Overview of the 2002 World Outlook

Major Conditioning Assumptions

The Macroeconomic Environment

Baseline projections largely depend on two external factors: macroeconomic assumptions and agricultural policy assumptions. Macroeconomic projections used in the 2002 FAPRI baseline were obtained from WEFA-DRI.

In 2001, the world economy experienced an aggregate slowdown, with a 1.3% rate of real growth, and with several important economies in recession (the United States, Japan, Mexico, and Argentina). There is some uncertainty among macro forecasters about when in 2002 economic recovery will take place, but the consensus is that 2002 is a turnaround year for most economies, with an expected aggregate annual growth rate of 1.7%. Aggregate growth will resume a stronger path after 2002 with an annual rate at or above 3.3% for the remainder of the outlook period.

Growth in Asia, and particularly in East Asia (for example, Taiwan and Singapore), has been slowing because of low information technology demand in the U.S. There is a potential for financial crisis in some countries (leftover from the 1998-99 crisis). The aggregate growth rate for Asia was 1% in 2001; it is expected to creep up to 1.7% this year and resume stronger growth after 2002, with annual rates of real growth above 4%.

China is the only bright spot in Asia for 2002, with a rate of real growth above 7% per annum. WTO accession should reinforce China’s growth. Japan is in stagnation and is expected to remain so in 2002, with an annual rate of growth of −1.2% and −0.9% in 2001 and 2002, respectively. Growth resumes in 2003 but remains modest for the rest of the outlook period, with annual rates of growth below 2.4%.

The EU-15 region also experienced moderate economic growth in 2001, with Germany’s growth halting at the end of the year, and with the aggregate growth rate for the EU-15 region subsiding at 1.7%. In 2002, growth remains modest, but beyond 2002, growth accelerates at an annual rate of between 2.3% and 3.2% for the EU-15 region.

Russia is recovering and doing better than expected; its annual rates of real growth are expected to stay above 5% after 2003.

Some acceding countries are doing well (Hungary and the Czech Republic had 3.8% and 3.7% growth rates in 2001 respectively) while others are doing poorly (Poland’s growth rate was a modest 1.3% in 2001). Much effort has gone into making the countries EU-ready. The growth paths of the CEECs have been converging with that of the aggregate EU-15.

Latin America’s performance is mixed. The aggregate annual rate of growth for the continent was 0.7% in 2001. It is expected to increase to 1.6% in 2002 and to 3.6% in 2003, and then to stay above 4% after 2003. Brazil seems to be avoiding the problems of Argentina, whose 2001 recession is deepening in 2002 (with a −4.9% growth rate). The country’s financial crisis, looming last fall, has had a severe impact over the last few months. The cost of foreign exchange nearly doubled in January 2002, and further devaluation and inflation are expected in subsequent years.

Growth in Mexico is stagnating but is expected to resume next year, with growth rates above 4% after 2002. Mexico’s growth path tends to oscillate around the growth patterns of the United States and Canada. The latter countries experienced a slowdown in 2001 but are expected to rebound and reach growth rates of around 3% per annum after 2002.

Most currencies in developing economies depreciated against the U.S. dollar in 2001. In 2002 and later years, all Latin American countries are expected to continue to devalue their currency vis-à-vis the dollar. The WEFA-DRI forecast expected Argentina to devalue its currency by 66.5% in 2002, by 27.4% in 2003, and to keep devaluing by about 13.5% annually after 2003. Recent developments in Argentina suggest that this pessimistic forecast of massive devaluation completed last fall was not pessimistic enough. The Brazilian real experienced a strong devaluation vis-à-vis the U.S. dollar of 28.2% in 2001 and this trend is expected to continue in 2002 with a 24.3% devaluation.

The euro depreciated by 2% in 2001 relative to the U.S. dollar and is expected to appreciate gradually after that to regain parity with the dollar in 2004. The 2002 FAPRI baseline maintains this parity for the remainder of the outlook period.

The yen depreciated in 2001 vis-à-vis the U.S.
dollar and is expected to depreciate again in 2002. After 2002, the yen appreciates moderately for the rest of the projection period and remains above 120 yen/U.S.$ until 2004. Currencies of all other major industrialized countries appreciate relative to the U.S. dollar beginning in 2002.

**Agricultural Policy Assumptions**

The FAPRI baseline assumes that all government programs and international agreements currently in effect will remain in place over the projection period. Several big policy changes occurred recently. China became a member of the WTO in December 2001 and Taiwan became a member as well in January 2002. The FAPRI baseline includes all policy provisions of the accession of these two countries.

As of March 2002, there is still considerable uncertainty regarding the new U.S. farm bill to be implemented in the coming years. Because a new farm policy has not been passed into law, the FAPRI outlook includes provisions of the 1996 U.S. FAIR Act. Although the FAIR Act includes provisions only through 2002, these provisions are extended at 2002 levels to the end of the baseline period. Loan rates are fixed in the baseline at the maximum levels allowed, and the Export Enhancement Program, though available, is not used in the projection period. The baseline assumes that no emergency spending package occurs in 2002 or thereafter.

The provisions of the Berlin Accord are implemented in the baseline as outlined in the legislation, including the dairy sector reforms from 2005 to 2007. The FAPRI baseline makes no assumption of enlargement of the EU to include CEECs.

Among the multilateral trade agreements, the Uruguay Round Agreement of the WTO has had the largest impact on agricultural trade, with provisions for developing members being implemented until 2004. After 2004, all WTO provisions are held constant until 2010/11. The 2002 FAPRI baseline does not include any conjecture regarding future policy changes brought about by the Doha round initiated in November 2001 at the ministerial meeting of the WTO.

As in the previous FAPRI outlook, some Chinese data series were adjusted in the FAPRI international livestock model to generate the 2002 projections shown in the world meat section of this publication. The sources for the Chinese data this year are the USDA’s PS&D data for beef, cattle, and hogs; and the FAPRI-adjusted series for pork, broiler, poultry, lamb, sheep, and eggs. The adjusted estimates of historical production and consumption are available online at www.fapri.iastate.edu in the spreadsheets containing the country-specific projections for the livestock sector.

**The Outlook for World Agriculture**

**Wheat**

Since peaking in 1996/97, world wheat area has declined continuously, decreasing by 15.4 mha. In 2001/02, world wheat area is projected to fall to just 0.1 mha above its 1994/95 record-low level. However, a strengthening world wheat price reverses this downward trend from 2001/02 on. Another 1.1 mha is added to world wheat area between 2001/02 and 2002/03, mainly because of growth in the U.S. and the EU. Over the baseline period, world wheat area rises slowly, growing 0.1% annually on average.

From its peak in 1995/96 to its dip in 1999/00, world wheat price decreased by almost 50%. As a result of lower area, lower world stocks, and sustained demand, world wheat price has begun to recover over the last two years. Over the next ten years, growing international demand drives wheat prices up. The wheat price at Gulf ports grows 2.13% annually over the baseline, reaching $156 per mt in 2011/12.

World wheat production grows an average of 1.46% annually, with a total increase of slightly more than 90.6 mmt over the outlook period. The EU accounts for approximately 30% of this increase. World wheat trade is projected to grow a little more than 3% annually, reaching 115.3 mmt by 2011/12.

On the import side, the fastest growth occurs in Asian countries, which are expected to depend increasingly on imported wheat to meet a domestic demand boosted by income growth. Over the baseline period, more than half of the increase in net imports occurs in Asia. Since 1996/97, China has been a relatively small player in the world wheat market, alternating as a net importer and a net exporter. Starting in 2002/03, in-quota imports in China are subject to a low tariff that exerts a downward pressure on domestic supply. As a result, Chinese net imports increase rapidly in the first four years of projection. Hence, although Chinese
imports remain far below their historical levels, China re-establishes itself as a major buyer on the world wheat market. Chinese imports are projected to reach 5.7 mmt by 2006/07 and then remain fairly stable through the rest of the projection period.

High-income East Asian countries, which include South Korea, Taiwan, Hong Kong, and Singapore, depend on imported wheat to meet their sharply increasing domestic needs. Imports in this region increase 18.6% over the outlook period, continuously rising from 5.9 mmt in 2001/02 to 7.1 mmt in 2011/12.

A sharp decrease in Indian consumption in 2001/02 led to high exports as well as soaring stocks. In 2001/02, India exported 2.9 mmt of wheat while stocks reached 27 mmt. Domestic consumption is projected to recover starting in 2002/03, while export subsidies contribute to lower stocks through shipments to Middle Eastern and other Asian countries. This results in a rapid decrease in Indian net exports starting in 2003/04. India becomes a net importer by 2009/10 and imports 1.3 mmt by 2011/12.

Of the Latin American countries, Brazil remains the largest market for wheat. The competitive advantage of Argentina in the region and higher returns for other crops limit area expansion in Brazil. Brazilian imports increase by 16% over the baseline, reaching 7.5 mmt in 2011/12. Because of fast-increasing domestic demand and trade liberalization, Mexican imports rise rapidly, growing more than 48% over the baseline and peaking at nearly 4 mmt by 2011/12.

On the export side, the expansion of world trade is projected to benefit primarily the EU and Argentina. Poor weather conditions severely affected yields and area in the EU in 2001/02. This resulted in the lowest EU wheat production since 1995/96, at 92.2 mmt of wheat. Consequently, EU net exports decreased to 6.7 mmt, the lowest level since 1979/80. The expected rebound in both area and yields allows the EU to recover its rank on the world market by 2002/03. Over the baseline, despite a slight appreciation of the euro, the EU wheat price remains below the world price. This allows EU exports to be competitive on the world wheat market without subsidization. During the next decade, EU wheat production rises at an average annual rate of 2.6%. The EU is expected to increase its exports by nearly 16.1 mmt and capture more than half of the world wheat trade expansion.

Over the baseline, the real devaluation of the peso enhances the competitiveness of Argentine exports, while low real income growth depresses domestic use. Argentine production thus grows nearly 3% annually through both area expansion and yield growth, reaching 22.1 mmt by 2011/12. Meanwhile, domestic consumption decreases at an annual average pace of 1%. Therefore, Argentina’s exportable surplus increases by 5.9 mmt, or 20% of the total increase in net trade. By 2011/12, Argentina exports 18.4 mmt of wheat.

The expansion of world wheat trade also benefits other traditional wheat exporters. Low yields in 2001/02 limited Canadian exports to 15.9 mmt. From 2002/03 to 2007/08, Canada remains the second largest wheat exporter. From 2007/08 on, the EU and Australia surpass Canada in terms of net exports. By 2011/12, Canadian exports reach 18.9 mmt, up 3.1 mmt from their 2001/02 levels. Australian wheat production grows 19.7% over the baseline. This growth, coupled with a slow increase in domestic consumption, enables Australia to increase its exports by more than 2.5 mmt over the outlook period. However, as Australian exports grow at a slightly slower pace than do competitors’ levels, Australia’s market share decreases slightly over the baseline period.

The decline in U.S. wheat exports since 1999/00 is projected to continue until 2003/04, as competitors return to the market. In the first two years of projection, U.S. exports decrease by 1 mmt, but from 2003/04 on, they increase by 3.9 mmt, peaking at 27.5 mmt in 2011/12. However, even though the U.S. remains the largest wheat exporter, its market share drops from 29% in 2001/02 to 23.8% by the end of the outlook period.

Coarse Grains

After a sharp decrease from 1996/97 to 2000/01, coarse grain prices started to recover in 2001/02 as a result of lower world stocks, a decrease in area, and sustained international demand. From 2001/02 on, coarse grain area is expected to grow slowly, adding 3.8 mha over the baseline period. This represents a modest 1.6% increase over the next ten years. Driven by higher returns, increases in corn and sorghum area offset a slight decrease in barley. By 2011/12, coarse grain area totals 237.8 mha, with nearly 60% planted in corn. Despite the meager 0.16% annual growth rate in coarse grain area, production is projected to add 135.5 mmt,
with the bulk of the growth resulting from yield growth in corn production. Strong demand from Asian countries and increases in livestock production sustain world consumption, which grows 1.29% annually over the next decade. As a result, coarse grain prices grow between 1.3% and 2% annually. World coarse grain trade expands by 33%, adding 27.6 mmt over the baseline period.

World corn trade grows the fastest among coarse grains, expanding by nearly 38% over the next decade. An additional 23 mmt—representing more than 83% of the expansion of world coarse grain trade—are brought to international corn markets during the baseline. Most of the additional shipments are destined for developing countries to meet sharply increasing feed demand.

Two-thirds of the increase in corn net trade is absorbed by Asian countries. However, modest growth is expected to come from the three traditional Asian markets for corn in the region; Japan, South Korea, and Taiwan account for 90% of Asian imports in 2001/02 but for less than 9% of the 15.4 mmt increase in Asian imports. In contrast, other developing Asian countries—primarily China, but also less traditional markets such as India, Thailand, the Philippines, Vietnam, and Malaysia—are projected to offer new market opportunities for corn.

Japan, whose corn imports ranged from 15.3 to 16.4 mmt over the last five years, remains the largest Asian corn importer, absorbing nearly 25.2% of world corn trade in 2001/02. The decline in Japanese livestock production, along with trade liberalization measures, results in a continuing flat trend in Japanese corn imports over the baseline. South Korea is the second largest Asian corn importer. South Korean corn imports are expected to increase from 6.7 to 7.7 mmt over the baseline. Slow growth prevails in the Taiwanese livestock sector as Taiwan faces increasing competition from international markets. This leads to a steady but modest increase in corn imports. Taiwanese imports increase from 4.7 mmt in 2001/02 to 5.1 mmt in 2011/12.

Sixty-two percent of the increase in Asian net imports is projected to come from China. Once a large exporter of corn, China becomes a major net importer over the baseline. Upon China’s accession to the WTO, exporters enjoy a low in-quota tariff of 1% on increasing quantities of corn. Fueled by growth in the livestock sector, feed use grows more than 2% a year over the baseline. Low prices, new industrial capacities, and population and income growth drive food and industrial use up by 5 mmt over the baseline. Despite increasing area and large releases of stocks until 2004/05, demand outpaces domestic supply, pushing Chinese net imports up to 7.5 mmt by 2011/12.

Latin American countries represent the second fastest growing market behind Asia, with imports rising by 3.4 mmt over the baseline. Mexico is the largest corn importer in this region, importing nearly 6 mmt in 2001/02. Over the outlook period, Mexican corn imports grow nearly 1.80% annually because of steadily increasing feed use and in response to a gradual reduction of over-quota tariff rates under NAFTA. By the end of the projection period, Mexico imports 7.2 mmt. The rest of the growth in net trade comes from African and Middle Eastern countries, where imports increase by 1.9 and 0.7 mmt respectively.

On the export side, Argentina strengthens its position as the U.S.’s main competitor. In 2001/02, weather conditions severely affected area and yields. As a result, Argentina reaches its lowest production level in five years, with only 11.5 mmt. The devaluation of the peso against the dollar enhances the competitiveness of Argentine corn and drives up corn area. Although the increased area puts some pressure on feed use, Argentina is able to expand its exports from 7 to 11.1 mmt over the baseline. Argentina also benefits from a drop in Brazilian exports and seizes an increasing share of the new market opportunities. In this context, despite a 16.3 mmt increase in exports, U.S. market share declines slightly over the baseline. By 2011/12, the U.S. is expected to supply 79% of the world trade, down from 82.1% in 2001/02.

Barley imports expand by 3.3 mmt over the baseline, growing an average of 2% annually. Sixty-four percent of this increase occurs in China, where demand from the brewing industry is rapidly increasing, while 35.4% of this increase is absorbed by Saudi Arabia to meet higher demand in feed use. The EU captures most of the growth in barley trade, expanding its exports to 7.5 mmt by 2011/12. Over the baseline period, EU barley market share increases from 33.6% to 41.1%, whereas Australian and Canadian market shares decline slightly. World sorghum trade is projected to increase by
1.3 mmt over the next decade, primarily because of the growth in Mexican imports. U.S. exports increase from 6.6 to 7.2 mmt over the next decade.

**Rice**

The world rice market is strikingly thin compared to markets for other grains, with roughly 5% of the total world production traded on international markets. Recent fluctuations in world trade also show how responsive the world rice market can be. In 1997/98, world rice trade peaked at 22.7 mmt, increasing by 7 mmt in one year in response to droughts in Indonesia and the Philippines. Between 1997/98 and 2001/02, world rice trade decreased by approximately 4.2 mmt and rice prices fell 42%.

As a result of continued urbanization and competition from other crops, world rice area reached 150.9 mha in 2001/02, 1.2 mha below its 2000/01 level. Consequently, world rice production was 392.6 mmt in 2000/01, or 4.4 mmt lower than the previous year. This downward trend is projected to continue until 2003/04, as urbanization limits area expansion and higher returns from other grains favor substitutions. From 2004/05 on, world rice area stabilizes at around 150 mha. Nevertheless, in the long run, yield growth offsets the decrease in rice area, allowing rice production to reach 437.4 mmt by 2011/12.

A decline in per capita consumption in many traditionally high-consuming countries slows the world rice consumption rate. Fueled only by population growth, consumption rises at a rate slightly lower than the production rate throughout the baseline. The growth in rice consumption mainly occurs in non-traditional rice-consuming countries, such as the U.S. and the EU. Conversely, per capita rice consumption in Asian countries declines because of urbanization and income growth and as Asian consumers tend to favor substitute of wheat for rice in their diets. Over the next decade, world rice consumption increases 32.7 mmt, or 8.1%. In the same time period, world rice trade rises 4.6 mmt, or 23.1%. As per capita consumption decreases, excess supplies in Asian countries expand and allow Asia to capture most of the increase in rice trade.

Indonesia and the Philippines were the largest importers on world rice markets in 2001/02. Indonesia remains the world’s largest importer during the baseline, with imports accounting for 8.3% of world rice trade in 2001/02. As population rises quickly and offsets the decline in per capita consumption, Indonesian rice consumption growth is projected to average 1% annually. With limited area expansion and less potential to release stocks to supply domestic markets, Indonesia relies increasingly on imports until 2004/05. In the long run, however, Indonesian imports decrease as production outpaces consumption. By 2011/12, Indonesian imports decrease to 1.3 mmt. The Philippines increases its imports by approximately 0.3 mmt. In recent years, Japan has been alternatively a net importer and a net exporter, depending on the quantity produced. Declining consumption steadily reduces Japanese imports starting in 2002/03. As for South Korea, WTO commitments contribute to a steady decline in rice area that leads to a 3.5% decline in production over the baseline period. As a result, South Korean imports increase by 41.3% over the baseline.

Thailand is the world’s largest rice exporter. Thai rice production grows 17.3% over the baseline, mostly through yield increases. Rising production and relatively flat consumption enable Thai exports to grow 38% over the next decade, capturing nearly 60% of the increase in world rice trade. Besides Thailand, Vietnam secures most of the remaining increase in rice trade, seizing 25.1% of the trade expansion over the outlook period. Driven by yield increases, Vietnamese production grows at an average rate of 1.5% a year. Vietnamese rice exports reach 5.1 mmt by 2011/12, increasing 1.1 mmt over the baseline.

In response to weak prices and high levels of stocks, Indian rice area decreases by 0.7 mha over the first two years of projection, driving down Indian exports. In the outer years, however, as per capita consumption declines and production rises through yield growth, India is able to regain some exports.

Among non-Asian markets, the largest potential for growth is projected to come from the EU and Saudi Arabia. In these two countries, growth in per capita consumption pushes imports to 0.7 and 1.3 mmt respectively by 2011/12. Expansion in Brazilian production and a decline in per capita consumption are responsible for the decrease in Brazilian imports over the baseline period. This directly affects Argentine and Uruguayan exports, which are the major suppliers of Brazilian markets. U.S. rice consumption grows nearly
1.9% annually over the next decade. Weak prices in the first years of projection lead to a decline in area. Together with growing domestic needs, this results in a steady decrease in U.S. rice exports. In 2011/12, U.S. exports are 1.7 mmt, down from 2.4 mmt in 2001/02.

**Oilseeds**

Record supplies depressed world soybean prices further in 2001/02; after 2003/04, prices recover, driven by strong meal and oil demand. The unprecedented shortfall in sunflower and rapeseed production boosted their prices in 2001/02 by 26% and 11% respectively. A strong supply response causes a decline in 2002/03. In the long run, all oilseed prices are expected to return to their historic relationships.

In 2001/02, the expansion of soybean area overcompensated the reduction in rapeseed and sunflower areas. As a result, total oilseed area increased by about 1%, to 153.1 mha. Next year, the area expansion is expected to be led by rapeseed and sunflower area growth. Total oilseed area increases by 8.56 mha during the baseline. More than 60% of the growth in total area occurs in the South American soybean sector. Total oilseed production reaches 333 mmt in 2011/12, with the increase driven by growth in both area and yields. Oilseed crush increases 19% to meet the rising demand for oilseed meal and oil. Strong income growth in developing countries increases the demand for vegetable oils and livestock products, which increases the demand for oilseed oils and meals. Each importing country’s domestic policy and crushing capacity dictate whether oilseeds or oilseed products are imported. Considering these factors, world oilseed trade is projected to increase by 34%, with meal and oil trade increase 16% and 21%, respectively.

Soybean area in 2001/02 increases 3% compared to last year, with the largest growth occurring in Brazil. Soybean area in the United States expands in response to the loan rate, which acts as the floor price and encourages soybean production.

Soybeans account for the bulk of the growth in import demand, followed by rapeseed and sunflower seed. The majority of the increase in soybean imports occurs in China and the EU. In 2008/09, China surpasses the EU to become the largest importer of soybeans because of strong per capita oil demand, demand for meal from the livestock sector, and Chinese grain policies. Chinese soybean net imports increase more than 50% over the baseline, rising from 13.8 mmt in 2001/02 to 21.4 mmt in 2011/12. The EU, currently the largest importer of soybeans in the world, increases its imports by 700 tmt over the baseline. Brazil captures 64% of the trade expansion, and the U.S. and Argentina capture 13% and 16% respectively. Rapeseed trade rebounds by 28% in 2002/03 and then grows at an annual rate of about 2%, reaching 7.4 mmt by 2011/12. Canada dominates the export market for rapeseed, while China and Japan account for more than 60% of rapeseed imports.

Oilseed meal consumption increases sharply from 163 mmt to nearly 196 mmt by the end of the projection period. The highest absolute increase is expected in soy meal consumption, which grows by 25 mmt. Soy meal also accounts for the majority of the growth in oilseed meal trade. The EU is the largest importer of soy meal, and its imports increase from 14.7 mmt in 2000/01 to 15.6 mmt in 2011/12. Driven by strong expansions in their livestock sectors, China and Brazil each increase their soy meal consumption by 5 mmt over the outlook period. Argentina has the strongest soy meal export growth.

Increasing incomes in less-developed countries play a crucial role in the more than 14 mmt increase in vegetable oil consumption by 2011/12. On a per capita basis, world vegetable oil consumption is expected to increase by an average of 0.07 kg per person annually over the baseline. Palm and sunflower oil consumption increase 21% each, while soybean oil consumption increases 19%. Chinese soy oil net imports increase from 0.31 mmt to 1.06 mmt, making China the second largest soybean oil importer. India remains the largest soybean oil importer, with its net imports reaching 1.85 mmt. India is also the largest importer of palm oil, and continued growth in population and income increases its imports from 4.10 mmt in 2001/02 to 5.44 mmt by 2011/12.

**Livestock and Poultry**

The outlook for the world meat sector in the next decade shows increases in consumption, production, and trade, and strengthening of world meat prices. The main driver on the demand side is the economic recovery in many countries after the slowdown in 2001, with average growth rates ranging from 1.59% to
7.55%. Full economic recovery is achieved in 2003 by most countries, with many continuing to show increasing growth rates thereafter. As a result, per capita consumption of beef, pork, and poultry increases by 2.3% annually, or 7.54 kg between 2001 and 2011. On the other hand, meat production capacity continues to expand. Structural transformation into larger-sized operations leads to the adoption of technological improvements and advanced management practices that continue to raise breeding herd productivity and feed efficiency. Moreover, several policy and institutional changes around the globe are improving the functioning of world markets. These include market-oriented domestic policy reforms, such as the Agenda-2000 reforms in the EU; trade liberalization in South Korea and Mexico; the zero-for-zero agreements between the EU and CEECs; accession of China and Taiwan to the WTO; and favorable institutional arrangements, such as the EU-U.S. Veterinary Equivalency Agreement.

The beef price increases 2.71% over the next three years. Pork prices cycle throughout the baseline. The peak price in 2006 is 0.18% higher than the 2001 price. The poultry price has an average annual increase of 0.90% throughout the decade. Responding to the higher meat prices, world meat production rises 20% during the projection period, amounting to an increase of 32.36 mmt, reaching 195.92 mmt in 2011. Broiler production shows the fastest growth at 24%, followed by an 18% increase for both pork and beef production. With meat consumption growing in many meat-deficit countries, demand increases by 5.09 mmt, or 51.21%, over the next decade. Meat trade satisfies some of the rising demand. Pork trade dominates the increase in meat trade, followed by beef and then poultry.

Low-cost producers in the Americas who have managed SPS challenges capture a growing share of international meat trade throughout the baseline. With abundant feed supplies, advanced production technologies, adequate transport and storage infrastructure, and exceptional sanitary and food safety controls, the U.S. and Canada increase their share of the international meat market. The U.S. alone captures 30% of the growth in meat trade during the decade. The devaluation of its currency by 9.89% coupled with strategic investment in infrastructure in the grain-rich Center-West regions improves Brazil’s competitive edge relative to other meat exporting countries. On the other hand, animal disease problems in the EU and Argentina compromise their export potential.

Disruptions in world meat markets caused by sanitary issues continued in 2001. The BSE crisis in Europe is more widespread, affecting all member states except Finland and Sweden. As a result, Europe’s share of international meat trade has declined, as major importers have imposed restrictions or total bans on importation of EU beef products. Also, FMD cases in Europe prompted Japan and the U.S. to impose a complete but temporary ban on meat imports from the entire EU. The FMD outbreak in the early part of 2000 in South Korea continues to close the Japanese pork import market to pork imports from South Korea, as did the FMD outbreak in Taiwan in 1997. Similarly, cases of FMD reported in Argentina were a setback to the anticipated entry of meat products from South America into lucrative markets in North America, Europe, and Asia. Recent cases of BSE reported in Japan are the first reported outside of Europe and the first in Asia. The full effects of these cases on meat import markets in Asia are still unknown. Recurring outbreaks of avian flu in Hong Kong have affected both the domestic poultry sector as well as the flow of live poultry imports from mainland China.

**Beef**

The beef sector is most affected by the animal disease outbreaks. BSE and FMD outbreaks in the EU and FMD outbreaks in Argentina reduced exports from these countries by 261 tmt in 2001. An additional reduction in exports of 202 tmt came from North America as its cattle sector was in a herd-rebuilding phase. As well, the continuing decline in Ukraine’s dairy sector further reduced its exports by 91 tmt. Although there was some weakness on the demand side, especially in Asia, because of a slow economy, depreciating currency, and BSE and FMD scares, it was compensated for by an expansion in Russian and Mexican imports, as consumption in these two countries continued to grow while their cattle sectors declined. As a result, there is an upward pressure on beef price over the next three years, prompting it to rise by 2.71% annually. The U.S. price for fed steers peaks at $78.47 per cwt in 2004. On the domestic side, the cattle stock expands beginning in 2005, and the U.S.
becomes a net exporter of beef in 2007. U.S. beef net exports are only 30 tmt in 2007, but they grow rapidly to 239 tmt by 2009 before reverting downward in 2011, making the country a small net importer.

Income and population growth, on the one hand, and various production constraints, on the other, enable consumption to rise faster than production in many countries, causing these countries to satisfy their excess demand with low-cost imports. For example, with an aging farm population and high production costs, production of all meats in Japan has been declining. In particular, beef production has declined since 1995 and continues to decline in the projection period at a rate of 1.44% annually. Both the beef and dairy sectors have declined by 1.07% and 0.81%, respectively. The first case of BSE in Japan has slowed consumption growth by 0.09% annually. The supply deficit is still met by beef imports, which show a modest growth of 0.72% annually, reaching 1.10 mmt in 2011. A calf deficiency-type payment is mitigating the rate of decline of beef production in Japan. A similar pattern is exhibited in South Korea, especially following the liberalization of Korea’s beef import market in 2001. Although Korea’s quota has not been binding (its fill rate was only 81% because of the financial crisis in 1997-98), South Korea’s beef imports are expected to expand as a result of a recent WTO ruling. The ruling stated that South Korea’s discriminatory beef retail distribution system, which changed in September 2001, is inconsistent with WTO rules. The liberalization follows several years of decline in South Korea’s cattle stocks. But, like Japan, South Korea implemented a “Hanwoo” Integrated Measures Program that provides deficiency-type support payments to encourage domestic production. Over the baseline period, beef production in South Korea declines 2.74% annually while consumption rises 2.84% each year after two successive declines at the start of the decade, causing beef imports to balloon to 361 tmt (65% of consumption) in 2011. Taiwan’s imports by 3.53% annually over the baseline after a 9.20% decline in 2001.

China traditionally has been a net exporter of beef, with declining exports but small imports. With demand increasing at a rate of 5% compared to a 4.77% increase in production, China becomes a net importer of beef, at 168 tmt in 2011. With poor animal genetics and lack of improved pasture, it is unlikely that China can adequately supply domestic demand for table cuts, especially the high-end cuts. Also, tariff for frozen beef is reduced from 40% to 12%.

Plagued by low profitability and credit problems, Mexico’s cattle inventory has been shrinking at an annual rate of 4.2% since its most recent peak of 30.7 million head in 1994. Growth in disposable income and population drive an expansion of beef demand. But it takes four years, until the year 2005, for the cattle sector to recover, causing beef net imports to increase 75.78% between 2001 and 2006. As the cattle sector recovers, net imports at the end of the decade are only 27.61% above the level in 2001. Strong demand for feeder cattle in the U.S. prompts an expansion in Mexico’s live cattle exports by 1.13% annually, although not at the high rates observed in the late 1990s. In 2011, Mexico’s live cattle exports reach 1.38 million head.

Next to Japan, Russia is the next largest net importer of beef in the world. In the next decade, Russia’s beef imports increase 30%, from 592 tmt in 2001 to 768 tmt in 2009. Most, if not all, of Russia’s cattle come from the dairy sector. In the first half of the baseline, cattle stock and production in Russia continue to decline 1.80% annually, while consumption recovers and grows by 0.11% each year. A slight recovery in production at the end of the decade, driven by recovery in the dairy sector, dampens imports to 705 tmt in 2011. The CEECs’ cattle stock, like Russia’s, is dominated by the dairy sector. It also follows a similar pattern, having an increasing beef deficit as a result of faster and earlier recovery in beef consumption at an annual rate of 0.14% during the first half of the decade, with production declining by 1.45% and not reversing until 2007.

Canada is increasing its exports of both beef products and live cattle. After cutting its annual live....
cattle export to the U.S. by half, Canada is again exporting more live cattle, at 1.17 million head in 2011, to meet American supply requirements. Beef exports jumped by 15% between 1999 and 2000, penetrating the Mexican beef import market as a substitute for certain types of U.S. beef that are currently subject to anti-dumping duties levied by the Mexican government. However, during the current herd-rebuilding phase, Canada’s exports declined by 8.09% in 2001 and by another 0.09% in 2002. Beginning in 2003, exports increase by 8.19% annually as Canada establishes an increasing presence in some Asian beef import markets. Canada’s share of world beef trade increases from 5% to 11% over the next decade.

SPS challenges in the EU and Argentina allowed Australia to increase its exports of both live cattle and beef in the first half of the decade. Beef exports increase 2.17% annually, peaking at 1.38 mmt in 2006. Australian beef exports decline after 2006, but live cattle exports continue to grow 4.42% annually, reaching 1.47 million head in 2011. The Philippines and Indonesia are the primary destinations for Australian live cattle exports. With rising incomes and population, demand for both beef and live cattle has increased in Indonesia and the Philippines. Both countries have encouraged growth in their feedlot-fattening sectors, despite the absence of a viable cow-calf industry to support feeding operations. In the Philippines, for example, live feeder cattle imports are charged only a 3% duty, while a 30% levy is applied to beef imports within the quota limits and a 40% to 45% levy is charged for over-quota imports. Moreover, feeder cattle imports are not counted against the TRQ. Australia’s beef export market share increases from 37% to 38% before declining to 34% at the end of the baseline.

Also, the recovery of New Zealand’s cattle sector is timely, filling the vacuum created by the EU and Argentina, allowing producers to benefit from rising demand and prices on international markets. A succession of severe droughts in the country reduced beef production by 16% between 1997 and 1999. Close to 70% of all cows in New Zealand are dairy cows, and that number increases by 1.2% in the first half of the decade. As a result, New Zealand ranchers are able to retain more dairy calves to rebuild beef herds early in the baseline, allowing production to grow 2.74%, which exceeds the 2.07% increase in consumption. New Zealand is able to increase its beef exports by 30% over the next decade, keeping its share of the export market at around 15% to 16%.

After a year of no reported outbreaks, Argentina’s FMD-free status was suspended in March of 2001. This means that there are firm restrictions against Argentine exports of both fresh-chilled and frozen beef to Europe, North America, and Asia, cutting Argentina’s 2001 exports to less than half their 2000 level. Also, the apparent success of Argentina in stabilizing its economy was broken with the negative growth in 2001 continuing into the following year and a currency devaluation of 66% next year. As a result, despite producer support in the form of an interest cost subsidy of 2%, and a tax rebate of 2.7% to 12% for exporters, beef exports remain below 350 tmt until 2008. Some export gains are due directly to the country’s depreciating currency, with exports reaching 438 tmt in 2011. Argentina’s share of beef trade declines from 13% to 8% but recovers slightly to 9% at the end of the decade.

Brazil, on the other hand, has made some progress in improving its production technology, with improved animal genetics through artificial insemination, controlled mortality, reduced slaughter age, and availability of improved pasture; infrastructure investments; and marketing promotion. Brazil gains a competitive edge with its currency depreciation of 5% per year. Also, Brazil has several states that are still FMD-free. Export growth in the next decade is 7.53% annually, reaching 854 tmt in 2011. As a result, Brazil’s export market share almost triples, from 7% to 20%.

After the 1996 BSE crisis, a balance in the EU beef sector was supposed to be attained through the Agenda 2000 reforms and through the termination of all BSE support schemes. A 20% reduction of the intervention price was included in the Agenda 2000, along with the replacement of intervention with private storage aid similar to the pork regime. With the end of the calf-processing scheme in 1999, the OTMS was supposed to follow in 2002. But of all these were interrupted with a recent outbreak that is more widespread, repeating the public concern reported in 1995-96, when per capita consumption declined by close to 8%. In this more recent case, per capita consumption declined by 5% in 2000 and by another 10% in 2001.
In 2001, the Purchase for Destruction Scheme removed 210 tmt in the first half of the year. This was replaced by a Special Purchase Scheme that operated like an intervention purchase and lasted until December of 2001. From an ending stock of only 2 tmt in 2000, this climbed to 300 tmt in 2001. Intervention stocks continued to increase to 425 tmt in 2002 as more animals withheld in the previous year now entered the market at heavier weights. The stock is projected to peak at 500 tmt in 2003 as the termination of the OTMS brings an additional one million head into the food chain. In 2000, EU beef exports dropped 30%. In the last quarter of 2000, major beef importers—such as Egypt, Japan, and Russia—imposed restrictions or a complete ban on beef imports from BSE-infected countries in the EU. Exports remained stable in 2001; they are projected to recover in 2002 but do not reach the GATT limit until 2004. Similar to the 1995-96 case, per capita consumption is assumed to recover in three to four years before it reverts to its long-term downward trend in 2005. At that time, intervention stocks are zero with a decline in beef production as dairy cattle numbers are diminished by long-run productivity growth.

**Pork**

The transformation of the pork sector in many countries has expanded productive capacity and improved productivity as shown by lower feed use per meat produced, higher sow productivity, and increased slaughter weight. However, rising incomes in countries that are not major pork-producing regions increase the demand for pork imports and boost world trade by 61.39, an increase of 1.38 tmt by 2011. With consumers substituting pork for beef after the BSE scare, the price of pork remains in the neighborhood of $45 per cwt. An inventory buildup after three years of good prices puts downward pressure on price, causing it to decline to $40.48 per cwt in 2003. It returns to an upward trend, reaching another peak of $45.89 in 2006. Except for the $39.89 per cwt price in 2009, pork prices do not fall below $40 per cwt in the next decade.

Japan remains the largest pork importer in the world, with net imports reaching 1.2 mmt in 2011. However, the 1.85% annual growth in imports in the next decade is much weaker than the 7.45% growth achieved in the 1990s. A weak economy and depreciating currency reduced Japan’s pork imports in 2001 by 7.54%. The primary reason for the slowdown in Japanese pork imports is that Japan has introduced a form of deficiency payments program that insulates Japanese pork producers from unfavorable price movements in the wholesale carcass market. As a result, production declines a scant 0.28% annually compared to the 2.17% decline in the 1990s. Consumption, on the other hand, increases by 0.71%. Hence, despite the policy change, Japan’s pork imports increase 31.52% over the baseline.

Taiwan’s swine-pork sector was devastated by the island-wide FMD outbreak in 1997. Production in 2001 is 28% lower than its pre-FMD level in 1996. With its accession to the WTO in 2001, production is expected to decline slightly, by 0.16% annually. On the other hand, domestic pork consumption increases by 0.37% annually, raising Taiwan’s imports of cheap muscle meats. Taiwan’s total pork imports increase 10.12% annually, reaching 119 tmt in 2011. The tariff for non-quota pork cuts is reduced from 15% to 12.50%.

China has been a pork net exporter in the past, exporting primarily to Hong Kong, and restricting imports with high duties and strict regulatory and licensing requirements. But beginning in 1999, China became a net importer of pork. China is a potentially large market, but realistic market penetration is projected to be modest. The reason is that a bigger proportion of China’s pork supply is still produced cheaply by backyard producers. The share of commercial farms is increasing over time. They supply mostly the coastal cities and export to Hong Kong. The cost structure of these farms is comparable to producers in the West. With the reduction of duties from 20% to 12% and with the opening of distribution businesses to foreign firms, the slight differential in the growth of consumption at 2.57% and production at 2.54% is met by more imports, reaching 333 tmt in 2011, or an annual growth of 11.69%. China’s export potential is constrained by SPS issues. To avoid these restrictions, China is exporting processed pork products. In addition, China is planning to establish disease-free regions.

South Korea gained significant share of the Japanese pork import market after a ban on imports from Taiwan was implemented in 1997. However, FMD cases in pork-producing regions have restricted South Korea’s exports to Japan. Similar to the case in
Japan, a weak economy and deprecating currency reduced South Korea’s imports of pork in 2001 by 30.64%. As the economy recovers, imports increase by 3.24%, reaching 163 tmt in 2011. With the high cost of production and continuing SPS concerns, South Korea’s exports recover, but they reach only slightly above half their peak level prior to the FMD cases.

Pork consumption in Hong Kong grows by 2.1% annually. With stable production, mostly from imported live swine, pork imports increase by 2.9%, reaching 409 tmt in 2011. Also, exports remain stable, as the potential to re-export to mainland China is affected by China’s accession to the WTO.

Improved consumer purchasing power and population growth caused pork consumption in Mexico to increase by 3.68%. Despite some industry integration, growth in domestic production is lagging behind at 2.4% with limited supply of cheap feeds and credit problems. As a result, pork imports increase by 8.4%, reaching 519 tmt in 2011.

Faster capital turnover and better feed supplies attract more investments in swine production in Russia and cause pork production to expand by 2.02% annually. Infrastructure and institutional constraints limit the long-term prospects for expansion. However, with earlier and faster recovery of consumption, at a rate of 2.33% annually, pork imports grow by the 3.56% needed to cover the deficit, especially in the first part of the next decade. Russian pork imports reach 666 tmt in 2011.

Owing to an abundant supply of cheap feeds, continuing improvement in productivity, adequate processing, storage, and transport infrastructure, and fewer SPS cases, low-cost producers in North America continue to capture the growth in the international pork market. In particular, the U.S. continues to build up its hog inventory, but not exceeding the peak level in 1999 of 55.5 million head, keeping growth in prices at modest rates in the next decade. By keeping a tight reign on production costs and improving productivity, efficient producers are able to weather the cyclical downturn in prices, and at the end of the decade, hog inventories are 2.35% larger. With production annual growth of 1.40% exceeding consumption growth of 1.20%, net exports from the U.S. increase 4.15% annually, allowing the U.S. to increase its market share from 9% to 10%.

Abundant feed resources, improved production technology, and additional investments in hog production facilities and meat processing plants allow Canada to expand production and exports of pork and live swine. Pork production growth of 2.95% exceeds consumption growth of only 1.91%, causing exports to grow at 4.74%, reaching 966 tmt in 2011. Exports of live swine to the U.S. also continue to grow at 2.35%, reaching 5.54 million head in 2011. Canada matched the growing demand for feeder pigs by midwestern producers with increased investment in weaner operation. Canada’s share of the world pork export market expands from 23% to 25%.

The BSE scare caused consumers to shift away from beef to other meat products, including pork, resulting in a 1.8% increase in per capita pork consumption. With the surge in demand, the pork price in the EU increased by 18% in 2001. More pork was retained for domestic consumption at a time when traditional export markets restricted imports of EU pork because of SPS issues. Also, Japan activated its pork safeguard from August 2001 to March 2002, when its quarterly imports exceeded 119% of a three-year average trigger level. EU pork exports dropped by 25% in 2001. Exports recover quickly, increasing by 31% in 2002, through a combination of resumption of normal flow of exports to traditional markets, reduced per capita consumption as beef consumption recovers, and production response to high prices in 2001. Environmental regulations and animal welfare requirements limit the EU’s long-term capacity. Production grows at a rate of only 0.54%. For the rest of the decade, exports average around 1.3 mmt and only slightly exceed 1998’s peak at the end of the decade at 1.49 mmt. The EU’s export market share declines from 59% to 46% in the first half of the decade, and to 39% at the decade’s end.

Brazil’s swine-pork sector grows by 3.68% annually, driven by strong exports, domestic demand, and increased investments. Local governments in Brazil provide incentives and have fewer environmental restrictions, attracting investors to develop infrastructure in the grain-rich Center-West region. Also, improved feeding and breeding programs have raised productivity in Brazil. With pork consumption growing by only 2.76%, Brazil is able to expand its exports by
11.17% to reach 487 tmt in 2011. Also, market promotion by the government and devaluation of its currency allows Brazil to expand its traditional markets and penetrate emerging markets (for example, Russia), raising its share of the pork export market from 5% to 12% in the first half of the decade, and by another 2% by the end of the period.

Led by Poland and Hungary, recovery in production allows Eastern Europe to expand exports, especially towards the end of the decade. As CEECs with zero-for-zero agreements with the EU increasingly comply with the stricter sanitary requirements in the EU, their exports may expand.

**Poultry**

Driven by its competitive price compared with that of other meats and by the perception that it is a healthier meat choice, poultry consumption in many countries grows faster than consumption of other meats over the next decade. In a number of countries, chicken consumption approaches or sometimes exceeds consumption of traditionally leading meat products, such as beef in the Americas or pork in Europe. On the production side, the ready availability of advanced production technology enables many producers to respond to the growing demand by increasing production by 31.84%. Where production is limited, increased consumption is met mostly through trade, which increases by 44.88%. The rapid growth in world poultry production alleviates pressure on world poultry prices, which show a sustained annual increase of only 0.90% throughout the next decade.

China accounts for 9% to 16% of world broiler imports. Whereas U.S. consumers prefer chicken parts with white meat (for example, chicken breast), Chinese consumers prefer the lower-cost cuts with dark meat, such as the back, neck, and feet. Driven by the complementary nature of demand for chicken parts in China and the U.S., China’s chicken imports grow 8.01% annually, from 429 tmt in 2001 to 1.17 mmt in 2011. New investments in the southern coastal cities for storage increases China’s capacity to absorb more poultry imports. Also, poultry has a relatively lower tariff compared to other meats. China also exports poultry, mostly products with high labor processing requirements, to the EU and Japan. Because of SPS concerns, the EU and Japan require strict inspection. Flow of live chicken exports to Hong Kong from the mainland has been interrupted by Avian flu cases in Hong Kong.

Poultry meat ranks second after pork in Taiwan’s meat consumption basket. Despite high production costs (reportedly as much as double U.S. costs), Taiwan’s import of poultry products has been very low, at around 12 tmt, because imports outside the 19 tmt quota have not been permitted. WTO accession eliminates the quota and reduces duties from 40% to 25%. As a result, poultry imports increase by 23.89%, as consumption growth of 2.28% outpaces the 1.14% growth in production. Efforts are made to alleviate the impact of accession through support for consolidation of production, modernization of facilities, and cultivation of customer loyalty programs.

Since the collapse of poultry production in the early 1990s, Russia has depended on imports to meet domestic demand, with imports meeting 86% of consumption needs in 1997. A production turnaround during the current year has reduced the share of imports to slightly above 30%. With consumption increasing by 2.94%, imports rise by 2.43%, the remainder being supplied by domestic production. Russia’s net imports of broiler meat reach 1.28 mmt in 2011.

Other major poultry importers in Asia account for a 20% share of total world imports, with Japan and Hong Kong capturing the largest share. Poultry consumption and imports declined in 2001 because of the weak economy and depreciating currency. Over the rest of the decade, however, consumption recovers and grows at 0.70%, while production declines steadily at 0.26%, leading to an annual increase in poultry imports of 2.30%. Hong Kong’s demand for chicken meat is met largely by imports, which account for 81% of the country’s total supply. Domestic production grows at 0.85%, including slaughter of live poultry imports. With a 0.97% increase in consumption, poultry meat imports increase by 0.93%.

After a decline in imports in 2001, with similar patterns of macroeconomic and population growth driving consumption, the combined net imports of Indonesia, the Philippines, and South Korea increase from 94 tmt in 2001 to 259 tmt in 2011, a growth of 9.89% annually.

Eastern Europe has been an importer of poultry products in the past. A 2.03% growth in consumption,
driven by income growth and increasing demand from HRI after privatization, causes imports to grow by 4.63%, reaching 129 tmt in 2011. Production growth lags behind at 1.92%.

Driven by income growth, per capita poultry consumption in Mexico overtakes beef consumption, the leading meat in the Mexican meat consumption basket, in 2003. The NAFTA poultry quota, with its prohibitive out-quota duties, was never binding because the Mexican government always revised the quota upwards by an average of 122 tmt when the NAFTA quota was exceeded. Its termination in 2003 is not expected to significantly boost imports, which are already growing by 4.52% per year to meet the 3.09% yearly growth in consumption. Domestic production grows by 2.93% annually, with 80% of integrated farms using mostly genetics from the U.S.

Poultry consumption in Saudi Arabia increases by 3.79%, driven by income and the high price of alternative meats such as beef and mutton. Despite the higher cost of production, the government of Saudi Arabia supports domestic production to partially meet the growing demand through a 30% refund of the cost of importing poultry equipment and a subsidy for the cost of importing corn and soybeans. Production grows by 1.90%, leaving more than half of total demand to be met by imports, which grow by 5.80%, reaching 600 tmt in 2011.

Strong exports and domestic demand drive the growth in the poultry sector in Brazil. Large investments in broiler production in the grain-rich Center-West region have been encouraged by fiscal incentives and subsidies from local governments. Use of high-performance breeding stock improved productivity. As a result, production increases by 4.06%. In comparison, domestic consumption increases by 2.73%, leaving a large amount of exportable surplus. Devaluation of the Brazilian currency and market promotion in the export market enable Brazil to increase its poultry exports by 9.78%, which go mostly to Russia, China, and the EU. Brazil’s export to Argentina in the next few years is affected by Argentina’s economic slowdown and its imposition of a minimum import price on poultry imports from Brazil. Brazil increases its share of the export market by 10% in the first half of the decade, and by another 5% in the second half.

The U.S. continues to show growth in broiler production, consumption, and trade over the next decade. With abundant feed grains, efficient production, and adequate transport and storage infrastructure, the U.S. increases its exports 3.97% annually, to reach 3.73 mmt in 2011. However, strong competition from Brazil reduces the U.S. share of broiler trade slightly, from 58% to 52%.

Over the last three years, net exports of poultry products from the EU declined by 5.32% as a greater proportion of poultry production was retained for the domestic market to substitute for beef after the BSE scare. As consumption adjusts back to normal levels, broiler exports grow 1.12% annually, with production growth of 0.96% slightly exceeding the 0.95% growth in poultry consumption. A ban on MBM affects feed costs, and environmental regulations and welfare requirements may adversely affect long-term prospects.

Thailand expanded its export to the EU after BSE and FMD scares there, leading to a price hike in poultry products in 2001. Exports further expand in 2002, but continued appreciation of the baht over the rest of the decade hurts Thailand’s competitive advantage, with exports remaining at the 400 tmt level. The Thai poultry sector is expected to adjust well to compensate and improves its competitive edge. Productivity improves with the use of breeding stock, improved feed conversion, and reduced processor costs. Investment and product innovation continue with more emphasis on higher-valued products through processing. Processors are responsive to buyer specifications such as producing without the use of animal protein in feeds, growth promoters, or some antibiotics.

**Dairy**

After stagnating in the 1990s, milk production in modeled countries began increasing in 1998. Over the next decade, milk production increases 12.2% despite a 1.7% reduction in total dairy cattle inventories. Just over 42% of the 48.4 mmt increase in milk production occurs in North and South American countries. U.S. milk production rises 10.5 mmt over the baseline, while cow numbers fall 0.3% annually, implying a 1.7% annual increase in output per cow on average. Productivity in Brazil’s dairy sector rises an average of 2.8% annually, which is coupled with a 4.1% decrease in cow numbers over the next decade to produce a 6.4 mmt
increase in milk output. Milk production in Mexico increases 10.5 mmt through combined growth in cow inventories and productivity per cow. Argentine yields and cow inventories decline over the short run because of capital constraints and economic uncertainty. However, growth resumes in 2004, with production levels reaching 1999’s peak level by the end of the projection period.

The vast majority of the growth in milk production in the Americas over the next decade remains in domestic markets to satisfy demands for fresh milk and dairy products. In contrast, the bulk of the combined 4.2 mmt increase in milk production in New Zealand and Australia is destined for export markets. New Zealand milk production increases an average of 2.0% annually over the baseline, and about 90% of the increase is exported as cheese and WMP. Australian milk production grows 1.3% annually from 2002 onward, as the industry rationalizes current capacity in response to recent deregulation. More than 70% of the growth in Australian milk production is used to satisfy increases in domestic consumption of fluid milk, cheese, and fresh dairy products. Substantial growth in milk production also occurs in China, Ukraine, Russia, and India.

Total fluid milk consumption rises 12.9 mmt over the baseline, leaving more than 73% of the growth in milk production to be processed into manufactured dairy products. Total butter production increases 18.3% by 2011, with nearly 79% of the growth occurring in India. Butter production remains relatively constant in the EU and Japan, while U.S. butter production increases 2.8% over the baseline. Total cheese production grows 18.2% over the baseline, with U.S., Australian, and New Zealand production increasing about 3% annually. Similarly, total NFD output rises about 3.6% over the baseline. NFD production in the U.S., the EU, and Canada declines substantially, but output in Mexico, Poland, Russia, Ukraine, India, and New Zealand increases considerably. Production of WMP rises 12.5% over the baseline. Brazilian WMP production grows roughly 4% annually.

Per capita cheese demand in modeled countries grows an average of 1.4% annually over the next decade, for a total increase in cheese consumption of 2.2 kg per person over the baseline. The U.S. and the EU account for 71% of the total increase in cheese consumption. The U.S. per capita cheese consumption increases 2.6 kg over the baseline. Per capita cheese consumption in Russia and the Czech Republic increases about 4.5% annually. Growing cheese demand in Russia is met by imports, largely from the EU and Eastern European countries, while growth in U.S. cheese consumption is met by domestic production. Per capita butter consumption decreases in most countries, except Poland, Brazil and Mexico. Butter consumption is relatively high in countries such as New Zealand, Poland, the EU, and the Czech Republic. New Zealand per capita butter consumption decreases about 3.5% annually, while U.S. butter consumption decreases about 0.5% annually.

International prices for NFD and WMP increased by 7.2% and 6.7% respectively in 2001. NFD and WMP prices decline about 13.7% and 9.4% respectively in 2002, as NFD and WMP supply increase in response to higher prices. From 2003 onward, NFD and WMP prices rise an average of 1.6% to 1.8% annually. The strength in powder markets is driven by a recovery in Asian demand for milk proteins coupled with a strong demand for cheese in several countries, which keeps additional milk from flowing to powder plants. A decline in exports from Australia and the EU along with strong import demand contributed to the 17.5% increase in cheese prices in 2001. On the other hand, butter prices increased a modest 0.7% in 2001. Butter and cheese prices rise steadily after 2002, increasing 4.3% and 2.5% annually, respectively.

New Zealand, Australia, and the EU supplied roughly 85% of butter exports in 2001. Moderate growth in EU and New Zealand exports keeps the share of these major exporters above 85% throughout the baseline. The EU butter export level increases from 62 tmt in 2001 to 155 tmt in 2011, growing 15% annually. However, EU butter exports remain below their quantity limits for subsidized exports. With substantial stocks and weak international demand, the EU domestic butter price declines 1.4% annually from 2001 to 2011. Australian butter exports increase about 1.4% annually. China, Egypt, Mexico, and Russia are among the major butter importers. As the Russian economy strengthens, butter imports increase 83 tmt by 2011. Mexican butter imports also increase 6 tmt over the baseline because of
increased demand. Increased butter demand in India, China, and other South Asian countries raises total butter imports by 109 tmt over the baseline.

The EU, New Zealand, and Australia contributed about 86% of cheese exports in 2001. The share of these major exporters remains above 86% throughout the baseline. Cheese exports from Australia and New Zealand grow an average of 3% annually, allowing these countries to capture 69% of the total growth in trade. Following implementation of the Berlin Accord reforms, EU unsubsidized cheese exports grow 55 tmt over the baseline, increasing nearly 2% annually. Milk quotas constrain domestic cheese production, causing Hungary to become a net importer of up to 14 tmt by 2011. Russia, Japan, and the U.S. import about 52% of the total cheese traded. Russian and Japanese cheese imports rise to 169 tmt and 249 tmt respectively by 2011. Exports from Oceania satisfy the 49 tmt increase in Japanese cheese imports and the 84 tmt growth in cheese imports by other countries in Asia.

Greater profitability in cheese markets prompts significant declines in U.S. and Canadian NFD exports. Supplies in international NFD markets remain tight in the coming decade, keeping prices above $1,700 per metric ton for the entire projection period. Australia, New Zealand, the EU, and the U.S. supplied about 71% of NFD exports in 2001. Exports from both the EU and the U.S. are limited by WTO export subsidy commitments. Although the EU has a cap on NFD exports, export levels stay well below their quantity limit throughout the baseline. The most important factor in EU NFD exports is a lack of excess supply. Strong demand for NFD reduced EU stocks by 19.2% and raised domestic NFD prices by 11.7% in 2001. With short supplies of NFD, the EU NFD prices remain well above intervention levels. Likewise, despite the elimination of the dairy support program in 2002, U.S. NFD prices remain above world prices. Poland seizes the opportunity to recover some of its NFD exports lost following the Russian economic crisis and increases its exports about 8% annually. A 35.3% increase in domestic NFD production reduces Brazilian NFD imports by 18.8%. Mexican NFD imports increase 19 tmt over the baseline. Malaysian NFD imports grow about 9.5% annually.

New Zealand, Australia, and the EU contributed about 90% of WMP exports in 2001. WMP trade grows a modest 14.4% over the next decade. Argentina, Australia, and New Zealand are able to supply the increased demand in WMP imports. New Zealand WMP exports increase 123 tmt by 2011, accounting for more than two-thirds of the total growth in trade. Argentine WMP exports grow an average of 3.3% annually to reach 120 tmt by 2011. Australian WMP exports rise 1.8% annually, reaching 240 tmt by 2011. Competition for milk supplies and subsidy allocations keeps the EU WMP exports stagnant at about 478 tmt. China, Egypt, Malaysia, and the Philippines are the major WMP importers. Developing countries in Asia, Latin America, and Africa represented by the rest-of-world aggregate increase WMP imports by 10% over the baseline, pushing the level to 1.1 mmt in 2011.