



## China and World Wheat Markets: Assessing Supply, Demand, and Trade in China

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The future role of China in world wheat markets is a compelling and important issue for producers in California and the rest of the US. Some analysts have estimated that China will continue to demand large quantities of imported wheat. Others have forecast that China will gradually move to a position where domestic supply will meet the nation's demand for wheat.

Such strong views on this topic may be somewhat surprising since previous studies of China's wheat supply, demand, and trade have ignored factors that determine production, consumption, and importing behavior. Here we examine the effects of China's income growth, urbanization, and market development on its wheat demand. We also study the effects of technology, agricultural investment, environmental trends, and institutional innovations on China's wheat supply. Together, these factors will determine if China becomes self-sufficient or continues to be the world's largest importer.

### Annual Grain Production and Utilization in China

Total wheat production in China rose to 99 million metric tons (MMT) in the early 1990s, making China one

of the largest producers of wheat in the world. China uses over 95 percent of its wheat for direct food consumption and only 4 percent for feed.

The average resident in China consumes 85 kilograms of wheat per year. However, rural residents consume 90 kilograms per person on average whereas urban residents consume only 67 kilograms. South Korea is the only country in which per capita consumption is larger than in China.

Unlike other East and Southeast Asian countries, China produces most of the wheat it consumes, relying on imports for only 10 percent of its wheat needs. In contrast, Japan and Korea import over 90 percent of their wheat needs. However, China's wheat imports account for 10-15 percent of world wheat trade.

### Sources of Demand Growth

Recent changes in the urban economy have made urban consumers almost entirely dependent on markets rather than the government for their food needs. Therefore, prices and income changes will largely determine future urban consumption. Income growth rates in China are among the highest in the world and

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will sharply increase food demand. However, increased urban incomes are likely to have larger effects on the demand for livestock products and feed grains than on food grains.

In most Asian countries wheat consumption would be expected to rise as populations shift from rural to urban areas. However, this may not be the case in China because per capita wheat consumption in rural areas is so much larger than in urban areas. The urban population in China increased from 19 percent of total population in 1980 to 28 percent in 1992. This migration pattern is expected to continue. Since rural demand currently exceeds urban demand, China's future migration is expected to dampen wheat consumption.

### Sources of Supply Growth

One-time institutional changes contributed to the high growth in wheat production enjoyed by China's agricultural economy in the early 1980s. But technology was important in the early reform period and was responsible for most of the growth in the agricultural economy in the late 1980s and early 1990s. Today in China, new varieties dominate wheat-producing areas. Investment in agricultural research in the past stimulated growth and is the key to maintaining strong supply growth.

Investment in agricultural infrastructure, especially irrigation, also boosted China's agricultural growth in recent decades. Since the early 1950s, China has increased its irrigated area from 18 percent to 50 percent of cultivated area. However, annual irrigation investment has been stagnant since the late 1970s.

### China's Wheat Economy in 2000 and 2020

Based on our economic simulation model, per capita wheat consumption in China should crest in the late-1990s. Starting from a 1995 baseline of 85 kilograms, per capita wheat consumption is projected to remain constant over the first fifteen years of the twenty-five-year forecast period. Per capita wheat consumption declines to 82 kilograms in 2020 (Table 1, row 1). Total wheat demand continues to increase through 2020 mainly because of population growth.

Aggregate wheat consumption is projected to reach 138 million metric tons (MMT) by 2020 (Table 2, column 7). Wheat consumption rises about the same percentage as for rice, China's other staple food grain, but increases by much less than for feed grain consumption.

Projections of wheat production in China indicate that wheat output will increase more slowly than

**Table 1. Projected Annual per Capita Wheat Food Consumption under Alternative Income Growth Scenarios in China, 1996–2020**

Alternative Scenario	Per Capita Wheat Food Consumption (kg)			
	1995	2000	2010	2020
<i>Baseline</i>				
National Average	85	85	85	82
Rural	92	94	96	97
Urban	67	68	69	68
<i>Low Income Growth</i>				
National Average	85	84	83	80
Rural	92	93	95	95
Urban	67	68	68	67
<i>High Income Growth</i>				
National Average	85	86	86	83
Rural	92	95	98	98
Urban	67	69	69	68

Note: Base year is 1995. Source: Authors' estimates.

wheat consumption in the 1990s (Table 2, columns 1 to 3). In the year 2000 domestic wheat output is predicted to reach 110 MMT, only about 10 percent more than the early 1990s (99 MMT). However, the gap between wheat output and consumption is expected to narrow after 2000 (Table 2, columns 4 to 9). The increase in production is predicted to largely be a result of the resumption of investment in agricultural research.

The predicted annual growth rates for production and consumption in the late 1990s imply an initial rising deficit in wheat. Wheat consumption rises at about 1.6 percent per year, 1.28 percent from population increases and 0.32 percent from rising per capita wheat consumption, while wheat production grows at only 1.3 percent per year. After wheat imports rise somewhat in the late 1990s, imports fall back to their current levels by 2010 and approach zero in 2020 as supply increases and demand slows (Table 2, row 1, columns 6 and 9).

### Alternative Projections

The sensitivity of the results to changes in the underlying forces driving the supply and demand balances is evaluated by altering baseline growth rates for variables including income, population, and investment in technology (Table 3). Lower population growth rates would reduce wheat demand by only 8

MMT (from 138 MMT to 130 MMT) in 2020 compared to the baseline with wheat imports completely disappearing (Table 2, row 2). Higher population growth rates would lead to increased imports of about 15 MMT in 2000 and imports would remain positive through 2020 (Table 2, row 3). Income growth, investment rates, price and market liberalization simulations are similar to the population growth rate simulations (Table 2, rows 4 through 7). Since expenditure elasticities for wheat are low, import demand for wheat rises but does not explode with rapid income growth. This outlook stands in stark contrast to aggregate grain import demand, which varies sharply with the assumed income growth rate

because the income elasticity of demand for livestock and the indirect demand for grain are much higher.

Continuing high levels of grain imports in China can be expected only if there is a continued decline in the growth of agricultural investment and if the government does not respond with countervailing policy measures as import levels rise. Agricultural research and irrigation investments have recovered in recent years and when grain prices rose in response to tightening grain supplies, government policy makers responded with promises of greater investments in agriculture. Most of the investments have been targeted at irrigation, but improvements in the operations of research institutes have also been announced.

**Table 2. Projections of Wheat Production, Demand, and Net Imports (million metric tons) under Various Scenarios with Respect to Population, Income, Technology and Price Policies, 2000–2020**

Alternative Scenario	2000			2010			2020		
	Demand	Production	Net Imports	Demand	Production	Net Imports	Demand	Production	Net Imports
Baseline	123	110	13	132	122	10	138	137	1
Low pop growth	121	110	11	128	122	6	130	137	-6
High pop growth	125	110	15	136	122	4	144	137	7
Low income growth	122	110	12	130	122	8	137	137	0
High income growth	124	110	14	134	122	3	140	137	3
Low investment rate	123	108	15	132	118	14	138	129	8
High investment rate	123	111	12	132	126	6	138	144	-6
Protection of domestic production <sup>a</sup>	123	111	12	130	123	7	135	139	-4
Liberalizing wheat market <sup>b</sup>	123	111	12	130	123	7	135	139	-4

<sup>a</sup>Real wheat prices will keep level with 1995 over projection period.

<sup>b</sup>Real wheat prices will decline (with a growth rate of -1%) more than the world trend (with a growth rate of - .5%) in order to bring China's domestic wheat market prices close to the world prices.

Source: Authors' estimates.

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**Table 3. Important Factors Affecting the Supply and Demand for Grain and Rice in China's Economy, 1958-1992**

Year	(1) Urban Income per Capita	(2) Rural Income per Capita	(3) Market Development Index	(4) Ratio of Urban Population	(5) Agriculture Research Expenditure	(6) Irrigation Expenditure
1958	n.a.	n.a.	n.a.	16	165	3053
1965	n.a.	n.a.	n.a.	18	357	1314
1970	n.a.	n.a.	n.a.	17	401	3256
1975	229	101	21	18	700	4526
1980	372	167	31	19	791	3209
1985	490	298	42	24	1078	2016
1990	593	306	45	26	808	3006
1992	778	319	46	28	977	5527

Notes and Sources: (1) and (2) are from ZGTJNJ (1980–1993) and are measured in real 1985 yuan. (3) is from Huang and Rozelle (1995) and measures the proportion of food purchased by rural households in consumption markets. (4) is from UN. (5) and (6) are in real 1985 million yuan and are from SSTC. (7) and (8) are in real 1985 million yuan and are from MRWEP.

Several factors may mitigate the decline in wheat import demand. For example, currently the intense rice-wheat and wheat-maize rotations in most of the nation's wheat-producing areas require large quantities of labor and may not be conducive to mechanized planting and harvesting. As wages increase, pressures will rise to search for labor-saving cropping patterns. With higher demand in the future for feed grains, farmers in some areas may choose to move to single season corn, a trend which if pervasive enough could reduce China's domestic wheat supply and increase its demand for imports.

### Conclusions

China is unlikely to import increasingly larger volumes of wheat in the near future. In fact, the most likely scenario is that China's wheat imports will fall by 2020. China could very well become self-sufficient in wheat within 25 years. However, there are scenarios under which China would continue to demand large volumes of wheat, especially if the structure of cropping patterns changes drastically or if the government is unable or unwilling to create its own new technologies to increase the wheat supply. Importing new wheat production technologies from other parts of the world provides China a viable alternative to developing its own. The most significant difference between our predictions and the predictions of others is in the nature of the demand for wheat-product in China, which will not have very high demand growth in per capita terms even as incomes grow and which will decline in importance as the rural populace begins its inevitable

move to the cities. Taking all factors into consideration, it does seem unlikely that China will become a much bigger wheat importer in the coming decades.

Despite poor prospects for bulk wheat exports to China in the future, there may still be opportunities for California wheat farmers to take advantage of the "China Market." Increasingly sophisticated urban consumers with changing tastes and preferences will be demanding a wider variety of higher quality wheat products. Imports can supply pastry-quality flour, hard pasta wheat, and a variety of processed and unprocessed wheat goods. Some California wheat producers have already adopted varieties allowing them to capture niche markets in other countries around the world. Given the size of China's consumer base, establishing a presence in a small corner of a new market could be a lucrative new channel for California agricultural exports.

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