

LONG-TERM CHANGES IN FOOD CONSUMPTION IN JAPAN*

SEIKI NAKAYAMA

The Japanese economy has shown a high rate of growth compared with European countries and America. Food consumption in Japan, however, has risen less rapidly than in these countries. The purpose of this paper is to explain the prewar rigidity in food consumption in Japan and to show how this has changed in the postwar period. The main factor in the rise of food consumption is usually the increase in per-capita income. Consumption of starchy foods generally decreases at certain levels of per-capita income. In Japan, however, this level of income is lower than in other countries. While in the West the decline in demand for starchy foods has generally been due to the increased substitution of livestock products, in Japan this has been due mainly to low caloric consumption. Before the Second World War, starch intake in Japan remained fairly constant despite the rise in per-capita income. One reason for this rigidity is Japan's fondness for rice. In the postwar period, however, income elasticity for food and drink has doubled and livestock products have become more important, thus raising total caloric intake. This shift in food consumption, however, has caused problems for food production and agricultural incomes.

I. PROBLEM

Japan's economy showed an annual growth rate of 3 to 5.5 percent during the approximately sixty years from 1870 to immediately before the Second World War, and it has been estimated that the real per-capita national income for the period from 1938 through 1942 amounted to approximately five times that of the period from 1878 through 1882.¹ The economic devastation resulting from the Second World War brought real national income levels for the period from 1947 through 1951 down to 70 percent of the prewar peak, but the subsequent rate of growth has become markedly larger, continuously maintaining an average annual 8 percent growth rate from 1950 until the present day.

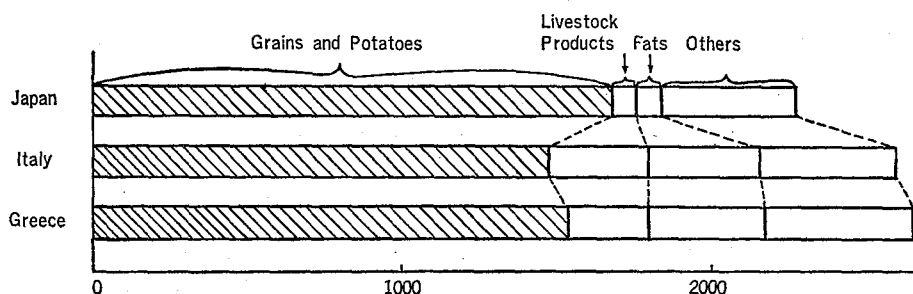
On the whole, Japan's economy is characterized by the fact that it has

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¹ See, Kazushi Ohkawa and others, *The Growth Rate of Japanese Economy since 1878*, Tokyo, Kinokuniya Co., 1957.

shown a fairly high rate of growth in comparison with European countries and America. In such a period of rapid growth, the level of food consumption in Japan naturally rose; but the speed of this change was still slow in comparison with European countries and America. In 1960 the per-capita national income for Japan reached approximately \$330, but the level of food consumption was conspicuously low when compared with other nations whose level of income was roughly the same. (See Chart 1.) That is to say, whereas in Greece, which has the same level of per-capita national income as Japan, the caloric intake from meat, milk, and eggs amounts to 270 calories and that from fats to 380 calories, the figures for Japan are only 70 calories and 90 calories respectively. Furthermore, taking the starchy food ratio to total caloric intake, the figure for Japan is 70 percent whereas the figures for both Italy and Greece are 50 percent. The figure for Japan shows no marked difference even from the figures for countries in Southeast Asia whose national income levels are far below that of Japan. It is due to a high starchy food ratio that Japan has been able to achieve a comparatively high rate of self-sustenance in food in spite of the limited amount of arable land (0.07 hectares per person).²

Chart 1. Comparison of Caloric Intake by Food Group



Sources: FAO, *Yearbook of Food and Agricultural Statistics*, 1958; For Japan, Ministry of Agriculture and Forestry, "Shokuryō jukyūhyō" (Food Balance Sheets), 1960.

Nevertheless, if this trend in food consumption is examined by analyzing the periods before and after the Second World War, a fairly conspicuous difference can be observed. This is because the prewar rigidity in food consumption sharply decreased after the war, and the rate of consumption rose quickly. This has made the rigid policies in food demand and supply practiced in the past gradually more difficult to implement and compelled the nation to modernize agriculture. This paper purports to survey quantitatively the long-term changes in the level of food consumption in Japan in order to make possible an understanding of this situation.

² Until 1959 the sum of Japan's food imports was roughly fixed at between four and five hundred million dollars and accounted for approximately 10% of the total supply. After 1960, however, imports began to show a rising curve because of the sharp increase in the import of feed.

II. QUANTITY OF FOOD CONSUMED

It is possible to take either expenditures for food or the material amount of consumption as indices representing the level of food consumption. The latter index has been adopted for the purposes of this paper. Since the object is to estimate the amount of consumption at the final stage, the portions discarded in the course of distribution and processing have been deducted. Furthermore, as the unit for indicating the quantity of materials, it was decided to use energy value (calories), which can be used as a fairly common yardstick transcending the qualitative differences among the various foodstuffs.

In Japan, data showing levels of food consumption are available in the "Food Balance Sheets" prepared by the Government since 1930. And in a somewhat more simplified form data can be obtained for as far back as 1911.

It is thus possible to obtain an orderly picture of the level of food consumption from 1911 onward by using quantitative or nutritive indices; but due to the lack of basic data, it is not possible to take this as far back as the 1870's which was our intention. Because of this, we have attempted to simplify still further the "Food Balance Sheets" formula from this standpoint.

The method used for the "Food Balance Sheets" is to derive the total amount of supply by adding to the domestically-produced food and agricultural products the balance of imports and exports deducting from this figure the portion used for natural shrinkage, feed, seed, industrial materials, and other non-food purposes. In the portion to be deducted in this manner, the item which shows a marked change over time is feed. The other items are not only small percentage-wise but show only a little change. Therefore, we decided to adopt the following procedure. First of all, the supply of each edible agricultural product was ascertained by using production and export-import statistics. Next, the figures obtained were multiplied by a fixed yield rate estimated for each product. In other words, the rate of deduction was made constant for the entire period. Then, after converting these figures to calories, they were classified into a number of food groups and totaled. At the same time, a separate estimate was made of the nutritive value of the concentrated feed given to livestock (in Japan's case, the crops raised specially for fodder are extremely scarce, so concentrated feed competes strongly with foodstuffs), and this figure was deducted from the caloric supply described above.

The question which arises here is the method by which the amount of feed consumption can be estimated. Fortunately, however, in Japan fairly precise statistics are available over a long period of time with respect to the number of livestock (Table 1). If the amount of consumption per head is roughly fixed, then, it should be possible to estimate the amount of feed consumed in accordance with the change in the number of livestock. At the same time, with respect to the amount of concentrated feed consumption per head, the figures estimated by the Livestock Bureau of the Ministry of Agriculture and Forestry are also available (Table 2). By carrying out the fol-

Table 1. Change in Number by Kind of Livestock

(Unit: 1,000)

	Milch cows	Service and beef cattle	Horses	Pigs	Chickens	Goats	Sheep	Rabbits
1878-1882	—	1,114	1,582	36	11,054	1.3	2	—
1883-1887	—	1,063	1,552	42	12,414	1.9	2	—
1888-1892	—	1,046	1,544	55	13,774	3.2	2	—
1893-1897	—	1,139	1,548	79	15,134	8.2	2	—
1898-1902	—	1,261	1,545	184	16,494	51.0	2	—
1903-1907	—	1,216	1,448	247	17,536	71.6	3	—
1908-1912	—	1,367	1,554	292	19,983	92.7	3	—
1913-1917	—	1,382	1,575	333	21,567	100.3	3	—
1918-1922	—	1,385	1,511	482	27,211	129.2	7	—
1923-1927	—	1,465	1,539	676	38,152	171.8	16	—
1928-1932	—	1,502	1,499	817	49,594	217.8	23	—
1933-1937	—	1,691	1,410	1,031	51,597	270.6	53	—
1938-1942	—	2,029	1,142	920	44,336	297.8	154	4,641
1943-1947	—	2,224	1,131	267	22,681	301.5	194	2,519
1948-1952	225	2,243	1,079	587	21,255	459.4	428	2,329

Note: The figures for pigs, chickens, goats, and sheep include years in the 19th century for which statistics are not available. In such cases complementary estimates were carried out.

Table 2. Calories Required through Concentrated Feed by Kind of Livestock

	Starchy value required for one year (kg)	Calories required for one year (1,000 cal.)
Milch cows	467	1,868
Service and beef cattle	175	700
Horses	292	1,168
Sheep	39	156
Goats	57	228
Pigs	547	2,188
Rabbits	8	32
Chickens	23	92

lowing test, we were satisfied that the estimated figures had a fair degree of reliability. That is to say, since the statistics pertaining to the actual amount of feed consumed are available in finished form from 1930 onward, we compared them with the consumption estimate for the number of livestock in the manner described above.

Table 3 shows the result of this comparison. The figures in the third column represent the totals obtained by converting the actual consumption of various concentrated feeds furnished by government statistics into calories, while those in the second column are the estimated amounts of consumption derived by totaling the results of multiplying the number of each kind of livestock by the respective calories required. To give a clearer picture, Chart

Table 3. Comparison of Demand for and Supply of Concentrated Feed for Livestock

(Unit: 1 million calories)

	Estimated demand	Supply	Difference
1930	8,764,383	8,494,668	269,715
1931	9,747,761	9,412,317	335,444
1932	9,949,188	8,814,573	1,134,615
1933	9,586,388	8,847,911	738,477
1934	9,955,015	9,496,237	458,778
1935	10,024,089	9,123,557	900,532
1936	10,089,365	9,628,489	460,876
1937	9,862,337	9,581,803	280,534
1938	9,848,948	9,836,494	12,454
1939	9,979,361	10,049,412	-70,051
1940	9,020,434	8,482,133	538,301
1941	—	—	—
1942	8,266,573	7,012,810	1,253,763
1943	7,510,694	5,831,121	1,679,573
1944	6,627,775	5,453,498	1,174,277
1945	—	—	—
1946	4,556,386	3,711,327	845,059
1947	—	—	—
1948	—	—	—
1949	5,906,299	5,652,103	254,196
1950	6,253,442	6,122,603	130,839
1951	6,434,046	7,597,038	-1,162,992
1952	8,259,154	9,764,552	-1,505,398
1953	9,409,552	10,308,306	-898,754
1954	9,559,370	11,174,640	-1,615,270
1955	9,994,329	11,774,370	-1,780,041

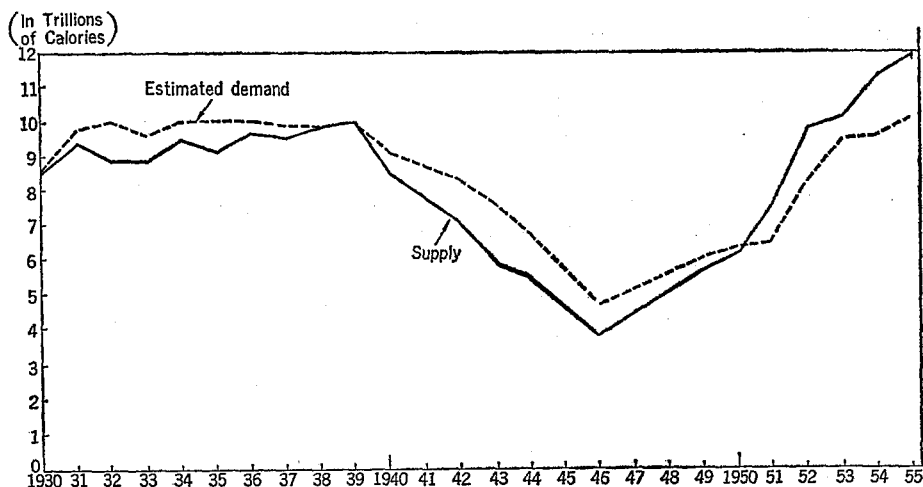
Note: Calculated by the author on the basis of Nōrinshō chikusankyoku (Livestock Bureau, Ministry of Agriculture and Forestry), *Nōkōshiryō iōkei* (Concentrated Feed Statistics).

2 presents the result in graphic form. On the whole, the difference between the actual amount of consumption and the estimated amount of consumption is not so large as to cause a decisive discrepancy in this kind of estimate. With respect to the period before the Second World War, it is evident that the trends shown by the two sets of figures are almost the same. This may be taken as proof that no major error arises even if the amount of feed consumption is estimated on the basis of the number of livestock.

The basic method underlying the estimates and the method of estimation was as described in the preceding passages. Next we shall explain the specific procedures followed in making the estimates.

In the first place, with respect to grains, potatoes, and pulse, production and export-import statistics exist for the entire period with the exception of a few insignificant omissions. Furthermore, with respect to livestock products,

Chart 2. Comparison of Demand for and Supply of Concentrated Feed for Livestock



most production statistics are available for the period from 1894 onward, but even for the period prior to this, extended estimates can be made on the basis of the number raised.

Next we shall describe the proportion of the part of each food product put to uses other than feed. This consists mainly of seed and of natural shrinkage which occurs in the course of distribution and processing. Since the portion used for feed is deducted as a separate item, it is naturally not included in the deduction in this case. For instance, the portion of wheat used for food is generally said to be only about 60 percent, but since in this case the bran used for feed is not deducted, the yield rate becomes much higher. On the basis of various data, we determined the yield rate of each food as follows:

Rice	97%
Wheat, barley, oats, rye, minor grains, and pulse	90%
Sweet potatoes	75%
White potatoes	80%
Eggs	90%
Meat	85%
Milk	100%

The figures set forth in Table 5 were obtained by converting the total amount of nutrition supplied, which was calculated in accordance with the procedure described in the foregoing passages, into daily per-capita figures. Owing to the limited availability of data, the figures are limited to starchy foods and livestock products, but it is assumed that the coverage does not fall below 80 percent throughout the entire period. In the case of the 19th century, however, the daily per-capita caloric intake dropped below 1,500 calories which is below the subsistence level. It is presumed that this is be-

Table 4. Caloric Supply by Food Group
(Unit: 1 million calories)

Year	Grains and Potatoes							Animal feed	Genuine food	Meat	Milk	Eggs
	Rice	Wheat, barley, etc.	Minor grains	Potatoes	Pulses	Total						
1878-1882	14,313,065	4,263,993	1,165,151	949,807	1,111,784	21,803,800	3,723,612	18,080,188	6,634	12,513	3,976	
1883-1887	15,732,176	5,267,221	1,223,268	1,396,352	1,353,517	24,972,534	3,791,776	21,180,758	17,429	13,313	4,458	
1888-1892	19,050,504	5,825,905	1,863,670	1,981,176	1,808,322	30,599,577	3,924,132	26,605,445	21,312	14,314	4,945	
1893-1897	19,747,162	7,114,534	1,542,364	2,254,111	1,985,274	32,643,445	4,174,082	28,469,363	32,581	15,616	54,347	
1898-1902	21,433,861	7,848,618	1,538,960	2,501,986	2,380,594	35,704,019	4,619,223	31,084,796	40,838	17,317	59,246	
1903-1907	24,052,536	7,870,529	1,510,460	2,773,949	2,581,166	38,788,640	4,713,546	34,075,094	47,557	17,918	62,971	
1908-1912	26,182,564	8,638,673	1,487,666	3,516,818	3,520,189	43,345,910	5,270,171	38,075,739	58,142	24,925	67,734	
1913-1917	28,250,333	9,154,308	1,439,470	4,040,045	2,971,677	45,855,833	5,746,808	40,109,025	75,833	30,130	78,658	
1918-1922	31,351,968	9,878,738	1,341,637	4,451,353	3,738,520	50,762,216	6,323,153	44,439,063	87,865	40,541	103,970	
1923-1927	33,332,149	9,517,267	1,020,666	3,668,429	4,274,463	51,812,974	7,853,420	43,959,554	105,911	70,370	145,266	
1928-1932	34,664,798	9,123,887	944,618	3,553,354	4,448,677	52,735,334	9,205,087	43,530,247	116,525	96,597	239,315	
1933-1937	37,058,276	8,601,354	777,079	4,126,989	4,165,066	54,728,704	9,335,599	45,393,105	145,775	142,743	303,188	
1938-1942	38,333,683	9,038,996	1,178,949	4,455,002	3,806,918	56,813,548	8,638,451	48,175,097	146,596	195,195	243,731	
1943-1947	30,253,483	8,209,613	463,048	5,138,094	2,543,630	46,607,868	4,998,744	41,609,124	62,338	114,214	31,934	
1948-1952	32,693,406	17,046,141	532,846	7,104,800	2,016,081	59,393,274	7,284,074	52,109,200	136,630	197,798	211,500	
1953	32,340,199	18,916,721	877,962	6,278,391	3,993,315	62,406,588	10,756,000	51,650,588	78,952	119,729	100,208	
1954	33,960,969	20,715,068	687,296	6,337,112	4,081,916	65,782,361	11,442,400	54,339,961	86,974	163,208	119,105	
1955	45,632,795	21,111,570	1,023,639	8,168,726	6,100,472	82,037,142	14,586,800	67,450,342	101,885	176,873	124,506	
1956	38,231,239	21,426,117	891,922	7,975,081	5,272,362	73,796,721	14,409,600	59,387,121	119,314	210,013	127,232	
1957	39,696,058	20,532,367	962,699	7,616,037	5,899,924	74,707,085	16,581,200	58,125,885	133,326	247,775	142,130	
1958	41,439,999	19,364,264	1,036,688	7,756,554	6,194,166	75,791,671	15,825,200	59,966,471	151,199	269,795	147,535	

Table 5. Daily Per-Capita Food Consumption by Food Group
(Unit: Calories)

	Grains and Potatoes	Livestock Products			Total
		Meat	Milk	Eggs	
1878-1882	1349	0.5	0.9	0.3	1.7
1883-1887	1520	1.2	1.0	0.3	2.5
1888-1892	1830	1.5	1.0	0.3	2.8
1893-1897	1876	2.1	1.0	3.5	6.6
1898-1902	1941	2.6	1.1	3.7	7.4
1903-1907	1006	2.8	1.1	3.7	7.6
1908-1912	2119	3.4	1.5	4.0	8.9
1913-1917	2084	4.2	1.9	4.4	10.3
1918-1922	2189	4.6	2.1	5.4	12.1
1923-1927	2031	4.9	3.3	6.7	14.9
1928-1932	1866	5.0	4.1	10.3	19.4
1933-1937	1815	5.8	5.7	12.1	23.6
1938-1942	1860	5.6	7.5	9.4	22.5
1943-1947	1528	2.3	4.2	1.2	7.7
1948-1952	1717	4.5	6.5	7.0	18.0
1953	1737	8.5	13.8	10.8	33.1
1954	1799	9.1	13.8	11.6	34.5
1955	1858	11.4	19.9	14.0	45.3
1956	1879	13.3	23.3	14.1	50.7
1957	1786	14.7	27.3	15.7	57.7
1958	1781	16.5	29.5	16.1	62.1

cause some of the peasants in those days were still eating a considerable quantity of low-grade grains which are not taken into account in the statistics of agricultural products (for instance, barnyard grass).

III. DETERMINATION OF THE INCOME ELASTICITY OF FOOD CONSUMPTION

The change in the amount of food consumption from the 1870's onward has been shown above. Next, we will examine what kind of economic factors have led to such changes.

It should be obvious that the main economic factor giving rise to the change in food consumption has been the rise in the level of per-capita income, for the relative level of food prices has not shown any clear change that can be regarded as a trend.

Let us first take the figures set forth in Table 5 and plot the caloric intake of starchy foods and livestock products against the per-capita national income. (The national income has been indicated in constant 1928-32 prices.) Charts 3 and 4 show the results.

Taking Chart 3 first, the caloric intake from starchy foods rises with the national income until the period 1918-1922, but shows a gradually negative

Chart 3. National Income and Caloric Consumption of Grains and Potatoes

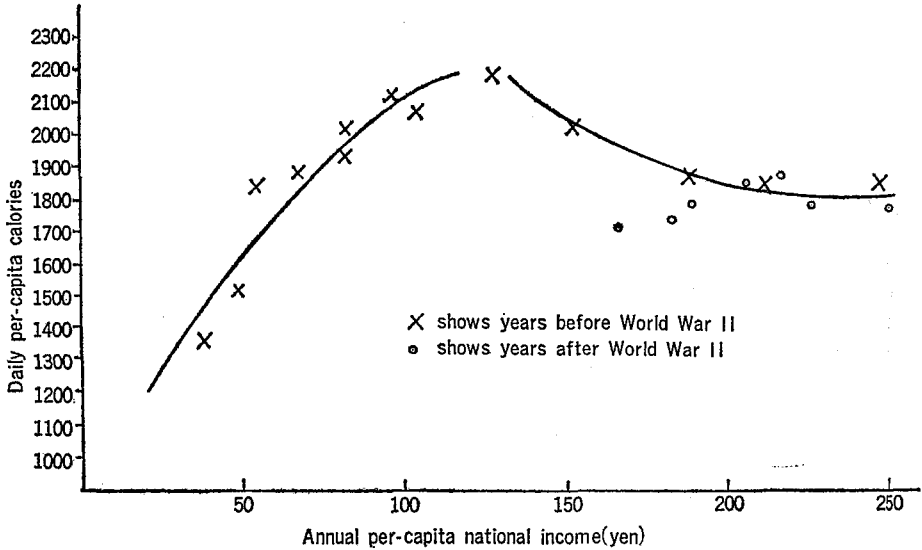
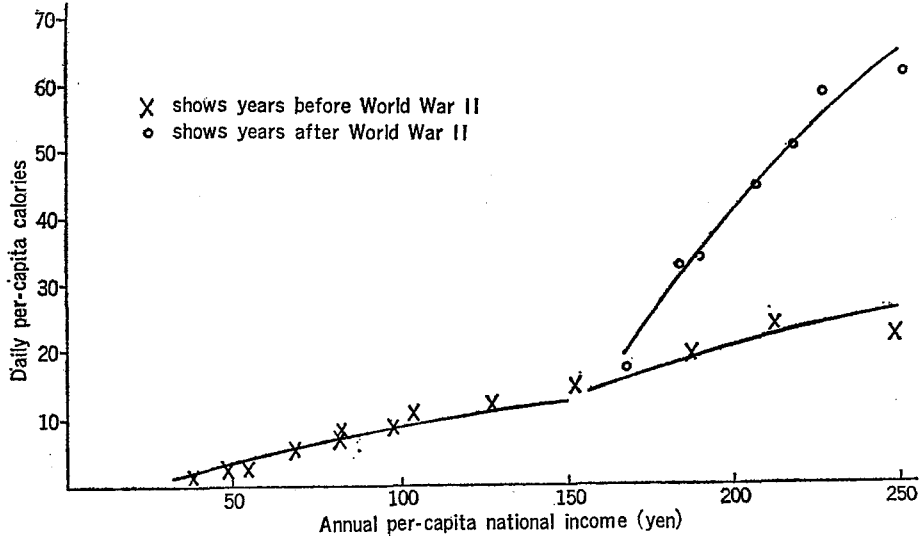


Chart 4. National Income and Caloric Consumption of Livestock Products



trend after this period. On the other hand, the relation between the consumption of livestock products and income presents a regularly rising curve throughout the entire period. Furthermore, in both of the above cases, attention must be paid to the fact that the trend after the Second World War was extremely anomalous. Therefore, in determining the income elasticity, postwar data have been excluded. Moreover, in the case of grains and potatoes, the entire period was divided at the period from 1918 through 1922 into two, and

the income elasticity of food consumption was determined separately for each term. The results of the calculations are as follows:

Grains and potatoes:

$$\text{Early period: } \log F = -0.0615 + 0.3832 \log Y$$

$$\text{Later period: } \log F = 0.6282 - 0.2700 \log Y$$

Meat, milk, and eggs:

$$\log F = -0.4857 + 1.4050 \log Y$$

(F =daily per-capita consumption (calories). Y =annual per-capita real national income.)

That is to say, the consumption of starchy foods had an income elasticity of 0.38 in the early period, but in the later period the figure dropped to -0.27 , and starchy foods dropped to the status of "inferior goods." On the other hand, consumption of livestock products maintained an income elasticity of 1.4 throughout the entire period.

IV. CHARACTERISTICS OF THE CHANGE IN FOOD CONSUMPTION IN JAPAN

What characteristics are to be found when the trend of food consumption in Japan is compared with that of foreign countries on the basis of the results of the calculations described in the foregoing pages?

It has been disclosed by estimates based upon international comparisons and historical changes in a given nation that starchy foods change from "normal goods" to "inferior goods" at a certain level of per-capita income. In this instance, Japan's long-term trend in the consumption of starchy foods is not particularly outstanding even when viewed from an international perspective. Nevertheless, when we inquire into the income level at which the change to "inferior goods" takes place, we find that the point of refraction lies at ¥130 in per-capita national income and around the period 1918-1922 in time. But an international comparison shows that this point of refraction occurs at a higher income level in other countries. For instance, Ireland, Italy, and the Union of South Africa, which are considered to be at the saturation point of starchy food consumption, have an income level somewhat higher than present-day Japan, and their income level was twice as high as Japan's during the period 1918-1922.

Furthermore, in the case of the Western nations, the decline in the consumption of starchy foods arises mainly as a result of substitution by livestock products. In Japan's case, however, even though it is true that the income elasticity of livestock products is a fairly high figure, the volume of consumption is so small as to be almost negligible in relation to starchy foods. That is, the decline in the consumption of starchy foods in Japan after the 1920's should be regarded as having been accompanied by a decrease in the total caloric consumption rather than having arisen through the substitution of livestock products. The cause for this is not quite clear, but one point that comes to mind is the fact that the change in the composition of Japan's

working population at that time saw a relative decrease in the population engaged in primary production and a sharp increase in the population engaged in the tertiary sector of the economy. According to the results of the survey of nutritive intake carried out in 1926-27,³ the adult daily per-capita caloric intake was 3,000 calories for farmers, 2,880 calories for mine workers, 2,550 calories for factory workers, and 2,250 calories for persons engaged in the tertiary sector. So there is sufficient ground to assume that the stagnation of industrial sector in terms of labor force and the change in the composition of labor force in the form of a movement from the primary to the tertiary sector had some relationship to the decline in total caloric intake. At any rate, characteristic of the trend of food consumption in Japan for the sixty years prior to the Second World War was the fact that the composition of food consumption with its emphasis on starchy foods underwent hardly any change in spite of the fairly conspicuous rise in the level of per-capita national income.

What could have brought about this rigidity in Japan's food consumption? The cause probably lies in peculiar fondness of Japanese for rice, a fondness which cannot easily be understood by foreigners. The rice which is eaten by Japanese is a variety called *Japonica* and is produced almost exclusively in Japan. In comparison with the long-grained or medium-grained *Indica*, which is produced everywhere in the world, the *Japonica* is short-grained and viscous. This is boiled in a special container until the water has been completely absorbed. This is Japan's chief staple. It can be eaten with adequate palatability by the addition of only a small amount of spice composed mainly of salt, and without combining it with other food. It is difficult to explain the reason for this in a perfectly scientific manner, but at any rate, there can be no doubt that it has a taste of which most Japanese are fond.

Therefore, to the Japanese, the switchover from wheat, barley, or minor grains to rice had the same significance as the switchover from grain-eating to meat-eating in other countries. The per-capita consumption of rice by the Japanese showed an increase of roughly 40 percent from about 1880 until 1920, so it can be presumed that the improvement in palatal satisfaction caused by this became a factor in delaying to a considerable extent the switchover to livestock products. This is a situation that does not adequately apply to the peoples of Southeast Asia, even though they are also rice-eating peoples.

V. POSTWAR CHANGES AND THEIR EFFECT UPON JAPANESE AGRICULTURE

However, the trend of food consumption after the Second World War has begun to show a tendency completely different from that of prewar days. The most conspicuous tendency is the fact that the income elasticity of live-

³ Naikaku tōkeikyoku (Statistics Bureau, Prime Minister's Office), *Kakei chōsa hōkoku—ei-yō ni kansuru tōkeikyō* (Family Budget Survey Report, Statistical Tables on Nutrition).

stock product consumption has risen. According to the result of calculations using yearly data from 1953 through 1958, the relation of the per-capita caloric consumption of livestock products with the per-capita national income was as follows:

$$\log F = -2.61102 + 1.84393 \log Y$$

That is to say, the income elasticity of the consumption of livestock products has risen from a prewar figure of 1.4 to the postwar figure of 1.8.

On the other hand, the caloric consumption of starchy foods has remained fixed at roughly the same level as that at the end of the prewar era, so the total caloric intake has a tendency to rise in accordance with the increase of the consumption of livestock products. Thus the proportion of livestock products to total caloric intake has shown a rapid increase, and the rate of food consumption has been accelerated.

With respect to the rise of the income elasticity of food consumption, it is also possible to corroborate this by using data from family budget surveys in the following manner. The following is the result obtained by calculating the linear logarithmic regression between the expenditures on food and drink and the total amount of consumption expenditures based on the result of family budget surveys of urban dwellers conducted by the Japanese Government before the war for the nine years from 1931 to 1939:

$$\log F = 2.57972 + 0.31271 \log Y - 0.17684 \log P$$

(F =real expenditures on food and drink. Y =real expenditures for consumption. P =retail price index for food.)

By way of contrast, the result obtained by making the same calculations based on the results of similar family budget surveys of urban dwellers conducted by the Japanese Government for the eight years from 1953 to 1960 was as follows:

$$\log F = 2.18768 + 0.64139 \log Y - 0.60201 \log P$$

(F and Y are the same as in the preceding case. P =consumers' price index for food.)

That is to say, the income elasticity of expenditures on food and drink has roughly doubled.

Next let us examine the conditions which have brought about this new trend. The most important of these is probably the change in the demand for rice. From the closing period of the war until several years after the war, the supply of rice in Japan decreased sharply on account of the decline in domestic production and the cessation of rice imports from Korea and Formosa. In urban areas in particular, only an extremely small quantity of rationed rice was provided for a long time. In this manner, the forced substitution of rice by various other foods had the effect of widening to some extent the previously rigid diet of the Japanese. Furthermore, the influence of the family system with its markedly feudalistic character may be cited as another factor having contributed to the rigidity of the Japanese people's pattern of food consumption. Here, too, it is conceivable that the postwar democratic trend has had an effect in bringing about this flexibility. In ad-

dition to the above, we cannot ignore the effect of the westernization of the general mode of living in Japan, the results of the school feeding program, the urbanization of rural communities, and other developments.

At any rate, this rise in food consumption which has taken place since the war has brought forward new problems for Japan's economy and agriculture. That is, the increase in the consumption of livestock products has inevitably given rise to a sharp increase in the total energy requirement including fodder.⁴ On the one hand, through the disparity of income which has developed between agriculture and other industries and through the increase in the demand for labor which has accompanied economic growth, the movement of labor from agriculture to other industries has become intensified, so the intensive utilization of land practiced previously is becoming difficult. According to my estimates, if the state of utilization of land in Japan and the yield per unit of land area remain as they are at present, the imports of food and feed in 1970 will exceed \$1.5 billion imposing a heavy burden upon the international balance of payments. Thus, one can say that the situation of Japan's agriculture calls for the simultaneous solution of two problems: (1) correcting the disparity of income which arises with economic growth between agriculture and other industries; and (2) correcting the deficiency in food productivity.

⁴ If the income elasticity of the consumption of original calories is obtained by totaling feed for livestock and vegetable foodstuffs which become food for human beings, the result is 0.3 for the period before the Second World War, and 0.6 for the postwar period. If calculated by using the rate of growth of income embodied in the economic program set up by the Japanese Government, the total consumption in 1970 will be 150 trillion calories, whereas the total supply in Japan as of 1960 stood at 80 trillion calories of domestic production and 15 trillion calories of imports.