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The Consumption Pattern of Milk Products and The Development of New Dairy Products in Japan

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The total milk production in Japan was 6,502,400 tons in 1980 and 7,680,000 tons is planning to produce in 1985. This means that milk and milk products are no longer our favorite foods. They are becoming one of the most important foods for us after rice. On the other hand, the balance of demand and supply has been broken already and we have many problems about milk production and milk industry (for example, the excessive milk production and the pressure of international trade etc.). Many of the major dairy research institutes appear to be too preoccupied with fundamental research, and with applied research into traditional dairy products, to give their attention to work on new products.

In this symposium, I would like to talk about milk and milk products produced in Japan, the condition of import trade, milk products expected to increase in the consumption and the development of new products.

1. Production and consumption of milk and milk products.

Table 1 shows the production of milk and milk products in Japan in 1980. The number of dairy farms has been decreasing 5-8% every year and now 115,400. However, each farm intends to breed many cows, then the number of cows is increasing (average 18 cows per one farm, in Hokkaido 35). Total milk production was about 6,502,400 tons last year. As milk production is excessive, a policy for adjustment of demand and supply is carried out in our country. But cows ability to produce milk is raised (5,000 kg/year), then the total milk production is supposed to increase several percent every year against the policy.

About 61.3% of the total milk production is consumed as market milk and the consumption is expected to increase 3.3% every year. Many kinds of liquid milk products were produced as the following, flavoured milk (coffee, chocolate and fruits flavour) 627,500 kl (119% of the year before last), fermented milk 243,300 kl, sour milk beverage 465,000 kl. In this year, fermented milk and sour milk beverage are more than 110% of last year up to the present. The increase of ice cream is also large. In 1980, 99,300 kl of ice cream was produced (milk fat concentration is more than 8%). Now, I would like to explain a standard of ice cream and other ice cream similitudes in Japan.

1) Ice cream: total milk solid (TMS) has to be included more than 15% and milk fat more than 8%.
2) Ice milk: TMS<10% and milk fat<3%.
3) Lacto ice: TMS<3%.

Only production of ice cream appears on a statistical table in last year. The amount of production of ice milk and lacto ice (milk fat is less than 8% or vegetable oil is used) can not be known, but it is obvious that these ice cream similitudes are consumed more than ice cream.

Then about other milk products will be explained. In a decade from 1965 to 1975 the consumption of cheese was increasing more than 10% every year, but only 6-7% for the past few years. Most of the cheese consumed in Japan is processed cheese and most part of it is made from imported natural cheese. However, the consumption of natural cheese, especially soft type natural cheese is observed to be gradually in-

Table. 1. The amount of milk and milk products produced in Japn (1980)

No. of dairy farms		115,400	Sweet. cond. whole milk	(t)	50,302
No. of dairy cows		2,120,000	Sweet, cond. skim milk	..	23,596
Milk production	(t)	6,502,400	Evaporeted milk	..	3,514
Market milk	(t)	3,986,200	Whole milk powder	..	31,714
Milk beverage	(kl)	627,500	Skim milk powder	..	126,760
Fermented milk	..	243,300	Modified milk powder	..	59,299
Sour milk	..	465,000	Ice cream mix powder	..	2,572
Ice cream*	..	99,300	Butter	..	64,109
			Cheese	..	65,928

* milk fat $<$8.0%

creasing. Production of modified milk powder was at the peak in 1973 (93,000 tons), has been declining during the last 4-5 year, because of the human milk nutrition movement and decreased of birth rate. So, it was only 59,300 tons. In the part of it, about 10,000 tons was for exportation to Southeast Asia especially to Taiwan.

Production and consumption of some of these traditional products, notably condensed and evaporated milk and whole milk powder have unchanged because they are almost used in ice cream, cakes and recombined milk manufacture. Butter and skim milk powder are made from the excess milk, therefore products are increasing and plenty in stock. Then, a number of leading dairy research institutes have strong teams concerned with the new utilizations and development of new products, but basically, there are problems in their high price.

Instead of butter, the consumption of margarine is increasing because they think that butter has much cholesterol and saturated fatty acid, so there is a risk to induce arteriosclerosis or hart disease. The consumption of butter has been declining in many countries during the last 25-30 year. Nothing to say, margarine is cheaper than butter. It is the another reason that soft type margarine was developed and is actually very easy to be used. Table 2 shows the cholesterol contents in animal food. It can not be said that the cholesterol in foods directly induces the disease of the system of circulation when Japanese eating habits are considered. It is not too much to say that there is no relationship between the hart disease and intake of 200-400 ml of milk or some bread and butter. It is considerable that cholesterol from foods except milk products is much more and cholesterol synthesized in human liver is so much, 1.5-2.0 gms in day. Then it is necessary to make people understood that cholesterol from foods is very small amount compared with by synthesis in human liver. A comparative clinical experiment taking butter or margarine by two groups of men for five years in West German was reported. In the experiment results there was no essential difference between the value of triglyceride and cholesterol in the serum. It is well known that eggs have much cholesterol but it must be know that they also have much linoleic acid which inhibit cholesterol to stock to in-side of arterly.

As mentioned above, the self-support rate of milk and milk products in Japan is about 90%, but the consumption of milk and milk products in our country is very small compared with other countries (10-20% of other countries). On the average, one person consumes 106.0 gms of market milk, 2.0 gms of cheese, 1.4 gms of butter and 5.0 gms of other milk products per day. It happens in the cause of the difference of eating habits and the high price of milk products. Milk and milk products and very nutritious and cheaper than other foods when per gms of nutrition value are considered. Laterly, problems of an over weight child, adult disease, shortage of vitamin or anemia appear in

Table 2. Cholesterol levels in animal foods

Sample		Cholesterol mg	Sample		Cholesterol mg
Milk	200ml	25	Beef	100 g	90
Cheese	25 g	36	Chicken	85 g	70
Ice cream	114 g	50	Paralichthy	85 g	50
Butter	20 g	50	Egg	55 g	264

Japanese. So it is very necessary to review the substance of nutritions and the balance of nutritive elements as well as to notice the nutritive effect of milk concretely as a good natural food.

2. The amount of imported dairy products

Table 3 shows the amount of imported dairy products in 1980. Many kinds of milk products as well as milk components (lactose, casein are imported and they amount to about 2.5 million tons when they are converted into liquid milk. The total account was 47.5 billion yen. Milk is over produced in Japan but much milk products is imported. This problem originates in the international trade and low price of milk products in other countries. The price in other countries is one third or one fourth of in Japan.

Casein and lactose which are not produced in Japan are used for making milk products similitudes (baby foods, ice cream, coffee whitener, yoghurt or cheese foods) and other foods (diet foods, bread, biscuits, noodle, meat products or fish-pastes). Skim milk powder used for animal feed is imported in very low price and account for the most part of the products. Only 8,500 tons of natural cheese is produced in Japan (Gouda, Blue, Camembert, Cream and Cottage cheese) and the most part is Gouda cheese. Therefore about 90% of processed cheese produced in Japan is made from imported natural cheese. In addition, much whey powder and milk powder with cocoa named "cocoa drink powder" is imported and used for many kinds of foods or cakes.

3. The development of new milk-based products

Table 4 shows the milk products expected the consumption increasing in near future. I have divided into 3 different new products. The first batch on nutritional milk products, including healthness and modified liquid milk, the second category on fermented milk products, including sour milk beverages, frozen dessert, custards and related products. The third batch deals of developments in new forms of butter, cheese and dried products.

In the liquid milk field, only limited people consume the high nutritive values liquid milk or diet foods but that is stamina foods and this is for the people of adult disease or lactose intolerance. Especially low fat milk is sold by more than 30 milk companies. The needs

Table 3, The amount and price of imported dairy products (1980)

Dairy product	Amount (t)	Price yen/kg
Butter	1,860	452
Cheese	74,488	410
Skim milk powder	22,137	213
Skim (animal feed)	79,476	170
Whey powder	9,577	100
Cream powder	9,133	191
Cocoa milk powder (contained sugar) (non sugar)	36,330	210–373
Lactose	61,190	184
Casein	18,322	561
Casein derivatives	3,943	689

Table 4, Diversification of milk products

Nutritional condition	High fat milk, high protein milk, vitamin fortified milk chlorella milk, honey milk, fluid milk for babies
Healthness	Low fat milk, lactose hydrlyzed milk, protein dydrolyzed milk, low Na-milk.
One's preference	Coffee, chocolate, caramel, strawberry, banana-falavoured milk
Custard-type	Custard milk purin
Fermented milk (sour milk)	Flavoured yoghurt, fruity oyghurt, helly yoghurt, fruit sour, acidophilus milk, bifidus milk, cultured butter milk, kefir, frozen yoghurt
Butter	Whipped butter, soft butter flavored butter (chocolate honey, nuts, etc)
Cheese	Variety of process cheese, slice cheese, soft-type cheese cottage cheese, cream cheese, flavoured frech cheese
Powdered milk	Modified milk powder, instant whole milk powder development of different ways of skim milk powder utilization

of low calorie food is accepted in it. The production of it. The production of it is still only 1% of the all liquid milk products but the consumption increasing is expected. Flavoured milk is also an expected product with one's taste. The popularization of fermented milk is remarkable because it is nutritious effective and to the intestine adjustment (using L. bifidus, L. acidophilus) and can be used for dessert (frozen yoghurt) in place of ice cream. In the fermented milk field, new products are made easily by changing the materials before fermentation. That is the reason there is a prospect of the consumption increasing.

Natural cheese is one of the prospective products, especially the consumption of soft type and fresh cheese are increasing lately. Then the development of soft type natural cheese with local color is expected in near future. The increasing importance of fresh and soft type cheese as an outlet for milk has been underlined by recent statistics on fresh cheese consumption in the countries of the EEC.

Example of the use of siim milk powder in food
(1979, presumption)

Sour milk beverage	32,000 t	31 %
Milk beverage	32,000	23
Cakes, bread	19,000	19
Recombined milk	11,000	11
Fermented milk	6,800	7
Instant skim milk	4,200	4
Ice cream	3,800	4
Other foods	2,000	2
Total	101,800	

Composition of modified milk powder in Japan

Constituent	Snow brand	Meiji	Morinaga	Wakodo	Wyeth (Japan)
Protein	13.5 %	13.5	13.7	13.9	12.0
Fat	27.3 %	25.0	27.0	27.7	28.0
(vegetable %)	81.7 %	80.0	70.0	74.4	100.0
Carbohydrate	55.0 %	57.7	54.2	54.1	56.0
(lactose)	55.0 %	51.0	49.2	54.1	56.0
Mineral	2.2 %	2.3	2.4	2.3	2.0
Moisture	2.0 %	2.0	2.7	2.0	2.0
Calorie	520	508	515	521	520
Conc. %	13.0 %	14.0	13.5	13.0	12.8
Protein	1.76 g	1.86	1.85	1.81	1.50
Fat	3.55 g	3.50	3.65	3.60	3.60
Carbohydrate	7.15 g	8.08	7.30	7.03	7.20
Mineral	0.29 g	0.32	0.32	0.30	0.25
Calorie	65.0	71.1	69.5	68.0	66.6

Composition of follow up milk

Constituent	Snow brand	Morinaga	Meoji
Protein	22.4 %	16.0	19.3
Fat	16.5 %	24.0	24.1
(vegetable %)		13.2	19.1
Carbohydrate	54.4 %	52.0	49.5
Mineral	4.2 %	5.0	4.6
Moisture	2.5 %	3.0	2.5
Calorie	455	488	492
Vitamin Mineral	A, B_1, B_2, B_6, C. D, E, nicotinamide, linoleic acid, Ca, Fe	A, B_1, B_2, C, D, nicotinamide, linoleic acid, Ca	A, B_1, B_2, B_6, C, D, E, nicotinamide, linoleic acid, folic acid, Ca, Fe
13 % conc. Protein	2.91 g	2.08	2.51
Fat	2.15 g	3.12	3.13
Carbohydrate	7.07 g	6.76	6.44
Mineral	0.55 g	0.65	0.60
Calorie	59.3 g	63.4	64.0

6.44