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REFORM IN CHINA'S AGRICULTURE

- Trade Implications

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DEPARTMENT OF FOREIGN AFFAIRS AND TRADE
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Introduction

Whether and how a country trades with the world is largely determined by its economic system and government's policies. In market economies, foreign trade is driven by market forces and trade patterns largely reflect such countries' comparative advantage which is based on resource and other endowments. In non-market economies, foreign trade is strongly affected by government economic strategies, including in relation to agriculture. Changes in these policies, due to economic reform, inevitably change such countries' foreign trade regimes and trade performance.

An important role of agriculture in economic development is to generate savings for industrialisation by producing cheap 'wage goods' (eg. food) and raw materials to maintain a profitable industrial sector and low-cost exports to exchange for imported capital goods. The agricultural sector also supplies surplus labour to the industrial sector. It is therefore crucial for economic development to ensure a continuous increase in agricultural productivity and competitiveness to underpin industrial growth.

There is a close relationship between the Chinese government's agricultural policies and China's trade in agricultural products. China's economic reform began with agricultural liberalisation. Between 1978 and 1983, agricultural reforms successfully transformed collectives to household-based farming and produced record-breaking growth in grain and meat output, overcoming endemic food shortages experienced since the 1950s. These reforms provided the pre-conditions for China's urban and industrial reforms in the mid 1980s. Despite many problems mainly related to incomplete reforms, agricultural output expanded strongly throughout the reform period, growing in real terms by about 5 per cent per annum from 1978 to 1995, compared with about 2 per cent per annum during the central planning period 1952 to 1977.

Changes in agricultural trade patterns since the reform also have been remarkable. From 1980 to 1995, while the proportion of foodstuffs in China's total exports dropped from nearly 17 per cent to about 5 per cent, the total value of food traded increased from about US$6 billion to US$16 billion. More importantly, after more than one and half decades of reform, China has become a strong net food exporter in the world market (Table 3). The success is not only due to greater incentives to individuals involved in household farming but also to the flexibility introduced by the communes' dissolution which is enabling a shift from land-intensive to labour-intensive farming, in which China has a strong comparative advantage.

However, China's agricultural reforms remain incomplete. As China has 22 per cent of the world's population but only 7 per cent of its arable land, the Government believes it should continue to intervene in basic food crop production and marketing decisions to ensure food security. It interprets the latter as meaning grain self-sufficiency. The Government introduced the 'Governor Responsibility System' in 1994, making provincial governments responsible for grain production and procurement targets and re-emphasising planning and direct intervention in an attempt to achieve grain self-sufficiency. However, achieving high levels of grain self-sufficiency will be very

costly given China's relative lack of comparative advantage in board acre crops given its scarcity of arable land and abundant labour force. It will also be difficult to enforce compulsory grain (and cotton) production given the rapid marketisation and internationalisation of the rest of the economy.

China's agricultural policy-making is therefore at a crucial juncture - it can either opt for internationally competitive agriculture based on its comparative advantage, or pursue grain self-sufficiency, either by enforcing production and procurement targets or protecting selected agricultural sectors. Both the latter approaches will impose significant costs on the economy. If, as at present, a forced production approach is used, most costs will fall on low income farmers and central region grain-surplus provinces. If trade protection is used, most of the cost will fall on urban consumers as food prices rise. As domestic prices of many major agricultural commodities are now close to international levels, the Government will need to decide soon whether to internationalise agriculture or continue self-sufficiency policies. If it goes for protection, this will push up agricultural prices and it will become politically difficult to wind back subsidies as they will become embodied in land prices as has occurred in Japan and Europe.

There are also other areas where future reforms will affect China’s agricultural production and thereby agricultural trade. For example, reforms in marketing, land tenure, agricultural investment, labour migration and agricultural R&D systems will have strong supply-side effects, while reforms in urban job allocation and social security system as well as urban immigration will have major demand-side effects.

This briefing paper, based on recent studies in this area, focuses on two areas: reforms in China’s agriculture since 1978 and their impacts on both China’s internal and external economies; and future reforms and their possible trade implications. It discusses the benefits of China’s continuing market reforms which have enabled agriculture to be internationally competitive and raised the costs of protecting grain sectors in pursuit of self sufficiency. The next section briefly examines problems with China’s agricultural production and trade under central planning. This is followed by a review of major reforms and their impacts. Existing policy problems and future reforms are then discussed. The final section examines the trade implications of possible supply and demand effects of these reforms.

Chinese agriculture under central planning

In the pre-reform China the Government pursued forced heavy industrialisation at the expense of agricultural development. By 1953, when the Government began to install a Soviet-style central planning system designed mainly to spur industrialisation, the economy had just managed to recover to its pre-war level. Agricultural productivity was too low to produce the voluntary savings needed to finance the Government’s ambitious industrialisation program. The Government therefore adopted a unified procurement and marketing system for farm products, using state power to transfer agricultural surplus to industry by setting agricultural prices far below their market level. Then the Government began a radical collectivisation of agriculture.

Understandably, the objective of individual household farms was maximising income rather than fulfilling state plans. Even without a free market, household-based farmers could still choose to consume more leisure or abandon cash crop farming if state prices for farm products were too low. Fulfilment of state production and sales plans was only possible if there was effective institutional enforcement and a high penalty of defaulting on state plans. Agricultural collectivisation was therefore introduced to ensure farmers maintained agricultural production even at unfavourable prices.

By 1957, all household farms were collectivised into 'agricultural cooperatives' and by 1958, these 'cooperatives' were transformed into much bigger people's communes.[1] Meanwhile, the state's unified procurement and marketing system replaced private agricultural purchasing and distribution networks. Agricultural output was then sold under a rationing scheme to urban consumers and industries at subsidised prices. As a result, a large surplus was transferred from agricultural producers to urban consumers and industries. It is estimated that through the so-called 'scissors effect' of low state prices, for agricultural products and high prices for industrial output (consumed by farmers inter alia) the Government squeezed about 600 billion yuan out of the agricultural sector during the central planning period.[2]

Collectivisation also helped control rural labour migration, which the Government feared would hinder industrialisation by reducing farm output and raising food prices relative to industrial product prices. Labour markets were replaced by a centrally planned job allocation system, while food supply, housing, education and heath care were brought under tight planning controls through a strict household registration (*hukou*) system. Migration between rural and urban areas was strictly controlled, essentially excluding rural people from urban employment and social security arrangements.

The most severe problem with collective farming was inefficiency. The communes' income distribution system provided no work incentives to farmers because it did not reward adequately individual effort. On one hand, assessing team members' performance was difficult and costly. Self-assessment of the quantity and quality of work was unlikely to produce an accurate measure of actual effort. Mutual assessment by team members could take up an enormous amount of time and lead to great tension

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[1] As a result of such collectivisation, about 120 million farm households were forced into some 24 000 communes, each of which contained about 5 000 households (Lin, 1994). The people's commune was both a political and an economic organisation. It undertook most local government functions, ranging from the administration and operation of schools and hospitals, to justice and police. Communes also controlled all economic activities, including assigning state production plans and procurement quotas to production brigades and teams, promoting new technologies, and mobilising massive amounts of labour to construct agricultural infrastructure.

[2] According to an estimation by Department of Policy and Law, Chinese Ministry of Agriculture, average state procurement prices for farm products were below the so-called 'value' of these products (a Marxian concept which is close to that of factor costs) by 39 per cent in 1957, 46 per cent in 1965, 41 per cent in 1971 and 36 per cent in 1978, while in these years industrial product price levels were 54, 44, 37 and 20 per cent, respectively, above their 'value' level (Guo et al. 1993, p. 11).

among families because some would inevitably feel they were unfairly treated. Assessment by team leaders could involve unbearable monitoring costs because of the nature of farm work often involves shifting between many different tasks on a very irregular basis (Lin 1988). Ultimately, egalitarianism became the only acceptable reward system because while no one had incentive to work, everyone had incentive to claim his or her rights to collective property as a collective member (Guo et al. 1993).

It is therefore not difficult to understand why shirking became a widely observed phenomenon in collective farming. Most team members presented themselves in the field to obtain work points but did not make a serious effort (Lin 1988). The marginal return to farmers on 'private plots' was much higher than that on collective land. One study shows that the productivity of 'private plots' was often 5 to 7 times that of the collective land (Guo et al. 1993, pp. 5-6).[3]

Resource allocation was also inefficient under the collective farming system since capital, labour and land mobility was heavily restricted. The planning system restricted free resource movement because it was seen as a threat to that system. As most surplus was extracted from agriculture there was no additional capital to improve productivity, so keeping land and labour in grain production was curtail to maintaining grain output. Restriction on resource mobility also reduced the opportunity cost of both land (rents) and labour (wages) in grain production, thereby reducing the cost of grain.

Under the planning system regional comparative advantage within China was ignored. To support industrialisation local self-sufficiency in grain production became an overriding policy goal. Furthermore, to reduce the cost of planning control central authorities had a strong incentive to keep plans simple regardless of local conditions. This led to simple quantitative controls such as control over areas sown to grains because this was relatively easy to monitor and enforce (Sicular 1992). Under such quantitative controls, grain was emphasised in preference to other food products, and grain quantity received more attention than grain variety and quality. These mechanisms further reduced allocative efficiency of agricultural resources among and within different regions, and caused output volume and quality to fall.

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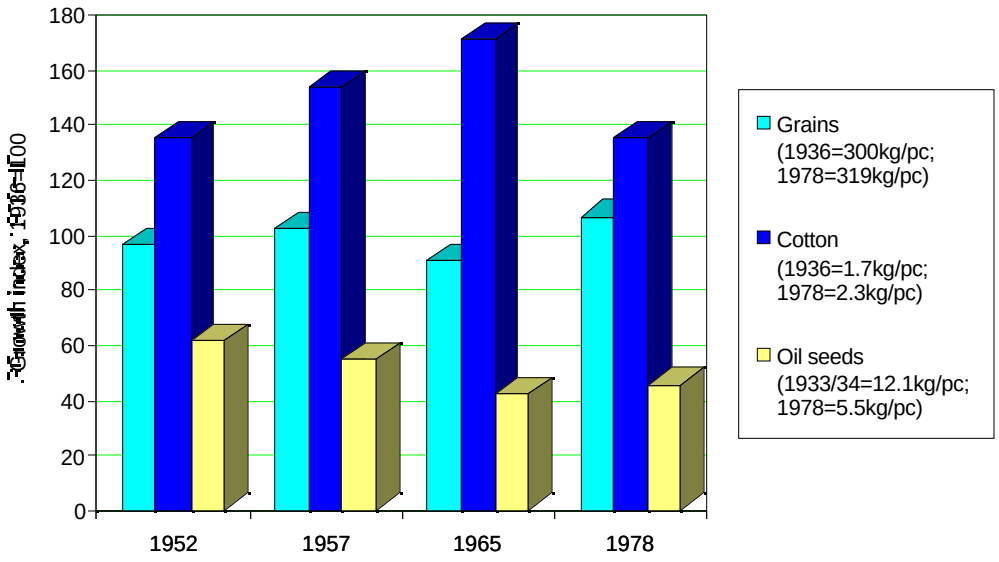
[3] A survey of a production team in Hebei Province found that under the collective system team members' income was not proportional to their labour input into collective land and their 'private plots'. An average member spent 81% of his/her working time on collective land which produced only 39% of his/her annual income, and spent 11% of his/her time on their private plot which generated to 46% of his/her annual income (quoted by Guo et al. 1993, p. 37).

Figure 1

Growth index of per capita output of grains, cotton and oil seeds, selected pre-reform years, compared with the pre-war records in the mid-1930s (*=100*)



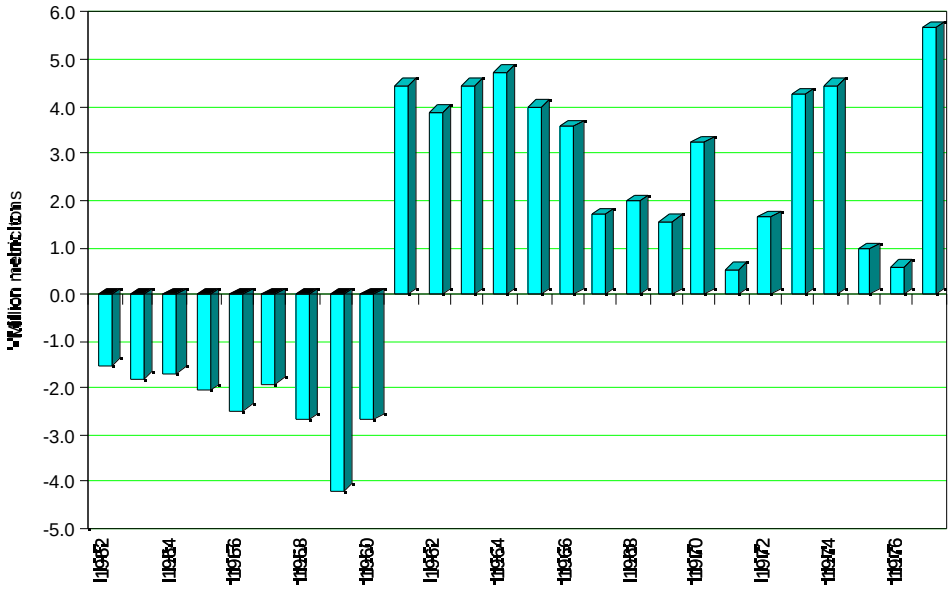
Note: For oil seeds, 1933/34=100. Per capita output is measure of output per member of the population. *Source*: SSB (1993: 389-90).

Consequently, China experienced severe shortages of basic foodstuffs throughout the central planning period, particularly the 1960s and the 1970s. Despite the heavy emphasis on grain production, there was no impressive improvement in the performance of grain production, even compared with the mid 1930s in terms of per capita productivity/output per head of population (Figure 1). Meanwhile the output performance of some non-grain crops was even worse, eg. the per capita output of oil seeds never regained its pre-war level during the central planning period (Figure 1). Cotton is another example. Although its per capita output level increased by about 27 per cent between 1952 and 1965, it had dropped back to the 1952 level by 1978 (Figure 1). This stagnation or decline in per capita output was due to poor farm labour productivity, particularly between 1957 and 1975. For example, during this period, output per farm labourer declined by 6 per cent in grain production, 7 per cent in cotton production, 31 per cent in oil seeds production, and stagnated in aquatic production. Only in meat production was there a moderate rise in labour productivity (DPL and DRS 1989: 303).

Figure 2

China's net export (negative) and import (positive) of grains during the central planning period, 1952-1977

(Million metric tons)



Source: SSB (various issues).

Agriculture's poor performance is also reflected in agricultural trade trends. In 1962 at the peak of the famine caused by the 'Great Leap Forward' China took a policy decision to cease grain exports and commence grain imports and became a net grain importer (Figure 2); on average importing about 3.5 million metric tons of grain (net) per annum over 1962 to 1978. Imported grains accounted for about one fifth of the value of China's total imports in the mid-1970s, and this item was still important in 1980 (Table 1). To pay for grain imports, China had to export other foodstuffs that were also in short supply, such as meat, fish and sugar, which were then subject to strict nationwide rationing schemes.

Agricultural reforms and their impact on the economy

Deng Xiaoping's 1978 reforms were essentially pragmatic, refocussing on improving living standards and catching up with developed countries. The economic reform began in the agricultural sector, while at the same time as the economy was opened to foreign trade and investment.

The reform of agricultural production system

China's agricultural reform was started spontaneously by poor farmers in Anhui in 1978. To link production team members' income with their work performance, farmers introduced a contract system between the production team and individual members or households. Among various forms of contract system, the boldest reform was a full

contract system (ie. '*da bao gan*'), under which households became completely responsible for inputs and output as well as their tax and sales obligations. Land and other separable production means, such as farm tools and draft animals, were equally distributed among the households within a village. The village's elected committee, representing the village community, was responsible for the maintenance and use of indivisible fixed capital and infrastructure. At the early stage, the state still had production plans, but the plans were now implemented through the contract system.

The full contract system was later officially named the household responsibility system (HRS) and adopted in 1980 as one of the contract systems to replace the collective farming system. However, because of its immediate positive effect on output and hence on household income, and more importantly, because it was *de facto* privatisation, the HRS soon was adopted throughout the country. The proportion of the teams adopting HRS increased rapidly from 5 per cent in 1980 to 67 per cent in 1982. By the end of 1983, 98 per cent of production teams had adopted the HRS (Guo et al. 1993, pp. 159-60). As a result, the government decided to legally abandon the people's commune system throughout all rural areas.

The reforms of price and market system

While the institutional transformation from collective to household-based farm production and management systems was essentially completed by 1984, the process of price and marketing system reform, especially for grain and cotton, still has not been completed after 19 years of reform. Although there is a steady trend towards liberalisation, the process has been characterised by cycles of deregulation and reintroduction of controls.

Following the initial introduction of contract system in agricultural production in 1979, the Chinese government significantly lifted state procurement prices for 18 major farm products in 1979; on average price by 25 per cent for quota sales, 50 per cent for above-quota sales of grain and vegetable oil crops and 30-35 per cent for cotton. Since then increase in state procurement prices has been the main mechanism to maintain farmers' incentives to produce and sell their products to the state.[4]

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[4] Major upward-adjustments to procurement prices were made in 1989-90, 1994-95 and 1996. On average, grain procurement prices were further lifted by 16 per cent in 1989, 44 per cent in 1994 and 42 per cent in 1996, while the cotton procurement price was lifted by 27 per cent in 1990, 65 per cent in 1994 and 30 per cent in 1995 (Guo et al. 1993, pp. 293-5; Yu 1995, p. 7; MoA 1996, p. 46; Information on 1996 procurement price adjustments is from interviews with officials from Ministry of Agriculture, PRC, August 1996).

Table 1

Extent of state control of China's major agricultural products, as of 1996

	Gross value of output in 1994 (billion 1990 yuan)	Share of total output (per cent)	Status of state control by 1996 (per cent)*
Total agricultural output	**1 052.6**	**100.0**	**10**
1. Crops	**530.7**	**50.4**	**10**
Total grain products	282.4	26.8	19
of which: cereal grains	217.7	20.7	25
other grains	64.7	6.1	Nil
Oil seeds	29.2	2.8	Nil
Cotton	28.1	2.7	100
Hemp	1.5	0.1	Nil
Sugar	10.8	1.0	100
Tobacco	6.7	0.6	100
Medicinal herbs	4.4	0.4	10
Vegetables and melons	92.2	8.8	Nil
Tea, silkworm cocoons, fruit	57.2	5.4	50**
Other crops	18.3	1.7	Nil
2. Wild plant gathering	**16.1**	**1.5**	**Nil**
3. Household handicrafts	**46.6**	**4.4**	**Nil**
4. Forestry	**51.7**	**4.9**	**Nil**
Afforestation	14.1	1.3	Nil
Forest products	15.3	1.5	Nil
Lumber	22.3	2.1	10
5. Animal husbandry	**313.4**	**29.8**	**Nil**
Livestock breeding	177.2	16.8	Nil
Poultry raising	45.9	4.4	Nil
Live animal/poultry products	76.3	7.2	Nil
Hunting/other animal products	14.1	1.3	Nil
6. Fishery	**94.0**	**8.9**	**Nil**
Seawater products	51.2	4.9	Nil
of which: cultured	15.9	1.5	Nil
Freshwater products	42.8	4.1	Nil
of which: cultured	27.7	2.6	Nil

Source: RSEST (1996, pp. 153-62). Information on the status of state control is from Department of Price Administration, State Planning Committee of China.

Note: * Calculation based on 1994 output value.

**By mid 1996, silkworm cocoons were subject to 100 per cent state control and some tea products herdsmen in minority areas consumed were also controlled.

At the same time the prices of products under the control of the unified procurement and marketing system were substantially raised, the scope of the unified procurement and marketing system was reduced. By 1985 the number of the system controlled items was reduced to 38, only 30 per cent of the 1980 level. More products have been liberalised since the mid-1980s, including pork, fish, poultry, tea, fruit and vegetables.

However, the Government currently still maintains pricing and marketing controls over strategic products: 70-80 per cent of marketable grains and 100 per cent of cotton, tobacco sugar and silkworm cocoons. Controlled items still account for about 10 per cent of total agricultural output. The current system is a two-tiered system through which, the Government maintains controls over a few key items (Table 1), but, the market still plays a key role.

There have been three major attempts to reform the united procurement and marketing system, particularly in relation to grains. Although these attempts have failed to completely reform China's grain marketing system, they have substantially increased the scope of market force in the grain economy.

The first attempt was made in 1985 when the mandatory state procurement of grain was replaced by a voluntary contract sales system. This reform was mainly motivated by desire to reduce the government's budgetary responsibility for grain purchases. Table 2 shows food (mainly grain and edible oil) price subsidies to urban consumers, which jumped from 1 per cent of government expenditure in 1978 to 13-14 per cent over 1981 to 1985. However, since the contract prices offered by the government were too low to induce voluntary sales, the government had great difficulty signing sufficient contracts with farmers, and mandatory quotas were reintroduced.

The second attempt was made in 1991-92 when state retail prices for urban rationed grains were raised, for the first time since 1965. Ration prices were successfully raised by 68 per cent in 1991 and by further 45 per cent in 1992, almost eliminating the gap between the state grain procurement prices and retail prices. Not only did this reform alleviate, though only temporarily, the government's financial burden in handling grains, it also indicated that freeing urban food prices was no longer politically risky.

Table 2

Total government expenditure and food price subsidies, 1978-1995

Year	Expenditure (bl. yuan)	Price subsidies (bl. yuan)	Subsidies as % of expenditure
1978	112.2	1.1	1.0
1979	128.2	7.9	6.2
1980	122.9	11.8	9.6
1981	113.8	15.9	14.0
1982	123.0	17.2	14.0
1983	141.0	19.7	14.0
1984	170.1	21.8	12.8
1985	200.4	26.2	13.1
1986	220.5	25.7	11.7
1987	226.2	29.5	13.0
1988	249.1	31.7	12.7
1989	282.4	37.4	13.2
1990	308.4	38.1	12.3
1991	338.7	37.4	11.0
1992	374.2	32.2	8.6
1993	464.2	29.9	6.4
1994	579.3	31.4	5.4
1995	682.4	36.5	5.3

Source: SSB (1996: 231, 243).

Encouraged by this success, in 1992 some local governments decided to fully liberalise local grain marketing by freeing both procurement and retail prices. This spontaneous reform immediately triggered the collapse of the unified procurement and marketing system for grains across the country prior to the central government formally sanctioned the move. However, following sharp food price rises at the end of 1993, the government nervously resumed administrative controls over grain production and marketing through a newly introduced 'governor responsibility system'. Under the 'governor responsibility system', the governor of a province is required to take full responsibility for the province's grain economy, including financial responsibility for grain procurement ensuring land staying in grain production, encouraging investment to increase yields, maintaining stocks, balancing supply and demand and stabilising the market. Following the introduction of the 'governor responsibility system', grain self-sufficiency has to some extent been reemphasised.

However, the successive reform attempts, though unsuccessful, have some positive impacts on China's grain economy. State procurement by quotas has been substantially

cut to 50 million tons which represents only 44 per cent of total marketable grain,[5] making room for a free market in grain.

After a decade of rapid income growth, food grain is much less important in urban consumer budgets, declining from 13 per cent of consumer expenditure in 1981 to 7 per cent in 1995 (State Statistical Bureau, 1996a). Grain prices are no longer a sensitive issue, as borne out by the muted reaction to the lifting of urban grain prices in the early 1990s. In fact, surveys indicate that 65 to 75 per cent of urban residents now buy grain from the free market rather than state grain stores (Tang, 1993; State Statistical Bureau, 1996a).

The introduction of the 'governor responsibility system' has finally terminated the centralised control of grain production, which should facilitate grain production suited to local conditions.

Economic impact of agricultural reforms

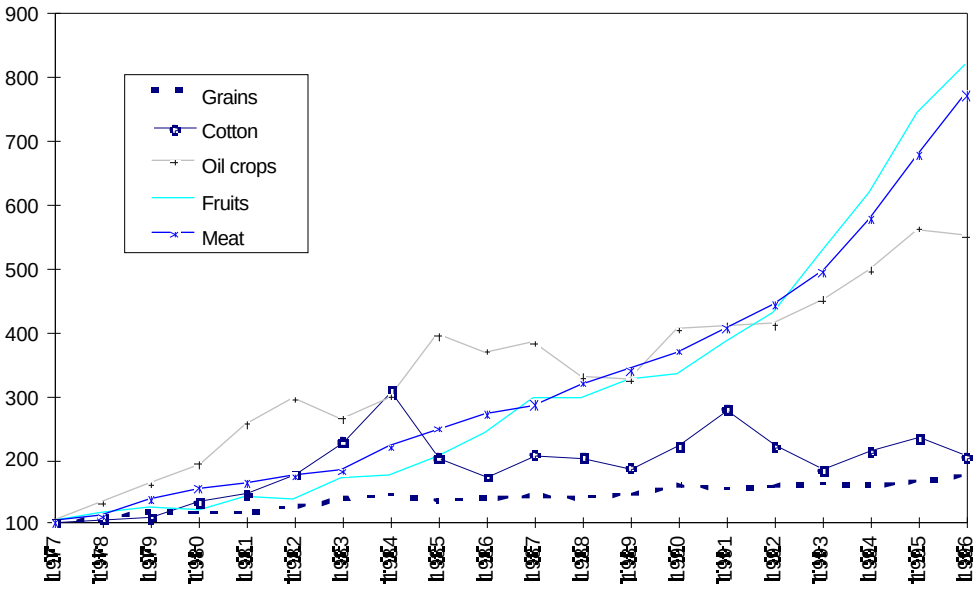
Decollectivisation of agriculture and marketing reforms were followed immediately by record-breaking harvests for grain and other major farm products, particularly during the period 1978-84. The great improvement in farmers' work incentives were the cause of these bumper harvests. From 1977 to 1984, grain output increased from 283 to 407 million tons, up by 5.3 per cent a year, oil crops increased from 4 to 12 million tons and cotton from 2 to 6 million tons, both up by 17 per cent a year (Table A1, Appendix). Although since 1985 changes in policy and market conditions (causing both income and price effects) have slowed the output growth of some farm products (grains and cotton) and caused fluctuations in others (oil crops), most major farm products have maintained a strong growth trend (Figure 3).

[5] Assuming that 25 per cent of a total annual output of 450 million tons is marketable, based on the situation since the 1990s. However, this does not include the 40 million tons that must be procured at negotiated prices.

Figure 3

Growth of major farm products between 1977 and 1996

(Growth index, 1977=100)



Source: Table A1, Appendix.

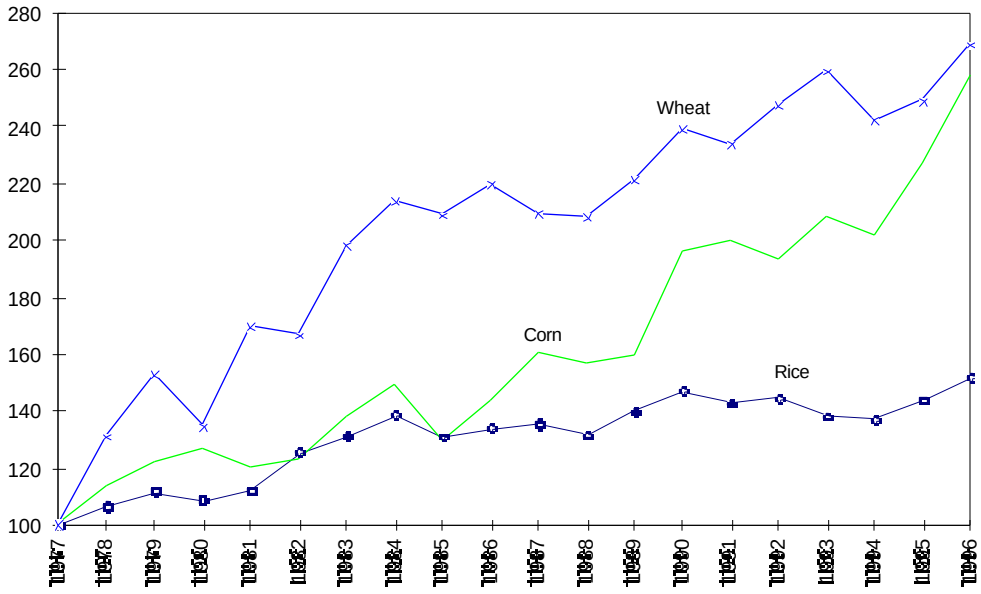
One study estimates that the incentive effects of decollectivisation may have explained over 70 per cent of agricultural growth between 1978 and 1984 (McMillan, Whalley and Zhu 1989). Although estimates on the output effect of institutional change vary greatly among studies, most show decollectivisation explain the major share of output growth (see Lin 1992 and Fan 1991). However, a recent study by Huang, Rosegrant and Rozelle (1996) argues that technological innovation could have been at least equally important. This study also found that the output effect of institutional change was only significant in the period 1978 to 1984. In that period it found institutional change explained only 34 per cent of rice output growth, 51 per cent of other grains' growth and 37 per cent of cash crops' growth.

Post-1985 agricultural output growth has been mainly attributable to improvement in allocative efficiency in Chinese agriculture, that is, the shift in resources from less profitable to more profitable crops and other forms of farm production in line with China's comparative advantage in agriculture. For example, as shown in Figure 3, land-intensive cotton and grain production registered slowest growth, while the less-land intensive and more labour-intensive meat and fruit production registered the fastest growth. Restructuring has also occurred in the grain sector. Among major grain crops, corn production has experienced the fastest growth in line with the growth of meat production (Figure 3). Driven by rapid income growth during this period and demand for convenience foods, wheat output also grew strongly while rice production has stagnated (Figure 4).

Figure 4

Growth of China's wheat, rice and corn production between 1977 and 1996

(Growth index, 1977=100)



Source: Table A1, Appendix.

The extent of remaining administrative control also affects output performance. Cotton production has virtually stagnated at its 1983 level mainly because of the low profitability of cotton production, which in turn has resulted in (and also been caused by) the maintenance of administrative controls. Meat production maintained continuous strong growth over the whole period, reflecting not only the rising demand for meat as incomes rose, but also a freer marketing system for meat than for grain.

Agricultural growth also created a huge rural market for consumer goods and generated a reservoir of savings that funded investment in rural enterprises. From 1978 to 1994, output from rural industrial enterprises grew at 25 per cent per year, far in excess of the state-owned industrial enterprises which grew at 5.5 per cent per year.[6] These enterprises produced a range of simple consumer goods including processed foods and manufactures and services such as distribution, restaurants and shops. By 1994, rural enterprises accounted for 30 per cent of total industrial output and other non-enterprises including private urban collectives and foreign funded firms produced a further 36 per cent, while the state owned enterprises' share of industrial output had dropped to 34 per cent.[7] Rural enterprises also produced over 25 per cent of exports.[8]

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6 The real growth of the gross value of output by rural enterprises is derived from the official gross value of output and the producer price index. data (The annual index is converted to 1984 = 100 for industrial products.)

7 Output shares by enterprise is based on current prices (State Statistical Bureau, 1995a, p. 249, p. 365 and p. 377).

The growth differential among farm products and the resource shift from on-farm to rural off-farm activities have caused a major structural change in the rural economy as a whole. From 1978 to 1995, measured by gross output value, the agriculture proportion in the rural economy declined from nearly 70 to 26 per cent. Within agriculture the share of crop farming, consisting mainly of grain production, declined from 80 to 58 per cent, the share of animal husbandry increased from 15 to 30 per cent, and the share of fishing and forestry increased from 5 to 12 per cent (SSB 1996, p. 63). That is, over this period, the proportion of rural output generated by nonagricultural activities increased from 30 to 74 per cent (RSEST 1996, p. 51).[9]

In 1980 when reforms began, China managed to export foodstuffs valued at about US$3 billion, which exceeded its food imports, of which by far the largest item was cereals (US$2.5 billion). By 1995, food exports (US$10 billion) exceeded by over 60 per cent food imports (US$6 billion) of which only US$3.6 billion were cereals (Table 3). The share of cereals in total imports fell rapidly from 12.2 per cent in 1980 to only 2.7 per cent in 1995, despite a 48 per cent increase in the US dollar value of cereal imports of this period (Table 3).

Table 3

Changes in the structure of China's food trade, selected years

(Million US$)

		1980		1985		1990		1995	
Commodity	*SITC*	*Export*	*Import*	*Export*	*Import*	*Export*	*Import*	*Export*	*Import*
Live animal	00	384	5	304	18	430	14	503	37
Meat	01	361	1	448	6	791	54	1 371	97
Dairy products	02	71	5	57	31	55	81	61	61
Fish	03	380	13	283	44	1 370	102	2 853	608
Cereals	04	423	2 458	1 065	982	614	2 353	285	3 629
Vegetables & fruits	05	746	48	825	52	1 759	83	3 342	184
Sugar	06	221	316	79	274	317	390	379	936
Coffee, tea	07	328	56	435	40	534	30	516	75
Feeding stuffs	08	58	14	241	83	623	182	351	421
Other foodstuffs	09	49	2	66	23	107	46	292	82
Total foodstuffs	0	2 985	2 927	3 803	1 553	6 609	3 335	9 954	6 131
- as % of total trade		16.5	14.6	13.9	3.7	10.6	6.3	6.7	4.6

Note: *SITC*: Standard International Trade Code.
Source: Lu (1996, Table 6).

The shift from land-intensive to labour-intensive farming is also reflected in post-reform agricultural trade patterns (Figure 5). Between 1980 and 1995 the share of labour-intensive products such as vegetables, fruits and animal products increased from 64 to 83 per cent of exports while land-intensive products such as cereals, tea and

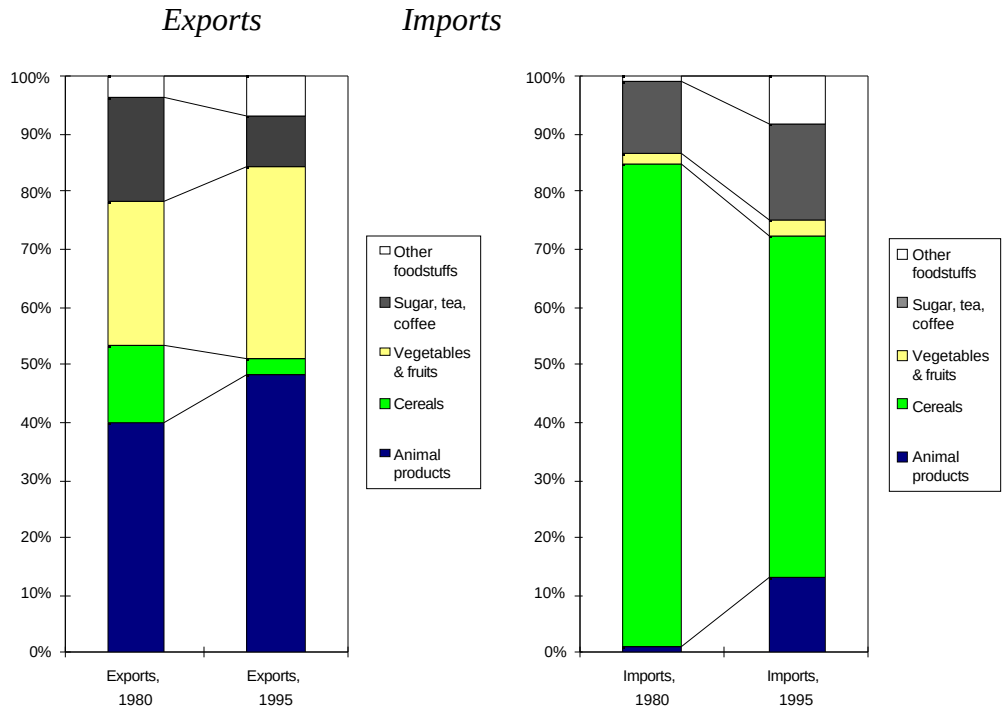
[8] Based on gross value of output instead of GDP using data from State Statistical Bureau (1995a, p. 32, p. 537) and Department of Rural Enterprises (1993, p. 31).

[9] Figures for the period 1978-94.

sugar decreased from 33 to 11 of exports (Figure 5). This trend should continue, generating significant new export income, assuming the Government relaxes compulsory grain production and allows farmers to produce the crops that are most profitable.

Figure 5

Changes in the patterns of China's exports and imports between 1980 and 1995



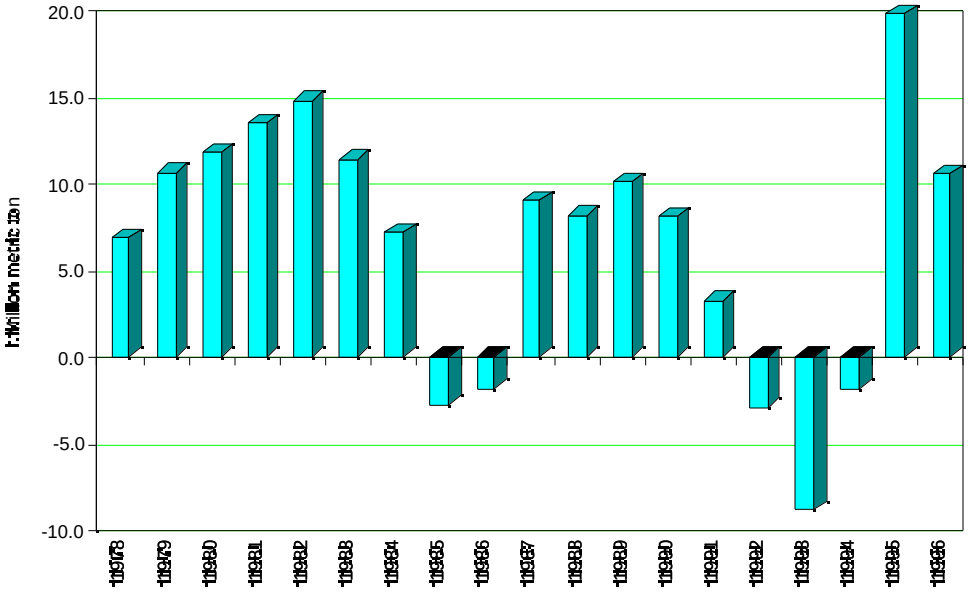
Source: Table 3.

While agricultural reform has dramatically boosted grain output, demand for grain has increased more quickly and China imported an average of 6.5 million metric tons per year between 1978 and 1996 (though great fluctuations were experienced due to the weather conditions) (Figure 6). The largest share of grain imports (90 per cent) is wheat. This demand shift is primarily due to rising incomes, and the demand for convenience foods. Demand for imported wheat has also strengthened as rising demand for meat has driven more food grain cropland into feed grain production.

Figure 6

China's net export (negative) and import (positive) of grains during the reform period, 1978-1996

(Million metric tons)



Source: SSB (various issues).

Remaining policy problems and possible future reforms

Marketing system

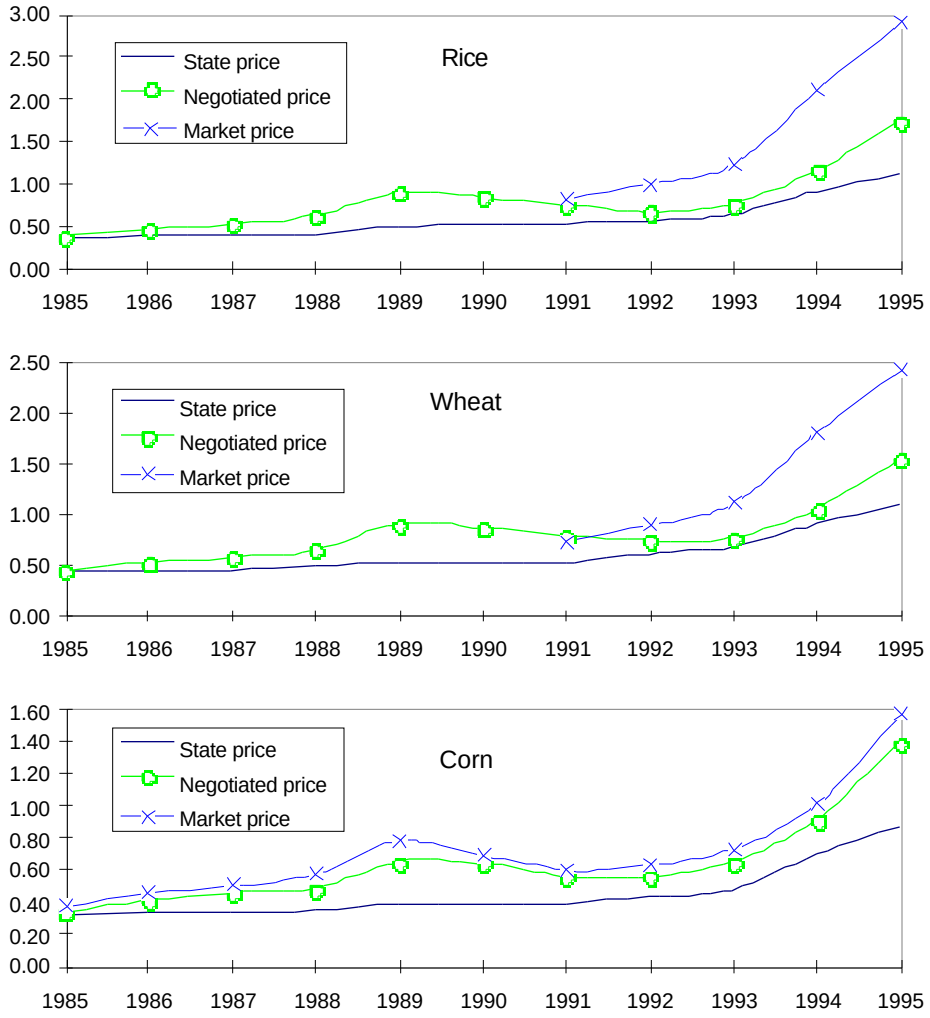
China's agricultural marketing is currently under a two-tiered market-planning system, with some products (vegetables and meat) traded completely through the market, some (cotton, tobacco) completely controlled by the state plan, and some (major grains) handled by both state planning and the market. As discussed previously, the state still imposes pricing and procurement plans on so-called strategic crops, including 80 per cent of marketed grains (roughly 20 to 25 per cent of the total crop, depending on the harvest) and 100 per cent of the cotton crop (Table 1).

The introduction of the two-tiered system was intended to smooth the transition from plan to market. It was expected that the planning system would gradually phase out and the market system would replace it. This has, however, not yet happened in grain marketing because the Government is concerned about food security and price rises experienced after previous reform efforts.

Figure 7

State, negotiated and market prices for rice, wheat and corn, 1985-1995

(Yuan per kg)



Source: Ministry of Agriculture (1996, Tables 14, 15, 16)

The coexistence of plan and market in the grain sector has put rising pressure on state procurement prices which has presented the Government with a major dilemma: raising state procurement prices (ie. quota prices) increases market expectations, pushing up market prices, while rising market price in turn put further pressure on state procurement prices. Figure 7 shows a close relationship between state and market prices. Negotiated prices are prices paid to farmers for above-quota sales by local government to fulfil their total procurement obligations required by the central government. These prices take into account market situation, but are still below market price level.

In the presence of grain markets, low planned state procurement low prices become difficult to enforce because high market prices tell farmers how much they lose by

selling grain to the state. In these circumstances, to fulfil the state procurement plans local governments often resort to enforcing sown area and sales quotas using administrative measures, and temporarily close the local grain markets, further distorting grain prices (Tang 1996).

This policy is very expensive for local governments as the central government is no longer financially responsible for grain procurement since the introduction of provincial governor responsibility system. Financial pressure on local governments increases as the central government tries to index farm prices to non-farm prices by making large adjustments in state procurement prices. The average procurement price of major grain crops was raised by 40 per cent in mid-1994 (Wang 1996), even though domestic price levels for these crops were already similar to or even higher than those on world markets since the beginning of 1994 (Garnaut et al. 1996). Another 40 per cent-increase in state procurement prices took place in mid-1996 in an attempt to bring the state prices in line with market levels (Wang 1996).

Sharp increases in procurement prices since 1994 are the main cause of record-breaking grain harvests in 1995 and 1996 (Yang 1996), but may not indicate the most efficient allocation of resources. High procurement prices have driven farmers to switch out of cash crops into grain they have also caused unnecessary high accumulation of grain reserves, reaching 120 million tons by the 1997 summer harvest, which is 30 per cent higher than the maximum China should hold according to the FAO (*South China Morning Post International Weekly* 26 July 1997).

A complete liberalisation of grain marketing would generate significant resource reallocation through major price corrections which would affect grain production. The general trend of agricultural restructuring will be a further shift from land-intensive to labour-intensive crop and non-crop farming which will bring higher returns to both land and labour inputs (Table 4). However, resource restructuring only will generate positive results if markets function smoothly and government policies promote the market development. One of the main factors pushing up the grain prices in 1993 and 1994 was that the restructuring of agriculture caused a substantial decline in the production of early-Indica rice in southern China, while large scale labour migration to this region raised the demand for this type of rice (Chen 1995). If there had been a more integrated grain marketing system between grain deficit and surplus regions and an effective grain stock system, the restructuring would have had less effect on inflation. The government's policy response to food price inflation should have been to reform the grain marketing system including enabling the free competition of non-state distribution networks rather than to reemphasise regional grain self-sufficiency.

Table 4

Net Output Value (*NOV*) *per Unit of Land* (*Mu*) *and Labour Day, 1993*

	NOV/mu (yuan)	Index of NOV/mu	Labour input/mu (days)	NOV per labour day (yuan)	Index of NOV per labour day
Wheat	110	100	13	8	100
Rape seeds	112	102	17	6	77
Corn	175	160	15	11	136
Sugar beet	188	172	18	11	125
Rice	250	228	19	13	154
Peanut	272	248	21	13	153
Tobacco	287	261	45	6	76
Cotton	339	309	41	8	97
Ramie	348	318	43	8	95
Sugar cane	528	482	40	13	157
Silkworm cocoon	756	690	96	8	93
Apple	1 180	1 077	65	18	216
Orange	1 255	1 145	74	17	201

Source: Calculated using data from State Statistical Bureau, Rural Social and Economic Survey Team (1996, pp. 279-82); State Statistical Bureau, Department of Rural Social Economic Statistics (1990, pp. 180-84).

If complete production marketing liberalisation is adopted, the already emerging trade pattern, as shown in Table 3 and Figure 5, of exporting more labour-intensive agricultural products and importing more land-intensive agricultural products like grains, sugar and cotton. . The restructuring also will further strengthen the shift in both production and consumption from grain-intensive meat such as pork to less grain-intensive meat such as poultry and aquatic food.

Land tenure system

The nature of agricultural land tenure system significantly affects efficiency and output, and therefore has strong supply side effects. As a result of the decollectivisation, each rural household received its entitled farm land on a fifteen-year contract. These leases were renewed for a further 15 years in 1995 (MoA, 1995). In return, each household agrees to sell a certain amount of output from the land at state-set prices, known as sales quotas. The Government policy made it clear that (1) farmers had a land-use contract for a term of fifteen years, now extended; (2) the land entitlement of each household was to be kept stable and any required adjustment of entitlements was to be minimised; (3) on the other hand, mobility of land-use rights was encouraged in order to help land concentration.

In spite of its *de facto* privatisation nature, the household responsibility system, HRS, has its limits - largely due to land tenure limitations. Firstly, the system induced unnecessary land fragmentation, because any plot of similar quality land was divided into tiny pieces to achieve maximum fairness among households. Secondly, as land is not owned by individual households, land entitlements among all households have to

be adjusted to population changes in any household to maintain equal distribution; causing further land fragmentation. Thirdly, the HRS's fifteen-year contract does not provide farmers with sufficient security to encourage stable land management through investment. Finally, households have no right to sell their land and there is no land market, so land lease trading is the only mechanism available to reallocate existing farm land to improve the economies of scale and allocative efficiency of land in line with changing market conditions, rural-urban migration and the move to non-farm rural activities.

Having realised these problems, since the 1990s the Government has encouraged local experimental reforms to improve the current land tenure system. The major reform is the so-called double-track land system which divides household contracted land into two parts: one is for household basic food grain production and the other is responsible for fulfilling state sales quotas. The primary aim of this double-track land system is to maintain fairness among households in terms of subsistence while stabilising the current land distribution. Under this system an increase (decrease) in family size raises (reduces) the family's entitled food-grain land while reducing (increasing) the family's land that is responsible for producing its state sales quotas (Rural Land Reform Project 1994). Meanwhile the contract term has been extended for another 15 years (MoA 1995).

The next step of the reform may be to consolidate small plots of the land with state sales responsibility into larger plots through an open, competitive bidding system, which will certainly improve the economies of scale of crop land. This has already happened in some areas. The rural economy will also gain some allocative efficiency through such a reform as both labour and land will be reallocated and household activities will be more specialised. The new 15 year contract term will also help households to take a longer term perspective on returns on their private investment in land.

Despite these actual and potential reforms, resource allocation in rural China is still subject to a number of constraints. For example, improvement in the economies of scale and allocative efficiency of land will be limited as long as land functions as social insurance for most rural households, the state imposes sales quotas rather than fully uses the market for grain procurement and marketing, and more importantly, there is no land market.

As a result of these constraints, current trends in production and trade look likely to continue in the medium term. China's export of labour-intensive foodstuffs will continue to grow following the pattern shown in Table 3 and Figure 5. China will therefore be more able to afford for land-intensive food imports from country like Australia, Canada and the USA. However, more radical changes in China's agricultural production and trade in line with its comparative advantage would occur if and when China fully privatises land, introduces a land market and abandons self-sufficiency policies. However, these are very sensitive issues which relate directly to socialist ideology and its policy on grain self-sufficiency, and the Government has not yet shown that it is has sufficient confidence to undertake such reforms. In the case of

cotton and sugar, in the medium to long term, when the problems of inefficient SOEs using these commodities as raw materials are resolved, it should be possible for the Government to marketise cotton and sugar production and marketing. Gradual reductions in the percentage of grain production procured by the state should also continue, encouraging the further development of more efficient alternative distribution mechanisms. If technological change improves the profitability of grain production so that farmers are willing to produce most of China's needs at international prices, the Government may feel able to withdraw from compulsory grain acquisition. However, until labour availability in rural areas declines significantly, incomes rise, and plots are consolidated, China will maintain a strong relative comparative advantage in labour intensive agricultural production.

Labour migration and the employment system[10]

China's post-reform labour shift from the agricultural to nonagricultural sectors, and migration to cities, has been unprecedented. It is estimated that of the current 450 million rural labour force in China, about 150 million are employed by rural enterprises, about 50-60 million are working in cities as migrant workers, and about 250 million are engaged in farming. However, despite such a huge relocation of the rural labour force, still about 150 million of these farmers are believed 'surplus' labour in the rural farming sector. Release of these labourers from this sector will have significant demand effect on structure of food consumption. However, the actual impact of such a labour release will be determined by a number of policy factors.

The core policy issue is the household residence registration system or *hukou*, urban employment system and related social security system that discriminate against rural residents. Under the *hukou* system, it is not usually possible for migrant labourers to permanently settle with their families in cities, especially large cities. There is severe job discrimination against migrant workers under the urban employment system. Many occupation categories only are available to people with urban *hukou*. In many cities it is impossible for migrant labourers to find a permanent job. More importantly, migrant labourers are not eligible for employer provided housing or covered by the social security system, which is location- and work unit-specific, and only operated within urban areas.

Because of these discriminatory policies, it is natural for migrant labourers to keep a close tie with their entitled family plots and village community to secure their future and provide employment insurance. In fact, most migrants, especially those working in large cities, will eventually return to their home villages and marry after working and living in cities for 5 to 6 years.

While discouraging migrant labourers to invest in cities, the *hukou* system does encourage a high level of remittance that has assisted agriculture and non-farm investment in rural China. Some studies indicate virtually all migrant workers' savings

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[10] This section is mainly based on a review on labour migration in China by Wu and Li (1996).

are remitted to their homes (Wang 1994, EAAU 1997, Chapter 11). Households receiving remittances are able to use more modern inputs in farming as substitutes for labour and land. One survey in Sichuan shows that about one third of remittances was spent on fertilisers, pesticides and plastic films (Chen and Yang 1995).

Food consumption demand is affected by rural-urban labour migration by its impact on food consumption, urbanisation and income growth. Migrants change their dietary habits and structure of food demand because of their urban life style and higher income. China's internal migrants are mainly young, unmarried adults, often males whose food demands differ from a cross section of the population with a more even age and sex distribution.

Given the huge population and employment pressures in large cities, China is not likely to abandon the *hukou* system in the short to medium term. However, complete freedom of migration to and permanent settlement in small cities will be possible in the foreseeable future, which will encourage the growth of new large cities. The development of a new social security system for such migrants and development of a rural land market will enable migrant labourers to break their economic ties with land. This will generate significant positive impacts on land and population redistribution and thereby on food production and consumption.

The R&D system

Land resources are becoming increasingly limited, and labour and other resources are moving out of agriculture. However, per capita income rise and population continues to increase, demand for agricultural products will continue to grow. One important means of increasing food production in the future will be through increased investment in farm technology and agricultural research and development (R&D). Many studies have suggested that R&D has played an important role in raising China's grain output (Lin 1992; Huang, Rosegrant and Rozelle 1996; Fan 1996).

Even in the pre-reform period China's grain production benefited as a result of agricultural research and development (Lin 1992). With endemic grain shortages the government had a strong incentive to develop high yield grain varieties.[11] However, because of a lack of incentives and inefficient resource allocation, China did not gain the full output growth potential of the new grain varieties under the collective farming system. This gives rise to two important questions; to what extent is there scope for technological change to continue to contribute to further growth in China's agricultural output and can the current agricultural research system achieve this outcome.

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[11] China was the first nation to extend semi-dwarf rice varieties in the 1950s. Its scientists were also the first to develop hybrid rice in the early 1970s (Lin 1992).

Table 5

Average Yield of Selected Foodstuffs:

China Compared with Selected Countries and the World's Best Performers

Country	*Wheat kg/ha*	*Paddy rice kg/ha*	*Maize kg/ha*	*Soybeans kg/ha*	*Peanut kg/ha*	*Beef/veal kg/ca***	*Mutton/ lamb kg/ca***	*Pork kg/ca***
China	3 318	5 869	5 033	1 589	2 688	204	12	80
India	2 420	2 817	1 750	835	988	103	12	35
Indonesia	n.a.	4 344	2 177	1 051	1 770	150	10	55
Thailand	1 556	2 175	3 167	n.a.	1 486	200	15	50
Japan	3 718	6 770	2 485	1 622	2 424	393	26	75
S Korea	2 857	6 083	4 167	1 481	1 700	257	14	81
Mexico	4 475	4 360	2 444	1 903	1 270	221	14	69
US	2 526	6 718	8 697	2 815	2 995	318	30	84
France	6 676	4 555	7 827	2 620	n.a.	283	17	85
UK	7 178	n.a.	n.a.	n.a.	n.a.	280	19	69
Russian Fed.	1 449	2 705	1 697	818	n.a.	195	22	80
Australia	1 174	8 336	5 818	2 079	2 368	220	20	n.a.
World mean	2 741	3 651	4 330	2 182	1 308	212	15	78
World max*	8 067	8 336	9 719	3 606	6 563	393	30	150
(Country)	(Norway)	(Australia)	(NZ)	(Italy)	(Israel)	(Japan)	(USA)	(Slovakia)

Note: *Excluding countries with very little total output. **ca = carcass, ha = hectare

Source: Food and Agricultural Organisation, FAO, 1994.

One way to assess China's food production potential is to compare aggregate average yields in China with those in the rest of the world. The gap between China's and the world's frontier level indicates, in purely technical terms, China's output potential.[12] Table 5 presents various countries' yield data for selected farm products. It appears that apart from soybeans, beef and mutton, China's yield per hectare is higher than the world average, but lower than that of the world's best. For the three major grains, for example, China's average yield is about 20 to 60 per cent higher than the world average, but only about 40 to 70 per cent of the world's best performers. For soybeans China's average yield is only 73 per cent of the world average. Both soybeans and peanuts are about 40-50 per cent of the world's best, as are the three meat products. All suggest there is considerable scope for increases in food production by increasing yields on available land.

Even if there is high output potential, inadequate investment in research may not be made due to policy problems. Since the 1980s, China has gradually implemented a series of science and technology policies. Reform has attempted to increase research productivity by shifting funding from institutional support to competitive grants,

[12] However, the high yields per ha and weight of carcasses achieved by some countries does not necessarily imply they are efficient would producers, as they may be responding to protection and subsidies- i.e. Japan's beef production.

supporting mainly scientific research focusing on problems that will be useful for economic development, and encouraging applied research institutes to earn their money by selling the technology they produce. As pointed out by Huang and Zhang (1996), while competitive grants programs have probably increased the effectiveness of China's agricultural research system, the reliance on commercial revenue to subsidise research and make up for falling budgetary commitment has weakened the system. Empirical evidence have demonstrated a declining effectiveness of China's agricultural research capacities (Rozelle 1996 and Fan 1996).

Improved use of existing technology and research and development could clearly play a role in raising output in the grain sector. However, while there appears to be scope in technical terms for large increases in yield, the benefits of achieving yield growth may not exceed the costs. The major policy need is therefore the appropriate management and evaluation of research and development programs. In particular, the design of agricultural research programs will be more efficient if it takes into account the cost of alternative sources of grain and other foodstuffs, including purchases from the rest of the world.

Implications for agricultural trade[13]

The many factors discussed above will not only affect agricultural resource allocation but have important food trade implications. If current reforms lead to an open agricultural sector with privately owned, freely traded land and more mobile labour, China could be expected to become a major world exporter of more labour-intensive agricultural products and processed food and a significant importer of land-intensive products (grains, cotton and sugar). This development would affect significantly world agricultural markets and agricultural exporters like Australia, providing excellent opportunities for competitive exporters of land-intensive products, but significant market challenges for competing labour-intensive food sectors.

More 'precise' trade implications can be derived from projections based on demand and supply assumptions. However, all projections over a couple of decades only indicative and are subject to strong assumptions. In fact, available projections vary greatly as shown in Table 6. Trade projections are even more problematic as they are based on the gap between demand and supply projections which are very sensitive to the parameters used in projection. For example, demand projection is not only very sensitive to income and price elasticises, but also income and population growth forecasts. Projected changes in the age, gender and rural-urban distribution of the population is also an important but often ignored factor that affects demand. Supply projection is very sensitive to assumptions on price, technology, institutional arrangements and government policies.

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[13] This section is largely based on Wu and Findlay (1996).

Table 6

Various projections of China's grain production and consumption, and trade implication

Source	Period of projection	Consumption at end point (B)	Production at end point	Implied net imports at end point (A)	A/B
Tyers and Anderson (1992)	1990-2000	510 mmt in 2000	420 mmt in 2000	90 mmt in 2000	18%
Garnaut and Ma (1992)	1990-2000	Normal growth (6% p.a.): 547 mmt in 2000; High growth (7.2% p.a.): 593 mmt in 2000	Upper limit of 500 mmt 500 mmt	Normal growth (6%): 50 mmt in 2000 High growth (7.2%): 90 mmt in 2000	9.1% 15.2%
Brown (1994)	1990-2030	a) No rise in consumption per capita: 479 mmt in 2030 b) Rise in consumption per capita and rise in population: 641 mmt in 2030	272 mmt in 2030 272 mmt in 2030	a) No rise in consumption per capita: 207 mmt in 2030 b) Rise in consumption per capita and rise in population: 369 mmt in 2030	43% 58%
Huang, Rozelle and Rosegrant (IFPRI) (1996)	Early 1990s to 2000, 2010 and 2020	450 mmt in 2000 600 mmt in 2020	410 mmt in 2000 550 mmt in 2020	40 mmt in 2000, *but not likely to be greater than* 50 mmt in 2020	8.8% 8.3%
OECF (1995)	1993 to 2000, 2005 and 2010	508 mmt in 2000 571 mmt in 2005 645 mmt in 2010	484 mmt in 2000 502 mmt in 2005 509 mmt in 2010	24 mmt in 2000, 69 mmt in 2005 136 mmt in 2010	4.7% 12.1% 21.0%
Mei (1995)	1993 to 2000, 2010 and 2020	511 mmt in 2000 593 mmt in 2010 695 mmt in 2020	500 mmt in 2000 578 mmt in 2010 675 mmt in 2020	11 mmt in 2000 15 mmt in 2010 20 mmt in 2020	2.2% 2.5% 2.9%
Wu and Findlay (1996)	1995 to 2000, 2010, 2020	8% p.a. growth and low feeding efficiency scenario: 523 mmt in 2000 585 mmt in 2010 643 mmt in 2020	477 mmt in 2000 518 mmt in 2010 554 mmt in 2020	29 mmt in 2000 64 mmt in 2010 88 mmt in 2020	5.5% 10.9% 13.7%

Future demand for food and feed grains

This section discusses the results from the recent projections by Wu and Findlay for food and implied feed grain demand in both urban and rural China from 1995 to 2020. In particular, these projections take into account the effects of 1) changes in age structure and 2) changes in feeding efficiency on grain consumption. The income elasticity of demand for food and feed grains is derived by Wu and Findlay from the simple relationship between per capita real income and food and (implied) feed grain demand for urban and rural households.

The assumed age-adjusted consumption level for 1995 is used as the starting point of per capita food and (implied) feed grain consumption. Population is projected to grow

from 1.23 billion in 1995 to 1.53 billion in 2020. The ageing of the population has been taken into account. For example, the 0-14 group will decline from 27 to 21 per cent, the 15-44 group will decline from 50 to 41 per cent, while the 45-59 group will rise from 14 to 21 per cent and the 60+ group will increase from 10 to 17 per cent. In the mean time urban share of the population is expected to increase from 29 to 47 per cent, based on the change in the urbanisation rate of 1.92 per cent a year over 1990-95. A number of GDP growth scenarios are used but here we choose the scenario of 8 per cent a year, which may be still too high.

China's projections of grain demand by Wu and Findlay lie less than most studies made outside China. In the low feeding efficiency scenario, China's total grain demand will be in the range of 523 mmt a year by 2000, 585 mmt a year by 2010 and 643 mmt a year by 2020. The results indicate that:

- demand for feed grain will be the only major driving force in the growth of demand for grain in China from the year 2000 onwards;
- the combined effects of income growth and change in population structure will lead to a fall in the demand for food grain;
- the pace of the increase in feed grain demand and the decline in food grain demand will be very sensitive to the rate of income growth;
- a change in feeding efficiency (grain-meat ratio) will make a significant difference to China's demand for feed grain.
- assumptions about substitution between feed grain and meat imports will also influence feed grain demand projections significantly.

Future supply of food and feed grains

A simple but important assumption used in supply projections is annual grain output growth. The assumption may be based on a simple extrapolation of grain output in previous periods or the experience of other countries at similar development stages or may be estimated by a sophisticated econometric approach taking account of all possible factors affecting grain supply. Some supply assumptions consider only technical potential while others take account of economic factors as well. However, the relevant policy variables discussed previously are very difficult to quantify so in some projections they implicitly rather than explicitly are assumed to have an effect on supply growth over time.

Based on other countries' experiences, Brown's (1994) controversial analysis assumed that China's grain supply would decline by at least 0.5 per cent a year from now to 2030, compared with 1 per cent decline for Japan since 1960, 1.2 per cent decline for Taiwan since 1977 and 1.9 per cent decline for South Korea since 1977 (Brown 1994). Carter and Zhong (1988) project zero growth, while all other estimates of grain output are positive. Garnaut and Ma assume 1 per cent growth in their for slow growth scenarios, and 1.7 in their for a rapid growth scenario. The OECF projection (1995) assumes that grain land area and yield per unit of land will continue to grow at 0.05

and 1.75 per cent a year, respectively, as they did in the period 1984-93. Some projections assume a declining growth rate but one which is still positive, such as OECF (from 0.8 in 1993-2000 to 0.6 in 2000-10), while some assume an increasing growth rate, such as Lin, Huang and Rozelle (1996) (from 0.7 in 1991-2000 to 1.6 per cent in 2010-20). However, such an assumption may be difficult to justify considering the rising opportunity cost of labour and land.

Data constraints are one of the important reasons for the variation in assumptions made. However, there are also offsetting forces at work in a rapidly growing economy, the relative importance of which is difficult to judge without more detailed modelling work. While there is no agreement on reasonable supply growth assumption, Wu and Findlay (1996) conducted a simple supply projection to provide a background against which to judge the sensitivity of the trade projections to the variations in demand parameters which they stressed.

Wu and Findlay assume that in 1995 demand for food grain was met in net terms and that China will be able to meet its (declining) demand for food grain from 2000 onwards at least in net terms; that is, China will achieve food grain self-sufficiency.[14]

They also assume that the growth rate of feed grain production is assumed to be 3 per cent per annum throughout the projection period, based on the growth of maize output in the past ten years.

Under these assumptions, China's total grain supply in the year 2000 will be 494 mmt, very close to the government's 500 mmt target (Luo, 1996). The implied total grain output growth will be about 1.1 per cent per annum over this period, slightly higher than the growth rate of 0.9 per cent achieved since the reform. This growth rate is expected to fall to about 0.5-0.6 per annum from 2000 to 2020, due to the rising opportunity cost of grain production and the resource movement away from grain production as a result of further reforms. As a result Wu and Findlay (1996) projected that China will be producing 521 mmt of grain per year by 2010 and 555 mmt per year by 2020.

Trade implications

The trade implications in quantity terms rely on the choice of economic growth and feeding efficiency scenarios. Although direct demand for imports is approximately the gap between projected production and consumption, there is not necessarily a direct relationship to international trade transactions because of changes in stocks and the management mechanisms for international transactions. If an 8 per cent income growth rate is chosen, under the low feeding efficiency scenario, China will need feed grain

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[14] Food grain output could decline faster than the rate required for self sufficiency in a free trade scenario, depending on the pressures for structural change in food grain producing regions of China and the offsetting effects of new technologies. In that case our assumption of food grain self sufficiency could only be met by subsidies to production and/or protection, the welfare costs of which may be substantial. A number of the CGE studies of China's grain trade have also produced estimates of these sorts of costs.

imports of 29 mmt per year by 2000, 64 mmt per year by 2010 and 88 mmt per year by 2020.

Under the high feeding efficiency scenario China will still enjoy a net grain surplus by 2000 and be in balance by 2020. However, this outcome is considered less likely. If the results under the low efficiency scenario are scaled down by 25 per cent to reflect some improvement in feeding efficiency, China would need feed grain imports of 22 mmt per year by 2000, 48 mmt per year by 2010 and 66 mmt per year by 2020.

There are a number of other factors to consider when assessing the outlook for China's grain trade, and trade in products like meat based on grain, and which suggest a number of topics for further work. These are the choice of trade policy regime, the substitutability between food and feed grain, and the substitutability between grain imports and meat (and live cattle) imports.

On the issue of policy regime, Wu and Findlay assume that the trade policy regime permits the growth in demand for feed grain driven by income increases to be met by import growth while in the food grain market the government will maintain a policy of self sufficiency. This approach highlights the sensitivity of projections to key parameters in the feed grain markets.

The method used is not detailed enough to project the path of domestic prices in the grain market. There has been some concern that China may switch to a policy of protecting agriculture, including grain (Garnaut, Cai and Huang, 1996). Further work is also required on this issue, including the form in which that assistance might be made available (eg. subsidies versus border barriers) and biases in policy between types of grain. Some of these issues are discussed in Cheng, Findlay and Watson (1996).

The choice of trade policy regime for the grain sector will also have implications for the size of the grain-consuming meat industry and therefore the pattern of trade in meat. A protected grain sector, for example, and a less restrictive meat import policy would lead to a larger volume of meat imports.[15]

Wu and Findlay's projection also assumes there is no substitutability between feed and food grain, whereas there is actually a degree of substitutability between these grains. In that case, a higher feed efficiency which makes available more grain for food use would reduce the rate of growth of food grain output required for self sufficiency. Alternatively more rapid food grain output growth (a consequence of technological change perhaps) would make it easier to meet domestic demand for feed grain, even in the low feed efficiency scenario. These interactions could also be examined in a more sophisticated modelling framework.

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[15] Using grain-meat conversion ratios of 6:1 (kg) for red meat and 3.5:1 (kg) for poultry meat (average levels of low and high grain-meat ratios) and assume some improvement in feed use efficiency, feed grain imports could be replaced by 3.7 mmt of red meat or 6.3 mmt of poultry a year by 2000, 8 mmt of red meat or 13.7 mmt of poultry a year by 2010, and 11 mmt of red meat or 18.9 mmt of poultry a year by 2020, or appropriate combinations of the red and poultry meat.

The possibility of a greater volume of meat imports is reflected in some modelling work reported by Anderson and Peng (1996). One of their concerns is that none of the standard methods of projection allow explicitly for the impact of events in the non-agricultural sector and international market. As Anderson and Peng point out, this means these projections do not take into account constraints on the use of resources in other sectors or constraints on China's international transactions. They report the results of an application of a multisectoral model (GTAP) to this problem. One scenario is based on growth of GDP in China of 7.8% a year through to 2005. The result is that China is projected to import 33 mmt of grain in 2005 and a grain self sufficiency rate of 96% (import dependence of 4%).

In Anderson and Pen's study, other economies in the rest of the world are also growing, at similar rates to China in the rest of East Asia and at slower rates in the developed economies. The Uruguay Round outcome of multilateral trade negotiations is also implemented, which removes export subsidies for farm products, thereby boosting world trade in farm products and also prices of those products. However, this price rise is not sufficient to offset the long term structural decline in food prices which is built in to the model. The Uruguay Round also removes quotas on exports of textile and clothing products which boosts the trade in those products but lower their prices. For details, see Anderson and others, 1996.

Anderson and Peng note that their import projections are relatively low compared to others in Table 6, in part because of the projected growth in imports of livestock and other food products.[16] However, they observe that a tighter set of trade restrictions on these items would raise the level of grain import dependency above 4%.

These results are also sensitive to assumptions made about value adding to grain in the food processing sector. Which will influence the pattern of trade in grain compared to processed products. A recent paper by Lu Feng (1996) highlighted the labour intensity of these activities compared to grain production. He observes that meat production requires little land (possibly no arable land) and a relatively large amount of labour input including some scope to use labour released by the seasonal variation in demand from other activities. Given its resource endowment, China might therefore become a competitive supplier of meat, a major exporter of labour intensive food products and a larger importer of the grain raw materials (and possibly live cattle) needed by this sector. The quantitative importance of these effects is a topic for further modelling work which captures more accurately the factor intensity of various value adding activities.

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[16] China pays for these imports by expanding net exports of manufactures, even though China is denied full access to the benefits of the Uruguay Round outcome because of lack of WTO membership. China's export growth is concentrated in light manufactures not including the textiles and clothing category in this scenario.

Concluding remarks

In conclusion, several major issues arise from this study. China's post-1978 agricultural reform has brought about significant positive impact on the Chinese economy in general and China's rural and agricultural sector in particular. Markets have replaced central planning and played an increasingly important role in China's agricultural production and trade. Agricultural resources including land and labour increasingly are reallocated in accordance with China's comparative advantage, which is reflected by a rapid growth of more labour intensive agricultural production and trade.

Secondly, China's agricultural reform has not been completed because of the Government's commitment to grain self-sufficiency. As long as this policy remains unchanged the Government will still maintain some control over agricultural land, labour and other resource mobility, which will limit the efficiency of resource use. Policy interventions through erratic price changes could also have been responsible for nationwide fluctuations in grain harvests, which have made China's grain market rather unpredictable. Therefore it should be realised that any significant policy changes regarding grain production and trade will inevitably cause further resource restructuring and thereby trade restructuring.

Thirdly, even if China continues to adhere to its food self-sufficiency policy, rapid industrialisation will make land-intensive agriculture more costly. In fact, if China's wants to keep its domestic food prices at world market levels, which are predicted to continue declining in real terms, it will have to import more land-intensive food ,at the margin - grain - to feed its population. It will in fact be in China's interests to import more grain in the future so that its industrialisation will be enhanced by cheap food available from world markets and agricultural resources can be freed up for labour intensive agricultural production, including for export. Finally should be aware that in such a policy environment any grain demand and supply predictions are subject to strong assumptions and can only be indicative. More importantly, income and price effects of possible resource reallocation caused by further deregulation and liberalisation in grain production and marketing could be much stronger than they would otherwise be in a freer market system.

Appendix

Table A1

Output of China's major food products, 1975 to 1996

(In million metric tons)

Year	Total grain	Of total grain: Rice	Wheat	Maize	Cotton	Oil crops	Sugar crops	Fruits	Meat	Fish
1975	285	126	45	47	2	5	19	5	8	4
1976	286	126	50	48	2	4	20	5	8	4
1977	283	129	41	49	2	4	20	6	8	5
1978	305	137	54	56	2	5	24	7	9	5
1979	332	144	63	60	2	6	25	7	11	4
1980	321	140	55	63	3	8	29	7	12	5
1981	325	144	70	59	3	10	36	8	13	5
1982	355	162	68	61	4	12	44	8	14	5
1983	387	169	81	68	5	11	40	9	14	5
1984	407	178	88	73	6	12	48	10	17	6
1985	379	169	86	64	4	16	60	12	19	7
1986	391	172	90	71	4	15	59	13	21	8
1987	403	174	86	79	4	15	56	17	22	10
1988	394	169	85	77	4	13	62	17	25	11
1989	408	180	91	79	4	13	58	18	26	12
1990	446	189	98	97	5	16	72	19	29	12
1991	435	184	96	99	6	16	84	22	31	14
1992	443	186	102	95	5	16	88	24	34	16
1993	456	178	106	103	4	18	76	30	38	18
1994	445	176	99	99	4	20	73	35	45	21
1995	467	185	102	112	5	23	79	42	53	25
1996	490	195	110	127	4	22	84	47	60	31

Source: State Statistical Bureau (1996), pp. 371-72; China News Agency, 15 December 1996.

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