	44690	48489	53532
Investment cost 6877.00					
Cost					
-with whole milk powder; 9.55 Baht/Kg		391550	426789.5	463069.95	511230.6
-with fresh milk; 8.73 Baht/Kg		357930	390143.7	423308.97	467334.36
Incremental Net cashflow ;Thousand Baht	-6877	33620	36645.8	39760.98	43896.24
Break-event point		8386.59 Tons			
NPV		103479.23 Thousand Baht			
Payback period		2.45 Months			
IRR		497%			

Table J.1: Incremental cost analysis by decrease investment cost 10%

Incremental cost analysis

By decrease 5% investment cost

Maximum capacity :

60000 Tons/year

Calender year	0 2002	1 2003	2 2004	3 2005	4 2006
Production volume -Tons		41000	44690	48489	53532
Investment cost 7259.05					
Cost					
-with whole milk powder; 9.55 Baht/Kg		391550	426789.5	463070	511230.6
-with fresh milk; 8.73 Baht/Kg		357930	390143.7	423309	467334.36
Incremental Net cashflow ;Thousand Baht	-7104.75	33620	36645.8	39760.98	43896.24
Break-event point		8852.50 Tons			
NPV		103272.19 Thousand Baht			
Payback period		2.59 Months			
IRR		482%			

Table J.2: Incremental cost analysis by decrease investment cost 5%

Incremental cost analysis

By increase 5% investment cost

Maximum capacity :

60000 Tons/year

Calender year	0 2002	1 2003	2 2004	3 2005	4 2006
Production volume -Tons		41000	44690	48489	53532
Investment cost 8023.17					
Cost					
-with whole milk powder; 9.55 Baht/Kg		391550	426789.5	463069.95	511230.6
-with fresh milk; 8.73 Baht/Kg		357930	390143.7	423308.97	467334.36
Incremental Net cashflow ;Thousand Baht	-8023.17	33620	36645.8	39760.98	43896.24
Break-event point		9784.35 Tons			
NPV		102437.26 Thousand Baht			
Payback period		2.86 Months			
IRR		427%			

Table J.3: Incremental cost analysis by increase investment cost 5%

Incremental cost analysis

By increase 10% investment cost

Maximum capacity :

60000 Tons/year

Calender year	0 2002	1 2003	2 2004	3 2005	4 2006
Production volume -Tons		41000	44690	48489	53532
Investment cost 8405.22					
Cost					
-with whole milk powder; 9.55 Baht/Kg		391550	426789.5	463069.95	511230.6
-with fresh milk; 8.73 Baht/Kg		357930	390143.7	423308.97	467334.36
Incremental Net cashflow ;Thousand Baht	-8405.22	33620	36645.8	39760.98	43896.24
Break-event point		10250.27 Tons			
NPV		102089.94 Thousand Baht			
Payback period		3.00 Months			
IRR		408%			

Table J.4: Incremental cost analysis by increase investment cost 10%

APPENDIX K.

Product cost by varied raw material cost

Product cost with fresh milk

By increase 5% raw material cost

	Description	Cost per unit	Material usage	Cost
		Baht/Kg.	Kg./1000 Kg product	(Baht)
Material cost	Fresh milk	12.500	210.640	2633.00
	Sugar	11.120	100.300	1115.34
	Salt	81.000	1.005	81.41
	Flavor	1,081.200	1.003	1084.44
	Premix	43.700	3.015	131.76
	Coffee powder	122.070	20.800	2539.06
			Subtotal +5%	
Fixed Cost	Indirect expense			247.04
	Laboratory			12.63
	Maintenance			212.45
	Salary			217.67
			Subtotal	
Depreciation	Before investment			285.23
	After investment			19.7
			Subtotal	
Variable cost	Labour			35.31
	Steam			181.01
	Water			98.53
	Electricity			146.20
			Subtotal	
Cost of product		Baht/1000Kg. Product		9413.80
		Baht/ 1Kg. Product		9.41
		Cost not include depre.		9.11

Table K.1: Product cost by increase raw material cost 5%

Product cost with fresh milk

By increase 10% raw material cost

	Description	Cost per unit	Material usage	Cost
		Baht/Kg.	Kg./1000 Kg product	(Baht)
Material cost	Fresh milk	12.500	210.640	2633.00
	Sugar	11.120	100.300	1115.34
	Salt	81.000	1.005	81.41
	Flavor	1,081.200	1.003	1084.44
	Premix	43.700	3.015	131.76
	Coffee powder	122.070	20.800	2539.06
			Subtotal +10%	8343.50
Fixed Cost	Indirect expense			247.04
	Laboratory			12.63
	Maintenance			212.45
	Salary			217.67
			Subtotal	683.57
Depreciation	Before investment			285.23
	After investment			19.7
			Subtotal	304.93
Variable cost	Labour			35.31
	Steam			181.01
	Water			98.53
	Electricity			146.20
			Subtotal	461.05
Cost of product		Baht/1000Kg. Product		9793.05
		Baht/ 1Kg. Product		9.79
		Cost not include depre.		9.49

Table K.2: Product cost by increase 10% raw material cost

Product cost with fresh milk

By decrease 5% raw material cost

	Description	Cost per unit	Material usage	Cost
		Baht/Kg.	Kg./1000 Kg product	(Baht)
Material cost	Fresh milk	12.500	210.640	2633.00
	Sugar	11.120	100.300	1115.34
	Salt	81.000	1.005	81.41
	Flavor	1,081.200	1.003	1084.44
	Premix	43.700	3.015	131.76
	Coffee powder	122.070	20.800	2539.06
			Subtotal -5%	
Fixed Cost	Indirect expense			247.04
	Laboratory			12.63
	Maintenance			212.45
	Salary			217.67
			Subtotal	
Depreciation	Before investment			285.23
	After investment			19.7
			Subtotal	
Variable cost	Labour			35.31
	Steam			181.01
	Water			98.53
	Electricity			146.20
			Subtotal	
Cost of product			Baht/1000Kg. Product	8655.30
			Baht/ 1Kg. Product	8.66
			Cost not include depre.	8.35

Table K.3: Product cost by decrease raw material cost 5%

Product cost with fresh milk

By decrease 10% raw material cost

	Description	Cost per unit	Material usage	Cost
		Baht/Kg.	Kg./1000 Kg product	(Baht)
Material cost	Fresh milk	12.500	210.640	2633.00
	Sugar	11.120	100.300	1115.34
	Salt	81.000	1.005	81.41
	Flavor	1,081.200	1.003	1084.44
	Premix	43.700	3.015	131.76
	Coffee powder	122.070	20.800	2539.06
			Subtotal -10%	
Fixed Cost	Indirect expense			247.04
	Laboratory			12.63
	Maintenance			212.45
	Salary			217.67
			Subtotal	
Depreciation	Before investment			285.23
	After investment			19.7
			Subtotal	
Variable cost	Labour			35.31
	Steam			181.01
	Water			98.53
	Electricity			146.20
			Subtotal	
Cost of product		Baht/1000Kg. Product		8276.05
		Baht/ 1Kg. Product		8.28
		Cost not include depre		7.97

Table K.4: Product cost by decrease raw material cost 10%

BIOGRAPHY

Mr. Saritsak Paditporn was born on January 14, 1975 at Surathani province, Thailand and graduated from Mahidol University, Department of Biotechnology, Faculty of Science in year 1997 and study in Master Degree of Engineering Management at Chulalongkorn University since 1998.

After graduate, he worked as canned liquid coffee production supervisor at Nestle Thailand for 3 year. At present, he was moved to work at another plant in the position of senior production supervisor of liquid milk plant at Nestle Thailand.

