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PROBLEM ASSESSMENT FOR CHINA

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PREFACE

One of the main purposes of the Food and Agriculture Program at IIASA is to build a series of national agricultural models, covering the relevant parts of the world's food production and consumptions.

China, having 22% of the world's population and producing 13,22% of the agricultural production, cannot be neglected in this context. As the first step of investigations, a problem assessment has been prepared. One should stress that the agricultural development in China as discussed in this paper, can be drastically changed in the nearest future. According to the latest information, new agricultural price policies have been introduced, which may have decisive effects. The basic problem, however, of, whether China will be able to feed her population, is a more complex one and depends on a series of different factors. This is an attempt to give a short summary of them.



PROBLEM ASSESSMENT FOR CHINA

Martha Neunteufel

INTRODUCTION

To understand today's Chinese economic and agricultural situation, one has to investigate the development after 1960, after the end of the Great Leap Forward. A short overview of the history of the People's Republic of China explains why 1960 is the turning point in the Chinese economic and especially, in agricultural development.

When the PRC was established in 1949, three years were needed to carry out the minimum recovery and reconstruction requirements. But during 1949-1952 not only the consequences of 30 years of war forced the PRC to make enormous stabilizatory efforts, but at the same time the base of the future socialist type economic system has been created. Thus beyond revitalization of the productive capacity and stopping inflation, also land reform and elimination of private commerce has taken place. In 1953 the 1st five-year plan was started which aimed at creating the basis of Chinese industry, and primarily, heavy industry. To speed up this process a forced accumulation and regrouping of resources in favour of industry was carried out. The economic policies of this period were very similar to those of the 1920's and 1930's in the Soviet Union.

Although the GNP was more than doubled even during 1949 and 1957, on the basis of political considerations the objectives of the second 5 year plan were enhanced. This decision led to the Great Leap Forward.

The collapse of the Great Leap Forward was caused mainly by overestimating the investment possibilities, overemphasizing the special Chinese characteristics and by inadequate planning. In addition three bad-weather years followed each other, thus grain production dropped in 1960 by 40%. (1959-61 were the only years in the PRC when there was malnutrition.) Also the break with the Soviet Union and the withdrawal of Soviet experts and assistance in 1960 added to the difficulties.

Thus in 1961 the Chinese government realized the failure of the GLF and created new principles to further development. The most important features of this new "General Line" was the emphasis on self-reliance and the new priority order of the economic sectors, "... agriculture the basis, industry the guiding factor".

In some aspects however the GLF survived. The system of agricultural communes has remained, although in a somewhat changed form, with the resulting decentralized power system as well as the rural industrial institutions, completing (but not substituting) the large scale industrial systems.

Not only the character and structure of economic development has changed after the GLF but the means too - more careful planning has been introduced, disturbed by the Cultural Revolution but continued after that again.

1. ECONOMIC DEVELOPMENT IN CHINA AFTER 1960

1.1 Uncertainties

The difficulties of investigating Chinese economy after 1961 lies in the fact, that Chinese statistical publications were stopped after the GLP, thus the data information is very limited. We have three sources of them:

- 1) Some official Chinese data, given by Chinese authorities, mainly after 1970, partly in the form of personal information to journalists or scientists (one of the most famous of them was the information that the late Chinese Premier, Chou gave Edgar Snow in 1970) and which were published partly in newspapers and broadcasts.
- 2) Foreign estimates, prepared by scholars of the Chinese economy, based on the official data, or on own experiences in China. The importance of these sources is becoming higher and higher as more and more visitors go and see the PRC. Perhaps even more important is the qualitative information they bring with them.

There have been long discussions about the usefulness of the official Chinese data, but they are generally believed acceptable* after their consistency, or at least non-contradiction has been proved. The biggest problem of the official data is however, that they are not connected to each other, rather they build a scattered set of different, separate data points.

The drawback of the second set of data - i.e. the foreign estimates - is, that they are estimates, and as such, certainly imprecise. And if we discuss the reliability of the official data, we can discuss the reliability of the estimates as well: they unavoidably reflect political intentions and are dependent on base and methodology of estimation.

- 3) The most widely known, and perhaps more accurate data are those about China's foreign trade supplied by the partner countries. Although these data don't contain China's exports in the frame of economic aid, this last term probably doesn't mean a high bias since China is estimated to give 0.25% of her GNP as aid to developing countries.

This short description of the availability of data has been necessary to show that most of the statements about the Chinese economy contain a given level of uncertainty in spite of all efforts to find out the "truth".

1.2 Economic organization

One of the crucial differences between the Chinese economic structure before 1960, and afterwards (mainly after the Cultural

* See e.g. Th. Rawski, "Recent Trends in the Chinese Economy" in the China Quarterly, Jan-March, 1975.

Revolution) is that in the first period the centralistic, in the second period the decentralistic characteristics are also important. There is, however, a discussion among the researchers of the Chinese scenery*, which characteristic is decisive. The self-sufficiency of different levels of collective units is heavily stressed - the role of the central government becomes important at and above the county (so-called hsien) level.

Communes and other productive units are highly independent, they decide on production and sales (i.e. sales to the state!), on investment and the method of income distribution. But they are independent in financing themselves as well - usually they don't get credits to finance their investments, and don't pay high taxes. According to an estimation, about 6% of the gross production of an agricultural production unit is paid to the state as tax in the form of grain. (The movement "Learn from Tachai" characterizes this effort very well. The Tachai brigade, famous throughout China, has carried out enormous land improvement efforts: they have built terraces and irrigation canals without any outside help, and at low investment costs but with high and intensive usage of human labor. They pay a tax of less than 1% of their gross income. Now every year a "Learn from Tachai" conference is organized.)

As a result of the decentralization efforts, regions became more or less self-sufficient, producing their own food, having their own small scale industries, etc. The self-sufficient regions generally correspond to administrative units.

This economic decentralization has big ideological and political importance. In the ideological education of the Chinese people, the collective decision is to bring people to socialist self-consciousness and self-reliance. The political importance of the decentralization is also obvious. But the decentralization has also been of practical importance. Since the transport systems of the country have not been completed yet, it was an almost hopeless task to supply regions with each other's products. Also in 1976, after Mao's death and the fall of the "Gang of Four", there were serious difficulties with the transport system. The present practice seems to be that even if regions have surpluses in some products, the needs of other regions are supplied by imports and the surplus regions are encouraged to produce other products instead of the surplus. Under such circumstances it is an open question how the system of economic planning is functioning, the more so as its important role was emphasized recently.

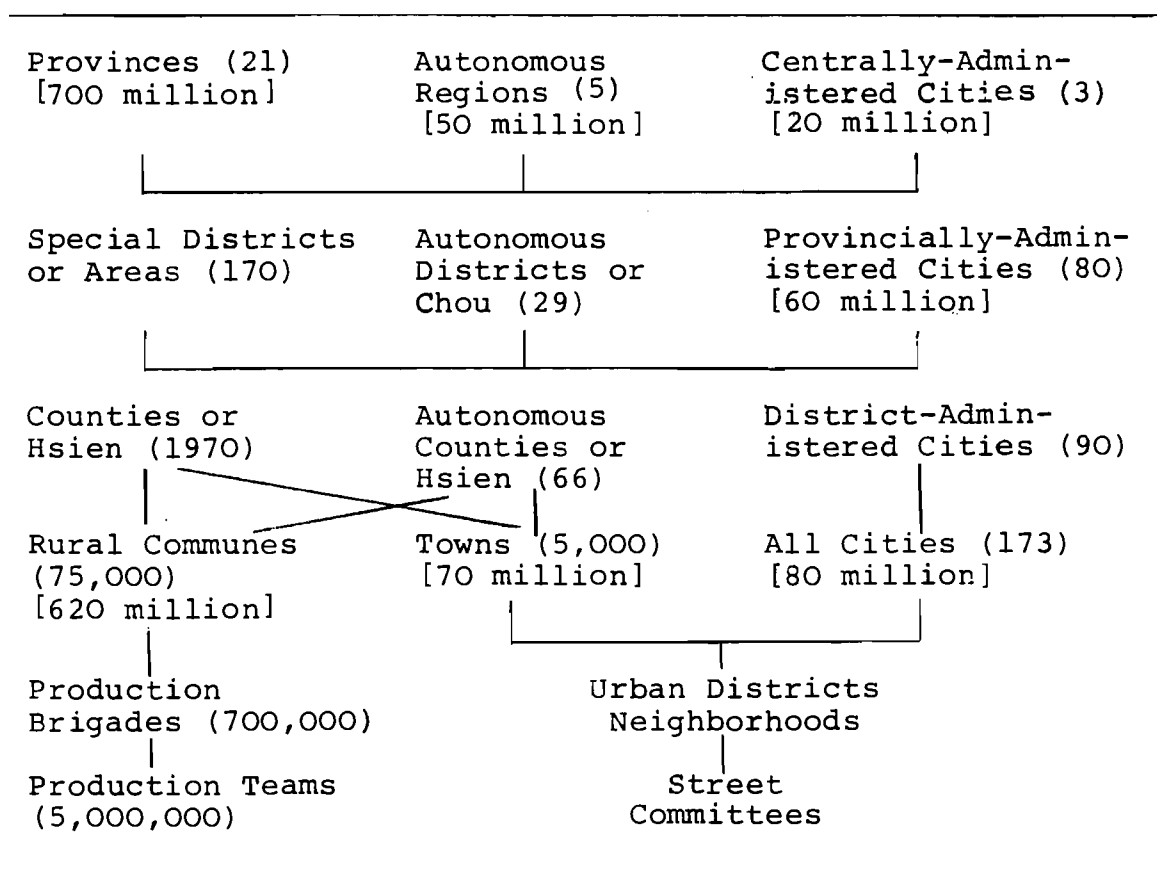
The costs of decentralization have been high - this became very clear in the last few years. The basic difficulty is still the economic effectiveness. Not all regions are equally appropriate to produce the products they need (not to mention availability of coal, mineral resources, etc.), thus the production structures are far from optimal. The small scale industries are

*See, for example, the articles of N.A. Lardy and A. Donnithorne in *The China Quarterly*, March 1975 and June 1976, respectively.

generally not appropriate to force advanced technologies and so are less productive. This has been clearly proved also by the fertilizer industry - the small scale plants produced very poor quality fertilizers, and only in small quantities. Thus in 1974, China decided to buy 13 big nitrogen fertilizer plants from Western countries, which will start with production in 1978 and 1979.

Indeed, one of the most difficult tasks for Chinese leadership is how to choose the appropriate combination of the centralization and decentralization in different fields. The political-hierarchical structure is known (Figure 1), but its decision-hierarchy is not quite clear.

Figure 1. The political structure of China, 1972.



() = number of units
[] = number of people

Source: P.K. Steidlmaier, *The Da-Zhai Model in Chinese Agriculture, 1969-1974*, Unpublished Ph.D. Thesis, Stanford University, 1975.

Not only the fertilizer supply, but also the irrigation problems can be solved only with central help. For instance, China's main irrigation difficulties are in the Northern wheat-region. To solve these problems will mean regulating the Yellow River - and this obviously is a central task and not one for a single commune or county. Similarly, the situation is the same with the mechanization of agriculture, which is stressed in the new long-term plan, accepted by the Party Congress in the spring of 1978.

1.3 Economic growth and structure

The size and structure of the Chinese GNP is one of the most discussed points. The problem is not only that there is little official information about it, but also that it is not quite clear what this information really means. There is confusion about the terms used by the Chinese. There is uncertainty as to whether they used Marxist or Western terminology when they give data about the national income. The other problem is connected with the exchange rate of the Chinese currency, there is no accepted Yuan/Dollar ratio. (The official exchange rate was 2.355 Yuan = 1US\$ in 1955, and 1.94 - 1.99 in 1975. This seems to be reliable, taking into account that the value of the US \$ decreased, and the value of the Yuan increased during this time. But many experts use exchange rates between 2.0 and 2.4, e.g. Ishikawa and also Edgar Snow used the exchange rate of 2.4 for 1970.)

According to these uncertainties, estimates result in different GNP values. The differences become more and more serious when we deal not with the aggregate GNP but with the GNP by origin or by end use. The experts are forced to make basic assumptions about rations and trends, increasing the subjective character of the estimations.

Since the most complete estimates are those prepared for the Joint Economic Committee of the Congress of the US, (JEC) it is necessary to describe them and afterwards discuss other results as well.

According to JEC experts, the average annual economic growth rate after 1960 was as follows:

Period	GNP	Agriculture	Industry
1961-65 readjustment ¹ & recovery	13	10	17
1966-69 cultural revolution	6	2	10
1970-75 resumption of regular planning	6	2	10

¹ It is more meaningful to take the period 1957-65 because the high values in the table are caused by the collapse of the GLF. Taking 1957 as the first year, the growth rates are 4, 2 and 9 respectively.

The Chinese GNP was estimated by Ashbrook* to be:

Year	GNP (bill of 1973 dollars)	Index of Ind. Prod. (1957=100)	Index of Agric. Prod. (1957=1000)
1961	82	108	77
1966	145	231	116
1970	179	313	129
1975 ²	238	479	141

1976 was a very difficult year for China, the death of Chou and later Mao caused political confusion and power conflicts which badly influenced the production. In addition, not only was 1976 a bad-weather year, but there were catastrophic earthquakes as well. All these unfortunate events resulted in a very low rate of economic growth. (The growth of industrial output was estimated at 5% - the half, compared to 1975's 10%, and the grain production increased only 1-2%**.)

The situation was the most critical in the transportation and steel industry. Quite a few industries did not make public their end of the year results which is generally taken to mean bad results.

According to the latest information in 1977 China could maintain the economic development of the early 1970's and the GNP was reported to have grown by 14% compared to 1976.

If we take the production values of agriculture and industry, given by Chou for 1970, and assuming they are given on 1970 prices as the base of the series, then we get the following results:

Year	Ind. Product.	Agr. Product.	Other sectors ³
	(bill of 1973 dollars)		
1961	35.4	20.4	26.2
1966	75.7	30.7	38.6
1970	102.6	34.2	42.2
1975	157.0	37.4	43.6

*JEC, 1975

**Current Scene, April-May, 1977

²Computed on the basis of "Research Aid", People's Republic of China Handbook of Economic Indicators: EC 76-10540. For earlier years this source contains the data given by Ashbrook.

³Computed as remainder

This means the following sectoral percentages in the GNP:

Year	Industry	Agriculture	Other Sectors ⁴
1961	43.2	24.9	31.9
1966	52.2	21.2	26.6
1970	57.2	19.1	23.6
1975	66.0	15.7	18.3

These results are somewhat distorted due to the price system used, which evaluates industry higher than agriculture. Both Eckstein* and Perkins ** estimated the share of industry lower and that of agriculture higher in the GDP. Unfortunately their time series are not complete, they contain only several years between 1957 and 1974.

The share of agriculture in the GDP according to Perkins is:

1962	32.6%
1965	32.6%
1970	29.4%
1974	25.2%

The clear diminishing tendency in the share of agricultural GDP confirms the fact that China has developed her industry very quickly since 1949. (During 1952 - 60 the average annual growth rate of industry was 18%, during 1960 - 66, 4%, and 1966 - 74 it was 8% according to Field's estimates*** .

It is very interesting that in China, unlike other countries in the same stage of industrial development, the share of the rural population in the total didn't change significantly, it is still above 60%. Even if we take into consideration that one part of the rural population works in the rural (also called

⁴ The percentages don't necessarily add up to 100 because of rounding

* A. Eckstein "China's Economic Revolution", Cambridge, 1977, page 229.

** D. H. Perkins "Estimating China's Gross Domestic Product", current scene, Marick, 1977.

*** Cited in A. Eckstein: "China's Economic Revolution", page 219.

small-scale) industries, the fact remains that about half of the population produces about one fourth of the GDP.

Basically this means that at present China has not been able to break the diminishing returns of the traditional agricultural techniques. New techniques do not dominate yet.

Data about the gross domestic product by end use are even more seldom than about GDP by origin. The most complete and generally accepted series are given by Liu-Yeh* .

Percentages in GDP by end use, 1961-1970:

	1961	1966	1970
Consumption	71	71	74
Personal	63	62	64
Government	8	9	10
Fixed Investment	19	24	23
Changes in inventory and statistical discrepancy	10	5	3
Export Surplus	0	1	1

1.4 The role of foreign trade in China

In the development of Chinese foreign trade - although it has been continuously expanding since 1950 - 1960 was a turning point. Before 1960 foreign trade grew faster than the GNP (14% compared to the 10-11% average annual growth rate of GNP) and 60-80% of it was with the socialist countries.

According to the fast industrialization of the 1950's China imported large scale industries, different capital goods, etc. After 1960 the foreign trade dropped at first to a very low level and afterwards rose again, however the average annual growth rate has been lower than that of the GNP.

The direction of the foreign trade has changed as well; the share of the socialist countries declined to 20-30% and most of this was with the Asian socialist countries. The commodity composition has changed as well: although the import of modern

* Liu-Yeh "Chinese and Other Asian Economies: A Quantitative Evaluation", American Economic Association, Vol. 63, No. 2.

technology has remained crucial, China became a big food importer. (At first after the Great Leap Forward, when there was the only famine in the history of the People's Republic of China, she was forced to import grain.) In the 1970's the foreign trade turnover has been as high as 4-8% of the GNP.

When dealing with Chinese foreign trade, one should stress the special importance of imports for China. Since self-sufficiency is one of the most discussed political subjects in China, not only the source, but also the volume of the imports reflects political intentions. Since China tries to keep her imports at a moderate level, the volume and structure of the imports reflect the urgent requirements and bottlenecks of the Chinese economy. (e.g. the high grain purchases after the GLF and in 1973 - 74, or the import of big fertilizer plants in the last years). In this sense exports have secondary importance, they have to finance imports: the balance of trade was negative only in 1967, 1970 and in the last four years since 1961. (Against the socialist countries China has had a positive trade balance since 1956.)

China's Foreign Trade, 1961-76 (Million of US Dollars)

Year	Exports		Imports	
	Total *	Agricultural **	Total *	Agricultural **
1961	1525	336	1490	628
1965	2035	762	1845	630
1970	2050	826	2240	404
1971	2415	980	2305	485
1972	3085	1290	2835	730
1973	4960	2140	5130	1680
1974	6515	2605	7380	2370
1975	6930	2740	7385	1405
1976 ***	7225	N/A	6300	N/A

N/A Not available

* data from 1961-72 are taken from N.R. Chen: "China's Foreign Trade, 1950-74" in JEC 1975, data from 1973-76 are taken from "People's Republic of China, Agricultural Situation", USDA, Foreign Agricultural Economic Report No. 137.

** data from 1961-70 are taken from H.V. Henle: Report on China's Agriculture, FAO 1974, and data for 1971-76 from USDA, Foreign Agricultural Economic Report No. 137.

Both sources emphasize the approximative character of these data.

*** Source: Asia Yearbook 1978 of the Far Eastern Economic Review.

China's main non-agricultural export commodities are textiles (textile fibres, yarn and clothing represent together 25-30% of total exports) and some chemicals. In the last few years the importance of Chinese oil exports has grown rapidly. In 1973 China exported 1 million tons, in 1975 exports were already 10 - 11 million tons valued at about 850 million US Dollars, i.e. 12 - 13% of China's export earnings.* Since China is estimated to have double the oil reserves of Saudi-Arabia, even with rapidly growing domestic oil requirements and considering the poorer quality of the Chinese oil, high exports are expected also in the future. This could enable China to finance higher imports than in the past.

China's main agricultural export products are rice, animals and meat (mainly pigs and pork) but also some fruits (bananas, oranges and apples), tea and silk are important. Most meat and meat products are sold to developed countries or in Hong Kong and Macao. (This means a high entrepot trade with third countries.) The main consumers of Chinese rice are developing countries and the Asian socialist countries.

China's most important non-agricultural import products are machinery and equipment (18-20% of total imports) iron and steel products (18-20% of total imports) and chemical fertilizers (7-10% of total imports). Most of these imports are bought from Japan, U.S. and the European developed countries.

The main agricultural import products are wheat, maize, cotton, and sugar.

As is indicated in the following table, China imports 3-5 million tons of wheat in "average" years. This may be needed to provide urban population and to keep stocks at a desired level.

In emergency cases, however, the grain imports jumped to over 7 million tons. The relative high wheat imports in 1974 can be explained by stockpiling activities. (It is estimated that in 1973 China had about 40 million tons in grain reserves and 58 million tons in 1976).

The cutback of wheat imports in 1975-76, was perhaps a result of China's negative balance of trade, caused by the severe export situation. This might have resulted in some stock depletion. In addition, 1976 was a bad weather year, thus China was expected to import more wheat in 1977 than the years before.

The situation was similar with cotton, where China, a big importer, purchased less in 1974-76 than before. Thus here also higher imports were expected for 1977.

The foreign trade in soyabean has been changing quickly since 1973. Until that year, China was a net exporter, but since then in some years she became a net importer.

* A. Eckstein: China's Economic Revolution, Cambridge University Press, 1977, page 262.

Trade in major agricultural commodities, 1971-76* (1000 metric tons)

Commodity/Country	1971	1972	1973	1974	1975	1976**
Wheat imports	3021	4252	5987	5346	3339	2000
" " from Canada	2988	3687	2388	1772	1922	1100
" " " US.	-	565	2815	1905	-	-
" " Australia	-	-	768	1318	1352	900
Maize imports	107	390	1626	1444	107	-
" " from Argentina	107	14	126	500	107	-
" " " U.S.	-	376	1500	854	-	-
Cotton imports***	151	425	386	144	159	-
from US.	-	127	195	67	2	-
Rice exports	924	899	2142	1983	1440	1000
Soyabean exports	460	370	310	340**	330**	200**
Soyabean imports	-	2	255	619	36	25
Sugar imports (raw value)	464	749	736	411	235	N/A

* "People's Republic of China, Agricultural Situation", USDA, Foreign Agricultural Economic Report, No. 137.

** preliminary

*** year beginning August 1.

The main trading partners are shown in the following table.*

Shares of PRC's Trade with Major Partners (Percentage) ¹					
Country	1961	1966	1970	1973	1974 ²
Japan	1.5	14.9	19.9	20.5	24.3
United States	--	--	--	8.9	7.9
Hong Kong	3.8	9.0	8.3	8.1	6.5
West Germany	2.7	5.1	6.3	4.9	4.7
Malaysia/Singapore	2.1	3.4	4.4	4.7	(3)
Canada	5.1	5.1	4.1	4.1	4.2
United Kingdom	4.1	4.2	4.9	3.4	2.4
USSR	30.3	7.5	1.0	2.7	2.0
Romania	1.0	1.6	2.5	2.7	(3)
Australia	6.6	2.9	4.1	2.5	3.7
France	1.8	3.7	3.6	2.3	2.5
Italy	1.6	2.7	3.1	2.0	1.6
Total of above	60.6	60.0	62.3	66.8	(3)
PRC Total Trade	100.0	100.0	100.0	100.0	100.0

¹ Data on trade refer to the combined volume of PRC exports to and imports from various countries

² Preliminary

³ Not available

* Source: N.R. Chen: "China's Foreign Trade, 1950-74", JEC, 1975, page 361.

1.5 The question of population growth

We do not know too much about the size and distribution of the Chinese population: we know it is the largest in the world, but that is all we know for sure.

The problem stems from the fact that in China the last population counts were held in 1953, (the result was 582 million), and neither birth rates nor death rates are exactly known. This fact is somewhat unbelievable at first sight in a country where, if it is needed the central government can influence the life of the individual even in small things. Leo Orleans' * explanation seems to be plausible: At the given economic structure, where regions are supposed to be autarchic, the question is not of great importance. Of course, at the level of food supplying units (e.g. communes, counties) it is important to know how many mouths there are to feed. At these levels, births and deaths are registered, and taken into account when rationing different foods. But these data are not summarized by the authorities, probably because they really don't need it, or because the costs of these activities are too high related to the benefits that the government could achieve.

Thus Chinese officials give different figures when asked about the population size. Orleans* cites Chinese statesmen giving figures for 1972 from less than 750 to 830 million. These differences, as well as differences among "foreign" estimates may be caused mainly by two facts: (1) they have different assumptions about the effects of birth control and the health services or (2) they generalize (most probably different) regional population growth rates.

The most prominent estimates were prepared by the UN and by the US Department of Commerce. Actually the two estimates have big deviations:

UN Estimates of Chinese Population: (mill)	1965	1970	1975	1980
a) low variant	710	772	829	883
b) high variant	710	772	844	919
USDC Estimates of Chinese Population: (mill)				
c) low variant	741	825	907	987
d) high variant	745	847	957	1043

The last Chinese information was summarized in "The China Quarterly" in June, 1977. This gives population figures by provinces, most of them referring to 1976, the sum of which is about 850 million (but perhaps not including all military personnel). If we regard this data, perhaps we can say that the UN high estimate and USDC low estimate seem to be more reliable.

* Leo A. Orleans, "China's Population: Can the Contradictions be Resolved?" in JEC, 1975.

The high uncertainties stemming from the population data show that one should be very cautious when looking at Chinese per capita figures.

Another open question is the size of the Chinese labour force, since the estimated age-distribution of the population varies according to the assumed population growth rates. Even less is known about the proportion of rural to urban population. In 1953, at the time of the last census, 13% of the total population was reported as urban population. In the meantime in the process of the industrialization this must have increased significantly, even if a strong political pressure has existed against the fast growth of the big cities. The UN estimate of the urban population for 1970 was 21.7% of the total, but this should be dealt with very cautiously, since we really have no comparison.

2. AGRICULTURAL PRODUCTION

2.1 Institutional framework

The present structure of Chinese agriculture has been established during the years of the Great Leap Forward. Though the size of different political administrative and productive units has changed (more than once) through the years, and the emphasis of functions of units has been shifted as well, the base of the structure is still the same. The relations of ownership have not changed either. In agriculture collective ownership is prevalent, i.e. all the members of the given unit are owners of all means available for the collective, in opposition to the majority of industrial production units, where state ownership is prevalent. The collective ownership means that the members of agricultural units decide themselves about their production plans, distribution system, investments, etc. through their elected management committees. Leaders are not "sent down" from state organs but are "local" leaders. The management committees are responsible in two directions: to the upper-level unit (which may be a state-organ, e.g. county) and to the membership. Actually the management committee level is that where the balance between plan - which represents the state's interest - and their own independent unit's interests - maximizing own income - has to be found.

The biggest productive unit in agriculture is the commune. It includes several production brigades, which themselves are built up from several production teams. The teams are the basic accounting and productive units of this system. All these units have political-administrative functions as well. According to Crook* an average commune in 1974 contained 15 production brigades with about 100 production teams, which means about 3350 households, a population of about 14,700 persons.

*Crook, F.W., "The Commune System in the People's Republic of China, 1963-74", JEC, 1975, pp. 366-410.

It should be stressed that the deviations from this average might be high according to geographical-natural conditions, tradition and structure of production, population density, etc. As a rule, however, communes in suburban areas are bigger than in rural areas both in area and in population size. The three-fold structure is very general although not without exceptions. Thachai for instance, the most famous production brigade is a basic unit itself, it does not contain any production teams.

Actually there is also a fourth unit in this system, the households, which as members build up the production teams and are also private owners. They possess about 5% of the total arable area in the form of private plots.

As also shown in Figure 1 on page 4, the communes production brigades and production teams are members of a hierarchical chain of political-administrative units. Which are their functions stemming from this role?

The communes keep strong contacts with state authorities and party committees, which together with the commune's management committee decide about economic planning and activities of the commune, control its industrial units, collect taxes, supply the state with statistical data needed, keep contact with the banking system, etc. Their economic role is completed by regulating and controlling market organizations, and supplying State Purchasing Organizations. (The marketing system will be discussed in chapter 3.2.) Beyond these administrative-economic activities, communes have their own militia units, which usually serve as public security troops, fire-fighting forces, etc. But communes run and control schools, health stations, hospitals also, and provide the population with other social services. They also run machinery, and occasionally agricultural research stations.

Some of the functions of communes are characteristic also for brigades. Some of them also have Party branches, militia units and small industrial plants. Brigades transmit state plans to teams, organize work to build roads, canals, etc. The brigades usually also have their own health station and primary schools. Branches of credit cooperatives and marketing cooperatives also supply their services at brigade level.

Depending on local conditions and economic structures, the size of a brigade or a team may correspond to the size of a village, thus the modern productive units could have been reorganized from traditional ones.

The team has the least administrative importance in the system of the productive units. It is responsible only for smaller repairing activities. Teams usually do not have their own Party cells. In contrast to their small administrative importance, teams are the basic units of production and income distribution. (The latter will be discussed in chapter 3.1.)

The production activities of the team include growing grain, oilseeds, cotton, fruits, vegetables and other crops. They also

raise hogs and deal with fishing. Livestock production (mainly pigs and chickens) is mainly dealt with in the households. Production teams do not have many subsidiary activities, or processing.

These activities are mostly carried out at the brigade level, which usually provides for milling of grain, oil pressing, crushing of sugarcane, etc. But it also may produce bricks, and other building materials, some consumer goods like mats, baskets, etc. Brigades support households by providing them with piglets, or teams by maintaining fishponds.

The commune is responsible for some industrial and most food processing activities, which need more investment and skilled personnel than a brigade could afford. Such industrial activities are for instance: production of simple agricultural machines, fertilizers, several building materials like cement, bricks, etc. They also may run smaller coal mines and hydroelectric power stations. As communes operate on the whole forestry sector, the timber production is also carried out at this level. The processing activities of the commune are: grain milling, oil processing, cotton processing, fruit canning, production of dairy products, etc.

This short overview emphasizes only the main functions and productive activities of the agricultural units, but perhaps is enough to show how the system works, how a commune can be a more or less self-sufficient unit.

2.2 Natural resources and agricultural technology

Soils

Due to the fact that the most part of China's territory is mountainous and due to unfavourable climatic conditions, only 15.3% of the total land area of the country is arable. The cultivated area is about 11%, increasing only very slowly in the 20th century. It has grown only 25% since the first world war when the population has doubled during the same period. Now the cultivated land is estimated as 107-115 million hectares. Eight percent of the total area is forest, among 31% is suitable for afforestation, 28% is grassland and about 18% of the area is desert*.

Since the possibility of expanding the cultivated area is limited, and it is very expensive, China has to increase the yields strongly to be able to supply her population. In this process, soil conservation is highly important, even more in a situation where one third of the cultivated area is said to be of poor quality. Additionally, the more fertile soils lie in the north where the growing season is shorter and where there is also less rainfall. In Central and South China where climatic conditions are better, the soils are acidic and much less fertile than in the north where, along the Yellow River, one of the largest loess plateaus of the world is to be found.

*Kuo, L.T.C., Agriculture in the People's Republic of China, Praeger, 1976.

In the northern areas, the main problem is soil erosion. The rivers are rapidly destroying the loess plateau. This problem has also existed in the past but traditional Chinese farming systems were able to handle it. As the rapidly growing food demand resulted in an urgent requirement of new technologies, new cropping systems have been introduced, which, unfortunately, did not take into account the soil erosion. (The most striking mistakes were made during the Great Leap Forward when thousands of irrigation canals, dams, etc. were built in the northern areas without proper techniques.) Salinization has become a main problem and also the siltation of canals is a serious difficulty. The top soil is more or less unsafe against erosion since only 5% of it is bound by vegetation. The afforestation programs have not been successful so far because of improper choice of tree species. To prevent soil erosion in the north and to regulate the Yellow River (with enormous investment) is one of the important tasks for China for solving her food problem.

In the central and southern part of China where multiple cropping is possible the extension of this practice was too strongly forced in the late 50's (two-crops-in-one-year system was introduced in the place of three-crops-in-two-years system), often resulting in soil deterioration because of inadequate fertilization and water supply. There has been an improvement in the last years in this respect and more care has been taken to plant green manure crops in the winter seasons so that soil productivity is maintained.

Water

From a first glance at the map of China (huge mountainous areas, different climatic conditions) it is obvious that water, in various forms, is a serious problem for Chinese agriculture.

The rainfalls, as mentioned earlier, are very poor in the northern and western areas (north of the Yellow River there is annual precipitation of about 200-600 millimeters, but even between the Yangtse River and the Yellow River there is only 500-1000 millimeters a year) thus irrigation and drainage are key questions of agricultural production.

China with having large rivers rushing down from the mountains has suffered throughout history from floods and droughts and thus flood control, water conservation, building of reservoirs, dams, dikes, etc., are extremely important.

The building of irrigation and drainage systems has been continuing since the early 50's, but in a relatively slow state. Only during the Great Leap Forward and the Cultural Revolution was it speeded up as previously mentioned when discussing the soil erosion problems. This speed-up of building has not brought too much result: though an enormous amount of work was mobilized, improper planning, undeveloped techniques and bad organization led to an irrigation system which did not work well. (Actually, the statistics of irrigated areas were updated afterwards and suggest that irrigation has not increased too much.) But still, from the

canal building campaigns, the system has survived that peasants are encouraged to take part in such work during the winter months in constructing and maintaining activities. (When one family member stays with such a project the family enjoys his food ration at home.)

The main change since the Cultural Revolution is, with respect to irrigation, that much care is taken in the use of mechanical and electrical energy for irrigation in order to ensure the full use of existing systems. In the early 70's about 20 million kwh electric energy was used for this purpose. The irrigated area in 1975 was between 37 and 44 million hectares.

After the Cultural Revolution, mainly in the early 70's, there was a great effort to dig tube wells and in fact in 1974 1.3 million wells were capable of irrigating 7.3 million ha of land*. (As a comparison, in 1965 there were only 100,000 wells in operation.) Accordingly, the number of mechanical pumps has grown. The limitations of this method of irrigation became clear when, in 1973, a drought year, too much water was taken from the wells and the danger of lowering the water table has risen.

Thus, although several experiments are going on to control flood and ensure a proper irrigation, the solution is still far away and will require high investment both in capital and in manpower.

Fertilizer

"The growth rate in China's chemical fertilizer industry has been nothing less than phenomenal. From 1960 to 1966, production quadrupled. From 1966 to 1973, it doubled again."**

This rapid increase means that China now applies about 60 kg nutrients of chemical fertilizers per hectare, compared to the 4-5 kg/ha in 1957. This increase was partly enabled by the forced growth of domestic fertilizer production, partly by huge imports. In the early 1970's China was the world's largest fertilizer importer.

As the fertilizer application is still at a relatively low level and, according to observation by foreign experts, is used very carefully, yield responses might be quite high. Thus China is expected to increase her fertilizer consumption relatively fast also in the future. Recently huge oil and gas deposits have been discovered and thirteen large size nitrogen fertilizer plants have been imported with developed technique. These seem to ensure supply at least for the near future. The fertilizer production will grow

*Erishman, A.L., China: Agriculture in the 1970's, JEC, 1975, pp. 324-350.

**Stavis, B., How China is Solving its Food Problem. Bulletin of Concerned Asian Scholars 7:3 (July-September, 1975) pp. 22-38.

in 1978-79 (when these plants will have been set in operation) at least by 65%*.

Since China is also relatively rich in phosphate rock and potash, the production of these fertilizers can be expected to increase. Also, this is even more likely as recently the proportion of different fertilizers in application is far from optional.

There is a question, however, of how China will produce this high volume of fertilizer. On a small scale base, as has been done until now (in 1973 about 63%** of the total production was produced by small scale plants), or the large scale production will be forced. The products of small, rural factories mostly based on local resources are usually of low quality but the advantage of these factories is the relatively low investment needed.

Discussing China's fertilizer situation, we have to mention the intensive use of natural fertilizers as well. China has developed an efficient system of collecting, storing and using natural crop nutrients and river pond, mud, night soil, manure, etc. The proportion of crop nutrients of these sources to the chemical fertilizers is still high. In 1966 it was about 40 kg/ha***. Also green manure crops are widely used, mainly in the multicropping areas.

Information about yield responses of different crops is scarce. Although some average yield responses to the mostly used fertilizers are known, as well as some experimental data¹, there are several uncertainties about what these data really mean. It is not clear, for instance, if the average refers to a regional or national average, which varieties are taken into account, if the data refer to irrigated or unirrigated cultivation, etc. On the basis of the scarce information available, Liu suggests, in opposition to some other experts, that the pattern of yield responses to fertilizers show an initial stage and improvement of responses would depend on better techniques of application; considering timing, soils and seeds, yield responses would be declining even at present low level of fertilizer application. The fertilizer availability in the last years was as follows:

*Stavis, B., How China is Solving its Food Problem. Bulletin of Concerned Asian Scholars, No. 3 (1975) pp. 22-38.

**Sigurdson, J., Rural Industrialization in China, JEC 1975.

***Chao, K., Agricultural Production in Communist China 1945-65, University of Wisconsin Press, Madison, 1970.

¹See, for example, Chapter 7 in Liu, J.C., China's Fertilizer Economy, Aldine Publishing Company, Chicago, 1970.

Imports, Production and Availability of Plant Nutrients
from Chemical Fertilizer*, 1970-74 ('000 tons)

Year	Nitrogen [*]			Phosphorus ^{**}			Potassium ^{**}		
	Imports	Production	Total	Imports	Production	Total	Imports	Production	Total
1970	1,480	1,562	3,042	...	1,103	1,103	5	116	121
1971	1,475	1,900	3,375	...	1,299	1,299	5	140	145
1972	1,535	2,360	3,895	9	1,439	1,449	5	152	157
1973	1,360	2,880	4,240	83	1,858	1,941	75	168	243
1974	1,000	3,162	4,162	40	1,611	1,651	190	180	370

* Unpublished research findings by H.J. Groen and F.L. Smith, cited by Erishman, in JEC 75.

** To convert to standard units of product divide nitrogen by 20 percent; phosphorus by 18.7 percent; potassium by 40 percent.

Mechanization

As different plans and speeches of Chinese leaders show, the mechanization of agriculture has been a permanent problem for thirty years. The First Five Years Plan already emphasized the importance of mechanization and the Party Congress in the spring of 1978 still mentioned mechanization as one of the largest tasks in developing agriculture. According to the latest program formulated in a long term plan, until 1980 the grade of mechanization of agriculture should reach 70%. This would require a 70% increase in application of middle and large size tractors, 36% in application of garden tractors and 32% increase in energy requirement of irrigation and drainage installations*.

The need for machinery in Chinese agriculture may sound strange if we think of the fact that a high percentage of the labour force is working in this field. Still, since Chinese agricultural techniques are very labour intensive, there is a labour shortage mainly in the peak seasons, when the first crop is harvested and the second one is sown.

In spite of the necessity for mechanization, not very much has been done. At the end of 1960 only on 5% of the country's cultivated land were machines used and on 15% were applied semi-mechanized methods**.

In the 1960's the tempo of mechanization was speeded up (the mechanization of irrigation has already been mentioned) and by 1970 in some provinces 60% of the farm land was cultivated by machinery. In 1974, 20 million hectares (18% of the total cultivated area) was ploughed by tractors***.

So far, the mechanization of agriculture mainly means the usage of tractors; mechanization of harvesting is almost unknown and against forced experiments with rice transplanters, they are not widely used.

Tractors are frequently used in the northern and north-eastern areas, mainly for wheat production. (Here also, machine sowing is developing.) In these areas the middle and large size tractors are used in contrast to the southern paddy areas where small garden tractors are prevalent.

The answer to why China has not had very much success with agricultural mechanization is strongly connected to the changing economic policies of rural industrialization. Domestic production of agricultural machinery was handicapped by the fact that it has been mainly based on local resources where raw material and appropriate technical knowledge were often missing. As both quality and quantity of steel production for instance are still at a low level as well as other metals required for the production being scarce, even the construction of simple machines has been difficult. As a result of decentralization of tractor production, the types produced have been very different, resulting in troubles with

*Peking Review, February 1978.

**Kuo, L.T.C., Agriculture in the People's Republic of China, Praeger Publishers, 1976.

***Stavis, B., Making Green Revolution, Rural Development Monograph No. 2, Cornell University, 1974.

maintenance and supply of spare parts, not to mention lack of skilled personnel.

Machinery imports were generally small. Although in the 50's Soviet tractors were imported, they did not help too much: constructed according to requirements of Soviet agriculture, they have been mainly suitable for working on large plain areas. Thus, they could only be used in the north but not on the southern hilly areas. Even if the Chinese had developed tractors more suitable to local conditions, the mechanization would still have remained a problem, since the majority of the land has not been adjusted to the requirements of mechanized agriculture. (Canals are not properly located, etc.)

Though in the 70's, China again imported agricultural machinery from developed countries (mainly tractors from France and Japan), the main task of mechanization still remains for the domestic production. Unfortunately, we do not know too much about Chinese tractor production, since the units reported have been changed, thus the meaning of given figures is not always clear.

An estimate of the tractor production is given as:

Tractor production (in 15 horse power units)*

	<u>Conventional Tractor production</u>	<u>Garden Tractor production</u>
1965	23,000	875
1970	70,000	9,000
1975	140,000	40,000

These numbers do not show the actual numbers of tractors produced in China, only the converted values to 'standard' tractors. Less is known about the actual number of tractors used, since neither their depreciation nor the capacity utilization is known.

The tractors in use can be estimated on the basis of production statistics and under the assumptions of a lifetime of seven years, as:

Tractors in use, 15 HP units

1966	111,500
1970	178,000
1975	615,000

The imported tractors are not included in this series as data on them are available only in value terms.

*Source--Research Aid: People's Republic of China. Handbook of Economic Indicators, ER 76-10540, August, 1976.

Agricultural research

Agricultural research has developed in an uneven way over the last twenty years. It has been strongly oriented towards the main crops and at the same time the application of results was stressed.

This orientation of agricultural research has led to a fairly peculiar picture: high grain (mostly rice) yields are in contrast to very poor yields of subsidiary crops, for instance soya. Quick and adequate application, wide-spread infiltration of new techniques of production are in contrast to poor basic research.

This situation is the follow-up of the changing policy regarding scientific work.

After the GLF, scientists were forced to take part in the work of huge demonstration fields, which were to bring peasants closer to new agricultural techniques. Though this method resulted in some success, in translating laboratory results to large-scale production, they were unsuccessful in their teaching purposes. Thus, after the Cultural Revolution, the next step has been made. Scientists were sent "down" to the production units, so called extension units, to realize the cooperated work of scientists and peasants. This was a real success from the application point of view, but the almost complete stop on laboratory work has damaged not only basic research but also academic work. The latter is the most serious as over time China has broken connections to the developed countries and all young scientists have been trained at home by scientists who received their degrees either in the Western countries before 1949 or in the Soviet Union in the 50's. Sending these, mainly already elderly, scientists out of the universities and laboratories, not only the current but also the future scientific research was damaged.

Some improvements in this respect have already been achieved in 1972 and for that time a balance between practice and theory has been striven after. Moreover, according to recent information, China plans to send experts with scholarships into developed countries to study new achievements in science and technology. Most probably also agricultural biologists will take part in these delegations.

In spite of all these difficulties in agricultural research, the Chinese, as mentioned earlier, have quite a few good high-yield varieties. As an American expert noticed: "I would not like to have the job of trying to achieve a doubling in Chinese rice yields. Their rice yields looked good."* These high-yield varieties have been developed in China. Although IRRI varieties were bought and experimented with as well, they have not been successful in China

*Cited by D. Perkins in his article: A Conference on Agriculture in the China Quarterly, September, 1976.

mainly because they have a longer maturity period than allowed by the multicropping system used in China. Similarly, Mexican wheat varieties have not been successful either by not fitting into Chinese climatic conditions. High-yield varieties of corn are widely used in the north-east, but there are good varieties of millet available also.

To illustrate results of Chinese agricultural research, Gilbert Etienne's* observations are cited.

Wheat: New varieties, good conditions, 3000-3750 kg/ha (irrigation), 40-63 kg/ha N in a research center; 4500-6000 kg/ha, 76-90 kg/ha N, 70-85 kg/ha P, 60t/ha organic fertilizer.

Rice: High yielding varieties (in a research institute) 6000-7500 kg/ha yield with similarly high application of crop nutrients.

Hybrid Maize: yields 3750-4500 kg/ha in good conditions, but also

Hybrid Sorghum yields 3750-6000 kg/ha under similarly good conditions.

The extension of high-yield varieties and their yields in broader application was estimated for 1974** as:

	Percentage of Area sown to high-yield variety of area sown to crop	Yield m t/ha
Rice	17.4	4.0
Wheat	8.3	3.0
Coarse Grains	2.8	3.0

Unfortunately, we do not know how much fertilizer is used in these areas, only that these data refer to irrigated fields. From other crops similar information is not available.

Summing up, one notices that the development of new high-yielding and disease-resistant varieties and their rapid extension is one of the key factors of China's agricultural future. Since area cannot be extended significantly, only the increase of yields can ensure appropriate agricultural production and this requires new varieties, the support of enough fertilizer and proper irrigation.

*China's Agricultural Development, ed. by G. Etienne. Asian Documentation and Research Center, Geneva. Studies and Documents, Vol. 1, Nos. 3-4, 1974.

**Stavis, B., Making Green Revolution, Cornell University, 1974.

2.3 Crop Production

A major role in China's crop production is played by grains, especially rice and wheat. In addition, barley, maize, millet and sorghum (kaoliang) are widely grown. Chinese statistics also often include potatoes in the grain production, taking one-fourth of the weight as grain equivalent. Actually these crops build the basis of the Chinese diet and are grown on about 80% of the cultivated area. (Also from chemical fertilizers, about 80% is used for grains.) From other food crops, soyabeans, nuts, rapeseeds and other oil crops are important. The most widely grown industrial crops are cotton and other fibre crops. But also sugar, tea and tobacco are considered in this group.

The most widely grown crop is rice, its acreage taking usually about 20% of the total sown area and its production exceeding 45% of total grain production. Almost 1.5 million metric tons were exported in the years 1971-75 on average. The best rice growing areas are in East, Central and South-West China where eleven provinces contribute 95% of the total rice output. The remaining 5% is produced in the northern and north-western areas as a minor crop. In South and Central China, rice is grown in the multiple cropping system: two rice crops followed by cassava, peas, wheat, vegetables or green manures as a third crop. In the northern and north-western parts, rice and wheat are the main crops and three harvests in two years are possible.

Wheat is the most important crop in the northern areas, not only because of its acreage (16-17% of total sown area) but also because of its nutritional role in the diet of the population in these areas. The Chinese diet in the south is based on rice and in the north on wheat; the nutritional habits allow only a very narrow substitution between them. That is one of the reasons why China is forced to import high volumes of wheat (3 million tons on average during the years 1971-75) even if she has high surpluses of rice. Wheat is a low-yield grain in China which occupies 20-22% of the grain area but yields only 11-13% of the total grain production.

As mentioned earlier, south of the Yellow River wheat is grown with rice together (mainly winter wheat). In the cooler areas (north-east) summer wheat is produced, mainly with soybean, millet and maize.

Coarse grains occupy about 12% of the total sown area, contributing about 25% of the total grain production. Millet, sorghum and barley are important food grains in the wheat growing areas, and are grown in poorer soils or in areas where precipitation is low. The main producing area of maize is in North China, but it is grown all over the country wherever climate conditions allow. As with other coarse grains, it is used as food grain but as feed it is also important.

The following table shows how different techniques are used in the grain production and with what results.

Estimates for area, yield and production
of food grain, 1974*

		Sown Area (million hectares)		Yield (Tons/ hectare)		Produc- tion (million tons)	
Rice	regular	25.9		2.7		70	
	safely irrigated	5.9	38.5	3.5	3.1	21	118
	high-stable	6.7		4.0		27	
Wheat	regular	5.2		.8		4	
	unirrigated, mech- anized	4.4		1.0		4	
	safely irrigated, partially mech- anized		30.0		1.5		45
	high-stable	17.9		1.7		30	
Coarse grains	regular	2.5		3.0		7	
	progressive	56.4		1.1		62	
	high-stable	2.3	60.6	2.0	1.2	5	72
		1.7		3.0		5	

For other crops such information is not available.

Potatoes and sweet potatoes are widely grown in the whole country, mainly in hilly areas, on about 8% of the total sown area. They are important supplementary and substituting foods to grains and again broadly used as feed.

Sometimes soybeans and pulses are also taken into account as grains, completing the protein supply of the Chinese diet. Soybean is extremely important in areas where animal proteins are scarcely available for the population. Ninety percent of soybeans are produced in the north-eastern areas, often together with maize and sorghum. Earlier, soybean was one of the most important agricultural export products of China, but over the last ten years exports have declined heavily and once, in 1974, China was a net importer. Soybean is consumed either directly or its oil is pressed out, similar to peanuts which are grown throughout the whole country but mainly in the north. Also broad beans, field peas and other pulses are grown extensively. Some cold resistant varieties are used as a second crop in northern areas.

The main oil crops apart from soybeans are rapeseed and sesame. Rapeseed is grown mainly in South West and Central China and used also as a winter crop after rice. Sesame is mostly planted in the northern provinces.

The leading industrial crop is cotton, occupying about 4% of total sown area and providing about 90% of the clothing fibre requirements of China. The main producing areas are the

*Source: B. Stavis, Making Green Revolution, Cornell University, 1974, p. 286.

Yellow River basin and regions north of the Yangtse. Cotton, after food grains, is the mostly fertilized crop. Though cotton production has always been forced, China is a large cotton importer and cotton textiles are still rationed (about 6 m/year). The second important fibre crop is jute, widely grown in the south-eastern areas.

Tea, the standard drink of Chinese people, is grown in the south-western to south-eastern areas. It is still one of the main agricultural export products in spite of the fact that the area devoted to tea production is less than 0.25% of the total cultivated area.

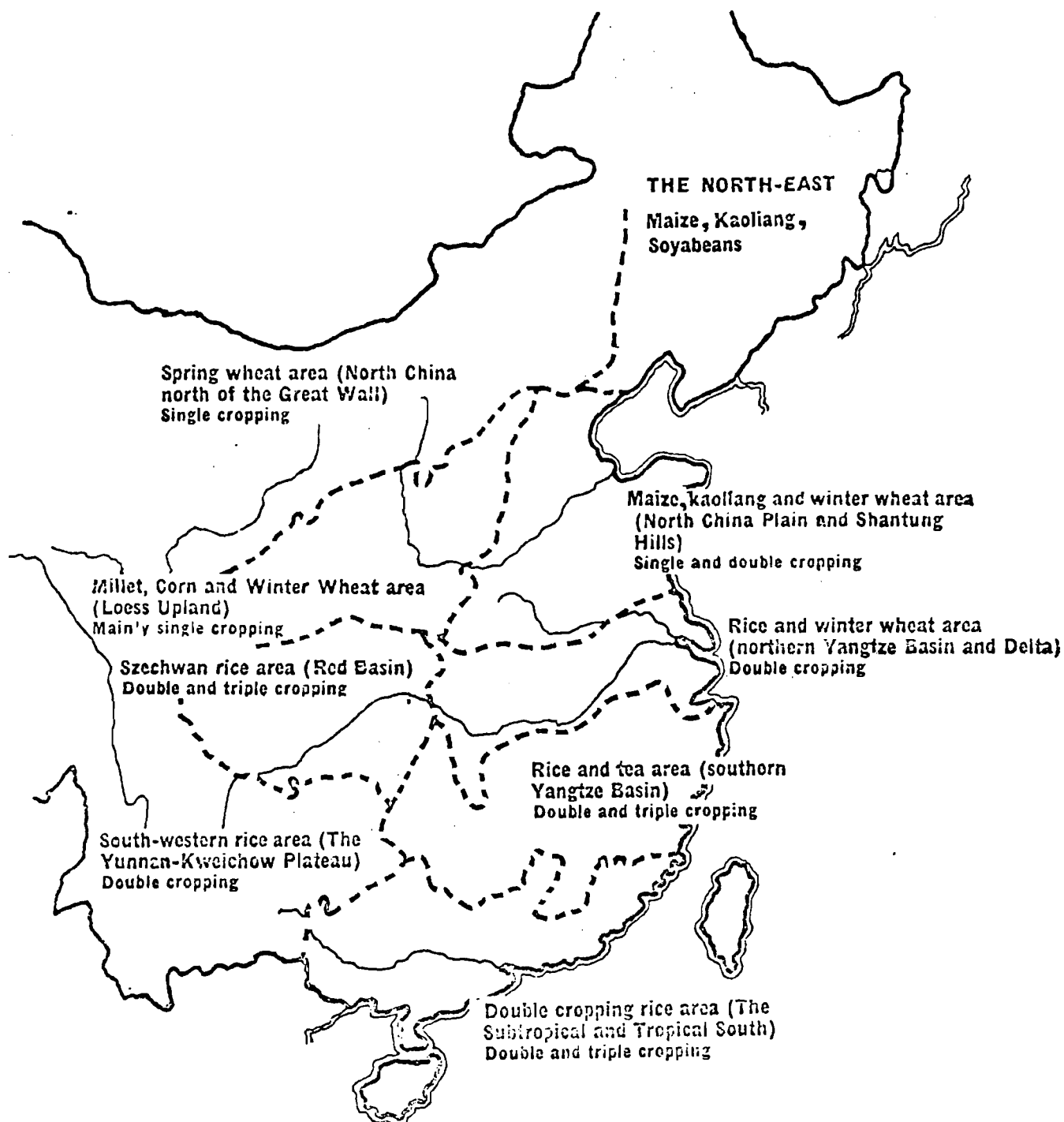
Sugar is also an important product of agricultural foreign trade, although it plays a changing role: in some years China is net exporter, and in other years net importer of sugar. About 85% of sugar comes from sugar cane and 15% from sugar beet.

The regional distribution of the main crops and the main cropping patterns are shown on the following figure* and map* (overleaf).

Regional Distribution of Main Crops in China

Crops	Major Production Regions	Crops	Major Production Regions
Rice	Central & South China	Rapeseeds	Central China
Winter wheat	North & Central China	Sesame	North China
Spring wheat	North-East & Inner Mongolia	Sweet potatoes	Central & South China
Kaoliang (Sorghum)	North China, north-east & northern part of Central China	Cotton	North & Central China
Millet	Western part of North China	Sugar-cane	Central & South China
Maize	Grown all over country, but more important in North China	Jute	Central China
Barley	North & Central China	Tobacco	North China
Soyabeans	North-east & North Shangung, Honan, Kiangsu	Tea	Central China
Peanuts	North China	Silk	Central & South China

*Source: Kung, P., Farm Crops in China. World Crops, May-June 1975, pp. 122-132.



Less is known about vegetable and fruit production. Although there are estimates available for production figures, we have little information about how they are produced. Most probably they play a subsidiary role in the production and are mainly planted in gardens and private plots.

The following tables illustrate the acreages, yields and production of some of the main crops for some years*.

RICE

<u>Year</u>	<u>Area</u> (million hectares)	<u>Yield</u> Kg/ha	<u>Production</u> (million tons)
1960	31.5	2,311	72.8
1965	29.8	3,020	90.0
1970	31.2	3,417	106.6
1973	33.7	3,353	113.0
1974	34.2	3,509	120.0
1975	34.5	3,536	122.0

WHEAT

<u>Year</u>	<u>Area</u> (million hectares)	<u>Yield</u> (Kg./ha.)	<u>Production</u> (million tons)
1960	26.8	784	21.0
1965	25.5	988	25.2
1970	25.6	1,223	31.1
1973	26.5	1,298	34.4
1974	27.2	1,360	37.0
1975	27.7	1,397	38.7

MISCELLANEOUS GRAINS

(barley, corn, millet, oats, pulses, rye,
sorghum and minor grains)

<u>Year</u>	<u>Area</u> (million hectares)	<u>Yield</u> (Kg./ha.)	<u>Production</u> (million tons)
1960	47.2	760	35.9
1965	54.4	1,105	60.2
1970	58.5	1,289	75.4
1973	58.1	1,294	75.2
1974	58.6	1,358	79.6
1975	58.8	1,367	80.4

*Source of all data: China's Agriculture--a Workbook for the Conference on China's Agriculture and Prospects for US trade. The National Council for US-China Trade, Special Report No. 15, November, 1976.

SOYBEAN

<u>Year</u>	<u>Area</u> (1,000 hectares)	<u>Yield</u> (Kg./ha.)	<u>Production</u> (1,000 tons)
1960	9,300	882	8,200
1965	8,100	844	6,840
1970	8,000	862	6,900
1973	8,500	941	8,000
1974	8,800	1,079	9,500
1975	9,200	1,087	10,000

COTTON

<u>Year</u>	<u>Area</u> (1,000 hectares)	<u>Yield</u> (Kg./ha) (Bales/ha.*)		<u>Production</u> (1,000M.Tons) (1,000 bales*)	
1960	5,300	171	0.78	905	4,157
1965	4,770	346	1.59	1,650	7,578
1970	4,800	416	1.91	2,000	9,186
1973	4,850	526	2.41	2,550	11,712
1974	4,850	516	2.37	2,500	11,482
1975	4,850	495	2.27	2,400	11,023

SUGAR CANE

<u>Year</u>	<u>Area</u> (1,000 hectares)	<u>Yield</u> (Kg./ha.)	<u>Production</u> (1,000 tons)
1960	347	273	9,320
1965	336	438	14,700
1970	400	525	21,000
1973	564	597	33,670
1974	617	638	39,400
1975*	632	729	46,123

* Extrapolated from 1970-1974

‡ Post-1970 figures based on increases equal to population growth, 1.78 percent per annum.

FRUIT PRODUCTION

(million metric tons)

<u>Year</u>	<u>Apples</u>	<u>Pears</u>	<u>Grapes</u>	<u>Oranges and Tangerines</u>	<u>Bananas</u>
1960	305	813	39	457	28
1965	325	850	125	570	176
1970	400	900	134	713	186
1973 [±]	422	948	142	751	196
1974 [±]	429	966	144	765	200
1975 [±]	437	983	147	778	204

2.4 Animal husbandry

Animal husbandry has to perform a three-fold task: to produce meat for human consumption, to supply agriculture with enough draft animals and with enough organic fertilizer.

The most popular meat in China is pork; its proportion in meat consumption has grown in the last years. It also plays an important role in agricultural exports. Hogs are bred all over the country--rural families are encouraged to keep at least two pigs. If a family is able to keep more pigs they receive meat extra to their meat ration. The other use of pigs is also very important: they are considered as moving fertilizer factories. This is still important, as according to some estimates in the 60's, 60% of grain production was dependant on organic fertilizers*.

Sheep and goats are mainly kept in the pastoral regions of Inner-Mongolia, Tibet, etc., where they provide the population not only with meat and milk but also with wool and shelter.

From draft animals, cattle and buffalo are the most popular with cattle kept mainly in the north/north-eastern regions and buffalo in the south. (One north-eastern province, Heilungkiang provided one-fourth of the total dairy products in 1976**.)

Estimates of animal population mainly rely on computations considering feed requirements and feed availability (both concentrated and roughage) and draft-power requirement and capability***, and on generalization of some regional data.

*Dawson, O.L., Communist China's Agriculture, Praeger N.Y., 1970.

**People's Republic of China Agricultural Situation, USDA ERS Foreign Agricultural Economic Report No. 137, July 1977.

***See Dawson, *ibid.*

LIVESTOCK INVENTORY*

(thousand head)

<u>Year</u>	<u>Cattle</u>	<u>Buffalo</u>	<u>Hogs</u>	<u>Sheep and goats</u>
1960	42,180	10,540	87,533	98,069
1965	48,660	12,070	126,680	115,000
1970	57,000	15,000	163,000	130,000
1973	61,750	15,815	217,749	138,751
1974	63,384	16,096	239,574	142,123
1975	65,134	16,383	269,119	145,274

There is a tendency towards increasing the number of draft animals although their number/sown ha seems to be declining. Also, a shift may be assumed to horses and mules from cattle, the latter being used more for purposes of dairy production. Plants for processing of animal products are to be extended.

3. FOOD CONSUMPTION3.1 Income distribution and price structure

When dealing with incomes in China, at first one should emphasize that this is one of the fields where the most serious lack of information exists. The first difficulty arises from the fact that the distribution of the national income between consumption and investment, government and personal consumption is not known. (Some estimates were given in chapter 1.3.) But not only the level of incomes is not known; there is an uncertainty also about their distribution.

Though this question has only limited importance in China where, not only by theory, but also by practice, high income differences do not exist, some moderate differences however do occur and their reasons can be explained.

There are both inter- and intrasectoral differences. Similarly to other developing countries, and mainly as a result of the economic policies of the early 50's, rural incomes on average are lower than urban ones.

Intrasectoral differences in the agriculture can be explained by the different natural resources and conditions with which the essentially independent productive units are confronted. In the industry the distribution of investments among different branches is important from this point of view. Unfortunately, we do not

* Source: China's Agriculture--a Workbook for the Conference on China's Agriculture and Projects for U.S. trade. The National Council for U.S.-China Trade, Special Report No. 19, Nov. 1976.

know too much about the decision structure which is decisive in this respect. This would be of importance insofar as high development in a given industry usually induces higher incomes and these industries in China are traditionally located in the coastal areas. Thus, not only an intrasectoral but also a regional inequality in income distribution can occur, if the state supports investments in several industries either directly or by investment loans, or by other financial means. This income inequality, however, may be necessary to force production in some key industries.

As mentioned, the rural-urban differences were highly influenced by the forced industrialization during the first Five Year Plan, in the early 50's, when agriculture had to support the industrial development. In both sectors the produced values added were strongly collected by the State and transferred to industrial investments.

This preference was also shown by the price structure: high industrial retail prices were confronted with low agricultural purchasing prices. The retail margin of agricultural products was high, which also enabled the State to concentrate on sources to invest in key industries.

After the GLF, when economic policy has changed and agriculture has become the basis for development, this also changes significantly: agricultural purchasing prices are continuously but modestly increasing and industrial prices are stable or, as for instance in the case of most agricultural inputs, slightly declining. The terms of trade have changed in favor of agriculture.

The income schemes are as follows: industrial workers receive their wages according to an eight-scale wage system, which did not change very much between the early 60's and 1977. The average annual real wage increases in this period only about 7%*. The proportion of the highest and lowest wages (managers, top technicians, etc. versus unskilled workers) was about 5:1.

In 1977, general wage increases have been carried out. There is still an open question of how much wage differences occur among different industries and different regions; how far the state prefers equality of income distribution against importance of economic efficiency in a given industry. It seems to be general that workers' wages do not strictly follow the increase of their productivity.

As agricultural productive units are more or less independent since 1961, the income differences within the agricultural sector might be higher due to the natural differences among communes. (Although taxes may still play a modest equating role.)

*Lardy, N.R., Economic Planning and Income Distribution in China. Current Scene, November 1976, pp. 1-13.

The income distribution system within the production team and the means of motivation may differ among teams, which, at least in principle, decide about this themselves. But there may also be differences among how income tax and the amount of grain deliveries are determined by the state, which determines the amount of distributable income. This often depends very much on political considerations, on economic pressure, etc. Obviously the income of the individual depends on these two factors: how much from the gross income can be distributed and how this distribution happens, according to which principles.

The system of determining how much the team can distribute among its members is usually the same in the different regions. Authorities estimate at first how much grain the given team could produce, taking into account its production capacity and assuming average weather. Computing the food and feed requirements, the amount of grain which should be reserved for seed and security reasons and the amount of grain which corresponds to the agricultural tax, the surplus production is established. One part of the excess grain has to be delivered to the state at a fixed (relatively low) price, but the team is expected to sell grain additionally, for a premium price as well. To increase their monetary income, teams sell to the state oilseeds, cotton, and other products to marketing organizations.

Thus teams have a given amount of grain for their own use, and a given monetary income. Subtracting from these the amounts needed to pay administrative officials, eventually credit rates, the shares allocated to capital accumulation, social and security funds and the payments to production expenses, the remainder can be distributed among the members.

As mentioned, the motivation and distribution system within a team has been highly influenced by the actual political situation. However, most probably those distribution systems have been used in the last years which mostly consider the labor contribution to production. (There were also cases when distribution happened equally to each member, or according to their needs.) The labor contribution is usually measured by the working point system. But this system can be constructed differently, a working point may have different meanings: just one labor day, independent of the quality of the labor, or taking into account the abilities (and perhaps ideological attitudes, etc.) of the given person. Thus, even within a measurement system, which reflects performances, egalitarian or performance oriented, etc., tendencies may exist.

According to the last developments in China, a more performance-stressed distribution system can be expected.

As no general data are available, some examples from industry and agriculture might indicate the income levels. (As they are collected from foreign visitors on their trips to China, one can assume that these incomes are above average ones, since usually

visitors feel that the production units which are shown to them are above average ones.) J. Prybyla* gives some income data for 1974. In modern industry plants he visited, the average monthly wage was between 50 and 80 yuans. In contrast to this, the average annual money income of a member of a rural commune was 400-500 yuans. Prybyla assumes that the average monthly industrial wage might be about 50 yuans, members of rich communes may get 42 and those of the poorest communes 12 yuans monthly.

A direct comparison of incomes in the two sectors is not possible, however, since commune members receive payments also in kind, and can have private plots on which they also produce for sale.

The price structure of goods is determined by the state in such a way that it also plays an equating role.

Prices of grains, edible oils and cotton textiles are fixed and strongly controlled by the state, although regional differences exist. Some agricultural prices are set changing during the different seasons to influence the timing of supply.

Both industrial and agricultural prices are stable, the retail prices have increased only 15% between 1952 and 1974!* As mentioned earlier, the terms of trade between industry and agriculture have changed in favour of the latter: as the purchasing price of farm and sideline products have increased about 8.4% between 1965 and 1974 and the rural retail prices of industrial products have declined 7.4% in the same period.** (Fertilizers, etc., agricultural inputs have become cheaper.) It is necessary to notice that the food retail prices have not increased with the purchasing prices: the retail margin has become smaller.

Some retail price data for industrial products and food items are also published by visitors to China. Unfortunately they are not of general character since they rely on personal experiences in a given department store in a given city and it is known that prices are not the same in different cities.

According to the calculations of W. Klatt***, an average urban family spends about 60% of its wage income on food. Though this seems to be very high, one should not forget that the effective income in China is higher than wage income, since people enjoy different social benefits. The health care system is free for industrial workers but also in rural communes all members are covered by full medical insurance. Also benefits like subsidized meals at factories, subsidized housing and public transportation, etc., increase the standard of living.

*Prybyla, J., Income and Prices in China. Asian Survey, Vol. 15, (March 1975) No. 3.

**Schran, P., China's Price Stability. Journal of Comparative Economics, Vol. 6, No. 5, May 1978.

***Klatt, W., Cost of Food Basket in Urban Areas of the PRC. The China Quarterly, June 1977.

3.2 Food distribution and marketing system

When agricultural production units are more or less independent and thus income differences do occur, the food distribution and marketing system of the Chinese State has also to play an equating role. The basic principle in China is that the basic food needs of all people should be satisfied. This is linked with the task of supplying different regions with each others' products and the supplying productive units with inputs and people with consumer goods with industrial origin. These are actually the functions the Chinese marketing system has to fulfil.

The basic tool of insuring the adequate minimum food supply of population is the state monopoly of trade with grain, oilseeds and cotton, i.e. in the products which are rationed. The State Purchasing Organizations collect the agricultural tax, paid in grains, the grain quotes what the communes have to deliver to the state at a fixed price and surplus grain sales, for which communes receive a premium, about 20-40% of the fixed price. Thus, in 1975 for instance, 20-30% of grain production* was flowing through this market channel. The State Purchasing Organization keeps contact with the communes and brigades, with the supply and marketing cooperatives in the countryside, with the municipal food companies and with the central storages.

The supply and marketing cooperatives are responsible for supplying the rural populations with all food products, except grains and oils, with consumer goods and inputs needed to the production. They operate in the commune and/or brigade level and are supervised by the county authorities. Thus, transport requirements are minimized and people can be supplied in the shops of their own brigade or commune.

These cooperatives also keep contact with municipal food companies in order to ensure the food supply of urban population. They also create and supervise direct delivery contracts between city shops and brigades at a specified quality and price. Both supply and marketing cooperatives and municipal food companies have a monopoly in trading products they handle in the area of their activities.

The state and cooperative trading system is completed by export companies which have connections to the three agencies discussed above.

There are also private markets and fairs in China where peasants can sell and buy products from their private plots, or products of collectives not under contract. Although there has been a long discussion about the capitalistic nature of these markets, they are still important in supplying the population with products of high nutritional importance (e.g. fruits). The prices on these markets are maximized and strongly controlled.

*Abbot, J.C., Food and Agricultural Marketing in China, Food Policy, November 1977.

Through this marketing system, China has succeeded in supplying her population at a modest but solid level. The rations of grain (833-976 grams of rice or wheat per day for heavy laborers and 417-458 grams for residents and children over 10 years)*, the 0.25 kg cooking oil per month and about 6 meters of cotton cloth per year per capita** meet the basic needs.

These rations are not strictly equal all over the country; they are adjusted to climatic conditions, traditional consumption patterns and, to some extent also, depend on the richness of the given commune. Most visitors of China observe that people look well-fed and well-dressed in contrast to most other developing countries.

3.3 Food consumption

Chinese food consumption is usually dealt with as average per capita consumption. This approach uses some estimates of total food consumption (since no consumption data are available), and some population estimates. Accordingly, the results can be highly different, depending on the estimates used.

A deeper analysis of the development of food consumption is hindered by the fact that neither personal income, nor consumer expenditure data are available.

The average per capita consumption data include biases stemming not only from the fact that incomes - as discussed in Chapter 3.1 - are different in different regions and economic sectors, but also consumer habits are different due to the huge size of the country, and diverse climatic conditions.

In the north, for instance, the main grain-food consumed is wheat, supplemented by maize and other coarse grains; in the south rice is the base of the diet; and the two basic grain foods are only very limited substitutes for each other. There is also some information available about differences in consumer behavior between urban and rural areas. Due to the income differences between industrial and agricultural sectors in urban areas, meat consumption is higher, grain consumption is lower than in rural areas.

Though there is an estimated food basket for urban areas available*** the generalization is not possible, since another example**** shows that even in neighboring areas the pattern of calory intake

*Wang, V.L., Food Distribution and Guarantee for Nutrition and Health: China's Experience. Milbank Memorial Fund Quarterly, 54, No. 2, 1976

**China: Man, Grains and Machines--Agricultural Growth and Prospects. G. Etienne (ed.), ASian Documentation and Research Center, Studies and Documents, Vol. 2, Nos. 3-4, 1977.

***Klatt, W., Cost of Food Basket in Urban Areas of the PRC. The China Quarterly, June 1977.

****Walker, K.R., Grain Self-Sufficiency in North China. The China Quarterly, Sept. 1977.

from grain consumption has changed very much in the last 20 years. In one of the provinces examined in the study, it has declined by 0.4%, while in the two other it has heavily increased (13% and 6.6% respectively). Since such shifts in other products and regions must also have occurred, any generalization of some micro-level data can be very misleading. Thus the average per capita consumption of whole China, even if it is a poor picture of consumption patterns, is still the most trustworthy figure.

Our calculations are based on the FAO Supply Utilization Accounts. Three population estimates were considered: the high and low variant of the US Dept. of Commerce and the medium variant of the UN population estimates.

Grain consumption was computed for three groups of grains: wheat, rice and miscellaneous grains. The last group includes barley, maize, oats, sorghum and millet.

The results for the three population estimates are as follows:

Wheat Consumption, kg/capita

Year	USDC High	USDC Low population estimate	UN Mid
1968	28.57	29.11	30.80
1970	30.57	31.37	33.53
1972	31.89	33.00	35.59
1974	32.79	34.34	37.16

Rice (milled) Consumption, kg/capita

1968	60.64	61.80	65.38
1970	65.07	66.77	71.38
1972	61.67	63.82	68.83
1974	63.73	66.76	72.24

Miscellaneous Grains Consumption kg/capita

1968	32.65	33.27	35.20
1970	35.37	36.29	38.80
1972	33.89	35.07	37.83
1974	35.23	36.91	39.94

This means that the total grain consumption per capita is as follows:

Total Grain Consumption, kg/capita

1968	121.86	124.18	131.38
1970	131.01	134.43	143.71
1972	127.45	131.89	142.25
1974	131.75	138.01	149.34

These figures are of course much lower than those generally used for Chinese grain per capita figures, as they usually are computed on the base of grain output per capita and are not corrected for wastes, feed usage, and feed consumption. (This latter approach can be supported by the fact that the grain ratio for peasants usually also includes the grain they use as feed for their animals.)

Meat consumption includes cattle and buffalo meat, sheep and goat meat, pork and chicken, including edible offals as well. Unfortunately we have no data about fish catches, thus we were not able to estimate fish consumption. This would increase the meat consumption significantly, as the fish consumption of the urban population is 0.5 - 1 kg/month*. (This is definitely higher than the average since most of the large cities lie in coastal areas.)

Meat Consumption, kg/capita

Year	USDC High	USDC Low	UN Mid
	population estimate		
1968	16.76	17.09	18.09
1970	16.53	16.96	18.15
1972	16.33	16.90	18.23
1974	16.37	17.15	18.55

About 20% of this meat consumption is bovine meat (including sheep and goats), 62% is pork and the rest is chicken. The proportion of bovine meat consumed is declining while the proportion of chicken is increasing. Pork is relatively stable.

Edible oil consumption includes consumption of vegetable oils (soybean, rapeseed, olive and cottonseed oils, etc.) and also lard, taking into account their oil and fat content (i.e. the figures refer to pure oil and fat consumption).

*China: Men, Grain and Machines, ed. by G. Etienne, Asian Documentation and Research Center, Studies and Documents, Vol. II, Nos. 2-3, 1977.

Consumption of Edible Oils and Fats kg/capita

Year	USDC High Population Estimate	USDC Low	UN Mid
1968	3.67	3.74	4.03
1970	3.95	4.06	4.41
1972	3.87	4.00	4.39
1974	3.86	4.04	4.45

In addition, about 0.5 - 1.0 kg of fish is consumed per month* and 15 - 17 kg of fruits and vegetables. Some eggs (ca. 0.3 kg eggs per month) and a small amount of dairy products improve the Chinese diet.

Chinese people, according to the observations of visitors to China are well-fed, and supplied with food on a low but acceptable level.

*China: Men, Grain and Machines. Agricultural Growth and Prospects. Edited by G. Etienne, Asian Documentation and Research Center, Studies and Documents. Vol. II, Nos 3-4, 1977.

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