

Overview of the 2006 U.S. and World Outlook

The Macroeconomic Environment

FAPRI baseline projections depend on two major external factors: macroeconomic assumptions and agricultural and trade policy assumptions. Macroeconomic projections used in the 2006 FAPRI baseline were obtained from Global Insight. The macro projections call for continued solid global economic growth above 3% per annum despite energy prices remaining at high levels for the outlook period.

As in 2004, NAFTA economies grew at a solid pace in 2005, with growth of 2.9% for Canada, 3.1% for Mexico, and 3.7% for the United States, and are projected to continue to grow in the coming decade, with average annual growth rates of 2.6%, 4%, and 3%, respectively. Price inflation is expected to remain moderate during the outlook period.

The outlook for the Asian economies is strong, with a projected average annual real growth rate of 3.7%, and with high growth rates (5% to 7.4%) predicted for China, Vietnam, Thailand, and India for the decade. Japan's outlook remains positive; its economy grew by 2.4% in 2005 and is projected to grow by 1.7% annually for the outlook period. Inflation remains low in most of Asia.

Argentina's GDP grew by 8.7% in 2005 and is expected to grow at around 4% annually until 2014. Brazil's economy grew moderately (2.7%) in 2005; it picks up during the coming decade at about 3.7% per year. The Latin America region grows at a 3.9% average annual rate during the outlook period. Price inflation is expected to be moderate in most of Latin America, except in Venezuela.

The economic growth convergence between old Europe and the NMS continued in 2005, with the former growing 1.5% and the latter 4.1%. This convergence will continue during the next decade, with the NMS growing more than twice as fast as the EU-15 (4.2% versus 1.9% per year). Most members of the EU-25 experience a moderate currency appreciation against the U.S. dollar in the coming decade, reducing their competitiveness.

Most major currencies appreciated against the dollar in 2005 and do so again in 2006. After that, Latin American currencies, including the Brazil-

ian real, depreciate in nominal and real terms. The Argentine peso is the notable exception; it depreciates nominally but appreciates in real terms over the whole decade because price inflation is significantly higher than in the United States. Outside Latin America the outlook calls for a continued weak U.S. dollar until 2015. A weaker dollar benefits U.S. agricultural exports by reducing the price of U.S. products in terms of foreign currency.

Agricultural and Trade Policy Assumptions

Regarding U.S. farm policy, the baseline incorporates provisions of the Deficit Reduction Act of 2005. The share of direct payments available before planting is reduced from 50% to 22%; total payments are unaffected. The Deficit Reduction Act extends the MILC program for two years, eliminates the Cotton Step 2 program, and limits conservation spending. Provisions of the Farm Security and Rural Investment Act (the 2002 farm bill) and the Deficit Reduction Act are assumed to continue throughout the baseline. Loan rates, target prices, and direct payment rates are all held constant between 2005/06 and 2015/16.

In 2005, the international policy environment included the continuing implementation of the 2003 European reforms with enlargement to 10 EU NMS and CAP reform to further decouple farm support from production decisions. Decoupling will be completed in 2007 and take the form of a SPF. The major policy change in the EU was the reform of the Common Market Organization for sugar adopted in February 2006. The reforms cover the period 2006/07 to 2014/15. The institutional price for white sugar will be cut by 36% over four years beginning in 2006/07. The minimum beet price will be reduced by 39.5% over the same period. Direct payments will be made to beet farmers as part of the SFP to compensate for 64.2% of income loss due to the price cut. No mandatory production quota cuts were applied, but reductions in production quotas will occur through a voluntary restructuring buy-up scheme lasting four years with payments to encourage factory closure and the renunciation of quota. The "A" and "B" production quotas will be merged into a single quota and kept at the current 17.4 mmt of white sugar. For countries that produced "C" sugar (above quota sugar) during 2004/05, an additional

amount of 1.1 mt will be made available against a one-time payment of €730/ton. The intervention system will be abolished after a four-year phase-out period and replaced by a reference price.

SPS shocks and trade restrictions in meat markets associated with BSE in North America, FMD in Latin America, and AI in Asia continued in 2005. The FAPRI baseline incorporates all shocks and resulting trade bans that occurred up to January 22, 2006. The more recent SPS shocks and policy changes regarding AI in Western Europe and FMD in Argentina are not incorporated in the 2006 FAPRI baseline. Similarly, no AI contamination was assumed for the United States despite expectations of potential AI invasion. These SPS shocks will remain a factor in the short-run outlook as the market recovers from them.

Energy policies are becoming prominent. Examples include the 2005 U.S. Energy Policy Act, the 2003 Renewable Fuels Directive of the EU, and new mandates in Brazil to increase fuel blends of biodiesel by 2008 and 2013 as well as new financing and tax incentives for biodiesel production. These policies have contributed to the emergence of biofuel markets. To reflect this emergence, the 2006 FAPRI outlook introduces an international ethanol baseline and some basic coverage of biodiesel in several countries (see Box 1 on biofuel policy and market developments on pages 6-7).

The 2006 outlook includes policy tables covering border tariffs and TRQs, export subsidies, and domestic policy interventions used in the FAPRI model. An extended policy database is available on our Web site and is updated once a year in the spring (www.fapri.iastate.edu/tools/).

The Outlook for U.S. Agriculture Crops

Increasing production costs and large supplies are major factors in U.S. crop markets in 2006. Higher prices for fuel, fertilizer, and other inputs increase farm production costs and discourage production of input-intensive crops. Back-to-back large crops of corn, soybeans, and cotton in 2004 and 2005 have put downward pressure on prices.

While supply-side factors explain much of the current market situation, the longer-term outlook is strongly affected by demand-side factors. Growth in

ethanol production is expected to result in increases in corn prices and production, with numerous spill-over effects on other commodities. Export demand growth is also an important factor for many crops, although competition from producers in South America and elsewhere is likely to temper the expansion of U.S. exports.

Ethanol production more than doubled between 2001 and 2005, and baseline production doubles again by 2013. Higher petroleum prices and the Energy Policy Act of 2005 both encourage more rapid expansion of the industry than projected a year ago. By 2007/08, the use of corn to produce ethanol exceeds U.S. corn exports. Recent USDA estimates suggest that ethanol production could increase even more rapidly than indicated in the FAPRI baseline. After 2006, producers shift acreage from soybeans, wheat, and other crops to corn. Increased availability of corn by-products limits growth in the use of both grain and oilseed meals in feed rations, and higher corn prices translate into lower government farm program payments (see Box 1).

Unless yields are lower than projected in South or North America, large supplies are likely to weigh heavily on soybean markets through 2006/07. If soybean acreage increases as projected in 2006, even strong growth in the use of U.S. soybeans may be insufficient to avoid a downturn in prices. Longer term, competition with corn for land and with South America for exports is likely to limit the scope for expansion of the U.S. soybean industry.

U.S. wheat prices have been stable in recent years, and no major price movements are projected in the near term under baseline assumptions of average yields and demand conditions. In later years, stagnant wheat production and a slight increase in wheat export demand contribute to a modest increase in projected wheat prices.

Strong export demand from China has allowed a slight increase in cotton prices in 2005/06, in spite of very large U.S. supplies. Growth in Chinese and world demand will be a key factor in the long-run outlook for the U.S. cotton sector. A shrinking domestic milling industry means that exports account for 79% of use of U.S. cotton by 2015/16.

Livestock, Poultry, and Dairy

Prices for cattle, hogs, chickens, and milk were all

unusually strong in 2004 and 2005. Supply is increasing in response to those high prices, and the result is expected to be lower prices for all four products in 2006. Longer-term prospects depend on production cycles and consumer demand shifts. Disease outbreaks can disrupt markets, as shown repeatedly in recent years.

U.S. cattle inventories have entered an expansion phase that is projected to last until 2012, and the result is likely to be lower cattle prices. Strength in domestic consumer demand for beef was a significant factor in the high cattle and beef prices between 2003 and 2005, and the future price outlook is sensitive to demand shifts. The baseline assumes a steady recovery in U.S. beef exports, but there is much uncertainty about how fast consumers in Japan, South Korea, and elsewhere will resume purchases of U.S. beef because of concerns about BSE.

After two years of high hog prices, pork production is projected to increase enough in 2006 and 2007 to result in significantly lower prices for barrows and gilts. Prices move cyclically in later years. Pork exports increased dramatically in 2004 and 2005, but future growth is projected to slow because of strong continued competition from Canadian pork and resumed competition from U.S. beef.

Chicken production registered a second straight year of rapid expansion in 2005, but demand growth helped sustain above-average wholesale prices. With increasing domestic supplies of all meats and poultry in 2006, chicken prices decline to more normal levels. Avian influenza continues to be a potential issue that could affect global supply and demand for poultry, with implications for all meats and feeds.

High milk prices in 2004 and 2005 have resulted in large increases in milk production in 2005 and 2006. Milk prices have declined in response, which in turn is expected to moderate the pace of future increases in supply. While baseline prices remain in a relatively narrow range, the volatility that has characterized dairy markets in recent years is likely to continue. Export sales of nonfat dry milk have provided support to the market in recent years, and the baseline reflects further export increases.

Farm Income and Other Aggregate Indicators

Net farm income in 2005 declined from the 2004 record, largely because of increased production

costs. An even larger decline in net farm income is projected for 2006, as crop and livestock receipts and government payments all decline and production costs increase another \$7 billion. After a slight further decline in 2007, net farm income generally increases in nominal terms but declines slightly in real terms after correcting for inflation.

Government farm program outlays by the CCC increased dramatically in FY 2005, as lower prices for corn and other commodities translated into increased expenditures under the marketing loan and CCP programs. Net CCC outlays are estimated to increase slightly in FY 2006, as corn program expenses alone exceed \$9 billion. As prices for most commodities increase in later years, net government outlays decline.

Food price inflation exceeded 3% in 2004 but declined to a more normal 2.4% in 2005. Given the projected moderation in meat and milk prices, the food CPI increases less than 2% in 2006 and again in 2007. Over the baseline period as a whole, food price inflation is slightly slower than the overall inflation rate.

Alternative Baseline Projections

The figures reported in this publication are based on a single set of assumptions about the weather, the economy, and other factors that affect commodity supply and demand. FAPRI also has developed a stochastic baseline of U.S. agricultural markets that estimates market outcomes under a wider range of assumptions. In essence, FAPRI develops 500 related baselines that share some assumptions, such as a continuation of current government policies, but that differ in their assumptions about crop yields, production costs, export demand conditions, and other factors.

Results of the stochastic baseline analysis are summarized in the FAPRI 2006 U.S. Briefing Book available at www.fapri.missouri.edu. That publication provides average results from the 500 related baselines. For most variables, those average results from the stochastic analysis are very similar to the estimates reported in this publication. Major exceptions are government farm program outlays and net farm income. Because of the nature of U.S. farm programs, average government spending and average farm income under a range of possible market outcomes are systematically greater than under the assumptions of the baseline reported here.

Box 1: The Emergence of Biofuel Markets

The U.S. Ethanol Market

Following significant technical progress and major investments in new plants, U.S. ethanol production doubled between 2000 and 2004, with major consequences for both energy and agricultural markets. The Energy Policy Act of 2005 encourages further expansion of ethanol production by mandating the use of 7.5 billion gallons of renewable fuels by 2012. Higher fossil fuel prices also contribute to the expansion of the U.S. ethanol market. Ethanol prices at the plant typically exceed those of unleaded gasoline. The 51¢-per-gallon tax benefit for ethanol makes it price-competitive at the pump. Given Global Insight forecasts of petroleum product prices, both gasoline and ethanol prices are projected to decline slightly between 2006 and 2012. Gross margins for ethanol producers are at historic highs but are expected to decline as corn prices increase and ethanol prices fall. Increased production of ethanol translates into increased production of corn co-products for use as livestock feed. Most of the projected growth in ethanol production occurs in dry mill plants, where distillers' grains are the co-product. Estimated domestic feed use of corn co-products now exceeds that of wheat, sorghum, barley, and oats combined.

In summer 2005, FAPRI analyzed the impact of the implementation of the Energy Policy Act. Relative to the January 2005 FAPRI baseline outlook, the Act increased the estimated amount of corn used to produce ethanol over the 2010/11-2014/15 period by an annual average of 632 million bushels. Corn production increased while corn exports, feed consumption, and stocks declined. Corn prices increased by roughly 5% above baseline levels, with smaller price increases for other grains. In contrast, increased ethanol production resulted in more production and lower prices of corn by-products. These by-products displace both corn and soybean meal in livestock rations, contributing to a 10% reduction in soybean meal prices. Livestock and poultry sector effects were small in aggregate and depended on the composition of feed rations. The taxpayer cost of farm programs was reduced by \$1.0 billion per year between 2011 and 2015. Increases in ethanol consumption could reduce tax revenue, given differences in the tax treatment of ethanol and regular gasoline. Net farm income exceeded baseline levels by nearly \$300 million per year on average over the 2011-2015 period. Higher corn receipts were partially offset by lower government payments. (See the full report at [http://www.fapri.](http://www.fapri.missouri.edu/outreach/publications/2005/FAPRI_UMC_Report_10_05.pdf)

[missouri.edu/outreach/publications/2005/FAPRI_UMC_Report_10_05.pdf](http://www.fapri.missouri.edu/outreach/publications/2005/FAPRI_UMC_Report_10_05.pdf).)

In this year's outlook, ethanol production grows even more rapidly than estimated in the Energy Policy Act report. Projected U.S. production of ethanol alone exceeds the levels of renewable fuel use mandated by the Act, and expanded use of biodiesel and imported ethanol makes it even more likely that the targets will be exceeded. The pace of plant construction has been more rapid than anticipated earlier. The 2006 outlook assumes significantly higher prices for petroleum and gasoline than did the 2005 outlook, and these higher prices contribute to higher ethanol prices and increased profitability for ethanol producers.

World Biofuel Markets

Ethanol, the dominant biofuel in world markets, is gaining importance as an alternative fuel source as part of the renewable fuels initiative adopted by a number of countries. In addition to energy supply and environmental concerns, ethanol is gaining favor as an alternative use for feedstock. Currently, this ethanol push is policy driven, particularly through the U.S. Energy Policy Act, the Renewable Fuels Directive of the EU, and fuel mandates in Brazil. Brazil has led the way in using ethanol as an alternative fuel, drawing on its ability to produce ethanol inexpensively from sugarcane. The U.S. is the second-largest producer of ethanol after Brazil, followed by China and India.

The world ethanol price (the Brazilian price for anhydrous ethanol) increased by 26.2% in 2005, to \$1.29 per gallon, reflecting increased demand for ethanol and high gasoline prices. The ethanol price is expected to decline in the coming years following the projected decline in gasoline prices. It begins to increase in 2010 as the demand for ethanol grows faster than production. By 2015, the world ethanol price increases by 1.8%, to \$1.32 per gallon.

Brazil

Brazil has been using ethanol derived from sugarcane as fuel since 1903. In 1931, the Brazilian government mandated a 5% ethanol blend in gasoline. Prompted by the 1973 oil crisis, Brazil launched PROALCOOL, the National Alcohol Program, to encourage the use of fuel ethanol. Under this program, fuel ethanol production increased dramatically. In 1979, Brazil introduced

the large-scale production of alcohol-driven cars and light vehicles. Although the program lost ground during the late 1980s with the discovery of large oil deposits and the fall in international oil prices, the program regained its former vitality in recent years. Currently, Brazil mandates a 20%-25% ethanol blend in gasoline.

Production and consumption increased, respectively, to 4.8 and 4.2 billion gallons in 2005 and are projected to increase by 37.5% and 27.5% by 2015, as the dramatic rise in the use of flex-fuel cars boosts ethanol consumption in Brazil. Flex-fuel vehicles run on any mixture of hydrous alcohol, anhydrous alcohol, and gasoline. Sales of flex-fuel cars increased by 583% between 2003 and 2004, and the market share of flex-fuel vehicles rose from 20% in 2004 to 54% in 2005. Ethanol exports increase to 1.2 billion gallons by 2015, making Brazil the largest exporter of ethanol in the emerging world market.

Brazil has also started to focus on biodiesel development to reduce further its dependence on imported oils, which account for more than 80% of domestic petroleum consumption. In 2002, a new biodiesel fuel research program was initiated by the Brazilian government. In January 2005, the government mandated a 2% blend of biodiesel (B2) by 2008 and a B5 blend for all diesel sold in the nation by 2013 (Law 11.097/2005). In addition, financing and tax incentives for biodiesel production were offered in May 2005 (Law 11.116/2005). Brazil has diverse biodiesel production sources (soybean oil, sunflower oil, palm oil, and castor oil). Soybean oil, however, is believed to be the most competitive and efficient source for Brazilian biodiesel production. The future relative contribution of each type of oil to biodiesel production is uncertain. FAPRI projects a modest amount of soybean oil for biodiesel in 2008/09¹ (0.3 mmt) and increases the projection to 1 mmt at the end of the baseline period.

EU-15

Europe has a potential market for ethanol and biodiesel because of its targets for renewable fuels. According to the Renewable Fuels Directive of 2003, member states were to try to achieve a 2% share of renewables by the end of 2005 and a 5.75% share by the end of 2010. The directive will result in increased production of biodiesel and ethanol, but targets are unlikely to be achieved. The CAP reform of 2003 introduced a carbon credit of 45

euros per hectare to growers of energy crops, including biodiesel and bioethanol. Sugar beet became eligible for the carbon credit under the 2005 Common Market Organization sugar reforms.

The 2003 Renewable Fuels Directive increased ethanol production in the EU-15 to about 543 million gallons in 2005. EU-15 ethanol production is projected to continue its upward trend, reaching 831 million gallons in 2015, a 53% increase. EU-15 ethanol consumption increased by 40.7% in 2005, to 535 million gallons. Since consumption grows faster than production, the EU-15 becomes a net importer of ethanol, from net exports of 9 million gallons in 2005 to net imports of 121 million gallons by 2015.

The significant development of the EU biodiesel industry in the last 10 years makes the EU the global leader in biodiesel production. In the EU, the primary source of biodiesel is rapeseed oil. FAPRI takes into account the impact of the directive on rapeseed oil demand and projects that EU industrial use of rapeseed oil increases by 48% over the next decade, to 4.9 mmt in 2015/16. The EU became a net importer of rapeseed oil in 2005/06.

Japan

Japanese net imports of ethanol are expected to reach nearly 155 million gallons in 2006 and 258 million gallons in 2015. The main drivers of the growing support for the use of fuel ethanol in Japan are continuing growth in CO₂ emissions, support of the Kyoto Protocol, and agricultural and energy policies. Japan permitted the use of 3% ethanol in gasoline in August 2003. With more widespread use of ethanol, Japan is likely to emerge as a major importer of fuel ethanol in the future.

China

China started to promote the use of ethanol-blended gasoline in 2000 and carried out experiments in some cities in 2002. Currently, nine provinces blend gasoline with 10% ethanol. China is now the world's third-largest ethanol producer, with the capacity to produce around 317 million gallons a year. At present, just over half that capacity is being utilized. China becomes a net importer of ethanol in 2009, and its net imports are expected to reach 72 million gallons in 2015.

¹ Because of the structure of data sources, ethanol is reported in calendar years while biodiesel is reported in marketing years.

The Outlook for World Agriculture

Wheat

The world wheat price is projected to decrease to \$157.5 per mt in 2006/07 as world production expands. The Gulf FOB wheat price grows to \$178.2 per mt by 2015/16 as growth in world demand puts pressure on world markets. In 2005/06, world wheat area is lower because of declines in Australian, Argentine, and EU wheat areas. Wheat area is projected to increase in 2006/07, with the main sources of increase coming from recoveries in Australia and Argentina. In the later years, production increases come from yield growth.

Per capita consumption of wheat continues to decline but population growth offsets this trend and food use reaches 557.2 mmt in 2015/16 while feed use reaches 113.8 mmt in 2015/16. Consumption grows 0.8% annually on average, with the main source of the demand increase coming from Asian, Middle Eastern, and African countries. In 2006/07, world wheat net trade increases to 93 mmt because of the lower price, which increases food demand. Trade grows 1.8% annually on average, reaching 105.7 mmt in 2015/16. U.S. market share decreases as competing suppliers increase their market shares.

Wheat area in Australia is projected to recover in 2006/07, increasing production to 25.3 mmt and net exports to 18 mmt. As production grows more than consumption, net exports increase to 19.8 mmt in 2015/16. Canadian wheat area declines over the next 10 years, so yield growth is the driver of the production increase. Domestic consumption reaches 11.2 mmt in 2015/16, primarily driven by the growth in feed use. Net exports increase to 16.6 mmt in 2006/07, as higher beginning stocks increase the supply, but they eventually decrease to 15.7 mmt by 2015/16, as production cannot keep up with consumption. In 2005/06, EU-15 production decreases with the return to an average yield level and the decline in area. In 2006/07, production increases to 101 mmt because of yield growth. In the remaining years, the main source of the production increase is yield growth, as wheat area increases only slightly over the next 10 years. Net exports reach only 8.3 mmt in 2015/16, hindered by the strong euro.

In Argentina, both area and yield are projected to recover, increasing production to 15.2 mmt in 2006/07 and net exports to nearly 10 mmt. Consumption

grows 0.9% on average annually, reaching 5.7 mmt in 2015/16. Aided by the nominal devaluation of the peso, production growth, and a meager consumption increase, Argentine net exports reach 12.9 mmt in 2015/16.

In 2005/06, China's wheat net imports decrease dramatically, to 1 mmt, because of the increase in production and release of stocks. The persistent decline in available stocks has decreased the supply of wheat. Consequently, regardless of the increase in production and decreasing per capita consumption, China is projected to remain a wheat net importer over the next 10 years. Net imports reach 2.1 mmt in 2015/16.

Coarse Grains

The world coarse grain area is lower in 2005/06 because of declines in barley and sorghum area. It is expected to decrease slightly in 2006/07 with reductions in corn and sorghum areas. After that, it increases steadily, reaching 245.7 mha in 2015/16, driven by increases in corn area, especially in the U.S. and Latin American countries, where it has a higher rate of return relative to other crops.

In 2005/06, corn production decreases as yields in the world return to their average levels. However, the high stock levels, reminiscent of the high production in 2004/05, increase the world corn supply, decreasing the price to \$90.16 per mt. In 2006/07, world corn consumption increases more than production and the Gulf FOB corn price increases to \$98.41 per mt. Consumption increases by more than 98 mmt over the next 10 years, driven by an increase in feed use from the livestock sector, especially in Asian and Latin American countries. Growth in both per capita consumption and population contributes to the increase in food demand.

The increase in demand translates into higher world net trade of corn, which is projected to increase to 88.8 mmt in 2015/16. The U.S. captures an increasing portion of this demand. Its market share increases from 62.2% in 2005/06 to 71.7% in 2015/16. In the next decade, the main U.S. competitors in the corn market, including Argentina and South Africa, increase their production, but their share in world production increases very slightly. Both Argentina and South Africa increase their production by 3 mmt over the next 10 years. Argentine net exports reach 13 mmt in 2015/16, capturing 14.7% of the market. South African net

exports increase in 2006/07 to 1.2 mmt and decrease in the outer years because of higher domestic feed use.

The expansion of EU NMS production is limited because the set-aside policy starts in 2009/10. The EU NMS increases its production and net exports significantly in 2005/06, capturing a larger share of the market. However, in 2006/07, with lower production and net exports, its market share decreases and continues to decrease slightly over the next 10 years.

Once a large net exporter of corn, China is projected to become a net importer in 2011/12. Growth in the livestock sector increases feed use by 17.4 mmt over the next decade. Production growth meets only part of this growing demand, as the increase in corn area is limited. Stocks have decreased considerably in the last few years, decreasing the stocks-to-use ratio. By 2015/16, the stocks-to-use ratio drops to 17%.

The world sorghum price increases in 2006/07 to \$105 per mt; thus, world net trade decreases slightly in 2006/07. With the increase in the world sorghum price over the next 10 years, world net trade does not reach its former levels. Japanese net imports are stable at 1.3 mmt in 2015/16. Mexican net imports of sorghum reach 3.5 mmt by 2015/16. The U.S. gains market share by 2015/16 at the expense of Argentina and Australia.

World barley production increases in 2006/07, but lower stock levels decrease the world barley supply, increasing the barley price to \$106.4 per mt. Net trade reaches 20.5 mmt in 2015/16, fueled by growth in Asian demand. China has the largest increase in net imports, with levels reaching 3.4 mmt in 2015/16. The EU-15 net exports of barley reach 4.6 mmt in 2015/16. Australian and Canadian net exports are 4.8 mmt and 2 mmt, respectively, in 2015/16. Lower consumption increases Ukrainian net exports to 4.2 mmt in 2006/07, but levels decrease later because of higher feed use. Russian net exports recover in the next decade, reaching 2.6 mmt in 2015/16.

Rice

Tight exportable supplies across Asia and record low world rice stocks have resulted in sharply higher Thai export prices in 2004/05 and 2005/06. The Thai 100% B price is \$293 per mt in 2005/06 but is expected to weaken to \$251 per mt in 2006/07 as world rice supplies increase. Global rice area is expected to in-

crease from just under 152 mha in 2005/06 to 153 mha in 2006/07 and remain there until 2015. Production is projected to increase by 452 mmt during the same period, as yields in many countries recover from the previous year's declines. Nearly 66% of the projected net growth in total rice production over the next decade comes from China, India, Bangladesh, Thailand, and Vietnam. Strong consumption, coupled with stocks liquidation by China and India, keeps the stocks-to-use ratio near 17% over the baseline.

Global rice consumption declines slightly, to 414 mmt, in 2005/06, as per capita rice use declines by nearly 1%, faster than the rate of world population growth. Total global rice consumption in 2006/07 is projected to increase to 417 mmt, mainly because of population growth. World per capita consumption of rice is expected to continue to decline, driven by urbanization, income growth, aging population, and diet diversification in a number of Asian countries. Global consumption is expected to grow at 0.8% during the outlook period. Of the projected net gain in world rice consumption over the same period, 61% is attributed to India, Indonesia, Bangladesh, China, Vietnam, Philippines, Nigeria, and Egypt.

Total world rice trade in 2005/06 is 29.0 mmt, up 5.0% from the previous year's level. The increases in exports from the U.S., Australia, and Pakistan offset substantial declines in shipments from India, Vietnam, and Thailand. Total rice trade expands by 5.5% in 2006/07 and is expected to continue to grow by 1.7% per year over the baseline, as global trade liberalization efforts continue. Thailand, Vietnam, and India are projected to capture the growth in world rice exports over the next decade. Projected major net importers include Indonesia, Iran, Bangladesh, Nigeria, Mexico, Malaysia, Saudi Arabia, Turkey, and Ivory Coast.

Oilseeds

The world prices of soybean and sunflower have weakened this year under the pressure of high supplies while the rapeseed price has increased because of strong EU biodiesel demand. For 2006/07, another price decline for soybeans is expected despite the production adjustment. This correction leads to a price rebound for soybeans in 2007/08. In the long run, all oilseed prices are expected to remain within their established relationships.

World oilseed area expands 1% in 2005/06 despite a weaker price last season, primarily because of sunflower area expansion from corn acreage in the CIS. Total area increases by 10% throughout the projection period. Seventy-six percent of this increase is due to soybean area expansion in South America. The expected expansion of the oilseed area is caused by increased worldwide demand for protein meals for livestock feed and vegetable oils for human consumption and industrial uses.

Total oilseed production reaches 416 mmt in 2015/16, driven by growth in both area and yields. Oilseed crush increases 27% 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 32% while meal trade and oil trade increase 31% and 42%, respectively, by 2015/16.

World soybean production reaches 277 mmt by 2015/16, an increase of 24% over the current year. In 2012/13, Brazil overtakes the U.S. as the largest soybean producer in the world. At the end of the outlook period, Brazil holds a 34% share while the U.S. share drops to 30%. World soybean production is primarily dominated by Argentina, Brazil, and the U.S. (85% combined) over the outlook period. By 2015/16, soybean areas in Argentina and Brazil combined increase 13.6 mha while areas in the U.S., China, and India fall by a total of 1.7 mha.

Soybeans primarily account for the growth in import demand, followed by rapeseed and sunflower seed. The majority of the increase in soybean imports occurs in China and in numerous smaller importing countries in the Middle East and North Africa. China strengthens its position as 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 rise from 28 mmt in 2005/06 to 48 mmt in 2015/16. The EU's import share decreases from 23% to 15% over the next decade, as the EU imports processed products rather than beans. Brazil captures a 51% share of the trade

while the U.S. soybean export share falls to 27% during the outlook period. World rapeseed consumption increases by 22% throughout the baseline, stimulated by emerging demand for biodiesel in the EU. Canada remains the leading exporter in the world market: about 74% of world exports originate there.

Oilseed meal consumption increases sharply, from 191 mmt to nearly 244 mmt by the end of the projection period. The highest absolute increase is expected in soy meal consumption, which grows by 43 mmt. By 2010/11, China surpasses the EU as the largest soybean meal consumer in the world. Driven by strong expansion in its livestock sector, China consumes an additional 15 mmt by 2015/16. U.S. consumption increases 1.2% annually, but the U.S. share of world consumption falls slightly. Soy meal also accounts for the majority of the growth in oilseed meal trade. Argentina is the leading exporter, supplying 30 mmt of soy meal over the next decade, while the EU is the dominant importer, with 28 mmt of imports.

Increasing incomes in developing countries play a crucial role in the 35 mmt increase in vegetable oil consumption by 2015/16. On a per capita basis, world vegetable oil consumption is expected to increase by an average of 0.3 kg per person annually over the baseline. Annual average world soybean oil consumption grows by 2.9%, followed by rapeseed and sunflower oil consumption with an annual growth of 2.0% and 1.7%, respectively. Palm and palm kernel oil demands also expand strongly on average at around 3.9% and 3.6% annually. Despite its focus on domestic production of meal and oil, China is expected to increase vegetable oil imports by 76% because of strong per capita consumption growth over the baseline. China surpasses India to take the leading role in soybean oil imports in 2005/06, and by 2015/16 it imports 3.6 mmt. China also dominates the palm oil imports in the world market. Chinese palm oil imports expand from 4.8 mmt in 2005/06 to 8.8 mmt in 2015/16.

Cotton

Improving yields and consolidation of mills have been dominant drivers of world cotton markets since 2004/05 and will continue to have an impact over the outlook.

Yields over the last two seasons were sizable: the 2005/06 world cotton yield of 711 kg/ha is second

only to the previous season's 732 kg/ha. After stagnant yields in the 1990s, yields worldwide appear to be advancing, with progress being made in the world's largest producing countries. Yields in China, Brazil, Uzbekistan, and the United States are at or above world levels; however, India, the country with the largest cotton area under cultivation, has yields that are less than half of those countries' levels and has plenty of room for growth.

With world cotton area in 2004/05 at the highest level since 1995/96, retreating only modestly to 34.9 mha in 2005/06, and combined with near record yields, production reaches an impressive 24.8 mmt, second only to last year's 26.2 mmt. With the last two seasons producing the largest two cotton crops in history, the anticipated 2005/06 A-index price of \$1,288 per mt is above last year's level of \$1,180 per mt. Even with large supplies, prices have been supported by surging world demand after the phasing out of textile quotas under WTO agreements. World mill use exceeds production in 2005/06, reaching 25.3 mmt. World mill use is expected to reach just under 30 mmt by 2015/16.

Textile quota elimination has resulted in concentration of world cotton spinning in a small number of countries. China, India, Pakistan, and Turkey account for 68% of world mill use in 2005/06 and expand to 76% of world mill use by 2015/16. While some of this gain in mill use has come from declines in the U.S. and Europe, developing countries will continue to see their growth in mill use slow or even decline. China offers the best opportunity for the world's cotton exporters; surging mill use and a shortfall in Chinese supplies imply an increased dependence on the country's imports. With domestic mill use declining, the United States will be looking for export markets for cotton and will face continued competition from expanding area in Brazil.

Sugar

World sugar production, consumption, and net trade in raw sugar equivalence increase by 16.8%, 17.9%, and 13.9%, respectively, between 2005/06 and 2015/16. The world raw sugar price increased by 33.3% in 2004/05 as a result of strong demand and production shortfalls. World sugar stocks have been declining for the past four years. The raw sugar price increases by 16.6% in 2005/06 as expectations of a

tight market continue. The sugar price reaches 14.7¢ per pound by 2015/16 as production is reduced in the EU and more sugarcane is diverted to ethanol production, particularly in Brazil.

Brazil remains a dominant force in the world sugar market, given continued record sugar production and the country's potential for expansion. Brazilian net exports reach 22.2 mmt by 2015/16. Australian sugar production decreases in 2005/06 because of declining area and adverse weather. With government financial support and favorable sugar prices, sugar production and net exports in Australia are projected to increase by 19.7% and 16.3%, respectively, between 2005/06 and 2015/16. Weather conditions also reduce Thailand's sugar production by 16.5% in 2005/06. Thai sugar production and net exports are projected to increase by 90.6% and 111.9%, respectively, between 2005/06 and 2015/16. The implementation of the EU sugar reforms results in a drastic reduction in EU sugar beet production and a trade reversal in the EU from a major sugar exporter to a net importer; imports total 3.6 mmt by the end of the projection period.

Russia and Ukraine combined are projected to lower sugar imports in the coming decade, as domestic production increases by 18.5% while consumption increases by 2.3% by 2015/16. In India, sugar production recovers in 2005/06, increasing by 29.7%. India is projected to become a small net exporter of sugar during the projection period.

Livestock and Poultry

For the last three years, SPS issues have affected the world meat market, and they will remain a factor in the short-run outlook as the market recovers from these shocks. Following the lead of Japan, several countries are opening their borders. Hence, the outlook for the world meat sector in the next decade shows recovery, with increases in consumption, production, and trade. The main driver on the demand side is solid and sustained economic growth in many regions, ranging from 3.4% to 6.6%. Per capita consumption of beef, pork, and poultry increases by 6.8 kg between 2005 and 2015. Meat production capacity also continues to expand. Structural transformation has raised productivity and efficiency and several policy and institutional changes around the globe have improved the functioning of world markets.

Rising meat demand fuels a 20.4% growth in total meat production over the next decade. Income and population growth and various production constraints enable consumption to rise faster than production in many countries, prompting these countries to satisfy their excess demand with low-cost imports. Total meat trade increases by 25.6% in the next decade.

The BSE case in Canada drove the U.S. beef price to record highs in 2003, and prices remained high through 2005, at \$87.3/cwt, despite a U.S. case of BSE. Demand adjustments also drove pork and broiler prices higher in 2004, by 33.1% and 19.6%, respectively. Meat prices drop in the short run and recover later in the decade.

Low-cost producers in the Americas capture a growing share of international meat trade throughout the baseline. Beef exports from the United States and Canada were compromised in the short run because of food safety issues. This drove the U.S. share of total meat trade to a low 19.6% in 2004. The United States regains 4 percentage points in market share by 2010 and maintains its share the rest of the decade. The devaluation of its currency by 2.3%, coupled with strategic investment in infrastructure in the grain-rich Center-West regions, improves Brazil's competitive edge relative to other meat exporting countries, allowing it to garner around 4.2 to 7.4 additional percentage points of market share in each of the meat categories.

Beef

This outlook assumes that there is recovery from BSE in the short run. The weak meat trade in 2004 was primarily due to the meager 0.4% growth in beef trade over the last two years. Over the rest of the decade, beef trade recovers and grows by an average rate of 3.0%, ending at 8.6 mmt in 2015. Beef production grows by 1.7%, reaching 61.9 mmt in 2015.

The excess beef demand in the outlook comes from three sources. First is the demand recovery from BSE in the short run, such as in Japan and South Korea. Second is the income- and population-driven demand expansion in countries such as Egypt, Indonesia, Mexico, the Philippines, and Russia. Third is demand from trade reversals—changing from an exporter to an importer—such as happened in China and the EU.

The U.S. BSE case in 2004 drove Japan's net imports to their lowest level in the last decade. With the

agreement to resume trade finalized, Japan's continuing decline in production and growth in consumption fuel a net import expansion of 6.1%. South Korea's beef net imports also dropped in 2004 because of BSE. With the opening of its market, South Korea's net imports recover to pre-crisis levels in three years and continue to grow over the rest of the period.

China traditionally has been a net exporter of beef, with declining exports but small imports. With severe constraint of improved grazing area and poor animal genetics, production growth falls behind consumption. As a result, China becomes a net importer of beef, at 431 tmt, in 2015.

Mexico's net imports in 2004 were 43.8% lower than the pre-BSE level in 2002. Despite the country's shrinking cattle inventory, domestic production responded to the crisis with a 7.6% increase to fill the supply deficit in 2004. However, growth in disposable income and population continue to drive an expansion of beef demand. After the pre-BSE net import level is exceeded in 2010, net imports continue to grow at 6.2%. Mexico's feeder cattle export to the United States declines slightly in the medium term, as the border with Canada is opened and the U.S. cattle price is lower.

Russia introduced a beef quota, with an in-quota rate of 15% and an out-quota rate of 60%. Despite the quota, a continuing deficit due to fast growth in consumption causes expansion of net imports to peak in 2009 at 862 tmt to meet a shortfall in production.

The EU was already a small net importer in 2003 and continues in this position for the rest of the decade. Beef production declines over the baseline by 0.6%, driven by lower dairy cattle production. After maximum decoupling of support in the beef sector beginning in 2007, production declines even faster, at a rate of 0.9%. For the 10 EU NMS, a binding dairy quota limits their beef surplus.

Resumption of Canada's boneless meat exports from animals less than 30 months of age and a 59.5% decline in imports resulted in a net export in 2004 that was actually 48.3% higher than before the BSE crisis. The new USDA "minimal risk region rule" and the abnormal animal inventory build-up allow meat exports to expand further in the short run. After the impact of the BSE case wanes, exports grow at a normal pace of 4.6% for the rest of the decade.

Producers in Oceania and South America benefited from the ban of North American beef in many importing countries. After declining by 7.6%, exports recover in 2004 as Australia exploits markets closed to U.S. beef; they continue to grow at 2.6% annually for the rest of the decade. Driven by the growing Asian demand for quality beef, Australia's feedlot capacity expanded and reached 1 million head. Exports of live animals grow by 12.9% annually, reaching 1.3 million head in 2015. Australia loses 1.5 points of market share as North American exporters recover their markets. The timing of recovery from droughts in the early 2000s allowed New Zealand exports to expand in 2003/04 by 12.9%. Exports continue to grow over the rest of the decade at 2.0% annually, reaching 677 tmt in 2015.

Argentine exports jumped by 65.2% in 2004. Herd rebuilding thereafter softens short-term exports but expands exports in the outer years. Nominal currency devaluation throughout the next decade helps Argentina's competitiveness, and the country gains another 1.8 points of market share. Improvement in productivity (breeding and feeding programs), favorable domestic policies (credit, infrastructure, and fiscal incentives), aggressive promotion, and weakening currency enhance Brazil's competitiveness. Brazil's beef exports grow in the next decade by 2.7%, improving that country's market share by 6.9 points.

Pork

Benefiting from trade shocks from BSE, FMD, and AI in the beef and broiler industries, pork trade grows the strongest in 2004 at 10.2% and grows another 9.4% in 2005. Pork trade grows by 2.4% annually over the projection period, reaching 6.5 mmt in 2015. Pork production increases at a rate of 1.9%, reaching 113.1 mmt in 2015.

With both beef and broiler imports restricted because of BSE and AI, respectively, Japanese pork imports increased by 14.9% in 2004. Over the rest of the decade, net imports grow by 1.8%. Taiwan's WTO accession dampens production increases while imports expand by 8.5%. For China, with the reduction of duties from 20% to 12% and with the opening of distribution businesses to foreign firms, the slight edge in the growth of consumption over production is met by more imports, which reach 186 tmt in 2015. South

Korea's consumption growth is supplied by more net imports, which grow at 2.1%.

Improved consumer purchasing power and population growth caused pork consumption in Mexico to increase by 9.4% in 2004. Despite some industry integration, a limited supply of cheap feeds and credit problems keep growth in domestic production lagging behind consumption, increasing pork imports by 3.0%.

Russia's pork quota has an in-quota rate of 15% and an out-quota rate of 80%. Russia attracts more investments in swine production, causing pork production to expand by 2.2% annually. With a weak recovery in consumption, pork imports decline by 1.4%.

Expansion in processing capacity contributes to Canada's pork sector growth of 3.0%. Canada's net exports grow by 5.1% annually, translating into a 1.9 point gain in market share. Also, Canada matched the growing demand for feeder pigs by U.S. Midwestern producers with increased investment in weaner pig operations. Canada's export of live hogs to the United States reaches 10.4 million head in 2015, more than half of which are expected to be feeder pigs.

The EU's pork net exports increased in 2004 by 8.7% as exports of beef and broiler from other countries were restricted because of SPS concerns. Strict environmental regulations and animal welfare requirements limit the EU's (especially the EU-15's) long-term capacity, and production grows by only 0.7% annually. As a result, the EU's market share drops by 3.3 points.

Strong domestic and export demand fuels a 3.1% annual expansion in Brazil's pork sector. Improvement in productivity (breeding and feeding programs), favorable domestic policies (credit, infrastructure, fiscal), and a weakening currency improve Brazil's competitiveness in the world pork market. Brazil's market share expands by 4.2 points.

Poultry

The AI outbreak, particularly in Asia, has caused the poultry market to post a weak growth in trade of only 0.6% in 2004. Recovery from AI allows poultry trade to grow at a rate of 2.2% over the rest of the decade.

The two countries hit hardest by the AI outbreak in Asia were China and Thailand. China's broiler

imports and exports dropped by 61.6% and 37.2%, respectively. In the next decade, as growth in production falls short of consumption, China's net imports reach 362 tmt in 2015. In Thailand, poultry exports were reduced by more than half in 2004. A focus on cooked and higher-valued products allows Thailand to recover 1.6 points of market share in the outer period.

With its border closed to Chinese and Thai broiler exports, Japan saw net imports decline by 16.0% in 2004, but the country's import level recovers in the outer period. Also, modest economic growth raises combined broiler net imports in South Korea, Indonesia, and the Philippines from 77 tmt to 277 tmt.

Policy changes in Taiwan, Russia, and Mexico also affected the poultry market. WTO accession eliminated Taiwan's quota in 2005 and replaced it with a tariff of 20%. As a result, poultry imports increase 16.2%. Russia; poultry import quota is set at 1.05 mmt, with nothing in excess allowed. As a result, net imports fell by 10.5% in 2003 and by another 11.2% in 2004 as confusion in the quota implementation rules impeded entry of products. Imports do not reach the quota until 2006; they remain at that level for the rest of the decade. Despite a new TRQ under NAFTA, Mexico continues to fill its shortfall in domestic production through net imports, which increase by 4.6% annually.

With the EU's limited long-term prospects and with Thailand's SPS challenges, Brazil is poised to gain 7.4 points of additional market share in the next decade. Strong exports and domestic demand drive the growth in Brazil's poultry sector. Large investments in broiler production in the grain-rich Center-West region have been encouraged by fiscal incentives and subsidies from local governments. As a result, production increases by 2.5%. Devaluation of the Brazilian currency and export market promotion enable Brazil to increase its poultry net exports by 1.8%.

Dairy

World milk production grows 1.7% annually over the next decade, with the most rapid growth occurring in China, India, Argentina, Brazil, Uruguay, Australia, and New Zealand. Despite a rising availability of milk in many importing countries, dairy product trade expands substantially for the next decade, especially of cheese, which increases 30%. As implementation

of CAP reforms leads to stagnation in EU butter and NFD exports, Australia, New Zealand, Argentina, the U.S., and India expand to compensate for the reduction in international supplies from the EU. Strong demand driven by income growth, population growth, and urbanization, along with gradual growth in global supplies, puts upward pressure on prices over the baseline.

Leading dairy exporters Australia and New Zealand enjoy continued export growth. Relief from drought conditions prompts Australian milk output to recover in 2006, and production reaches pre-drought levels in 2008. Milk production in Australia grows 2.6% annually over the long term, generated by growth in both cow numbers and yields. Exports of cheese and WMP grow by 6% and 7%, respectively, during the outlook period. New Zealand's milk production continues to be adversely affected by poor weather in 2006; it starts to recover from 2007 on, growing 1.4% annually. Consequently, New Zealand's exports of dairy products grow, especially of cheese and WMP. Australia and New Zealand's NFD exports stagnate because of their lower profitability; their market share decreases from 34% to 29%.

North American milk production increases 12.8% in the next decade, reaching 110 mmt by 2015. About 87.8% of the growth occurs in the U.S., and Mexico accounts for the remainder. Supply controls constrain Canadian milk production. While Australia and New Zealand hold up their NFD exports, U.S. NFD export increases from 301 tmt to 567 tmt in the next decade.

Continued devaluation of the Argentine peso, a recovering economy, and firm world dairy prices drive the recovery of the Argentine dairy sector from 2004 onward. Milk output increases 3.6% annually throughout the baseline and boosts output of dairy products by an average of 2% to 6% annually. Argentina steadily increases its dairy exports, especially of cheese and milk powder. Uruguay's milk supply expands 4% annually. A modest growth in consumption enables Uruguay to increase exports of dairy products, especially of cheese, which increases 69.4% over the baseline.

Milk production in the EU, which is restricted by milk quotas, averages 142.8 mmt during the baseline. Cow inventories continue to decline while milk yield per cow increases at the same pace. Because of the decrease in intervention prices for butter and NFD,

higher returns from cheese production, and restricted milk supply, some milk is diverted from butter and NFD into cheese production. Cheese production rises 8.4% over the baseline, while butter and NFD production decrease 3% and 2%, respectively. During the baseline, fluid milk consumption declines while cheese consumption increases in both the EU-15 and EU NMS. The steady growth in domestic cheese consumption absorbs the bulk of the increase in cheese production, limiting the growth in cheese exports at the beginning of the baseline. As more milk is shifted to cheese production, cheese exports from the EU-15 and EU NMS increase 1.1% and 0.9% annually, respectively, from 2009 onward.

Russian milk output increases 1% annually over the baseline, with yields increasing enough to overcome herd declines and accommodate growth in fluid milk consumption as well as increased output of all four major dairy products. The growth in butter and NFD production catches up to the growth in consumption and consequently stabilizes Russia's butter and NFD imports throughout the baseline. As the most profitable dairy business, production of cheese in Ukraine continues to increase. Ukrainian milk production remains stable, near 13 mmt, for much of the baseline. Growing domestic demand and weaker Russian import demand for butter and milk powders hamper growth in Ukrainian dairy product exports over the medium term.

Strong economic growth, changing diets, and population growth all contribute to a steady expansion in Asian dairy consumption. To meet domestic demands for dairy products, China and India significantly increase milk production. The Chinese government encourages milk production through better genetics

and herd management; Chinese cow yields are expected to increase 3% annually, and herd expansion should add 3.9% growth annually. Chinese imports of milk powder are expected to eventually decrease as consumers switch to fluid milk and as powder production expands.

Indian cow milk production grows 1.7%, and buffalo milk grows 4% annually. The latter represents about 60% of milk output and is valued for its high fat content. Roughly 40% of raw milk is directed toward fluid use in India, and the remainder is processed into butter and other fresh products. Indian butter production increases 54%, or 1.5 mmt, accounting for most of the growth in world butter production. India's butter export reaches a record high at 28 tmt in 2008; it then decreases as Indian butter demand grows faster than supply. Indian NFD output, a by-product of butter, increases 76% during the projection period, and NFD export grows 17% annually.

Southeast Asia depends heavily on imports to meet domestic demand. It increases its share of total NFD imports from 32.8% in 2005 to 35.7% in 2015. China and Japan account for about 6.7% of the NFD import market by the end of the baseline. Together, the seven countries of Asia generate virtually all of the growth in NFD trade. While Chinese WMP imports decline, Southeast Asia increases its imports 5.1% annually. Steady growth also occurs in Asian cheese and butter imports. As a leading cheese importing country, Japan's cheese import increases 1.6% annually, reaching 251 tmt in 2015. China, Southeast Asia, and South Korea combined increase their cheese imports 5.7% annually. Total butter imports into China, Japan, South Korea, and Southeast Asia increase 4.8% annually over the baseline.