ROBERT D. BARRY

JAPAN'S FOOD DEMAND AND 1985 GRAIN IMPORT PROSPECTS

Economic Research Service • U.S. Department of Agriculture • Foreign Agricultural Economic Report No. 53

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AND 1985 GRAIN IMPORT PROSPECTS

by

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U.S. Department of Agriculture

Economic Research Service

Foreign Development and Trade Division

Washington, D.C. 20250 June 1969

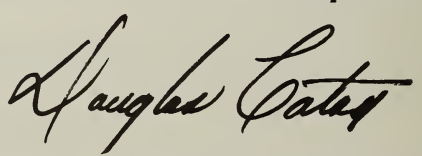
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402

FOREWORD

This study is part of a larger research project on the demand prospects for agricultural exports of less developed countries being conducted by the Economic Research Service under a participating agency service agreement for the Agency for International Development. Phase A of the overall project, involving historical analysis of agricultural exports of less developed countries since 1951, has been completed. Research is now in progress on Phase B, which involves analysis of demand prospects in importing countries for selected agricultural products. Phase C will involve analysis of policy implications of these estimated world demand prospects for export earnings from these products in less developed countries.

The demand for imports in individual countries is greatly influenced by national policies adopted to deal with domestic problems of production and consumption. This is particularly evident in Japan, a major developed market and a growing outlet for agricultural exports of less developed countries. This report is an in-depth study of the role of national development policies in Japan and specifically analyzes the impact of these policies on grain imports both historically and into the future. The effect of alternative policies (food strategies) relating to production, consumption, and imports of grain to meet the growing meat and grain requirements in a rapidly growing economy is analyzed in detail. The need to satisfy a growing consumer demand for meats and meat products forced Japan to emphasize domestic livestock production, and thus imports of feed grains. This demand is in addition to the food grain requirements which must be met concurrently in a rapidly growing society.

Japan's grain imports increased from 4 million tons in 1957 to 11 million tons in 1966. With continued rapid economic growth, Japan's grain imports could more than double by 1985, depending upon what levels of food consumption are attained and the types of trade and production policies that are adopted. This growth of Japan's import demand for grains and other agricultural products is of special interest to less developed countries from the standpoint of their export demand prospects for grains.



Director, Agriculture and Rural
Development Service
Office of War on Hunger
Agency for International Development

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SUMMARY

By 1985, Japanese grain imports could more than double those of 1966, but whether they do will depend largely on the Japanese Government's strategy toward foreign trade and domestic farming. Because the nation's agricultural sector is carefully regulated, and because food demand is far below the saturation level, Japan's food supply strategy can be quite flexible.

Japanese grain imports rose from 4 million tons in 1957 to 11 million tons in 1966. By Government decision, imports of food grain rose to partly offset the decline in Japan's food grain production after 1960. Feed grain imports rose as livestock output expanded.

In the late 1950's, Japan recognized that its food supplies and agricultural incomes were inadequate and would have to be increased. During 1957-62, new steps were taken. Consequently, by 1962, these steps led to a new set of policies--a new food strategy for increasing food supplies and consumption as well as producer incomes.

More agricultural raw materials were imported for converting into food by livestock production and other methods. Grain, raw sugar, and oilseeds had to be imported, since larger domestic quantities were not available to fuel the new processing capacity encouraged by the strategy.

Changes in Japan's food consumption and expenditure between 1957 and 1965 illustrate the food strategy's impact. Total food energy consumed per person rose moderately over 1957-65 at the average annual rate of 0.9 percent, but energy per person from livestock products rose at a spectacular 11.3-percent annual rate. Real expenditure on food per person rose strongly--at the average rate of 4.2 percent per year--while the economy as a whole grew even faster. Most of the new consumer spending on food went to fruits, vegetables, fish, beverages, and livestock products.

Japan's total food consumption per person was lower than Europe's and North America's, despite the 1957-65 rise. Consumption was lower because of severe production constraints in agriculture and fishing, and because of trade restrictions on processed food imports. Japanese consumption of livestock products was especially low, because animal agriculture was developing from a low prior level of resource use.

Urban food prices rose from a 1957 base of 100.0 to an index of 146.3 by 1965. If growth in Japanese industry and commerce keeps generating consumer purchasing power rapidly, as expected, and if food price rises are to be curbed, incremental food expenditure will have to be absorbed by larger supplies, more food services, and a changed food mixture. But, each of these absorbents can substitute for the other to some extent.

Eager consumer buying of many kinds of food and processing or marketing services gives food strategists great flexibility in "choosing," through policy, the pattern and level of food services and supply. For high-value foods, economic demand can still expand greatly.

To accomplish supply objectives, several alternative food development paths for the next 15 years are possible. Three alternative strategies are illustrated. Each would have a diverging impact on Japan's food consumption over time. By 1985, each would employ livestock production and grain imports to a widely different degree. Each strategy would depend on imported food commodities in general to a very different extent. Because massive food imports entail special risk, Japan evaluates potential problems carefully and may further diversify supply sources to reduce risk. Southeast Asia may become an increasingly important supplier of feed grains to Japan, especially if Japanese interests step up their influence over grain production in that region.

Because levels of Japanese food production and consumption per person are lower than in other developed countries, Japan can choose to match the levels in these countries or advance toward them only part way. For grain, the implications of this choice are very great.

While continued rapid growth of the whole economy is a necessary condition for a large increase in food consumption per person, it is not a sufficient condition. Japan's coming allocation of resources to and within the food sector will be decisive. Government policies will shape the level and pattern of food production and the future market for grain. Japan has the power to channel its agricultural trade in a variety of ways, depending upon the food strategy it selects.

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by

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Chapter I.--ANALYZING A TRADE-DEVELOPMENT PROBLEM

The Problem

Japan is a rapidly growing market for food exports from both developed and developing nations. In 1966, Japan imported $2.0 billion of foodstuffs, more than triple the value of these imports in 1957 (31, 100). 1/ 2/ In 1966, grains and their products, comprising the largest commodity group, were about 42 percent of food imports by value. Japanese grain imports rose from 4 million metric tons in 1957 to 11 million tons in 1966 (100). Both less developed and developed countries have shared in the grain sales to this growing market. To better evaluate prospects for the future, we need to know why the Japanese grain market has grown so rapidly in the past and what factors will shape its future growth.

A new study of the Japanese grain and food situation is necessary because comparatively little has been published on the topic in English. Moreover, the experience of Western developed countries may not be a reliable guide to the future of Japan--the first Eastern country to reach Western levels of economic development. There is no guarantee that Japanese food consumption and grain usage will rise to Western levels even though Japanese incomes may exceed those of many Western nations in years to come.

Because Japan's food consumption per person is now the lowest of any comparably developed country, it has a great range of choice in determining its future consumption levels. Japan's age-old problem of limited cropland for food production can now be circumvented by technology, investment, and food imports. Barring catastrophe, the Japan of the future will surely be rich enough to afford a diet of great abundance, implying a heavy flow of grain. Yet, this nation will also have the power to choose a diet of moderation, implying a much lighter flow of grain. The power to choose derives from the ability to allocate productive resources in alternative patterns through public policy. Thus, the development path which Japan chooses for its food economy will have a great impact on its foreign agricultural trade.

1/ Underscored numbers in parentheses refer to items in References, p. 79.

2/ The value of the Japanese yen has been constant at the rate of ¥360 to $1.

Since trade and development are so highly interdependent in Japan's food sector, many kinds of public policies, toward imports as well as domestic agriculture, affect the flow of grain and other foodstuffs. The public policies which, historically, have had the strongest effect may be thought of as a set--as Japan's food "strategy".

Before there is a "strategy", there must be a great problem calling for solution. In Japan, food has been such a problem. For decades, Japan suffered frequent food crises, when supplies became especially short. Moreover, the average Japanese ate a nutritionally inadequate diet even in years of normal harvest, when there was no crisis. Food was and still is too important not to elicit consistent, concerted, high-level Government actions to cope with the problem. To be a "strategy", Government policies must fit together like puzzle pieces to form an economically rational solution to the food problem. They do.

Of course, strategy in this sense is not thought out all at once by one individual or even by a committee. It emerges over time. The full outline may be several years in completion and may persist for years, until another formative period when the outline is reshaped. A new food strategy seems to have emerged from the formative years 1957-62 to actively guide the Japanese food flow of the 1960's. Japan has the option of changing this strategy in the future, and could adopt any of several alternative strategies, each of which would change the present course and yet be a logical extension of it.

What are some of Japan's major strategic alternatives in the food sector? One purpose of this study is to identify hypothetical strategies and suggest how each may affect the flow of Japanese grain imports. A more general purpose is to introduce a framework for understanding the actual evolution of Japan's food strategy in the years to come, and the subsequent effects of it on grain imports.

Method of Analysis

Historical data on Japan's domestic grain production and grain imports are shown in the following chapter to set the stage for the remainder of the study. The Japanese grain supply is analyzed both by grain type and by country of origin. Since the Japanese grain flow has greatly expanded in the last decade, and since most grain is a raw material for human food, food consumption is analyzed to explain the recent upsurge in the grain flow. In addition, contrasts are drawn between food consumption in Japan and other countries.

The late 1950's are selected as a base period for analysis because a great debate on agricultural policy began at that time. The new policies which emerged from this debate are described, and their effect upon food consumption and the grain flow is assessed. A detailed picture of food consumption in 1957 is updated to 1965, highlighting the significant grain-related changes in consumption patterns.

Since food transactions at retail are matching flows of both physical goods and money, this study attempts to reconstruct these flows (annual

averages per person) for 1957 and 1965. Per capita food consumption by commodity is stated in matching physical and money units. Theoretically, the physical units could be either units of weight or of energy. For an individual food, it is relatively easy to translate between weight and energy units. However, since physical units are aggregated more frequently by energy (calories) than by weight, the energy units are employed here for the main analysis. Therefore, the principal device for analyzing food consumption is called the food energy-expenditure flow.

This analytical device is important in assessing one of Japan's persistent food sector problems--supplying the food commodities to meet the rapidly growing pool of food purchasing power. Such flow data for different years reveal what happens as consumers earn more real income in a growing economy and spend more on food and beverages than in an earlier period. The data reveal on which commodities the consumer spends his incremental food money, and how much food he gets for his expenditure. At issue is the ability of the Japanese Government, through its food strategy, to shape the commodity incidence of consumer food expenditure by substituting certain foods for others, adding food energy of certain types, or restraining supplies of other types.

At issue also is the degree of risk the nation is willing to run by importing food raw materials and processed products. The concept of "food import-dependency" is introduced as a measure of risk. The import-dependency of total food consumption (or of only one food group) is the share of human food energy which is physically dependent on imports, regardless of whether these imports are consumer-ready foods or raw materials essential for food production. As an example for one commodity, all energy from pork produced in Japan, largely with foreign corn, would be considered import-dependent.

Since import-dependency is defined physically, not by value, no account is taken of grain import value in relation to the value added by Japanese processing, whether milling foreign wheat or feeding foreign grain to domestic livestock. For the purposes of this study, value added by processing is not central to risk measurement, but technological dependency is. Import-dependency measures the degree to which Japanese consumers risk their food intake upon ocean transport and foreign procurement. Assessing the import risk in any food policy is vital for Japan. Import-dependency overcomes defects of the self-sufficiency concept, which frequently is found by commodity but not in aggregate. Moreover, self-sufficiency indices usually ignore the use of imported feed energy in livestock production.

The study portrays the longrun Japanese food-strategic problem from the perspective of the mid-1960's, using the data and concepts mentioned above. The constraints on Japanese food production receive special emphasis. On the assumption that future food consumption, production, and import patterns are not already predetermined, three alternative food strategies are hypothesized. They are, in effect, alternative development and trade paths for the future. Each strategy is a set of policies responsive to the longrun food problem, yet the results of each alternative would necessarily be different.

To illustrate the differences among the alternative strategies, consumption targets for the major food groups are matched to each strategy. These

targets are illustrations of possible planning objectives which might be selected by Japan under a certain strategy if it were "chosen" or emerged. The targets are not predictions. For consumer products of cereal grains and livestock, both consumption and production targets are illustrated in detail for each strategy. (Production targets for other foods are implied but not stated.) The total quantities of grain which would be required to meet food targets are then estimated for each alternative strategy, as well as grain import needs. All targets apply to 1985, the most distant year for which Japan's Economic Planning Agency has already published a preliminary forecast of the country's gross national product (GNP).

The method of analysis does not purport to yield a "most likely" or a "recommended" solution to Japan's longrun food problem, nor even a single forecast of grain imports in 1985. But, by focusing upon a range of alternatives and the implications of food-strategic choices, the reader may be better able to perceive a pattern in Japan's decisionmaking as it unfolds during the years ahead.

Chapter II.--THE UPSURGE IN GRAIN IMPORTS, 1957-66

During 1957-66, both Japan's total annual grain flow and its grain imports expanded greatly (fig. 1). Where did the grain come from? What kinds of grain accounted for the expansion? Within the total grain flow, what were the main surges and ebbs? This chapter explains a few reasons for change, but for the most part only describes the changes in a major flow of food raw materials--grain.

Per Capita Supply

Japan's grain flow (total new supply) for any year is defined as domestic production plus imports for the same year. Exports are disregarded, since they are negligible. An increase in year-end grain stocks over the previous year-end level is included automatically in the new supply concept, since the increase must come from either production or imports. However, a decrease in year-end stocks would not be a new supply, since the net amount of grain released for the year had already been included in the new supply for a prior year.

In 1957, Japan's total new supply of grain was 19.3 million metric tons. By 1960, the flow had risen to 21.4 million tons, and by 1966 to 26.2 million tons. Tables 1 and 2 also show the Japanese grain flow per capita, to eliminate the effect of population increase from the analysis. Per capita supply is a "consistency device" for analyzing change over time.

As shown in tables 1 and 2 and figure 1, the per capita grain supply increased steadily from 1957 to 1966, except for the leveling-off of 1961 and the dip of 1963. However, this dip was more than made up by the increase of 1964. The concurrent rapid growth in per capita real expenditures on food and beverages (shown in table 7, ch. VIII) illustrates that the expansion in grain flow accompanied expansion in consumer food purchasing power.

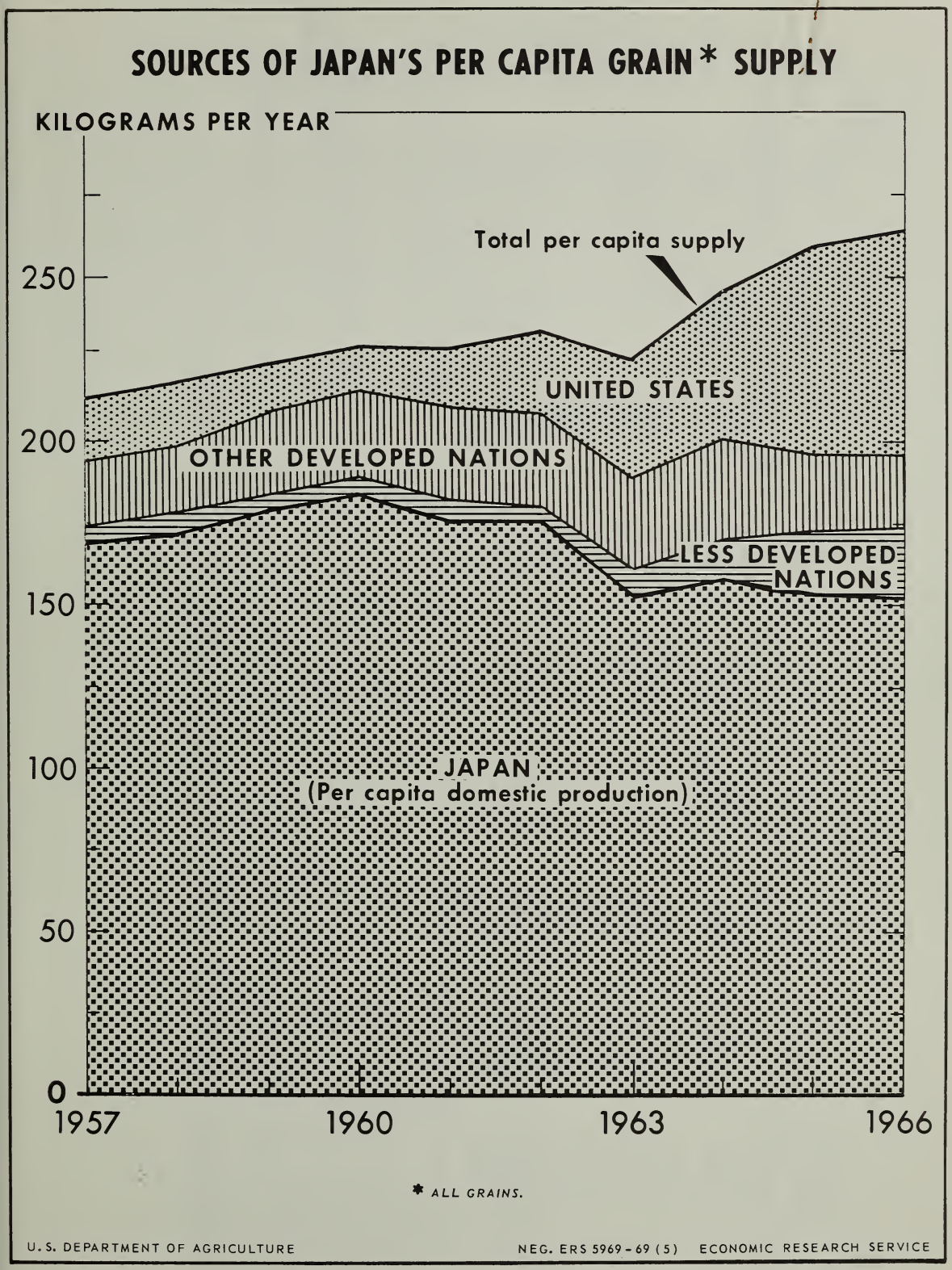
SOURCES OF JAPAN'S PER CAPITA GRAIN* SUPPLY
KILOGRAMS PER YEAR
Total per capita supply
UNITED STATES
OTHER DEVELOPED NATIONS
LESS DEVELOPED NATIONS
JAPAN
(Per capita domestic production)
250
200
150
100
50
0
1957
1960
1963
1966
* ALL GRAINS.
U.S. DEPARTMENT OF AGRICULTURE
NEG. ERS 5969-69 (5) ECONOMIC RESEARCH SERVICE

Figure 1

Table 1.--Sources of Japan's total new supply of grain, 1957-66 1/

Calendar year	Japan		United States		Other developed countries 2/		Less-developed countries 3/		All sources	
	Domestic production	Per capita 4/	Imports	Per capita 4/	Imports	Per capita 4/	Imports	Per capita 4/	Total new supply	Per capita 4/
	Thousand metric tons	Kilograms	Thousand metric tons	Kilograms	Thousand metric tons	Kilograms	Thousand metric tons	Kilograms	Thousand metric tons	Kilograms
1957...	15,375	169.10	1,710	18.80	1,784	19.62	462	5.09	19,331	212.61
1958...	15,797	172.15	1,869	20.37	1,692	18.44	610	6.65	19,967	217.60
1959...	16,637	179.59	1,365	14.74	2,289	24.71	459	4.95	20,750	223.99
1960...	17,101	183.06	1,210	12.95	2,399	25.68	648	6.93	21,357	228.61
1961...	16,578	175.83	1,561	16.55	2,664	28.26	632	6.70	21,435	227.34
1962...	16,716	175.63	2,308	24.25	2,665	28.00	498	5.23	22,187	233.11
1963...	14,634	152.19	3,373	35.08	2,756	28.66	878	9.13	21,641	225.06
1964...	15,308	157.51	4,408	45.35	3,056	31.44	1,299	13.36	24,070	247.67
1965...	15,208	154.75	6,119	62.27	2,410	24.52	1,724	17.55	25,461	259.08
1966...	15,096	152.40	6,819	68.83	2,257	22.78	2,062	20.82	26,233	264.83

1/ Rice, wheat, barley, corn, sorghums, rye, oats, millet and buckwheat. Total new supply is domestic production plus imports.

2/ Canada, Australia, Argentina, South Africa, all Europe including the U.S.S.R.

3/ Countries of Asia (except U.S.S.R. and Japan), Africa (except South Africa), Latin America (except Argentina).

4/ Japanese population figures used to compute per capita supplies are, in thousands: 90,924,(1957); 91,763 (1958); 92,638 (1959); 93,419 (1960); 94,285 (1961); 95,178 (1962); 96,156 (1963); 97,186 (1964); 98,275 (1965); 99,056 (1966). Details may not add to totals because of rounding.

Sources: Statistical Yearbooks #38, #42, #43, of the Ministry of Agriculture and Forestry, Japanese Government (Japanese domestic production).
Annual Returns of the Foreign Trade of Japan, Ministry of Finance, Japanese Government (imports).
Statistical Yearbook, 1966, Office of the Prime Minister, Japanese Government (population).

Table 2.--Japan's total new supply of grain, 1957-66

Calendar year	Rice		Wheat		Barley		Corn and sorghums		Rye, oats, millet and buckwheat		All grains	
	New supply 1/	Per capita 2/	New supply 1/	Per capita 2/	New supply 1/	Per capita 2/	New supply 1/	Per capita 2/	New supply 1/	Per capita 2/	Total new supply 1/	Per capita 2/
	Thousand metric tons	Kilograms	Thousand metric tons	Kilograms	Thousand metric tons	Kilograms	Thousand metric tons	Kilograms	Thousand metric tons	Kilograms	Thousand metric tons	Kilograms
1957	11,811	129.90	3,570	39.26	3,013	33.13	616	6.77	322	3.54	19,331	212.61
1958	12,498	136.20	3,561	38.81	2,783	30.33	779	8.49	345	3.76	19,967	217.60
1959	12,778	137.94	3,828	41.32	2,796	30.19	1,036	11.18	311	3.36	20,750	223.99
1960	13,033	139.51	4,209	45.06	2,301	24.63	1,513	16.20	300	3.21	21,357	228.61
1961	12,545	133.05	4,412	46.79	1,976	20.96	2,094	22.21	407	4.31	21,435	227.34
1962	13,187	138.55	4,193	44.06	1,726	18.13	2,821	29.64	261	2.74	22,187	233.11
1963	13,034	135.55	3,894	40.50	931	9.68	3,500	36.40	281	2.92	21,641	225.06
1964	12,999	133.75	4,836	49.76	1,674	17.22	4,267	43.90	294	3.03	24,070	247.67
1965	13,376	136.11	3,932	50.19	1,869	19.02	4,940	50.27	344	3.50	25,461	259.08
1966	13,557	136.86	4,941	49.89	1,552	15.67	5,908	59.64	276	2.78	26,233	264.83

1/ The sum of Japanese domestic production plus imports.

2/ Japanese population figures used to compute per capita supplies are those shown in note 4/ of table 1.

Details may not add to totals because of rounding.

Sources: Same as table 1.

Key Changes, 1960-66

As figure 1 shows, 1960 was a turning point. After 1960, Japan's domestic grain production per capita reversed its prior rise and started to decline, although it held steady after 1963. In 1961 and 1962, per capita grain imports from non-U.S. sources held about constant for 2 years, and then moved to a somewhat higher level as imports from the less developed nations gained more of the market. After 1960, per capita grain imports from the United States reversed a decline, began to rise and continued rising each year through 1966. The extraordinary expansion in American grain sales to Japan since 1960 can be explained better by observing specific changes in the 1960-66 grain flow.

Because 1960 was a turning point, a capsule summary of the complex surges and ebbs begins with this year (table 3). Since the total flow in 1960 was about 229 kilograms per person, and about 265 kilograms in 1966, the rise for the period 1960-66 was approximately 36 kilograms per person. The 6-year rise averages to an increase of about 6.04 kilograms per person annually, shown as the total in table 3. This table also shows how changes in grain types are related to change in country origin. Four changes are especially prominent:

Imports of Corn and Sorghums. The great surge in the flow of corn and sorghums was principally an increase in imports from the United States, although feed grain imports from the less developed countries also rose. The rapid development of Japanese livestock production, referred to in later chapters, explains the surge. Explaining the corn-sorghum surge simply by growth in per capita income is not sufficient. The larger Japanese corn-sorghum imports must be attributed to the allocation of specific productive resources which expanded Japan's feed-livestock economy.

Domestic Grain Production. Japan's per capita output of all grains ebbed by an average of 5.11 kilograms each year. Per capita declines in rice and wheat production accompanied, although they did not match, the drop in per capita barley output. Minor grain output also declined. The drop of 1.50 kilograms a year in rice production is explained partly by the annual population increase, since the harvested tonnages fluctuated in only a narrow range. However, the failure of total rice production to advance very much in the face of the Japanese Government's sharp boosts in producer support prices for rice after 1962 is also noteworthy (61, 62). (Rice output rose in 1967-68, though.

The flow of domestic barley dropped sharply. The decline was partially made up by imports, but the total barley flow still decreased by a per capita average of 1.49 kilograms per year. Moderate amounts of barley for feed had to be imported to meet the gap between the growing feed demand and the sharply reduced supply of domestic barley available for feed.

The drop in domestic wheat output per capita for the 6-year period was no as great as for rice, largely because total wheat production in 1961 and 1962 was higher than in 1960, and because of a vigorous rebound of the 1964 harvest after the wheat and barley crop disaster of 1963. Japan's apparent unwillingness to stimulate wheat and barley production and the modest population rise also help to explain the annual drop of 5.11 kilograms, all grains. (Although 1967-68 rice crops exceeded peak crops of 1960-62, wheat and barley crops fell. Neither total nor per capita grain output in 1967-68 reached 1960 levels.)

Table 3.--Average annual change in Japan's per capita grain supply, 1960-66 1/

Grain	Source				Total, all sources
	Japan	United States	Other developed countries 2/	Less-developed countries 2/	
	Kilograms	Kilograms	Kilograms	Kilograms	Kilograms
Rice	-1.50	+ .27	+ .02	+ .77	- .44
Wheat	-1.01	+1.88	- .07	0	+ .80
Barley	-2.24	+ .44	+ .31	0	-1.49
Corn and sorghums	- .10	+6.72	- .90	+1.52	+7.24
Others 3/	- .26	*	+ .17	+ .02	- .07
Total, all grains	-5.11	+9.31	- .47	+2.31	+6.04

1/ Each figure is the average of 6 year-to-year changes in per capita supply during 1960-66.
2/ As defined on table 1.
3/ Rye, oats, millet, and buckwheat.

* +0.00167

Sources: Same as table 1.

Technologically, harvests might have at least matched the population rise, but on economic grounds the policymakers apparently decided not to try it. To stimulate production by further boosts in farm grain prices could only add to the already burdensome deficits in the budget of the Japanese Government's Food Agency (60, 107).

Rice Imports. Rice imports rose somewhat, partially offsetting the declin in the domestic rice supply per capita. Thus, the supply of all rice declined by only 0.44 kilograms per person annually, less than the drop in domestic production alone. Why did rice imports not rise more?

Under current consumer preferences, it is often difficult for the Food Agency to make up a fall in the domestic rice supply exclusively through import of rice. Japanese consumers prefer short-grain rice, which is in relatively scarce export supply from the United States, Taiwan, South Korea, Spain, and Mainland China (100, 114). Of the rice imported by Japan from 1960 to 1966, roughly 65 percent by tonnage was short-grain (100), and the percentage might well have been higher had more short-grain been available abroad.

The more abundant long-grain rice, which accounted for about 85 percent of world rice trade in 1958-60 (114) is considered inferior by Japanese consumers as a staple dish because of its physical properties. To move at retail in Japan, the long-grain must sell far below the short-grain in price. The premium of short over long within Japan is substantially greater than the differential usually found on world markets. As a result, the Food Agency skimmings (state trading profits) on imported long-grain rice are much less than or imported short-grain (10). The Food Agency has a monopoly on all rice imports (also wheat imports) and must consider the financial effect on its own budget of all import transactions in these grains.

Rice imports have been relatively small because they have had to compete not only against domestic rice, but also against imported wheat. Because the Japanese economy is heavily invested in rice production and marketing as well as in wheat milling, the invested resources have not been left idle in the short run. The flow of domestic rice and domestic plus imported wheat occupies these resources, but the import of milled rice does not, by and large.

The average annual decline in Japanese per capita consumption of all rice (domestic plus imported) by humans during 1960-65 was very small--only 6.6 calories per day (29). The decline was not steady, however, as consumption fluctuated in accord with the total rice supply per capita, especially the domestic portion. Peak consumption during the period (1,083 calories per person daily, all rice) occurred in 1962, the year of the period's peak domestic harvest. Lowest consumption (1,024 calories) occurred in 1965, the year of the period's lowest domestic harvest (29).

Domestic rice still occupies a very strong position in the Japanese diet. Japanese consumer preferences, limited short-grain exportable supplies in other countries, Japan's own pricing and import policies, and especially the competition of wheat raise obstacles to massive rice imports.

Wheat Imports. Imports of U.S. wheat surged to offset the drop in domestic wheat production, to take up some of the slack left by rice, and to fill part of the gap from the 1960-66 barley decline. The rest of the barley gap was not filled at all by grains, but by alternate sources of energy, that is, sugar plus fats and oils (table 6, ch. VI).

Although American wheat performed very impressively in the Japanese market, compared with the wheats of other exporting countries, there was little unusual in wheat's performance as a grain. Foreign wheat merely moved in to fill some of the gap when domestic grains faltered. During the period, wheat functioned as a residual item among the food grains. However, wheat products would seem to outrank long-grain rice and barley in consumer preference under the prevailing price relationships.

It is possible that wheat's competitive power in the Japanese market against short-grain rice has not yet been fully tested. Since the Food Agency skimmings on wheat imports, equivalent to an average 25 percent tariff (10), boost the prices of wheat products to the consumer, then a substantial skimmings decrease passed on to the retail level might aid the consumption of noodles and bread, the closest competitors of short-grain rice. Such a decrease in wheat skimmings would be of even greater help to wheat products if consumer rice prices keep rising as fast as they have risen since 1962. Thus, one should not discount wheat's potential.

In summary, the substantial increase in total grain supply and usage from 1957 to 1966 was accompanied by an important change in the composition of the grain flow. Imports surged after 1960. Much more corn and sorghums were imported, thus changing the mixture substantially in favor of grains for livestock feeding. The examination of food consumption and production in succeeding chapters will shed further light on the reasons for the great upsurge in Japan's grain imports.

Chapter III.--THE FOOD PROBLEM AS SEEN IN THE LATE 1950's

Japan's food problem of the late 1950's was a persistent food shortage of two dimensions. The first was nutritional. Per capita food consumption stagnated at a level somewhat below the Food and Agriculture Organization's nutritional reference standard for the country. 3/ The second was economic. The

3/ According to the F.A.O.'s Third World Food Survey (98), ch. 5 and 6 and app. 5, the short-term daily food consumption target per person for Eastern Asia (including Japan) was set at 2,350 calories, balanced among food types. The target (reference standard) was for the retail level, with an allowance for wastage between purchase and use. In the late 1950's Japan's actual per capita consumption (including all beverages) by this retail concept--the concept used throughout the present report--remained stable at about 2,250 calories per day (29, 79). Presumably, national average food consumption below the reference standard was a sign of nutritional deficiencies for some segments of the population. But, this report does not further evaluate nutritional deficiencies nor measure nutritional progress over time.

Japanese ate less food than they were "entitled" to by their relatively high incomes. Although Japanese incomes matched those of several Western nations, Japanese food consumption fell short of usage in these countries. 4/ Consumption fell short because Japanese food production was lower than in the West (per capita), and not enough was imported to make up the difference. Japan's agriculture and fisheries faced difficult problems in attempting to expand total food output.

The chronic food shortage of the late 1950's was distinct from the temporary food crises of the war and postwar years. Yet, this chronic problem threatened to deteriorate because it mirrored deep-seated economic strains. The nutritional deficit could be overcome in a few years. However, the continuing tension between a growing food demand and a lagging food supply could lead to severe, recurring economic difficulties.

The late 1950's is a good period with which to start an analysis of the food problem, because the temporary crises of the immediate postwar years were over by then and because a great debate on agricultural policy began about 1957.

The Income-Energy Gap

As shown in figure 2, Japanese per capita food consumption for 1957-59 was substantially lower than that in the three Western countries--Portugal, Spain, and Greece--whose per capita incomes approximated Japan's for those years (9, 29, 42, 55, 64). The typical Japanese consumer was not eating nearly as much as was "justified" by his relatively high income. For example, average Portuguese and Japanese consumers had personal incomes 5/ of about $200 and $21(in 1957-59. Yet, the Portuguese consumed about 2,650 calories per person per day while the Japanese at 2,250 calories barely exceeded the intake of the average Burmese, whose income was only about $50 per year (3, 4, 101). Measured against Portuguese consumption, Japan's income-energy gap stood at about 400 calories per capita per day during these years. However, measured against Greek consumption, the gap stood at 850 calories. By whatever measure, a big difference existed between Japanese and Western consumption levels (9, 29, 42, 55, 64).

The income-energy gap cannot be attributed to any lag in Japan's per capita consumption of staple, starchy foods (cereals, sugar, and potatoes), since

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4/ In this report quantities of food consumed are stated most frequently in calorie units so that consumption aggregates can be in units of physical quantity. Adding energy units is a convenient way to aggregate dissimilar kinds of food. Therefore, in this report international comparisons of food consumption in calorie units are between levels of gross availability of food (an economic concept) and not between nutritional levels (a physiological concept). Degrees of diet adequacy are not assessed.

5/ Actually, this is current private consumption expenditure (9, 64) per person (42, 55), converted to U.S. dollars at official exchange rates for 1957-59. Data are 3-year averages, rounded. Similarly for 1963-65. Private consumption expenditure per capita is a reasonable substitute for personal disposable income per capita.

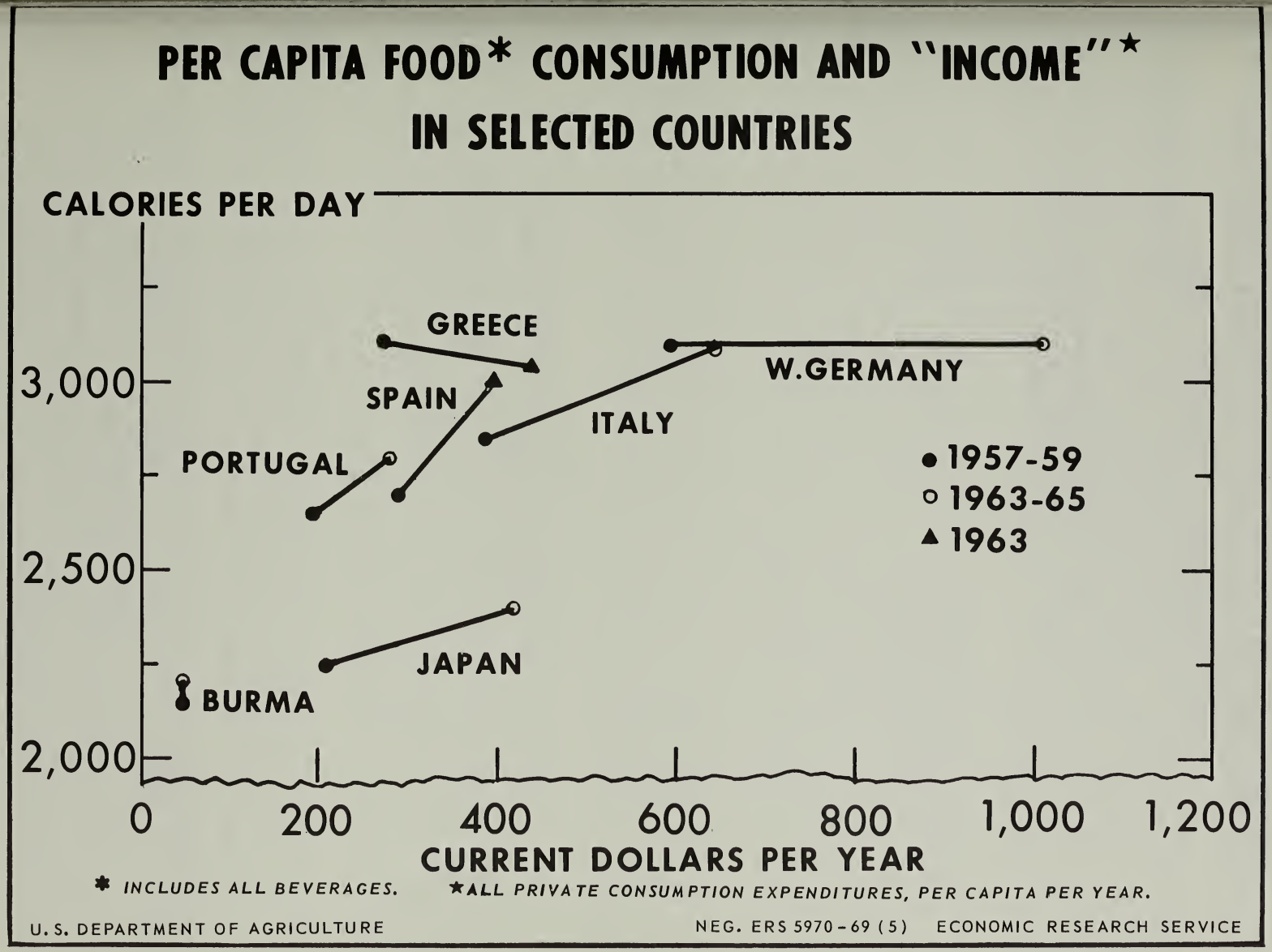
PER CAPITA FOOD* CONSUMPTION AND "INCOME"*
IN SELECTED COUNTRIES
CALORIES PER DAY
3,000
2,500
2,000
GREECE
SPAIN
PORTUGAL
ITALY
W.GERMANY
JAPAN
BURMA
● 1957-59
○ 1963-65
▲ 1963
0
200
400
600
800
1,000
1,200
CURRENT DOLLARS PER YEAR
* INCLUDES ALL BEVERAGES.
*ALL PRIVATE CONSUMPTION EXPENDITURES, PER CAPITA PER YEAR.
U.S. DEPARTMENT OF AGRICULTURE
NEG. ERS 5970-69 (5) ECONOMIC RESEARCH SERVICE

Figure 2

Japanese daily per capita consumption of these foods matched or exceeded Western levels (29). The gap is chiefly attributable to Japan's relatively low consumption of livestock products.

As shown in figure 3, Japanese per capita daily consumption of livestock products averaged only 62 calories in 1957-59, much below the Portuguese average of 244 calories. When fish and marine products are added for both countries, Japanese consumption, at 152 calories, was still only half the Portuguese, at 316 calories. Even if livestock product and fish consumption in the two countries is averaged for these years by alternate methods (such as grams of animal protein or grams of animal fat per person per day), Japanese usage was much lower (29).

The Japanese 1957-59 income level alone did not call forth enough livestock production, and not enough total food production plus imports to permit consumption to reach Western levels. Although food intake in the West has not been exactly the same from country to country as per capita incomes passed the same $100, $200, and higher points on the economic growth scale, the relationship of energy consumption and income has fallen within a definable range as countries developed (3). Japan's income-food energy relationship is unique in the annals of economic development, because over time it has fallen outside the range of Western experience. Why?

Since rising income alone has not pulled consumption up to the level "expected", what has held it back? Mainly, the slow growth in Japanese food production. But what held production back? The answer is found in a brief review of the production economics of Japanese agriculture, based on the conclusions of several economists.

Output, Productivity, Resources, and Development

Japan's income-energy gap of the late 1950's resulted from greatly unbalanced agricultural and industrial development. While Japanese commerce and manufacturing boomed, farming only crept ahead. The relatively high per capita income observed for Japan in 1957-59 was, of course, the result of substantial long-term growth for the economy as a whole. However, the long-term growth rate was much higher in industry than in agriculture. 6/

The unbalanced growth of the Japanese economy and the retardation of agriculture during the last 50 years is discussed in detail by Ohkawa and Rosovsky (82). They demonstrate that, even before World War II, Japanese food output could not keep pace with demand, and agricultural labor productivity fell far

6/ See (9, pp. 40-41), for data to calculate growth rates in agricultural and industrial sectors of the Japanese economy for 1951-59 (and to 1965, if desired). Japanese national income (valued at current prices of each year) from agriculture, forestry, and fishing increased at the average annual rate of 5.7 percent from 1951 to 1959. National income (current prices) from all other sectors of the economy combined increased at the average annual rate of about 14 percent during these years.

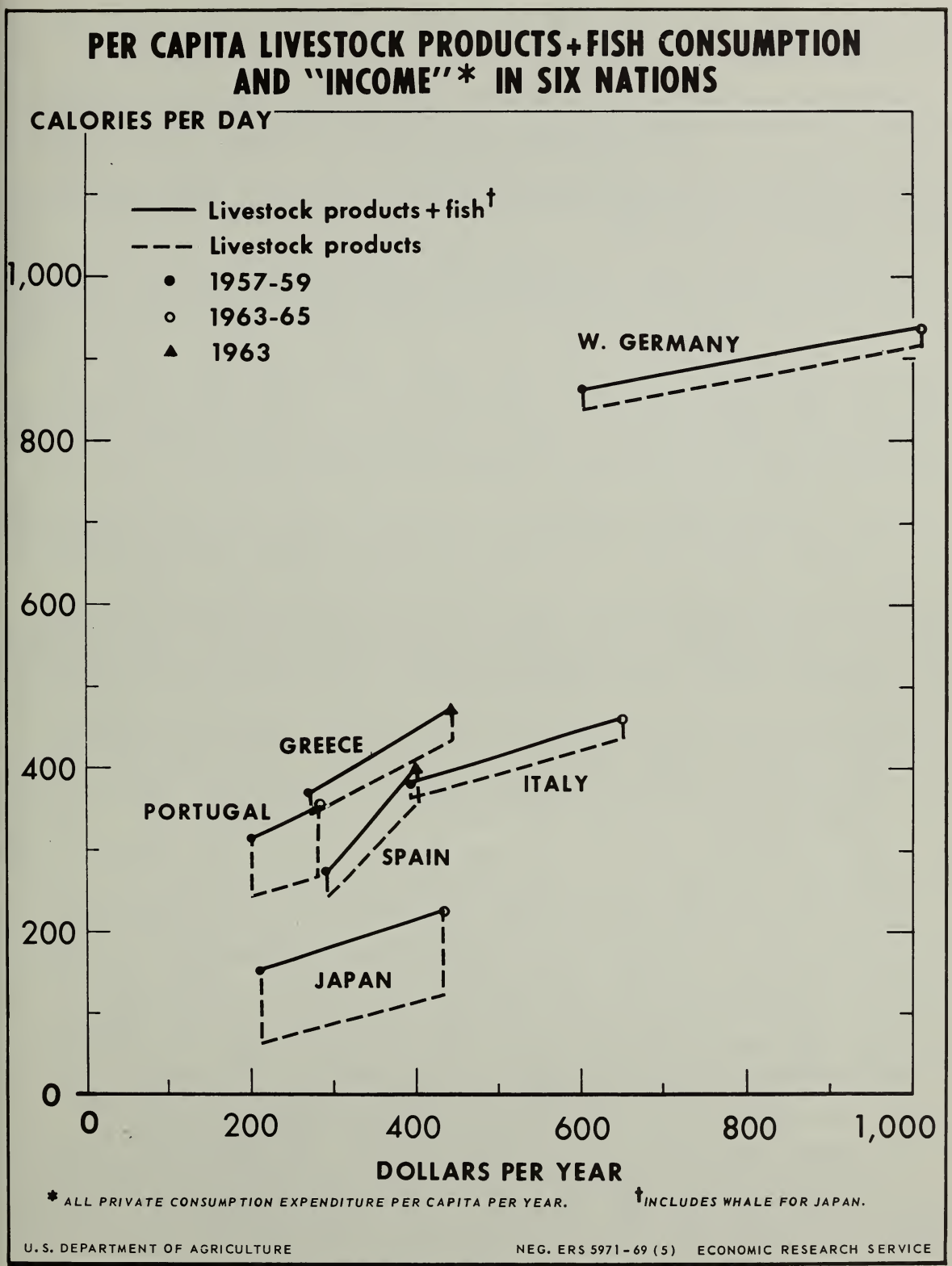
PER CAPITA LIVESTOCK PRODUCTS+FISH CONSUMPTION AND "INCOME"* IN SIX NATIONS
CALORIES PER DAY
Livestock products + fish†
Livestock products
1957-59
1963-65
1963
1,000
800
600
400
200
0
W. GERMANY
GREECE
PORTUGAL
ITALY
SPAIN
JAPAN
0
200
400
600
800
1,000
DOLLARS PER YEAR
* ALL PRIVATE CONSUMPTION EXPENDITURE PER CAPITA PER YEAR.
† INCLUDES WHALE FOR JAPAN.
U.S. DEPARTMENT OF AGRICULTURE
NEG. ERS 5971-69 (5) ECONOMIC RESEARCH SERVICE

Figure 3

behind productivity in nonagricultural employment, as did income. The situation continued into the postwar era.

Japan's agriculture not only remained less developed than the country's industry, but also was less developed than the agriculture of Western Europe. In making comparisons, both physical product and value indicators are useful. As a key indicator of technological development in the agriculture of industrialized countries, physical output per labor unit is often more relevant than physical output per land unit.

Judging by crop yields, Japan's agriculture was very advanced. For example, by the late 1950's the Japanese rice yield (national average) was among the highest in the world, the result of a "yield takeoff" which began 70 years before (81, 112). For 1955-59, the annual rice yields averaged 4.9 metric tons (rough) per hectare, or 3.6 metric tons (brown) per hectare (79, 112). Although this high yield reflected an efficient use of scarce land, it concealed an increasingly inefficient use of labor, which was rapidly becoming scarce too as industry and commerce surged. The opportunity cost of labor in rice production was rising, as alternative uses for this labor opened.

Several international comparisons illustrate Japan's low labor productivity in rice farming. About 1960, representative grain outputs associated with 100 man-hours of farm labor in the indigenous factor mix were: Japan, 0.3 metric tons of rice (rough); Italy, 3 tons of wheat; Northern Europe, 12 tons of wheat; United States, 18 tons of feed grains and 21 tons of food grains. 7/ Judging by the labor productivity standard, Japan's crop agriculture was not advanced at all, compared with farming in other developed countries.

7/ Labor used in Japan's rice production in 1960 averaged (nationwide) 171.5 man-hours per 10 ares, that is, 1,715 man-hours per hectare, or 17.15 labor units of 100 man-hours per hectare (81, p. 422). Japan's average yield of rice (rough) was 5.17 metric tons per hectare in 1960 (112). Thus, the yield of rice to 100 man-hours of labor was 5.17/17.15, or 0.3 metric tons. About the same value for Japanese labor use is found in (45, p. 87). Data for Italy from Italian Ministry of Agriculture sources are shown in Mangum (56, pp. 35 and 48). Although Italian labor use is not stated on a national average basis, annual labor use in wheat production in plains regions (with some mechanization) is about 70 man-hours per hectare, or 0.7 labor units of 100 man-hours. Plains wheat yields to land are about 2.0 metric tons per hectare. Thus, the yield of wheat to 100 man-hours of labor would be about 2.0/0.7, or 2.86 tons, rounded to 3 tons. The calculation for "Northern Europe" is based on work requirement data from an OECD manual for farm management (111, pp. 44-45). An OECD working committee developed data for this report, which contains labor productivity norms not quite achieved, yet within reach for the countries studied. The report centered on "the more advanced European countries." Committee members were mainly from Northern Europe. For winter wheat production at an assumed yield of 4.0 metric tons per hectare, the labor norm was set at 34.2 hours per hectare for the crop year, including soil preparation, seeding, management of the growing crop, harvesting, and surface cultivation. According to these norms, the yield of wheat to labor would be 4.0/0.342, or 11.7 metric tons per 100 man-hours, rounded to 12 tons. However, national average wheat yields in Northern Europe were well short of 4.0 tons per hectare around 1960, except in the Netherlands and Denmark. Thus, achieved wheat yields (continued)

The productivity of Japanese agriculture can also be measured in terms of value. For the years 1957-59, Japan's sectoral income per worker in the primary sector (agriculture, fishing, and forestry) stood at only 39 percent of the sectoral income per worker in the secondary sector (mining, construction and manufacturing). 8/ This relationship reflects the high opportunity cost of holding labor in Japan's traditional cropping patterns.

As an international comparison, gross agricultural output per farm worker in Japan averaged only $312 per year for 1955-59, while the gross agricultural output per farm worker for all Western Europe averaged $960 in 1955 (22, 115). Based on the gross output measure, labor productivity in Japanese agriculture was roughly one-third that of Western European agriculture. Of course, this measure identified the output from a mixture of many factors of production, not labor alone.

Because of different output composition and pricing, Japan's agricultural labor productivity relative to Western Europe's was much lower under the physical product concept than under the value concept. Nevertheless, it is fair to say that the general productivity of Japanese agriculture was lower than that of Western Europe. In fact, the low productivity of Japanese agriculture in comparison with either Japanese industry or Western farming was and is recognized repeatedly by Japanese officials, as in the Ministry of Agriculture and Forestry's 1957 white paper (12, 83).

Japan's system of agricultural production, characterized by low labor productivity, led to the inadequate level of food output revealed by the income-energy gap. In theory, domestic food output which falls below a nation's average nutritional requirements, or which cannot adequately meet consumer food demand without excessive food price inflation, need not be associated with low agricultural productivity. For example, a hypothetical country, highly developed and efficient in both agriculture and industry, might still be unable to produce "enough" food despite the high productivity of both agricultural land and labor. It then would import processed food to fully satisfy demand.

7/ (continued) to labor in Northern Europe in 1960 were probably well short of the 12 tons per 100 man-hours suggested as a norm. Data for U.S. yields to labor come from (7) for total production and from (16, table 15) for total man-hour use. Since labor use is aggregated for all "food grains" (wheat, rye, buckwheat, and rice) and all "feed grains" (corn, oats, barley, grain sorghums), grain yield to labor is also stated on this basis. Total production figures for these grain groups are derived from (7). For 1960, U.S. total production of food grains was 40,272,335 metric tons, and total labor usage 188 million man-hours. Thus, yield to labor was 21.4 metric tons of food grains per labor unit of 100 man-hours. U.S. feed grain production in 1960 was 141,175,642 metric tons, and labor usage 784 million man-hours. Yield to labor was 18.0 tons of feed grain per labor unit of 100 man-hours.

8/ Data on national income by sectors from (9, pp. 40-41). Labor force data by sectors from (63, Dec. 1961, p. 8). Sectoral national income per worker from the primary sector is also much lower than that from the tertiary sector--utilities, transportation, communication, wholesale and retail trade, banking, insurance, real estate, services, and public administration.

However, Japanese agriculture of the late 1950's, as noted above, was characterized not by high but by low labor productivity for a developed country. Consequently, given Japan's relatively small arable land area per capita, and its less developed livestock industry, the low labor productivity in agriculture and the inadequate level of food output were simply two aspects of the same production problem.

The lag in agricultural productivity was the result of Japan's land-saving, labor-intensive production technology plus the size and allocation of its stock of agricultural inputs, so heavily devoted to field crops. Relatively few "input packages" were applied to livestock production. As a result, there was not much of the comparatively high-value livestock output to boost the economy's gross agricultural output (in value terms). The many workers in agriculture, the factor proportions, and the lack of the high-value livestock output all contributed to the low gross output per worker.

Although capital and nonconventional inputs increasingly substituted for labor in the changing factor mix as the century progressed, the scale of production remained very small (50, 81, 115). Despite Japanese postwar technological advance, Japan's agriculture started from so far behind Western Europe that it was unable to catch up in either per capita energy production or productivity. By 1959, the food problem still was not solved.

Any attack on the problem mainly by boosting the output of traditional field crops surely would have been doomed. Greater output from expansion in the cultivated land area was not feasible, since the nation was already near its cropland ceiling. The new cropland added after 1955 was offset by cropland withdrawn for urban and other use (51, 79, 80). All the burden of raising crop output would have to fall upon methods of increasing per hectare yields. Yet, under the small scale of production, greatly increased amounts of capital and much more advanced technologies could not be employed economically for field crops. Enlarging the scale of production, although essential, would be a lengthy process which could not boost food supplies quickly enough to solve the food problem just ahead.

Japan would need to develop new agricultural sectors--livestock, for example--not only by adding new farm enterprises, new resources, and technology, but also by reallocating many resources already in field crop production. Yet, unless the transformation progressed rapidly beyond the accomplishments of the 1950's, there would be little hope of closing the income-energy gap through greater domestic production alone. Japan might soon have to face the question of whether to close the gap at all.

The Flow of Food, 1957

A detailed analysis of Japan's food flow for 1957 sheds further light on the food problem of the late 1950's and is a base for comparison with later years. The retail food flow is chosen because the ultimate economic demand is at retail, and because good data are available on the retail flows of matching food quantities and expenditures. Although the quantity flow is referred to as consumption or energy consumed, technically the quantities are

"processed supplies available for consumption" and not mouth-intake itself. The quantities, in calories per person per year, are based on the Ministry of Agriculture and Forestry's Food Balance.

The Ministry of Health and Welfare's National Nutrition Survey, a sample survey of nutrient intake by humans, yields results which agree reasonably well, but not entirely, with those of the Food Balance (38). The per capita energy intake of the Nutrition Survey is somewhat lower than the per capita processed supplies for consumption of the Food Balance, and the food-by-food composition is not exactly the same. The difference between the two totals of consumption can be 200 calories per person per day. Since the Balance and the Survey each uses a different statistical procedure, the somewhat different results are expected and are not a concern. Food Balance results cover the retail level, including meals in institutions and restaurants, and are consequently more useful for this study than the Survey results, which are limited to household usage.

Table 4 shows per capita consumption by food group for 1957 in units of 1,000 calories. Annual per capita consumption of 826,000 calories (rounded) of all food and beverages is equivalent to daily per capita consumption of 2,263 calories from Japan's Food Balances (29, 79). Total food and beverage expenditure in 1960 yen is taken from Japanese national accounts statistics, converted to a per capita basis, and allocated among the food groups as described in appendix I (9, 42). From the two flows, consumer costs per thousand calories are calculated by food group. The average cost for a group is, in effect, a weighted average of the costs of all products in the group, since the average is calculated by dividing group total expenditure by group total energy.

The food energy-expenditure flow in table 4 brings out the clear division of food groups into "high-cost energy" and "low-cost energy" categories. However, it would be inaccurate to say "high-cost foods" and "low-cost foods," because the cost data in table 4 refer only to energy content. A food group might not be "high-cost" at all if only protein content, for example, were costed.

The cost categories of table 4 do not imply that any food product was a better buy than any other in 1957. These cost categories and the cost-of-energy concept are useful to the economist, but not necessarily to the typical consumer. The economist is interested in both the changes in cost-of-energy relationships over time and the cost differentials between food groups at a given time.

The foods of high-cost energy are beverages, fish and whale, fruits and vegetables, and livestock products. Each group averaged well over 100 yen per thousand calories individually, while all the high-cost groups combined averaged about 130 yen per thousand calories. The foods of low-cost energy are cereals, fats and oils, potatoes, pulses, and sugar. Each group averaged well under 100 yen per thousand calories individually, while all low-cost combined averaged about 28 yen per thousand calories. Thus, foods in the high-cost group cost the consumer almost 5 times as much per energy unit as those in the low-cost group. The average cost of all food energy was about 42 yen per

Table 4.--Japan's per capita food consumption, expenditure, and energy origin, 1957 1/

Food group	Food consumed	Food energy-expenditure flow			Energy origin		Food import dependency rate 3/
		Energy consumed	Consumer expenditure	Cost per thousand calories 2/	Domestic	Import-dependent	
	Kilograms	Thou. cal.	1960 yen	1960 yen	Thou. cal.	Thou. cal.	Percent
High-cost energy							
Beverages	20	16	2,992	182.18	14	2	14.0
Fish and whale	26	34	3,774	111.17	34	0	0
Fruits and vegetables	96	41	4,732	116.80	41	0	0
Livestock products	22	21	3,062	144.63	17	4	20.7
All high-cost	165	112	14,560	129.94	105	7	6.0
Low-cost energy							
Cereals	157	527	12,973	24.60	439	88	16.7
Fats and oils	3	28	701	24.94	13	15	55.0
Potatoes	48	61	1,284	21.07	61	0	0
Pulses	31	49	2,072	42.37	48	1	2.7
Sugar	13	49	2,756	56.77	6	43	88.0
All low-cost	252	714	19,786	27.71	567	147	20.6
All food	418	826	34,346	41.58	672	154	18.6

1/ Japanese fiscal year 1957, from April 1, 1957 to March 31, 1958.
2/ Consumer expenditure divided by energy consumed.
3/ Import-dependent energy as a percentage of energy consumed.

Details may not add to totals because of rounding.

Sources: See appendix I.

thousand calories, reflecting the heavy weighting of low-cost energy in the average.

The low-cost calories accounted for 86 percent of per capita food consumption. But expenditures on this low-cost energy accounted for significantly less than 86 percent of total expenditures. By contrast, consumption of high-cost energy was only 14 percent of the calorie total, but 42 percent of the expenditure total.

Clearly, added beverages, fish, whale, fruits, vegetables, and livestock products absorb consumer purchasing power very readily, requiring new consumer expenditure (in relation to total food expenditure) to be proportionately greater than the addition to energy (in relation to total food energy). Conversely, added food in the low-cost energy groups boosts average food consumption very readily, generally not requiring new consumer expenditure to be proportionately as large as the addition to energy.

In addition to the above profile of the 1957 food energy-expenditure flow, table 4 shows separate estimates of energy origin. In 1957, about 19 percent of all energy consumed was import-dependent, that is, imported as consumer food products or manufactured in Japan using an essential input of imported agricultural raw materials (such as wheat for breadmaking or feed grains for livestock, the animal food products being later consumed). Only 6 percent of high-cost energy depended on imports, while about 21 percent of low-cost energy was import-dependent.

The import-dependency rates of both livestock products and cereals reveal that Japanese crop agriculture was not able to produce enough grain and other feedstuffs in 1957 to be self-sufficient in these consumer products. About a sixth of cereal and a fifth of livestock product consumption depended upon overseas procurement. Although the dependency was not yet massive by any means, additional per capita consumption of these products would probably have to depend upon the import of food raw materials from abroad.

The Economic Danger Ahead

By 1959, danger was foreseen for the Japanese economy in the continued imbalance between agricultural and nonagricultural growth. The degree of danger would depend on the extent of the imbalance. At moderately different growth in the food and nonfood sectors during the 1960's, food prices might do no more than escalate gradually. However, if the imbalance widened, Japan might be faced with stagnating or declining per capita food supplies and a rapidly growing pool of consumer purchasing power. Food prices could then skyrocket, creating many political and economic difficulties, especially among groups whose incomes rose less than the average. As seen from 1959, the Japanese income-energy gap might never be closed, and could even widen significantly by the mid-1960's.

Although the threat of much higher food prices was not inevitable, the danger could not be taken lightly. As a consequence of economic growth, more Japanese consumers depended on the market economy to supply food (45, 63).

The rural-urban population shift was well underway by the mid-1950's, with no prospect of abating, since the industrial demand for labor was growing (63). People were being cut loose from the "food insurance" of subsistence farms, even though a family's full transition from farming to urban jobs could span a generation or more.

Threats to market stability from a possible increase in consumer food costs and a cutback in per capita supplies would become more intense as time went on. By 1959, very rapid growth was being forecast for Japanese industry and commerce during 1960-69--correctly, as we now know (9, 14, 20, 35, 87). Policymakers knew that measures had to be taken to stimulate Japanese agriculture to share substantially in this growth. Not surprisingly, the emerging Japanese agricultural expansion program stressed livestock, fruit, and vegetable production to combat the imminent problems.

Livestock production, if expanded on a sound basis, could exploit some of the unused high payoff possibilities in Japanese agriculture. But great expansion in livestock output would require large imports of feedstuffs. In the late 1950's, Japanese cropping could not meet all food grain demands, let alone large new feed grain requirements. Therefore, Japan would have to move much farther away from complete self-sufficiency toward a greater dependence on foods wholly or partly of foreign origin.

Food production based on imported raw materials could be very efficient both technologically and economically. Such production--or even direct imports of finished foods--could lead to better diets, better resource use, and faster economic growth. Yet there was risk. Once committed to imported raw materials or foods, would the import flow be dependable? Balancing food supply and demand via larger imports necessarily interlocks nutrition with world politics, overseas shipping, industrial production, machinery exports, the balance of trade, foreign exchange, and the balance of payments. Solving the Japanese food problem in the complex mid-century enviroment called for equally complex Government policy.

Chapter IV.--THE NEW POLICY DECISIONS OF 1957-62

During 1957-62, Japan took important policy decisions which, by the end of the period, added up to a new food strategy. Although continuities ran through this period of change, this chapter concentrates on the new elements. In roughly chronological order, the following major steps contributed to the new strategy:

First, the Ministry of Agriculture and Forestry's 1957 white paper called for important structural changes in Japanese agriculture to remedy its low productivity (83). This white paper set off a great debate on agriculture lasting several years and culminating in important legislation in 1961.

Second, the Government initiated the Senkan and Zosan wheat bran milling programs in 1958 and 1959. They were designed to increase the supply of bran for animal feeds, and to provide restraints upon both formula feed and flour prices (11).

Third, the Government instituted guidelines on maximum prices at which feed mills could sell formula feeds to wholesalers. In June 1959, the Government for the first time sought and successfully obtained a rollback of formula feed prices by the feed mills. Guidelines, operative since then, have kept animal feed prices relatively low (94).

Fourth, in 1960 the Prime Minister announced the Doubling National Income Plan, covering the decade 1961-70. This Plan called for an average annual "real" growth rate of over 7 percent during the sixties (35). Such a rate would double the country's national income in 10 years. Investment, a major source of the expected growth, was to be increased, both in absolute amount and in relation to the gross national product. Consumption also was to increase, although less rapidly than investment. Thus, an increase in food consumption expenditures was considered not only desirable and necessary, but inevitable as well.

Fifth, an import liberalization program covering many industrial and some agricultural commodities was adopted in 1960 for implementation over the next few years (35, 89). Liberalization meant the eventual removal of import quotas (in accord with the General Agreement on Tariffs and Trade) and the eventual removal of formal foreign exchange controls (in accord with the Charter of the International Monetary Fund). Import quotas were removed from soybeans in 1961, raw sugar in 1963, and grain sorghums in 1964 (103, 104). (Corn for animal feed already entered without quota or tariff.) Japan sought full participation in both GATT and IMF in the hope of increasing both exports and imports. Expanding exports would enable Japan to obtain more imports needed for economic growth--vital raw materials, advanced equipment, and technology. The liberalization program probably increased the demand for food as a consequence of economic growth.

Sixth, rice, wheat, and barley were to remain unliberalized commodities for a long time if not permanently. These three grains, unlike sorghums and corn, were produced domestically in volume, and were protected by the Government Food Agency's import program and state trading operations. Dismantling state trading was improbable in the foreseeable future. Dairy products, beef, and pork from abroad also remained under quantitative restrictions (37, 104).

Seventh, also to remain under control were certain imports of long-term capital, notably direct investment in Japan from abroad which would grant management control of joint ventures to foreigners. In the food sector, such direct investment was not prohibited, but approved or rejected by the Government according to administrative standards (35, 66).

Eighth, the Agricultural Basic Law was passed in 1961, capping the great debate on agriculture. This legislation was a charter acknowledging that Japanese agriculture must be an industry as well as a way of life. Low productivity was to be improved through the "selective expansion" policy emphasizing livestock, fruit, and vegetable production. New kinds of farm operations and farm enterprises were to be created where none had existed before. These were to produce livestock, fruit, and vegetables with improved efficiency (81).

Ninth, the Livestock Products Price Stabilization Law was enacted in 1961. The Law authorized certain government price-support measures for dairy products, pork, and eggs. The Livestock Industry Development Corporation was established to undertake the price-support program. Preventing excessive price fluctuations and boosting production of livestock products were major objectives (52).

Tenth, in 1961 the Japanese Government obtained a short-term credit from a consortium of private commercial banks for the first time (35). Japan experienced a severe balance of payments crisis in 1961. Crisis in Japan's international payments was not new; indeed, it was expected because of the Government's aggressive payments policy of financing longer term liabilities by shorter term credits. This policy helped to raise the economy's growth rate by stimulating the flow of growth-inducing imports (35). The 1961 credit from U.S. commercial banks was, in a sense, only one more elaboration of an essentially consistent payments policy. Yet, this credit was also novel because it was an even more forward, aggressive step at the time when Japan was making another bold move toward greater dependence on imported food.

Eleventh, Japanese trading firms formed an importers' cartel to purchase corn from Thailand. The cartel, called the Thai-Corn Importers' Council of Japan, apparently was authorized by the Export and Import Trading Law of 1952, as amended, which permitted foreign trade cartels (41). From about 1961, the corn import cartel negotiated with the Thai Government each year over the terms of Japan's corn purchases from Thailand. The negotiations covered price, quantity, delivery schedule, quality, and other matters. The cartel assigned purchase quotas among its own trading firm members for specific shipment periods and for the entire annual purchase. The cartel cooperated with the Japanese Ministry of International Trade, the Ministry of Agriculture and Forestry, and the Japanese feed manufacturing industry (59).

Twelfth, the Japanese Government controls most imported and domestic rice, wheat, and barley through the Food Agency's operations and also sets or guides the prices for these grains and their products at all levels. In 1962, the Government made a series of rice, wheat, and barley price decisions which marked a turning point in Japanese grain and food pricing. From 1957 through 1960, the Government held the farm rice price steady, while raising farm wheat and barley prices somewhat. Prices of all three grains were increased by about the same proportion in 1961. However, the Government's price decisions of 1962 initiated a continuing rapid acceleration in farm rice prices, expedited by similar decisions in the following years. From 1962 on, farm prices of rice increased much faster than those of wheat and barley (5, 57, 61, 62).

Thirteenth, at the consumer level, retail prices of rice, wheat, and barley (or products) were manipulated to follow, in general, the farm prices. The Government held the consumer rice price constant from late 1957 until late 1962, when an increase of 11 percent was decreed. The similar performance of both farm and retail prices was not coincidence; raising the former put upward pressure on the latter through the Food Control Special Account, that is, through the Government's budget. To hold down the budgetary deficit from the farm rice subsidy, consumer rice prices had to be raised (10, 57, 60, 107).

Beginning in 1960, the urban Japan consumer price index for all foods, after holding steady for several years, began to rise because of rising retail prices of fish, meat, vegetables, fruits, and processed foods. Since consumer rice prices held steady until very late 1962, rice obviously did not contribute much to the 1960-62 rise in the all foods index (8, 63).

However, the 1962 and subsequent increases by the Government in the consumer rice price became a major upward influence on the all food index after 1962. This index continued to rise at about the 1960-62 rate, as the price increases moderated for foods other than rice (8, 63). Thus, from late 1962, the Government's consumer rice price decisions took the lead in maintaining the rate of advance in the all foods index. Since rice, as the main staple, was already the target of many substitutable foods encroaching on its dominant position, the 1962 turnaround and later decisions probably aided the consumption of foods more steady in price than rice.

Chapter V.--THE NEW FOOD STRATEGY

The new policy decisions of 1957-62 each added a piece to a mosaic which, at this writing, can be seen as a rational, comprehensive food strategy, substantially complete by early 1963. Most important, the Government sought a very high rate of growth for the entire economy. Policies for both food supply and demand had to adapt to the prior goal of fast economic growth.

Major Goals and Lines of Action

The Government had two parallel objectives as it adopted policies to deal with growing consumer purchasing power. (1) Increase the per capita supply (physical amount) of all food in total to lessen nutritional deficiencies and help satisfy economic demand; and (2) increase physical supplies of (what is termed here) high-cost energy faster than supplies of low-cost energy. In theory, both these objectives need not have been pursued at once, but in the Japanese situation both were deemed advisable. These were, and still are, the two main goals toward which Japanese food strategy is moving.

Domestic food-making capacity was expanded, especially for high-cost energy, and more and more food raw materials were imported to fuel this added capacity. Such raw materials are quite far from consumer-ready foods, and must be combined with many other inputs by Japanese farms and industries before being ready for retail. These raw materials are largely the feed grains, wheat, oilseeds, and raw sugar. The feed grains help to produce high-cost energy, while wheat, oilseeds, and sugar are partly for high-cost and partly for low-cost energy.

An alternate means which might have been chosen--but was not--was to import much more consumer-ready food. Instead, by protection, imports of consumer-ready food are kept low and well-controlled. Behind the protective shield, a new kind of food industry can grow up (for example, feed-livestock), even as an older kind remains secure (for example, rice). Both infant and ancient industries are protected by this shield, around which pass in volume only strategic imports.

Tariffs, quantity restrictions, state trading, and other nontariff barriers restrict the flow of consumer-ready foods to protect food processors. In this manner, Japanese enterprise can gain profits which would otherwise go to foreign suppliers if the consumer-ready foods were imported instead of the raw materials.

Food Raw Material Imports

Since the Japanese have chosen to implement their strategy largely by importing agricultural raw materials instead of processed food products, one might expect to find free access for these raw materials. However, this is not true. Imports of the essential raw commodities are also regulated, by openly protectionist devices for wheat and by less obvious devices for feed grains and oilseeds. Yet, these control devices have not prevented trade expansion, nor were they designed to do so. Controlling and managing an import flow need not stop the flow from enlarging, although over the long run the size of the increase and the composition of the flow by commodity may be very different with controls than without them.

Regulating food raw material imports helps to harmonize the interests of Japanese producers and consumers. Regulating the raw materials in a food-short country such as Japan puts an approximate ceiling on the supply of end products--consumer foods. Government strategy lifts the ceiling gradually, but not as fast as if consumer purchasing power were in control through the marketplace. In allocating resources to food production, the strategists, not the consumers, are sovereign.

Public policy responds partially to consumers by expanding food raw material imports, and also responds to the pressure of domestic producers by assuring them, not foreign suppliers, the larger share of consumer food expenditures. For example, the Food Agency's quotas and skimmings (state-trading markups or profits) on wheat imports deny imported wheat products a wide price advantage over domestic wheat products or domestic rice. Thus, domestic rice and wheat are fully used at prices acceptable to Japanese growers, but wheat imports rise nevertheless. Because of consumer demand, the Japanese have not had to grant free access to wheat to import more. Nor could they grant wheat free access and still protect domestic rice, unless rice were subsidized even more at still greater budgetary cost.

Feed grain imports do not go unregulated either, even though they are needed in great volume to carry out the food strategy. True, corn and grain sorghums for animal feed enter Japan without state trading, tariff, or quota (sorghum quota lifted in 1964) (104), but lack of formal trade restriction only means that regulation is inland instead of at the wharf. In this case, "regulation" means strong influence on production capacity and operating conditions in the main feed grain-using industry--the feed-livestock economy. Since this industry operates at nearly full capacity in Japan, the Government's control over added capacity--over further development--puts an approximate ceiling on feed grain imports.

The three main kinds of influence are the following: (1) The agricultural policy toward livestock production, markedly expansionist since 1961, but not necessarily so permanently; (2) the guidelines on formula feed prices, which have kept these prices low since 1959; and (3) control over production capacity in the formula feed industry by requiring new feed mills or mill expansions to be licensed by the Ministry of Agriculture, and providing both long- and short-term financing largely from the banking system, which usually cooperates closely with the Government. The Government has chosen to expand the feed-livestock economy because of its food strategy. The expansion has been quite deliberate and not at all unregulated.

Therefore, the feed grains and the other major raw foods from abroad can properly be called strategic imports because they enter in a large volume which can be greatly expanded or contracted only upon Government decision. For example, a sixfold increase in feed mill capacity and feed grain imports over the next 20 years could only follow from a distinctive pattern of Government decisions about the livestock economy (for example, "Strategy A"), and not from some very different pattern (for example, "Strategy B") which necessarily could employ only a threefold increase in mill capacity and imports over the same length of time.

Critical International Aspects

Under its current strategy, Japan has been very reluctant to grant control over food enterprises to foreign interests. Foreign direct investment in the food sector is carefully limited, and foreign equity capital is almost never allowed to take the majority interest in a food enterprise. Evidently, the Government believes that it can cooperate more effectively with business and that business will adapt better to the Government's food-strategic objectives if management is in Japanese hands.

Since raw food imports enter in large volume, decisions to import must be consistent with current balance of payments policies. Moreover, the flow of imports must be dependable, since many domestic resources are "locked into" the processing of food raw materials. The new strategy strives to widen Japan's choice of supply source (the country) from which commodities are purchased. If Japan can open alternate sources of supply, and if the purchase decision is in Japanese--not foreign--hands, then the buying of raw food commodities can become part of a balancing of trade flows and international accounts. Promotion of Japanese exports is frequently linked to procurement of imports (89). All imports and exports are handled through Japanese trading companies, which coordinate trade flows expertly (35, 44).

To stimulate alternative sources of supply, Japan has turned increasingly to East and Southeast Asia--particularly to Thailand--for corn since 1961. The magnitude of future Japanese involvement in East-Southeast Asia is not yet clear, but if it becomes very great the current food strategy might undergo significant change.

As of now, the new food strategy which emerged during 1957-62 has greatly increased the flow of imported food raw materials, the source of supply being

governed mainly by market availability rather than Japanese economic influence at the source. However, the strategy has restricted imports of many processed and semiprocessed foods by quantitative controls.

CHAPTER VI.--CHANGES IN FOOD CONSUMPTION AND EXPENDITURE, 1957-65

The ultimate proof of the effectiveness of Japanese food-strategic decisions is the results posted by the economy's food sector. The annual flows of consumer energy and expenditure on food in effect summarize all phases of activity and all transactions in this sector for a year. Major changes in domestic food production and foodstuff international trade necessarily will be reflected in the food consumption and expenditure flows.

Japan's food strategy succeeded to a marked degree in averting food crises in the 1960's. As suggested by contrasts in the food flows for 1957 and 1965, the strategy was neither a fiction nor a forgotten design. But a persistent, longrun food problem remained.

The Income-Energy Gap Over Time

Compare the income-energy gap for the years 1963-65 with that of 1957-59 (fig. 2 and 3). Japan's food consumption and expenditure relationship continued to be well outside the range of Western experience, regardless of whether all food is considered (fig. 2) or just livestock products and fish (fig. 3). For 1963-65, compare Japan's consumption of all food energy with that of Spain, Greece, and Portugal, where per capita private consumption expenditure (a close substitute for per capita income) was about equal to or less than Japan's. Measured against Portuguese consumption, the 1963-65 gap still stood at 400 calories per person per day, even though Japan's per capita "income" was above Portugal's. Measured against Spanish and Greek consumption, the gap was about 600 calories per person per day (9, 29, 42, 55, 64).

Despite advances in income and food consumption, Japan was not closing the gap. Future advance in Japanese per capita income is probably a "necessary condition" for closing this gap. But, income advance alone--reflecting mainly nonfood economic activity--is not a "sufficient condition". Along with industrial progress must also come an allocation of new resources to the Japanese food sector for its further development. Without this development, closing the gap is not assured, no matter what future income levels may be.

Failure to close the gap in the future would mean that the food problem, as defined here, would persist. If the gap were to hold about steady, without widening, roughly the same interaction between purchasing power and physical supplies would continue, with moderate-to-sharp increases in food prices. However, a marked widening of the income-energy gap in the future could be accompanied by very sharp price increases. Japan's future performance, compared with Italy's, will be significant, since Japan's rapid economic growth might well "equalize" Japanese and Italian per capita personal incomes after a decade or so.

The income-energy gap is useful to place Japan's food problem in a general perspective. However, a more detailed analysis of the consumption and expenditure changes in Japan's food flow from 1957 to 1965 illuminates the problem even more clearly.

1957 and 1965 Food Flows Compared

Since the flow data are a cross-section of Japan's food sector at the consumer level for a given year, comparison of the flows for 2 years yields a rudimentary time series for this cross-section. The observed changes and continuities from 1957 to 1965 suggest possible future configurations of Japan's food energy and expenditure flows.

The most striking difference between the 1957 and 1965 flows is in the high-cost energy group. Knowing what happened to this high-cost energy is the key to understanding the future range of choice open to Japanese policymakers dealing with food problems.

Foods of High-Cost Energy. Annual consumption of beverages, fish and whale, fruits and vegetables, and livestock products rose from 112,000 calories per person in 1957 to 168,000 calories in 1965, an increase of 56,000 calories, or about 50 percent. However, real per capita consumer expenditure on these same foods rose much faster, from ¥14,560 in 1957 to ¥26,820 in 1965, an increase of ¥12,260, or about 84 percent (tables 4, 5 and 6). During 1957-65, practically all the incremental food expenditures went to foods of high-cost energy (fig. 4), resulting in the absorption of more than half of the purchasing power by less than a fifth of the energy in 1965 (fig. 5).

Of the ¥12,260-increase in per capita expenditure on foods of high-cost energy (table 6), more than a third was accounted for by fruits and vegetables, the leading food group in absorbing new purchasing power spent on food. Next were livestock products, absorbing more than a quarter of the added expenditures. Next were beverages, followed by fish and whale. Yet, even fish and whale absorbed almost twice as much of the added expenditures as all the food groups in the low-cost category combined.

Of the 56,000-calorie increase in per capita consumption of high-cost energy, 25,000 calories were of domestic origin, while 31,000 were import-dependent. Because of the sharp increase in import-dependent energy, the average import-dependency rating for the entire high-cost group rose from 6 percent in 1957 to almost 23 percent in 1965. Livestock products supplied most of the added energy; fruits and vegetables followed. Livestock products added 29,000 calories to the per capita supply of high-cost energy from 1957 to 1965, the main portion of the 56,000-calorie increase.

Moreover, all of this added livestock product energy was import-dependent. Actually, the supply of import-dependent calories from livestock rose not just by 29,000 calories but by 30,000, since the livestock energy entirely from domestic sources declined by 1,000 calories during the period. Although much of this 30,000-calorie increase could have been achieved by importing processed livestock products, only 3,000 calories of the increase were actually in

Table 5.--Japan's per capita food consumption, expenditure, and energy origin, 1965 1/

Food group	Food consumed	Food energy-expenditure flow			Energy origin		Food import dependency rate 3/
		Energy consumed	Consumer expenditure	Cost per thousand calories 2/	Domestic	Import-dependent	
	Kilograms	Thou. cal.	1960 yen	1960 yen	Thou. cal.	Thou. cal.	Percent
High-cost energy							
Beverages	42	26	5,529	212.65	23	3	11.7
Fish and whale	30	36	5,611	155.86	36	0	0
Fruits and vegetables	139	56	9,134	163.11	55	1	2.1
Livestock products	62	50	6,546	130.92	16	34	67.5
All high-cost	263	168	26,820	159.64	130	38	22.5
Low-cost energy							
Cereals	144	484	12,966	26.79	380	104	21.4
Fats and oils	7	61	1,148	18.82	12	49	80.5
Potatoes	32	48	1,585	33.02	48	0	0
Pulses	29	53	2,492	47.02	38	15	27.8
Sugar	18	71	2,583	36.38	12	59	82.6
All low-cost	229	717	20,774	28.97	491	226	31.5
All food	492	885	47,594	53.78	621	264	29.8

1/ Japanese fiscal year 1965, from April 1, 1965, to March 31, 1966.
2/ Consumer expenditure divided by energy consumed.
3/ Import-dependent energy as a percentage of energy consumed.

Details may not add to totals because of rounding.

Sources: See appendix I.

Table 6.--Comparison of Japan's 1957 and 1965 per capita food flows

Food group	Percentage distribution				Increase or decrease 1957 to 1965			
	1957		1965					
	Energy consumed 1/	Consumer expenditure	Energy consumed 1/	Consumer expenditure	In energy consumed 1/		In consumer expenditure	
	Percent	Percent	Percent	Percent	Thou. cal.	Percent	1960 yen	Percent
High-cost energy								
Beverages	2.0	8.7	2.8	11.6	+10	+ 58.0	+ 2,537	+ 84.8
Fish and whale	4.1	11.0	4.1	11.8	+ 2	+ 6.6	+ 1,837	+ 48.7
Fruits and vegetables	4.9	13.8	6.4	19.2	+ 6	+ 38.6	+ 4,402	+ 93.0
Livestock products	2.6	8.9	5.6	13.8	+29	+135.0	+ 3,484	+113.8
All high-cost	13.6	42.4	19.0	56.4	+56	+ 49.9	+12,260	+ 84.2
Low-cost energy								
Cereals	63.9	37.8	54.7	27.2	-44	- 8.3	- 7	- .1
Fats and oils	3.4	2.0	6.9	2.4	+33	+117.7	+ 447	+ 63.8
Potatoes	7.4	3.7	5.5	3.3	-13	- 21.0	+ 301	+ 23.4
Pulses	5.9	6.0	6.0	5.2	+ 4	+ 8.4	+ 420	+ 20.3
Sugar	5.9	8.0	8.0	5.4	+22	+ 45.5	- 173	- 6.3
All low-cost	86.4	57.6	81.0	43.6	+ 3	+ .4	+ 988	+ 5.0
All food	100.0	100.0	100.0	100.0	+59	+ 7.1	+13,248	+ 38.6

1/ Calculated from the unrounded energy figures.

Details may not add to totals because of rounding.

Sources: Same as tables 4 and 5.

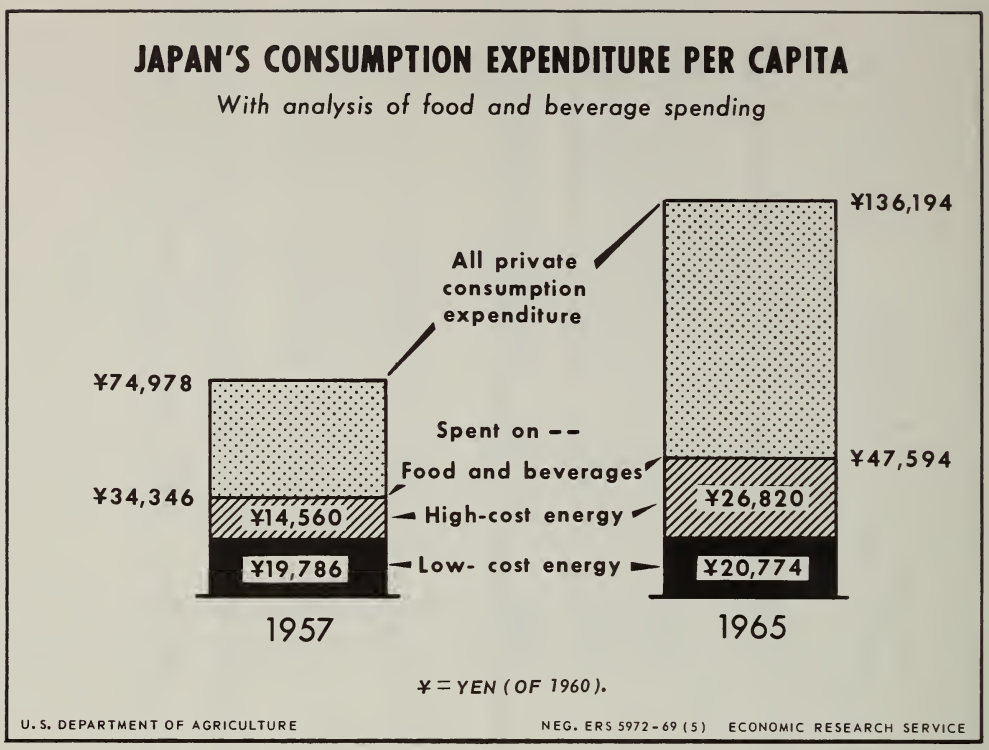

Figure 4

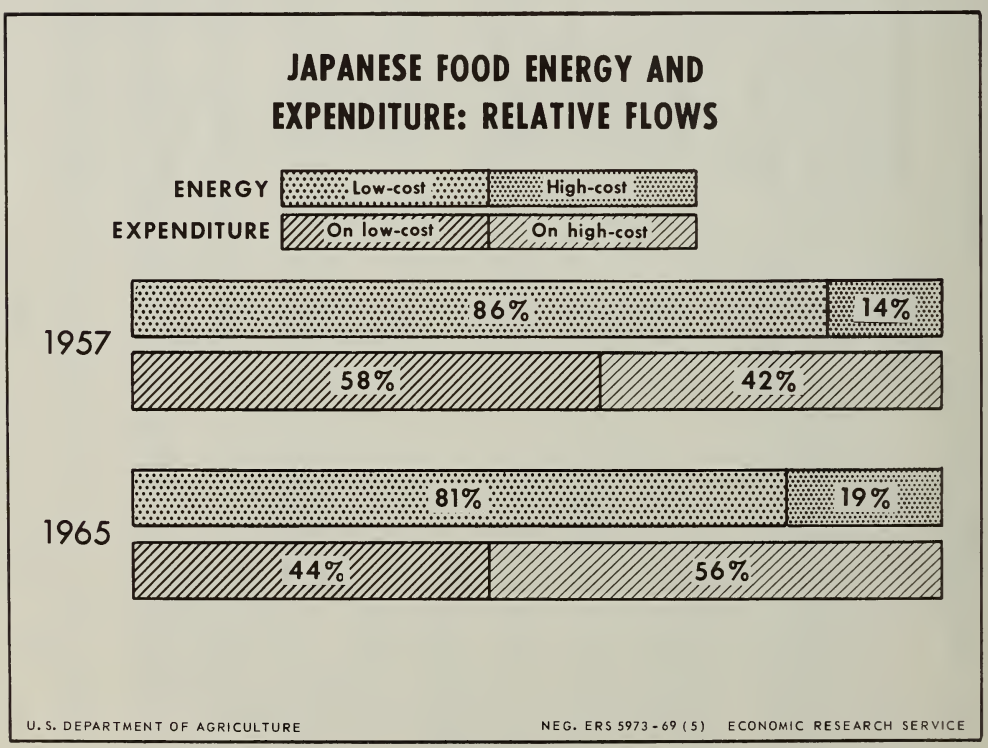

Figure 5

processed form. 9/ Consequently, 27,000 calories of the consumption rise in livestock products came from a larger Japanese output greatly dependent on the 1957-65 upsurge in feed grain and oilseed imports. That is, almost half of all the 56,000-calorie rise in high-cost energy is attributable to this import surge in feedstuffs. By 1965, 68 percent of livestock product consumption was import-dependent, compared with only 21 percent in 1957.

Since expenditures on livestock products did not rise quite as fast as the supply of energy from these foods, the cost per thousand calories declined from ¥145 in 1957 to ¥131 in 1965. In the high-cost group, only livestock products declined in cost, however, because expenditure on beverages, fruits, vegetables, fish and whale rose more rapidly than their energy supplies, resulting in higher unit energy costs in 1965 than in 1957 for these three groups.

For the entire high-cost group, the rise in the average cost of energy from ¥130 per thousand calories in 1957 to ¥160 in 1965 reflected the more rapid increase in expenditure than in energy supplied. The relationship between costs per energy unit and retail food prices is discussed in appendix I.

The Japanese Government's food strategy had a very strong impact on the consumption of livestock products. The selective expansion of agriculture, called for by the Agricultural Basic Law in 1961, set the policy toward more animal (as well as fruit and vegetable) output. The policy was followed effectively by aids to capital investment in livestock, the new administered price incentives for pork and dairy production, and the open-door policy on feedstuff imports. True, some oilseeds still had to overcome moderate trade restrictions, but these restrictions did not decrease the import flow. On the contrary, oilseed imports rose greatly.

In light of Government licensing of each expansion in feed compounding capacity, the rise in this capacity from 2.6 million tons of formula feed annually in 1957 to 7.5 million tons in 1965 (94) (basis: 1 shift, 8 hour day, 25-day month) is impressive testimony to the open door. Government involvement in the livestock expansion was both active and essential.

In viewing cause and effect, the added consumer purchasing power, that is, "new demand," led to the additional consumption of food energy only indirectly. New demand by consumers did not directly cause the rise in livestock product consumption and the upsurge in feed grain and oilseed imports. Rather, the guided, strategic expansion of production capacity in Japan's feed-livestock economy was necessary to translate this new demand into the import upsurge and the observed increase in livestock product consumption.

Given the Japanese political and economic system, this expansion in capacity could have come only with the active encouragement and support of Government policy--only after certain food-strategic decisions. The added purchasing power was an underlying influence, indeed, but not through the marketplace as

9/ Per capita consumption of livestock products imported in processed form is estimated at 1,350 calories per year in 1957 and 4,307 calories per year in 1965, an increase of 2,957 for 1957-65, rounded to 3,000 calories. See appendix I, table 14, for 1965 calculation.

an expression of consumer sovereignty. The line of influence had to pass through the food strategy or be little influence at all. Policymakers did not really have to decide as they did. They chose to do so, mindful, though, of the consequences of alternative choices.

As it turned out, the Government's leverage upon food consumption pattern, particularly through the livestock group, was extremely important. Had the supply of high-cost energy not increased between 1957 and 1965, the force of the new food purchasing power coming from economic growth would have boosted food prices much more--perhaps uncomfortably more. If the 1957-65 experience holds any lesson for the future, it is that added food expenditures can be absorbed most readily by expanding the supplies of high-cost energy.

Since livestock output can be expanded quite rapidly, as demonstrated during 1957-65, it is very effective in soaking up new expenditures. Therefor, one would expect to see continued rapid growth in the supply of livestock products. Yet, marked future expansion in fish production could signal a slower pace of growth in Japan's feed-livestock economy. Food strategists may be abl to choose, in future years, between added supplies of fish or of meat, both competing as similar physical products as well as objects seeking the consumer's currency. Naturally, competition takes place not only in the commodit flow but in the expenditure flow as well.

In the future, the Government may also be able to boost the output of fruits and vegetables, equally if not more effective than livestock output in absorbing expenditure. Beverages, too, compete with livestock products for consumer food money. If a major food-strategic goal is to supply more objects to absorb expenditures, not just to add to protein supplies, more beer could b better than more broilers.

Foods of Low-Cost Energy. Per capita consumption of cereals, fats and oils, potatoes, pulses, and sugar practically stagnated in total when the 196 intake of 717,000 calories per person is compared with the 1957 intake of 714,000 calories. However, real per capita consumer expenditures on these sar foods rose by 5 percent, from ¥19,786 in 1957 to ¥20,774 in 1965 (tables 4, 5 and 6). By 1965, these foods accounted for 81 percent of the energy in the average Japanese diet, but absorbed only about 44 percent of the food purchasing power (fig. 5).

There were roughly offsetting increases and declines in energy consumptio among the foods making up this low-cost group. From 1957 to 1965, yearly energy from cereals declined by 44,000 calories per person. However, energy from fats and oils rose by 33,000 calories for the period, and from sugar by 22,000 calories. Potato energy declined, while pulse energy increased somewh The consumption offsets in this low-cost group suggest that some of the products are very ready substitutes for the others, depending upon the availabil of supplies. The fact that the low-cost group did not absorb much of the new food purchasing power is reflected in the stable average cost of energy for t group, which rose only from ¥28 to ¥29 per thousand calories from 1957 to 196 Whether this low-cost group might have absorbed more purchasing power is a moot question. Consumers clearly preferred to scramble for high-cost energy

rather than bid up low-cost energy unit costs by allocating more of their purchasing power to the latter category.

The import-dependency of low-cost energy rose from about 21 percent to about 31 percent over the period. Larger imports of cereal grains, oilseeds, other pulses, and raw sugar were responsible. Japan had to increase imports of low-cost energy substantially during 1957-65 just to maintain the consumption level in this food category. The food strategy was extremely important in increasing import-dependency, thus holding up consumption.

The 1957-65 decline in energy from domestic cereals from 439,000 calories per capita to 380,000 calories reflects the smaller supplies of domestic rice, wheat and barley already referred to in chapter II. Similarly, the rise in import-dependent cereal energy from 88,000 calories per capita in 1957 to 104,000 calories in 1965 mirrors the larger per capita wheat imports also referred to (table 3). The larger wheat imports, procured solely by the Food Agency, were an obvious expression of the Government's food strategy.

The rise in import-dependent energy from fats and oils was mainly a residual effect. A major addition to oil supplies resulted from expanded imports of soybeans and other oilseeds crushed for high-protein animal feed meal. Since demand for meal rose with growing formula feed and livestock production, Government policy to expand this output played a dominant role in increasing the supplies of meal and the joint product--oil.

Would supplies of edible oils have expanded as much over 1957-65 in the absence of the larger requirement for high-protein meal? Without the very strong meal demand, if much more oil were desired, Japan could have imported the oils themselves or oilseeds of much higher oil yield than soybeans--copra or peanuts, for example. But such an outcome would have been most unlikely. Japanese industry regards its achieved level of edible oil output as temporarily excessive (72), understandable in light of the decline in the real cost of fats and oils energy from about ¥25 per thousand calories in 1957 to about ¥19 in 1965 (tables 4 and 5). The expanded supplies of edible oils had to be moved at stable to somewhat lower current prices, that is, much lower real prices (a circumstance which industry probably would not have chosen voluntarily if not confronted with larger amounts of an inevitable joint product).

The substantial expansion in pulse import-dependent energy from 1,000 calories per person in 1957 to 15,000 calories in 1965 resulted from rising imports of beans and soybeans entirely for food processing. Of the increase, 11,000 calories were accounted for by food soybeans and 3,000 calories by other pulses. 10/ Trade restrictions on the import of these pulses for food were eased, permitting the substantial expansion in imports (29). Soybeans came in over a 13 percent tariff, having been freed from import quota in 1961 (37, 103, 104). Other pulses were still subject to quotas as well as 10 percent tariffs (39), but, since imports increased, quotas were obviously enlarged. The actual

10/ Import-dependent pulse energy is calculated at 1,314 calories annually per person in 1957 and 14,746 calories in 1965, an increase of 13,432. Of this increase, 2,518 was in "other pulses" and 10,914 in "food soybeans", rounded to 3,000 and 11,000. See appendix I.

liberalization of soybeans and the larger quotas for the other pulses illustrate the Government's important role.

Import-dependent consumption of sugar products rose from 43,000 calories per person in 1957 to 59,000 calories in 1965, an increase of 16,000. Consumption of domestic sugar rose by only 6,000 calories per person--from 6,000 calories in 1957 to 12,000 calories in 1965. The domestic rise was proportionately larger than the import rise, and so the sugar import-dependency rate declined slightly. Although imported sugar accounted for most of the consumption rise, close analysis of the source of imports shows that about 6,000 calories of the total imported sugar consumption per capita in 1965 came from the Ryukyu Islands (29, 100). By contrast, practically no sugar came from the Ryukyus in 1957 (100). Sugar from this source received special treatment in the Japanese market akin to the protection for domestic sugar (103, 104). Thus, about half the 1957-65 increase in sugar consumption came from protected sources--beet and cane sugar from Japan plus cane sugar from the Ryukyus. Because Ryukyuan sugar is shown as imported in trade statistics, it is not included in the domestic column on tables 4 and 5.

The intent of Government policy appears to have been both protectionist and expansionist. This is demonstrated by the expansion in raw sugar imports, the rise in domestic production aided by high support prices, and the resulting rise in sugar consumption despite consumer prices which were higher than the sum of world levels plus processing and marketing markups.

Japan liberalized its imports of raw sugar in August 1963, removing them from import quota restrictions (5, 104). However, imported raw sugar still had to bear a specific import duty (39). The impact of this duty on consumer prices was reinforced by an internal tax on all refined sugar from imported raw, except Ryukyuan (37, 103). These taxes did not prevent the sugar import flow from rising, as already noted.

In addition, the Government established minimum prices which producers were to receive from the mills for domestic beets and cane. These prices were maintained by the Government's action in purchasing, storing, and reselling domestic raw sugar at price levels insulated from the competition of world raw sugar by the taxes described above (5, 104).

Thus, Government policy assured that domestic and Ryukyuan sugar production would be fully used at prices acceptable to growers, and that imported sugar could enter to increase supplies for consumption. Although resulting refined sugar prices were high relative to world levels, Japanese consumers were not deterred from buying more.

The Government followed a high-price, restrictionist sugar policy only in relation to world prices and available supplies. In relation to prior Japanese prices and supplies, however, the policy was basically lower price, expansionary. The Government followed an effective course in boosting sugar supplies, involving not only the 1963 liberalization, but also the new 1964 domestic program.

Yet the sugar supply increase was of little help in absorbing new expenditure, since per capita real expenditure on sugar products was lower in 1965

than in 1957. Consumer prices for refined sugar fluctuated during 1957-65, reaching a peak in 1963, then falling sharply to the period's low point in 1965 (8, 63). The real unit cost of energy to the consumer was much less in 1965 than 1957, because larger supplies were marketed.

Although Japan's food strategy was responsible for preventing any general per capita consumption decline in the low-cost group during 1957-65, many measures had to be taken just to hold the line. As a result, the low-cost energy made almost no contribution to absorbing new purchasing power spent on food. It is hard to see how the low-cost group could give much help toward expenditure absorption in the future, except at very much higher unit costs and retail prices, which could prove almost impossible to accept. Direct price controls and rationing would surely be more palatable in an emergency.

Barring a serious crisis, the main question about low-cost energy is whether per capita consumption of it can be kept at the present level or whether there will be advantage in allowing decline. Given a decision for decline, there would also be complex problems about supply mixture in this low-cost group, with opportunities for trade-off and substitution. Should per capita supplies of one food be decreased very sharply, another less sharply, and another not at all--or actually increased? Should supplies and consumption of each food be decreased in roughly equal proportion? There are probably several major policy alternatives.

All Food Energy. Although per capita energy consumption rose by 7 percent from 1957 to 1965, per capita food expenditures rose by 39 percent. The greater expansion in the food money flow than in the food quantity flow is striking. It led to the increase in the average real cost of energy from ¥42 to ¥54 by 1965 (fig. 6). Equally striking is the absolute decline in per capita energy supplied from purely domestic sources (fig. 7).

In 1957, Japan consumed 672,000 calories per capita produced domestically without aid of food raw material imports, and not including processed food imports. However, by 1965, Japan consumed only 621,000 such all-domestic calories per capita, not including processed food imports or food based on imported agricultural raw materials. One concludes that Japan's economic capacity to produce food entirely on its own was constricting.

The increase in total food consumption per person from 826,000 calories in 1957 to 885,000 calories in 1965 was achieved through imports. Imports also made it possible for Japan to offset the absolute decline in capacity to produce food solely from domestic agricultural sources. Imports both added and substituted. Import-dependency for all food rose from 19 percent in 1957 to 30 percent in 1965. The future degree of import-dependency will stem not from the size of the import flow alone, but also from the amount of continuing decline, if any, in Japan's purely domestic food production capacity.

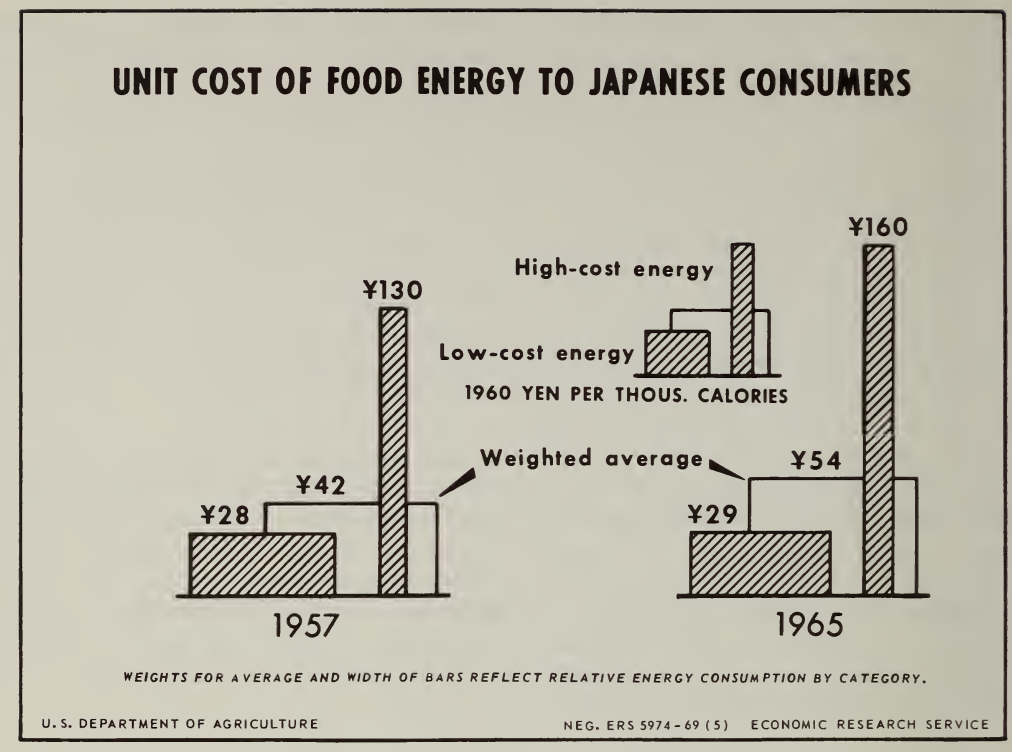

Figure 6

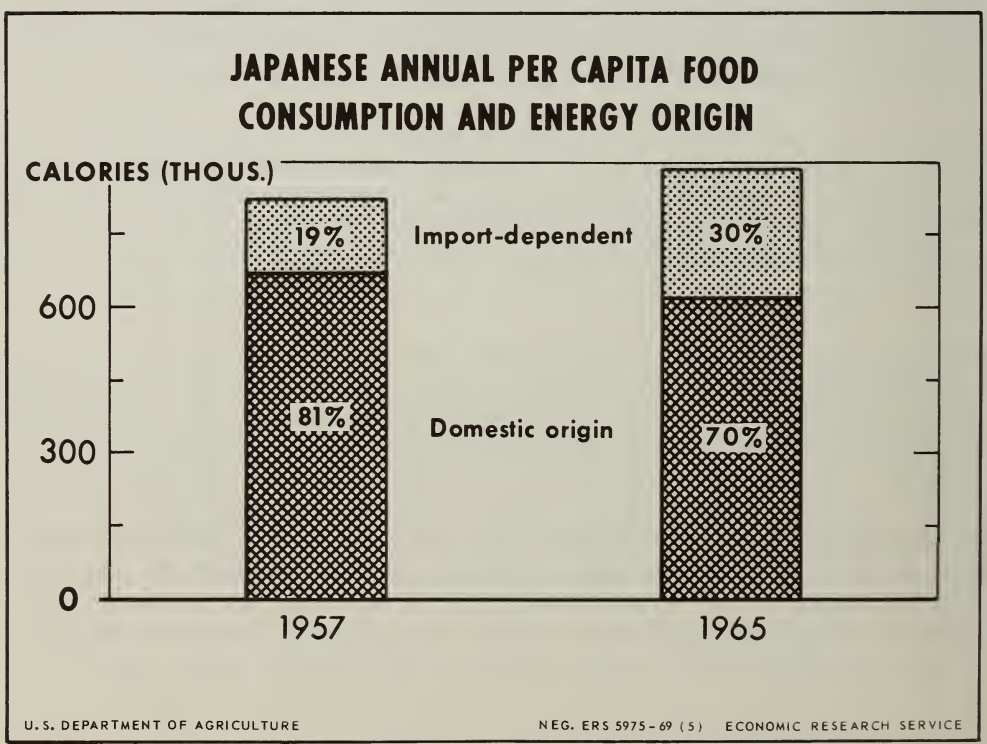

Figure 7

Chapter VII.--THE LONGRUN FOOD PROBLEM AS SEEN IN THE LATE 1960'S

Buoyant Demand, Constrained Supply

As seen in the late 1960's, Japan's longrun problem is to loosen the severe constraints on food supplies to meet a rapidly rising food demand without excessive price increases and to improve nutrition. In a definitional sense, total demand and total supply are equal, since the quantities marketed and purchased are equilibrated through price. But total food demand may also be thought of as consumer food purchasing power. In this sense, Japanese food demand has consistently outrun food supplies since 1957, as attested by rising retail food prices.

Economic growth in commerce and industry generated most of the new consumer purchasing power, because neither income nor output from agriculture and fishing kept pace with the rest of the economy. Food supplies were constrained seriously by production problems and import restrictions.

Total consumer demand was subject to no comparable constraint. Since per capita consumption of all food in Japan is so far below Western European and American levels, neither Japanese food wants nor economic demand is yet saturated. Thus, without an imminent saturation limit on the total quantity demanded, but with constraint on the quantity supplied, expected economic growth in the 1970's and beyond could lead to runaway food prices at some point.

Japanese food prices already have advanced far faster than usually thought acceptable in the United States. For example, the U.S. Bureau of Labor Statistics Retail Food Price Index for major U.S. cities, base 100.0 in 1957, rose to 111.2 by 1965 (34, p. 174). However, Japan's Consumer Price Index for all food in Japanese cities, base 100.0 in 1957, rose to 146.3 by 1965 (8, 63).

To those whose incomes fell behind the average increase, such a sharp rise in food prices must have brought hardship, especially in Japan. The national average daily diet of 2,424 calories per person (1965) was barely above the Food and Agriculture Organization's nutritional reference standard (2, 98). (See footnote 3/, chapter III.) For those who were already consuming below the national average as well as below the nutritional minimum and whose incomes did not keep pace, the price rise must have been inequitable three times over.

Without question, as evidenced by its expansionary food strategy, the Japanese Government has been and remains aware of the many inequities and perils of sharply rising food prices. 11/ However, the constraints on food supplies have been so difficult to overcome that even the 1957-65 increase in the total food flow, while substantial, could not prevent very large price advances. The fact that these did not elicit a much greater supply response

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11/ The Japanese Cabinet established a Commodity Price Stabilization Advisory Council in 1967. Members were appointed by the Prime Minister. The Council worked with the Price Policy Section of the Economic Planning Agency. Late in 1968, the Council issued a report to the Prime Minister stressing the importance of curbing food price rises. The report recommended that food supplies be increased (30, 76).

from Japan's food sector is testimony enough as to the toughness of the supply problem.

For the future, it would be convenient, but exceedingly difficult, to circumvent the supply problem by restricting demand directly, that is, by siphoning off food purchasing power. However, restricting food expenditure is hard to accomplish directly, short of rationing and price control. Restriction is quite imperfect if attempted through policies to dampen economic growth and slow advance in disposable personal income.

Since growth and income policies are formulated with many goals and interests in mind besides food, a decision for an economic slowdown is not eas to reach. And even if reached, a decision for general slowdown might not squeeze selectively enough upon consumer food purchasing power. Across-the-board increases in direct or indirect taxes are not selective tools either, although an excise tax on food might drain purchasing power unless consumers reallocated some nonfood expenditure to food. Food taxes, though, are highly regressive, inequitable, and difficult to enact.

Possibly more useful would be a large outpouring of consumer durables to compete with food for spending power. The objective would be to whittle down the "marginal propensity to spend on food" below its expected value. Yet, eve this approach does not hold great promise for effectively managing food demand judging from the 1957-65 record.

From the observed average propensities to spend on food (Engel coefficients), which accorded with other-country experience during 1957-65, 12/ Japanese consumers seem to have spent marginally for food about as expected despite a consumer goods boom. The propensity to spend on food is among the most regular of economic behavior patterns, not altered profoundly or with ea except in great crisis.

Consequently, the main road to food price stability and better diets lie through further expanding the supplies of food for Japanese consumers. In th absence of an open door for processed food imports, and even with no relaxing of present production constraints, per capita food production could advance somewhat. But merely a moderate advance in production might fail to achieve such reasonable food-strategic objectives as closing the income-energy gap or averting sharp price rises. To achieve these objectives will probably requir breaking the 1957-65 technological, economic, and institutional constraints, and multiplying the successes already attained.

Crop Production Constraints

Economic and technological problems have combined to reinforce the natur scarcity of land in constraining domestic crop production. The geography of

12/ In 1957, Japanese expenditure on foods and beverages (not including tobacco) was 46.7 percent of private consumption expenditure. By 1965, this percentage had fallen to 35.8 percent (9, pp. 50-51 and 214-215). This drop s in accord with other-country experience (92, p. 19).

Japan severely limits the land area for cultivation. With such a large population Japan's current cropland area per person works out to only 0.06 hectares--less than in Switzerland, Taiwan, the Netherlands, or Belgium (20, 42, 55, 85). Arable land area can and has been expanded, through reclamation, at substantial cost. But the area reclaimed recently has been offset by the area taken out of cultivation for urban and other use (51, 79, 80).

Traditionally, double-cropping--largely with winter crops--added land to production. And, the land-saving, labor-intensive production technology also helped to relax the scarce-land constraint on output by boosting crop yields per land unit. But now, the traditional labor-saving, double-cropping, small-scale agriculture is no longer profitable enough for producers to maintain land and labor usage at prior levels for certain crops. Declines in Japanese production of such key field crops as wheat, barley, sweet potatoes, soybeans, and rapeseed over 1957-65 are the evidence (1, 2). The overall limit on crop production imposed by the interaction of agricultural structure and scarce land is no longer relaxing, but constricting.

As an illustration, double-cropping has declined as labor moved to other employment or retired because of age. Some workers migrated permanently to urban jobs, others just for the winter, while some worked at farming only part-time the year around. Selective farm labor shortages began to appear, according to Takasuga (97). The total agricultural labor force (including part-time workers) declined steadily from 19.5 million persons in 1955 to 15.2 million in 1965. Since the number judged to be part-time and seasonal workers remained roughly stable at about 5.2 million, most of the decline occurred in farm managers and full-time workers--from 14.3 million in 1955 to 10.0 million in 1965 (1, 2). Consequently, it is not surprising that some withdrawals of land from production accompanied labor withdrawals.

The total area planted to crops reached its postwar peak of 8.2 million hectares in 1956 and has trended downward since then. In 1965, the planted area was 0.9 million hectares less than in 1956, a fall of 10 percent--the result of steady declines each year except 1960 (1, 2). The fall is due mainly to a decrease in double-cropping, since the total land surface devoted to crops (not counting the second crop) remained about the same. The area planted each year as a percentage of total cropland fell steadily, from 144 percent in 1956 to 129 percent in 1965, indicating a decline in double-cropping (1, 2). This decreasing percentage reflected the smaller area planted each year to second crops, such as barley. The area planted to rice, the major summer crop, was approximately stable (1, 2).

In the years ahead, even more land may go out of production, including some now in rice. Kamiya is especially pessimistic about the size of the future planted crop area. According to his economic model, 3 to 5 million hectares could go out of production in the future, which would represent a decline of from 41 to 68 percent of the 1965 planted area (49).

If enough capital could be substituted for labor in production functions, land withdrawals because of labor withdrawals might be stemmed. In fact, Japanese agriculture has become more and more capital-intensive, as demonstrated by both Yamada and Kaneda (50, 115), a development which undoubtedly

slowed land withdrawal somewhat, since added capital has been substituting for some of the withdrawn labor.

But, as shown by Kaneda and acknowledged repeatedly by the Ministry of Agriculture and Forestry, the very small scale of crop farm enterprise has not enlarged much (51, 83). Thus, there are still very serious barriers to the introduction of great new efficiencies by massive labor-saving, capital-intensive production techniques. Agriculture has remained a low-productivity sector (12, 58, 83), as noted previously, and the purely domestic output of food energy per person has declined.

Breaking the present constraints on Japanese crop production, if it is to happen, can come only with a great enlargement in the operating scale of the average farm enterprise. The need for structural reform is widely recognized. Its future pace, though, is not at all certain and is a matter of food-strategic action. Nevertheless, expansion of fruit and vegetable production, particularly through the creation of new farm enterprises, may be somewhat easier than the complete restructuring of the rice economy. This is a major premise of the Agricultural Basic Law.

Progress in Livestock Production

Remarks on the constraining influence of small-scale, labor-intensive crop agriculture apply with equal force to livestock production when carried out on very small farms. Yet, Japanese agriculture as a whole was very successful in raising the output of livestock products from 1957-65, as reflected in the previously mentioned energy consumption data (ch. VI). In that period, milk output rose from 1.3 million metric tons to 3.3 million tons; pork output from 142,000 tons to 386,000 tons; the output of poultry from 38,000 tons to 205,000 tons; and the production of eggs from 0.4 million tons to 1.0 million tons (1, 2).

The much larger number of hogs and chickens raised per farm household in 1965 than in 1957 and the moderately larger number of dairy cattle reveal that some expansion in enterprise scale was already underway (1, 2). For the future, even without major structural reform in the countryside, it may be possible to increase the 1965 output of poultry, eggs, and pork very greatly by creating new enterprises of large scale. 13/

A survey was conducted by the Ministry of Agriculture and Forestry of cost per output unit by scale of operation in hog and egg production for 1965. The survey showed definite economies of scale, although much more for eggs than for hogs (91). Another continuing survey by the Ministry showed that only 25 percent of all meat hogs marketed in 1963 came from herds of more than 20 hogs (95). By 1965 this had risen to 49 percent. This 49 percent of marketed hogs was supplied by only 5 percent of the farms raising hogs (in whatever number). The trend to larger scale hog farming is already well established.

13/ There may be constraints on the rate at which dairy product and beef output could expand because of relatively small supplies of roughage in Japan. See chapter X for further discussion.

In general, larger scale hog raisers enter the business not as a sideline or an adjunct to diversified farming, but as a specialized operation, according to a study of Japan's pork industry prepared for the U.S. Feed Grains Council (95). These raisers are not only independent owner-operators but also cooperatives. The structure of the industry is becoming increasingly complex.

In broad outline, the situation in poultry production is similar. There is a strong trend toward larger scale of operation, with an increasingly complex industry production and marketing structure, including some vertical integration by giant feed firms and other companies (96).

As of the mid-1960's, one can already see in Japan's livestock economy the emerging outlines of that "dual structure" so characteristic of the nation's industry--very large firms and very small firms existing side by side. The constraints imposed on livestock output by a very small scale of enterprise and low level of technology probably can be overcome after a few years or a decade by a buildup of production capacity in the larger scale segment of the livestock industry.

The pace of growth in this segment has been and will continue to be of great interest to Japan's food strategists. Through Government livestock programs, financing devices, and guidance to the feed industry, the Government's continuing involvement will be of great importance in speeding up or dampening the pace of growth.

Problems and Possibilities in Fishing

From the postwar years to the present, Japan has been the world's leading fishing power. Japan led all other countries in annual fish catch until 1962, when Peru became the leader (25). But Peru's operations are limited largely to the waters near its own shoreline, and most of its catch is processed to fishmeal for livestock feed (25). By contrast, Japan's fishing operations are worldwide and its fish catch is primarily for human consumption.

Small Increase in Fish Supply. Japan's total fish output 14/ rose from 5.0 million metric tons in 1957 to 6.5 million tons in 1965, an increase of 1.5 million tons (29). However, the amount of fish for human consumption rose from 4.3 million tons in 1957 to 5.0 million in 1965, an increase of only 0.8 million tons (calculated from unrounded data) (29). Japan's net foreign trade position in fish and the increasing use of Japanese-caught fish for livestock feed help to explain why the supplies for human food rose much less than total fish output.

14/ Total fish output (for food and feed) and the total catch of fisheries are somewhat different concepts. Especially with regard to Japan, quantities representing each concept differ. Total catch of fisheries (excluding whales) (6.9 million tons in 1965) = Total fish output (for food and feed) of fish, shellfish, and marine animals other than whales (6.5 million tons in 1965) + seaweed catch (0.25 million tons (wet) in 1965) + fertilizer fish catch (0.15 million tons (est.) in 1965) + pearl oyster catch (114 tons in 1965).

Japan's exports were largely fish for food (91 percent of the fish export tonnage in 1965), sold to gain profitable markets abroad, whether exported from Japan itself or from high-seas fleets operating near foreign markets and financing their extended voyages. Fish imports also rose during the period, but mostly for animal feed (82 percent of the fish import tonnage in 1965) (27). Japan's 1965 net imports of feed fish were 0.5 million tons (live-weight basis). Net exports of food fish also totaled 0.5 million tons (27).

The fishing sector's output rise during 1957-65 appears impressive, but the initial impression is reversed on further analysis. Total output (by weight) increased at the annual average rate of 3.4 percent for the period. Yet, when the rate of increase is analyzed at the consumer level, per capita supplies of fish for food rose at the annual average rate of only 1.1 percent during these years. The increase in fish for human food barely kept ahead of Japanese population advance, as already noted by the very small 1957-65 rise in fish-whale energy consumption per person. The fishing industry's performance in raising per capita food supplies is not at all impressive, compared with that of the livestock sector.

In mitigation, though, the domestic fishing sector aided the 1957-65 livestock buildup by supplying significant amounts of fish for feed. In 1965, about 0.9 million tons of Japanese fish output went to livestock feed, 0.6 million tons more than in 1957 (28, 29). When converted to meal, 1965 domestic feed fish yielded roughly 19 percent of all high-protein meals used in formula feeds for livestock that year (91). About 40 percent of the 1957-65 increase in Japan's annual fish output went to livestock feed (28, 29). It could be considered "wasteful" to feed fish protein to animals when, theoretically, it would have been used with greater biological efficiency directly by humans. However, economic, not biological, criteria must have dictated fish usage.

Catching feed-quality fish, processing them into meal, and selling the meal to formula feed mills apparently offered attractive profit opportunities to Japanese fish enterprises. Since the processing of feed fish into meal is mainly accomplished by large fishing firms, these firms and the enterprise structure of Japan's fishing industry deserve attention.

Fishing Industry Structure and Production Problems. In 1965, there were about 297,000 fishery "management units" in Japan, of which about 291,000 were individuals (2). These were mainly subsistence fishermen, household heads using unpaid family labor. Coexisting with subsistence fishing were the commercial units--sole proprietors, cooperatives, partnerships, associations of various forms, and corporations. Of these enterprises, only 14 were capitalized at more than ¥100 million in 1965 (47). And of these, only four--the largest firms in Japan's fishing industry--were capitalized above ¥5 billion for that year, the largest at ¥15 billion (99). This leading firm was the 25th largest industrial corporation in Japan in 1965, ranked by sales.

Together, the four largest fishing firms accounted for about 60 percent of Japan's 1965 total fish output, by weight (33). In commercial fishing, as in other Japanese industries, the "dual structure" is unmistakable. Giant enterprises exist side-by-side in both competition and cooperation with many small and medium-sized ones.

These giant firms are preeminent organizers of fish production, managing much more capital than they own. Some is equity capital, of course, but more is borrowed from private or Government financial institutions (99). In 1965, the three largest firms posted profits on equity capital of 11 percent, 12 percent, and 9 percent; the fourth firm posted a loss (99). Since these firms have access to financing and produce large fish tonnages, they can integrate vertically in search of the best profit opportunities. They are not restricted merely to catching fish and selling them at the wharf.

The large firms are turning increasingly for their profits to fish processing and processed product marketing (47). Production of fish pastes and sausages, chopped fish, and frozen fish has increased rapidly. Some firms are even moving in the direction of generalized food enterprises. The processing and sale of fish meal for livestock feed is only a special case of product diversification, which is not necessarily identical with maximizing the output of fish for human food.

By moving more heavily into processing and distribution during 1957-65, the larger firms were expanding into shore activities not constrained by either the physical or economic production problems encountered at sea (47). The physical problems concerned not only the uncertainty of finding desirable fish at the right time and place on the high seas, but also the heavy fishing pressure on the resources in waters close to Japan.

Fish from these waters, classified as "domestic marine" output, accounted for 4.5 million tons (90 percent) of the total 1957 fish output and 5.1 million tons (78 percent) of the total 1965 production (1, 2). High-seas, inland fresh-water, and culture output made up the rest. Small, medium, and large enterprises all competed for the fish in the close-by waters. Output gains from these waters were no longer coming easily or rapidly.

The economic problem was basically a tightening of the labor supply, spurring adoption of more advanced fishing technology (47). Capital was substituted for labor per physical output unit, at the same time that the total amount of expansion capital employed in the industry was sharply rising (1, 2). Japan expanded its fishing industry by moving increasingly upon the high seas, ranging over the world in search of productive fishing grounds. The drive to extend Japan's long-range capabilities involved both the large fishing enterprises and the Japanese Government's Fisheries Agency, part of the Ministry of Agriculture, Forestry, and Fisheries.

The role of the Government in determining industry capacity and managing fish production is especially important. Licenses are required from the Fisheries Agency to construct new fishing vessels (13). Once a vessel is constructed, it needs an operating license, which has to be renewed periodically. Moreover, the Fisheries Agency assigns voyage fishing rights by areas of the globe, and regulates the kinds of operations to be performed on each fleet voyage (13). Some operations are limited by international conventions agreed to by the Japanese Government (90). Much of the industry's financing is under Government control. Thus, the industry's fleet expansion and operation during 1957-65 were not accidental nor haphazard. Neither were they in simple

response to market demand nor necessarily in accord with a theoretical consumer sovereignty over input allocation in fishing.

The size of the Japanese powered-vessel fishing fleet, a broad measure of production capacity, rose from a 1.3 million gross tonnage in 1957 to 2.1 million in 1965, a rise of 53 percent (1, 2). The number of powered vessels increased from 155,000 to 217,000 in the same period. The number of ships over 100 tons doubled--from 900 to 1,800 (1, 2).

The total labor force in fishing did not change much, remaining somewhat under 600,000 for almost every year of the period (42, 63, 79). However, there was a small outflow from subsistence fishing and a corresponding buildup in the hired labor force, which rose from 180,000 in 1957 to 220,000 in 1965--an increase of about 22 percent (42, 63, 79). Labor costs rose more than fish prices for the 1957-65 period, and a cost-price squeeze was averted in successful firms principally by economizing on labor and intensifying the use of capital (43, 79). In the future, the industry could well continue its present course, compiling favorable large-enterprise results, but without adding much to per capita food supplies.

Possible Role of Fish Protein Concentrate. Yet, a new method of processing and using fish as a protein concentrate, already on the way toward international commercial application (65, 88), might add substantially to the Japanese fishing industry's productive capacity. This new method could tap major fish resources now unused or underused because they could not heretofore be mass-processed economically for human food (19). The possibilities will surely be evaluated seriously by the Fisheries Agency and Japanese industry.

Fish protein concentrate (FPC) is a stable, virtually odorless and tasteless powder of high nutritive quality for consumption by humans as an ingredient in formulated foods. An industrial process extracts oil, water, and other substances from raw whole fish in bulk, reducing them to powder containing about 80 percent protein (93).

During the 1970's, Japan's fishing industry could find FPC production technologically and economically feasible, if experience with an FPC production and marketing system in other developed countries seemed favorable. Hoped-for benefits to Japan from FPC production would be (a) profits for fishing enterprises from a high-volume, relatively low-price product, and (b) larger per capita supplies of fish, that is, of fresh fish plus fish products. The processing into FPC of large quantities of mass-schooling, fatty fish, such as herring, menhaden, and anchovy, could boost per capita supplies of processed fish products, since these species are now underused (25, 84, 113, pp. 345-361).

Nevertheless, there are many uncertainties about FPC's economic potential in developed countries. Actual unit cost of FPC from large-volume production is still unknown. FPC's recalcitrance to blending with other ingredients, unless engineered out, could hinder acceptance by commercial food processors (18). Profitable introduction of FPC is not yet assured. Analysts now foresee at least four major conditions which must be met if FPC is to be a commercial success in developed countries (16, 84).

First, the landed cost of suitable fish as raw material must be quite low, far below the landed cost of fish for fresh use. Chapman believes that a lower cost can be consistently attained, even allowing for high standards of raw material hygiene (18).

Second, the FPC processing plant must be able to depend upon an uninterrupted inflow of fish raw material. An integrated sea-land operation is essential. In addition, both the FPC plant and other, more conventional processing plants would benefit from integrated operation. Species caught in mixture and not usable by the conventional plant could be diverted to FPC to supplement supplies caught specifically for the concentrate. Whole fish that one plant does not use could become part of the other's raw material.

Third, FPC must be capable of convenient use by manufacturers of formulated foods. Present problems with FPC's blending properties might mean that widespread commercial use would have to await new technological developments in manufacturing (18, 84, pp. 135-137).

Fourth, a potential consumer market must exist for the processed products to which FPC is added. An existing system for marketing fishery and other food products in highly-processed form would make the introduction of FPC much easier.

Japan's fishing industry appears to be capable of fulfilling at least some of these conditions. Fish availability should not be a great problem. There is an under-exploited herring resource in the waters near Japan, for example (90). Mass-schooling fatty fish are also available elsewhere in the Pacific area (18). The large-enterprise segment of the industry should have no serious problems in raising capital and could manage FPC production jointly with other facilities.

The experience in processed-product marketing already acquired by the Japanese fishing industry would be valuable in marketing FPC domestically. Moreover, the Japanese market environment would seem to be favorable, because fish products are familiar and because highly-formulated consumer convenience foods are becoming increasingly important. FPC could have promise as a nutritious and low-cost ingredient in various convenience foods (such as fish sausages) created for Japanese tastes and marketed aggressively.

If FPC could be priced to compete in Japan with other high-protein ingredients, such as nonfat dry milk or soy flour, it might become very profitable to manufacture, assuming satisfactory product properties. Japanese FPC manufacturers of the future might share in the substantial factory to retail markups often taken on formulated foods. FPC sales could climb, adding to per capita supplies of processed fish products and other foods using FPC as an ingredient.

The above is not a prediction of a bright future for FPC in Japan, but simply an hypothesis of how the product might be used to break through the food output constraints facing the Japanese fishing industry. Should Japan do so, the impact upon the future of livestock products and feedstuff imports could be substantial.

Ultimately, the Japanese Government's attitude toward FPC will prove decisive because of its great influence over operations and industrial capacity in fishing. If an appropriate FPC production and marketing system emerges, the Government will have extremely important decisions to make regarding the degree of Japan's commitment to FPC production. One would expect food-strategic decisions to be made not only in light of the Japanese food situation, important though it would be, but also in view of the severe protein shortages in less-developed countries.

Japan could play a humanitarian role in introducing a proven FPC system--production technology, equipment, and marketing methods--to critically food-short Asia and Africa. The establishment of FPC production in a developed country could be an important prerequisite to its adoption by the less-developed world. If FPC has a commercial potential in any developed country, surely it has in Japan.

Import Policy Constraints on Supply

Most human food energy cannot enter Japan without passing through some kind of formal trade restriction, be it tight or loose. In general, the Japanese Government admits the amount and type of food it wishes to, with the result that Japanese imports of processed foods are probably much smaller than they would be in the absence of strategic decisions to restrict trade. There are three main kinds of restriction, exclusive state trading (purchase and internal resale only by a government or semi-government agency), import quotas, and tariffs. In some instances more than one kind of restriction applies to the same product.

The following imported products are subject to exclusive state trading as well as import quotas: Rice, wheat, barley, pork, condensed and evaporated milk, dry milk, and butter. All state-traded commodities are also subject to skimmings (analogous to variable specific tariffs) (5, 105, 108).

Import quotas without state trading apply to: Corn and grain sorghums for nonfeed processing, beef, some fish, some fresh fruits, peanuts, dried pulses, rapeseed, most vegetable oils and shortenings, most liquors, refined sugar and products, plus other processed foods--a very broad range of products (37, 108).

Specific or ad valorem tariffs are applied to mutton, horsemeat, chicken, eggs, fish, processed dairy products, fruits and vegetables, soybeans, lard, and many processed foods (39).

Although state trading and import quotas are restrictive, they are simply devices. They are only on-the-surface expressions of a more deeply-held determination on the part of Japanese policymakers either to import or not to import, or to hold imports to an approximate level. When desired, other devices besides conventional trade barriers are found to manage imports (the selective application of sugar excise taxes or the availability of bank credit, for example).

Removing import quotas is an important step toward trade growth. However, import liberalization need not automatically lead to trade expansion (35), and expansion can occur without liberalization. What matters most for the future is the assessment of key Japanese officials and industry and farm leaders that it is to Japan's interest to import or not. What matters is their assessment of the role that imports can play in Japan's food strategy. Once convinced that import expansion will serve Japanese food-strategic goals (as with soybeans), policymakers arrange for the loosening of import restrictions.

Chapter VIII.--TOWARD 1985: FOOD-STRATEGIC OPTIONS AND ALTERNATIVE DIETS

Future Japanese food policies probably will presuppose continued rapid growth in the economy. In mid-1968 the Japanese Government's Economic Planning Agency issued a long-range forecast of the nation's economy in 1985. The real gross national product was forecast to increase at an average annual rate between 7.5 percent and 8.3 percent for 1965-85 (73). The forecast is credible, since real GNP rose at the average annual rate of 9.7 percent during 1957-65 (table 7).

This achieved growth rate was spectacular. Japan has become even more than the leading economy in Asia. It is now an economic superpower whose GNP ranks third in the world behind the output of only the United States and the Soviet Union (68, 77). Significantly, Japanese 1957-65 growth did not occur mainly in agriculture, forestry, and fishing (the so-called "primary" sector), but in other areas of the economy. The share of agriculture, forestry, and fishing in national income was only 18 percent in 1957 and it fell steadily to 12 percent in 1965 (9).

In the future, as in the recent past, most of the new growth--and new consumer purchasing power--will come from industry and commerce. A continuing outflow of labor from agriculture would aid the economy's growth, and food output is essential to growth, but most of the coming output increase will not be of agricultural products.

However, growth outside of agriculture and fishing will not bring with it its own new food supplies to accompany the additional food expenditures. Growth on the average, even if guaranteed for the future, would give no assurance that food supplies or marketing services would rise fast enough in the 'seventies and 'eighties to keep prices stable or even limit price advances to the 1957-65 rate. As before, future food supplies and services will increase not in automatic harmony with the economy as a whole, but will rise only after more resources are allocated to food production or more processed food is imported.

Processing and Marketing Services and Strategic Flexibility

What the consumer spends for food buys not only food quantity and assortment, but also processing and marketing services of many kinds. Adding these services to fresh food products creates new kinds of foods and new food utility. Product plus service absorbs much more consumer food expenditure than the original fresh product alone.

With economic development, increments of consumer purchasing power are absorbed over time by a combination of incremental processing and marketing services, plus incremental total food quantity. (Except that in highly developed countries, total food quantity consumed per person seems to reach a peak, after which added expenditure is absorbed entirely by additional services, changes in the quantity mixture, and the food price level). The way in which more service and more food energy are combined is of great importance, since, in absorbing expenditure, service can substitute for energy and vice versa.

As already shown in chapters VI and VII, a changed Japanese food mixture (more high-cost energy) plus a generally higher food price level absorbed the added 1957-65 food purchasing power. Quite probably, processing and marketing services also played some role, as Japanese food marketing grew with urbanization and introduced more modern features.

A highly developed food processing and marketing system will account for a much larger share of the consumer's total food expenditure than an embryonic system. Japan's food sector certainly would rate between these highly developed and embryonic extremes. Thus, one would expect Japan's total markup in food value between farm or wharf and the consumer to increase in the future, both in absolute and relative to total consumer food expenditure.

This occurred in the United States after 1929, the earliest year for which the detailed marketing bill is calculated (32). The marketing bill is "the total difference between consumer expenditure for farm foods and the corresponding farm value." It is the sum of all charges or markups made for services and materials added to a food group by succesive processors, assemblers, transporters, wholesalers, and retailers. The marketing bill was probably expanding (relative to consumer food expenditure) prior to 1929 as well. Substantial commercial processing of food was well underway in the United States by the early 20th century, and urbanization required more food-related marketing services.

A Japanese food marketing revolution is now underway (78, 95, 96, 109). The future pace and direction of change in processing and marketing may be just as important to Japanese food strategists as possible changes in food production and imports. Capital, labor, and management allocated to the processing and subsequent distribution of domestically produced foods may be able to substitute for larger imports (by weight or energy) of processed foods. Other complex substitution patterns, involving alternative levels of imported food raw materials in combination with alternative degrees of food processing and alternative distribution channels, are also possible.

To the extent that Japanese food strategists can influence resource allocation in food processing and marketing, they will expand policy options--gain flexibility--toward the amounts of food and food raw materials to be imported. They will also expand options toward the amount of domestic food output which is import-dependent. The objective of absorbing future consumer purchasing power without excessive food price advance can then be pursued by any of several routes, none entirely dependent upon an increase in supplies of food energy.

Table 7.--Japan's gross national product, consumption expenditure, food consumed and average annual rates of increase, 1957-65

Japanese fiscal year	Real gross national product		Real private consumption expenditure		Real consumption expenditure on food and beverages		Food and beverage energy consumed		Real consumption expenditure on livestock products		Livestock product energy consumed	
	Total	Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total	Per capita
	Billion 1960 yen	1960 yen	Billion 1960 yen	1960 yen	Billion 1960 yen	1960 yen	Billion cal.	Calories	Billion 1960 yen	1960 yen	Billion cal.	Calories
1957	11,744.1	129,164	6,817.3	74,978	3,122.9	34,346	75,103	825,995	278.4	3,062	1,925	21,170
1965	24,663.1	250,960	13,384.5	136,194	4,677.3	47,594	86,957	884,833	643.3	6,546	4,889	49,749
	Percent											
Rate of increase	9.7	8.7	8.8	7.7	5.2	4.2	1.8	0.9	11.0	10.0	12.4	11.3

Sources: Annual Report on National Income Statistics, 1967. Economic Planning Agency, Government of Japan. (For GNP, PCE and food expenditure data.)
Abstract of Statistics on Agriculture, Forestry and Fisheries, Japan, 1966. Ministry of Agriculture and Forestry, Japan. (For 1965 food energy data.)
Statistical Yearbook of Ministry of Agriculture and Forestry, Japan, 1957. (For food energy data.)
Food Consumption Statistics, 1954-1966. OECD. (For food energy data.)
Japan Statistical Yearbook, 1966. Office of the Prime Minister, Government of Japan. (For population used to calculate per capita expenditure series, and total energy food and livestock series.)
Same as tables 4 and 5. (For livestock product expenditure data.)

As noted earlier, the Japanese Government already controls processing capacity in the formula feed industry. Influence upon enterprise financing through the banking system is another powerful tool used to affect inputs for food processing and marketing. Administrative restriction upon and selective licensing of direct foreign investment in the food sector is present policy. Given the Japanese economic system of close cooperation between business and Government, strategic influence over food sector resource allocation is feasible.

In the United States, the development of food processing and marketing during the 20th century played a significant role in decreasing the total quantity of food consumed per capita (32, 34). Although the advent of widespread processing and marketing helped increase consumption of many perishable foods such as livestock products, it also helped decrease the consumption of certain staples. On balance, the food decreases outweighed the food increases in the total calorie measure.

U.S. per capita food consumption reached a peak about 1910 and has trended downward since then. Daily per capita consumption (all food) of about 3,495 calories in 1909-11 declined to about 3,145 calories in 1959-61 (34). Increased U.S. per capita expenditure on food since 1910 was absorbed by a changed food mixture and new processing and marketing services (32). New processed food products were created.

The food processing and marketing revolution came to the United States when per capita consumption was well above 3,000 calories per day. But, a roughly similar revolution is coming to Japan when per capita consumption is still below 2,500 calories per day. Thus, because of the apparent influence of processing and marketing on restraining the total amount of food consumed, there is no obvious reason why Japanese per capita consumption ever has to reach those levels already attained by the United States, Canada, and Western Europe.

U.S. marketing bill data show that processing and marketing services added to meat, poultry, eggs, fruits, and vegetables were particularly effective in absorbing consumer pruchasing power after 1929 (32). American experience is proving useful for Japanese development. Continuing rapid growth of the fledgling frozen foods industry, for example, will mean that Japan is adding processing and marketing services by expanding the output of convenient foods. Government policy toward which services in which amount are to be added to each food group will be of major importance.

The Concept of Future Alternatives

Different paths into the future are possible, spreading out in a fan-shape the farther away one travels from the fork where they diverge. Japan now stands at one fork and could choose a new way of managing its food economy. Manifestly, there is more than one way to allocate agricultural inputs or regulate food imports. Other forks and other choices will present themselves in future years.

Assuming that Japan's food consumption pattern for 1985 is not already predetermined, then two axioms logically follow: (1) There is a range of

possible consumption outcomes, that is, alternative per capita food flows for 1985 are possible, each different in total food quantity and composition. (2) For each of the alternative 1985 flows, there would be an alternative scenario or sequence of events leading from the food flow "now" to the food flow "then."

Whatever scenario occurs will result from the interacting of the Government's food strategy and complex domestic and international economic forces. Since the Government's policies strongly influence the constraints on the country's food supplies and the possibilities for future development of the food sector, the strategy will set the pace of change.

At this early date (1969 is still early, relative to 1985), many different scenarios leading to different 1985 food flows are still possible. Uncertainty about the future is heightened by the power for change which rests with Japan's food strategists.

In the past, alternative designs for a food strategy were not winnowed and one chosen in a single council meeting. The actual strategy emerged bit by bit. Thus, the three alternative food strategies would gradually diverge over time and each would be widely different by 1985 even though any choice along the way need not by itself seem truly strategic. The set of food policies changes by accretion. Of course, by 1985 the range of choice for 1985 could not be as wide as it is now. Alternative commitments for large blocs of 1985's productive resources are still possible today, although options will shrink as actual employment approaches.

As shown in chapters IV and V, Government policies which affect food are not limited to those dealing with import barriers and agricultural production alone. Policies toward the feed manufacturing industry and direct foreign investment in food processing are but two illustrations of the Japanese Government's involvement in the flow of food to the consumer from farm or wharf. Policies toward the allocation of resources to food processing and marketing in Japan are also important components of a strategy toward economic activity in the food sector.

For convenience, only three alternative food strategies, illustrating some of Japan's policy options, are discussed below. There may be other possible strategies as well. The ones illustrated are labeled Western, Pacific, and Eastern. In each illustration, policymakers would envision a somewhat different role in the world economy for Japan and a different structure of Japanese foreign trade. In effect, each strategy would select a different development path for the food sector, because of different food policies and other related economic policies affecting the economy as a whole.

The intended impact of each strategy upon 1985 per capita food consumption is expressed as a set of food targets. Different consumption and production targets accompany each strategy. These targets are not projections but reasonable objectives for the matching policies.

Western Food Strategy

Argument for the Strategy. A possible advocate of the Western strategy might envision Japan as an extremely efficient processor of imported raw materials and exporter of finished products, well integrated into a more liberal world economy. Achieving maximum domestic growth and export potential could require an even more efficient allocation of Japanese economic resources as well as a reduction of trade barriers. Since Japanese skilled labor is becoming more valuable and a relatively scarce input, labor-saving in the food sector could be strongly sought. Protection of domestic food production by trade barriers could be minimized.

Consumer sovereignty over food supplies is an ideal toward which to move. Consumers' voices and marketplace "votes," expressed by rising expenditure on food, should become increasingly persuasive with policymakers. Government, agriculture, and industry would strive to increase food supplies greatly, thus lessening upward pressure on food prices.

Possible Detailed Policies. (1) Accelerate the rapid expansion in livestock production through appropriate price and income supports for Japanese producers, and improve marketing efficiency. (2) Continue the "free" import of foreign feed grains, and encourage further rapid expansion of animal feed manufacturing capacity. (3) Alter the structure of Japanese farming through land tenure reforms and other measures to encourage a great enlargement of farm scale. (4) Modify the domestic rice program through both (a) keeping producer rice prices stable (current yen) and (b) raising consumer rice prices (current yen). The rice consumer rather than the taxpayer would eventually finance the rice program. (5) Aim to equalize human consumption of rice and wheat products, greatly increasing the imports of foreign wheat to this end. (6) Boost sugar imports and increase sugar consumption. (7) Assure that livestock products will be a cheaper source of energy than fish products. Choose not to emphasize the production of fish protein concentrate through Government programs, and give only modest aid to the fishing industry. (8) Encourage only a modest expansion in domestic fruit and vegetable production. (9) Plan for only the minimum resource use in food processing and marketing. Emphasize marketing services for livestock products, with much less attention to processing services for convenience foods.

Consumption Targets. Perhaps by the early 1970's, consumption targets for the mid-1980's would be set or would emerge implicitly from food-strategic decisions themselves. Thinking about food consumption targets for a future date is already ingrained in Japanese policymaking. 15/ The Western strategy would aim to boost food supplies fast enough to reach a target of 3,000 calories per person per day for all food and beverages by 1985. This target would include, among other subtargets, the goal of 800 calories of livestock

15/ Long-range Japanese forecasting includes both production and consumption projections. See the 1976 outlook (53) and the report of the 1977 projection (75) prepared by the Japanese Ministry of Agriculture, Forestry, and Fisheries. Official projections of this nature carry important overtones of desired objectives. For example, a Government projection of wheat imports, when wheat is state-traded, can be viewed as a preliminary import target.

Table 8.--Possible 1985 targets [1/] for a Western food strategy in Japan

Food group	Food energy-expenditure flow			Energy origin		Food import dependency rate 6/
	Energy consumed 2/	Consumer expenditure 3/	Cost per thousand calories 4/	Domestic 5/	Import-dependent 5/	
	Thou. cal.	1960 yen	1960 yen	Thou. cal.	Thou. cal.	Percent
High-cost energy						
Beverages	40	--	--	32	8	20.0
Fish and whale	40	--	--	40	0	0
Fruits and vegetables	66	--	--	64	2	3.0
Livestock products	292	--	--	18	274	93.8
All high-cost	438	81,000	184.93	154	284	64.8
Low-cost energy						
Cereals	350	--	--	180	170	48.6
Fats and oils	100	--	--	12	88	88.0
Potatoes	35	--	--	35	0	0
Pulses	50	--	--	30	20	40.0
Sugar	122	--	--	20	102	83.6
All low-cost	657	27,000	41.10	277	380	57.8
All food	1,095	108,000	98.63	431	664	60.6

1/ Annual per capita basis.

2/ The general target is 3,000 calories per day, all food energy, equivalent to 1,095,000 calories per year, about equal to German consumption in the early 1960's. This energy total is targeted 40 percent to the high-cost group and 60 percent to the low-cost group, also in accord with German experience. Individual food group targets are logical objectives in accord with the commodity policies of the Western strategy. (See text.)

3/ Illustrative 1985 per capita expenditure of ¥108,000 is the result of compounding the 1965 expenditure of ¥47,594 for 20 years at an annual growth rate of 4.2 percent, the rate achieved during 1957-65. ¥108,000 total distributed 75 percent to high-cost energy and 25 percent to low-cost, approximating U.S. 1961-62 distribution.

4/ Consumer expenditure divided by energy consumed.

5/ Origin targets as expressions of policies toward domestic production and imports described in text.

6/ Import-dependent energy as a percentage of energy consumed.

products per person daily. If the subtargets and total were achieved, the size and configuration of Japan's 1985 food flow would be recognizably Western, akin to those of North European countries in the 1960's or later.

Commodity consumption targets for the Western strategy are suggested in table 8. The yearly target of 1,095 calories per person is equivalent to 3,000 calories per capita per day, all food. The daily livestock product consumption target of 800 calories is equivalent to the yearly target of 292,000 calories in table 8.

This livestock target seems within reach of the Japanese economy by 1985. During 1957-65, total energy consumed from livestock products increased at the average annual rate of 12.4 percent (table 7). To reach the 1985 per capita target (at the population of 120 million projected for 1985 by the Economic Planning Agency), total livestock product consumption would not have to increase as fast as from 1957 to 1965. A 9 percent average annual increase for 1965-85 in livestock product usage would suffice. While this is a high rate to sustain for a 20-year period, it cannot be ruled infeasible in the light of prior rapid increase.

As noted, the 1985 target level is roughly comparable to the 1965 levels achieved in Northern Europe. Belgian 1965 annual livestock product consumption per person was 326,000 calories (894 calories per day), while the West German level was 332,000 calories (910 calories per day) (29). However, the suggested Japanese livestock consumption target is placed somewhat lower than these to allow for greater fish-whale consumption in Japan than in Europe. Consequently, it is the combined livestock-fish-whale 1985 target which approximates the comparable German and Belgian totals for 1965.

Special Economic Factors. Present restrictions on the import of food sector capital would be eased. Added capital in this sector would boost the rate of advance in food supplies if the problems over foreign managerial influence could be worked out to the satisfaction of both Japanese and foreign participants in joint ventures. The Western strategy presupposes that formulas for solving these problems have been largely worked out and that food sector capital is flowing in from abroad.

Pacific Food Strategy

Argument for the Strategy. A possible advocate of the Pacific strategy might envision Japan not only as one of several leading economic powers in the world, but also as the leading political-economic power in East-Southeast Asia and the southern Pacific basin. While Japan's major export volume may always be to Europe and North America, great gains could be made closer to home. More food raw materials, as well as processed products, could be obtained from East-Southeast Asia, Australia, New Zealand, and South America to diversify sources of supply and to make possible greater Japanese manufactured exports to these areas.

While the most efficient longrun allocation of resources is a desirable goal, who can best judge what this allocation is? The domestic consumer as a

"sovereign"? Or, guiding councils of wise men, rich in international experience? For example, in some parts of the food sector it could be more rational to avoid excess commitment of capital and other resources to food production based on imported agricultural raw materials and to bring in semi-processed foods instead. Consumer sovereignty need not lead to this result.

Total food energy consumption should be somewhat lower than under the Western strategy, according to the Pacific strategy argument. In the event of international crisis, prolonged disruption of ocean transport, or even temporary dock strikes, it could be more risky and inefficient to suffer widespread idling of resources for converting food raw materials than to endure a cutback in consumer-ready food imports and quantity rationing with price controls at home.

Possible Detailed Policies. (1) Undertake a slower expansion in domestic livestock production than under the Western strategy, matched by a slower expansion in animal feed manufacturing capacity. Imports of feed grains would also expand more slowly than under the Western strategy. (2) Invest heavily in and help manage production of corn and sorghum on large plantations in Southeast Asia and otherwise encourage output there. In effect, grant preferential import allocations to feed grains from this area. (3) Sharply boost imports of meat and other livestock products from countries in or near the Pacific Basin, such as Australia, New Zealand, Taiwan, Argentina, and the United States. Capital and other resources committed to the Japanese feed-livestock sector would be less than under the Western strategy. (4) Sharply expand output of fish and fish products, giving great weight to fish protein concentrate for human consumption. (5) Encourage a rapid expansion of domestic fruit and vegetable production. (6) Establish free trade in rice, both domestic and imported. Short-grain rice imports from East Asia would be increased by undercutting Japanese rice prices. Even long-grain rice from Southeast Asia might improve its present poor position in the Japanese market if attractively priced. (7) Keep wheat imports under control in order to slow the expansion in wheat-product consumption and to assure that rice/wheat-product relative prices at retail will favor rice. (8) Encourage a heavy addition of processing and marketing services to food products.

Consumption Targets. Policy would aim to raise food supplies to reach a target of 2,900 calories per capita per day, all food and beverages, by 1985. This would be equivalent to 1,058,000 calories per year, as shown in table 9. Other possible commodity consumption targets are also shown in this table. Since total anticipated food supplies would be less than under the Western strategy (the consumption target is smaller), food prices would probably be higher. Nevertheless, the anticipated per capita supply increase over the 1965 level would be substantial.

Special Economic Factors. During 1958-66, Japan ran almost uninterrupted trade surpluses with (individually) Burma, Cambodia, Taiwan, Indonesia, Korea, Thailand, South Viet Nam, Kenya, and Tanzania (23). For the future, Japan could secure more stable and larger industrial export markets by more closely balancing its trade position with these countries, especially by further helping to develop their raw material and agricultural resources and then

Table 9.--Possible 1985 targets 1/ for a Pacific food strategy in Japan

Food group	Food energy-expenditure flow			Energy origin		Food import dependency rate 6/
	Energy consumed 2/	Consumer expenditure 3/	Cost per thousand calories 4/	Domestic 5/	Import-dependent 5/	
	Thou. cal.	1960 yen	1960 yen	Thou. cal.	Thou. cal.	Percent
High-cost energy						
Beverages	42	--	--	32	10	23.8
Fish and whale	55	--	--	50	5	9.1
Fruits and vegetables	85	--	--	75	10	11.8
Livestock products	209	--	--	25	184	88.0
All high-cost	391	81,000	207.16	182	209	53.5
Low-cost energy						
Cereals	430	--	--	280	150	34.9
Fats and oils	70	--	--	10	60	85.7
Potatoes	30	--	--	30	0	0
Pulses	52	--	--	32	20	38.5
Sugar	85	--	--	10	75	88.2
All low-cost	667	27,000	40.48	362	305	45.7
All food	1,058	108,000	102.08	544	514	48.6

1/ Annual per capita basis.

2/ The general target is 2,900 calories per day, all food energy, equivalent to 1,058,000 calories per year. This energy total is targeted 37 percent to the high-cost group and 63 percent to the low-cost group. Individual food group targets accord with the commodity policies of the Pacific strategy. (See text.)

3/ Illustrative 1985 per capita expenditure of ¥108,000 is the result of compounding the 1965 expenditure of ¥47,594 for 20 years at an annual growth rate of 4.2 percent, the rate achieved during 1957-65. (See table 7.) ¥108,000 total distributed 75 percent to high-cost energy and 25 percent to low-cost, approximating U.S. 1961-62 distribution. Expenditure by commodity groups not illustrated.

4/ Consumer expenditure divided by energy consumed.

5/ Origin targets as expression of policies toward domestic production and imports described in text.

6/ Imports dependency [illegible]

importing the raw products. In return, these countries might make firm commitments for Japanese industrial products. Japanese-induced agricultural development programs in other Southeast Asian nations might also result in trade expansion with them.

At issue is the extent and nature of Japanese involvement in East-Southeast Asian and African economic affaris. Many countries in these regions have great potential for producing farm commodities needed by Japan; the commodities are directly competitive with those of the United States and other developed countries. The degree of competition might be especially keen in instances where production in less-developed countries was partially financed or managed by the Japanese themselves. The Pacific strategy would undertake to do this on the maximum feasible scale.

Eastern Food Strategy

Argument for the Strategy. A possible advocate of the Eastern strategy might think of Japan as an economic engine running mainly on internal, not external power. While some export expansion is required to balance essential imports of raw materials and technology, the internal market is responsible for most of Japan's spectacular growth, not the export market. The role of foreign trade is vital, but its volume never has and never should dominate Japanese economic life. And especially not the food sector.

It could be much too risky to permit Japanese food supplies to become overly dependent upon imports, whether of processed foods or food raw materials. Food production and marketing need to be more efficient, of course, but this can be accomplished considerably short of a 50 percent or greater food import dependency rating. The old-style, labor-intensive agriculture is already on the way out, being gradually modernized as labor is drawn to commerce and industry. However, the new-style, labor-saving agriculture is not yet fully established.

Both old and new industries in the food sector require protection for a prolonged transitional period, according to the argument. Eventually, largely with Japan's domestic resources, the new agriculture and fishing will be able to compete freely with imported food products of all kinds on the Japanese market.

Major dependence on foodstuff imports could be risky because of the threat of ocean transport disruption, the chance of crop failures abroad, and the possibility that Japan's future balance of payments position could deteriorate. The Japanese balance of payments could become much more difficult to manage in the future.

Cyclical variations in Japan's balance of payments tend to reflect the nation's immediate economic strength or weakness in the world economy. However, there seem to be longer-run waves in a country's balance of payments as well, which lead to a mainly-surplus or mainly-deficit position over a decade or so. Should the Japanese Government at some future date decide that a general program of corrective action in its trade account were necessary, overdependence on foodstuff imports could make this action more difficult.

5/ Origin targets as expression of policies toward domestic production and imports described in text.

From a political standpoint, a food supply cutback for balance of payments reasons might be difficult. From an economic standpoint, a cutback of agricultural raw materials for food processing would have to idle some associated food sector inputs. Idle capital facilities and resulting unemployment would be unpalatable as well as inefficient. Livestock herds and flocks might have to be reduced in distressed liquidation.

Although the Eastern food strategy would yield Japan smaller per capita food supplies by 1985 than either the Western or Pacific strategies, the resulting higher energy costs could be worthwhile as the price of risk avoidance. Moreover, in compensation for smaller supplies, consumers would receive more marketing services, and especially more convenience, embodied in food through processing services. Thus, an increasingly urban Japan might be willing to accept a ceiling on food supplies somewhat lower than in Western Europe.

Possible Detailed Policies. (1) Expand the output of domestic livestock and products, but at a rate somewhat slower than under the Pacific strategy. (2) Reach out to Southeast Asia for corn and grain sorghums for feed, but not quite as aggressively as under the Pacific strategy. (3) Sharply expand output of fish and its products, especially emphasizing fish protein concentrate. (4) Retain the present trade barriers to the import of processed foods, especially meat and other livestock products. (5) Expand domestic fruit and vegetable production sharply. (6) Retain the major features of the present highly protective domestic price and income program for rice. However, encourage farm consolidation and greater efficiency to maximize domestic rice production. (7) Keep wheat imports under control as under the Pacific strategy. (8) Boost domestic sugar production, but hold the line on imports. (9) Allocate many more resources to food processing and marketing, to substantially increase the share of these services in consumer food expenditure.

Consumption Targets. Policy would aim for 1985 per capita food consumption of 1,022,000 calories per year (table 10), equivalent to a target of 2,800 calories per day. Although this target is below those of the other strategies, consumption at this level would still be well above the achieved 2,424 daily calories per person of 1965. Even under the Eastern strategy the livestock product target is about triple the achieved 1965 level.

Special Economic Factors. In the Eastern strategy's drive to hold down food import dependence, a new source of high-protein meal for livestock feed might prove an attractive substitute for meal from imported oilseeds. A petroleum-based microbiological animal feed industry is already developing in Japan (67, 74). The technology is presently capable of mass-producing high-protein meals from microorganisms which feed upon petroleum by-products. Cost now seem to be the remaining issue, not the nutritive value of the product for animals nor basic production technology. Feeding trials employing this meal in animal diets were favorable (48, 74).

The small-scale plants for petroleum meal production now under constructio or planned in Japan may not yet be cost-competitive. However, as the industry develops, prices might well be competitive in the future with both fish meal and soybean meal at Japanese formula feed mills. Since this new product is so closely linked to the petroleum industry, cost problems can probably be solved.

Table 10.--Possible 1985 targets [1/] for an Eastern food strategy in Japan

Food group	Food energy-expenditure flow			Energy origin		Food import dependency rate 6/
	Energy consumed 2/	Consumer expenditure 3/	Cost per thousand calories 4/	Domestic 5/	Import-dependent 5/	
	Thou. cal.	1960 yen	1960 yen	Thou. cal.	Thou. cal.	Percent
High-cost energy						
Beverages	47	--	--	37	8	17.8
Fish and whale	55	--	--	55	0	0
Fruits and vegetables	90	--	--	87	3	3.3
Livestock products	147	--	--	40	107	72.8
All high-cost	337	81,000	240.36	219	118	35.0
Low-cost energy						
Cereals	430	--	--	310	120	27.9
Fats and oils	75	--	--	15	60	80.0
Potatoes	32	--	--	32	0	0
Pulses	60	--	--	45	15	25.0
Sugar	88	--	--	25	63	71.6
All low-cost	685	27,000	39.42	427	258	37.7
All food	1,022	108,000	105.68	646	376	36.8

1/ Annual per capita basis.

2/ The general target is 2,800 calories per day, all food energy, equivalent to 1,022,000 calories per year. This energy total is targeted 33 percent to the high-cost group and 67 percent to the low-cost group. Individual group targets accord with the commodity policies of the Eastern strategy. (See text).

3/ Illustrative 1985 per capita expenditure of ¥108,000 is the result of compounding the 1965 expenditure of ¥47,594 for 20 years at an annual growth rate of 4.2 percent the rate achieved during 1957-65. (See table 7.)

4/ Consumer expenditure divided by energy consumed.

5/ Origin targets as expressions of policies toward domestic production and imports described in text.

6/ Import-dependent energy as a percentage of energy consumed.

Initial operations at a loss could be sustained by the industry if longer run prospects were favorable.

Under the Eastern strategy, the Japanese Government would heavily assist the production of petroleum meal for livestock feed. By manufacturing this meal, Japan might save some foreign exchange and help to hold down import dependence. Vegetable-oil and protein-meal procurement would tend to become less related as economic activities, since meal supplies would be physically less dependent upon oilseed supplies.

Targets for Food Consumption and Import Dependency

Three strategic combinations of detailed policies have been suggested. Other combinations and detailed policies are also possible, but the three strategic options portrayed suggest the wide range of possibilities. The year 1985 is selected because it is the most distant year for which the Japanese Economic Planning Agency has already prepared a detailed general economic outlook complete with population projection (73).

To illustrate the differences between the three strategies more clearly, the alternative commodity objectives expressed verbally on the foregoing pages are also shown numerically on tables 8-11 as specific targets. Such widely different strategies as the Western, Pacific, and Eastern could not all have similar consumption outcomes. The targets for each of the strategies are set at different levels, chosen subjectively, but in accord with the general direction of resource use in the Japanese economy. These are not predictions, simply reasonable consumption objectives for the matching policy alternatives already listed. Other analysts might with equal reason choose different target numbers to illustrate a certain strategy.

By using data from the Standard Tables of Food Composition in Japan, prepared by the Science and Technology Agency of the Japanese Government, energy targets can be converted to metric weight units (28). Thus, corresponding production targets can be derived as well. (See chapter X.)

Without making a prediction about the level of per capita food and beverage expenditures in 1985, it is also useful to assume some expenditure level for illustration. The assumed 1985 level of ¥108,000 was obtained by compounding the 1965 level at the 4.2 percent rate of increase achieved in the food expenditure series during 1957-65 (9, 42, 54) (tables 7, 8, 9, and 10). This assumption demonstrates the probable large gain in 1985 food and beverage expenditure over 1965. In addition, the strong probability that high-cost energy will take most of the new food expenditure is illustrated by the assumed allocation of ¥81,000 to high-cost and ¥27,000 to low-cost energy.

To simplify tables 8, 9, and 10, the same assumed expenditure level is used for each table. Actually, one might expect a slightly different per capita food expenditure for each 1985 alternative, since the respective food policies might have minor differential effects on the growth rates for Japan's gross national product and private consumption expenditure. Since the extent to which these growth rates would differ is not clear, no attempt is made to assume different expenditure targets for the strategic alternatives.

Table 11.--Japan's food consumption and import dependency in 1957 and 1965, and 1985 alternative targets

Food group	Consumption 1/					Import dependency rate				
	1957	1965	1985 targets			1957	1965	1985 targets		
			Western	Pacific	Eastern			Western	Pacific	Eastern
	Thousand calories					Percent				
High-cost energy										
Beverages	16	26	40	42	45	14.0	11.7	20.0	23.8	17.8
Fish and whale	34	36	40	55	55	0	0	0	9.1	0
Fruit and vegetables	41	56	66	85	90	0	2.1	3.0	11.8	3.3
Livestock products	21	50	292	209	147	20.7	67.5	93.8	88.0	72.8
All high-cost	112	168	438	391	337	6.0	22.5	64.8	53.5	35.0
Low-cost energy										
Cereals	527	484	350	430	430	16.7	21.4	48.6	34.9	27.9
Fats and oils	28	61	100	70	75	55.0	80.5	88.0	85.7	80.0
Potatoes	61	48	35	30	32	0	0	0	0	0
Pulses	49	53	50	52	60	2.7	27.8	40.0	38.5	25.0
Sugar	49	71	122	85	88	88.0	82.6	83.6	88.2	71.6
All low-cost	714	717	657	667	685	20.6	31.5	57.8	45.7	37.7
All food	826	885	1,095	1,058	1,022	18.6	29.8	60.6	48.6	36.8

1/ Annual per capita basis.
Sources: Compiled from tables 4, 5, 8, 9 and 10.

The three strategies would differ markedly in import dependency (table 1
The import-dependency rates should be thought of as derived targets determine
from the energy-origin objectives of tables 8, 9 and 10. The intent behind a
Western strategy would be to seek a high degree of food import dependency to
boost food supplies and consumption very greatly over the 1965 level. The in-
tent behind an Eastern strategy would be to hold import dependency near the
1965 level, but allowing some increase. The purpose of the Pacific strategy
would be to work toward a somewhat greater import dependency than the Eastern
but not as great as the Western--an intermediate path.

Food policy choices leading to such contrasting consumption patterns and
different degrees of import dependency would be of great moment for Japan's
food sector and foreign trade position. Each of the alternative food strateg
could point to a very different pattern of future Japanese grain imports. Ja
undoubtedly has the power to channel its agricultural trade in a variety of
ways, depending upon the future development strategy it chooses for the food
sector of its economy.

Chapter IX.--THE IMPORTANCE OF GRAIN FROM SOUTHEAST ASIA

Japan's trade balance with the countries of Southeast Asia is of special
importance for both political and economic reasons. As already noted in the
previous chapter, Japan has run a consistent export surplus with many of thes
nations. Policies toward grain imports from this region must be placed in th
context of all Japanese trade and investment relations with the area.

Huh examined these relations and concluded that long-term capital outflo
and technical assistance from Japan to Southeast Asia may be the key to over-
coming the trade imbalance (36). In any case, such outflows and assistance
could be expected to raise primary product exports to Japan and Japanese con-
sumer and capital goods exports to Southeast Asia. Although grain from South
east Asia was previously discussed mainly under the Pacific food strategy, it
would also play a role--although different in relative importance--under the
other strategies.

Food Import Diversification

The longstanding themes of manufactured exports, primary product imports
trade, aid, and development were woven into a very significant article by
T. Ogura in 1966. Ogura is chairman of the Agriculture and Fisheries Researc
Council, an official arm of the Ministry of Agriculture and Forestry which
directs the Government's technical and economic research programs in agricul-
ture. The article is entitled "How to Secure a Stabilized Supply of Food", a
a portion follows in unofficial translation (106):

> The import of farm products will continue expanding in spite of the increase in indigenous production. We must consider whether it is advisable for the nation to remain dependent mainly on imports from the United States as at present. The export capacity of the United States may be great, since the United States even maintains restrictions on agricultural production at home. The total dependency on

the United States, however, cannot be regarded as desirable, in view of the fact that the food importing countries of the world are becoming more and more dependent on the United States. It is necessary for Japan to have more diversified sources of food supply in order to secure a stabilized food supply. Also, the balance of trade between Japan and the agricultural countries of Southeast Asia and other backward regions is favorable to Japan, while that between Japan and the United States has usually been unfavorable. Moreover, it has become necessary for Japan to play a role, as one of the advanced countries, in the development of these countries.

Such being the circumstances, it is time for Japan to establish a new food supply system from an international point of view with consideration to the necessity of agricultural development in the friendly countries as well as to trade relations, instead of merely trying to purchase cheap food in order to meet the shortage of food supply at home. As one of the concrete steps for this purpose, it may be advisable to set up a special account within the Food Control Special Account under which to import food and feedstuffs from less developed countries with funds transferred from the general account to this special account, so that the nation can import food smoothly and, at the same time, help the agricultural development of these countries and secure the stabilized supply of food and feedstuffs for itself.

Ogura is arguing that suppliers in Southeast Asia should take over some of he share of the Japanese grain import market now held by the United States, ven though U.S. volume in absolute quantities may increase. The great stress pon stability of the food supply suggests that Japanese strategists might well hoose to hold total daily energy consumption per person well below 3,000 calo- ies if, by doing so, they could make the supply more secure and more stable. trong moves to diversify supply sources could also contribute greatly to the ecurity of the supply.

It is believed that Ogura's opinion is widely shared by other Japanese overnment officials. If so, Japan may be very serious indeed about its ffort to improve Southeast Asian agriculture. We might well witness a big ush from Japan toward rice, corn, and sorghum production in that region. On rice, see chapter X.)

Corn and Sorghum Procurement

Japan's involvement in Southeast Asian feed grains is already considerable nd deepening rapidly. This involvement illustrates some of the methods of referential trade as applied by Japan to the import of corn. These methods re to be distinguished from, although they implement, the general government- o-government bilateral trade agreements which may list commodities to be raded, but rarely mention values or quantities of trade, whether in total or y commodity. Japan may try to move even more actively into the feed grain usiness. Japanese firms may become, in a sense, both sellers and buyers, with cean transport of feed grain from Southeast Asia to Japan frequently an intra- ompany transfer instead of a freemarket international trade flow.

Japanese interests make arrangements with a country for the production or purchase of corn. In an economic sense, these arrangements are preferential import allocations by Japan, whether or not they are in a legal sense under th provisions of the General Agreement on Tariffs and Trade. For corn, an arrang ment takes any one or all of three forms:

1) The Japanese importers' cartel; 2) The overseas produce-and-import joint venture; and 3) The overseas procure-and-import joint venture. Each may be used in combination with the others in the same foreign country. The latte two involve direct Japanese investment in the corn-exporting country.

The Japanese importers' cartel is illustrated by the Thai-Corn Importers' Committee referred to in chapter IV. The committee members are the major Japanese trading firms which import corn from Thailand, but officials of the Japanese Government and major Japanese feed manufacturing firms sit in inform- ally. The activities of this committee are revealed in the following 1963 news release (59):

> The Thai Corn Mission headed by Mr. Bunjurd Cholvijarn, President of the Thailand Board of Trade, and the Japanese trading firms' negotiation body headed by Mr. Y. Kono, Chairman of the Thai-Corn Importers' Committee, met in Tokyo on April 15th thru 18th to negotiate the manner in which the 1963/64 crop of Thailand corn should be transacted between Thailand and Japan. The main points of the agreement reached thru their negotiation are:
>
> (1) The Thailand Department of Foreign Trade (DFT) and the Thai-Corn Importers' Committee of Japan (TCIC) will do their best in realizing a trade volume of 500,000 M/T for the 1963/64 crop of Thailand corn.
>
> (2) In a fashion similar to the new system adopted last year, all corn transactions between Thailand and Japan will be regulated by DFT and TCIC in the following respects:
>
> (a) DFT will inform TCIC of the approximate exportable quantity of corn to Japan, and TCIC will specify the Japanese import need for Thailand corn about two months before each specific shipment period.
>
> (b) DFT and TCIC will determine the quantity and price of corn at least one month in advance of the specific shipment period.
>
> (c) DFT and TCIC shall inform each other of the names of the exporters and importers to whom the quotas for a specific shipment period have been allotted and the extent of such quotas.
>
> (d) Individual Japanese importers and Thai exporters are free to conclude contracts with any exporters or importers within the limits of their quotas.

Similar agreements were concluded in the summers of 1964, 1965, and 1966 between this committee and representatives of the Thai Government. Prior to the 1965 negotiations, representatives of the Japanese Feed Manufacturers Association visited Thailand to obtain information needed for the subsequent purchase negotiations. The largest quota allocated to any one of the Japanese trading companies for 1965-66 imports turned out to be almost 12 percent of the Thai corn flow to Japan.

The 1966 negotiations took place in Bangkok; the agreement specified that the importers would purchase 800,000 metric tons of corn from the 1966-67 crop at prices fixed 45 days prior to shipment and "based upon" those of U.S. grade 3 yellow corn. About 740,000 tons was actually shipped. From the 1960-61 Thai corn crop, 434,000 metric tons had been shipped to Japan; 750,000 tons from the 1965-66 crop. In 1967-68, however, exports to Japan fell off because of a smaller Thai crop. In 1968, the Government of Thailand abrogated the agreement (15). Nevertheless, the history of this agreement is an interesting case study of one method by which Japan may operate in Southeast Asia.

The overseas produce-and-import joint venture is illustrated by the newly-formed Societe Khmer des Cultures Tropicales (SOCTROPIC) (The Cambodian Tropical Crop Corporation) and the Japan-based Lampung Development Company, set up to invest in joint Japanese-Indonesian enterprises near Lampung, Sumatra. Among other activities, both these joint ventures are to initiate the production of corn on a commercial basis where little or none was produced before.

The ownership of SOCTROPIC is divided between the Cambodian Government (51 percent) and a Japanese consortium (49 percent). This consortium, called the Japan-Cambodia Economic Cooperation Company, was established in 1965 during the early stages of negotiation with Cambodia. The consortium is owned jointly by a leading Japanese trading firm (14 percent), four other trading firms (9 percent each), and the Japanese Government itself (50 percent) (69, 110).

In the Japanese efforts to assist in Southeast Asia's economic development, SOCTROPIC is the first organization of its kind. It will establish at least four plantations along the Mekong River. Corn as well as other tropical crops will be produced with the aid of Japanese Government-sponsored assistance teams. Japan may or may not lessen the imbalance in its trade with Cambodia, but it is moving to fulfill its general objectives of aiding developing nations, and it will get corn from a non-U.S. source.

The Lampung Development Company has been established by a leading Japanese trading company, a bank, and five industrial firms for the purpose of financing joint development ventures with the Indonesian Government in a certain area of Sumatra (70). These enterprises will create an agro-industrial complex for lumbering and corn-growing, with associated light industries and transport facilities such as railways, highways, and a port. Corn and lumber will be exported to Japan. Under Indonesia's new foreign investment law, the enterprises will receive very liberal tax treatment, and the machinery or equipment required can be imported from Japan duty free. Again, Japan aids development abroad partly by managing the production and import of corn from a non-U.S. source.

There may, of course, be some "startup" problems in attempting to produce corn of acceptable quality on a commercial scale. However, there is no reason to doubt the long-term feasibility of sizable commercial corn operations throughout Southeast Asia (102, 112).

The overseas procure-and-import joint venture is illustrated by Japanese participation in the Bangkok Drying and Silo Company, an existing firm, reputedly the largest grain elevator operation in Thailand. The enterprise is to double its capitalization through investment participation by two of the largest Japanese trading firms, plus an overseas trading arm of Zenkoren, the cooperative which is Japan's largest animal feed manufacturer. The objective is to keep up with commercial competition in Thailand by expediting the collection of corn from the countryside and improving the terminal facilities near Bangkok for corn export, principally to Japan (71).

In each of the three arrangements above, whether importers' cartel or production or procurement joint venture, the role of a Japanese trading firm or firms is central. Through one means or another, the trading firms are committing themselves to the purchase of certain amounts of corn from Southeast Asia, with the open backing and encouragement of the Japanese Government. In effect, the Japanese Government, through the trading firms, is establishing preferential import allocations for corn from the countries involved.

If Southeast Asian nations are to take preference in the Japanese corn market through Japanese overseas investment and the trading firms, and if conventional bilateral trade agreements with South Africa and other nations continue to involve corn or grain sorghums, then the market share in Japan for the United States could fall. U.S. corn and milo would be excluded from the preferential share of the market and would participate only in the residual share. The size of this residual share would be determined as the difference between the preferential total and the total requirement of Japanese feed grain users.

As suggested in the following chapter, this total requirement for 1985 would be quite different under each of the three alternative strategies. Therefore, to estimate the Southeast Asian share in the Japanese feed grain market, one needs two specifications: First, a level of total feed grain usage in Japan; second, a level of production in Southeast Asia--particularly the amount of production which falls under the influence of Japanese overseas operations and investment. Since food-strategic alternatives would influence these specifications differently, one should look to the emerging strategy to assess the probable importance of grain from Southeast Asia in the future Japanese market.

Chapter X.--1985 GRAIN IMPORTS UNDER ALTERNATIVE STRATEGIES

How would each of the three alternative food strategies affect Japanese grain imports? The answer might best be given only in words, not in numbers, that is, without estimating quantities of grain. But, for greater understanding of what each strategy would try to accomplish and how, numbers are helpful. The numerical illustrations of per capita consumption targets (by energy), shown in chapter VIII, are now converted to corresponding total production targets (by weight) for products in the cereals and livestock food groups. In addition, estimates are made of total quantities of grain needed to reach these

cereals and livestock targets under each strategy. Then, an estimate is made of how much of the grain requirement could be produced domestically and how much would have to be imported.

Thus, a set of consistent consumption/production/grain raw material targets specifies each strategy's quantitative objectives or reasonable expectations for consumer cereals, livestock products, and grain imports. The grain and product targets illustrate what Japanese 1985 indicative planning goals might be if policies of the corresponding food strategy were adopted.

The calculations by which illustrative consumption targets are converted into production and grain requirements are shown in detail in appendix II, tables 15-20. The calculating assumptions specified on these tables are by no means ultimate and are open to modification. Table 12 and figure 8 summarize the results of the grain requirement calculations by combining the grain totals from the appendix II tables. This chapter sets forth some of the reasoning by which key consumption/production/grain requirement targets are selected.

Grain Import Targets Under a Western Strategy

Under a Western strategy and the calculating assumptions discussed above, 1985 intended total grain usage is about 60 million metric tons, more than double the 1965 level (table 12). Almost 42 million tons of grain is targeted for livestock feed, about 7 times the 1965 usage. However, the 1985 estimated grain requirement for food milling is lower than the 1965 actual amount by 2 million tons. Since 1985 domestic grain production is also targeted lower than the 1965 level under this strategy, all the planned increase in grain usage over 1965 (plus an amount to make up for the smaller domestic production) comes from imports. The total grain import target is estimated at 50 million tons, five times the 1965 level.

Grain for Livestock Feed. A massive increase in feed grain usage and imports would be needed to achieve the livestock production increase sought by the Western strategy. Hog raising would be especially emphasized by this strategy. The Western strategy's consumption target for pork (table 18, appendix II) equals the achieved Danish per capita pork consumption of 42.4 kilograms in 1957-58, a peak year (29).

Data from other Western European countries and North America show that annual per capita pork consumption over 35 kilograms is most unusual, but attainable (29). Although the targeted per capita Japanese pork production and consumption at 42 kilograms per year by 1985 may be extremely large, it is worthwhile for that very reason to calculate how much feed grain would be needed to achieve that production.

Characteristically, hogs are intensive users of feed grain per unit of dressed meat produced, even when not fed up to the U.S. average feeding rate (6). Therefore, if Japan should choose (as assumed under the Western strategy) to emphasize hog production very strongly, its requirement for imported feed grain would be extremely large. Just as much emphasis would be placed upon poultry meat and egg production. A much larger targeted output of these would require a further boost in the feed grain import target.

Table 12.--Japan's domestic and imported grain 1/ usage: 1965 actual and 1985 estimated requirements to meet food consumption targets of alternative food strategies 2/

Usage	Actual, 1965 3/			Estimated requirements, 1985 4/								
				Western strategy			Pacific strategy			Eastern strategy		
	Domestic	Imported	Total	Domestic	Imported	Total	Domestic	Imported	Total	Domestic	Imported	Total
	Million metric tons											
Milling for food 5/	12.8	3.5	16.3	7.0	7.3	14.3	10.8	5.9	16.7	11.9	5.1	16.9
Livestock feed 6/	.5	5.5	6.0	1.0	40.8	41.8	1.0	16.9	17.9	1.1	12.4	13.5
Manufacturing, seed, and waste	7/ 1.9	7/ 1.3	7/ 3.2	1.8	2.0	3.9	2.0	1.6	3.6	2.0	1.4	3.4
Total usage, or total new supply	15.2	10.3	25.5	9.8	50.2	60.0	13.9	24.4	38.2	15.0	18.8	33.8

1/ All grains, that is, rice, wheat, barley, corn, grain sorghums, oats, rye, millet, and buckwheat.

2/ How much raw grain would be needed to achieve the food consumption targets for the respective strategies, and under the agricultural and trade policies applicable to each? The assumed food consumption targets for 1985 are shown in tables 8, 9 and 10. The estimated per capita grain requirements to meet these targets are in appendix II, and are converted to tonnages by multiplying by 120 million, the population projected for 1985 by Japan's Economic Planning Agency in 1968.

3/ From Japanese Ministry of Agriculture and Forestry's Food Balance, 1965. See Abstract of Statistics on Agriculture, Forestry and Fisheries: Japan, 1966.

4/ Grain tonnages for milling and feed are estimated as shown in tables 15 to 20, appendix II. Although not shown here, the following estimates are made by individual grain: Manufacturing tonnages are "educated guesses". Waste tonnages at 2 percent of milling, feed and manufacturing totals. Seed tonnages at the following percentages of milling, feed, manufacturing and waste domestic totals: Rice 0.8 percent, barley 1.7 percent, others 2 percent.

5/ Tonnages are gross food basis, that is, weight of unmilled grain for food (not including grain wasted) even though brans and byproducts not consumed by humans are thereby included.

6/ Does not include brans and food milling byproducts destined for animal feeding. For the estimated requirement columns, tonnages are feed values in corn units. Actual weight of raw feed grain would probably be higher on the assumption of large usage of sorghums and barley, of lower feeding value than corn per unit of weight. See tables 18-20, appendix II.

7/ Includes 1965 net addition to stocks of grain.

Details may not add to totals because of rounding.

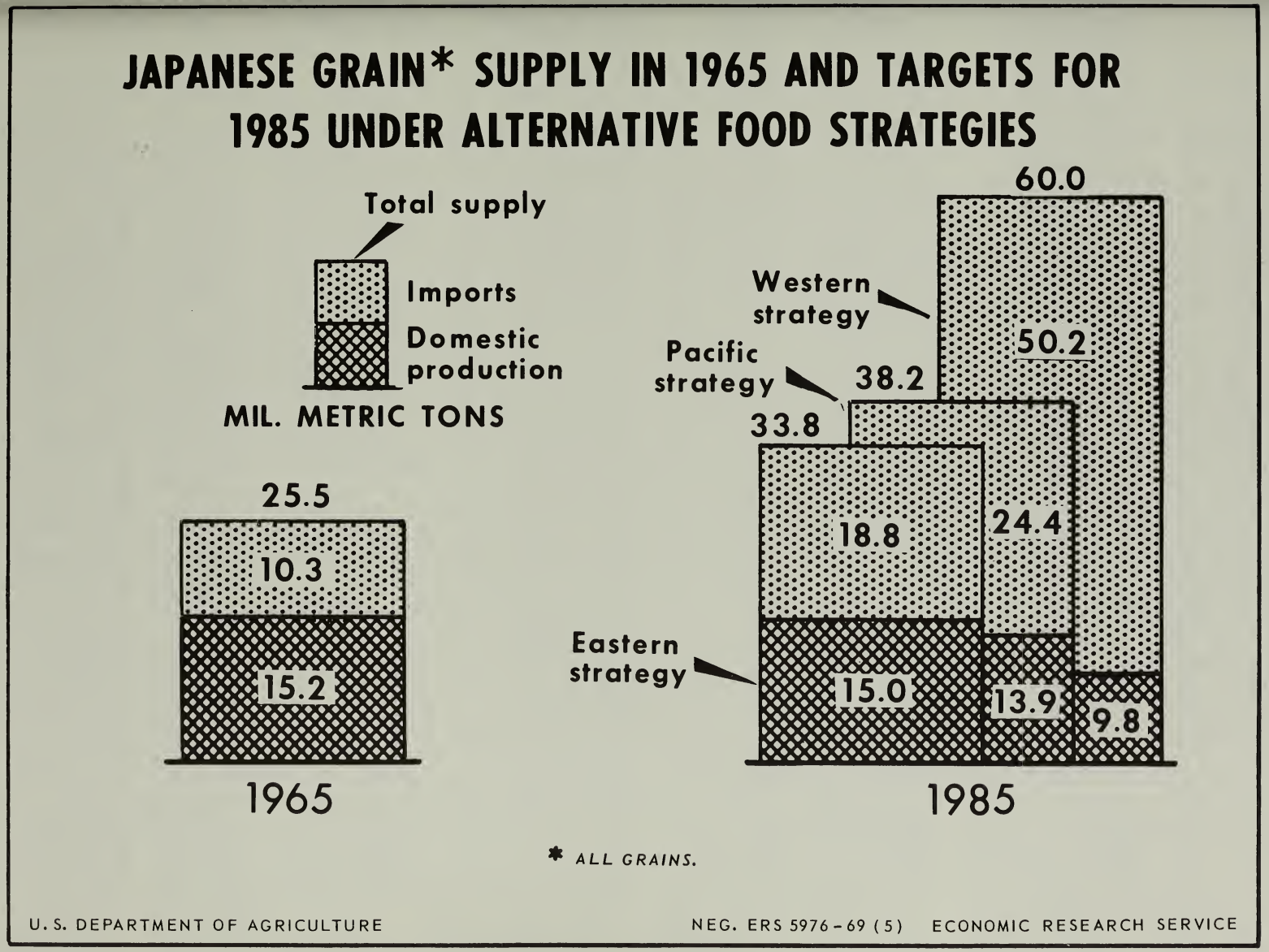
JAPANESE GRAIN* SUPPLY IN 1965 AND TARGETS FOR 1985 UNDER ALTERNATIVE FOOD STRATEGIES
Total supply
Imports
Domestic production
MIL. METRIC TONS
25.5
10.3
15.2
1965
60.0
Western strategy
50.2
Pacific strategy
38.2
33.8
18.8
24.4
Eastern strategy
15.0
13.9
9.8
1985
* ALL GRAINS.
U. S. DEPARTMENT OF AGRICULTURE
NEG. ERS 5976-69 (5) ECONOMIC RESEARCH SERVICE

Figure 8

The very high production/consumption targets for pork, poultry, and eggs might seem out of balance with the beef target, if Japan had a realistic optio for great expansion in beef production. However, it is almost impossible to expect a great buildup in specialized beef herds in addition to the modest expansion in dairy herds targeted for the Western strategy.

Expansion in Japanese cattle herds cannot outrun the expansion in necessa total roughage from grazing land and harvested forage crops. Japanese geograp and present land usage place both natural and economic constraints on availabl roughage. While total supplies of roughage can increase over time, roughage projections to 1976 by Japan's Ministry of Agriculture and Forestry give no grounds for predicting a specialized beef industry to rival those of land-rich nations (53, 91).

Although this reasoning would be refuted by importing large numbers of feeder cattle for feeding out in Japan with imported grain, the Western strate assumes that such would not occur. It further assumes that Government import controls would hold the inflow of imported meat, eggs, and dairy products to relatively small proportions. (See footnote 3/, table 18.)

In light of the constraints on beef production and the modestly higher m production target, the very high targets for pork, poultry, and egg productio consumption do not seem out of balance for the Western strategy. The impact grain imports of policies to achieve these targets would probably be spectacular.

The extremely rapid output advance targeted for pork and poultry would b sought by creating new enterprises, new production capacity. Large-scale hog and chicken factory farms could be constructed by large proprietors, cooperatives, or corporations. Much new investment and management talent would be required. Cooperation between Government and private enterprise can probably work just as effectively in large-scale agriculture as in industry. There mi well be an important role for technical-managerial advice and investment from abroad.

Grain for Food Products. Under a Western strategy, 1985 policies toward food grains would focus about equally on domestic rice and imported wheat. T shift away from the predominant rice orientation of 1965 would be startling, looking backward from 1985, but the new policies would be instituted very gra ally, moving by cautious, small steps. Many devices which now protect and stimulate rice production and subsidize its consumption would be phased out, lessening or eliminating the financial burdens of the rice support program to the Government. At the same time, the devices which regulate wheat imports would be gradually relaxed. State trading in wheat imports would be cut back and skimmings reduced until wheat was being imported without restriction.

By 1985, domestic rice, wheat, and barley would be competing freely with imported wheat. Consumption-production-import objectives for these grains (table 15) are set by judgment, since neither past Japanese experience nor other-country data give much clue as to what happens when a traditionally ri eating society modernizes and admits wheat into free competition with rice. While the Japanese cultural heritage probably would guarantee a large share the cereals market to milled short-grain rice (even if priced above flour,

bread, noodles, crackers, and buns), the crucial question is: How much rice could Japanese farmers be expected to produce and to market from their 1985 crop under the above policy assumptions?

Rice production per person could turn downward rapidly as the outmigration of labor from agriculture was reinforced by dissolving domestic price supports and lessening protection against foreign wheat. One would expect wheat imports to rise, making up for some of the decline in rice marketed to urban areas. However, with increasing competition for cereals from other attractively priced food groups (such as livestock products), per capita consumption of cereal products would surely decline substantially from the 1965 level.

Grain Import Targets Under a Pacific Strategy

Under a Pacific strategy, 1985 intended total grain usage is about 38 million tons (table 12). Almost 18 million tons of grain is targeted for livestock feed under this strategy--about triple the 1965 usage. However, the 1985 estimated grain requirement for food milling is about the same as the 1965 actual usage. Since 1985 domestic grain production is targeted lower than the 1965 usage by 2 million tons, 1985 food grain imports are targeted higher by about this amount. The total grain import target is estimated at just over 24 million tons--more than double the 1965 level.

Grain for Livestock Feed. A large rise in feed grain usage and imports would be needed to achieve the livestock production increase sought by a Pacific strategy. However, the targeted increase in livestock product consumption is greater than the planned rise in Japanese output of these products, because of the intention to substantially expand imports of meat, eggs and processed dairy products. (See footnote 3/, appendix table 19.) These would remain under import quota or tariff protection, except that quotas would be larger and tariffs somewhat lower.

Under this strategy, Japanese-produced milk and all meat would be emphasized about equally. Per capita energy targets for all domestically produced meat total 62,000 calories per year, while the domestically produced dairy product target is 67,000 calories (appendix table 19). However, the fastest buildup from the 1965 production level would be in chicken meat, targeted for 1985 at more than 6 times the 1965 production of 205,000 tons. Although a Pacific strategy would boost pork output rapidly too, targeted 1985 production is only 3½ times the 1965 output.

Since the production of chicken meat characteristically uses less feed grain per unit of consumer product (by weight) than pork production (6), a Pacific strategy favors a less intensive use of feed grain on a unit basis than a Western strategy. A somewhat less intensive use of grain in dairy cattle feeding is also assumed for a Pacific strategy in contrast to a Western. Therefore, targeted feed grain usage under a Pacific strategy is disproportionately lower than under a Western--lower not only because production-consumption targets are lower, but also because grain usage (on the average) is less intensive per product unit.

Grain for Food Products. Under a Pacific strategy, 1985 policies toward food grains would focus primarily on rice. The major emphasis would be on domestic rice, although rice imports would play an important subsidiary role equal to that of wheat imports. Rice policies in 1985 would be very differen from those of 1965, with the complete removal of support from domestic rice a the unrestricted import of foreign rice.

However, 1985 wheat policies would be about the same as those of 1965, perhaps somewhat more restrictive. Foreign wheat would still be state-traded subject to quantitative control and Government skimmings (state-trading marku analogous to variable specific tariffs). Price support would be largely with drawn from domestic wheat. The policy's intention would be to hold total im- ports of wheat for food milling to about 3 million tons, that is, to slightly reduce per capita consumption of all wheat products from the 1965 level. Thu the production of domestic rice would be protected against the competition o foreign wheat.

There would be a gradual phaseout of programs now supporting rice produc tion and restricting rice imports, but even so, transitional upheavals in the domestic rice economy would occur. After the transition, rice farming in 19 would be more efficient than it was in 1965. But, Japan's rice producers would be able to compete against only the world rice economy, not against the world wheat economy as well.

The main food grain competitor for Japanese rice would be imported shor grain rice, since Japanese consumers greatly prefer this type. Imported lon grain rice need not offer serious competition for a rationalized 1985 rice economy, producing favored short-grain varieties on large-scale, mechanized farms.

Exportable supplies of short-grain rice in other countries seem likely remain much smaller than those of long-grain rice. Thus, rice production- consumption targets on table 16 are reasonable goals for 1985 under a Pacifi strategy's rice policies. The imported wheat targets, of course, are not ho for free market levels (as they are for rice), but objectives for a Governme control program over imports.

Grain Import Targets Under an Eastern Strategy

Under an Eastern strategy, the 1985 grain usage target is 34 million to (table 12). About 13½ million tons of grain is targeted for livestock feed, slightly more than double 1965 usage. The 1985 estimated food grain require ment is only marginally higher than 1965 actual consumption. 1985 domestic grain production for food milling is targeted almost 1 million tons lower th in 1965, and 1985 food grain imports are targeted 1½ million tons higher tha in 1965. The total grain import target is estimated at almost 19 million to not quite double 1965 imports.

Grain for Livestock Feed. The rise in feed grain usage and imports wo be only moderate under an Eastern strategy, in light of the expected rapid economic progress in Japan. This strategy aims for almost a tripling of pe capita total (domestic plus imported) livestock product consumption (from

50,000 calories per year in 1965 to 147,000 calories by 1985, tables 5, 10, 20). Per capita imports of processed livestock products and domestic production are each targeted at about triple the 1965 level. However, targeted feed grain usage rises less than targeted livestock product consumption--not because of processed product imports, but because of assumed Japanese production practices which would "save" on feed grain usage by livestock.

For example, there would be a special emphasis on expanding dairy herds. In contrast to the other strategies, less stress would be placed on expanding hog and poultry numbers. Milk production characteristically uses less feed grain per energy unit of consumer product (for example, per 10,000 calories of food product) than pork, poultry meat or egg production (6, 29, 86). In addition, the dairy technology envisioned under an Eastern strategy (footnote 17/, appendix table 20) would save further in its use of feed grains because of assumed Government policies favoring replacement of grain in dairy rations by such feeds as molasses and high-protein petroleum meal from microorganisms. Dairy cattle, as ruminants, could convert the relatively scarce Japanese roughage supplies into food more efficiently than nonruminants, which would be taking more of the roughage under the other strategies.

The major push toward dairy production is in accord with an Eastern strategy's basic principle: Wherever possible, substitute food raw materials or byproducts of domestic origin for those of foreign origin. Nevertheless, pork and poultry meat output is also targeted to increase greatly (table 20).

Grain for Food Products. Under an Eastern strategy, policies toward food grains would remain very similar to those of 1965. As a result, per capita supplies of domestically-produced food grain (primarily rice) would continue the gradual decline begun in 1960 (chapter II). Also, per capita supplies of imported food grains (primarily wheat) would continue to increase very gradually. These results might be expected from policies which continued to support and protect domestic rice and continued to purchase foreign wheat through the Government's Food Agency, with substantial skimmings added to c.i.f. wheat prices.

Support for Japanese-grown wheat and barley would remain minimal. Thus, domestic production of these grains for food (not counting brewing barley) is targeted to drop rather sharply. Since imports of rice and wheat would be under quantitative control by the Food Agency, targeted import quantities are goals for the Agency's 1985 import program.

An Eastern strategy would tend to hold the ongoing withdrawal of labor from domestic rice production to a relatively slow pace. The domestic food grain economy would not be rationalized nearly as fast as under either of the other two strategies. Therefore, it is logical to expect that domestic food grain production would be higher under the protectionist Eastern strategy than under the others. Targets are set accordingly.

Chapter XI.--CONCLUSIONS

Japan's total grain imports increased rapidly and steadily from 4.0 million metric tons in 1957 to 11.1 million tons in 1966. Policies of the

Japanese Government shaped this increase--especially those policies collectively termed the nation's "food strategy". Japanese food strategy during the next 15 years probably will be equally decisive in determining how much grain Japan will import in the long run.

Within broad limits, these policies effectively control the quantity and the mixture of resources employed in producing foods highly dependent upon grain as a raw material. Influence over labor, land, fixed capital, and other inputs influences usage of raw materials.

Historically, Japan heavily concentrated agricultural inputs upon the production of rice because it was the major source of food energy. In recent years, the country has emphasized rice partly because of Government protection and support. What happens in the future to rice inputs and output also will be much influenced by Government policy. Therefore, what happens to rice inputs will greatly affect what happens to imports of rice, and particularly wheat, whose consumer products compete with milled rice.

Japan's resources devoted to livestock raising and the resulting output livestock products (per person) are still far below comparable input and output levels in Western Europe and North America. For example, per capita grain usage for livestock feed is much lower in Japan than in the EEC as a whole or even in Italy (29, 42, 55, 86). Recent expansion in Japan's output of livestock products has not come from activating idle production capacity, but from creating new production capacity--new formula feed mills and new poultry farms, for example. As in the past, what happens to production capacity in Japan's future feed-livestock economy will be very much influenced by Government trade, investment, and price policy.

And, what happens to this production capacity will set the upper limit for feed grain imports. Because Japan started from such a low base in livestock output, it has extraordinary flexibility in determining how high this output is to be raised in the future and how much more livestock feed will be needed. Per capita output might be brought up to Western levels, but it need not be.

The average growth rate for the economy as a whole will not be the primary factor in setting a future level of grain usage or imports. Although rapid growth in Japan's gross national product may be a necessary condition for sharp advance in grain usage through 1985, it is certainly not a sufficient condition.

Even within an enviroment of industrial and commercial growth, only large new agricultural investments and much reallocation of farm resources can advance Japanese per capita grain usage to West European and North American levels. Lesser degrees of such agricultural change will leave Japan's grain usage substantially below that of other highly developed countries, even though Japan may overtake some of them in per capita income. Japan's future development path in food production and marketing, and its rate of climb along this path, will be the decisive factors in setting future levels of grain usage and imports.

Policies toward other foods which can and do compete with those based on grain will have a critical impact on grain usage. If production and marketing

f fruits, vegetables, fish, and beverages were promoted vigorously by Governent policy, there would be much less need to expand livestock output and grain mports rapidly.

From a food-strategic standpoint, rising consumer food purchasing power an be absorbed in Japan not only by more livestock products and cereals, but lso by more of other foods. In aggregate, the saturation level is still far way. Japanese total food consumption per person (measured either in energy or n weight) is considerably lower than that of Western Europe and North America.

In the future, per capita expenditure on food and beverages apparently will ontinue to rise so fast that, over time, consumers will be willing and able to uy additional per capita quantities of many foods. Moreover, if suppliers ere to market additional per capita quantities, they would probably find the urchasing power so strong that, over time, the additions could be quite large ithout driving prices down. Additional food-related services will also be in emand and can substitute for additional quantities to some extent.

Recently, food prices have been rising very fast, since new supplies have ot kept pace with added purchasing power spent on food. Large new food supplies, plus additional processing and marketing services, will be needed if ood prices are to be restrained. Future Government policy will be crucial, ince it is a key force in setting levels of supply and service.

If the strong aggregate consumer demand for food continues as expected, he Japanese Government's influence over food supplies will be a major influence upon per capita food consumption. Undoubtedly, there are limits beyond hich the Government would not want to go in encouraging a supply buildup in ruits, vegetables, fish, livestock products, and beverages out of concern for riving producer prices down excessively. However, through its influence on roduction, processing, marketing, and imports, the Government could choose to estrict supplies of certain foods to levels well below these limits.

Each of several future combinations of food types, quantities, and processing and marketing services could probably absorb future food purchasing ower without generating unmarketable surpluses or depressed supplier incomes. ince alternative future supply patterns also seem feasible, depending on how esources are allocated and imports admitted, Japan seems to have major foodtrategic options for the future.

A strategic option may be thought of as a set of alternative, mutually onsistent policies and quantity objectives. Different strategies could have ifferent effects upon grain flows. Although there may be many possible alterative sets, only three are illustrated here. These are termed the Western, acific, and Eastern food strategies.

Each strategy's aggregate consumption target is composed of individual argets for each major food group. These are consistent with assumed policies oward imports and the use of productive resources in Japan's food sector. Of articular interest are the Western and Eastern strategies, illustrating large nd small grain flows for the Japan of 1985. This report does not attempt to elect the most probable outcome for that year. The focus is on possibilities, ot probabilities.

Under a Western strategy, a reasonable daily total food consumption targe for 1985 would be 3,000 calories per person, compared with the 2,400 calories consumed in 1965. It heavily emphasizes Japanese production and consumption o livestock products.

To achieve targets of a Western strategy, total grain requirements in 198 would be about 60 million metric tons, compared with the 25½ million tons used in 1965. Estimated total grain import requirements would be 50 million tons, with almost 41 million tons of these imports used for livestock feed, compared with the 5½ million tons of grain imports so used in 1965.

Under a Pacific strategy, a reasonable 1985 daily consumption target woul be 2,900 calories per person. It too emphasizes expansion in livestock output but at a slower rate than under a Western strategy. Japanese investment in grain production in Southeast Asia would aim for a rising feed grain flow from that region. Wheat imports would be held under restriction and cut somewhat in volume, but the domestic rice economy and rice imports would be liberalized.

To achieve targets of a Pacific strategy, total grain requirements in 198 would be about 38 million tons. Estimated grain import needs would be about 24 million tons, with almost 17 million tons of these imports for livestock feed.

Under an Eastern strategy, protectionist compared with the others, a reasonable 1985 daily consumption target would be 2,800 calories per person. Individual food targets reflect the emphasis on producing food from domestic resources insofar as possible, minimizing the flow of imported food raw materials, although not decreasing it. Livestock production is targeted to expand, but at an even slower rate than under a Pacific strategy. The import of feed grains from Southeast Asia would also be stimulated deliberately, as under a Pacific strategy. Both domestic rice and imported wheat would remain under control.

To achieve targets of an Eastern strategy, total grain requirements in 1985 would be roughly 34 million tons. Total grain imports are estimated at 19 million tons, with about 12 million tons of these imports going to livestoc feed. Imported plus domestic grain fed to livestock would be slightly more than double 1965 usage.

Japan still has a capability to commit resources in such a way that its needs for grain in 1985 might range between widely different levels. As of th late 1960's, the nation has not yet committed, nor could it commit, most of th productive resources which will eventually be in operation in 1985. Particularly in the livestock sector, production capacity can rise at alternative rates.

Because of Japan's remaining flexibility in organizing its food sector, predictions of the most probable levels of grain usage in 1985 may have to awa later, more definite knowledge of actual resource commitments. Many strategi decisions about resources, trade, and investment are still pending. The outlines of Japan's 1985 food flow are still indeterminate. The future of food Japan is more open than in almost any other highly developed nation.

REFERENCES

Abstract of Statistics on Agriculture, Forestry and Fisheries, Japan, 1960. Japanese Government, Tokyo, 1961.

Abstract of Statistics on Agriculture, Forestry and Fisheries, Japan, 1966. Japanese Government, Tokyo, 1967.

Agricultural Commodities--Projections for 1975 and 1985, Volumes I and II. Food and Agriculture Organization of the United Nations, Rome, 1967.

Agricultural Data Book (1968) for the Far East and Oceania, ERS-Foreign 219, ERS, USDA, Washington, 1968.

Agricultural Policies in 1966, Europe, North America, Japan. OECD, Paris, 1967.

Agricultural Projections for 1975 and 1985, Europe, North America, Japan, Oceania. OECD, Paris, 1968.

Agricultural Statistics, 1966. USDA, Washington, 1966.

Annual Report on the Family Income and Expenditure Survey, 1965. Bureau of Statistics, Office of the Prime Minister, Japanese Government, 1966.

Annual Report on National Income Statistics, 1967. Economic Planning Agency, Japanese Government, 1967.

Barse, Joseph R. Policies and Market Patterns Affecting Japanese Grain Imports. Unpublished manuscript, 1967.

_____. Private interviews with Japanese nationals, 1967.

Basic Problems in Agriculture and Orientation of Government's Basic Action Programs in Japan. Report of the Investigation Commission on Basic Problems of Agriculture, Forestry and Fisheries, Japan, Tokyo, 1960.

Borgstrom, Georg. Japan's World Success in Fishing. Fishing News (Books) Ltd., London, 1964.

Bronfenbrenner, Martin. "Economic Miracles and Japan's Income-Doubling Plan", in Lockwood, William W. (ed.) The State and Economic Enterprise in Japan. Princeton, 1965.

Business Week, March 22, 1969.

16. "Canadian Conference Examines the Future of FPC", Fishing News International, February, 1968. Report on the Ottawa Conference on FPC, held October 24-25, 1967.

17. Changes in Farm Production and Efficiency, A Summary Report, 1968, Statistical Bulletin 233. ERS, USDA, Washington, 1968.

18. Chapman, W. M. "The Development of a Fish Protein Concentrate Industry in North America". Paper delivered at Ottawa FPC Conference, October, 1967. See Proceedings, reference (84).

19. Chapman, W. M. "The Fish Protein Concentrate Story: Fish Catch for FPC", Food Technology, Vol. 21, No. 7, July, 1967.

20. Cho, S. Y. Japanese Economic Planning, 1952-1962. Unpublished Ph.D thesis, Columbia University, 1965. Available in the Library of Congress.

21. Christensen, Raymond P. Taiwan's Agricultural Development: Its Relevance for Developing Countries Today, FAER-39. ERS, USDA, Washington, 1968.

22. Dewhurst, J. F., Coppock, J. O. and Yates, P. L. Europe's Needs and Resources. New York, 1961.

23. Direction of Trade, Annual 1958-62 and Annual 1962-66. International Monetary Fund and International Bank for Reconstruction and Development, Washington.

24. The Economic Relationships Between Grains and Rice, Commodity Bulletin 39. Food and Agriculture Organization, Rome, 1965.

25. Effective Use of the Sea, Report of the Panel on Oceanography. President' Science Advisory Committee, Washington, June, 1966.

26. Fisheries in the Food Economy, Basic Study 19. FAO, Rome, 1968.

27. Fisheries Statistics of Japan, 1966. Ministry of Agriculture, Forestry and Fisheries, Japanese Government, Tokyo.

28. Food Balance Sheet, 1965. Prepared by Ministry of Agriculture, Forestry and Fisheries, Japanese Government. Reproduced and translated into English as Mitsui's Grain Report No. 167, February 20, 1967.

29. Food Consumption Statistics, 1954-1966. OECD, Paris, 1968.

30. Foreign Agriculture, January 27, 1969. FAS, USDA, Washington.

31. Foreign Trade of Japan, 1968. Japan External Trade Organization, Tokyo, 1969.

32. Gale, Hazen F. The Farm Food Marketing Bill and its Components, Agricultural Economic Report 105. ERS, USDA, Washington, 1967.

33. Hewins, Ralph. "Kenkichi Nakabe, Japan's Trawler Tycoon", Fishing News International, March, 1968. London.

34. Hiemstra, Stephen J. Food Consumption, Prices, and Expenditures, Agricultural Economic Report 138. ERS, USDA, 1968.

35. Hollerman, Leon. Japan's Dependence on the World Economy: The Approach Toward Economic Liberalization. Princeton, 1967.

36. Huh, Kyung-Mo. Japan's Trade in Asia. New York, 1966.

37. "Import Regulations and Customs Duties on Agricultural Items (as of March 31, 1965)." Bureau of Customs, Ministry of Finance, Japanese Government.

38. Insull, William, Oiso, T., and Tsuchiya, K. "Diet and Nutritional Status of Japanese", The American Journal of Clinical Nutrition, July, 1968.

39. The International Customs Journal, No. 28 (12th edition), Japan. International Customs Tariff Bureau, Brussels, 1967.

40. International Financial Statistics, February, 1965. IMF, Washington.

41. Iyori, H. "Cartels in Japan", Oriental Economist, January, 1964.

42. Japan Statistical Yearbook, 1966. Bureau of Statistics, Office of the Prime Minister, Japanese Government.

43. Japan Statistical Yearbook, 1967. Bureau of Statistics, Office of the Prime Minister, Japanese Government.

44. Japan Trade Guide Annual, 1966. Tokyo, 1965.

45. "Japanese Agriculture--Groping for Path to Modernization", Oriental Economist, October, 1967.

46. Japanese Import Requirement: Projections of Agricultural Supply and Demand for 1965, 1970 and 1975. Department of Agricultural Economics, University of Tokyo, 1964.

47. "Japan's Fisheries Industry", the entire issue for November 1967 of Monthly Review, the Mitsui Bank, Ltd., Tokyo.

48. The Journal of Commerce, December 2, 1968.

49. Kamiya, K. "Nihon Nōgyō no Kanōsei" ("The Potential of Japanese Agriculture"), Nōgyō Sōgō Kenkyū, (The Quarterly Journal of the Agricultural Economy), Volume 19, No. 1, pp. 1-47, as summarized in 1964 Annual Report of The National Research Institute of Agriculture, Japanese Government, Tokyo.

50. Kaneda, H. Technical Change and Returns to Scale: An Econometric Study of Japanese Agricultural Development in the Postwar Years. Unpublished Ph.D. thesis. Stanford University, 1964. Available in the Library of Congress.

51. Land Reform in Japan. Agricultural Land Bureau, Ministry of Agriculture and Forestry, Japanese Government, Tokyo, 1966. In English.

52. Livestock Industry in Japan. Livestock Bureau, Ministry of Agriculture and Forestry, Japanese Government, Tokyo, 1966. In English.

53. Long-Range Outlook for Demand, Supply and Production of Agricultural Commodities in Japan. Study materials of Ministry of Agriculture, Forestry and Fisheries, Japanese Government, translation arranged by U.S. Embassy, Tokyo. Includes 1976 outlook.

54. Long-Term Economic Growth 1860-1965. Bureau of the Census, Department of Commerce, Washington, 1966.

55. Main Economic Indicators, November, 1967. OECD. For population data on countries other than Japan.

56. Mangum, Fred A. The Grain-Livestock Economy of Italy with Projections to 1970 and 1975. Institute of International Agriculture Research Report 2, Michigan State University, East Lansing, 1968.

57. Matsumoto, T. Staple Food Control in Japan. No. 7 in Agricultural Development Series of Agriculture, Forestry and Fisheries Productivity Conference, Tokyo, 1959.

58. Medium-Term Economic Plan, 1964-1968. Economic Planning Agency, Japanese Government, January, 1965.

59. Mitsui's Grain Report, No. 126, July 25, 1963

60. _____, No. 138, June 20, 1964.

61. _____, No. 151, July 20, 1965.

62. _____, No. 162, July 20, 1966.

63. Monthly Statistics of Japan. Bureau of Statistics, Office of the Prime Minister, Japanese Government. Various issues, for example, May, 1968.

64. National Accounts Statistics, 1956-1965. OECD, Paris, 1967.

65. News Release, U.S. Department of the Interior, October 22, 1968. "Department of the Interior Announces Award of Contract for Fish Protein Concentrate Plant".

66. Nihon Keizai Shimbun (Japan Economic Journal), International Weekly Edition, September 19, 1967.

67. _____, January 16, 1968.

68. _____, January 30, 1968. Economic Planning Agency data.

69. _____, January 30, 1968.

70. _____, February 13, 1968.

71. _____, February 20, 1968.

72. _____, May 21, 1968.

73. _____, July 9, 1968.

74. _____, November 12, 1968.

75. _____, November 26, 1968.

76. _____, December 24, 1968.

77. _____, December 31, 1968.

78. _____, January 14, 1969.

79. Nōrinshō tōkei hyō, Shōwa 32 (Statistical Yearbook of the Ministry of Agriculture and Forestry, 1957). Japanese Government, Tokyo, 1959.

80. Nōrinshō tōkei hyō, Shōwa 40-41. Japanese Government, Tokyo, 1966. For 1965, some 1966. In Japanese entirely.

81. Ogura, T. (ed.). Agricultural Development in Modern Japan. Tokyo, 1963.

82. Ohkawa, K. and Rosovsky, Henry, "The Role of Agriculture in Modern Japanese Economic Development". Reprinted in Eicher, Carl and Witt, Lawrence (eds.). Agriculture in Economic Development. New York, 1964.

83. The Present Status and Problems of Japan's Agriculture and Forestry (Japan's Agriculture and Forestry White Paper). Ministry of Agriculture and Forestry, Japanese Government, Tokyo, 1957. Mimeographed English language edition translated by the Office of the U.S. Agricultural Attache, Tokyo.

84. Proceedings, Conference on Fish Protein Concentrate, Ottawa, Canada, October 24 and 25, 1967, Canadian Fisheries Reports No. 10, July 1968. Department of Fisheries of Canada.

85. Production Yearbook, 1964. Food and Agriculture Organization, Rome, 1965.

86. Regier, Donald W. Growth in Demand for Feed Grains in the EEC, ERS-Foreign 158. ERS, USDA, Washington, 1967.

87. Shima, Y. "The Income-Doubling Program and Public Investment", The Kyoto University Economic Review, April, 1961.

88. Snyder, Donald G. "The Fish Protein Concentrate Story: Bureau of Commercial Fisheries Program", Food Technology, Vol. 21, No. 9, September, 1967.

89. Spurlock, Hughes, The Competitive Position of U.S. Farm Products in the Japanese Market, FAER-32. ERS, USDA, Washington, 1966.

90. The State of World Fisheries. FAO, Rome, 1968.

91. Statistics on Livestock and Feed. Japan Feed Manufacturers Association, May, 1967.

92. Stevens, Robert D. Elasticity of Food Consumption Associated with Changes in Income in Developing Countries, FAER-23. ERS, USDA, 1965.

93. Stillings, Bruce R. "Nutritional Evaluation of Fish Protein Concentrate Activities Report (Bureau of Commercial Fisheries), Spring, 1967.

94. A Study of the Formula Feed Industry of Japan. A private research report, prepared for the U.S. Feed Grains Council, 1967.

95. A Study of the Market Structure for Pork and Pork Product in Japan. A private study, prepared for the U.S. Feed Grains Council, 1968.

96. A Study of the Market Structure for Poultry Meat in Japan. A private research report, prepared for the U.S. Feed Grains Council, 1966.

97. Takasuga, Y. "The Efflux of Labor from Japanese Agriculture and the Rise in Prices", Rural Economic Problems, December, 1966.

98. Third World Food Survey, Basic Study 11. FAO, Rome, 1963.

99. Time's Directory of Japan's Leading Corporations, 1967. Time International, Tokyo.

100. Trade of Japan, Imports, Commodity by Country. Data from Bureau of Customs, Ministry of Finance, Japanese Government, various years. Yearbooks issued annually by the Ministry or the Japan Tariff Associatio

101. United Nations Yearbook of National Accounts Statistics, 1966.

102. U.S. Agricultural Attache (Bangkok), Report AGR-135, January 30, 1968.

103. U.S. Agricultural Attache (Tokyo), Report AGR-147, December 13, 1962.

104. _____, Report AGR-350, June 25, 1964.

105. _____, Report AGR-123, March 15, 1966.

06. _____, Report AGR-151, May 26, 1966.

07. _____, Report AGR-84, February 20, 1967.

08. _____, Report AGR-89, February 24, 1967.

09. _____, Report AGR-9, July 18, 1967. Based on Ministry of Agriculture's 1966 sample survey of Japanese household eating habits.

10. _____, Report AGR-81, November 16, 1967.

11. Work Requirement Data for Farm Management Purposes. Publication 72 of Documentation in Agriculture and Food Series. OECD, Paris, 1965.

12. World Crop Statistics, 1948-64. FAO, Rome, 1966.

13. The World Food Problem, Vol. II, Report of the Panel on the World Food Supply. President's Science Advisory Committee, Washington, 1967.

14. The World Rice Economy, Vol. I, No. 36, of Commodity Bulletin Series. FAO, Rome, 1962.

15. Yamada, S. "Changes in Output and in Conventional and Nonconventional Inputs in Japanese Agriculture Since 1880", Food Research Institute Studies, Vol. VII, No. 3, 1967.

APPENDIX I

Estimating Japan's Food Energy-Expenditure Flow and Import-Dependency

The calculations for tables 4 and 5 have two principal objectives: (1) t estimate the annual per capita consumer expenditure on each of the major food groups, thereby matching the food-by-food expenditure flow with the corresponding food-by-food flow of energy consumed, and (2) to estimate how much of the energy consumed per capita was of domestic origin and how much import-dependent, by food group. Each objective is accomplished by a different procedure; the first is shown in table 13 and the second in table 14. These tables show computations for 1965 only. The results are posted to table 5. Calculating procedures with 1957 data are the same.

In table 13, all data in columns 1 and 2 are taken from Japan's food balance for the Japanese fiscal year 1965 (2, 28, 29). The calorie-gram equiv lence is found in this balance. The estimated costs in column 3 are taken or calculated from Japan's household budget sample survey (8) (nationwide since 1963, urban previously) for the individual foods. Initially, these costs are entered only for individual foods, not on the lines labeled "TOTAL", except for sugar and fats/oils.

This survey shows quantity of a food purchased by the average household in a year, expenditure on this amount, and unit value or average price. Table 13 uses this survey only as a source for price/cost data, not for consumption or expenditure data as such. More than 150 consumer foods are covered by the 1965 household data. This is a sample survey of behavior of households, not simply of commodities purchased for consumption at home. While there is not perfect coverage of restaurant meals, neither are they excluded entirely. Son foods are not as well covered by the sample as others (chocolate, for example, lacks quantity and price data to accompany the expenditure data), but on the whole it is a remarkable body of information, improved since the late 1950's. As a result, it should be recognized that 1957 cost estimates for the "column concept" are not as reliable as those for 1965.

In column 3, a national weighted average price or cost is shown for each food and food group. These costs are calculated from the budget survey's report of consumer expenditure per unit on the 150-plus food commodities. For example, the cost of wheat products in column 3 is calculated from average uni expenditures for flour, bread, noodles, crackers, cake, and other wheat products, including monosodium glutamate. Weights used in averaging are kilogra consumed for the year. There are some conceptual problems, of course, since cake may contain sugar, milk, and eggs as well as wheat flour. (Rice cakes a excepted.) This conceptual problem of how to handle combinations of ingredie from different food groups is a basic limiting consideration which applies to expenditure estimates for other food groups, also. Thus, cost and expenditur

Table 13.--Estimating the food energy-expenditure flow by food group, 1965

Consumer food or food group	Food consumption per capita per day		Estimated cost per gram	Expenditure per capita per day	Expenditure per capita per year	Expenditure distribution "A"	Expenditure distribution "B"	Expenditure per capita per year	Food consumption per capita per year	Cost per thousand calories
	Calories	Grams	1965 "current" yen			Percent		1960 yen	Calories	1960 yen
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Rice, all	1,023.8	302.6	0.11699	35.401	12,921.4					
Wheat products	262.0	79.4	.16891	13.411	4,895.0					
Barley products	33.3	9.9	.06261	.620	226.3					
Other grain products	6.4	2.1	.06261	.131	47.8					
TOTAL, CEREALS	1,325.5	394.0	.12579	49.563	18,090.5	30.8249	27.2438	12,966	483,807.5	26.80
Sweet potato	26.5	22.1	.06010	1.328	484.7					
White potato	32.9	42.7	.04500	1.922	701.5					
Starch	72.6	21.6	.13000	2.808	1,024.9					
TOTAL, POTATOES	132.0	86.4	.07012	6.058	2,211.1	3.7676	3.3299	1,585	48,180.0	32.90
Soybean products	55.3	14.1	.11378	1.604	585.5					
Other pulses	43.9	11.9	.24677	2.937	1,072.0					
Miso	33.2	21.0	.10870	2.283	833.3					
Shoyu	12.9	36.1	.07480	2.700	985.5					
TOTAL, PULSES	145.3	83.1	.11461	9.524	3,476.3	5.9234	5.2353	2,492	53,034.5	46.99
Minor meats	3.1	2.1	.30000	.630	229.9					
Beef	6.1	4.2	.74090	3.112	1,135.9					
Pork	24.0	8.6	.63230	5.438	1,984.9					
Chicken	6.1	4.5	.58660	2.640	963.6					
Eggs	37.8	24.2	.20930	5.065	1,848.7					
Milk and products	59.2	100.0	.08135	8.135	2,969.3					
TOTAL, LIVESTOCK	136.3	143.6	.17423	25.020	9,132.3	15.5608	13.7530	6,546	49,749.5	131.58
Whale	17.0	5.7	.23680	1.350	492.8					
Fish	82.1	76.0	.26442	20.096	7,335.0					
TOTAL, FISH & WHALE	99.1	81.7	.26250	21.446	7,827.8	13.3380	11.7885	5,611	36,171.5	155.12
TOTAL, SUGAR	193.5	50.6	.19516	9.875	3,604.4	6.1416	5.4281	2,583	70,627.5	36.57
TOTAL, FATS & OILS	167.6	18.9	.23219	4.388	1,601.6	2.7290	2.4120	1,148	61,174.0	18.77
Vegetables	113.4	290.7	.08708	25.314	9,239.6					
Fruits	40.4	89.7	.10704	9.601	3,504.4					
TOTAL, FRUITS AND VEGETABLES	153.8	380.4	.09178	34.915	12,744.0	21.7148	19.1921	9,134	56,137.0	162.71
TOTAL, ALL FOOD	2,353.1	1,238.7	.12980	160.789	58,688.0	100.0	(88.3826)			
TOTAL, BEVERAGES	71.1	114.6			7,610.0		11.6174	5,529	25,951.5	213.05
TOTAL, ALL FOOD AND BEVERAGES	2,424.2	1,353.3			66,298.0		100.0	47,594	884,833.0	53.79

estimates are subject to a margin of error on this ground, but in every case the major commodity component of a consumer food is used as the basis for classification. For example, canned tuna packed in soy oil is used only in the calculation of the weighted average price of fish, not of vegetable oils. Of course, unit values for many other kinds of fish are used also in calculating this average price. There are very few foods listed in the household budget survey for which the major commodity component is in doubt.

To continue the example for wheat products, the column 2 value is multiplied by the column 3 value to yield the column 4 value. This latter value is then multiplied by 365 days (for wheat products or any other individual food, not totals) to yield the column 5 value, expenditure per year. Column 5 values are then totaled for each major food group, for example, TOTAL, CEREALS. Subsequently, column 3 and 4 values on this TOTAL, CEREALS line are derived by division.

The totals from each food grouping are added to derive TOTAL, ALL FOOD, an expenditure distribution "A" is calculated (column 6). The TOTAL, BEVERAGES amount in column 5 is known from Japanese Government data, while the totals for other food groups have had to be estimated. The national annual expenditure on beverages is known from (9, pp. 214-215), reduced to a per capita basis using a 1965 population of 98,275,000 (42).

The total expenditure (1965 "current" yen) on all foods and beverages is already known from (9, pp. 214-215). Reduced to a per capita basis, it is ¥65,505 (1965 yen). The total of column 5 is a calculating total, a close approximation, taken to be close enough to ¥65,505 for estimating purposes. Thus, the estimated expenditure distribution "A" (column 6) of the ¥58,688 ALL FOOD total in column 5 is just that--an estimate only.

Since the percentage share of beverages in per capita total food and beverage expenditure is already known from (9, pp. 214-215), that is, 11.6174 percent, this percentage is entered in column 7. Since the percentage of all food and beverage expenditure going to food only is known to be 100 minus 11.6174, that is, 88.3826, the expenditure distribution "A" is applied to 88.3826 to obtain distribution "B" of column 7.

The problem is now to convert the "current yen" distribution of expenditures implied by column 7 (but not stated--the yen distribution by food group would apply to the actual 1965 per capita total of ¥65,505) to a "constant yen" distribution so that comparisons in "real" terms can be made over time. 1965 food expenditures stated in 1960 yen simply make a general adjustment for the smaller food purchasing power of the 1965 yen. See implicit deflators in (9, pp. 54-55).

The Economic Planning Agency in (9, pp. 50-51), has already stated Japan's gross national expenditure for each year from 1951-65 in constant yen of 1960. Among the breakdowns for each year is expenditure on food, beverages, and tobacco (1960 yen). Implicit deflators apply to the food, beverage, and tobacco series. Fortunately for the calculation, tobacco prices, strictly controlled, did not change at all between 1957-65 (8, 63). The price index remained at 10

Thus, constant tobacco prices are current prices (and vice versa) and can easily be "removed" from the food, beverage, and tobacco constant yen series, since current yen tobacco expenditure is known from (9, pp. 214-215).

Following this procedure, total constant yen (1960) expenditure in 1965 on food and beverages is estimated at 4,677.3 billion yen (almost 4.7 trillion yen), which, when reduced to a per capita basis at 98,275,000 population, is ¥47,594. This is the total entered for column 8.

Expenditure distribution "B" is applied to this ¥47,594 per capita total to obtain the other values in column 8, the expenditures by food group in constant yen of 1960. Group totals of column 1 are then multiplied by 365 to obtain the values in column 9, annual per capita calorie consumption by food group. Column 10 values are then obtained by dividing column 8 values by those of column 9.

Some of the differences between the cost of energy concept and retail food prices should now be apparent. The cost of energy concept is one of national accounting, akin to a weighted average price of all food in the nation. Such a weighted average could be derived for Japan. The figure at the bottom of column 3 would qualify as such an average, except that beverages are left out.

But this total of 0.12980 yen per gram of food, or 129.80 yen per kilogram is meaningful only as a national accounting concept. Theoretically, actual retail prices of individual commodities in individual localities are all components of this national average price for a "representative" kilogram of food. However, since this national accounting "average price" for food includes implied prices for on-farm consumption and is weighted differently from a food price index in the cities, changes in this average price over time will not directly parallel changes in the index. Furthermore, commodity weights in a price index are often held constant over many years, while weights for this national accounting average price change each year as the physical food mixture changes.

However, when the national accounting price is changed from a metric weight basis to an energy basis (as shown in table 13) the relationship to conventional food price indices becomes weaker. For many foods, energy content is not well correlated with food weight in metric units. The price (or cost) of an energy unit should simply be regarded as a different concept of pricing, neither better nor worse than the conventional manner of pricing by metric weight unit.

The concept of "1960 yen" used here means a currency of constant food purchasing power. Food and beverage expenditures and unit costs in 1960 yen mean "real" expenditures and costs, deflated from current values by the national accounting deflator or index of food prices. This was 100 in 1960, 135.4 in 1965 (9, pp. 54-55). It was 97.9 in 1957.

When an increase in the real price of one food (in constant yen per gram) is observed over time, it means that the current price rose faster than the all-food deflator index by which the real price was calculated. Conversely, a decrease in the real price of one food means that the current price did not

rise quite as fast as the all-food deflator index, although the current price need not have declined. Increases or decreases in the real cost-of-energy for a food (in constant yen per thousand calories, as used in this paper) are not as closely related to the all-food index as changes in real price per metric weight unit, as already noted.

In general, though, the calculated 1957-65 changes in real unit costs of energy for a food group correspond very well to the direction of change in real price per metric weight unit suggested by published price indices (not the deflator) for the same food group covering the same years.

Calculations of energy origin and import dependency on table 14 are general estimates. The coefficients of column 1, table 14 (shown as percentages) are applied against matching total daily per capita calorie consumption by food group to obtain values in columns 2 and 3, which simply divide the per capita consumption figures into "from direct imports" and "from domestic production," on an energy basis.

However, the "energy consumed from domestic production" of column 3 includes much produced or processed from the great quantities of agricultural raw materials imported in bulk. Some adjustment must be made to reflect the contribution to consumption of these bulk imports of wheat, feed grains, oilseeds, and raw sugar. The adjustment factor is shown in column 4. When this factor (as a coefficient) is multiplied by column 3, column 5 values result. Column 5 totals are added to those of column 2 to yield the new "import-dependent" totals of column 6. The column 6 figures are then subtracted from food group per capita consumption (calorie) totals shown in (2, 28, 29) to arrive at column 7 figures. Column 6 figures as a percentage of total per capita consumption by food group are the import-dependency rates of column 8.

The column 4 adjustment factors are very influential in the calculation. For wheat, the factor 0.76 is the estimated proportion of total food wheat supply imported in 1965; the same concept holds for food barley, and food soybeans. For the livestock products, the coefficient 0.68 is selected because about 68 percent of all total digestible nutrients (TDN) fed to animals was imported in 1965. It is arbitrarily assumed that beef animals were fed domestic barley for their grain ration. Small amounts of refined sugar and refined or crude vegetable oils were imported directly in 1965. These are reflected by the factors in column 1. The factors for sugar and fats and oils in column 4 are estimates of the proportion of the total raw sugar supply and the oilseed supply which was imported in 1965. The factors for sake and beer are estimates of the proportions of rice-for-sake and barley-for-beer which were imported in 1965.

Corresponding appendix tables for 1957, to support table 4 data, are available from the author. Sources for analogous columns 1 and 2 are (29) and (79). For data in the analogous column 3, see (79), supplemented by the 1959 household budget survey. (Food prices were very stable during 1957-59.) Current yen and constant yen expenditures on food and beverages for 1957 are derived from (9), as for 1965, using a 1957 population of 90,924,000 (41) to calculate per capita expenditure.

Table 14.--Estimating energy origin and import-dependency rates, 1965

Consumer food or food group	Proportion of total supplies (by weight) imported as processed product	Energy imported as processed products, per capita per day	Energy processed domestically, per capita per day	Proportion of domestically-processed energy dependent on imports	Import dependent energy processed domestically, per capita per day	Total, import-dependent energy, per capita per day	Total, domestic-origin energy, per capita per day	Import-dependency rate
	Percent	Calories	Calories	Percent	Calories	Calories	Calories	Percent
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rice, domestic	0	0	944.6	0	0			
Rice, imported	100	79.2	0	0	0			
Wheat products	0	0	262.0	76	199.1			
Barley products	0	0	33.3	16	5.3			
Other grain products	0	0	6.4	0	0			
TOTAL, CEREALS		79.2	1,246.3		204.4	283.6	1,041.9	21.4
Sweet potato	0	0	26.5	0	0			
White potato	0	0	32.9	0	0			
Starch	0	0	72.6	0	0			
TOTAL, POTATOES		0	132.0		0	0	132.0	0
Soybean products	0	0	55.3	54	29.9			
Other pulses	24	10.5	33.4	0	0			
Miso	0	0	33.2	0	0			
Shoyu	0	0	12.9	0	0			
TOTAL, PULSES		10.5	134.8		29.9	40.4	104.9	27.8
Minor meats	77	2.4	.7	0	0			
Beef	5	.3	5.8	0	0			
Pork	0	0	24.0	68	16.3			
Chicken	4	.2	5.9	68	4.0			
Eggs	0	0	37.8	68	25.7			
Milk and products	15	8.9	50.3	68	34.2			
TOTAL, LIVESTOCK		11.8	124.5		80.2	92.0	44.3	67.5
Whale	0	0	17.0	0	0			
Fish	0	0	82.1	0	0			
TOTAL, FISH AND WHALE		0	99.1		0	0	99.1	0
TOTAL, SUGAR	2	3.4	190.1	82	156.5	159.9	33.6	82 6
TOTAL, FATS AND OILS	19	31.8	135.8	76	103.2	135.0	32.6	80.5
Vegetables	0	0	113.4	0	0			
Fruits	8	3.2	37.2	0	0			
TOTAL, FRUITS AND VEGETABLES		3.2	150.6		0	3.2	150.6	2.1
Sake	0	0	34.3	8	2.7			
Beer	0	0	20.6	27	5.6			
Other beverages	0	0	16.2	0	0			
TOTAL, BEVERAGES		0	71.1		8.3	8.3	62.8	11.7
TOTAL, FOOD AND BEVERAGES		139.9	2,284.3		582.5	722.4	1,701.8	29.8

APPENDIX II

Estimating Grain Import Requirements Under the Three Alternative Food Strategies

This appendix calculates the quantity of raw grain needed to reach preselected, targeted consumption levels of retail cereals products and retail livestock products. Such calculation rests on certain assumptions about the technology of converting raw grain into available human food energy in both the food grain and livestock sectors. The calculations in this appendix are based on the 1965 Japanese conversion technology for the food grain sector, but on the 1965 American or European conversion technology for the livestock sector, except as otherwise noted in footnotes to the tables.

While alternative food strategies can and may give rise to changed or alternative grain conversion rates, especially for a product in the livestock sector, the main differences in grain requirements for the strategies stem from the distinctive allocations of productive resources. The focus is upon the differing impact on grain needs of alternative strategies for the future development of Japan's food sector. Tables 15-20 show the procedures by which targeted grain requirements are estimated.

Table 15.--Possible targets 1/ for Japan's cereals consumption in 1985 under the Western food strategy and implied quantities of grains-for-food

Item	Unit	Domestic origin					Import-dependent				Total, all grain
		Rice	Wheat	Barley	Other	Total, domestic	Wheat	Rice 2/ (brown)	Rice 3/ (milled)	Total, imported	
1. Energy consumed from processed cereals, per capita per year ...	Thou. cal.	163	11	5	1	180	152	3	15	170	350
DIVIDED BY:											
2. Energy per kilogram 4/.	Cal.	3,510	3,550	3,370	3,580	--	3,550	3,510	3,550	--	--
EQUALS:											
3. Cereals weight consumed, per capita per year ...	Kg.	46.439	3.099	1.484	.279	51.301	42.817	.855	4.225	47.897	99.198
MULTIPLIED BY:											
4. Conversion factor: Food cereals to original grain 4/	--	1.1	1.3	1.7	1.4	--	1.3	1.1	1.0	--	--
EQUALS:											
5. Weight of grain-for-food before processing, per capita per year ...	Kg.	51.083	4.029	2.523	.391	58.026	55.662	.941	4.225	60.828	118.854
MULTIPLIED BY:	Million persons	120	120	120	120	120	120	120	120	120	120
6. Assumed population 5/..											
EQUALS:											
7. Assumed total grain for cereals processing	Metric tons	6,129,960	483,480	302,760	46,920	6,963,120	6,679,440	112,920	507,000	7,299,360	14,262,480

1/ Given the Western food strategy (see text), and given the goal of achieving cereals product consumption in 1985 of 350,000 calories per capita, of which 180,000 calories would be of domestic origin and 170,000 calories import-dependent, this table suggests one configuration through which the strategic goals could be met.

2/ Imported as brown rice, processed in Japan and consumed as milled rice.

3/ Imported as milled rice.

4/ Values from Japanese Government's Ministry of Agriculture and Forestry Food Balance, 1965. On line 4, "original grain" means brown basis for domestic rice and either brown or milled basis for imported rice.

5/ The Japanese Government's Economic Planning Agency's mid-1968 projection estimates the 1985 population at 120 million.

Table 16.--Possible targets[1/] for Japan's cereals consumption in 1985 under the Pacific food strategy and implied quantities of grain-for-food

Item	Unit	Domestic origin				Import-dependent					Total, all grain
		Rice	Wheat	Barley	Total, domestic [2/]	Wheat	Rice [3/] (brown)	Rice [4/] (milled)	Barley	Total, imported	
1. Energy consumed from processed cereals, per capita per year ...	Thou. cal.	251	20	8	280	70	6	72	2	150	430
DIVIDED BY:											
2. Energy per kilogram [5/].	Cal.	3,510	3,550	3,370	--	3,550	3,510	3,550	3,370	--	--
EQUALS:											
3. Cereals weight consumed, per capita per year ...	Kg.	71.510	5.634	2.374	79.797	19.718	1.709	20.282	.593	42.302	122.099
MULTIPLIED BY:											
4. Conversion factor: Food cereals to original grain [5/]	--	1.1	1.3	1.7	--	1.3	1.1	1.0	1.7	--	--
EQUALS:											
5. Weight of grain-for-food before processing, per capita per year ...	Kg.	78.661	7.324	4.036	90.412	25.633	1.880	20.282	1.008	48.803	139.215
MULTIPLIED BY:	Million										
6. Assumed population [6/]..	persons	120	120	120	120	120	120	120	120	120	120
EQUALS:											
7. Assumed total grain for cereals processing	Metric tons	9,439,320	878,880	484,320	10,849,440	3,075,960	225,600	2,433,840	120,960	5,856,360	16,705,800

1/ Given the Pacific food strategy (see text) and given the goal of achieving grain product consumption in 1985 of 430,000 calories per capita per year, of which 280,000 calories would be domestic origin and 150,000 calories import-dependent, this table suggests one configuration through which the strategic goals could be met.

2/ Includes consumption of products of "other" grain also, at 1,000 calories per capita per year. The implied column for "other" would duplicate the "other" column on table 15.

3/ Imported as brown rice, processed in Japan and consumed as milled rice.

4/ Imported as milled rice.

5/ Values from Japanese Government's Ministry of Agriculture and Forestry Food Balance, 1965. On line 4, "original grain" means brown basis for domestic rice and either brown or milled basis for imported rice.

6/ The Japanese Government's Economic Planning Agency's mid-1968 projection estimates the 1985 population at 120 million.

Table 17.--Possible targets[1/] for Japan's cereals consumption in 1985 under the Eastern food strategy and implied quantities of grain-for-food

Item	Unit	Domestic origin					Import-dependent				Total, all grain
		Rice	Wheat	Barley	Other	Total, domestic	Wheat	Rice 2/ (brown)	Rice 3/ (milled)	Total, imported	
1. Energy consumed from processed cereals, per capita per year ...	Thou. cal.	289	15	5	1	310	98	2	20	120	430
DIVIDED BY:											
2. Energy per kilogram 4/.	Cal.	3,510	3,550	3,370	3,580	--	3,550	3,510	3,550	--	--
EQUALS:											
3. Cereals weight consumed, per capita per year ...	Kg.	82.336	4.225	1.484	.279	88.324	27.606	.570	5.634	33.810	122.134
MULTIPLIED BY:											
4. Conversion factor: Food cereals to original grain 4/	--	1.1	1.3	1.7	1.4	--	1.3	1.1	1.0	--	--
EQUALS:											
5. Weight of grain-for-food before processing, per capita per year ...	Kg.	90.570	5.493	2.523	.391	98.977	35.888	.627	5.634	42.149	141.126
MULTIPLIED BY:	Million persons	120	120	120	120	120	120	120	120	120	120
EQUALS:											
7. Assumed total grain for cereals processing	Metric tons	10,868,400	659,160	302,760	46,920	11,877,240	4,306,560	75,240	676,080	5,057,880	16,935,120

1/ Given the Eastern food strategy (see text), and given the goal of achieving cereals product consumption in 1985 of 430,000 calories per capita per year, of which 310,000 calories would be domestic origin and 120,000 calories import-dependent, this table suggests one configuration through which the strategic goals could be met.

2/ Imported as brown rice, processed in Japan and consumed as milled rice.

3/ Imported as milled rice.

4/ Values from Japanese Government's Ministry of Agriculture and Forestry Food Balance, 1965. On line 4, "original grain" means brown basis for domestic rice and either brown or milled basis for imported rice.

5/ The Japanese Government's Economic Planning Agency's mid-1968 projection estimates the 1985 population at 120 million.

Table 18.--Possible targets[1/] for Japan's livestock economy in 1985 under the Western food strategy and implied quantities of grains-for-food

	Item	Unit	Product sectors of the livestock economy: Pork	Chicken	Eggs	Beef, from beef herds	Beef/veal, dairy herds	Dairy products	Horse and mutton	Total, all sectors
	Energy consumed from Japanese production, per capita per year:									
1.	Domestic origin 2/	Th. cal.	0	0	0	2	5	11	*	18
2.	Import-dependent 2/	Th. cal.	138	27	34	2	0	44	0	245
3.	Total	Th. cal.	138	27	34	4	5	55	*	3/ 263
	DIVIDED BY:									
4.	Energy per kilogram 4/	Cal.	3,250	1,300	1,560	2,500	1,900	660	1,400	--
	EQUALS:									
5.	Food weight consumed (or produced), per capita per year 5/	Kg.	42.4	21.0	22.0	1.5	6/ 2.5	83.0	.1	172.5
	MULTIPLIED BY:			43.0						
6.	Feed units needed per food unit (all feed, in corn units) 7/	Kg.	8/ 6.0	8/ 4.8		8/ 16.5	--	8/ 1.4	9/ 30.0	--
	EQUALS:									
7.	Total feed fed (roughage plus concentrates), per capita per year 7/	Kg.	254.40	206.40		24.75	--	116.20	3.0	10/ 604.75
	MULTIPLIED BY:									
8.	Concentrates fed coefficient 11/	--	.92	.98		.23	--	.35	.15	--
	EQUALS:									
9.	Total concentrates fed, per capita per year 7/	Kg.	234.048	202.272		5.693	--	40.670	.450	483.133
	MULTIPLIED BY:									
10.	Grains fed coefficient 11/	--	.80	.63		.78	--	.72	.75	--
	EQUALS:									
11.	Total grains fed, per capita per year 7/	Kg.	187.238	127.431		4.441	--	29.282	.337	348.729
	MULTIPLIED BY:	Million								
12.	Assumed population 12/	persons	120	120		120	--	120	120	120
	EQUALS:									
13.	Assumed total grains fed 7/	Met.tons	22,468,560	15,291,720		532,920	--	3,513,840	40,440	41,847,480
	LESS:									
14.	Assumed domestic production of grains-for-feed 13/	Met.tons	0	0		266,520	--	702,720	40,440	1,009,680
	EQUALS:									
15.	Implied imports of grains-for-feed 14/	Met.tons	22,468,560	15,291,720		266,400	--	2,811,120	0	40,837,800
16.	Implied production of food product 15/	Met.tons	5,088,000	2,520,000	2,640,000	480,000		9,960,000	12,000	--

See footnotes on following page.

Table 18, foonotes:

1/ Given the Western strategy, and given the goal of achieving livestock product consumption of 292,000 calories per capita per year, this table suggests one possible configuration through which these consumption goals could be met. Per capita production targets are also stated, linked to the consumption targets by the energy-to-weight conversion shown on line 4 of this table. The calculations leading to grain import estimates are based on assumptions about converting animal feed into livestock products for human food. These assumptions are explained below.

2/ Calculated last, using figures from lines 13, 14, and 15. Also see footnote 13/.

3/ The 263,000 calories per capita per year from Japanese production plus an allowance of 29,000 calories per capita per year from imports of carcasses, eggs and dairy products equal the 292,000 calories of livestock products for the Western option. The 245,000 calories of Japanese-produced energy which are import-dependent are added to the 29,000 calories of direct imports to reach the figure of 274,000 calories import-dependent shown on table 8 of the text.

4/ Estimated, based on commonly-found values in food composition tables of various countries. Feed conversion technology affects these values. Thus, the caloric value of a kilogram of pork used in this table is about equal to that reported by Denmark, the Netherlands, and the United Kingdom, which are more sparing in their use of feed in pork production than the United States. The caloric value of a kilogram of U.S. pork, on the average, is higher than that of these Northern European countries. See Food Consumption Statistics, 1964-1966, OECD.

5/ Dressed carcass weight for meats, shell included for eggs, fluid milk equivalent for dairy products.

6/ Dairy beef/veal production at 3 percent of milk production, both by weight. Based on U.S. 1965 experience. Feed covered by dairy column.

7/ Feed item in corn units, equal in feeding value to one kilogram (or metric ton) of corn.

8/ For chicken eggs and dairy products, feed units shown are the same as those calculated for the United States in 1965 from the following sources: "Supplement for 1967 to 'Livestock-Feed Relationships, 1909-63'", Statistical Bulletin 337 (Supp.), ERS, USDA, Nov. 1967--for feed usage in corn units. Agricultural Statistics, 1966, USDA--for livestock product production. For pork and beef, feed units shown are lower than those calculated for the United States in 1965 (from the same sources) to reflect a slightly different 1985 feed conversion technology for Japan, assumed to be somewhat more sparing in its use of feed than the U.S. technology of 1965. In 1965, the United States used an estimated 9.9 tons of all feed (corn units) to produce a ton of pork, and an estimated 17.3 tons of all feed (corn units) to produce a ton of beef. Lower values are used in this table to more closely approximate Northern European experience of the early 1960's as reported in Agricultural Projections for 1975 and 1985, OECD, pp. 116-117. Although data for Japan's feed usage in the early 1960's are available, they are not used in this table because Japanese animal agriculture was not as highly developed as Northern Europe's or the United States' at that time, and because Japanese data are not stated on a comparable basis in the OECD source.

9/ Estimated.

10/ On the assumption that massive amounts of roughage would not be imported nor supplied from nonconventional sources, the amount of available roughage in Japan may serve as a rather severe constraint upon the expansion of beef and dairy production. Extrapolating from the Japanese Ministry of Agriculture and Forestry's projection of 11.7 million metric tons roughage (T.D.N. basis) for 1976, a figure of 16.5 million tons roughage (T.D.N. basis) for 1985 would be possible. Such T.D.N. tonnage might translate, very approximately, into 15 million metric tons roughage (corn unit basis). Consequently, this table assumes a roughage limit of about 15 million tons(corn units). For calculating purposes, the roughage amounts used in this table are 121.7 kilograms per capita per year, distributed among dairy herds, 75.5 kgs.; beef herds, 19.1 kgs.; hogs, 20.4 kgs.; poultry 4.1 kgs.; and horses and sheep 2.6 kgs. The per capita 121.7 kilograms roughage (corn units), multiplied by the assumed population of 120 million is 14.6 million metric tons.

11/ Based on coefficients estimated for U.S. feed usage in 1965. Calculated from sources listed above in footnote 8/.

12/ The Japanese Government's Economic Planning Agency, in its projection issued in 1968, estimates the 1985 population at 120 million.

13/ Domestic production of grains-for-feed is assumed to be about 1 million metric tons per year, composed of wheat, barley, and corn. The grain is assigned to the beef and dairy sectors. Accordingly, domestic-origin consumer energy from dairy products is estimated at 0.2 of all dairy product energy per capita, with a coefficient of 0.5 for beef-herd beef. Cow beef and veal from dairy herds is assumed as a byproduct, and thus of domestic origin.

14/ Actual tonnages would be higher than the corn units shown if grains of feeding values lower than corn accounted for much of the tonnage.

15/ Line 5 multiplied by line 12. Dressed carcass weight for meats, shell included for eggs, fluid milk equivalent for dairy products.

* Less than 500 calories.

Table 19.--Possible targets [1/] for Japan's livestock economy in 1985 under the Pacific food strategy and implied quantities of grains-for-feed

Item	Unit	Product sectors of the livestock economy							
		Pork	Chicken	Eggs	Beef from beef herds	Beef/veal, dairy herds	Dairy products	Horse and mutton	Total, all sectors
Energy consumed from Japanese production, per capita per year									
1. Domestic origin 2/	Th. cal.	0	0	0	2	6	17	*	25
2. Import-dependent 2/	Th. cal.	39	14	20	1	0	50	0	124
3. Total	Th. cal.	39	14	20	3	6	67	*	3/ 149
DIVIDED BY:									
4. Energy per kilogram 4/	Cal.	3,250	1,300	1,560	2,500	1,900	660	1,400	--
EQUALS:									
5. Food weight consumed (or produced), per capita per year 5/	Kg.	12.0	11.0	12.6	1.2	6/ 3.0	101.6	.1	141.5
MULTIPLIED BY:			23.6						
6. Feed units needed per food unit (all feed, in corn units) 7/	Kg.	8/ 6.0	8/ 4.8		8/ 16.5	--	8/ 1.4	9/ 30.0	--
EQUALS:									
7. Total feed fed (roughage plus concentrates), per capita per year 7/	Kg.	72.00	113.28		19.80	--	142.24	3.00	10/ 350.32
MULTIPLIED BY:									
8. Concentrates fed coefficient 11/	--	.92	.98		.23	--	.35	.15	--
EQUALS:									
9. Total concentrates fed per capita per year 7/	Kg.	66.240	111.014		4.554	--	49.784	.450	232.042
MULTIPLIED BY:									
10. Grains fed coefficient 11/	--	.80	.63		.78	--	16/ .45	.75	--
EQUALS:									
11. Total grains fed, per capita per year 7/	Kg.	52.992	69.939		3.552	--	22.403	.337	149.223
MULTIPLIED BY:	Million persons	120	120		120	--	120	120	120
EQUALS:									
12. Assumed population 12/	Met.tons	6,359,040	8,392,680		426,240	--	2,688,360	40,440	17,906,760
LESS:									
13. Assumed total grains fed 7/	Met.tons	0	0		284,280	--	682,800	40,440	1,007,520
EQUALS:									
14. Assumed domestic production of grains-for-feed 13/	Met.tons	6,359,040	8,392,680		141,960	--	2,005,560	0	16,899,240
15. Implied imports of grains-for-feed 14/									
16. Implied production of food product 15/	Met.tons	1,440,000	1,320,000	1,512,000	504,000		12,192,000	12,000	--

See footnotes on following page.

Table 19, footnotes:

1/ Given the Pacific strategy, and given the goal of achieving livestock product consumption of 209,000 calories per capita per year, this table suggests one possible configuration through which these consumption goals could be met. Per capita production targets are also stated, linked to the consumption targets by the energy-to-weight conversion shown on line 4 of this table. The calculations leading to grain import estimates are based on assumptions about converting animal feed into livestock products for human food. These assumptions are explained below.

2/ Calculated last, using figures from lines 13, 14, and 15. Also see footnote 13/.

3/ The 149,000 calories per capita per year from Japanese production plus an allowance of 60,000 calories per capita per year from imports of carcasses, eggs and dairy products equal the 209,000 calories of livestock products for the Pacific option. The 124,000 calories of Japanese-produced energy which are import dependent are added to the 60,000 calories of direct imports to reach the figure of 184,000 calories import-dependent shown on table 9 of the text.

4/ Estimated, based on commonly-found values in food composition tables of various countries. Feed conversion technology affects these values. Thus, the caloric value of a kilogram of pork used in this table is about equal to that reported by Denmark, the Netherlands, and the United Kingdom, which are more sparing in their use of feed in pork production than the United States. The caloric value of a kilogram of U.S. pork, on the average, is higher than that of these Northern European countries. See Food Consumption Statistics, 1954-1966, OECD.

5/ Dressed carcass weight for meats, shell included for eggs, fluid milk equivalent for dairy products.

6/ Dairy beef/veal production at 3 percent of milk production, both by weight. Based on U.S. 1965 experience. Feed covered by dairy column.

7/ Feed item in corn units, equal in feeding value to one kilogram (or metric ton) of corn.

8/ For chicken eggs and dairy products, feed units shown are the same as those calculated for the United States in 1965 from the following sources: "Supplement for 1967 to 'Livestock-Feed Relationships, 1909-63'", Statistical Bulletin 337 (Supp.), ERS, USDA, Nov. 1967--for feed usage in corn units. Agricultural Statistics, 1966, USDA--for livestock product production. For pork and beef, feed units shown are lower than those calculated for the United States in 1965 (from the same sources) to reflect a slightly different 1985 feed conversion technology for Japan, assumed to be somewhat more sparing in its use of feed than the U.S. technology of 1965. In 1965, the United States used an estimated 9.9 tons of all feed (corn units) to produce a ton of pork, and an estimated 17.3 tons of all feed (corn units) to produce a ton of beef. Lower values are used in this table to more closely approximate Northern European experience of the early 1960's as reported in Agricultural Projections for 1975 and 1985, OECD, pp. 116-117. Although data for Japan's feed usage in the early 1960's are available, they are not used in this table because Japanese animal agriculture was not as highly developed as Northern Europe's or the United States' at that time, and because Japanese data are not stated on a comparable basis in the OECD source.

9/ Estimated.

10/ On the assumption that massive amounts of roughage would not be imported nor supplied from nonconventional sources, the amount of available roughage in Japan may serve as a rather severe constraint upon the expansion of beef and dairy production. Extrapolating from the Japanese Ministry of Agriculture and Forestry's projection of 11.7 million metric tons roughage (T.D.N. basis) for 1976, a figure of 16.5 million tons roughage (T.D.N. basis) for 1985 would be possible. Such a T.D.N. tonnage might translate, very approximately, into 14 million metric tons roughage (corn unit basis). Consequently, this table assumes a roughage limit of about 15 million tons (corn units). For calculating purposes, the roughage amounts used in this tables are 118.4 kilograms per capita per year, distributed among dairy herds 92.5 kgs.; beef herds 15.2 kgs.; hogs 5.8 kgs.; poultry 2.3 kgs.; and horses and sheep 2.6 kgs. The per capita 118.4 kilograms roughage (corn units), multiplied by the assumed population of 120 million is 14.2 million metric tons.

11/ Based on coefficients estimated for U.S. feed usage in 1965. Calculated from sources listed above in footnote 8/. See footnote 16/.

12/ The Japanese Government's Economic Planning Agency, in its projection issued in 1968, estimates the 1985 population at 120 million.

13/ Domestic production of grains-for-feed is assumed to be about 1 million metric tons per year, composed of wheat, barley, and corn. The grain is assigned mainly to the beef and dairy sectors. Accordingly, domestic-origin consumer energy from dairy products is estimated at 0.25 of all dairy product energy per capita, with a coefficient of 0.67 for beef-herd beef. Cow beef and veal from dairy herds is assumed as a byproduct and thus of domestic origin.

14/ Actual tonnages would be higher than the corn units shown if grains of feeding values lower than corn accounted for much of the tonnage.

15/ Line 5 multiplied by line 12. Dressed carcass weight for meats, shell included for eggs, fluid milk equivalent for dairy products.

16/ Assumes less intensive grain use for milk production than under the Western strategy, but somewhat more intensive than under the Eastern. Assumes Japan's ability and willingness to expand domestic production of carbohydrate substitutes for grain in ruminant feeding, such as molasses.

* Less than 500 calories.

Table 20.--Possible targets[1/] for Japan's livestock economy in 1985 under the Eastern food strategy and implied quantities of grains-for-feed

Item	Unit	Product sectors of the livestock economy							
		Pork	Chicken	Eggs	Beef, from beef herds	Beef/veal, dairy herds	Dairy products	Horse and mutton	Total, all sectors
Energy consumed from Japanese production, per capita per year:									
1. Domestic origin 2/	Th. cal.	0	0	0	2	6	32	*	40
2. Import-dependent 2/	Th. cal.	25	12	18	0	0	40	0	95
3. Total	Th. cal.	25	12	18	2	6	72	*	3/ 135
DIVIDED BY:									
4. Energy per kilogram 4/	Cal.	3,250	1,300	1,560	2,500	1,900	660	1,400	--
EQUALS:									
5. Food weight consumed (or produced), per capita per year 5/	Kg.	7.7	9.0	11.8	1.0	6/ 3.3	109.9	.1	142.8
MULTIPLIED BY:			20.8						
6. Feed units needed per food unit (all feed, in corn units) 7/	Kg.	8/ 6.0	8/ 4.8		8/ 16.5	--	8/ 1.4	9/ 30.0	--
EQUALS:									
7. Total feed fed (roughage plus concentrates), per capita per year 7/	Kg.	46.20	100.0		16.50	--	153.85	3.00	10/ 319.55
MULTIPLIED BY:									
8. Concentrates fed coefficient 11/	--	.92	.98		.23	--	.35	.15	--
EQUALS:									
9. Total concentrates fed, per capita per year 7/	Kg.	42.504	98.000		3.795	--	53.847	.450	198.596
MULTIPLIED BY:									
10. Grains fed coefficient 11/	--	.80	.63		16/ .75	--	17/ .25	.75	--
EQUALS:									
11. Total grains fed, per capita per year 7/	Kg.	34.003	61.740		2.846	--	13.462	.337	112.388
MULTIPLIED BY:	Million persons	120	120		120	--	120	120	120
EQUALS:									
12. Assumed population 12/									
13. Assumed total grains fed 7/	Met.tons	4,080,360	7,408,800		341,520	--	1,615,440	40,440	13,486,560
LESS:									
14. Assumed domestic production of grains-for-feed 13/	Met.tons	0	0		341,520	--	717,240	40,440	1,099,200
EQUALS:									
15. Implied imports of grains-for-feed 14/	Met.tons	4,080,360	7,408,800		0	--	898,200	0	12,387,360
16. Implied production of food product 15/	Met.tons	924,000	1,080,000	1,416,000	516,000		13,188,000	12,000	--

See footnotes on following page.

Table 20, footnotes:

1/ Given the Eastern strategy, and given the goal of achieving livestock product consumption of 147,000 calories per capita per year, this table suggests one possible configuration through which these consumption goals could be met. Per capita production targets are also stated, linked to the consumption targets by the energy-to-weight conversion shown on line 4 of this table. The calculations leading to grain import estimates are based on assumptions about converting animal feed into livestock products for human food. These assumptions are explained below.

2/ Calculated last, using figures from lines 13, 14, and 15. Also see footnote 13/.

3/ The 135,000 calories per capita per year from Japanese production plus an allowance of 12,000 calories per capita per year from imports of carcasses, eggs and dairy products equal the 147,000 calories of livestock products for the Eastern option. The 95,000 calories of Japanese-produced energy which are import dependent are added to the 12,000 calories of direct imports to reach the figure of 107,000 calories import-dependent shown on table 10 of the text.

4/ Estimated, based on commonly-found values in food composition tables of various countries. Feed conversion technology affects these values. Thus, the caloric value of a kilogram of pork used in this table is about equal to that reported by Denmark, the Netherlands, and the United Kingdom, which are more sparing in their use of feed in pork production than the United States. The caloric value of a kilogram of U.S. pork, on the average, is higher than that of these Northern European countries. See Food Consumption Statistics, 1954-1966, OECD.

5/ Dressed carcass weight for meats, shell included for eggs, fluid milk equivalent for dairy products.

6/ Dairy beef/veal production at 3 percent of milk production, both by weight. Based on U.S. 1965 experience. Feed covered by dairy column.

7/ Feed item in corn units, equal in feeding value to one kilogram (or metric ton) of corn.

8/ For chicken eggs and dairy products, feed units shown are the same as those calculated for the United States in 1965 from the following sources: "Supplement for 1967 to 'Livestock-Feed Relationships, 1909-63'", Statistical Bulletin 337 (Supp.), ERS, USDA, Nov. 1967--for feed usage in corn units. Agricultural Statistics, 1966, USDA--for livestock product production. For pork and beef, feed units shown are lower than those calculated for the United States in 1965 (from the same sources) to reflect a slightly different 1985 feed conversion technology for Japan, somewhat more sparing in its use of feed than the U.S. technology of 1965. In 1965, the United States used an estimated 9.9 tons of all feed (corn units) to produce a ton of pork, and an estimated 17.3 tons of all feed (corn units) to produce a ton of beef. Lower values are used in this table to more closely approximate Northern European experience of the early 1960's as reported in Agricultural Projections for 1975 and 1985, OECD, pp. 116-117. Although data for Japan's feed usage in the early 1960's are available, they are not used in this table because Japanese animal agriculture was not as highly developed as Northern Europe's or the United States' at that time, and because Japanese data are not stated on a comparable basis in the OECD source.

9/ Estimated.

10/ On the assumption that massive amounts of roughage would not be imported nor supplied from nonconventional sources, the amount of available roughage in Japan may serve as a rather severe constraint upon the expansion of beef and dairy production. Extrapolating from the Japanese Ministry of Agriculture and Forestry's projection of 11.7 million metric tons roughage (T.D.N. basis) for 1976, a figure of 16.5 million tons roughage (T.D.N. basis) for 1985 would be possible. Such a T.D.N. tonnage might translate, very approximately, into 15 million metric tons roughage (corn unit basis). Consequently, this table assumes a roughage limit of about 15 million tons (corn units). For calculating purposes, the roughage amounts used in this table are 121.0 kilograms per capita per year, distributed among dairy herds 100.0 kgs.; beef herds 12.7 kgs.; hogs 3.7 kgs.; poultry 2.0 kgs.; and horses and sheep 2.6 kgs. The per capita 121.0 kilograms roughage (corn units), multiplied by the assumed population of 120 million is 14.5 million metric tons.

11/ Based on coefficients estimated for U.S. feed usage in 1965. Calculated from sources listed above in footnote 8/. See notes 16/ and 17/.

12/ The Japanese Government's Economic Planning Agency, in its projection, issued in 1968, estimates the 1985 population at 120 million.

13/ Domestic production of grains-for-feed is assumed to be about 1 million metric tons per year, composed of wheat, barley, and corn. The grain is assigned mainly to the beef and dairy sectors. Accordingly, domestic-origin consumer energy from dairy products is estimated at 0.44 of all dairy product energy per capita, with a coefficient of 1.0 for beef-herd beef. Cow beef and veal from dairy herds is assumed as a byproduct and thus of domestic origin.

14/ Actual tonnages would be higher than the corn units shown if grains of feeding values lower than corn accounted for much of the tonnage.

15/ Line 5 multiplied by line 12. Dressed carcass weight for meats, shell included for eggs, fluid milk equivalent for dairy products.

16/ Assumes slightly less intensive grain use for beef-herd beef production than under the Western or Pacific strategies. See footnote 17/.

17/ Assumes less intensive grain use for milk production than under the Western or Pacific strategies. In other words, this coefficient implies Japan's ability and willingness to obtain domestic-origin carbohydrate substitutes for grain in ruminant feeding, such as molasses.

* Less than 500 calories.