

## CHAPTER II

### CONSUMPTION OF MILK AND MILK PRODUCTS

As started earlier, this work deals with *an* economic study, Therefore, this chapter should deal with consumption of milk and dairy products in Thailand because it is of prime importance to the production of these commodities. To more easily visualize consumption, one should split the subject up into reasons for consumption, per capita consumption, factor determinants, and trends in the use of these commodities for direct gratification of consumer desires. These aspects will be investigated at some length.

#### 2.1 Reasons for Consumption

As investigated and experienced, although Thais consume rice as the primary staple food today, they certainly as well consume milk and various milk products, e.g., condensed and dried milk, ice cream, and butter. Especially, they consume fresh, condensed, and dried milk as essential foods for health all the year round. This means that the demand for these commodities is rather constant and perhaps even increases gradually. The authentic reasons for the consumption of such products, revealed by a survey conducted in 1965 by the Faculty of Economics and Business Administration, Kasetsart University, Bangkok, are<sup>1)</sup> (1) using the products for feeding babies; (2) preferring the taste of the products; (3) mixing the products with tea, coffee and other hot drinks; (4) realizing the nutritive value of the products; (5) contributing to health and energy; and (6) mis-

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<sup>1)</sup> Sriaroon et al, Survey of Consumer Attitude Toward Milk in Bangkok and the Production and Marketing Structure Currently Utilized in Distributing This Product in 1965 (Bangkok: Kasetsart University, 1965), p. 24.

cellaneous others. Be conclude, from these points, that people consume the products for reasons of nutritive value, among others. The fourth and fifth points above result from a better health education and from advertisements made Partly by sellers and partly by the Ministry of Public Health of Thailand, since the Ministry has realized that the quality of population health is essential for a maximum production of wealth. And health is in turn a function of education, proper nourishment and sanitation, etc. According to available pertinent statistics, the consumption of milk and dairy products amounted to 62,261.85 tons in 1967.<sup>1)</sup>

As to the consumption of particular products, in the past people consumed more dried and condensed milk than other forms. Today's consumption pattern is similar. Authentic reasons for the consumption of dried and condensed milk revealed by the survey are<sup>2)</sup> (1) utilizing the product for feeding babies because of high nutritive value; (2) mixing the product with tea, coffee and other hot drinks and for better flavour in cooking and baking; (3) being less perishable under tropical conditions; (4) being cheaper in price compared with fresh milk; and (5) being as good in quality as fresh milk, but more convenient to buy. These reasons certainly induce the people to consume these forms of the product in bigger quantities than the fresh variety.

Some Thais do not consume fresh milk at present because of the following reasons:<sup>3)</sup> (1) believing that milk contains too much fat, harmful to health; (2) having an aversion to milk taste; (3) thinking milk too expensive; (4) not knowing the nutritive value of milk; and (5) having a satisfactory substitute for this product such as various beverages.<sup>4)</sup>

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<sup>1)</sup> This amount consists of the imported milk and milk products of 59,946.85 tons and of the local milk production of 2,275 tons in 1967.

<sup>2)</sup> Sriaroon et al, Op.Cit., p. 18.

<sup>3)</sup> Sriaroon et al, Op.Cit., p. 10.

<sup>4)</sup> They are orange, juice, coffee flavoured milk, artificial milk.

Now some of these reasons may require further explanation. The third reason is that of consumers who have little demand for dairy products. They think that pasteurized fresh milk and milk products are very expensive and that they cannot afford them. This difficulty could be solved by an appropriate measure such as government subsidy of the industry. The fourth point is the problem of lack of education in regard to milk. The increasing dissemination of knowledge of dairy-product health value would be appropriate to solve the problem successfully. As for the first and the second points, some consumers consider that milk is very fatty and harmful to health, thus they do not consume it. This is perhaps the property of form problems which should be solved properly by an appropriate measure such as utility creation which is able to satisfy non-milk drinkers' wants. The last problem is a marketing one that should be overcome by more advertising or by a proper distribution of better and high quality products. It would thereby induce the non-milk-drinkers to buy the product instead of other beverages and thus increase demand and consumption at home.

It is quite clear that many people consume milk and milk products in Thailand. This would indicate that there is actually an effective demand for these commodities.

## 2.2 Time of Consumption of Fluid Milk

Investigation shows that Thai adult men drink more fresh milk at meal time than Thai adult women. A principal reason for this imbalance is that women seldom drink milk because they are afraid of becoming fat. Thai children drink milk much more than adults because their parents know the nutritive value of milk.

Concerning time of consumption of fluid milk, Thais in Bangkok at every level of income prefer to drink milk in the morning and before bedtime rather than at other meal times.

They prefer other **kinds of drinks** during other **periods**. **Considering** all age **levels** and income **levels**, a substantial majority of people have a rather strong preference for buying fresh milk through home delivery **service because it is convenient**. Thus, a minority prefers to buy **fresh** milk in **retail** or **from** other institutions such **as** the **office** of the producer.

### 2.3 **Factors** Determining **Dairy-Products** Consumption

We now turn **our** attention to **examine** the **factors** that have probably affected the **demand** for milk and dairy products in **Thailand**. In **general**, the **demand** for these **commodities** is **dependent** chiefly upon these **factors**: **real income**, **taste**, **real price of the product**, **age level**, **brand of the product**, **advertising**, **population size**, and **availability** of substitute goods. **Each** of these relevant factors should **be considered** and analyzed separately.

#### 2.3.1 Income Level

Consumer income considerably **affects** the **consumption** of dairy **products** in the country. A **high income** enables **people** to consume the products **daily**, but a low income does not. **Some** Thai rural people do not consume the products mainly because of their low agricultural income. In the past **Thais** with high income **consumed** the products daily in greater **quantity**, and among the consumers of the products they constituted the **larger** group. Thais with low income **consumed** the products occasionally in smaller quantities and constituted the **smaller** group.

To verify the above **statement**, the **monthly income** of Thai consumers in **Bangkok** is **used**; of **Bangkok**, because it is the country's most important center. **According** to the survey made by senior lecturers of the **Kasetsart** University in 1965, 2,200 **families** in Bangkok **were** interviewed. On the

level of their monthly **income**, the families were **divided** into 6 groups. And the first four **groups** with monthly **income ranging** from 450-4,000 Baht were considered **as** the **loner income groups**. The **second** two groups with monthly income ranging from 4,000-6,000 Baht or more were considered **as** the higher income groups. An analysis concerned revealed that the **lower** percentages of **consumers** of dairy **products** were in the **loner income groups** and the higher percentages were in the higher income groups. From these **facts**, we can conclude that the **Thais** with real higher income **were** greater in number **as consumers** of dairy products and the **Thais** with lower income **were much smaller** in number **as consumers** in 1965.

In 1973 such a **conclusion is not justified**, because the figures **have changed** considerably. According to a survey made by the author in 1973, **Thai consumers** of milk and milk products with **loner income** are **bigger** in number and **consume** the **commodities** in **greater quantities**, while the ones with **real higher income** are smaller in number and **consume** the **commodities** in smaller quantities. Some **reasons** for this statement are that (1) **those** with lower income constitute a **bigger** group of the population of Thailand which **consumes** the products today and (2) **those** with real higher income **constitute** a smaller group which **consumes** the **products** in smaller quantities. In the past only a few low-income people consumed the **products**, but today a majority of **them consume** the products for health **purposes**. However, the consumption of dairy products by the people is highly influenced by their income levels, particularly among the low-income **consumers**. An income-level change **affects** consumption. For **instance**, a rising income enables people to consume the products more. **The per capita consumption increases proportionally** to a rise in **income**, while the **degrees** of income elasticity of demand for **the products** is relatively **loose**. For example, the numerical value of income elasticity of demand for whole milk measured by **FAO** around 1970 **was 1.5 ( $E_i > 1$ )**. **Income is** thus

the major shifter of demand for **the product.**<sup>1)</sup>

More knowledge of the nature of **milk** consumption can be gained by determining the age levels of consumers **to** find a correlation between **age** and **consumption.** To achieve this **purpose, an analysis** of the subject will be presented here.

In 1965 surveyors of the Faculty of **Economics** and Business Administration interviewed 2,200 respondents in Bangkok about the consumption. The respondents were divided into 6 age groups according to their age levels. The **ages** were arranged in terms of **class** intervals. All computations concerned clearly revealed that the percentages of consumers **of fresh milk were** only slightly different **among** the various age groups and can thus conclude that there **was** no **signifi-** cant correlation between age and fresh **milk** consumption in 1965.

In 1973 this conclusion is still justified **because** the figures have only slightly changed. The present study reveals **that, in general, Thai** consumers are not mindful of their ages as a factor in their consumption of **milk** and **milk** products. They think instead of the nutritive value of **milk** and their desire to satisfy thirst.

In 1965 the **percentage** of **consumers** of any form of **milk** in the 0-5 year **age level** group **made** up 75.6 **per** cent of the total number of **consumers** of milk in Bangkok. The prime reason for this **high** consumption is that the **Thais use** dairy **commodities** for feeding babies. (This is an exception **all** high consumption among the age groups in **Thailand.**) This characteristic of milk **consumption** obtains **today, probably** **because** the **nature** and quality of cow **milk** are believed to be **similar** to those of human milk.

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<sup>1)</sup> Agricultural Commodity Projections, 1970-1980 (Vol. 11, Rome: FAO, 1971), p. 272.

### 2.3.3 Price of Dairy Products

Viewed in its broader sense, a commodity's price acts as a signal and rationer. A higher price means tighter rationing and discourages consumption by those whose incomes are low; conversely, a lower price stimulates consumption. On the production side, a higher price signals industry to increase its output. Conversely, however, lower price depresses production, for economic reasons.

The above applies to the consumption of dairy products. For example, the price of liquid milk contained in a half-pint or quarter litre container is two Baht. Milk consumers feel this price rather high compared with the price of other beverages. It discourages the consumption of milk to some extent. People having low incomes thus consume cheaper beverages. Some milk consumers with low incomes will even discontinue milk consumption for some time. On the other hand, if the price decreases, they will consume more. They react to specific changes in the price of liquid milk.

According to the 1965 Kasetsart survey, price had some influence on milk consumption of Bangkok people at every income level. The results of the survey indicated that 15.86 per cent of Bangkok consumers in all income groups would consume more milk if the prices decrease 10 per cent, and 29.09 per cent would consume more milk if the prices were decreased 25 per cent. But 22.22 per cent and 31.31 per cent of the consumers in the lowest income group would consume more milk if the prices were decreased 10 per cent and 25 per cent respectively. However, among all income groups, 58.23 per cent of the consumers would consume milk in the quantity they usually drink, despite a price change in either direction. The interesting reason for such consumption without consideration of price can be split into two categories: (1) that of lower income groups, who could not consume more because they could afford it at any price, and (2) that of the high-income groups,

who would not change the quantity consumed **because** of their **concern** solely with the nutritive value of milk.<sup>1)</sup> From the data, then we conclude that the **price** of milk affected its consumption by **Thais** at every income level in nearly the same **manner, although price** would probably influence more consumers in the lower income **levels** than in the higher income groups.

In 1973 the present study reveals that the pattern of **milk-price** behaviour is almost similar to that above. The main **reason** is that price remains a main factor. The lower price of milk stimulates consumption because they feel that their **incomes thus** increase to some **degree**. Yet today's higher price does not **discourage** higher-income **consumers**. They see that milk and milk products are a kind of necessary food for health. Although the price **increases, these** consumers do not **wish** to change their consumption **significantly**.

#### 2.3.4 Brands of Dairy Products

A brand marking a **commodity** with a trademark for recognition and promotion is a decisive factor mainly for **consumers** to determine which commodity they want to purchase. **Buying** the commodity without brand consideration may not be reasonable. A reasonably **intelligent** buyer should express brand preference to get right merchandise of **good** quality.

As regards Thai consumers of milk and milk products, the present study **reveals** that, on the basis of **brand, they** fall into two groups: the one with a brand **preference** and the other without a brand preference. The first **group, which** is the **smaller, purchases commodities** with brand consideration. **Among** the **consumers** of this **group, some** consider the quality of the goods **they purchase** while others consider both quality and flavour. And some in this group have brand preference **because** of a reputation of the plant producing the brand and would not readily

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<sup>1)</sup> Sriaroon Resanond et al, Op. Cit., p. 21.



use a substitute brand.

The second and larger group of milk consumers at every income level purchases milk without brand consideration. They have the opinion that brand has no influence over their milk purchase.<sup>1)</sup> This may be due mainly to their limited knowledge of nutritive or hygienic value of milk and other values associated with it. Such ignorance may be justified for Thai rural consumers because of their backwardness.

From the above facts we can draw a conclusion that the greater number of Thai milk consumers purchase milk without brand preference and that brand had little influence in milk consumption in Thailand during and before 1965.

Such a conclusion is not justified at present for a number of reasons. Thai milk consumers in greater number now purchase the commodity with brand consideration. Because they associate the product quality with a specific brand produced by a hygienic plant. They recognize the brand of their favourite product. One of the most popular brands is called "Mali Brand"; it carries the picture of a flower popular in Thailand. Consumers prefer the product labelled with this brand very much at present. It is thus fair to say that the brand of dairy product has much influence over consumption today.

### 2.3.5 Advertising and Promotion

Another important factor influencing dairy-products consumption is advertising. It is decisively important because it is the art of making known to people, in one way or another, the products offered for sale. Various methods of persuasion are employed to induce people to purchase.

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<sup>1)</sup> Op. Cit., p. 32.

The **sellers** of milk and milk **products** in Thailand are **aware of** the importance of **advertising**. **Advertising** done by **sellers** is designed to promote milk and milk-products **consumption** by instilling **the people** the knowledge of the high nutritive value of the **said products** and their **immense importance** to health.

Advertisements embrace **fresh milk, ice-cream, dried and condensed milk, evaporated milk** and other **products** through publicity media such as television, <sup>1)</sup> radio, <sup>2)</sup> newspapers, <sup>3)</sup> posters, <sup>4)</sup> films <sup>5)</sup> and highway **display signs**. <sup>6)</sup> It is apparent that the **advertisements** for all dairy products except fresh milk are more effective when presented by television than by other media because most **consumers** recall better the advertisement <sup>6</sup> on **television**. However, **fresh milk** advertisements prove more effective over radio than on television because many homemakers **hear** fresh milk **advertisements** over the radio. They **perhaps** had seen fresh milk **advertisements** on television **less** often because such ads do not **often appear**. **Newspapers** advertisements are less effective than those on radio **because** a smaller number of **consumers** subscribe to newspapers then **listen** to the radio.

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 There are at least three television stations in Thailand today; each of them has a daily program advertising various goods and services. One of the goods advertised periodically is **condensed milk**. Other kinds of dairy **products** are advertised occasionally.

2) The country has about one hundred radio **stations** broadcasting **daily**; many of them broadcast **qualities** of some dairy products occasionally.

3) Five newspaper<sup>3</sup> in Thai and three **newspapers** in English have published the advertisements of every kind of dairy products for **some** time.

4) Many **alacarda** are displayed in public places advertising **some** kinds of dairy **products**. The placards are very popular.

5) Many **cinemas** have films and **slides** on milk and milk products shown for one minute prior to showing motion picture features.

6) The highway **signs** are generally installed on **sides** of highways and at **road** conjunctiona.

The advertisements do induce people to buy the above-mentioned commodities to some extent.

Hesldas appearing in **advertisements, milk** consumption is written about by the **Ministry** of Education of Thailand In relation to **the subject of hygiene, one** of many subjects **taught** at primary **and** secondary schools and **some** vocational colleges In the country today. These lessons are designed to **make school** boys and **girls** realize the nutritive value of milk, knowledge which certainly stimulates **milk** consumption at home.

### 2.3.6 Availability of Substitute Goods

Near substitutes for pasteurized fresh milk have been found. **One** of them is an artificial milk made from **soya-been, manufactured** by a bottling plant In **Bangkok**. Its nature and quality similar to **that** of natural **milk, it** is also **popular among** Thai consumers **today**. The price of one bottle of **210 c.c.** of **the artificial** milk is **1.25 Baht, lower** than the price of one plastic bag of **200 c.c. of** pasteurized fresh milk produced by a **dairy plant.** <sup>1)</sup> **The artificial** milk is not only **much lower** in **price, but** also **slightly greater** in volume. **When** the artificial milk price is much lower than that of the **natural milk, the** demand for the latter is affected. **It is apparent** that many **consumers, e.g., those who** feel it inconvenient to buy fresh **milk, tend** to purchase the artificial milk. In the **process** the milk consumption fluctuates from time to time. **More specifically, the** consumers buy less **natural milk** at two Yaht than **previously**. **Therefore, the** substitute goods have **influenced** the demand *for the* said product for **some** time at present.

### 2.A Per Capita Consumption of Milk and Milk Products

Our next task is a **scrutiny** of per capita consumption of those **commodities** for visualizing the whole consumption

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<sup>1)</sup> Two Baht in 1972.

picture.<sup>1)</sup> Owing to a quite new dairy industry, Thai home consumption per head is of course small, unlike that in a dairy country such as Denmark. Moreover, no official data of complete milk consumption of the past is available consecutively for a trend study in Thailand. To clarify the matter as much as possible, reliable official data concerning some specific year should be presented in the present study.

Each consumer consumes pasteurized fresh milk and milk products daily and annually in different quantities by reason of different income. But the quantity as such is not very much different among the consumers within various monthly income groups. And the quantity of each form of the product consumed is not much different among the various products,<sup>2)</sup> except powdered milk, which is consumed in greater quantity because the people use it for feeding babies.

Quantitatively, in Bangkok the daily per capita consumption of fresh milk in 1965 among milk consumers on all income levels was 7.69 ounces. For evaporated milk daily per capita consumption was 6.24 ounces lower than that of fresh milk in the same year. The powdered milk per capita consumption was 14.49 ounces daily in 1965, higher than rates of consumption of other products. Besides these, people consumed condensed milk at the fairly high rate of 8.18 ounces per capita daily. This product is used mostly for cooking and mixing with tea, coffee, and other hot drinks. They drink less artificial milk and other kinds of miscellaneous milk products, the rate of daily per capita consumption of these two products being only 5.65 and 7.03 ounces respectively in 1965. The daily per capita consumption of all milk-based products by all income groups was 49.28 ounces, and the annual per capita consumption was 17,987.30 ounces in the same year.<sup>3)</sup>

1) Per capita consumption of milk relates only to those who consume milk.

2) They are all fresh milk, canned or evaporated milk, powdered milk, condensed milk, artificial milk, and others.

3) Sriaroon Resanond et al, Op. Cit., p. 13.

Considering all **figures, it** can be concluded that the daily **per** capita consumption of powdered milk by all monthly income groups in Bangkok **was** bigger than that of any other dairy product In 1965.

As to the per capita consumption of milk and milk products by the entire population in 1972, this present research reveals that it **is** very small when it **is** compared to the recommended amount of the products required for health by a human body. If we take the aggregate **quantities** of both local and imported dairy products **as** the basis for calculating the per **capita consumption, it** is found that the **average** value of **these** commodities **consumed** annually by one Thai consumer **is** about 30 Baht in 1973, <sup>1)</sup> or **approximately** 102.12 ounces (3.18 kg.) of dairy products. The main **reason** for such low **par** capita **consumption is** that rural people in great numbers do not **consume** any dairy products because of their **low** income. <sup>2)</sup> This **is a** main problem that should be **overcome** in the near future.

## 2.5 Trend in Dairy-Products Consumption

Local statistics of milk **and** milk **products** produced locally in past **years** can be cited because of the new and under-developed dairy industry of Thailand. And **experience** in the consumption of dairy products tells **us** that the local dairy production is recognized **as** being extremely inefficient to **meet local demand, which** has increased up to present. **Particularly, the** demand for the **pasteurized fresh** milk during the 1960-1972 period **increased** to 12.77 per cent<sup>3)</sup> due **to, e.g.,** (1) the increase of a **preference for taste** of the product **and** (2) the considerable **increase** in population.

Thailand **has** to import the products **consumed** annually by consumers and dairy industry **producers. Statistics re-**

1) Division of Agricultural Cooperatives, "Policy on Organization and Promotion of Dairy Cooperatives" (a pamphlet in Thai, 1973), p. 3.

2) *Ibid.*, p. 3.

3) The Division of Agricultural Economics.

Regarding yearly imports are presented below.

**Table 1.**  
Thai Population and Imported Milk and Milk Products  
and Their Value, Thailand, 1956-1972

Year	Population (000)	Total Dairy Products <sup>1/</sup> (kg.)	Percentage Change	Growth Rate (%)	Value (Baht)	Percentage Change	Growth Rate (%)
1956	23,445	38,819,000					
1957	24,148	47,180,000					
1958	24,873	50,277,000					
1959	25,619	51,871,000					
1960	26,388	52,672,000					
1961	27,180	53,789,000					
1962	27,995	59,177,860			454,515,516		
1963	28,835	63,839,138	6.79		521,468,824	14.73	
1964	29,700	60,271,686	-5.58		543,608,345	4.24	
1965	30,598	60,181,013	-0.15		549,849,517	1.15	
1966	31,508	62,428,172	3.73		554,664,444	0.07	
1967	32,680	59,986,854	-3.91		557,871,580	0.58	
1968	33,693	63,278,315	5.48		560,304,219	0.44	
1969	34,738	66,394,351	4.91		592,345,432	23.56	
1970	34,152	50,463,148	23.99		438,501,838	-36.61	
1971	36,527	39,278,786	22.16		431,360,007	-1.63	
1972	37,623	30,082,943	23.40	-5.04	471,734,717	9.36	-.67

source: 1. Division of Agricultural Economics, "Agricultural Statistics of Thailand 1970", Bangkok, the Division, 1972, p. 122.

2. Division of Agricultural Economics.

<sup>1/</sup>They cover fresh milk, condensed and dried milk, cheese, butter and others.

<sup>2/</sup>"Preliminary Report of the 1970 Population and Housing Census of Thailand", Bangkok, National Statistical Office, Nov., 1970, p. 2.

From Table 1 we learn that the quantities of silk and milk products imported increased steadily from 38,819,000 kgs. in 1956 to 63,839,138 kgs. in 1963. This would imply the consumption of the products by the people increased in this period because of the people's greater recognition of the nutritive value of the products. Another reason for the increased consumption is that Thai population growth, as shown by Figure 2, created a demand for dried and condensed milk in

increased quantities during the period. The population is increasing at the rate of nearly 1.5 million persons each year,

However, the quantities of imported products have decreased generally since 1964. Particularly, they decreased consecutively during the 1970-1972 period. The growth rate of dairy-products importation during the 1962-1972 period was -5.04 per cent per annum. The reasons for this decrease are, e.g., (1) the price per kg. of foreign powder milk increased

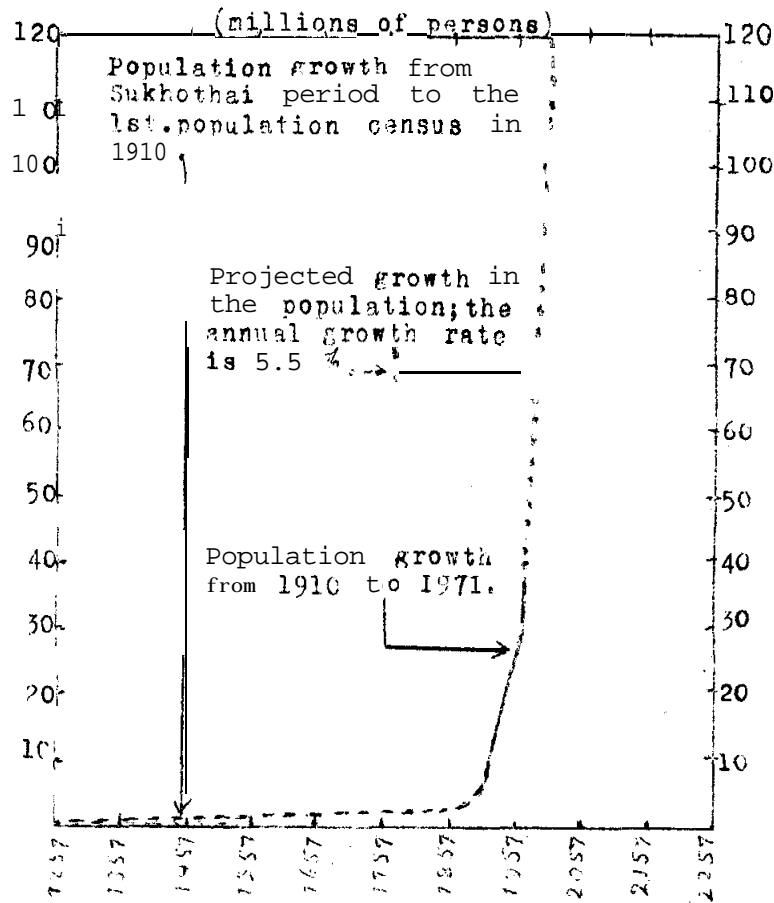


Figure 2

Thailand Population Growth, 1257-2007

from 4.90 Baht in 1970 to 11.09 Baht in 1972 and the price per kg. of butter oil increased from 17.32 Baht to 21.42 Baht over the same period, (2) the duty imposed on the imported dairy products increased from 10 per cent to 25 Per cent in 1970, and (3) milk production now takes place on farms in Thailand to supply in part the growing demand.

Table 1 shows that the total values of dairy products imported by Thailand decreased at an annual rate of -0.67 per cent during the 1970-1972 period. The decrease is small because of the increase of per-unit price mentioned above. In 1972 the percentage change of the imported Products values was 9.36 per cent, which was higher than the percentage change of the quantities of imported products in the same year, the main reason for this disparity being that the products prices were very high in 1972.

According to the statistical sense, however, adding quantities of local fresh milk to the quantities of imported products of the same year may indicate an upward trend in total consumption. It is forecast that the trend will continue upward in years to come.

To test the hypothesis and to visualize a trend line for consumption, the Method of least squares is applied in Table 2. In this table the equation of an arithmetic straight line trend is  $Y_c = a + bx$ , where  $Y_c$  is the trend value of the time series  $Y$  in the years numbered  $x$ . The letter  $a$  is called the  $Y$  intercept, while  $b$  indicates the slope of the trend line. The value of  $a$  and  $b$  is constant and unknown requiring solution.

To do this the two "normal equations" are used under:

$$\sum Y = Na + b\sum(X) \quad \text{----- (1)}$$

$$\sum XY = a\sum(X) + b\sum(X^2) \quad \text{----- (2)}$$

where  $N$  is the number of items in the series.

Since  $X$  in column (3) of Table 2 = 0

$a\sum(X)$  in the equation (2) = 0

and  $b\sum(X)$  in the equation (1) = 0

thus the normal equations are simplified to:



$$\sum Y = Na$$

$$\sum XY = b \sum X^2$$

Solving these equations for a and b,

$$a = \frac{\sum Y}{N} \quad \text{----- (1)}$$

$$b = \frac{\sum XY}{\sum X^2} \quad \text{----- (2)}$$

Table 2

Computation of Trend-Least Squares Straight Line  
Short Method—Odd Number of Years  
Imports of Dairy Products of Thailand, 1956-1972

(1) Year	(2) Import (ton) Y	(3) K I	(4) XY	(5) X <sup>2</sup>	(6) Yc = a+bX
1956	38,819		-310,552	64	53,214.04
1957	47,180	1	-330,260	49	53,243.02
1958	50,277	2	-301,662	36	53,272.00
1959	51,871	3	-259,355	25	53,300.98
1960	52,672	4	-210,688	16	53,329.96
1961	53,786	5	-161,358	9	53,358.94
1962	57,775	6	-119,550	4	53,387.92
1963	63,839	7	-63,839	1	53,416.90
1964	60,271	8	0	0	53,445.88
1965	60,181	9	60,811	1	53,474.86
1966	62,428	10	124,856	4	53,503.84
1967	59,986	11	179,958	9	53,532.82
1968	63,278	12	253,112	16	53,561.80
1969	66,394	13	331,970	25	53,590.78
1970	50,463	14	302,778	36	53,619.76
1971	39,278	15	274,946	49	53,648.74
1972	30,082	16	240,656	64	53,677.72
	$\sum Y = 908,580$	$\sum X = 0$	$\sum XY = 11,823$	$\sum X^2 = 408$	

Source: Table 1

Substituting the value obtained from columns (2) and (4) in Table 2 in the two simplified normal equations, we get

$$a = \frac{908,580}{17} = 53,445.88$$

$$b = \frac{11,823}{408} = 28.98$$

Having substituted these value for a and b in the equation of an arithmetic straight line trend, the resulting equation

then read:

Trend of Annual Imports of Dairy Products of  
Thailand, 1956-1972

$$Y_c = 53,445.88 + 28.98X$$

Origin: 1964

Units: tons

We substitute each-year value of  $X$  obtained from column(3) of Table 2 in the above equation(see column(6)). Then we plot these corresponding points, and draw a straight trend line through them on the following graph:

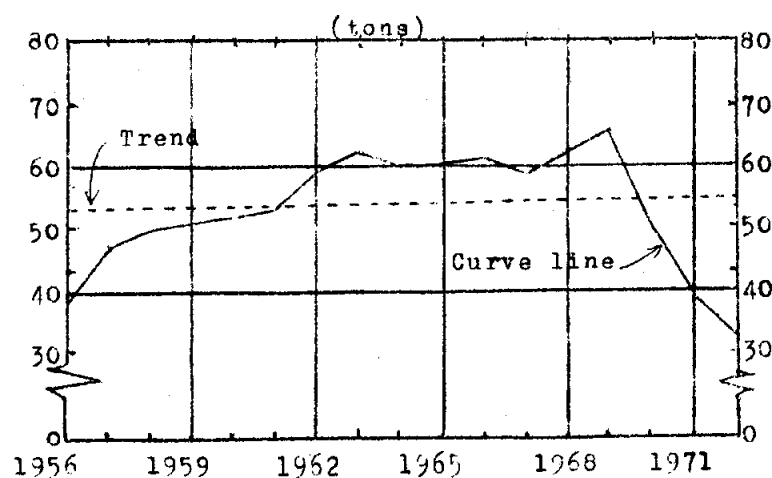


Figure 3

Imports of Dairy Products of Thailand,  
1956-1970. Trend Indicated by a Least-  
Squares Straight Line.

The above figure shows a slightly upward trend in imports of dairy products between 1956 and 1972. The reason for this increasing trend might be greater local market demand. On the basis of this figure, it is expected that such a trend will still be upward for a few years to come.