CIMMYT

WORLD WHEAT OVERVIEW AND OUTLOOK 2000-2001

Developing No-Till Packages for Small-Scale Farmers

Javier Ekboir, Editor

Part 3 Current and Future Trends in the Global Wheat Market

Colin A. Carter*

Consumption

Wheat is the primary grain consumed by humans around the globe. About 75% of the world's wheat is consumed directly, 15% is consumed indirectly in the form of animal products, and another 10% is used for seed and industrial use. The global consumption of wheat doubled in the last 30 years to reach nearly 600 million tons per year in recent years (Figure 1). Rising population and incomes, along with increased urbanization and its associated changing dietary patterns, caused consumption to increase by about 5.6 million tons yearly in the last decade. Future growth in wheat consumption is expected to originate mainly in developing countries, which also account for the recent growth in global wheat consumption. According to the United Nations, population is growing by about 1.5%/yr in developing countries, compared to almost zero growth, on average, in developed countries. In addition, urbanization is a phenomenon that is largely confined to the developing world.

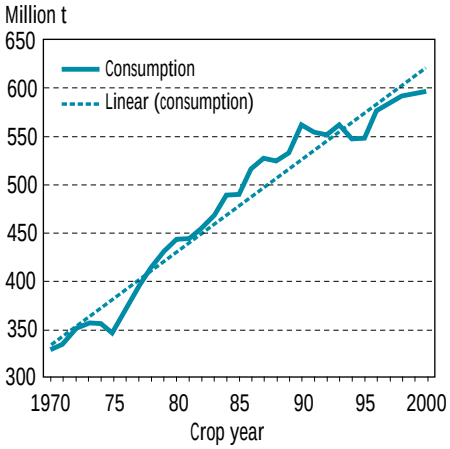

Figure 1. World wheat consumption, 1970-2000.
Source: USDA (2001b).

Feed use accounts for a relatively small share of total world wheat consumption. During the last decade, this share dropped from approximately 20% to 15%. The main explanation for this shift was the dramatic decline in feed use in the former Soviet Union (FSU). The International Grains Council data indicate that between 1990/91 and 1999/00, the use of wheat for feed in the FSU fell by more than 46 million tons—a 74% decline—precipitated by economic recession and the collapse of livestock production in that region.

Outside the FSU, regional patterns of feed use of wheat vary dramatically. For instance, average feed consumption of wheat is relatively high in the European Union (EU) and Canada, around 45% and 50% of total domestic consumption, respectively. Alternatively, feed consumption of wheat is relatively low in the US (less than 20% of domestic use in most years).

Production

World wheat production has been just under 600 million tons in the past three or four years, below the long-term trend (Figure 2). Global wheat production is concentrated in a few countries. Australia, Canada, China, the EU, India, Pakistan, Russia, Turkey, the Ukraine, and the US account for over 80% of world wheat production. China is the world's leading wheat producer, followed by the EU, US, and India.

* Colin Carter is with the Department of Agricultural and Resource Economics, University of California, Davis.

Figure 2 shows that the total volume of world wheat production has almost doubled in the past three decades. The annual production growth rate averaged 2.06% from 1970 to 2000 (Table 1). Most growth in wheat production came from increased yields rather than increased area. From 1970 to 2000, yields grew by 2.04%/yr on average, and the average area growth rate was essentially zero (Table 1). However, there was variation in the rate of growth in wheat area during this period. Harvested wheat area grew in the 1970s at about 1.22%/yr, and then declined in the 1980s and 1990s.

Increases in world wheat yields were significant in the 1970s and 1980s but slowed considerably in the 1990s (Table 1). In the 1970s, yields grew at over 2%/yr and rose even faster in the 1980s, at about 2.75%/yr on average. The slowdown in the average growth rate of world wheat yields in the 1990s partly masks significant regional differences. In some parts of the world, wheat yields increased significantly in the 1990s. In the US, for example, average wheat yield growth rates were zero or negative during the 1970s and 1980s and increased by 1.3%/yr in the 1990s. At the other extreme, the FSU experienced a steep drop in average growth of wheat yields in the 1990s. In this region, the average annual growth in yields fell from +3% in the 1980s to –3% in the 1990s, a huge swing. Lower subsidies, problems with input procurement, and inefficient markets contributed to the severe fall in the growth of wheat yields in the FSU.

Even though wheat yields in the US grew at 1.3%/yr in the 1990s, they did not grow as fast as US maize and soybean yields during the same period. The pace of genetic improvement was slower for wheat than for competing crops for a number of reasons, including technical breeding issues. Another reason is that seed companies were discouraged from investing in wheat research because of lower potential returns compared to maize or soybeans (Vocke 2001).

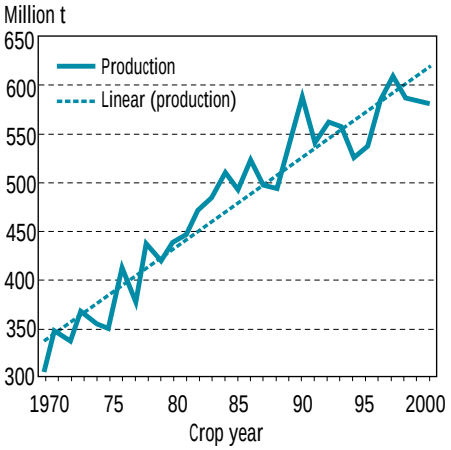

Figure 2. World wheat production, 1970-2000.
Source: USDA (2001b).

Trade

Like production, global trade in wheat in recent years is below the long-term trend (Figure 3). In absolute volume, however, more wheat is still traded than any other grain, averaging about 105 million tons over the last decade, or almost 20% of total world production. Trading is primarily from the North to the South, as industrialized countries now account for about 85% of wheat exports and developing countries account for about 75% of import volume.

Figure 3 shows that growth in global wheat trade has been relatively low or stagnant since the end of the 1970s. Trade grew rapidly during the 1970s and leveled off during the early 1980s and throughout the 1990s. On average, trade grew by almost 4%/yr in the 1970s, growing faster than production (3.29%) (Table 1). The average growth in world wheat trade slowed to 0.75%/yr in the 1980s and became negative in the 1990s.

Table 1. Growth in world wheat production, consumption, and trade, 1970-2000 (average annual percentage change)

Period	Area	Yield	Production	Consumption	Trade
1970s	1.22	2.07	3.29	2.78	3.98
1980s	-0.92	2.75	1.82	2.3	0.75[a]
1990s	-0.17[a]	0.82	0.65[a]	0.8	-0.51[a]
1970-2000	0.02[a]	2.04	2.06	2.09	2.09

Source: USDA (2001d).
Note: Growth rates estimated by the following regression: ln(y) = a + b * time.
[a] Denotes coefficients insignificant at the 10% level.

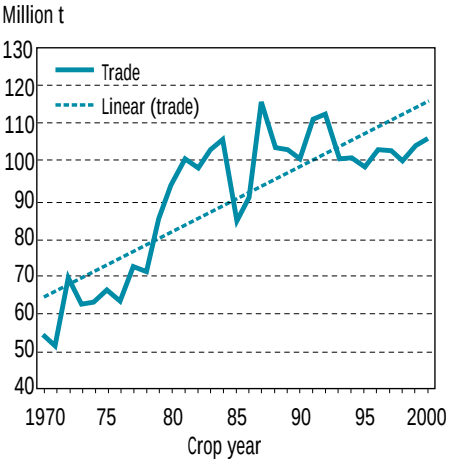

Figure 3. World wheat trade, 1970-2000.
Source: USDA (2001b).

The US is the largest wheat exporter, followed by Canada, Australia, the EU, and Argentina (see Part 4 of this report). Recently, a number of smaller exporters have emerged that are of consequence in aggregate, including Kazakhstan, Hungary, India, Romania, Russia, and the Ukraine.

China and the FSU together were large wheat importers during the early 1980s, at one point accounting for one-third of total world imports. Their combined significance as importers declined sharply in the 1990s, however, and at present they are small importers. In the future, the FSU will most likely emerge as a major wheat exporter instead of an importer. At the same time, China will probably revert to importing wheat, with erratic swings in yearly import volumes.

Import demand for wheat in East Asia, Latin America, and North Africa (all developing countries) has continued to grow, which is why global wheat trade has not fallen dramatically with the departure of China and the FSU from the import market. The strong possibility that developing countries will account for most of the growth in demand for imports in the foreseeable future is extremely important for exporters, because developing countries tend to import lower quality wheat. East Asia (excluding China), where imports have doubled in the last decade, is now the largest importing region.

In South America, Argentina and Brazil are major players in the wheat market, and developments in policy and infrastructure in these two countries have the potential to change the shape of the international market (Ekboir, forthcoming). Both Argentina and Brazil have tremendous untapped potential to expand grain and oilseed production (Schnepf and Dohlman 2001). Argentina is one of the top five exporters. Its wheat production increased by nearly 50% in the 1990s, and there is good potential for additional growth in wheat production. Recent gains in production have been driven by area expansion and dramatic increases in yields owing to the use of improved varieties and more intensive use of inputs. Future growth is expected to manifest itself in the form of higher yields as opposed to area expansion (Wainio and Raney 1998).

In contrast, Brazil is the largest wheat importer in the world, but its dependence on imports could change in the coming years as a result of significant new infrastructure investments (Ekboir, forthcoming). At present, high transportation costs discourage grain production in central Brazil, but the Brazilian government recently announced plans to develop a north-south water transportation corridor that will allow the development of agricultural production in the Cerrados (a large savanna area in the center of the country). The higher altitude in the Cerrados is more conducive to wheat production. In addition, production should increase with the growing popularity of zero tillage and the agronomic benefits of including wheat in rotation with soybeans and maize.

Milling versus Durum Wheat

The world wheat market consists primarily of markets for two distinct commodities—milling wheat and durum wheat. The world milling wheat export market is relatively large, with trade of approximately 95 million tons in the 1990s. This milling market can be further segmented into two broad categories: small, higher quality, higher protein, and higher–priced markets (including importing countries such as Japan, the UK, and the US) that demand precise specifications with regard to protein, hardness, moisture, and color; and larger, lower quality, and lower priced markets (including countries such as Iraq, Iran, Indonesia, Brazil, the Philippines, and Egypt), where specifications are very flexible. Although the dividing line between high- and low-quality markets is subjective, high-quality markets account for less than 10% of the milling wheat market, whereas 90% of this market is for lower quality milling wheat.

The world durum market is much smaller than the milling wheat market. Durum wheat production averages just over 30 million tons, typically accounting for less than 5% of total world wheat production. Annual world durum exports averaged about 6 million tons in the 1990s; Algeria, the EU, and the US accounted for between 45% and 60% of total world imports. Although world production of durum wheat has varied from year to year, there has been no underlying long-term upward trend in durum wheat production. At the same time, there has been no clear trend in the volume of world durum trade.

Prices and Reserve Stocks

Measured in real terms, international wheat prices have been falling for many years, reflecting the fact that world wheat supply has kept pace with demand (Antle and Smith 1999). The most recent deviation from this trend occurred during a short spike in world wheat prices in 1996. The potential impact of relatively low wheat stocks became evident in 1996 when US wheat prices hit record high levels (the average price in May was US$ 260/t) in the spring, largely due to the expectation of a very low stocks-to-use ratio (Figure 4). In 1996, world wheat carryover stocks were at historically low levels relative to consumption. Weak import demand and increased stocks-to-use levels after 1996 resulted in a sudden collapse of wheat prices and a return to the long-term downward trend in real prices.

Over the past ten years, global wheat "end-of-year" stocks have averaged about 160 million tons, or 28% of annual consumption. This ratio of carryover stocks is consistent with the long-term average over the past 30-40 years of about three to four months of global utilization (Carter, Revoredo, and Smith 1999). In the last few years, however, end-of season wheat stocks have been running lower—at about three month's utilization—largely because the US and EU reduced stock holdings from mid-1980s levels. As of June 2001, the US Department of Agriculture (USDA) estimated that the 2000/2001 year-end world wheat stocks could be as low as 18.2% of consumption, lower than the 1996 ratio (19.7) and lower than the ratio in the early 1970s (21.3), when wheat prices boomed (Figure 4). It is interesting to note that the recent decline in global wheat stocks (as a percentage of consumption) has not resulted in a price spike. This situation could result from a number of factors, including the declining share of world wheat production that is traded. Another explanation is that participants in the wheat market assume that China's wheat reserves are larger than published foreign estimates.

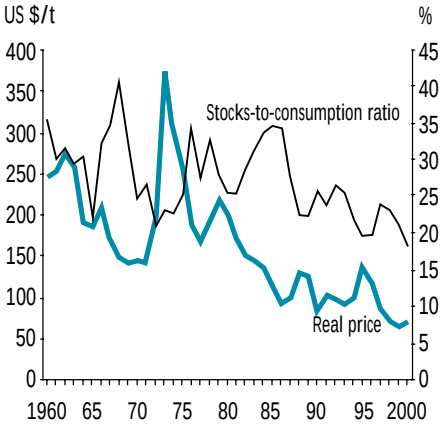

Figure 4. World wheat stocks-to-use ratio and real wheat price, 1960-2000.

Source: USDA (2001b). Price is Kansas City No. 1 Hard Red Winter (13% protein). The US CPI is from the US Bureau of Labor Statistics, 1982-1984=100.

One of the most important variables in the world wheat equation, the size of China's grain reserves, is a state secret for economic security reasons. China's agricultural yearbook has no information on domestic grain stocks. This issue is important because China may hold as much as one-third of the world's wheat reserves. The USDA and the United Nations Food and Agriculture Organization (FAO) periodically attempt to estimate the size of China's grain stocks, but there is tremendous uncertainty in these estimates. Some of the stocks are stored privately on farms in rudimentary small-scale facilities and some are stored in large state-run storage facilities that are off-limits to foreigners.

In 2001, however, both FAO and USDA revised their estimates of China's domestic stocks of wheat, rice, and maize. The abrupt fall in China's grain production in 2000 did not lead to large imports, as expected, and partly for this reason, the FAO and USDA decided that China must have been sitting on large stockpiles of grain (FAO 2001; USDA 2001c). Consequently, USDA tripled its estimate of China's 2000/2001 ending grain stocks from 66.1 million tons to 230.1 million tons and quadrupled its figure for China's wheat stocks from 13.7 to 54.2 milion tons. A few months earlier, FAO revised its total cereal grain stock estimate for China from 28.1 to 364 million tons—nearly 13 times more than its previous estimate. The FAO revisions for China were so large that they more than doubled the estimate of world cereal grain reserves to 640 million tons at the end of crop year 2001.

Wheat Policy

Policy initiatives in the richer northern countries that are surplus wheat producers are a key factor determining the future of the wheat industry. Subsidies for wheat growers remain high, especially in the US and EU. These subsidies adversely affect the competitiveness of farmers in low-cost wheat-producing nations such as Argentina, Australia, and Canada. According to the Organization for Economic Cooperation and Development (OECD), for every ton of

wheat produced in Australia in 1999, about US$ 10 was received from the government. In the same year, subsidies in the US and EU were US$ 50/t and US$ 60/t, respectively. The world wheat price in 1999 was only about US$ 100/t.

Overall, the world wheat market remains seriously distorted in economic terms. As a broad generalization, farmers in rich countries are paid wheat prices that are above world prices to encourage them to expand production beyond market clearing levels. In poor countries, wheat farmers are paid relatively low prices, which reduces production and expands consumption. There is some optimism for policy reform, however, because agricultural trade was given priority under the Uruguay round of multilateral GATT negotiations (now the World Trade Organization or WTO).

United States

Historically, the primary feature of US grain policy was a combination of government guaranteed farm prices, export subsidies, and government stockholding activities. Subsidies varied inversely with the global supply-demand balance. When world supplies were low and prices high, US farmers received less government support. However, when global supplies were burdensome and prices low, farmers were paid not to grow wheat but received very high prices for the wheat they did grow.

United States policy has had some clear impacts on world markets since the 1970s, when the US became a major grain exporter. The doubling of US agricultural exports during the 1970s subjected the US government to political pressure from domestic interests to introduce or preserve policies to maintain export market share. In the 1980s, the combination of US production and export subsidies lowered world prices, but its market share was maintained (at a high economic cost).

United States farm policy is revamped every five years by what is referred to as "Farm Bills." The latest Farm Bill (1996) was called the Federal Agriculture Improvement and Reform (FAIR) Act. The FAIR Act introduced the most fundamental changes in US farm policy since the 1930s. Government payments were no longer linked to specific crops and crop prices, and farmers no longer had to take land out of production to receive government subsidies. Furthermore, the US government withdrew from holding reserve stocks and dramatically reduced the use of export subsidies.

Under this bill, payments to individual producers were based on historical plantings and yields. Individual growers could obtain payments of up to US$ 150,000/yr, and some growers received multiples of this amount through partnerships and other business arrangements.

From 1996, government farm payments were no longer linked to plantings or market prices. However, the 1996 legislation led to a dramatic shift in area from wheat to soybeans (Figure 5). Government payments under the 1996 legislation created a situation in which soybeans became more profitable per unit of land compared to wheat. Farmers responded to high soybean loan rates and planted record soybean areas year after year under this bill. Planted soybean area in 2001 was 74.3 million acres (30.1 million hectares), up from 57.8 million acres (23.4 million hectares) in 1990—almost a 30% expansion. In comparison, US wheat area declined from 75.1 million acres (30.4 million hectraes) in 1996 to 62.5 million acres (25.3 million hectares) in 2000 following the 1996 bill.

The 1996 Farm Bill expires in 2002. The Agricultural Committee of the House of Representatives has proposed replacing the legislation, but as of September 2001 the Senate Agricultural Committee had not issued its own proposal for the next Farm Bill. The final debate over the new bill will be complicated by the shrinking US budget surplus and competing priorities for taxpayer dollars. With the Senate controlled by Democrats (by one vote) and the House of Representatives narrowly controlled by Republicans, the political debate will be vigorous.

The proposed House of Representatives version of the Farm Bill retains many of the features of the 1996 Farm Bill, but

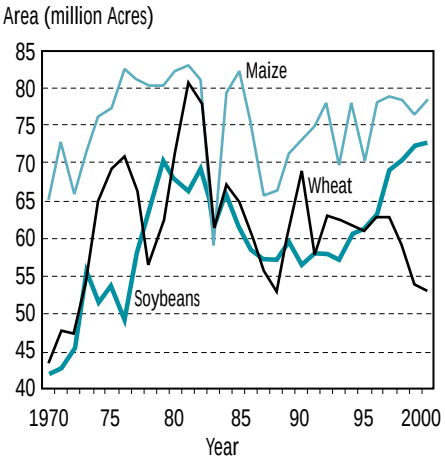

Figure 5. US harvested area, 1970-2000.
Source: http://www.nass.usda.gov:81/ipedb/

reinstates "target prices" from previous Farm Bills. Under the new legislation, planting flexibility rules in the 1996 bill would continue to apply. Producers have the option to update their base areas, and counter-cyclical government support would be introduced, based on target prices.

The University of Missouri's Food and Agricultural Policy Research Institute (FAPRI) analyzed the House of Representatives proposal for the new Farm Bill (Adams and Richardson 2001). This analysis indicates that the proposed bill would marginally increase area planted to cereal grains and cotton while reducing soybean and oilseed area. The reduced soybean area could slightly increase all oilseed prices and slightly reduce prices for grain and cotton. The proposed bill reduces the marketing loan for soybeans from US$ 5.26 per bushel to US$ 4.92, which may halt the expansion in US soybean area. On net, the proposed farm bill changes have little impact on total crop area, according to the FAPRI analysis.

European Union

As noted, the EU is the second largest wheat producer after China, and a leading exporter. The EU's Common Agricultural Policy (CAP) was implemented in 1962 to shield farmers from world competition. Grain production expanded rapidly in the EU during the 1970s, largely because of subsidy-induced yield increases resulting from enormous use of purchased inputs. Until 1992, no area provision was in place.

As a result of the CAP, the EU went from being a major wheat importer to a major exporter. It paid farmers high prices, leading to high production. The surplus was "dumped" on world markets. It was partly these EU policies that generated support for massive export subsidies (i.e., the Export Enhancement Program) in the US 1985 Farm Bill, leading to the "grain trade wars" between the US and the EU.

The EU recently reformed its agricultural policy through the Agenda 2000 legislation introduced in 1999. Agenda 2000 modified EU policy from price supports to direct payments. One impetus for Agenda 2000 was the inclusion of several central and eastern European countries in the EU. Another was the need to reduce export subsidies to comply with the Uruguay-round WTO commitments.

One of the main features of Agenda 2000 with regard to cereals and oilseeds is the reduction of intervention prices for all cereals by 15% over two years (the last cut took place on 1 July 2001). As a result, export subsidies will be reduced because they are computed as the difference between the intervention price (+10%) minus a reference world price. To partially compensate growers for the lower intervention price, Agenda 2000 increased direct payments to farmers (on a per hectare basis). However, the increase in direct payments is not expected to cover the reduced returns from the lower domestic market prices that result from the cut in intervention prices.

Furthermore, Agenda 2000 involves a 33% reduction in direct payments to oilseed farmers (on a per hectare basis) to make oilseed payments equal to those of cereals (the last cut in oilseed direct payments will take place in 2002/2003). At the same time, there will be no change in direct payments for maize and durum wheat production.

Some analysts have projected that Agenda 2000 will result in surplus wheat production in the EU (Leetmaa 1999). If production does expand, the increased supply would lead to expansion of EU wheat exports. The reasoning behind this projection is that wheat area will increase in the EU due to higher profitability for wheat compared to coarse grains and oilseeds.

However, the net effect of Agenda 2000 on wheat production is unclear because of the complicated cross-commodity impacts of the policy reform. The drop in the market price of wheat will not be fully compensated by higher direct payments for wheat and will induce a decline in wheat production. Lower direct payments for oilseeds (relative to wheat) will induce a shift in area from oilseeds to wheat, however. Unchanged payments for maize and durum wheat will make these crops more profitable compared to milling wheat. Oilseed area will surely decline in the EU, but the net effect of Agenda 2000 may not necessarily result in a significant increase in wheat production.

China

Modern China has stressed self-sufficiency in food production, with grains being the most important component of production and consumption. However, as a

proportion of the total value of agricultural output, grains are declining in importance. Direct human consumption of grains is growing at a much slower rate than indirect consumption (through meat). In 1999/2000, China produced 114 million tons of wheat, 138 million tons of rice (on a milled basis), and 137 million tons of coarse grains. In that same year, China was a net exporter of about 10 million tons of grain (including wheat, rice, and maize).[1]

Wheat is prominent in China's agriculture, and the share of wheat in overall grain production and consumption has increased since economic reforms in 1979. China's wheat economy is also of international interest, because China is the world's largest producer and consumer of wheat, with production and usage normally exceeding 100 million tons per year. During the past decade, China has at times been the world's largest wheat importer, accounting for around 15% of the global trade volume in the late 1980s and early 1990s. China's annual imports are erratic, however, changing with domestic economic and political conditions. For instance, China's wheat imports plummeted in the late 1990s to less than 1% of total world trade, and in 2000/2001, China was a small net exporter of wheat.

The uncertainty associated with China's wheat trade is therefore very high, and domestic wheat consumption is one important factor determining future trade patterns. Most wheat is consumed in rural areas, where 75% of the population resides and where consumers have shifted from coarse grains and potatoes to wheat. As incomes increase, wheat consumption may initially increase, partly substituting for coarse grains, and then level off and decline when incomes become higher (Carter and Zhong 1999).

To better understand possible changes in wheat consumption in China, it is helpful to examine past trends in other Asian countries. For instance, after the Second World War, per capita consumption of wheat was relatively low in Japan, Taiwan, and Korea, and rice was dominant. Per capita wheat consumption increased with income growth in these three countries and leveled off later. The same trend can now be observed in China's relatively affluent provinces, where rice dominates both production and consumption. However, as per capita wheat consumption is already high in China on average, national per capita wheat consumption could decline with further income increases.

In China, the production of grain is land intensive compared to that of other agricultural products such as cotton, fruits, and vegetables, which are more labor intensive. In the long-run, China will most likely develop a growing grain deficit due to rising domestic incomes, a growing population,[2] and a declining agricultural land base. However, the balance of long-term supply and demand for grains within China is very uncertain.

Because the conditions for joining the WTO stipulate no new subsidies, it is doubtful that China's agricultural policies will follow those of Japan, South Korea, or Taiwan and shift from taxation to subsidization of agriculture. For this reason, China may well develop a grain deficit. The size of the deficit will depend on policy developments related to the rural economic structure, investments in agriculture, and exogenous changes in the international grain market.

Conclusion

It is difficult to anticipate or predict the specifics of future developments in the wheat market, but certain issues will play a critical role. These include likely production increases in the former Soviet Union (FSU); new policy reforms in China, following its entry into the WTO; agricultural policy developments in the US and EU; the changing relationship between carryover stocks and wheat prices; and the development and adoption of genetically modified wheat varieties.

Reform of farm subsidies in rich, wheat-surplus nations is at the top of the agenda for the WTO, which suggests that the present situation of excessive subsidies will not last forever and indeed may end one day. In the meantime, the role of government and how government policy changes over time is instrumental in understanding the world wheat market.

[1] USDA, World Agricultural Outlook Board, WASDE-377, Washington DC, August 10, 2001.
[2] China's population is expected to reach 1.6 billion by the middle of the 21st century.