

Food Problems and Outlook in China

Ke Bingsheng*

Abstract

China's food and agricultural sectors have experienced dramatic changes over the past two decades. The introduction of reform policies has substantially improved food supply situations. The Chinese people have never before faced such an abundant and diversified food market. Even nationwide surpluses in farm products occurred in the mid-1980s and the early 1990s.

However, looking into the future, there are still great challenges. Factors including population expansion, fast rising income and aspirations, resources depletion and degradation must be considered. The price hike of agricultural products and the associated high inflation in 1993/94 have challenged the over-optimistic atmosphere in the surplus period of 1991/92. Great concern arose again among agricultural administrators and the general public about the future agricultural growth potential and food security.

This paper reviews representative and controversial projections on the future food and agricultural issues in China. Through the identification and analysis of the major influencing factors, the author tries to narrow the wide gap between the various projections and provide a personal estimation on the most probable and likely development trend in China's food market and policy options in the decades to come.

An overview of various projections

A large number of analyses and projections on China's food future have been made, by both Chinese and foreign scholars and institutions. Most of the studies have concentrated on the grain sector, for grain is the decisive food issue in China. Projections of China's future grain demand, production potentials, and import needs in the coming decades vary considerably, due to differences in assumptions, data and estimation approaches (Fan *et al.*, 1996).

Some representative research results for the years 2,000, 2,010, and 2,030 are summarized in Table 1. It is obvious that there is no consensus either on production, or on demand. The resulting imbalances, or import needs, vary considerably. The gap between the most pessimistic and optimistic views is almost 80 million tons for the year 2,000, 111 million tons for the year 2,010 and over 300 million tons for the year 2,030.

Nevertheless, consensus does exist on the following: (1) demand will increase continuously over the next three decades; (2) supply can not keep pace with demand, and thus, (3) an ever rising import demand will occur.

* China Agricultural University, P. R. China

Major factors influencing production

It is difficult to determine the accuracy of the various projections, because there are many uncertain variables involved in the projections. The many uncertainties make the projected figures no more than rough estimations or guesses. However, certainties do exist for some factors that will significantly influence the demand, supply and trade of food in China. Through the analysis of those factors, helpful hints can be obtained for a better understanding of the future development trend.

1 Areas

The currently used official figure for cultivated land in China, 96 million ha is derived from the data from State Statistical Bureau (SSB). It is significantly underreported. The actual figure should be 124 million ha, or 29.5% higher than SSB data, according to the land census figures released by the State Land Administration (SLA, 1992).

The primary reason for the underestimation is that most of the newly reclaimed farm-

Table 1 Grain projections for China (million tons)

A. For the Year 2000

Source	Demand	Production	Import need
USDA	387	362	25
World Bank	420	411	11
Huang <i>et al.</i>	547-592	500	50-90
OECD	507	483	24
Ma Xiaohe	512	500	12
Cheng Xikang	510-525	480-510	15
Hu Angang	520-560	480-525	40

B. For the Year 2010

Source	Demand	Production	Import need
World Bank	502	483	22
Huang <i>et al.</i>	513	486	27
Rosegrant <i>et al.</i>	468	453	15
OECD	648	512	136
Mei Fangquan	600	580	20
Ma Xiaohe	603	581	22

C. For the Year 2030

Source	Demand	Production	Import need
Brown	479-641	272	207-369
Chen Xikang	725-780	675-725	50
Alexantratos	620	570	50

Note: Definition of grains in the table varies with the authors. Brown, World Bank, Huang *et al.*, Rosegrant *et al.* and Alexantratos use USDA's definition, which includes wheat, rice (milled) and corn and other coarse grains. All others use China's SSB definition, which includes the commodities in the USDA definition plus potatoes in grain equivalent (ratio of 5 to 1), soybean and pulses.

Sources: Garnaut and Ma, 1992; Mei *et al.*, 1995; OECD, 1995; Brown, 1995; Fan *et al.*, 1996, Alexantratos, 1996; Huang *et al.*, 1997.

land had not been included in the statistics. Farmers and local governments tend to underreport the land areas, in order to lessen the quota procurement burden, to reduce taxes, and to exaggerate yield levels, which often is seen as an important indicator for the performance of local agricultural administrators. Given a relatively reliable report of production, the underreport of areas suggest that yields are overstated.

Continued tendency in the decrease of cultivated land has been observed in the past two decades. During the period from 1978 to 1994, a total of 15 million ha of cultivated land was removed from crop production. Taking newly reclaimed land into consideration, the net loss was reduced to 4.5 million ha. Only a fraction of the shrinkage of the cultivated land is associated with non-farming purposes. The major part is caused by the expansion of fishery uses, planting rotation and reforestation, etc. Inland artificial fishery production has been increased by nearly 10 times over the past 16 years.

The effects of the decrease in the cultivated areas are further offset by the increase of the cropping index, from 151% in 1978 to 156% in 1994, reducing the net loss of sown areas to 1.9 million ha, or 1.2 % in the 16-year period. Sown areas for grain crops fell more remarkably by 9%. This is less the result from farmland loss, but rather due to a significant expansion of areas for cash crop (oilseeds, sugar, tobacco) and vegetable cultivation and fruit tree planting. Grain share in the total sown areas fell from 68% (81% in SSB grain definition) in 1978 to 59% (74% in SSB grain definition) in 1994.

In the process of rapid economic development, it is inevitable that more farmland will be taken away for non-farm uses. Extrapolating the farmland loss figure in the past 15 years for the future, a net loss of 4 million ha, or 3% of the current farmland area, can be expected by the year 2010. This is most likely to be offset by the increase in the cropping index.

2 Yield

Theoretically and statistically, there is still a great potential for China to increase grain yields. The comparable yield levels for grain as a whole, wheat, corn and rice are all significantly lower in China than in advanced economies as indicated in Fig.1 (Calculated based on

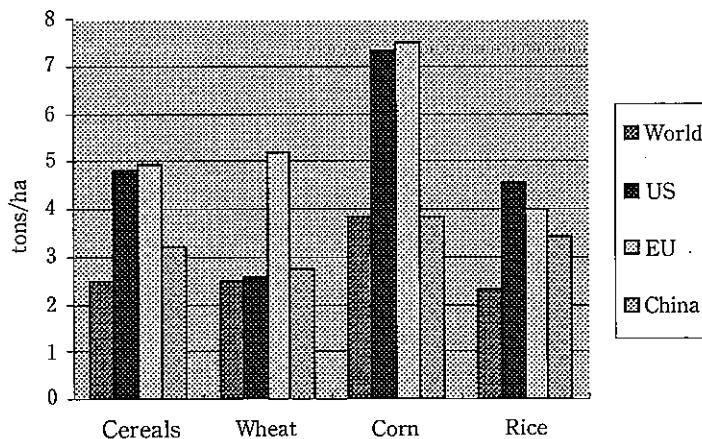


Fig. 1 Grain Yield Comparison (1990-95)

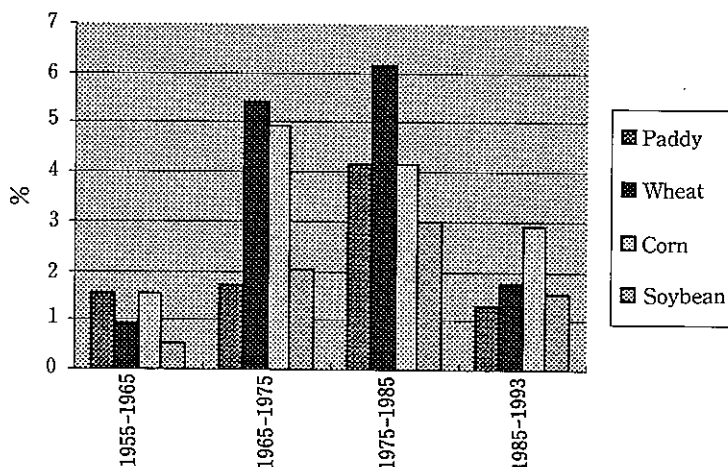


Fig. 2 Annual Grain Yield Growth in China

SLA area data). Taking grain as a whole, yields in China are only around 65% of those in US and EU. The wheat and corn yields in China are 50% of those in EU and in US, respectively. The yield gap for rice is smaller, with the Chinese level being 75% of that in US.

Grain yields had risen markedly in the two decades prior to the mid-1980s, with an annual growth of 3-5%. However, the growth rate then slowed down to around 2% for the last decade, as depicted in Fig. 2, which indicates increased difficulties in realizing the yield growth potential. Whether this potential can be realized depends on a number of factors. Price or price ratio between grain and other farm products will affect the share of areas allocated to grain production which implies that if grain prices rises sharply in case of serious shortage, more areas could be shifted from cash cropping into grain production. Rise in food prices will also promote capital-intensive farming, including greenhouse farming and irrigated farming in arid regions.

Constraints on production growth

Major constraints for realizing this potential include insufficient funding for agricultural research, problems in technical extension, insufficient investment in agriculture, and unfavorable farm production structure as well as insufficient economic incentives.

1 Low quality of farmland

For a large country like China, the average yield figures may be misleading. In the plain with favorable natural conditions and in the rain-fed regions, grain yields are much higher than the national average which leaves less room for improvement. The low-yielding areas are generally located under rather poor geographic and natural conditions, including areas suffering from heavy soil erosion in Loess Plateau, in mountainous Southwest and Southeast China, arid and semiarid areas in Northwest China. Due to heavy population pressure, land unsuitable for cropping at all has been exploited by farmers for grain production in many areas. This kind of land gives only marginal yields and also damages the ecological systems.

Areas with water erosion continued to increase by an annual rate of 3% in the past decade. The huge investment needed to improve these conditions is too high to be considered realistic in the foreseeable future. Water shortage is another very critical problem. In the North China plain, irrigation depends heavily on non-renewable groundwater resources, resulting in a continuous decrease of the groundwater level as much as over one meter per year in some areas.

2 Weak response to fertilizer input

Fertilizer input has increased continuously at a rapid pace over the past decade, but only with a weak yield response. During the last decade, chemical fertilizer input doubled, or increased by 7% annually. Crop production, especially grain production, has responded very weakly at only 2% annual growth rate. The intensity of fertilizer input is especially high in the eastern provinces, with over 600 kg/ha effective components of N, P and K. The excessive chemical fertilizer input is also causing increased concern about negative environmental effects.

3 Insufficient investments

Great efforts have been made in increasing government investment in agriculture. However, investment is still far from sufficient. The major inland grain-producing regions are also the weakest provinces in terms of government revenues. Some local governments experience such a poor financial situation that they have to mobilize every cent available first to pay salaries to the government employees. The share of agricultural investment has already been as high as over 15% in the local governmental expenditures. It is unrealistic to raise the share further.

4 Small-scale farm structure

China has a small-scale farm structure, with an average farm size of 0.5-1.0 ha. This small-scale farm structure associated with the high illiteracy rate of 30% in rural population makes the extension and application of new technology very difficult in China. Small farm scale affects the economic incentives of the farmers in making every effort to increase marginal production, for a relative high percentage increase in yield will bring about only a small absolute economic return in value. Given such a small-scale farm structure, it is also difficult for individual farmers to obtain commercial loans for agricultural investments due to the low credit and high administrative costs.

Major factors influencing demand

On the demand side, major influencing factors include population growth, changes in population structure, per capita income growth, changes in subsidy policy, foreign exchange and transportation capacities.

1 Population development

Population expansion will be the primary driving force for China's future food demand.

The average annual population growth for the past decade was 1.4%. If this trend continues into the next 35 years, China's population will then reach 2.0 billion by the year 2030. The Chinese government has set a high population control goal, according to which the total population should be 1.4 billion in 2010, 1.5 billion in 2020, and 1.6 billion in 2030. Whether this goal can be achieved will have a substantial impact on food demand growth and hence the Chinese food balance in the future. The high population growth scenario implies that 25% more food will be required compared with the low population growth scenario, with other things being equal. Given a grain consumption level of 400 kg per capita, 160 million tons of additional grain are needed. How China is able to implement her population control policy will play a crucial role in her future food balance.

2 Changes in population structure

Due to the rural-urban migration, the urban population growth was higher than the national average, and registered an annual rate of 3.4% over the past decade, resulting in a rising share of urban population from 23.7% in 1985 to 29.0% in 1995. If this trend continues into the next 35 years, the urban share will be nearly 50% by 2030, which will further increase the food demand and change the food demand structure, i.e. less food grain and more feed grain. As shown in Table 2, the urban residents and rural residents show significant differences in food consumption patterns. Generally speaking, urban population has a high food and grain(including direct consumption of food grain and indirect consumption of feed grain through livestock products) consumption level due to higher income and other factors.

3 Income growth

The per capita disposable income deflated has increased by 165% for the urban and 120% for the rural households since 1981, as indicated in Table 2. The average annual growth rates were 7.2% and 5.8%, respectively. Given a positive income elasticity for food, the income growth exerts additional pressure on food demand. There are various estimations on the income elasticity of food demand in China, and they vary markedly from one to another. The only consensus of the findings is that the income elasticity for grain is much lower than that of animal products. Taking both food grain and feed grain into consideration, further income improvement will definitely enhance the total grain demand.

However, it seems that the income effects on food demand increase in China are not as conspicuous as many people believed. As indicated in Table 2, per capita food grain consumption has fallen significantly in urban households, and has stagnated in rural households since 1980. Vegetable consumption has declined for both the urban and the rural residents, which reflects largely a shift from low quality vegetables toward high quality varieties. In contrast to the general assumption that meat consumption exerts a significant impact on income, the per capita meat consumption has shown only weak responses to income growth, with less than 20% growth for the urban residents and 40% for rural residents over the whole period of 1981-1995, in spite of the substantial income improvement. One possible reason for this weak income response is the reform policies in other economic sectors, which have eliminated various subsidies to the consumers and thus resulted in higher food and non-food costs. The medical care reforms, housing reform and education reform are examples among many

Table 2 Food consumption in China

(unit : kg/per capita)

Year	Urban households							Rural households						
	Income in 1980 (Yuan)	Grain	Vegetables	Edible oil	Meat	Eggs	Fish	Income in 1980 (Yuan)	Grain	Vegetables	Edible oil	Meat	Eggs	Fish
1981	414	145.4	152.3	4.8	20.5	5.2	7.3	202	217.6	124.0	3.1	9.4	1.3	1.3
1982	438	144.6	159.1	5.8	20.9	5.9	7.7	239	221.0	132.0	3.1	9.8	1.4	1.3
1983	459	144.5	165.0	6.5	22.4	6.9	8.1	271	221.0	131.0	3.5	10.8	1.6	1.6
1984	516	142.1	149.0	7.1	22.7	7.6	7.8	302	227.0	140.0	4.0	11.6	1.8	1.7
1985	535	134.8	144.4	5.8	22.6	6.8	7.1	310	218.5	131.1	4.0	12.0	2.0	1.6
1986	610	137.9	148.3	6.2	25.3	7.1	8.2	312	220.2	134.0	4.2	12.9	2.1	1.9
1987	629	133.9	142.6	6.4	25.3	6.6	7.9	318	220.2	130.0	4.7	12.8	2.3	2.0
1988	648	137.2	147.0	6.7	23.8	6.9	7.1	316	221.0	130.0	4.8	12.0	2.3	1.9
1989	620	133.9	144.6	6.2	23.9	7.1	7.6	296	222.7	133.0	4.8	12.3	2.4	2.1
1990	668	130.7	138.7	6.4	25.2	7.3	7.7	330	222.7	134.0	5.2	12.6	2.4	2.1
1991	723	127.9	132.2	6.9	26.6	8.3	8.0	332	217.6	127.0	5.7	13.5	2.7	2.2
1992	811	111.5	124.9	6.7	26.5	9.5	8.2	348	213.4	129.1	5.9	13.3	2.9	2.3
1993	917	97.8	120.6	7.1	24.5	8.9	8.0	362	226.1	107.4	5.7	13.3	2.9	2.5
1994	1025	102.0	121.0	7.7	24.4	9.7	8.6	394	218.5	109.0	5.7	12.6	3.0	3.0
1995	1093	97.0	118.6	7.6	23.7	9.7	8.8	443	220.2	104.6	5.8	13.1	3.2	3.4

Note: Converted from row grain to commercial grain, assuming 50% of the consumption consists of paddy and 70% mill rate of rice

Source: SSB, *Statistical Yearbook of China*, various years.

MOA, 1996, *China Agricultural Development Report*, Agricultural Publishing House of China.

others. This will still hold true in the future, as more market-oriented reform measures will be adopted and the income effects on food demand will be partially reduced. For the urban resident, the decline in food grain consumption over the 1981-95 period was around 40 kg, or largely the same amount to meet the 10 kg growth in meat, egg and fish consumption in the same period.

4 Price, foreign exchange and transportation

Prices for agricultural products in China have been lower than world market prices. However, the price hike in 1994/1995 has changed the situation. Since the summer of 1995, prices for all grain varieties in China have become higher than the comparable world market prices. Currently, grain prices in China are largely the same as the world market prices. As China is becoming increasingly linked with the world market, the price relationship will be the most important factor for the future food trade in China.

Agricultural trade in China used to be perceived as an important means to earn hard currency to support industrial development. This policy goal of agricultural trade has changed gradually as the overall trade volume of China is growing very rapidly, resulting in a continued decline of food and agricultural share in the export total.

As shown in Table 3, food export increased from 3 billion US\$ in 1980 to 10 billion US\$

in 1995, while food import fluctuated within 2-4 billion US\$, with a peak of over 6 billion US\$ in 1995. The food share in the total export declined substantially from 16.5% to 7% during the 15-year period. Food share in import showed the same tendency, but with a large falling pace. Given the dramatically falling importance of agricultural trade in hard currency earnings and stockpiling of foreign exchange reserves, which registered over 100 billion US\$ by the end of 1996, the major goals of agricultural trade policy are shifting to higher consideration of profit and domestic market stabilization.

It can also be seen from Table 3 that China has enjoyed a food trade surplus since the mid-1980s, even in 1995 when China greatly increased grain import and practically stopped grain export. It seems that China is not only feeding China, but also some other countries in the world.

Policy changes in agricultural trade have taken place in a background of general trade policy reforms. The elimination of export subsidies and merging of the two-tier foreign exchange system are among the most important measures in recent years. These two steps provide the preliminary conditions that paved the way toward a more market-oriented trade policy. In addition, import tariffs have been reduced. Import tariffs for major agriculture-related products including cotton and fertilizer range from 3% to 8%. Grains (wheat, corn and rice) and breeding animals are exempted from import tariffs. Foreign exchange is no longer a constraint for China's food import. However, insufficient transportation capacity is

Table 3 Food trade in China

Year	Export			Import		
	Total	Food	Food share	Total	Food	Food share
	Billion US \$	Billion US \$	%	Billion US \$	Billion US \$	%
1980	18.12	2.99	16.5	20.02	2.93	14.6
1981	22.01	2.982	13.3	22.02	3.62	16.4
1982	22.32	2.91	13.0	19.29	4.20	21.8
1983	22.23	2.85	12.8	21.39	3.12	14.6
1984	26.14	3.23	12.4	27.41	2.33	8.5
1985	27.35	3.80	13.9	42.25	1.55	3.7
1986	30.94	4.78	14.4	42.91	1.63	3.8
1987	39.44	4.78	12.1	43.21	2.44	5.7
1988	47.52	5.89	12.4	55.27	3.48	6.3
1989	52.54	6.15	11.7	59.14	4.19	7.1
1990	62.09	6.61	10.6	53.35	3.34	6.3
1991	71.84	7.23	10.1	63.79	2.80	4.4
1992	84.94	8.31	9.8	80.59	3.15	3.9
1993	91.74	8.40	9.2	103.96	2.21	2.1
1994	121.01	10.02	8.3	115.61	3.14	2.7
1995	148.77	9.95	6.7	132.08	6.13	4.6
1996	151.07	10.23	6.8	138.84	5.67	4.1

Source: SSB, *Statistical yearbook of China*, various years.

still a bottleneck for food import. This is not only true for unloading capacities in harbors, but also the case for inland road and rail transportation. Most of the regions with grain deficit in the central and western parts are mountainous areas, such as Loess Plateau in the North and Yun-Gui Plateau in the Southwest, with a very poorly developed infrastructure.

Food security outlook and policy perspectives

Food security is a long-standing concern for Chinese policy makers. In reply to the increased concern over China's future food problems, the Chinese government issued a white paper entitled "The Grain Issue in China" in October 1996, just before the World Food Summit. The seven-part document provided an overview of the progress made during the past four decades in food supply in China (IOSC, 1996). It estimated the future food demand and the production growth potential over the next three decades. It pointed out the strategies to achieve the goal of self-sufficiency, including increasing investment levels in agriculture, enhancing application of advanced technology, promoting more efficient and sustainable utilization of natural resources, and furthering reforms to provide a better institutional and policy environment.

Generally speaking, the authoritative views expressed in the document are optimistic. A moderate growth in grain demand is predicted, and it is estimated that 400 kg grain (in Chinese definition, i.e., including paddy rice, tubers and beans) per capita will be sufficient to support the food demand by 2030. These predictions are based on the assumptions that the Chinese dieting habits consist of a very diversified pattern and that the consumption of plant products as major suppliers of energy and nutrients will not change significantly; the feed/livestock conversion ratios will increase and as such reduce the feed grain need. The white paper assumes that the elimination of subsidies in housing and medical care as well as a rise in other consumer goods will further lower the income elasticity of grain and food. On the supply side, potential is seen first in further yield improvement. The demand of 400 kg/per capita can be met if the yields increase annually at a rate of 1% in the 1996-2010 period and 0.7% in the 2011-2030 period. Assumed yield growth is substantially lower than the average growth rate of over 3% for the past four decades. Farmland preservation, raising of cropping index, and reclamation of annually 0.3 million ha land resources, estimated at 14.7 million ha in total, will be able to stop the decline in farmland areas and stabilize the grain-sown areas. Further potential exists to increase the productivity in grassland, aquaculture, and forest areas. Reduction by half of post-harvest grain losses, which are estimated at over 10% at present, will also generate 20 million tons more grain for consumption.

The white paper also recognizes the great challenges ahead. The first one is resource constraints. Low per capita level of land and water resources raises more demand for agriculture inputs and investment. The infrastructure is underdeveloped, and the ability of agriculture to withstand unfavorable changes in natural conditions is very low. The small landholders-around half a hectare/per farm on the national average-often make blind production and marketing decisions due to the lack of an efficient information system in the transition process from a planned economy to a market-oriented one, thus tending to exaggerate supply fluctuations. Finally, the industrialization process will inevitably put the agricultural

sector at a disadvantage in competing for natural and economic resources with other sectors of the economy.

A set of policies is mapped out to alleviate the constraints on the increase of production. The first one is to increase agricultural investment to improve the land conditions. Irrigation system will be further expanded to raise the irrigated area from the current 49.3 million ha to 53.3 million ha by 2000, 56.7 million ha by 2010, and 66.7 million ha by 2030, or from 52% to 56%, 60% and 70% in the total cropland area, respectively. Water use efficiency will be raised from 40% to 60%. Irrigation areas with water-saving technology will increase from the current 13 million ha to over 40 million ha. The rate of effective utilization of natural precipitation will reach 30%. The existing 60 million ha of land with low and medium level yields will be upgraded. Agricultural input industry, including pesticide, agricultural plastics, farm machinery, rural electricity and power industries, will be promoted. Domestic fertilizer production capability will be enhanced greatly to meet the increased demand anticipated by the turn of the century. By the year 2000, the share of agricultural investment in the total infrastructure investment of the central government will be increased from the current 17% to 20%. The growth of agricultural expenditure should be higher than that of the government revenue, and the growth of agricultural loans should be higher than the average growth rate of other loans.

Extension of existing and new technologies is seen as another key agricultural policy domain. Efforts will be made to improve the breeding, extension and marketing of new and high-yielding varieties. Seed coating will be spread to cover 50% of the total marketed seeds by the year 2000. Major new and applicable technologies include plastic coverage, precise seeding, integrated pesticide management, appropriate utilization of fertilizer, water-saving irrigation and dry-land farming. Professional training of farmers, reform in agricultural education and research system will be enhanced to improve technical support for farmers.

Grain problem is a food problem by nature. The strategies to address food problems will not only cover the grain sector, but also the non-grain agricultural sectors, including animal husbandry, aquaculture, as well as vegetable and fruit production. The Chinese government plans to improve the productivity of grasslands, to increase industrial feed production, which only processes one-fourth of the feed grain in China, and to tap the potential of non-conventional feed resources such as straw treated with ammonia to increase livestock production. Aquaculture using sea water and fresh water in inland areas is seen as the major way to increase fishery production. Reforestation programs will be further implemented to alleviate the problem of soil and water erosion, to enhance biological and environmental protection, and to increase fruits and nuts harvest.

Further institutional changes and marketing reforms have been enacted. Firstly, the Household Responsibility System will remain as a long term institutional arrangement. Not only the right of use of land under contract will be extended for 30 years more after the original 15-year-contract term expires, but also the land-use right may be inherited and transferred to others against payment, provided that the utilization purpose of the farmland remains unchanged. Secondly, further grain marketing reform measures will be adopted. The regulated pricing system will give way to a pricing system determined by market forces. Elimination of the two-tier pricing system is currently under discussion. The currently regu-

lated inter-provincial grain trading will be replaced by free trade between the surplus and deficit regions according to their needs. The government will use indirect means to achieve market stabilization goal. The state grain marketing agencies will be further reorganized to separate the functions of government and business. Development of intermediate marketing organizations to improve the links between small landholders and market will be encouraged. Thirdly, waste in food consumption will be reduced. Alcohol production, which presently consumes over 20 million tons of grain a year, will be reduced and replaced by a large production of soft drinks and fruit wines. Fourthly, the current market stabilization system will be improved to increase the food security against natural calamities.

China is determined to make every effort to rely on herself to ensure long-term food security for its growing population. However, it does not object to international cooperation and trade. China's agricultural policy makers recognize the need to open up more the domestic agricultural market to meet the requirement for joining the WTO, to be more integrated in the global market to benefit from international cooperation (Wan, 1996). Even for its most important product, grain, China does not pursue a policy of complete self-sufficiency. For the first time, the self-sufficiency goal of grain was quantitatively fixed and set at 95% (IOSC, 1996). In normal years, the net import of grain will be kept under 5% of the domestic consumption. This translates to a net import of 25 million tons of grain presently and 32 million tons by 2030 when the total domestic consumption reaches 640 million tons. According to the many discussions in which the author has been involved with various circles in China, grain imports larger than the 5% target in any individual years in the coming three decades is possible. The most important policy implication of the self-sufficiency statement is perhaps not the figure itself, but the released message that China is willing to keep its grain market open.

Over time, the policy goal of high self-sufficiency may be adjusted. In a global environment of increasing international cooperation, the long-term perspective of world peace, with the improvement in mutual understanding and build-up of mutual trust of policy makers of China with other countries, along with the deepening of domestic market reform and the further liberalization of the agricultural markets, and the increasing awareness of the benefits from trade for optimizing domestic resource use and environmental protection, more free trade policies might be expected. The acceptable self-sufficiency rate of grain may be further lowered, perhaps to 90%. Under a more rational trade policy, China will export more labor-intensive products such as vegetables and other horticultural products, and import more land-intensive products such as grain, as many Chinese and overseas scholars have suggested.

Nevertheless, China's grain imports are unlikely to be very large due to several constraints. First, the real income improvement will slow down as demonstrated in recent years. The reform measures in reducing subsidies for housing, transportation, medical care, education and other social welfare measures for the urban population will substantially offset the income growth effects on food consumption (i.e., higher consumption of livestock products). The large rural population is facing increasing difficulties in raising income through the expansion of farm production. The long-standing underemployment and unemployment in both urban and rural areas have become more and more critical and cast a shadow on the future income improvement, suggesting that the derived demand for feed grain will not grow as fast as some scholars have predicted. In short, China will have no financial problem to buy a

large volume of grain from the world market, but the individual Chinese will not be able to afford a high level of expensive food consumption. Second, the share of agricultural population will remain high in the next three decades and is unlikely to decrease below 50%. The majority of the rural population will continue to rely on themselves to meet food needs. They consume what they produce, and will not rely on food imports. Third, transportation capacity is another constraint. This refers not only to harbor unloading capacity, but also to the inland transportation system. For the vast inland and mountainous areas, the limited transportation capacity and very high transportation costs prohibit large volume of food trade. In the foreseeable future, i.e., in the next two to three decades, this situation can not completely change. Taking all these factors into consideration, it seems unlikely that China will import more than 10% of her food or grain needs in the near and distant future.

Concluding remarks

To sum up, food demand in China will continue to rise due to population expansion and income improvement in the next three decades. The most important factor for the future food balance in China will be the population growth. A less successful population control policy will have much larger effects on food demand than income improvement. Agricultural production could not keep pace with the development tendency of demand due to inevitable resources shrinkage, natural, structural, financial and economic constraints in tapping yield potentials, thus resulting in an increased food deficit.

However, food import would not exceed a certain limit set by constraints on slow real income growth, transportation capacities and costs, as well as policy goals in food sufficiency. It is most likely that the annual grain import, on the average, will not exceed 10% of the domestic consumption, or will range from 20 to 60 million tons annually in the next three decades.

Food price would further rise and consumers would respond to reduce their demand. On the average, consumption level of animal products would not increase as rapidly as some people predicted. The food consumption pattern would not change dramatically as plant products would remain the major food energy suppliers.

The goals of food and agricultural trade have shifted from hard currency earning to more consideration on food security and economic efficiency. Technically, China might be able to feed her increasing population. However, with improved international cooperation and greater emphasis on the principle of comparative advantage, China can be fed better and more efficiently. More and more people involved in the decision-making process for agricultural policy in China have recognized this fact which is the basic reason for being optimistic about the future of marketing policy reform for agriculture in China in the coming years.

It is essential, therefore, to strengthen the understanding and confidence of policy makers in the market mechanism, to build up more trust on the major food trade partners for a long-term and stable cooperation without being threatened by food weapon policy, regardless of economic or political reasons. China will have a more market-oriented domestic agricultural policy given better comprehension and trust of policy makers on market forces. China will open her door for food and agriculture much wider as long as she feels her food security and

national sovereignty are not threatened by world food powers. Both Chinese and overseas agricultural economists can make great contributions toward this goal.

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