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APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND

CLASSIFIED INVESTIGATION NO. 5
CONCENTRATED COCONUT MILK

REPORT NO. 1
CANNING OF CONCENTRATED COCONUT MILK

BY
UBOLSRI CHEOSAKUL

ASRCT, BANGKOK 1972
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F O R E W O R D

The objective of present investigation is to devise effective processes for canning concentrated coconut milk with unique characteristics in appearance, texture, and flavour, so that the milk can be used for many other food preparations.

CANNING OF CONCENTRATED COCONUT MILK

By Ubolsri Cheosakul*

SUMMARY

A canned, concentrated coconut milk with unique characteristics of colour, texture, flavour, odour, taste, and physical properties was developed in the Food Technology Laboratory. The same process as that described in Report No. 2 on Classified Investigation No. 7 was applied with a few modifications, i.e. preparation of coconut milk, batching, concentration, homogenization, and steaming, in the hope of obtaining a good product with long shelf life. The composition of the finished product was then determined as a control measure.

INTRODUCTION

After a series of investigations on the production of stabilized coconut milk kept in various kinds of containers, the Food Technology Unit found that the stabilized coconut milk was not homogeneous due to its separation into two layers (fat and water layers) and was rather dilute for use as heavy cream in certain recipes of Thai foods. The Food Technology Unit, therefore, carried out further investigations to devise methods of preparing a concentrated coconut milk with desirable texture, flavour, appearance, cost, and suitability for exportation.

In this present investigation a process suitable for canning concentrated coconut milk was developed. It was modified from the previous process by introducing some additives into the coconut milk, evaporating the mixture to exactly four-fifths of the original weight, and then homogenizing and filling it into cans as usual.

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MATERIALS AND METHODS

i) Materials

1) Whole coconut, local.

2) Benzoic acid, B.P. grade, Siam Sciences Service Ltd. Partnership, Bangkok, Thailand.

3) Keltrol, food grade Xanthan Gum, Kelco Company, Clark, N.J., U.S.A.

4) Glycerin, B.P. grade, Siam Sciences Service Ltd. Partnership, Bangkok, Thailand.

5) Tween-80, Vidhyasom Co., Ltd., Bangkok, Thailand.

ii) Equipment

1) Shredding machine, a locally made, pin-roller grater with $\frac{1}{2}$ hp motor.

2) Wabash hydraulic press, Model 30-122T, serial No. 3713, 30-ton force, Wabash Metal Product Company Inc., Hydraulic Division, Wabash, Indiana, U.S.A.

3) Colloid mill, Type OKFRV8, Nr. 508277, Karl Kolb Scientific Technical Supplies, Frankfurt/M, Germany.

4) Self-indicating scale, August Sauter Kg, Nr. 503175, Ebingen (Wurtt.), Germany.

5) Mettler analytical balance P1000, No. 315273, Mettler CH-8606 Greifensee-Zurich, Switzerland.

6) Dixie automatic can sealer, SD-IP-23, Style 309P978-A, Dixie Canner Equipment Co., Athens, Georgia, U.S.A.

7) Can, size 307X113, internally 613 lacquered and externally plain, manufactured by the Metal Box Company of Malaysia Limited, Room 303, I.C.B. Building, 2 Shenton Way, Singapore 1.

8) "NITCHO" High Speed Mixer, Model MX-40, Serial No. 441201, Nihon Choriki Shoji Co., Ltd.

9) Stainless steel steam kettle, capacity 5 gallon, Dover Corporation/Groen Division Elk Grove Village, Illinois, Model TDC/2-20, Patent No. 2950904.

10) Stainless steel pot with cover, capacity 40 litres, 5 gallons.

11) Steam autoclave.

12) Water tub.

13) Perforated basket.

14) Stainless steel graduated beaker.

15) Stainless steel spatula.

iii) Preparation of coconut milk

1) Raw material

2) Shredding

The same procedures as described in Report No. 1 on Classified Investigation No. 7, p. 3 was applied.

3) Pressing

Using a Wabash hydraulic press the shredded meat was pressed at 4500-5000 lb/in^2. The schedule of pressing for the production of coconut milk was as follows:

Weigh charge of shredded coconut
Press until flow abates
Remove and loosen the residue
Press again until flow abates
Remove and lossen the residue
Add water (200 ml of water per kg of the unpressed shredded coconut meat)
Press until flow abates
Remove and loosen the residue then press again until flow abates.

iv) Batching

The expressed liquid was strained through cloth and collected in a pot. The required amounts of Keltrol (0.05% w/w), Benzoic acid (0.1% w/w), glycerin (5% w/w) and Tween-80 (0.02% w/w) were added to the coconut milk, which was then mixed in the "NITCHO" high speed mixer for about 10 minutes.

v) Concentration

After having been throughly mixed, the coconut milk was concentrated in the steam kettle for about 45 minutes. The weight of the concentrated coconut milk was adjusted to exactly four-fifths of the original weight by further evaporation or addition of water as required.

vi) Homogenization

The concentrated coconut milk was blended in the colloid mill five times under nearly aseptic conditions created by wiping the colloid mill with 95% ethanol.

vii) Filling in the can

viii) Steaming

ix) Labelling

x) Quality control

The same procedure as that described in Report No. 2 on Classified Investigation No. 7, except in the case of steaming, was used. The sealed cans were treated as follows:

Group 1: heated in live steam for one hour.

Group 2: boiled in boiling water for one hour.

Group 3: boiled in the pressure cooker at 5 lb/in^2 for 30 minutes.

RESULTS AND DISCUSSION

To obtain a higher yield of coconut milk, as much liquid as possible should be expressed from the shredded coconut meat first without and then with addition of a given volume of water according to the required concentration of coconut milk. As shown in Table 1, the average yield of 774 ml of coconut milk per kg of shredded coconut meat was obtained by pressing the shredded coconut meat twice without and then twice after addition of 200 ml water per kg of unpressed, shredded coconut meat. However, the maximum yield of coconut milk by various methods will be further investigated.

In Table 2 the standard deviation from mean and the coefficient of variation from 5.73 to 12.85% indicate that the results are reliable. Some variations of the reported fat, protein and ash contents of the product are to be expected from variation of the raw material as well as from normal limits of accuracy of the analytical methods. The overall results seem to be reasonably consistent.

A distinct coconut odour developed during the evaporation of coconut milk in the steam kettle. From careful organoleptic and practical evaluation, it appears that the canned concentrated coconut milk has unique characteristics, i.e. white colour, smooth texture, pleasant flavour, distinct coconut odour, sweeter taste, readily dispersed in water, very slow separation into two layers after mixing with water, no recurring precipitation at high temperature, and useful for cooking a large number of foods.

CONCLUSION

In the development of canned, concentrated coconut milk on a laboratory scale, the same process as described in Report No. 2 on Classified Investigation No. 7 was applied, except that 5 steps, namely, extraction, batching, concentration, homogenization, and resterilization, were modified. The composition of the product was determined for the study of its quality after storage. On immediate appraisal, the product has unique qualities which make it highly desirable.

TABLE 1

YIELD OF COCONUT MILK EXTRACTED BY WABASH HYDRAULIC PRESS

Expt. no.	Wt. of shredded coconut meat before expression (g)	Yield of coconut milk after pressing twice without addition of coconut water (ml)	Wt. of coconut residue after pressing (g)	Vol. of coconut water added to the coconut residue (ml)	Yield of coconut milk after pressing with addition of coconut water (ml)	Wt. of coconut residue after final pressing (g)	Total yield of coconut milk (ml)
1	11980	6765	5000	2396	2630	4240	9395
2	11220	6356	4410	2244	2580	3840	8936
3	11280	6190	4640	2256	2550	4140	8740
4	10240	5550	4220	2048	2400	3860	7950
5	10280	5600	4180	2056	2300	3760	7900
6	10230	5500	4340	2046	2450	3800	7950
7	10360	5600	4220	2072	2275	3720	7875
8	10240	5450	4300	2048	2400	3860	7850
9	10280	5600	4100	2056	2300	3700	7900
10	11030	6060	4450	2206	2290	4060	8350
11	10340	5600	4260	2068	2350	3700	7950
12	10040	5500	3920	2008	2380	3500	7880
13	10450	5650	4360	2090	2340	3940	7990
14	10940	6090	4340	2188	2550	3880	8640
Total	148940	81511	60740	29782 (about 200 ml per kg of unpressed, shredded coconut meat)	33795	54000	115306 (about 774 ml per kg of shredded coconut meat)

Note: Transferred from Notebook No. 63/27 p. 51-56.

TABLE 2
AVERAGE COMPOSITION OF CANNED, CONCENTRATED COCONUT MILK

Lot No.	No. of cans	Percentage per weight					
		Moisture	Fat	Protein	Ash	Crude fibre	Carbohydrate
2971F001	4	59.7	28.6	3.7	1.1	nil	6.9
2971F002	3	56.7	30.7	3.9	1.2	nil	7.5
2971F003	3	58.4	28.4	4.1	1.3	nil	7.8
2971F004	3	54.5	32.1	4.3	1.2	nil	7.9
2971F005	2	53.5	32.7	4.2	1.2	nil	8.4
2971F006	2	53.8	32.7	4.3	1.2	nil	8.0
2971F007	2	52.5	33.4	4.3	1.3	nil	8.5
2971F008	2	53.4	33.6	4.3	1.2	nil	7.5
2971F009	2	43.4	39.1	4.9	1.4	nil	11.2
2971F010	2	53.6	32.5	4.3	1.2	nil	8.4
2971F011	2	54.2	32.9	4.2	1.2	nil	7.5
2971F012	2	54.9	32.5	4.2	1.2	nil	7.2
2971F013	2	55.2	30.6	4.0	1.2	nil	9.0
2971G014	2	53.8	32.7	4.2	1.2	nil	8.1
Total		757.6	452.5	58.9	17.1	nil	113.9
Average per lot		54.1	32.3	4.2	1.2	nil	8.2
Standard deviation from mean		.99	0.68	0.07	0.02	-	0.28
Coefficient of variation in %		6.82	7.89	6.36	5.73		12.85

Note: Transferred from Notebook No. 29/1 p. 1-4 and No. 63/27 p. 51-56.

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