

# APSTRACT

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# Trends in agriculture and food production

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**Summary:** Agricultural reform resulted a shift from collective farming to small-scale production in China. This reform also has resulted a strong increase in gross agricultural output, which coincides with a slower increase in labour productivity. At the beginning of the reforms, agriculture accounted for 70 percent of total employment in China and still employs more than 50%. As a result of these reforms, China has undergone impressive economic growth also in the agriculture; the country has become one of the world's top exporters and is attracting record amounts of foreign investment. The government has also stepped up investments in rural areas to meet the market demand for agricultural products. Results are very competitive compared to Central and Eastern European countries, where agriculture accounted for only 15 percent of total employment, but agricultural reform resulted a strong decline in gross agricultural output, which coincides with a similarly strong decline in employment. When approaching the issue of sustainable agriculture, we have to take into consideration, which China and India feed the largest populations in the world and both countries have had its own agricultural successes in the past 50 years. China has used land far more efficiently than many developed countries. With nine percent of the world's arable land, China is responsible for the greatest share of agricultural production worldwide. Volume of produced pork, eggs, wheat, cotton, tobacco, and rice has increased and China exports an increasing amount of product each year. China has opened his borders, but do not expose food consumers to price shocks and producers to risks and disincentives. In this paper, the land-tenure system and the trends of agricultural developments are analysed in China and selected countries of EU.

## Introduction

The economic development of China and India presents threats and opportunities at the same time, says the State of the World 2006 report (*State of the World*, 2006). The strategy these countries make in the next few years will lead the world either towards a future growing ecological and political instability—or a development path based on efficient technologies and better stewardship of resources. From 1978 to 2007, GDP in China grew at an annual average of 9.7% to become one of the largest economies in the World. Foreign trade grew at an average of 17.4% annual, the third largest in the world (*World Bank*, 1999). China has attracted 83.5 billion US\$ of foreign direct investment and made overseas investment of 18.7 billion dollars, both are the biggest amount for developing countries. Per capita consumption grew by 4.4 times for urban and 4 times for rural residents (*World Trade Organization*, 2001, *Winters*, 2002).

The population living in poverty has dropped from 250 million to 20 million. China has benefited a lot from the trade and investment opportunities. Economic transformations generates one of the most sustained economic growth in the world since 1960 and has reduced the number of those living in poverty and also resulted a sizeable middle class and considerable environmental problems (*Zhi*, 2006). The GDP data published in 2006 indicate that the size of the economy, measured in financial terms, reached over US\$ 2,500 billion, and GDP measured at Purchasing Power Parity (PPP) is four times higher than the above figure. Average incomes per capita at PPP are US\$ 7,200, which is 25% of the average per capita income in the EU. There are large parts of the country, where income levels have reached, that of some developed East Asian and European countries. Many of China's

industries have become completely integrated into the world supply chain and China could become the largest exporter in the world by 2015 (*Lan*, 2003, 2005).

## Agricultural development policy and land use

Land-tenure system in China combines private use rights with public ownership to provide economic incentives for farm households. Nominally, agricultural land is collectively owned by groups of 30–40 households (*Sicular*, 1988, 1995). In some cases, the village is the collective owner and there are around 10 groups in each village. Regardless of who owns the land, the village leadership may still influence and sometimes dictate land-use and land-allocation (*Yao*, 2000, *Ho*, 2001, *Ho and Lin*, 2003). Villages divide land parcels into four tenure categories, each with different rights and responsibilities attached. The most common allocation is “responsibility land,” which is allocated to households in return for the household's commitment to deliver a quota of grain. The bundle of rights extended to farmers varies among villages, sometimes among groups in the same village, and also according to the tenure category of each parcel. The most important right allocated to farm households is the right to residual income, which allows farmers to freely sell their output and retain their earnings.

From the 1960s through the early 1980s, China taxed its agricultural sector by procuring commodities at below-market prices to subsidize urban consumption and industrial development (*Lippett*, 2000). In 1978, the government began to shift away from collective farming giving individual households greater control and decision-making powers over land and other resources. Economic growth in agriculture has been focused on the productivity of rural population.

Agricultural development policy can be divided into six periods. During the 1990s, central government taxation of farmers receded, although local taxes and fees have become more expressed for farmers. The first period, from the 1950s through the early 1980s is characterised by collective farming.

The second period from 1979 to 1984, coincides with the introduction of the household responsibility system (HRS) and adjustments in the state purchase price for agricultural products. These price adjustments resulted an overall improvement in development of trade for grain and oilseeds. Local free markets were gradually given permission to re-open as an outlet for farm surpluses. After the fulfilment of the state procurement quotas, most products could be exchanged in deregulated local markets at higher than the quota price. Before economic reform, state commercial enterprises and marketing co-operatives had the exclusive entitlement to purchase grain and oil crops. By 1984, the share of state marketing dropped down to 91 percent for the 12 most important crops and livestock products and the overall agricultural output increased significantly.

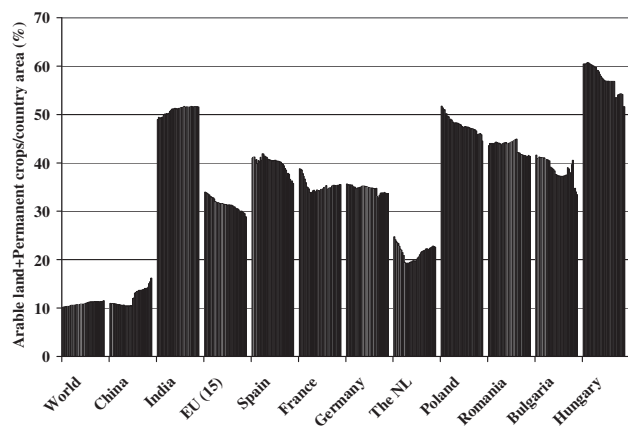


Figure 1: Proportion of arable and permanent crop area in selected countries (%)  
Source of data: [www.fao.org/statistics/](http://www.fao.org/statistics/)

In the beginning of the third reform period (1985–1989), a program was introduced to enhance the functioning of rural markets. Over this relative long period the adjustments of agricultural policies occurred in favour of market liberalization, quantities and prices were determined by market mechanisms. The debate was particularly intense in the second half of the 1980s, when the rate of growth of agricultural production fell and it was further exacerbated in the beginning of the 1990s, when increases in agricultural prices affected inflation. In 1985 the marketing of many products, including animal products, fruit and vegetables, was deregulated, and a voluntary procurement contract for rice, wheat and maize was introduced. The introduction of the rural market program led to stagnating agricultural production and decreasing grain production (Lardy, 1998). This observation might be partially explained by the fact that labour mobility was allowed and an important labour outflow from agriculture took place. Following a decrease in grain production, the procurements quickly lost its voluntary

character so that contracts were mandatory again in 1986, but the procurement quota for grain was partly reduced. In addition, a new subsidy system for fertilizer and fuel was introduced for the cultivation of grain and oil crops to encourage higher production (Lardy, 1998).

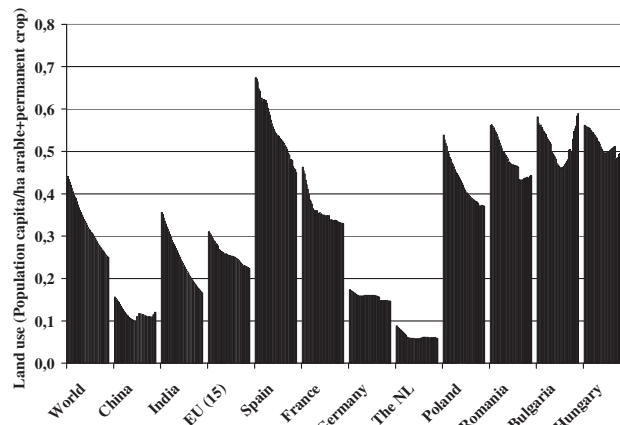


Figure 2: Trends in per capita arable land and permanent crop area in selected countries (ha) Source of data: [www.fao.org/statistics/](http://www.fao.org/statistics/)

Following criticisms of the impact of the rural market program, the government introduced a set of adjustment policies in 1990 and the government implemented reform in the cereal sector to phase out the old centrally planned supply system in favour of more market oriented solutions. Cereal and oilseed price subsidies to urban dwellers were eliminated; purchase and selling grain prices were equated. Interregional grain transfers were replaced by a contract system between provincial governments (Nguyen and Wu 1993). The government reformed the input supply system by removing subsidies and allowing private firms to supply inputs to producers. The system of supplies of fertilizers and fuel for deliveries of grain and oil crops to the state agencies was converted to monetary payments. However, market reform in agriculture remained incomplete, which is reflected by the different degrees of price and quantity controls in different sub-sectors (grain, cotton and oil crops versus livestock and vegetables), by the segmentation of regional agricultural markets, and by the isolation of domestic markets from international markets.

Political changes in 1994 initiated the fifth period (1994–1998). Most reforms aimed at a rebirth of self-sufficiency policies, not only at the national level but also at the regional level (OECD, 1997, Nyberg and Scott, 1999, Lu, 1999). It was not allowed for the relatively developed regions to purchase grain from other regions. Private grain traders were not allowed to buy grain from farmers before the latter had fulfilled their respective state purchase contract. The Governor's responsibility system was introduced in 1995 to maintain the overall balance of grain supply and demand. Policy instruments included stabilization of planting area, output, and stocks, as well as the installation of local reserves to directly regulate grain markets and stabilize prices. Some local governments have also reintroduced command purchase and others have set barriers to regional grain trade.

The rural market reforms for cereals, oil crops and cotton were also largely reversed, but the state procurement prices for grain and cotton increased substantially (Tian and Zhang, 2003). Between 1993 and 1996 prices for cereals and cotton doubled and the gap between the regulated quota procurement prices and market prices (for grain) narrowed substantially (Peng, 1998). In 1997, market prices even fell below the quota prices. In order to protect the interest of grain producers and to meet food security goals, the central government launched a price support policy and set a support price level for all cereals and subsidies were provided to the state grain marketing enterprises (Hsu and Gale 2001).

In May 1998, a new grain reform was announced in order to reduce the financial effects of the grain support program. The central government deepened the reform in the grain marketing area. The new policy is summarized as “four separations and one improvement”. The four separations set for grain marketing include separating government policy from commercial business functions; central grain reserves from local commercial reserves; central and local responsibilities on grain marketing and new debts from old debts. The one improvement means that quota procurement prices are determined by the prevailing market price. At the beginning of this agricultural development period, the original idea was to introduce a transition period before the total liberalization of the grain sector. However, the huge government debt caused the direction of the grain marketing reform to make a surprising change Wu, 1997, Wu et al. 2001, Xu, 2002, Brümmer et al 2006). The central government announced a means of simultaneously recovering the huge government debts, and raising market prices over state procurement prices (Holbig, 2004, Huang et al. 2004). This involves tightening up the country’s grain marketing system and returning it to government monopolistic control.

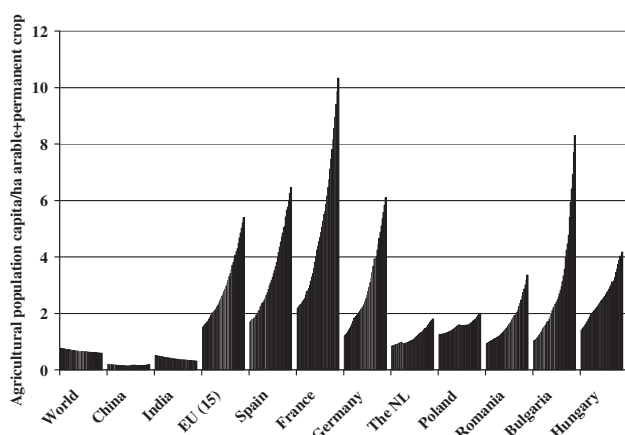


Figure 3: Arable land and permanent crop area used by agricultural population in selected countries (ha) (Source of data: www.fao.org/statistics)

The permanent crop and arable land areas is about 10% of the total territory of the country in China, while India cultivate about 50% of its territory (Figure 1). This is higher proportion than the means of 15 EU countries before the enlargement in years 2003 (Figure 1). China has 10 persons to feed per hectare of arable land, which is more than twice

the world average of 4.4 persons per hectare. China is largely self-sufficient in food production. Yields of major crops in China are above world averages (Table 1). China’s share of world agricultural production exceeds its share of world population for most major commodities. China produces over 40 percent of the world’s pork and vegetables. China’s low shares of milk, sugar, beef, soybean, and fruit production reflect its relatively low consumption levels for these commodities. Importing soybeans, allows China to free up one part of its land for higher yielding crops. High production and consumption of vegetables in China also makes efficient use of scarce land resources. China maintains its high level of food production by double- and triple-cropping and applying large quantities of fertilizer and labour to its limited land base. In contrast with China, Hungary is richly endowed with farmland. China has over 300 labourers for every 100 hectares of farmland. The size of arable land and permanent crop in EU (15) was less than 2 hectares in 1961, but sharply increasing and it was close to 6 hectares in 2007 (Figure 3). The size of arable land and permanent crop is less than 2 hectares in the Netherlands and more than 10 hectares in France. This is much higher than the World average. China’s farms are small and mostly cultivated by households. China has 10 persons per hectare of arable land and permanent crop area, which is less than half the world average. The average household cultivates about 1 hectare, which is located different places. Farmland is still owned collectively by villages and village leaders allocate land-use rights among households based on family size and labour availability.

Table 1: Participation of China in production of some selected crops in years 2004–2007

Source of data: www.fao.org/statistics/

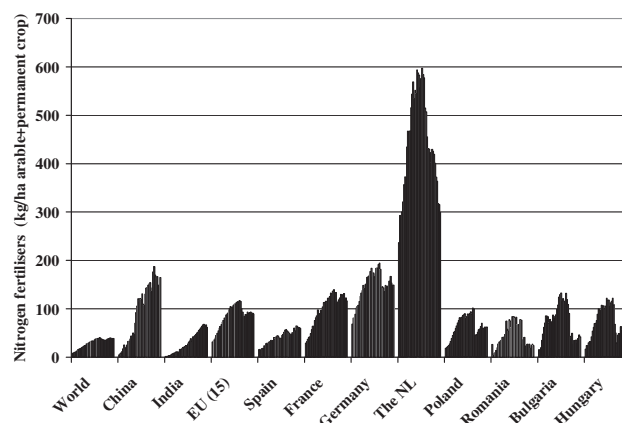
term	Harvested area (million ha)		Yield (t/ha)			
	China (%)	World	China	World	China	China (%)
Rice, paddy	18,82	155,985	29,358	4,12	6,28	152,5
Maize	18,03	150,788	27,175	4,86	5,36	110,3
Wheat	10,59	217,366	23,014	2,81	4,52	160,7
Soybeans	9,78	94,087	9,198	2,31	1,72	74,4
Vegetables fresh	48,23	17,479	8,403	14,13	17,26	122,1
Rapeseed	24,63	28,565	7,023	1,73	1,69	97,7
Seed cotton	15,46	34,319	5,304	2,07	3,78	182,2
Potatoes	25,92	19,011	4,929	16,76	14,42	86,1
Sweet potatoes	52,24	8,999	4,701	13,94	21,64	155,3
Groundnuts, with shell	20,37	23,078	4,698	1,55	3,00	193,1
Watermelons	56,23	3,459	1,948	26,66	31,93	119,8
Apples	39,91	4,837	1,931	13,11	13,39	102,1
Cabbages and brassicas	56,10	3,097	1,737	22,10	20,14	91,2
Cucumbers and gherkins	63,47	2,526	1,604	17,37	17,04	98,1
Plums and sloes	66,77	2,367	1,580	4,04	2,95	73,0
Tomatoes	30,24	4,589	1,388	27,57	23,50	85,3

term	Harvested area (million ha)		Yield (t/ha)			
	China (%)	World	China	World	China	China (%)
Tobacco, unmanufactured	35,15	3,928	1,381	1,67	1,89	113,5
Tangerines, mandarins	64,11	2,042	1,310	12,48	9,86	79,0
Sugar cane	6,13	20,815	1,272	68,19	77,60	113,8
Beans, dry	4,62	26,451	1,221	0,71	1,51	211,9
Asparagus	89,97	1,338	1,204	5,11	5,06	99,0
Pears	70,06	1,673	1,173	11,78	10,28	87,3
Tea	40,40	2,757	1,114	1,34	0,95	71,0
Broad beans, horse beans, dry	40,50	2,630	1,065	1,77	2,08	117,4
Eggplants (aubergines)	54,85	1,912	1,052	16,79	16,80	100,1
Sunflower seed	4,42	23,166	1,023	1,28	1,82	142,2
Peas, dry	14,87	6,678	0,993	1,58	1,28	80,8
Onions, dry	27,94	3,403	0,951	18,59	20,77	111,7
Millet	2,55	35,895	0,917	0,88	2,07	235,5
Barley	1,55	56,301	0,872	2,45	4,15	169,4
Buckwheat	32,06	2,700	0,863	0,81	0,79	97,9
Peaches and nectarines	46,55	1,493	0,695	11,73	11,27	96,1
Spinach	79,08	0,871	0,689	15,61	16,76	107,3
Garlic	56,28	1,183	0,666	12,88	17,40	135,0
Persimmons	89,78	0,735	0,660	4,42	3,40	76,9
Chillies and peppers, green	36,55	1,732	0,633	14,93	20,84	139,6
Sesame seed	8,08	7,659	0,619	0,44	1,00	225,6
Sorghum	1,33	43,469	0,576	1,40	4,49	321,7
Other melons (cantaloupes)	43,08	1,238	0,533	20,87	24,90	119,4
Lettuce and chicory	49,85	1,043	0,520	21,92	22,17	101,2
Linseed	18,83	2,612	0,485	0,91	0,99	108,4
Carrots and turnips	40,10	1,196	0,480	22,25	18,21	81,9
Natural rubber	5,47	8,601	0,470	1,13	1,13	100,0
Grapes	6,25	7,454	0,466	8,96	13,09	146,2
Mangoes, guavas	9,88	4,478	0,442	7,12	8,41	118,1
Cauliflowers and broccoli	38,39	0,999	0,383	17,89	20,88	116,8
Oranges	9,62	3,866	0,372	16,42	7,53	45,8
Pumpkins, squash	20,92	1,520	0,318	13,41	19,00	141,7
Bananas	6,83	4,324	0,295	17,78	23,82	134,0
Triticale	7,57	3,652	0,277	3,32	1,86	56,0
Cassava	1,43	18,514	0,265	11,85	15,97	134,8
Peas, green	22,79	1,087	0,248	7,36	9,58	130,2
Castor oil seed	18,26	1,303	0,237	0,99	0,93	93,9
Oats	2,02	11,593	0,234	2,07	2,85	137,5
Rye	3,46	6,479	0,223	2,24	2,55	113,5
Beans, green	23,16	0,921	0,213	7,00	11,39	162,6
Walnuts, with shell	27,99	0,672	0,188	2,54	2,66	104,7
Sugar beet	3,28	5,367	0,176	46,75	53,35	114,1
Flax fibre and tow	35,06	0,472	0,165	2,08	4,33	208,1
Chestnuts	39,97	0,338	0,135	3,68	6,91	187,6
Tung Nuts	72,16	0,187	0,135	2,44	2,73	112,0
Ramie	96,80	0,114	0,110	2,48	2,52	101,7

**Table 2:** Participation of China in the consumption of plant nutrients 2004–2007

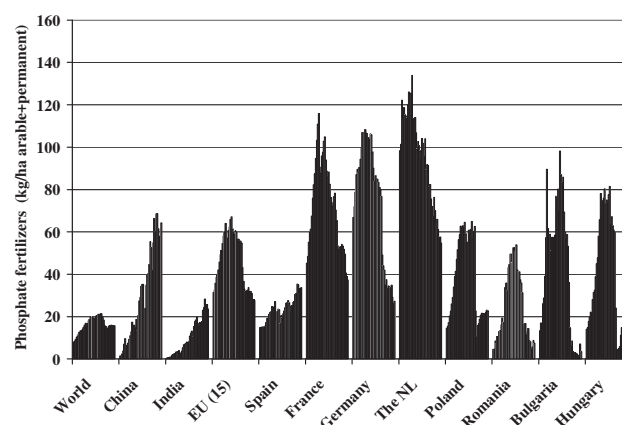
Source of data: [www.fao.org/statistics/](http://www.fao.org/statistics/)

Consumption in nutrients million tonnes	China	World	%
Nitrogen (N total nutrients)	30,264	95,716	31,6
Phosphate (P2O5 total nutrients)	11,226	38,713	29,0
Potash (K2O total nutrients)	5,367	28,085	19,1



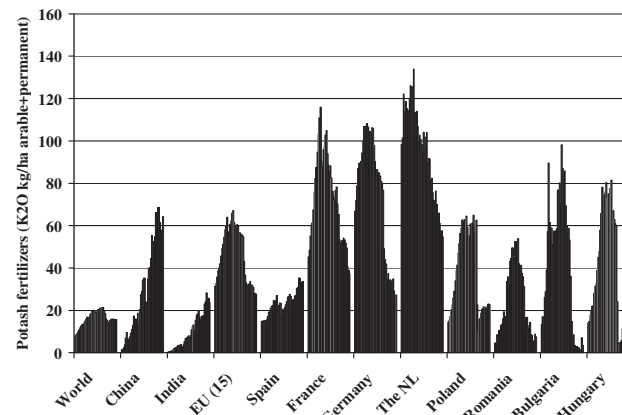
**Figure 4:** Trends in nitrogen fertilizers use between (1961–2004) in selected countries

Source of data: [www.fao.org/statistics/](http://www.fao.org/statistics/)



**Figure 5:** Trends in phosphate fertilizers use between (1961–2004) in selected countries

Source of data: [www.fao.org/statistics/](http://www.fao.org/statistics/)



**Figure 6:** Trends in potash fertilizers use between (1961–2004) in selected countries

Source of data: [www.fao.org/statistics/](http://www.fao.org/statistics/)

Nitrogen, phosphorous and potassium fertilizer use per hectare is more than 3–4 times higher than the world averages. Nitrogen input is 150–180 kg/ha, which is higher than the means of EU (15). China uses similar amount of phosphorous and potassium as the EU countries. The rate of application of tendency of nitrogen, phosphorous and potassium fertilizer increasing in China and the input level of fertilisers are decreasing in EU, especially in the new EU member states (Figure 4–6). The high levels of fertilizer and pesticide use in China mean that further expansion of agricultural output through greater input use may not be sustainable (Guo, 2002). China has started to return environmentally fragile land to more sustainable forest or grass land, which further reducing the availability of land for arable crops. China has a relatively high share of irrigated land. Water supplies are dwindling in northern China, and pollution from industrial effluents and agricultural runoff is worsening. To accommodate growing consumer demand for food, the agricultural sector will probably need to make more efficient use of limited land and water resources by changing the mix of crops planted, adopting higher yielding varieties, improving land management and/or consolidating land holdings to achieve size economies.

### Changing structure of livestock production

Dramatic increase in animal protein consumption would not have been possible without a rapid expansion of domestic livestock industry in China. Since 1985, pork output has increased markedly, reaching over 51.838 million tonnes in 2003–2006. Beef sector has grown from an inconsequential output level in the 1980s to the third largest in the world. Likewise, China has moved into second place behind the United States in total output of poultry meat. China produces more than 90% of the meat of mules, asses, goose and guinea fowl (Table 3.). China is a dominant producer of duck meat.

Since market reforms in the 1980s, an increasing number of traditional households in China have taken advantage of expanded marketing opportunities to raise additional animals for sale in local markets. Many households shifted their focus from crop production to livestock and increased the swine from 1 or 2 head per household to 10, 50, or 100 head. Encouraged by growing applications of imported technologies and management practices, large-scale commercial operations have also increased since the

1980s. Since 1985, the share of China's pork produced by traditional households has declined from 95 percent to less than 80 percent. Traditionally, livestock production was a sideline activity for many households; more farms are now specializing in livestock production. Households that specialize in livestock production and large commercial operations have risen in share and they produce 15% of overall livestock production. This transition in livestock production has important impacts on feed use. Traditional household operations make full use of readily available, low-cost feedstuffs. They often feed their swine with large quantities of water plants, vegetables, tubers, crop residue, table scraps, wheat and rice bran. These low-quality feeds are supplemented with some grain, protein meals, and concentrates, but traditional swine diets are often deficient in protein and energy, causing low productivity. Specialized producers often employ more advanced management and breeding practices and feed their livestock with grain and protein meal and archive roughly 36 percent more yield than

**Table 3:** Participation of China in the production of some selected animal products in years 2004–2007 Source of data: [www.fao.org/statistics/](http://www.fao.org/statistics/)

Items	Animal (million head)			Yield (kg/ head)		
	China	World	(%)	China	World	%
Meat of Mules	0,630	0,634	99,4	100,00	100,40	99,6
Meat of Asses	2,156	2,318	93,0	80,00	78,90	101,4
Goose and guinea fowl meat	555,567	601,318	92,4	4,00	3,97	100,9
Duck meat	1 931,374	2 535,651	76,2	1,30	1,45	89,5
Pig meat	662,548	1 323,583	50,1	78,24	79,02	99,0
Hen eggs, in shell	2 197,371	5 669,611	38,8	11,02	10,55	104,5
Goat meat	146,705	382,571	38,3	13,26	12,34	107,5
Rabbit meat	377,529	1 057,389	35,7	1,42	1,46	97,3
Goatskins	139,646	399,397	35,0	2,60	2,47	105,4
Horse meat	1,609	4,911	32,8	120,94	154,88	78,1
Sheep meat	154,226	536,840	28,7	15,10	15,64	96,5
Sheepskins	144,310	533,874	27,0	2,80	3,20	87,5
Sheep milk, whole, fresh	40,120	193,686	20,7	27,02	47,08	57,4
Cattle meat	49,613	296,740	16,7	135,84	203,34	66,8
Cattle Hides	47,684	306,153	15,6	34,00	25,20	134,9
Chicken meat	7 480,023	48 694,760	15,4	1,38	1,45	94,9
Buffalo meat	3,420	22,775	15,0	98,88	137,86	71,7
Buffalo Hide	3,299	29,778	11,1	30,00	27,47	109,2
Buffalo milk, whole, fresh	5,347	53,229	10,0	525,48	1 492,20	35,2
Camel meat	0,067	1,525	4,4	221,80	207,24	107,0
Cow milk, whole, fresh	9,652	241,441	4,0	2 751,58	2 236,18	123,0
Camel milk, whole, fresh	0,072	4,305	1,7	202,08	347,80	58,1
Bird meat	0,805	57,644	1,4	0,15	1,04	14,3
Goat milk, whole, fresh	1,321	165,580	0,8	197,64	86,56	228,3
Turkey meat	0,400	642,398	0,1	10,93	8,82	124,0
Natural honey (hives)	7,406	40,565	18,3	20,95	50,54	41,5

traditional households. As a result, specialized producers reduce the time it takes for swine to reach slaughtered weight by 20–80 days. The shift from traditional households to specialized operations has increased the demand for quality grain and oilseed-based feeds, reinforcing the growth in the number and capacity of Chinese feed mills.

### Growth rate of agricultural production

All the indices at the country, regional and world levels are calculated by the Laspeyres formula according to the FAOSTAT. The indices are calculated from production data presented on a calendar year basis. Production quantities of each commodity are weighted by 1999–2001 average international commodity prices and summed for each year. To obtain the index, the aggregate for a given year is divided by the average aggregate for the base period 1961–1965. Since the FAO indices are based on the concept of agriculture as a single enterprise, amounts of seed and feed are subtracted from the production data to avoid double counting them. Deductions for seed (in the case of eggs, for hatching) for livestock and poultry feed is applied to both domestic and imported commodities. They cover only primary agricultural products destined to animal feed (maize, potatoes, milk, etc.). Processed and semi-processed feed items such as bran, oilcakes, meals and molasses have been completely excluded from the calculations at all stages. In this way, the FAO indices may differ from those produced by the countries themselves because of differences in concepts of production, coverage, weights, time reference of data and methods of calculation.

The largest increase in agricultural production was detected for China and India (Figure 7). Agricultural production index in Spain was similar to the World average and steadily increasing, while agricultural production has decreased in many Eastern European countries since 1980s. Similar trends were reported by *Majewski*, (2008) and *Bronisz, Heijman*, (2008) for *Poland* and *Kovács Katona*, (2007) for Hungary.

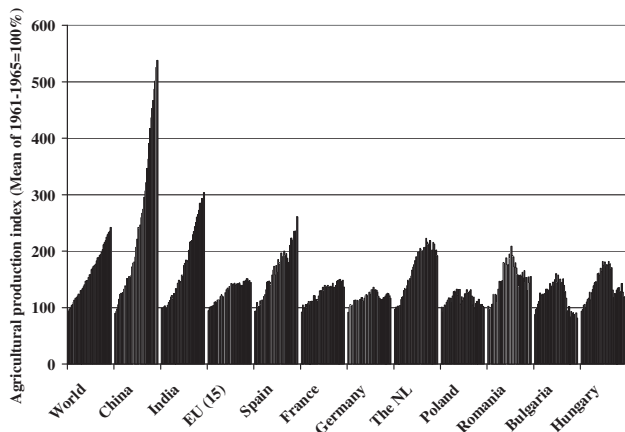


Figure 7: Agricultural production index in some selected countries  
Source of data: [www.fao.org/statistics/](http://www.fao.org/statistics/)

Crop production data refer to the actual harvested production from the field or orchard and gardens, excluding harvesting and threshing losses. Production therefore includes the quantities of the commodity sold in the market and the quantities consumed or used by the producers. When the production data refers to a production period falling into two successive calendar years and it is not possible to allocate the relative production to each of them, it is usual to refer production data to that year into which the bulk of the production falls. The largest increase in crop production was detected for China and India (Figure). Agricultural production index in Spain and in the Netherland was similar to the World average and steadily increasing, while crop production has decreased in many Eastern European countries since in the second part on the examined period of 1961–2006.

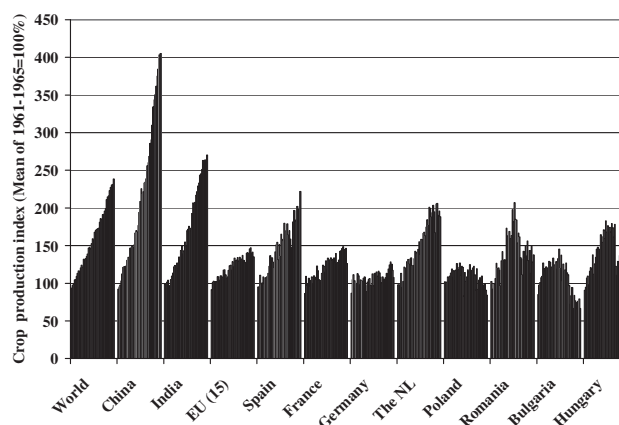


Figure 8: Crop production index in some selected countries  
Source of data: [www.fao.org/statistics/](http://www.fao.org/statistics/)

Overall per capita meat consumption in China, however, is still lower than in many EU member states. Most of China's livestock are still raised by traditional rural households that devote the bulk of their labour to crop production. Households generally keep livestock to provide food, draft power, and manure for the family. The largest increase in livestock production was detected for China (Figure 8). Livestock production index in Spain was similar

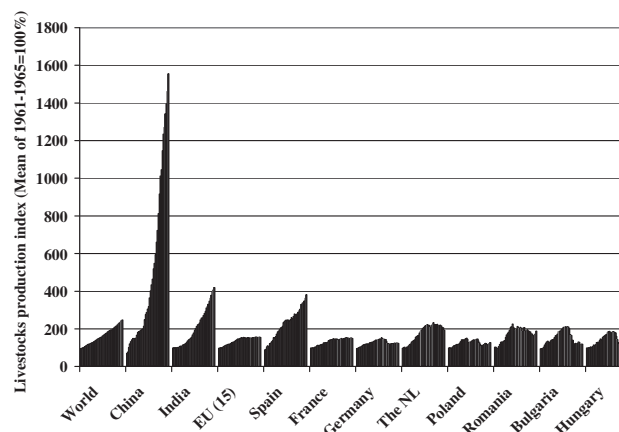
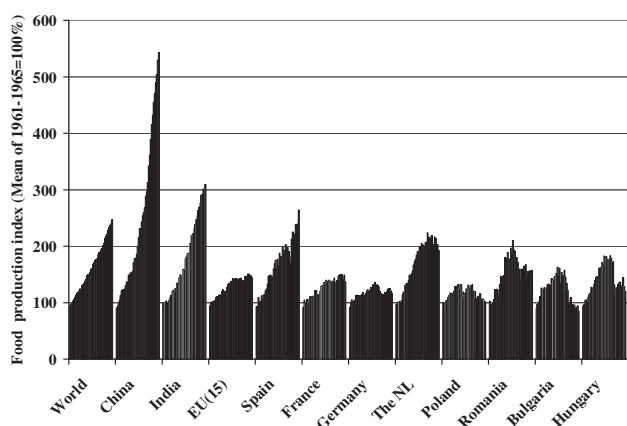


Figure 9: Livestock production index in some selected countries  
Source of data: [www.fao.org/statistics/](http://www.fao.org/statistics/)

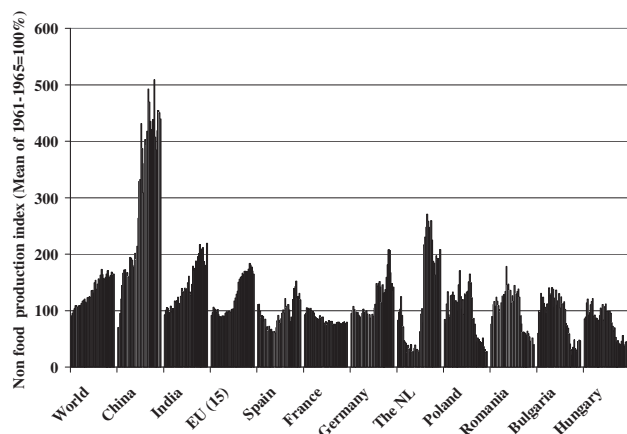
to India and steadily increasing in the examined period. Livestock production has decreased in many Eastern European countries since 1980s.

Food production index refers to the total amount of the commodity available as human food during the 1961–2006 period (Figure 10). Data include the commodity in question, as well as any commodity derived from them as a result of further processing. Food from maize, for example, comprises the amount of maize, maize meal and any other products derived available for human consumption. Food from milk relates to the amounts of milk consumed as well as the fresh milk equivalent of dairy products.



**Figure 10:** Food production index in some selected countries  
Source of data: [www.fao.org/statistics/](http://www.fao.org/statistics/)

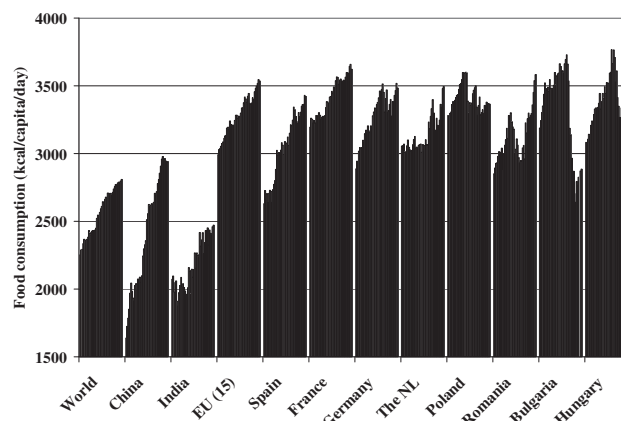
Indices for meat production are computed based on data for production from indigenous animals, which takes account of the meat equivalent of exported live animals but excludes the meat equivalent of imported live animals. For index purposes, annual changes in livestock and poultry numbers or in their average live weight are not taken into account. The largest increase in food production was detected for China and India (Figure 10). Food production index in Spain was similar to World average and steadily increasing, while food production index has decreased in many Eastern European countries since 1980s. The economic value of grassland products are well



**Figure 11:** Production index for non food commodities in some selected countries  
Source of data: [www.fao.org/statistics/](http://www.fao.org/statistics/)

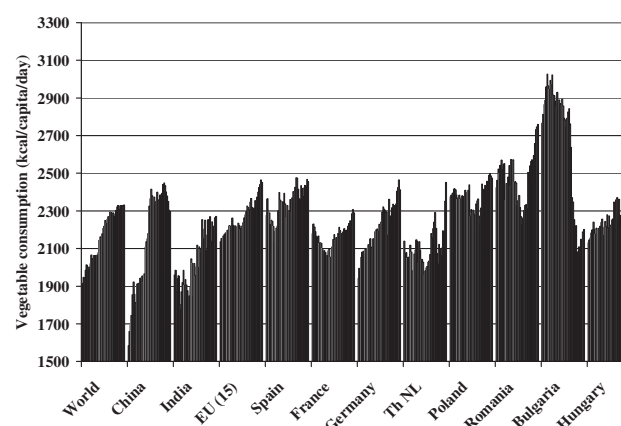
known, but *Nábrádi*, (2007) highlighted the fact that certain utilization potentials is far from being complete.

The largest increase in non food production index was detected for China and the Netherlands (Figure 11). Production index for non food commodities in Spain was similar to the mean of EU countries, while production index for non food commodities has decreased in many East European countries since 1980s.



**Figure 12:** Food consumption in some selected countries  
Source of data: [www.fao.org/statistics/](http://www.fao.org/statistics/)

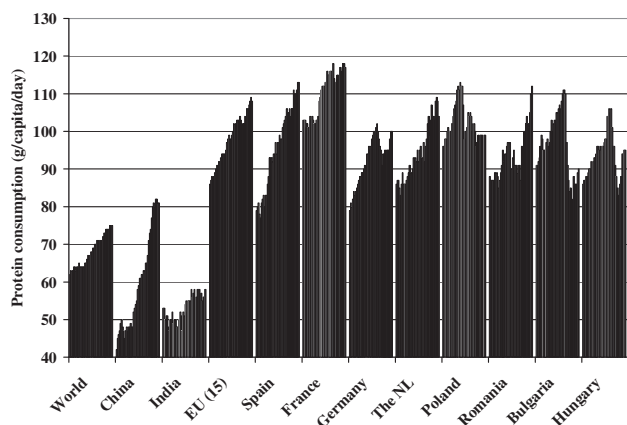
Although per capita incomes and food expenditures in China are still low, food security is not a problem for most of the regions in China. Data in figure refers to the total amount of food available for human consumption expressed in kilocalories. Caloric content is derived by applying the appropriate food composition factors to the quantities of the commodities. In XX century, famine and food insecurity were common in China, but food consumption and food availability have soared since beginning of examined period (1961–2007). China is still a poor country, but it has a rising urban middle class with world-class consumption standards. Farm families, which still make up the 50% of the population, grow much of the food they consume. Food insecurity is not a problem for most of provinces, and per capita food supply, is above the world average in beginning



**Figure 13:** Vegetable consumption in some selected countries  
Source of data: [www.fao.org/statistics/](http://www.fao.org/statistics/)

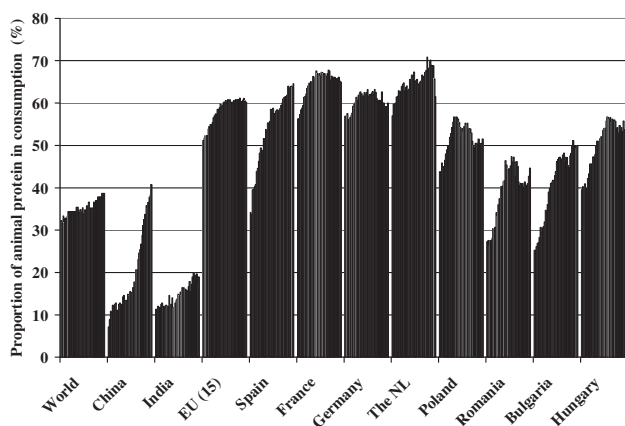
of XXI century. Per capita food supply is about 3000 kcal/capita/day, which is 500 kcal/capita/day less than in the member state of EU, except for Bulgaria, where the food supply was reduced sharply (Figure 12).

Cereals (mostly rice and wheat) and vegetables make up about 70% of per capita food consumption in China, which is higher share than in the EU. Per capita consumption of cereals and vegetables in China exceeds the world averages, but consumption of fruits, sugar, sweeteners, fats and oils is lower. Per capita vegetable consumption is about 2400 kcal/capita/day, which is similar to data of EU member states (Figure 13).



**Figure 14:** Protein consumption in some selected countries  
Source of data: [www.fao.org/statistics/](http://www.fao.org/statistics/)

Per capita protein consumption is increasing sharply in China (Figure 14). Data in figure refers to the total amount of protein available for human consumption resulting from the multiplication of the quantity of food available. Protein content is derived by applying the appropriate food composition factors to the quantities of the commodities and is expressed in grams. Per capita protein consumption is about 80 g/capita/day, which are 10–30 g/capita/day less than the number in EU countries. These differences in food consumption between China and EU reflect a combination of lower per capita incomes and preferences in China. As consumers grow wealthier, consumption of all foods will grow, but consumption of meat, fruits, fish, fats and oils will grow the fastest (Figure 15).



**Figure 15:** Proportion of animal protein in human diet in some selected countries  
Source of data: [www.fao.org/statistics/](http://www.fao.org/statistics/)

China is one of the largest customers for agricultural products. The level of agricultural imports is still modest. Country tends to import bulk commodities and items used as intermediate inputs in labour-intensive manufacturing. At the same time, China is a major exporter of high-value, labour-intensive food products, such as manufactured foods, animal products, fish, vegetables, and fruits. The agricultural exports go largely to Asian markets. Until the 1980s, there was relatively little value-added in China's food sector, as consumers prepared most meals at home using rice, noodles, raw vegetables, and meat produced at home, purchased from state-run foodstuff stores, or purchased directly from farmers. Since then, foods processing and retailing industries has grown fast, as consumers demanded more quality and convenience. Modern supermarkets are the most widespread retail outlet for food, but they are being challenged by emerging hypermarkets, most of which are owned by foreign chains. Hypermarkets are introducing China to modern supply chain management techniques designed to improve efficiency in wholesaling and distribution. These developments might open new channels for high-value food imports. The demand for quality, uniform farm products in high volumes may transform agricultural production processing and retailing in China.

## Trade and sustainable development

In the late 1990s, the market prices of some commodities rose above world prices in China as government supported prices (Brown, 1995). In the years leading up to WTO accession, China has liberalized trade considerably, but still maintained many barriers to agricultural trade (Carter and Rozelle, 2001, 2002, Huang and Rozelle, 2002). In accordance with its membership in the WTO, China lowers tariffs, weaken state trading monopolies, increase the openness of import license and quota allocation, and require publication of trade regulations, thus weakening most of the policy instruments the government has used to restrain agricultural imports. In the first few years after WTO accession, China allowed limited quantities of grains, cotton, vegetable oils, wool, and sugar to enter the country at low tariffs of 1–9 percent. At the same time, WTO entry opened more markets for China's labour-intensive exports, potentially moving China's trade patterns in a direction that will make more efficient use of human and natural resources. After the country's WTO accession, government fined other means of protecting and subsidizing farmers to maintain a degree of food self-sufficiency and social stability. Government subsidies are minimal in China, but spending on both price-distorting subsidies and infrastructure, education, and other subsidies, which are not tied to prices, have risen considerably. Increased competition after the WTO accession pushed China's food marketing system to squeeze out inefficiencies and reduce farm-retail margins. The country's goal of food self-sufficiency has led policymakers to restrain imports of land-intensive grains, the production of

which has a high opportunity cost. China's agricultural trade has grown relatively slowly, in comparison with booming merchandise trade (Duncan, 2001, Gilbert and Wahl 2002). The rapid development of transportation and marketing infrastructure has also played a role in integrating the national economy. Transportation and logistics costs account for an estimated one-fifth or more of retail prices, which is much higher than in developed countries. Marketing costs will need to be reduced to allow farmers in China to compete for markets on coastal and overseas area of China (Hsu et al. 2002, Fan and Chan-Kang, 2005). Inadequate port facilities and lack of warehousing and cold storage facilities can also impede both domestic and international trade. China is a major exporter of maize, chicken meat and preserved food, fruit and vegetables (Table 4). Tea, garlic frozen and dehydrated vegetables are also important export items for China. The country is responsible for more than 40% of world total export in respect of canned mushrooms, apple juice, carded and/or combed hair.

**Table 4:** Share (%) and volume (million USD) of most important export commodities in China between 2004–2006 Source of data: [www.fao.org/statistics/](http://www.fao.org/statistics/)

Export item	China	World	(%)
Crude Materials	1 673,758	23 314,415	7,18
Maize	1 088,732	10 999,423	9,90
Food Prepared	1 017,894	21 724,704	4,69
Fruit	546,203	5 900,076	9,26
Meat of Chicken Canned	520,930	3 054,138	17,06
Vegetables Preserved	520,774	3 592,950	14,49
Tea	421,613	3 159,917	13,34
Garlic	420,556	726,888	57,86
Vegetable Frozen	402,201	2 776,751	14,48
Vegetables Dehydrated	353,055	954,140	37,00
Beans, dry	323,759	1 309,839	24,72
Waters, Ice	315,484	2 097,429	15,04
Pork	306,307	5 480,347	5,59
Canned Mushrooms	303,122	748,375	40,50
Apple juice, single strength	302,792	735,891	41,15
Hair Carded/ Combed	301,551	647,086	46,60
Rice Milled	289,719	6 630,823	4,37
Groundnuts Shelled	250,811	752,169	33,34
Tobacco, unmanufactured	243,237	6 348,600	3,83
Chicken meat	236,391	8 455,154	2,80
Cigarettes	235,277	13 148,042	1,79
Apples	234,996	3 503,633	6,71
Paste of Tomatoes	229,868	1 560,912	14,73
Silk Raw	228,235	261,488	87,28
Prep of Pig Meat	225,078	1 679,649	13,40
Prepared Groundnuts	224,952	566,608	39,70
Cake of Soybeans	182,559	10 189,954	1,79
Dried Mushrooms	177,315	323,981	54,73
Confectionery	176,534	5 374,992	3,28
Vegetable Preservatives	167,827	367,051	45,72
Vegetable Fresh Or Dried	157,638	268,509	58,71

Export item	China	World	(%)
Pastry	152,892	10 426,397	1,47
Ginger	146,083	217,581	67,14
Prepared Nuts (Excluding Groundnuts)	132,729	1 097,994	12,09
Beverage Non-Alcohol	131,459	6 832,705	1,92
Wheat	120,985	17 041,994	0,71
Soybeans	119,563	14 429,944	0,83
Mushrooms and truffles	119,458	976,127	12,24
Chillies and peppers, dry	118,511	504,002	23,51
Vegetables fresh	114,197	1 471,283	7,76
Beverage, Alcohol	111,760	15 460,927	0,72
Vegetables, Prep, Pres, Frozen	101,036	385,102	26,24
Fruit, Nut, Peeled and Sugar	97,465	277,866	35,08
Food Wastes	95,246	3 825,085	2,49
Natural honey	93,273	808,570	11,54
Oil Essential	88,475	1 614,788	5,48
Pears	88,085	1 262,436	6,98
Onions, dry	84,910	1 187,175	7,15
Cotton lint	83,865	8 421,130	1,00
Tangerines, mandarins	76,769	2 039,082	3,76
Nuts	74,291	519,260	14,31
Flour of Wheat	73,932	2 139,045	3,46
Beer of Barley	70,957	7 090,399	1,00
Breakfast Cereals	68,536	2 555,379	2,68
Sesame seed	64,892	678,130	9,57
Taro (cocoyam)	64,109	77,725	82,48
Preparations of Beef Meat	61,090	1 309,147	4,67
Carrots and turnips	60,639	503,119	12,05
Sugar Refined	58,303	6 724,918	0,87
Sunflower seed	56,486	1 074,143	5,26
Chestnuts	55,189	207,389	26,61
Wool Degreased	54,094	922,449	5,86
Hen eggs, in shell	50,872	1 222,686	4,16
Sausages of Pig Meat	50,770	1 854,173	2,74
Feed	49,491	734,625	6,74
Groundnuts, with shell	49,171	147,674	33,30
Soya Sauce	46,773	204,468	22,88
Fruit Dried	42,235	448,281	9,42
Fruit Juice	36,487	1 862,984	1,96
Chocolate	34,202	10 577,121	0,32
Cider Etc	31,464	365,001	8,62
Rice Husked	30,803	453,810	6,79
Walnuts Shelled	30,450	403,448	7,55
Prepared Meat	30,095	135,590	22,20
Oil Boiled	30,014	440,868	6,81
Pig meat	29,773	8 699,900	0,34
Pineapples Canned	29,655	687,899	4,31
Pet Food	29,517	4 907,698	0,60
Beet Pulp	29,165	225,900	12,91
Duck meat	28,624	265,675	10,77
Cauliflowers and broccoli	28,133	624,715	4,50
Potatoes	27,810	1 891,680	1,47
Maize oil	26,321	641,780	4,10

Export item	China	World	(%)
Meat-Cattle Boneless	26,310	13 577,872	0,19
Tobacco	26,251	2 256,212	1,16
Cinnamon (canella)	26,136	124,871	20,93
Cocoon	25,884	47,698	54,27
Sheep meat	25,198	3 188,456	0,79
Cocoa Butter	25,174	2 061,836	1,22
Leeks, other alliaceous vegetable	24,982	177,959	14,04
Vegetable Prod for Feed	24,335	169,168	14,38
Vegetables in Vinegar	23,910	906,777	2,64
Buckwheat	23,776	38,523	61,72
Milk Whole Dried	23,752	4 422,318	0,54
Glucose and Dextrose	23,505	924,858	2,54
Cake of Rapeseed	23,212	626,138	3,71
Food Prep, Flour, Malt Extract	23,190	2 676,191	0,87
Coffee Extracts	22,899	2 521,501	0,91
Oil of Tung Nuts	22,669	32,016	70,81
Soybean oil	22,022	5 044,862	0,44
Cow milk, whole, fresh	20,183	2 162,413	0,93
Sesame oil	20,104	89,414	22,48
Bananas	19,970	4 906,680	0,41
Cabbages and other brassicas	19,902	537,255	3,70
Groundnut oil	19,404	230,463	8,42
Straw Husks	19,167	95,233	20,13
Spices	19,103	567,168	3,37
Fruit Fresh	18,821	564,976	3,33
Oilseeds	18,790	170,691	11,01
Mixes and Doughs	18,576	1 420,672	1,31
Coffee, green	17,551	6 884,884	0,25
Flour of Oilseeds	17,404	419,695	4,15
Peanut Butter	16,709	91,258	18,31
Gluten Feed & Meal	16,523	819,395	2,02
Sugar	16,344	411,058	3,98
Fat Prepared	16,299	760,006	2,14
Bran of Maize	16,235	60,023	27,05
Extracts Tea, Mate, Prep	16,133	382,785	4,21
Hides Cattle	14,540	18,527	78,48
Raisins	14,191	739,082	1,92
Goose and guinea fowl meat	13,712	142,035	9,65
Rice, paddy	13,379	376,044	3,56
Tomatoes	12,713	4 293,687	0,30
Macaroni	12,541	1 956,311	0,64
Ice Cream and Edible Ice	12,392	1 760,126	0,70
Triticale	12,236	51,032	23,98
Rabbit meat	12,115	147,435	8,22
Beeswax	12,017	41,304	29,09
Meat	11,379	151,895	7,49
Cereal Preparations,	11,339	429,220	2,64
Cake of Cottonseed	11,307	62,978	17,95
Chillies and peppers, green	11,291	2 428,128	0,46
Tapioca of Cassava	11,184	30,165	37,07
Oranges	11,057	2 479,136	0,45
Sorghum	10,861	663,857	1,64
Peas, green	10,494	123,065	8,53

China has been a major importer of corn and cotton. China is a net importer of bulk commodities, primarily soybeans, cotton lint and palm oil. In some years, During the 1990s, China emerged as a major market for imports of oilseeds, vegetable oils, and oil meal. China uses most other agriculturally related imports as intermediate inputs for manufacturing. China uses imports of fabrics, hides, and skins in its export-oriented garment, footwear, and leather product industries. Net imports of fertilizers help boost China's domestic crop production, reducing the need for food imports. Meat and other agricultural imports have grown at a steadier rate.

**Table 4:** Share (%) and volume (million USD) of most important import commodities in China between 2004–2006 Source of data: [www.fao.org/statistics/](http://www.fao.org/statistics/)

Import item (million USD)	China	World	(%)
Soybeans	6 315,951	17 015,679	37,12
Cotton lint	2 238,191	8 544,179	26,20
Palm oil	1 535,137	10 007,041	15,34
Rubber Nat Dry	1 295,229	6 292,221	20,58
Cattle hides Wet salted	1 021,268	3 005,250	33,98
Soybean oil	992,921	5 240,037	18,95
Wool, greasy	932,084	1 901,282	49,02
Wheat	877,680	19 303,825	4,55
Crude Materials	756,036	24 464,482	3,09
Maize	703,111	13 007,403	5,41
Food Prep	624,780	22 929,641	2,72
Cigarettes	544,246	14 813,945	3,67
Beverage, Distilled alcohol	364,433	14 609,140	2,49
Chicken meat	351,018	8 087,774	4,34
Barley	347,722	3 181,765	10,93
Sugar Raw Centrifugal	305,236	6 052,539	5,04
Tobacco, unmanufactured	296,850	7 722,938	3,84
Cassava dried	277,254	516,338	53,70
Meat-Cattle Boneless (Beef & Veal)	230,142	13 227,710	1,74
Food Prep, Flour, Malt Extract	204,838	2 544,559	8,05
Milk Whole Dried	200,690	3 810,424	5,27
Rice Milled	169,342	5 876,357	2,88
Cassava Starch	167,812	312,620	53,68
Tallow	161,546	903,034	17,89
Flax fibre and tow	154,279	410,456	37,59
Skins With Wool Sheep	149,941	631,082	23,76
Natural rubber	141,195	1 012,066	13,95
Offal of Pigs, Edible	136,657	855,967	15,97
Infant Food	135,597	1 880,482	7,21
Milk Skimmed Dry	127,016	3 495,073	3,63
Rapeseed oil	126,079	1 684,645	7,48
Fatty Acids	124,982	1 872,066	6,68
Wool Degreased	124,361	948,078	13,12
Beer of Barley	119,196	6 909,857	1,73
Whey Dry	116,658	1 021,914	11,42
Skin Furs	113,927	1 434,432	7,94
Apples	109,747	3 814,235	2,88
Food Wastes	107,191	3 854,641	2,78

Import item (million USD)	China	World	(%)
Rapeseed	102,979	2 292,450	4,49
Chocolate	101,865	10 279,013	0,99
Wine	94,067	18 119,460	0,52
Fruit Fresh	92,460	817,001	11,32
Bananas	90,478	7 269,793	1,24
Sheep meat	89,534	3 256,741	2,75
Pork	89,115	9 240,348	0,96
Palm kernel oil	88,861	1 038,067	8,56
Pastry	84,061	10 477,989	0,80
Fruit, tropical fresh	82,973	236,924	35,02
Sesame seed	82,066	700,596	11,71
Grapes	80,671	3 863,291	2,09
Sugar Refined	72,650	6 159,022	1,18
Coconut (copra) oil	70,458	1 196,921	5,89
Oil Essential	68,101	1 750,829	3,89
Frozen Potatoes	67,101	2 747,256	2,44
Fruit Prepared	64,385	6 225,966	1,03
Sugar Confectionery	54,371	5 407,715	1,01
Feed, Other	53,708	852,047	6,30
Orange juice, single strength	53,119	2 449,943	2,17
Pet Food	49,422	5 159,812	0,96
Wet Salted pigs Skins	45,683	69,866	65,39
Cherries	42,443	588,458	7,21
Peaches and nectarines	41,842	1 245,887	3,36
Butter Cow Milk	41,353	3 566,082	1,16
Fat prepared	41,150	832,140	4,95
Turkey meat	40,513	1 383,045	2,93
Oranges	40,190	2 881,236	1,39

## Summary

Home and international trade promotes growth in China and that growth reduces poverty. Reducing trade barriers promotes more efficient resource use. Greater efficiency of agricultural production in China means that societies can produce more of the commodities people want, within their limited resources, raising overall social welfare. The poor farmers are able to improve their levels of nutrition, health and education, creating a virtuous circle of rising productivity and poverty reduction. Agricultural development policy has balanced the effects of trade liberalization and improved food security. Trade liberalization was useful for large and more export-oriented firms and it has led to scale incentives and size concentration. Trade liberalization itself does not hold guarantee that everyone will benefit from transition, but agricultural development policy assisted the poor and vulnerable members of society. Trade liberalization in China has not marginalized small farmers and does not create unemployment, but reduced poverty. Agricultural import from developed countries has not undermined the economic and social welfare of poor rural areas, but assisted the

development of producing and processing firms in rural area. China has opened his borders, but do not expose poor food consumers to price shocks and small food producers to risks and disincentives.

Food-consumption levels have grown and will continue to grow as the population grows richer. Income growth and urbanization are likely to boost food demand considerably and change the consumer preferences. Demand for meat, fish, vegetable oils, and dairy products will also grow fast. The country's transition from rural semi-subsistence to urban lifestyles will have profound impacts on consumption patterns, shifting demand from self-grown rice, wheat, and vegetables to fish, meat, processed foods, and restaurant meals. Consumers will also pay more attention to food quality, and they may demand foods with specific attributes.

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