Iowa Ag Review

A Publication from the Center for Agricultural and Rural Development, Department of Economics, College of Agriculture

March 1997 | Quarterly | Vol. 3 No. 1 and 2

What's Inside?

ISSN 1080-2193
www.econ.iastate.edu/card/agreview

FAPRI 1997 Agricultural Projections

by FAPRI/ISU Staff

The value of U.S. exports are expected increase by more than 37 percent in the next ten years, and both bulk and high-value product exports are expected to show continued gains due to extraordinary world food demand. A recent analysis by FAPRI shows projects the value of U.S. agricultural exports to increase from $58 billion in 1996 to more than $80 billion in 2006.

FAPRI staff presented details from the analyses to members of the U.S. House and Senate agriculture committees in Washington, D.C., on March 6 and 7, 1997. USDA personnel and representatives from farm and commodity organizations were also briefed at that time.

The optimistic outlook for agricultural exports stems primarily from new market access opportunities derived from trade agreements and from the positive macroeconomic situation in developing countries. This general optimism is tempered by concerns about greater commodity price volatility in the future and periodic price weakness.

The combined effect of demand growth in large, emerging markets, additional market access brought on by new trade agreements, large reductions in government-funded carryover stocks, and increasing variability in production implies strength in average farm prices and income. But this combined effect also implies increased crop supply uncertainty with subsequent price fluctuations, especially in the early years.

The FAPRI analysis shows that in the next decade, barring a fundamental change in world weather variability or in stockholding behavior, crop price instability will be above levels experienced over the past decade. A change in producer or processor stockholding could help offset this instability.

World Economic Outlook

A pattern of economic stability in a wide cross-section of countries has raised hopes for sustained and evenly

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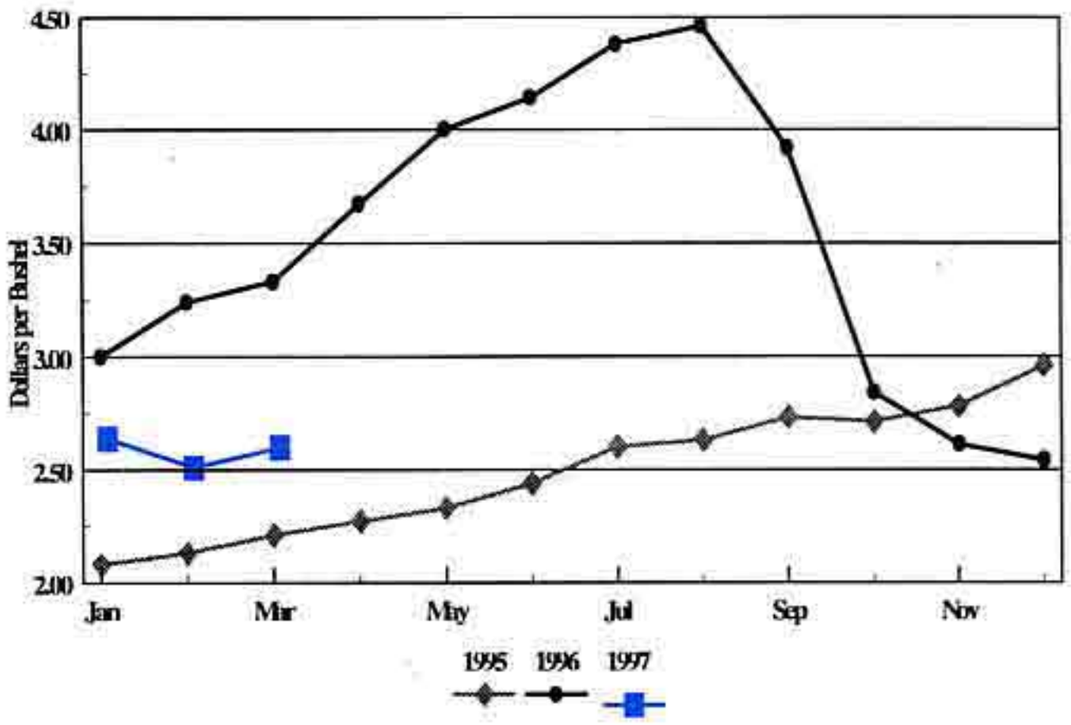
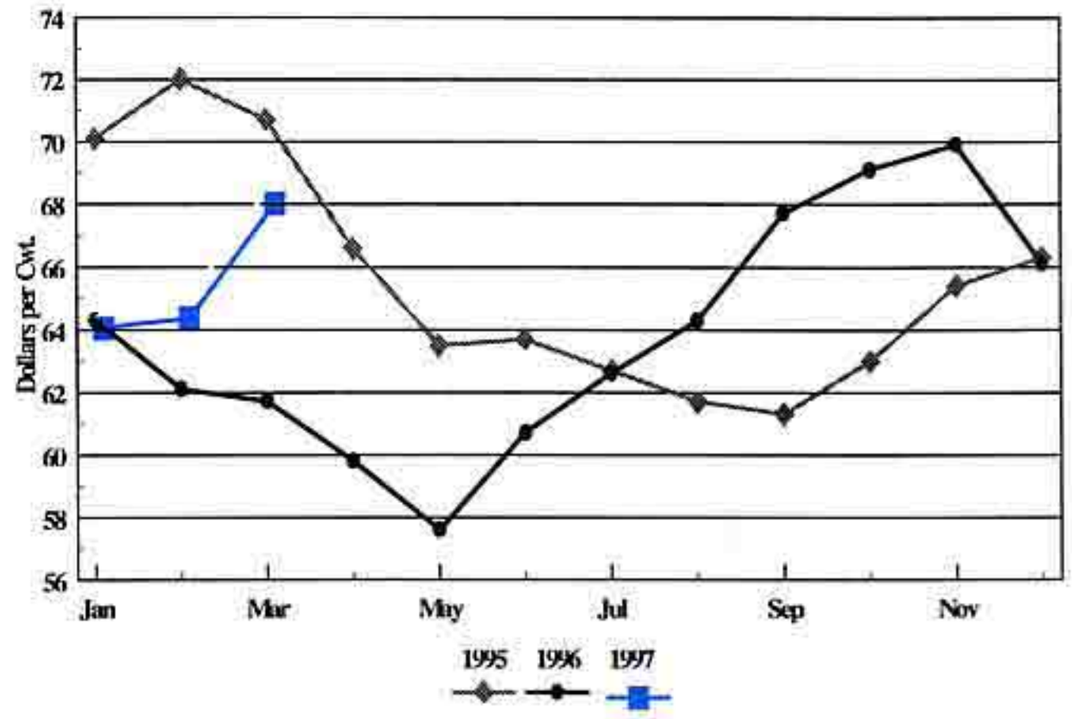
IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

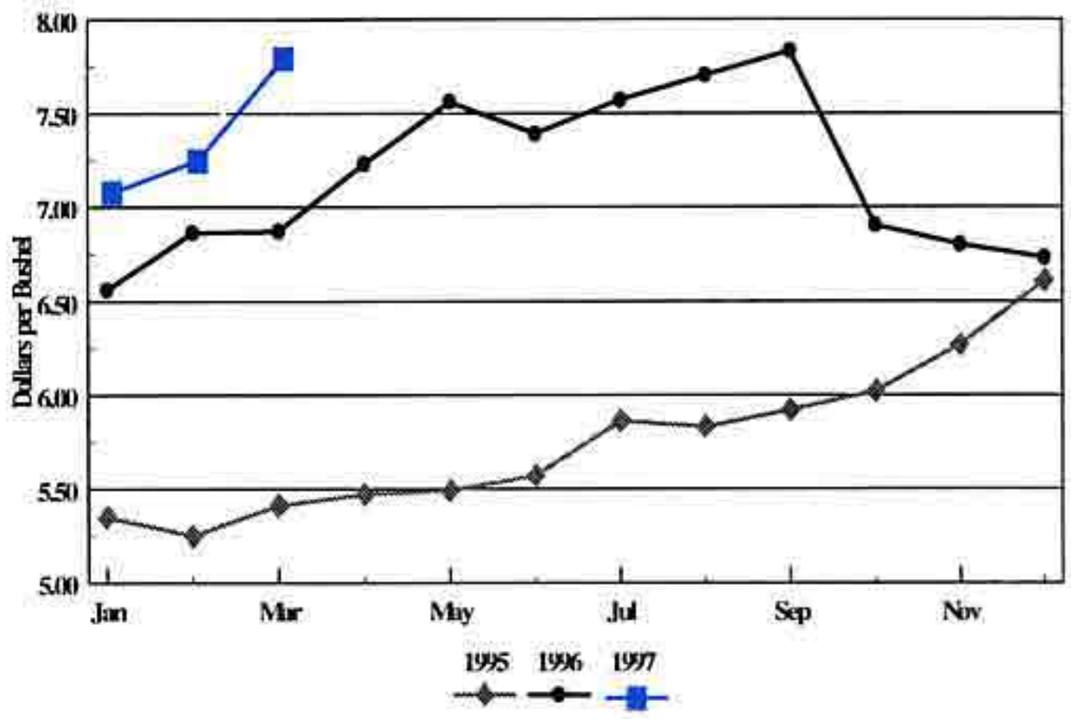
Iowa Corn Price



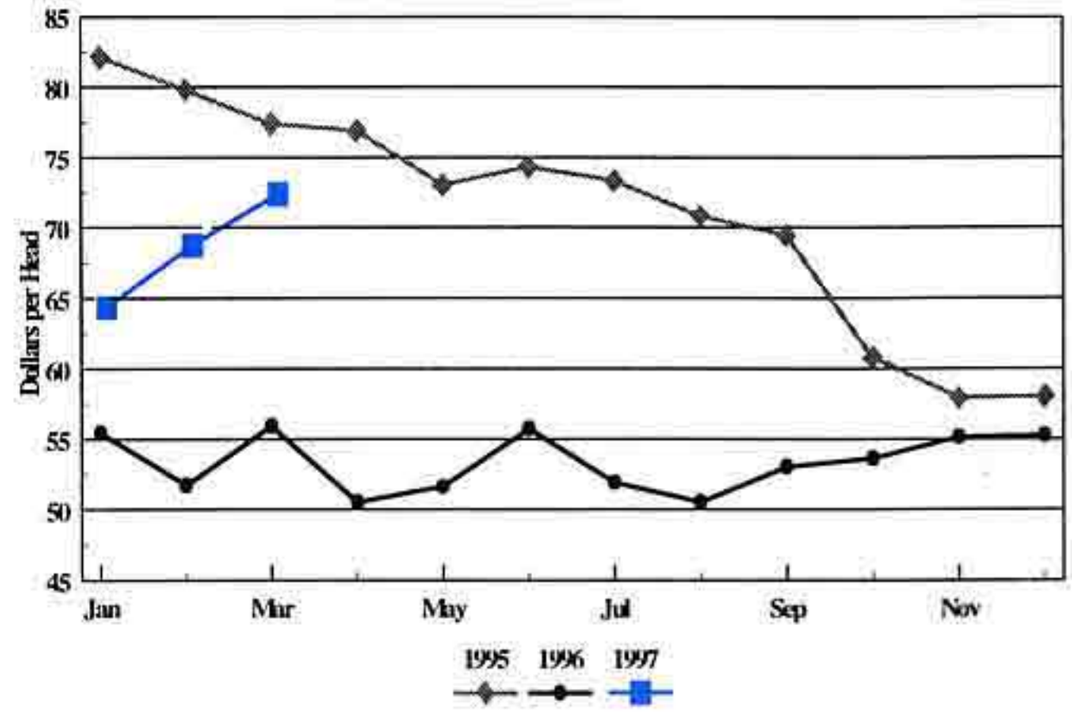
Iowa Steer and Heifer Price



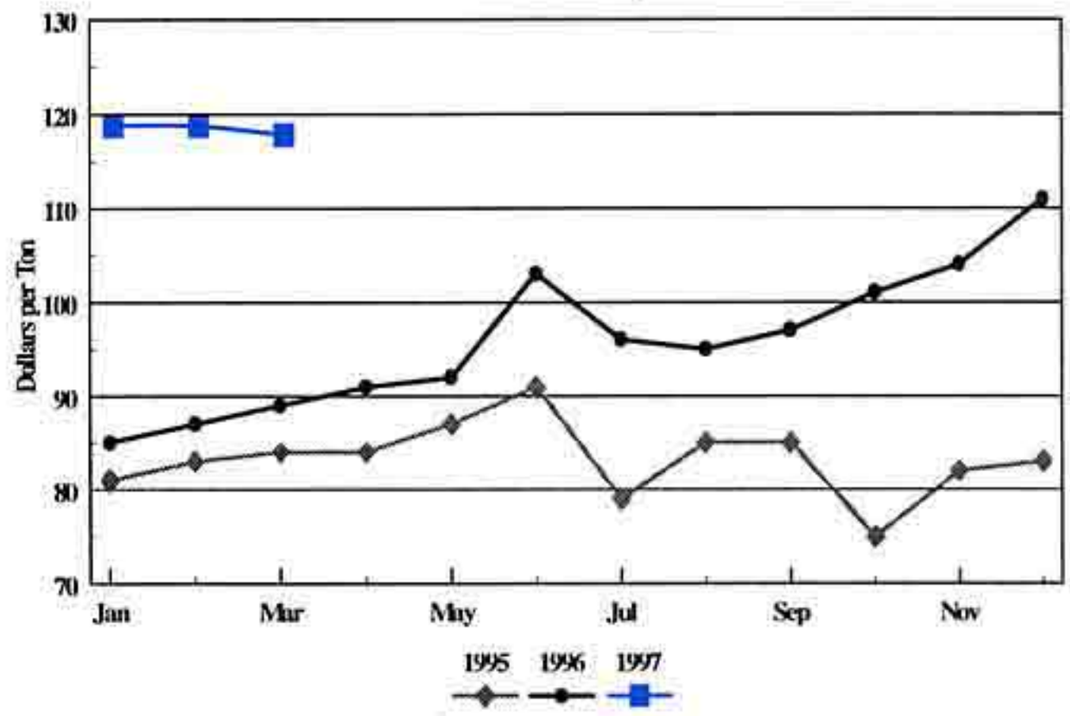
Iowa Soybean Price



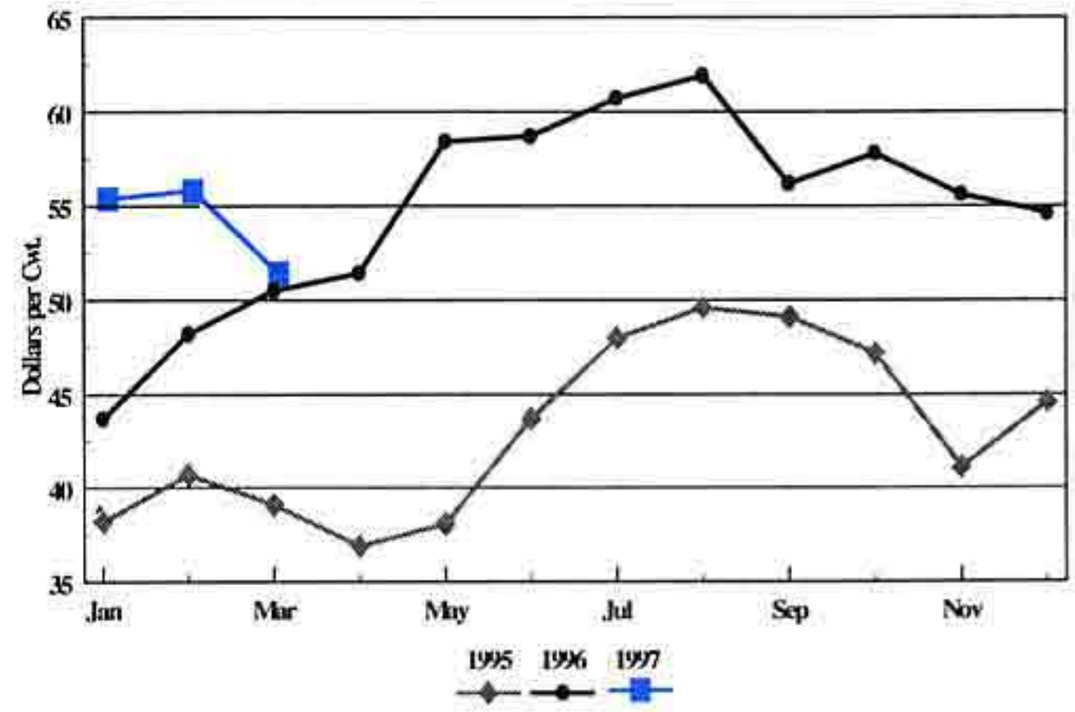
Iowa Feeder Calf Price



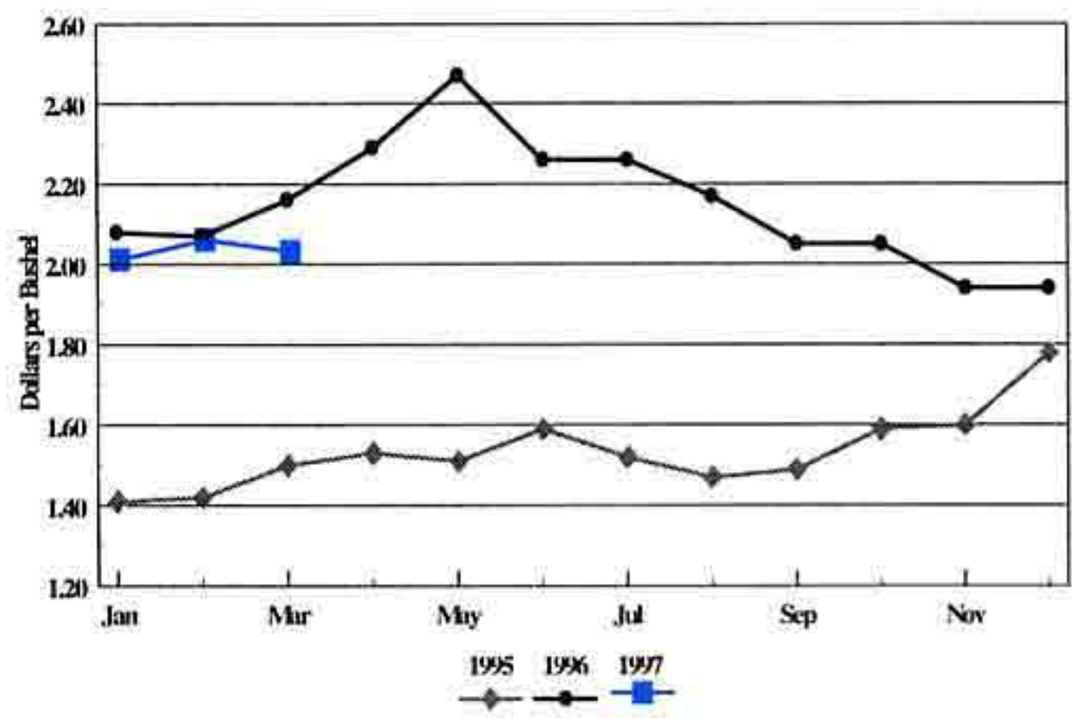
Iowa Alfalfa Hay Price



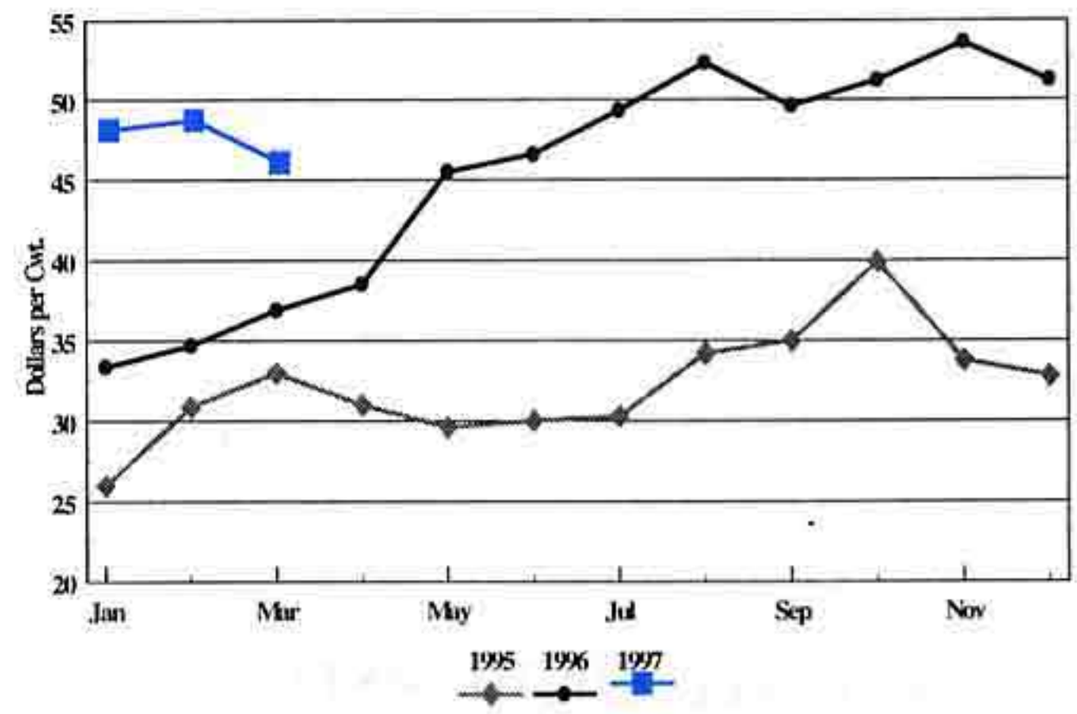
Iowa Barrow and Gilt Price



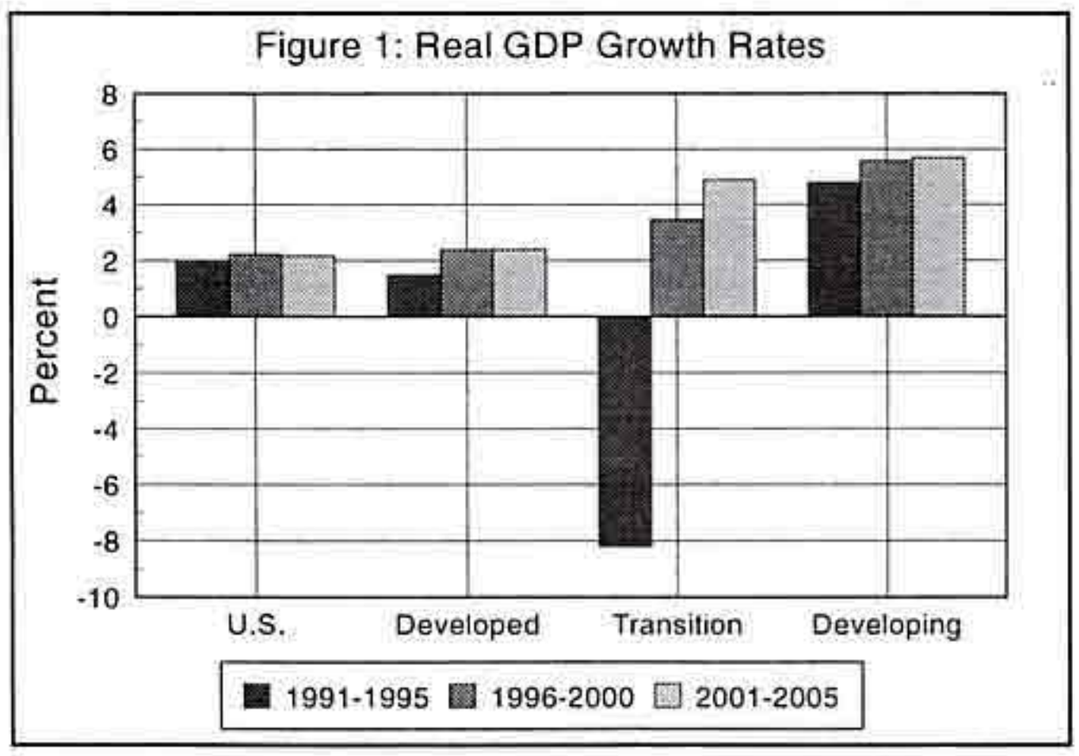
Iowa Oat Price



Iowa Sow Price

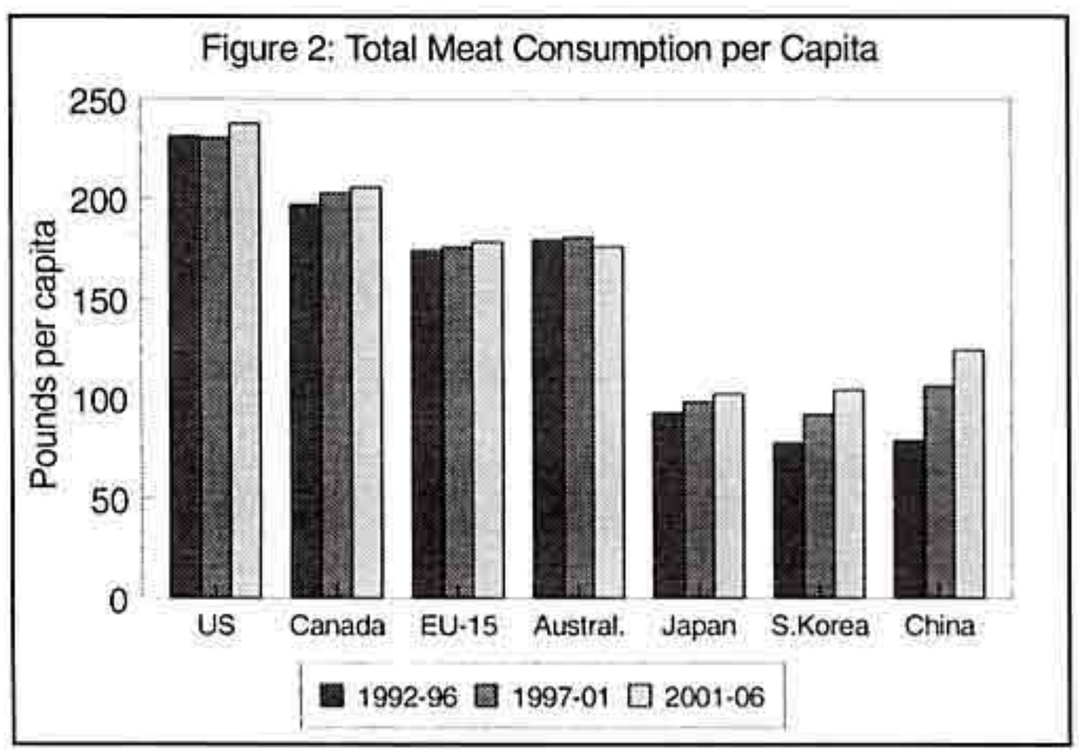


distributed global economic growth. The United Nations expects 116 of 137 monitored nations to have positive economic growth in 1997. This compares to 61 in 1993. Reforms in developing countries, both macroeconomic and political, form the basis for this growth. World growth in real GDP is pojected to average about 3 percent annually over the next decade (Figure 1). Economic growth in developing countries is projected to be 5.7 percent while economic growth in developed economies is projected to be 2.4 percent. While there are some regional differences (Asia with faster growth and Africa with slower growth), the overall prospects are positive. Rising incomes in the developing regions of the world and responsive demand will boost food consumption and result in dietary shifts to higher protein foods.



World Meat

The increased demand for animal-based foods in developing countries causes meat consumption to outpace domestic production (Figure 2). Net imports of broilers are projected to grow by 1.4 mmt over the next 10 years, with China accounting for 0.4 mmt. In developed countries, the gradual shift towards increasing poultry consumption has been aided by the BSE (mad cow) scare.



Growth in beef trade arises from three sources: (1) market access commitments for Japan and South Korea; (2) increased imports into the Former Soviet Union as meat is imported to replace domestic supplies lost as a result of herd liquidation; and (3) income growth in Latin America increases Mexican imports while dampening Brazil's potential to export due to expanded domestic consumption.

Per capita pork consumption in China is projected to increase by 25 percent in 10 years. Much of this pork will be produced domestically but some of the feeds necessary to produce it will be imported. Market access commitments increase pork imports in South Korea and Japan. The Former Soviet Union continues to import pork to replace a loss in domestic supply, again a result of herd liquidation. Mexican imports of pork are projected to grow rapidly as a result of strong economic growth. Per capita pork consumption in the European Union (EU), United States, and Canada is expected to stabilize.

In terms of supply, the United States plays a large role in satisfying the world demand for meats. The U.S. is projected to capture a large share of the growing world demand for poultry. Brazil is also capable of expanding production. Jointly these countries can meet much of the growth in demand and, as a result, broiler prices remain relatively stable.

Beef prices are driven by the U.S. cattle cycle. Prices rise from 1997 to 2000 and fall for the rest of the projection period. Beef herds in Australia and to a lesser degree in Canada rise in response to higher prices. EU beef production recovers from the BSE induced decline but exports are restricted by commitments to the World Trade Organization (WTO).

World trade in pork grows by 50 percent over the projection period. Comparative advantage will favor the United States to capture a large share of this growth. Pork production in Taiwan and the European Union will be limited by environmental and other constraints. The European Union's ability to export is also limited by WTO commitments.

World Dairy

Cheese prices show marginal increases relative to butter and non-fat solids over most of the projection period. The short-run imbalance between cheese, butter, and non-fat dry prices corrects by 1997. Demand for cheese increases with income and a growing convenience food industry. Some strengthening in non-fat solid prices is expected because of growing food demand in developing countries. Butter trade increases by 68 percent. Most of the projected expansion in dairy production occurs in Australia and New Zealand.

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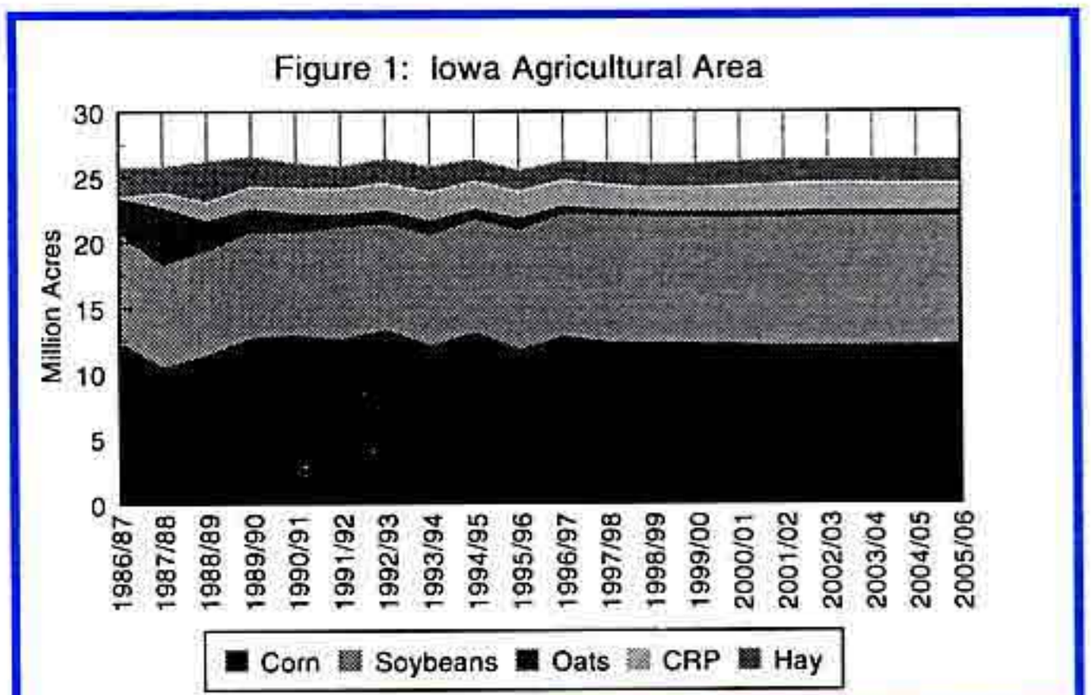
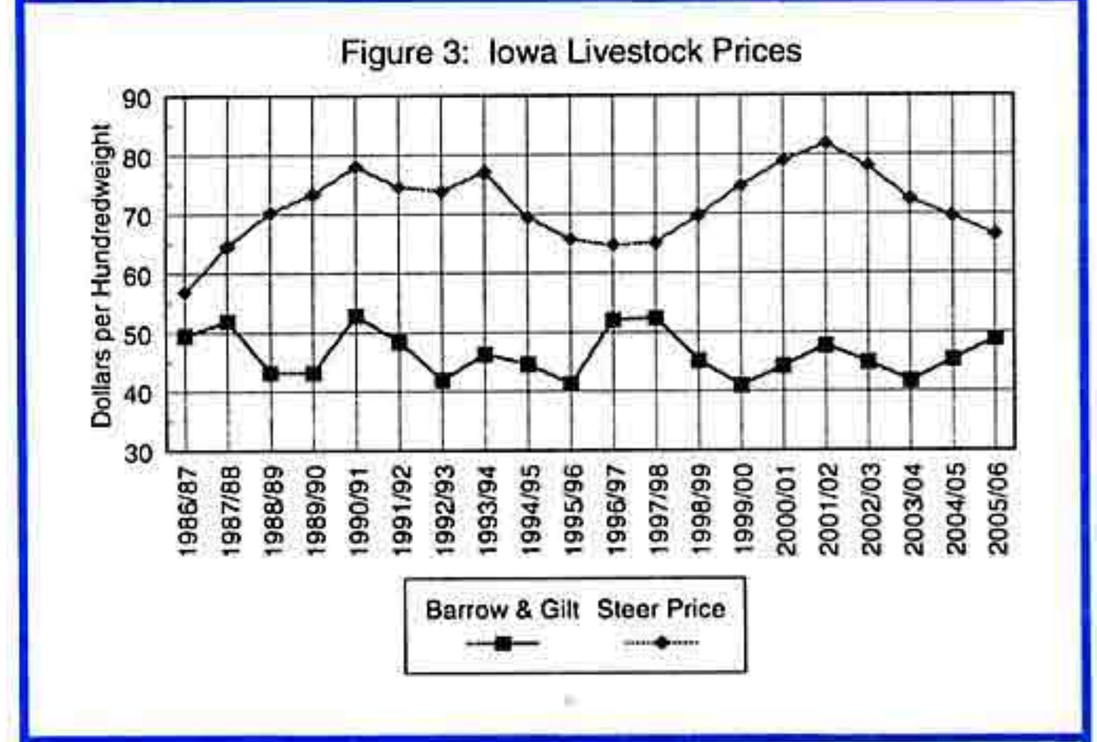
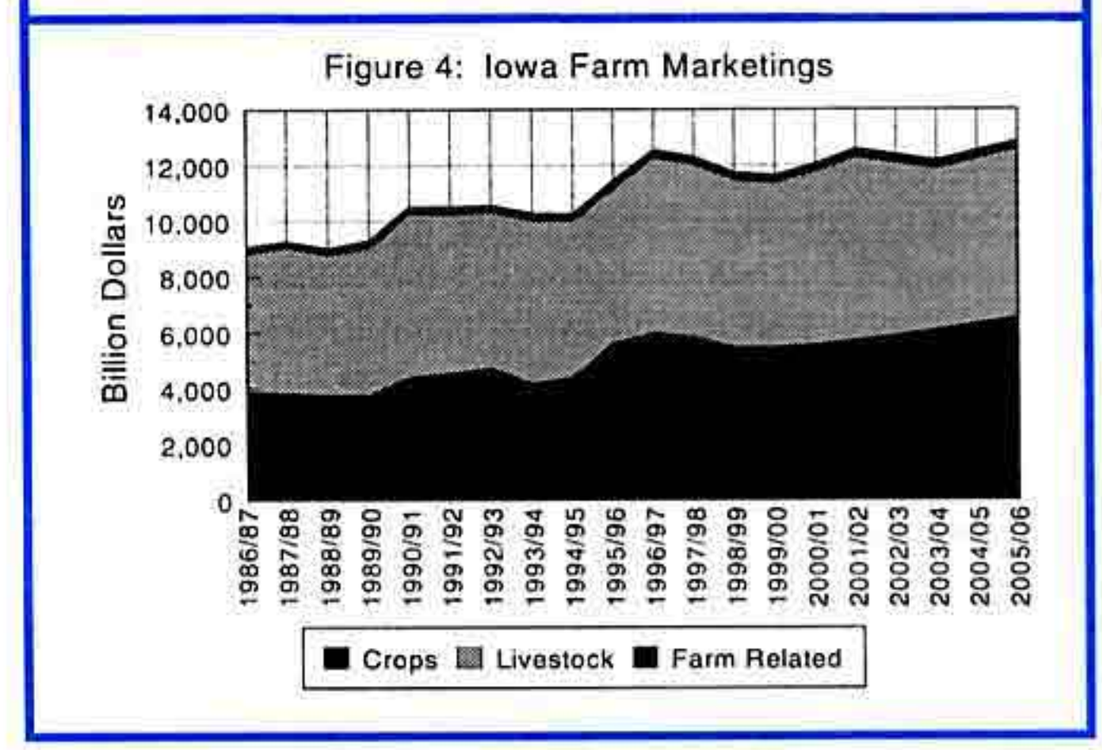






Impacts on Iowa

by FAPRI/ISU Staff

Iowa agriculture, generally, faces a positive outlook for the next 10 years. The increased and stable world economic growth, coupled with new government policies (GATT, NAFTA, and FAIR Act), will place the Iowa producers in an advantageous position. They will be able to have greater ability to respond to market signals and benefit from crop rotations. As a result, more soybeans will be planted (Figure 1). Production of corn is expected to average 1.65 billion bushels in 1997-98 and rise to 1.80 billion bushels by 2005-06. Soybean production will increase to 440 million bushels in 1997-98 and reach almost 500 million bushels by the end of the period Prices for these commodities will follow the U.S. average farm prices and are bullish relative to the past ten years (Figure 2).

Iowa prices and production cycles follow the U.S. levels (Figure 3). Barrows and gilts, 230-250 lb., are expected to peak in 1997, 2001, and 2005 at $51.74 per cwt., $47.73 per cwt., and $48.83 per cwt. respectively. Fed cattle prices are beginning to climb after hitting the bottom in the cycle in 1996. Prices will continue to climb until 2001 ($81.85 per cwt.) when the cycle turns and prices fall until the end of the projection period.

Iowa cash receipts fall slightly this year due to lower crop prices. After 1998-99, receipts are expected to climb gradually to the end of the period where they reach $12.9 billion (Figure 4).

The positive economic outlook for the world implies optimism for Iowa agriculture on average. Unforeseen events such as weather catastrophes, political hostilities, or a reversal of a movement toward "free trade," could limit the strong demand. For now, however, there is a generally positive outlook for U.S. agriculture and the agricultural sectors in which Iowa plays an important role.

For producers, the increased market orientation puts added emphasis on marketing and financial management. In this environment, rewards are high, but risk has increased as well. ◆

World Wheat
High prices and tight markets helped induce an 8 percent increase in world wheat production in 1996-97. Additional area and favorable weather in most wheat producing regions resulted in increased world production of 44 mmt to a level of 580 mmt. World wheat area increased to a record level of approximately 230 million hectares in 1996-97. This is an additional 10 million hectares compared to 1995-96.

Two years of increased production depress the price of U.S. hard red winter wheat at the Gulf ports to $152 per metric ton in 1997 and $149 per metric ton in the following year, the lowest price over the projection period. As the wheat price drops, wheat is projected to lose area to competing crops. Longer term, a steady annual increase of 1.3 percent for world wheat consumption puts upward pressure on wheat prices. After 2001, as price recovers, world wheat area is expected to stabilize between 226 to 228 million hectares. Over the next 10 years, production is expected to keep pace with rising consumption. The Gulf price is expected to stabilize between $163 and $170 per metric ton. The U.S. average farm price drops to $3.30 per bushel in 1998-99 and grows steadily to $3.82 per bushel by 2005-06.

World Feed Grains
As with other cereals, producers faced high prices for coarse grains when they made their planting decisions for the 1996-97 crop year. These high prices induced a 2.4 percent increase in the world area for coarse grains. Favorable weather conditions lead to a 8.6 percent increase in yields over last year's harvest so that production increased by 11 percent over the 1995-96 harvest.

With the strong increase in production, grain prices in 1996-97 are falling from the previous year's highs. Global coarse grain area for 1996-98 is only expected to decline by a marginal amount. Global demand for coarse grains is expected to continue to increase at approximately 1.6 percent each year over the baseline period. With yields in the United States only expected to grow at 1.2 percent each year and total area expected to be relatively constant, corn prices at the Gulf of Mexico bottom out a $107 per metric ton in 1997-98 and gradually increase to $127 per metric ton at the end of the projection period. U.S. farm price for corn falls to $2.37 per bushel in 1997-98 and rises to $2.82 per bushel by the end of the period. On average over the next ten years, world production is expected to keep up with demand, with real prices relatively flat.

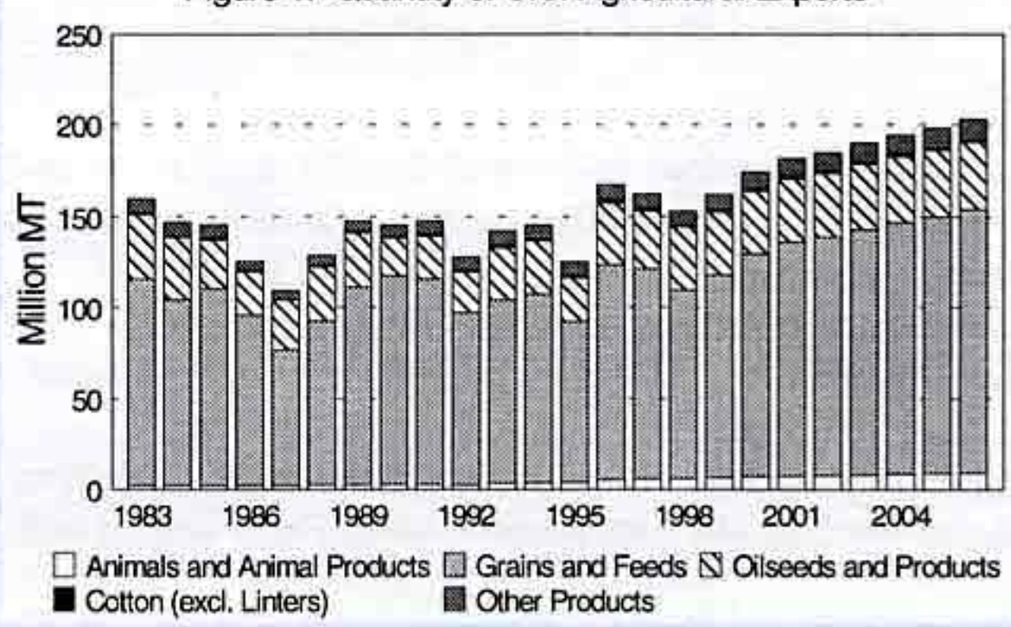
World Oilseeds
Expansion of world oilseeds (soybean, rapeseed, and sunflower) area is expected over the course of the baseline. From a harvested area of 104 million hectares in 1996-97 total oilseed area increases to 119 million hectares in 2005-06. The annual average growth of yields for world oilseeds is 0.87 percent over the 10 year projection period. Over thisperiod, oilseed production grows by an average annual rate of 2.3 percent, reaching 228 mmt by 2005-06.

Consumption for soymeal, rapemeal, sunflowermeal, and palm kernel meal grows 22 percent from 122 mmt in 1996-97 to 150 mmt in 2005-06. Growth in oil production is primarily based on the strength of growth in the palm oil sector, which increases its share from 29 to 32 percent of the

U.S. Agricultural Exports
by FAPRI/ISU Staff

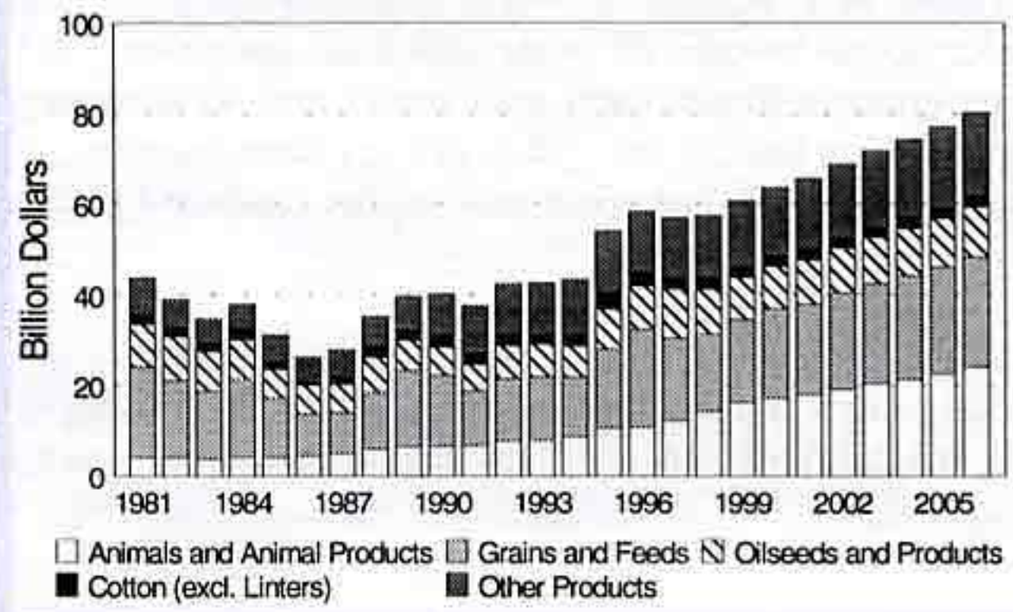
Although the quantity of U.S. agricultural exports will likely fall in fiscal year 1997, due to a decline in grain exports, they are expected to rebound quickly. The export level is projected to break the 200 mmt mark for the first time in history in 2005 (Figure 1).

Figure 1: Quantity of U.S. Agricultural Exports



The value of exports is also expected to expand, not only because of increased levels but also because of strong prices for all agricultural commodities. Estimated export value will increase from below $60 billion in 1996 to above $80 billion by 2006, a 37 percent increase over the 10 year period. The export of livestock products and feed grains benefit the most from this new demand (Figure 2).

Figure 2: Value of U.S. Agricultural Exports



The value of animals and products actually approach the value of grains and feeds exports by the end of the period. The value of meat exports—beef, pork, and broilers—will nearly double in ten years. In fact, meat exports will account for more than half of the total $22 billion increase in the value of agricultural exports. This increase in animal exports helps domestic feeding because more than 20 mmt are fed to exported animals by 2005 compared with 9 mmt in 1996

By 1999, U.S. pork exports are projected to surpass those of the European Union, making the United States the world's largest net exporter of pork. Additionally, in ten years the United States will be exporting almost as much beef as Australia, the country that presently dominates the market. Simply put, the world will be demanding much more meat over the mid-term, and the United States is in a good position to supply that meat. These projections are contained in a recent analysis by FAPRI (Food and Agricultural Policy Research Institute) at Iowa State University.

The optimism for agricultural exports stems primarily from new market access opportunities derived from trade agreements and from the remarkably positive macroeconomic situation in developing countries in general, but especially in Asia and Latin America. Several large, emerging markets are demonstrating strength and stability in income growth. This is fundamentally a much different international macroeconomic situation than The optimism for agricultural exports stems primarily we had in the 1970s and 1980s.

The strong export demand outlook bodes well for U.S. farm prices and net farm income over the long run. After modest near-term weakening, corn and soybean prices show continuous increases. This general optimism is, however, tempered by concerns about much greater commodity price volatility in the future, given the current market and policy environment. With steady growth in demand and supply, agricultural commodity prices will become more and more responsive to weather induced yield shocks; and price variability will remain high.

Direct feed-grain exports, led by corn, are projected to increase by 30 million metric tons over the period to more than 80 million metric tons in 2005. The growth in feed-grain demand is also derived from increases in international meat consumption and production. The United States continues to indirectly export corn in the form of meat, with the feed-grain export equivalents of meat exports growing by approximately 12 million metric tons. Together, direct and indirect exports of corn increase by 42 million metric tons.

The combined effect of 1) demand growth in large, emerging markets; 2) additional market access brought about through trade agreements; 3) large reductions in government-funded carry-over stocks, and; 4) increasing variability in production implies strength in average farm prices and income. However, this combined effect also implies continued price fluctuations.

The FAPRI analysis indicates that in the next decade, barring a fundamental change in world weather variability or in stockholding behavior, price instability will be above the levels experiences over the past decade. ◆

market. U.S. soybeans will have a season average price of $6.85 per bushel in 1996-97; then declines to $5.80 per bushel in 1999-2000 and rises to $6.52 by the end of the period. ◆

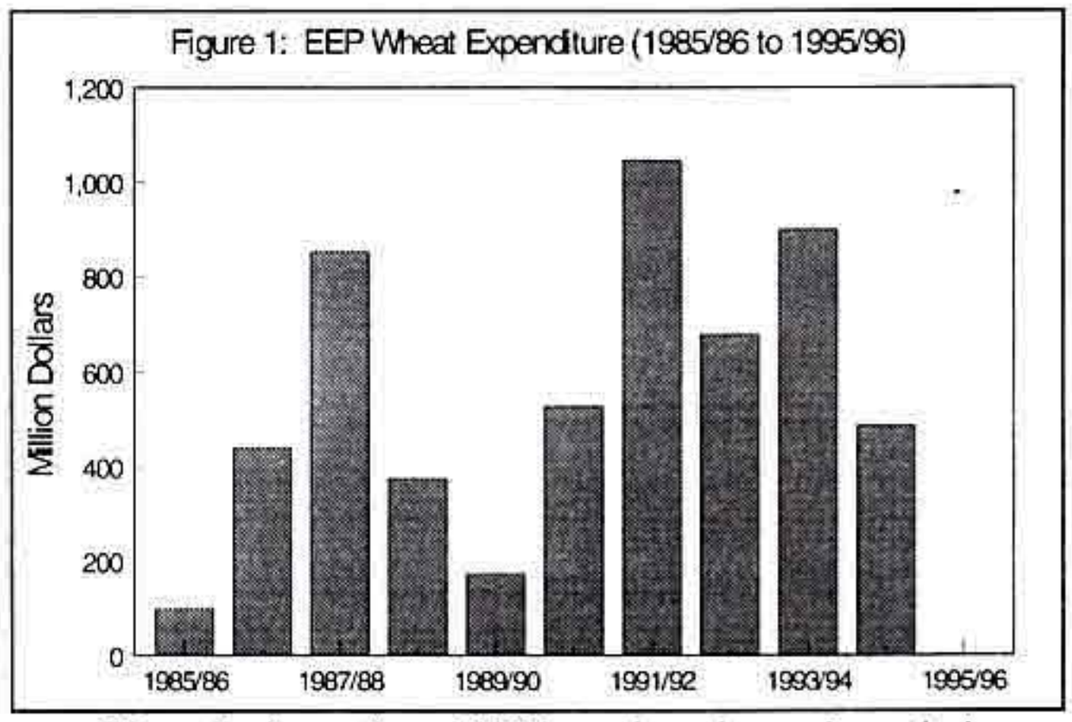
(For more information on the 1997 agricultural outlook, see our web site at www.ag.iastate.edu/fapri.

CARD/FAPRI ANALYSES

The Impact of EEP Removal on U.S. Wheat

Samarendu Mohanty, (515-294-6296) and FAPRI/ISU Staff

The Export Enhancement Program (EEP) was initiated under the Food Security Act of 1985. The purpose of the program was to offset the adverse effects on U.S. exports due to unfair trade practices or subsidies by competing exporters and also to support U.S. prices. Supply restrictions, price supports, and export subsidies together have caused U.S. wheat prices to be above world prices over the past decade.



Since its inception, EEP has played a major role in exports of many agricultural commodities, particularly wheat, which has accounted for 80 percent of the value of all EEP-assisted sales. Over the period 1985/86 to 1995/96 more than 5.5 billion dollars were spent on wheat EEP sales. Figure 1 shows the distribution of expenditures over the ten-year period. During the past decade, EEP has been applied to an average of 50 to 70 percent of U.S. wheat exports.

Eliminating EEP - A Scenario

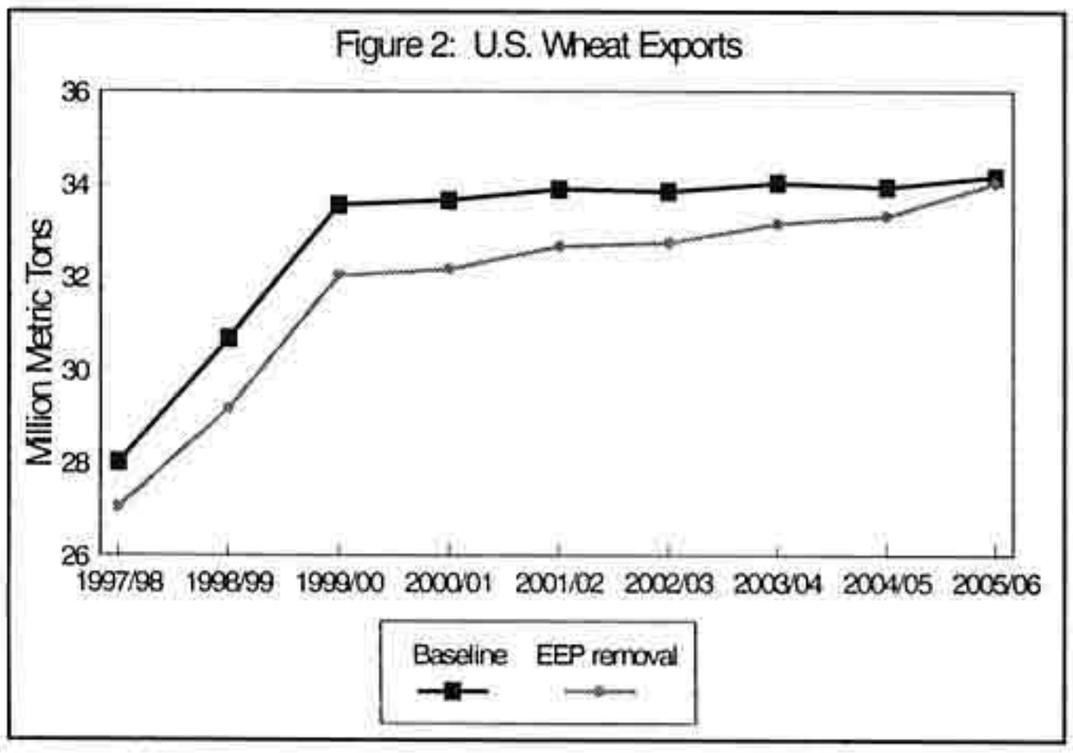
With the current higher world prices, EEP may have a relatively smaller impact on the quantity of wheat exported and on farm, Gulf, and importer prices. A recent FAPRI/ISU study measured the impacts of elimination of Export Enhancement Program (EEP) on U.S. wheat exports and prices over the coming ten-year period.

A baseline projection was developed for the years 1996/97 to 2005/06 using FAPRI commodity models (see *FAPRI 1997 Agricultural Projections* in this issue). The impacts of EEP were then determined by running the alternate (No EEP) scenario in which the EEP effects on importers and exporters are removed. The difference between the two scenarios provided the impacts of EEP.

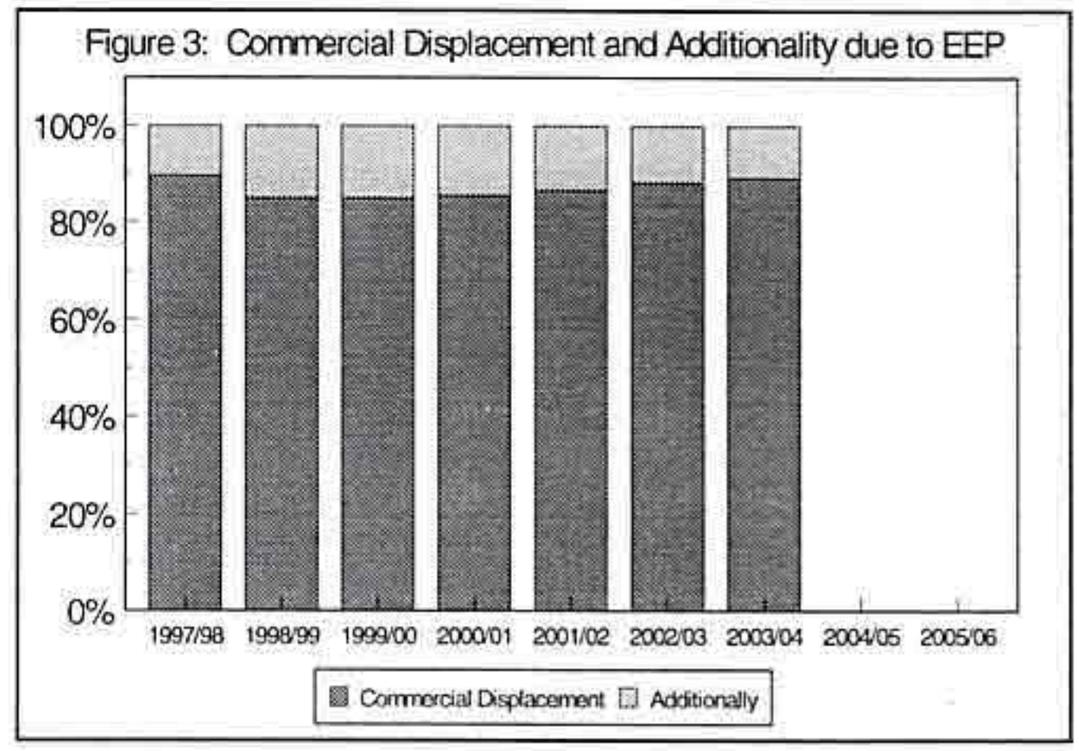
For our baseline projections, maximum EEP expenditures are constrained by the 1996 FAIR Act limits; but minimum EEP expenditures depend on EU export restitutions. For the European Union, the level of export restitution depends on the difference between world price and the EU domestic price. If domestic price is above the world price level, then EU subsidizes, which in turn causes the United States to subsidize its exports through EEP. On the other hand, if world price is higher than EU domestic price, then the European Union need not provide export restitution and, subsequently, EEP subsidy is reduced.

Results

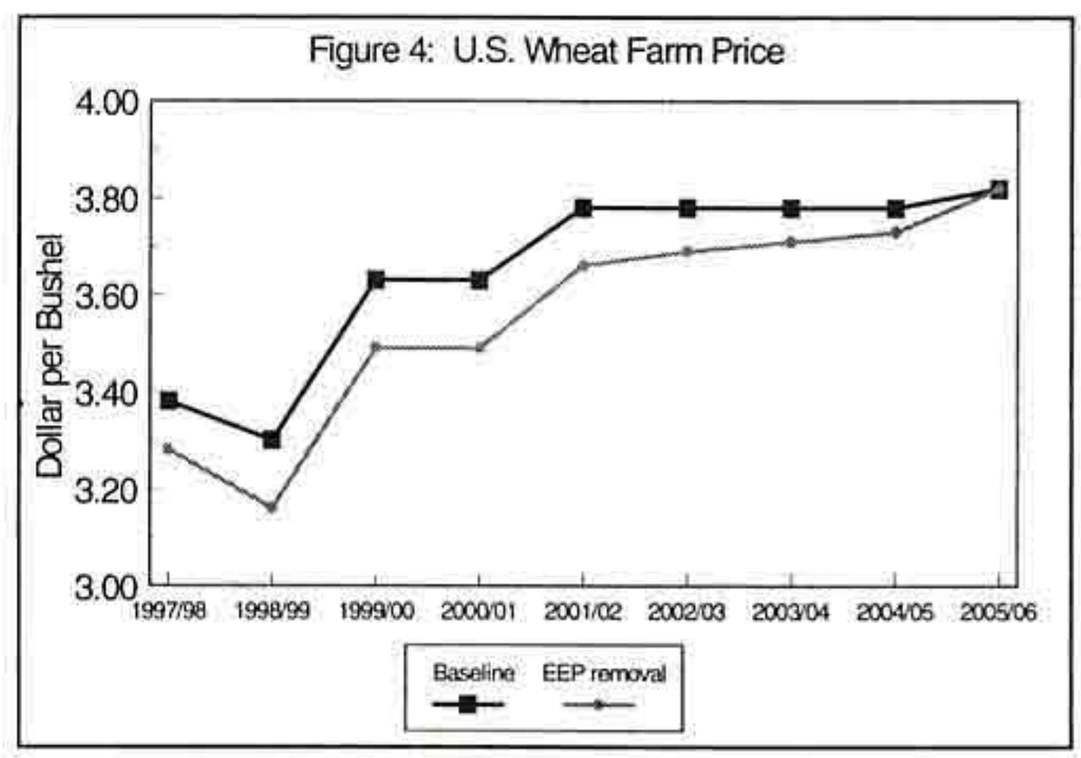
In the baseline projection, average per-unit EEP subsidy is projected to be around $14 per ton for 1997/98 to 1999/00. But after 1999/00, average per-unit subsidy is reduced to $10 per ton and subsequently reduced to $5 per ton by 2003/04 and zero by 2004. Correspondingly, U.S. EEP wheat expenditures are estimated to be $131 million in 1997/98, increasing to $145 million by 2000/01, and declining to $0 for 2004/05. The reduction of EEP subsidy is linked to EU restitution: i.e. after 2000/01, world wheat price exceeds the EU domestic price, enabling EU to export without any subsidy, and U.S. EEP subsidy phases out.



Some of the important analytical results from the baseline and no-EEP scenario are summarized below. The results indicate that elimination of EEP decreases U.S. wheat exports by 1 to 5 percent (4 to 5.6 million bushels) over the projection period (Figure 2). Thus, the export additionality, calculated as a ratio of change in exports due to EEP and quantity of wheat exported through EEP, ranges from 10 to 15 percent during the period 1997/98 to 2003/04 (Figure 3).



In other words, commercial displacement due to EEP is estimated to be 85 to 90 percent. Although the size of the EEP varies over the baseline period, the estimated percentage of additionality remained relatively stable at 10 to 15 percent.



The decline in world wheat trade due to elimination of EEP even further diminishes the impacts of EEP on U.S. share of world wheat trade. Share changes range from a 0.12% to a 1.35% decline. Similarly, average wheat farm price decreases by $ 0.05 to $0.15 per bushel (Figure 4). The results suggest that removal of EEP during the projection

(continued on page 8)

period may not increase the price paid by importers to the extent that there would be a significant negative impact on U.S. wheat exports.

In summary, the elimination of EEP is likely to marginally reduce U.S. wheat exports and expand competitors' market shares. The additionality of the program is projected to be 10 to 15 percent over the projection period. Thus the displacement of commercial exports ranges from 85 to 90 percent. The results also suggest that the ability of the EEP to expand U.S. exports is somewhat limited, mainly due to domestic policies of major wheat importers and exporters that insulate their prices from world price fluctuations.
(For more detailed information see CARD Briefing Paper 97-BP 15).◆

The Potential Market for U.S. Pork Variety Meats in China

Dermot Hayes (515-294-6185)
Roxanne Clemens (515-294-8842)

Chinese consumers view products such as loins and tenderloins as uninteresting and lacking in taste. Chinese dishes call for small pieces of strong-tasting products, and Chinese consumers will pay accordingly.

During a May 1996 visit, Dermot Hayes collected the prices shown in Table 1 for pork and pork variety meats at Chinese wet markets and wholesale markets. (The prices are presented both in U.S. dollars per pound and as the ratio of the meat or variety meat price to the loin price in order to avoid errors due to currency valuation.)

The direct price comparison shown in the table is somewhat suspect because of production subsidies in China, questions about the exchange rate, and the various locations from which the prices were collected. The price ratios are, however, an accurate measure of the taste differences that exist between Chinese and U.S. consumers. For example, pork stomach sells at a 50 percent premium to loins in China, whereas stomach sells at 40 percent of the loin price in the United States. Lungs sell at only 2 percent of the loin price in the United States but at 20 percent of the loin price in China.

The reason these ratios are so different is that, until recently, China has protected its variety meat market. Discussions between Hayes and numerous individuals along the Chinese pork chain indicate that Chinese restrictions on pork variety meat imports are currently under review. One reason for this review is that the market price differences shown in the table

(continued on page 9)

Iowa Cash Receipts

	1996	1995	1994
	(Million Dollars)		
Crops	7,364	5,891	5,034
Livestock	5,385	5,068	5,105
Total	12,749	10,959	10,140

Average Farm Prices Received by Iowa Farmers

	March 1997	Feb. 1997	March 1996
		($/Bushel)	
Corn	2.65	2.56	3.33
Soybeans	7.85	7.30	6.87
Oats	2.03	2.06	2.16
		($/Ton)	
Alfalfa	118.00	119.00	89.00
All Hay	110.00	112.00	84.00
		($/Cwt.)	
Steers & Heifers	68.40	64.70	61.70
Feeder Calves	72.70	69.10	55.90
Cows	40.90	37.30	31.70
Barrows & Gilts	51.40	55.80	50.50
Sows	45.90	48.60	36.90
Sheep	34.50	35.00	33.00
Lambs	100.00	96.10	73.20
		($/Lb.)	
Turkeys	0.45	0.43	0.45
		($/Dozen)	
Eggs	0.535	0.570	0.622
		($/Cwt.)	
All Milk	12.90	12.80	13.20

World Stocks-to-Use Ratios

	Crop Year		
	1996-97 Feb. Projection	1995-96 Feb. Estimate	1994/95
		(Percent)	
Corn	10.94	5.00	16.57
Soybeans	5.84	7.84	13.79
Wheat	20.94	15.79	20.48

are creating a large and very visible black market in imported variety meats (mostly from the United States). The Chinese government's attitude seems to be that some control over this market is better than no control. Also, the Chinese government is acutely aware of recent food price inflation, especially in urban areas. Imported variety meats are viewed by urban Chinese as being much more palatable and more attractive than the frozen split sides currently on offer from Sichuan province. Chinese pork producers realize that they cannot produce sufficient variety meats to satisfy local tastes without producing a surplus of loins.

These factors suggest that the United States could quite easily obtain a variety meats exemption as part of the World Trade Organization (WTO) accession agreements, and it is useful to speculate as to what might happen if Chinese restrictions on variety meat imports were lifted and a low or zero tariff was applied to imported variety meats.

Recently, China permitted the importation of selected variety meats for sale in hotels. The official tariff on these imports was 44 percent, to which a 17 percent sales tax was added. Discussions between Hayes and Mr. Yao, the individual who imported these products, suggest that after paying tariffs and sales tax, the variety meats imported under the official exemption were just competitive with smuggled imports. This competitiveness would suggest that the tariff equivalent of the current ban is between 40 percent and 50 percent.

Likely suppliers to China's variety meat market, should it be opened, would include the United States (with annual production of 8 mmt), Canada (production of 1.2 mmt), Denmark (production of 1.5 mmt), and the Netherlands (production of 1.36 mmt). Exporters that value variety meats (Eastern Europe, Taiwan, and Mexico) would not be in a position to supply this market. These potential exporters have a combined production of 12 mmt, carcassweight equivalent. Contrast this with Chinese production of 36 mmt and it becomes clear that variety meat prices in the rest of the world would tend to rise to Chinese levels, rather than for Chinese variety meat prices to fall to world levels. In other words, China would be the dominant market in pork variety meats.

To calculate the impact of this liberalization on the U.S. pork industry, we need to calculate the effect on U.S. drop credits of the removal of a 40 percent to 50 percent tariff. Because U.S. prices would rise to Chinese levels, this is equivalent to asking what a 40 percent to 50 percent increase in the U.S. drop credit would mean.

Prior to the recent surge in U.S. pork variety meats exports, U.S. drop credits averaged $6.50 per hog. More recently, the drop credit has risen to about $10.50 per animal as exports have grown. This drop credit does not include all the items that could possibly be exported under such a ban, such as lard and ears, but it is a reasonable approximation of the current value of these products. A 45 percent increase in the U.S. drop credit would add $4.72 to the value of each hog carcass, or about $1.90 per hundredweight.

This additional value would eventually make its way back to U.S. hog producers, and it would do so without increasing retail pork prices in the United States. In fact, the U.S. broiler industry has discovered that new export markets for chicken legs and wing tips have actually reduced the cost of producing chicken breasts, thereby allowing U.S. poultry producers to become more competitive on the U.S. domestic market while at the same time improving profits.

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Table 1. Price comparison for pork cuts and variety meats in China and the United States

	China Price ($/lb.)	Ratio of Product Price to Loin Price in China	U.S. Price ($/lb.)	Ratio of Product Price to Loin Price in U.S.
Loin	1.20	N/A	1.32	N/A
Lung	0.24	0.20	0.03	0.02
Pork Stomach	2.16	1.50	0.54	0.40
Pork Kidney	1.56	1.30	0.17	0.13
Lard	0.72	0.60	0.25	0.19
Feet	0.87	0.725	0.20	0.15
Boneless Butt	1.20	1.00	0.81	0.61
Ham	1.27	1.06	0.84	0.63
Tongue	1.61	1.35	0.55	0.41
Small Intestine	0.70	0.50	N/A	N/A
Large Intestine	0.38	0.31	N/A	N/A
Nape of Neck (incl. bones)	1.32	1.10	0.10	0.07
Head Mask	0.33	0.28	N/A	N/A

Because U.S. hog producers and U.S. *and* Chinese pork processors would benefit from such a move while causing only a very small reduction in Chinese hog prices, almost all participants would benefit from such a change. Therefore, it should be possible to obtain some concession in this area during the WTO accession talks. The net annual benefit to the U.S. pork industry of such a concession is estimated to be approximately $300 million per year.◆

SPECIAL ARTICLES

The FAPRI Process Of Analysis

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In several past issues of the *Iowa Ag Review* we have written about baselines and scenarios that the Food and Agricultural Policy Research Institute (FAPRI) produces. This article will clarify what FAPRI is and what it does.

Background

FAPRI was established in 1984 by a grant from the U.S. Congress. The primary focus of its research is on the analysis of domestic and international agricultural and trade policies. FAPRI is administered jointly by CARD at Iowa State University and the Center for National Food and Agricultural Policy (CNFAP) at the University of Missouri-Columbia. FAPRI/ISU is responsible for international modeling and analysis, while FAPRI/UMC is responsible for U.S. modeling and analyses. In addition to the two core centers, affiliate universities provide specialized expertise and multi-institution collaboration.

FAPRI provides an annual baseline on the U.S. agricultural sector and world commodity markets directly to the Senate and House Agriculture Committees. Information is also disseminated to commodity organizations, farmers, agribusinesses, state legislators, and others interested in the agricultural economy.

In studies ranging from the farm to the international marketplace, FAPRI uses comprehensive data and computer modeling systems to analyze the complex economic interrelationships of food and agricultural industries.

FAPRI Mission

The objectives of the FAPRI program are:

- Develop and maintain an analytical support system that facilitates research and analysis on food, agricultural, and trade policy issues.
- Evaluate supply, demand, and policy factors in the United States and abroad that influence both short-term and long-term trade prospects and patterns.
- Provide information to help public policy participants and decision makers evaluate trade and policy issues and increase public understanding of these issues.

FAPRI accomplishes its mission by preparing baseline projections each year for the U.S. agricultural sector and for international commodity markets. The multiyear projections are published as FAPRI Outlooks, which provide a starting point for evaluating and comparing scenarios involving macroeconomic, policy, weather, and technology variables.

The FAPRI Process

A look at a single year's schedule provides some of the major milestones of each FAPRI baseline process. In mid-October of each year the baseline process begins. A meeting of personnel from all the participating institutions is held to set the assumptions for the preliminary baseline or "melt down" that is held in November. The assumptions discussed range from worldwide policy assumptions to agronomic and biological assumptions to macroeconomic data issues. Shortly after the meetings, each analyst develops a five-year preliminary assessment of supply, utilization, and certain policy assumptions for the commodities and countries for which that analyst is responsible. These preliminary assessments are then distributed to select reviewers from academia, government, and industry for feedback on the specific paths laid out in the analysis.

After the reviewers have responded to the individual preliminary assessments, all the members gather at Iowa State University in Ames for the melt down process, during which the members collaboratively solve the linked commodity models. The major models that are run simultaneously are U.S. Crops, U.S. Livestock and Dairy, International Crops, International Livestock and Dairy, and International Oilseeds.

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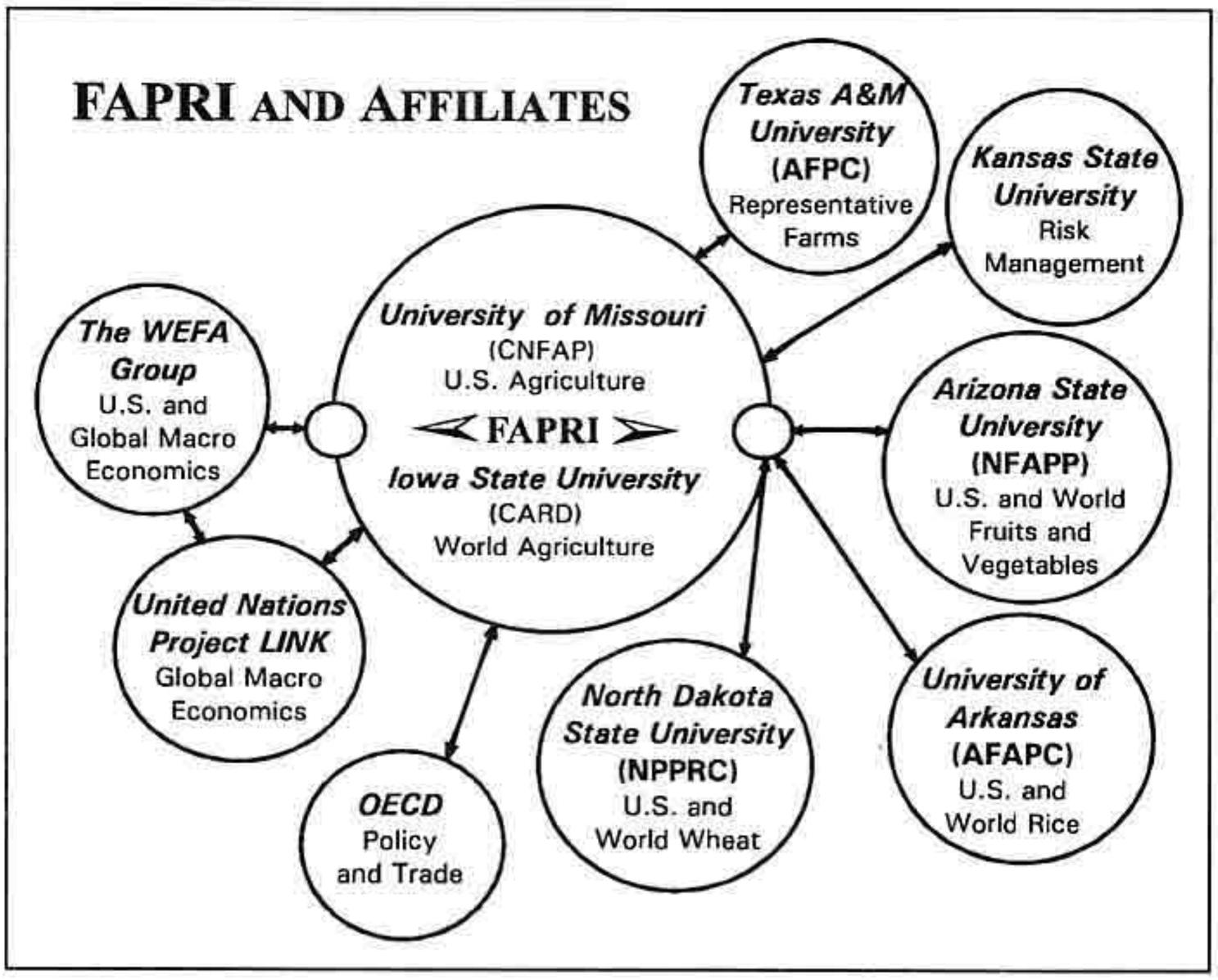

This analysis encompasses more than 25 agricultural commodities with 17 regional groupings encompassing 35 countries as well as an aggregate world total. This lengthy process produces the preliminary baseline. The baseline projects all the variables for ten years into the future and assumes normal weather and unchanging governmental policy.

Outside Review

The next step in the FAPRI process is an outside review of the preliminary baseline. More than 150 commodity analysts from various domestic and international governmental units, agricultural industries, trade groups, and universities gather in Kansas City in January to provide critical analysis of, and input, for, the baseline. This review meeting is a forum to gather information that will be used to provide the most plausible picture of the world food and agriculture outlook under current market and policy conditions.

Within two weeks after the Kansas City meeting, the review comments are incorporated into each individual model. The FAPRI personnel then gather for a week at the University of Missouri in Columbia to establish the final baseline. In early March the final results are presented to the U.S. Congress, U.S. Department of Agriculture, Congressional Budget Office, and commodity organizations. Immediately following these briefings, the results are disseminated on the World Wide Web and published in two Outlook reports.. FAPRIcommunicates the analysis to the public via presentations, the *Iowa Ag Review*, and press releases during the spring and summer (see *FAPRI 1997 Agricultural Projections* in this issue).

Scenario Analyses and Model Enhancement

After the baseline is officially released in March, many requests are directed to FAPRI from users of the information.

These requests are specific: for example questions relating to how a change impacts agricultural markets, trade, prices, farm income, and government costs. Some of the changes may be new agricultural policy proposals, different weather conditions, different macroeconomic assumptions, trade proposals, biological factors, and many others (see *The Impact of EEP Removal on U.S. Wheat* in this issue). The baseline makes it possible to quantitatively evaluate the impacts of changes.

When the faculty and staff aren't analyzing outlook scenarios, they are engaged in model development. On a regular basis, new econometric models are constructed, old models are updated, and the realm covered by the FAPRI system is expanded. The newly developed models are reviewed in late August by all the members of the FAPRI team and incorporated into the FAPRI system for the next cycle of analysis. In October, the process starts all over again.

FAPRI and Affiliates

FAPRI is joined in special research by an affiliation of universities including Arizona State University, Kansas State University, North Dakota State University, Texas A&M University, and the University of Arkansas. This collaboration encompasses numerous research areas as shown in the schematic.

In addition to university cooperation, FAPRI at Iowa State also collaborates with international organizations, such as the United Nations, the Organization for Economic Development and Cooperation (OECD), the World Bank, and many others.

FAPRI comprises over 30 analysts and support staff at Iowa State University and the University of Missouri-Columbia. The FAPRI outlook process contributes to the monitoring of the health of the U.S. and world agriculture and food sectors and is flexible to meet the continually changing conditions faced by agriculture. FAPRI continues to be challenged by new domestic and trade policy questions as agricultural markets continue to evolve. FAPRI meets this challenge by using the best qualitative and quantitative analyses to provide policymakers and other interested parties with the most objective information possible. ◆

Grains and Oilseed Cropland: A Global Perspective

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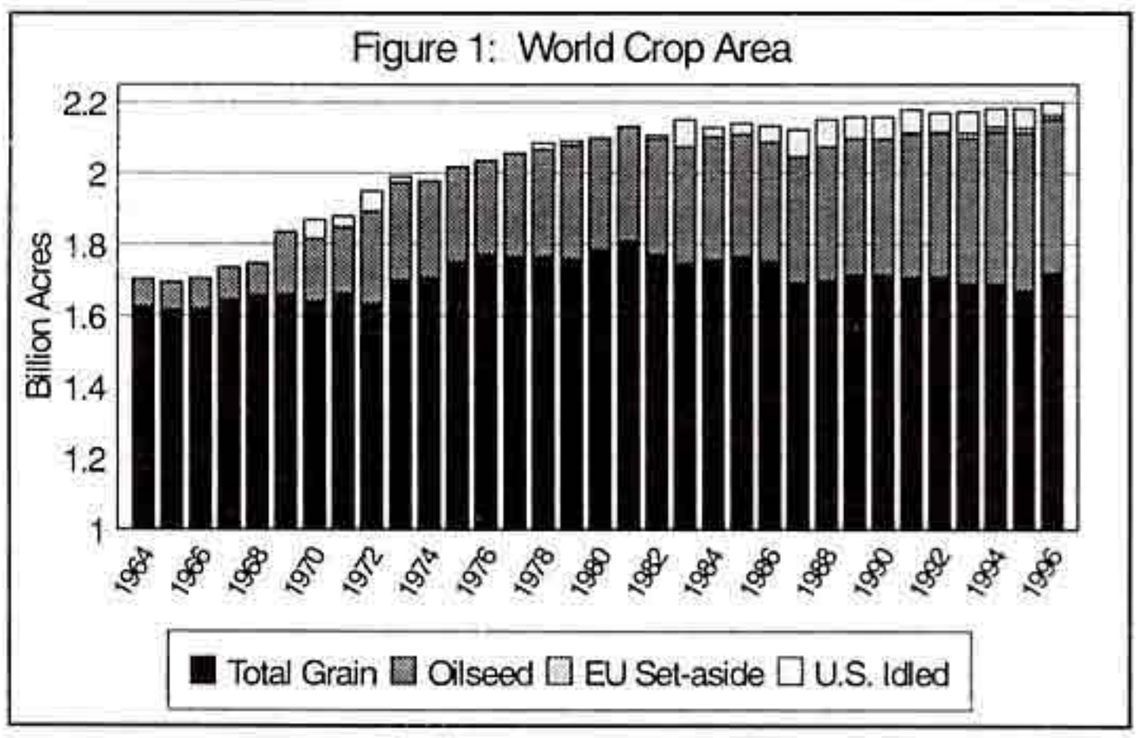
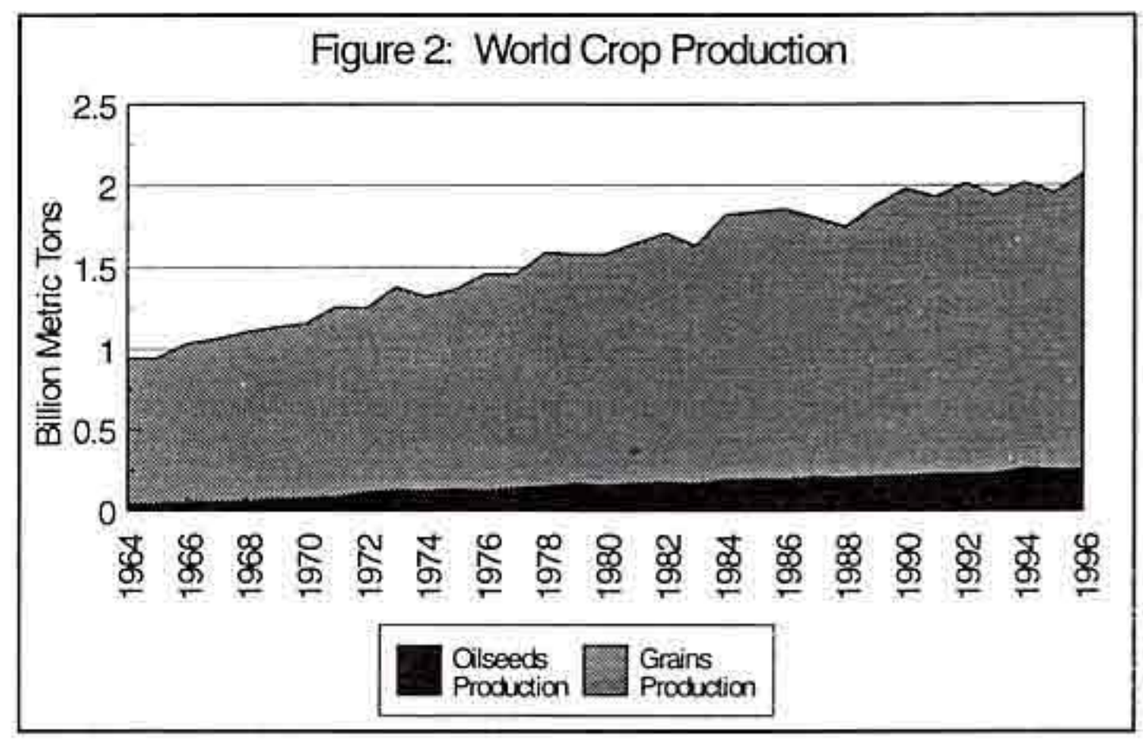
Current tight grain markets have led some commentators to argue that the world is entering a phase of rising food scarcity. The present situation is related to the rise in world consumption, which has tended to outpace production during the 1990s. While most supply shortages were due to weather shocks, the global area planted to grains has decreased from 1,784 million acres in 1980 to 1,718 million acres in 1996 (USDA). The question remains, "Are there enough land resources available globally to meet future production needs?" The combined grains and oilseeds area has, however, increased over that same period.

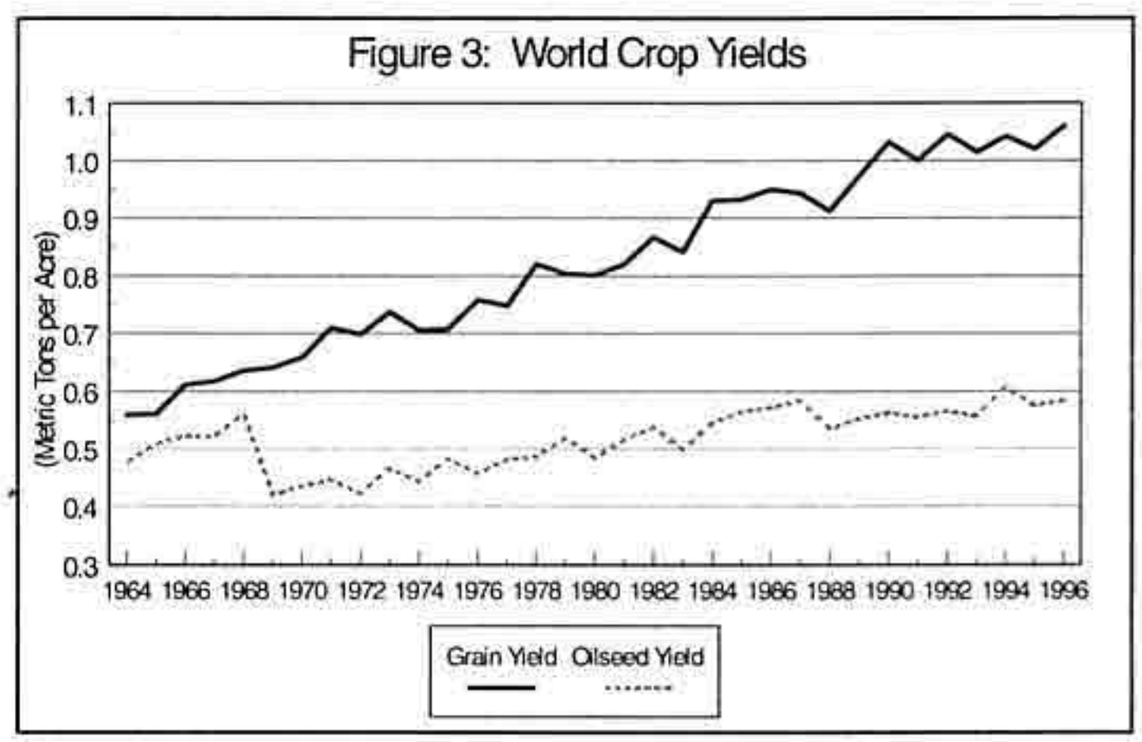
International

The decline in global grains area over the past 15 years can be primarily explained by two factors: a substitution of land resources to oilseed production, and government programs that idle land. Figure 1 illustrates that since 1980, additions to total arable area have diminished from an annual growth rate of 1.2 percent in the period between 1970 and 1980 to an annual growth rate of 0.3 percent between 1980 and 1990. With total land area effectively constant, expanding oilseeds area has come at the expense of grains area.



One explanation of the increase in oilseeds area is that producers have shifted area planted to these crops to avoid the uncertainties associated with the ongoing subsidy war that has affected international grain markets (primarily wheat) but has only had a minor impact on oilseeds trade. Other explanations of the shift to oilseeds area include rotational considerations and, perhaps most importantly, continued strong growth in demand for oil and protein meal products combined with low oilseed yield growth. Whatever the cause of the shift in cropping patterns from grains to oilseeds, the production of grains has not declined as a result of the reallocation of the land resource. Figure 2 illustrates the continued growth in grains production. The reason for continued growth in production is yield growth. Figure 3 demonstrates that grains yields have been growing more rapidly than oilseeds yields. Between 1980 and 1996, yields for grain grew at an annual rate of 1.6 percent and oilseeds yields grew by less than 1 percent.





Government land diversion programs, although important locally, have had only a minor effect on global arable area. In 1991, government-sponsored idled land accounted for about 3 percent of total global grains and oilseeds area. By 1996, idled land accounted for only 1.6 percent of the total area. In the United States, the FAIR act has removed all land set-aside, with the exception of CRP and Wetlands Conservation. The European Union has reduced its set-aside from 15 percent of base area to 5 percent in 1997.

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Although world grains area has declined over the past 16 years, most of this land could be induced back into grains production—but at the cost of higher prices relative to oilseeds markets. Even if all the land in government set-aside programs is returned to production, the total effect on grains area will be minimal.

Any assessment of future grains markets requires an examination of China. Some commentators have expressed concern that China may not be able to feed its population because of a loss of agricultural land and growing demand.

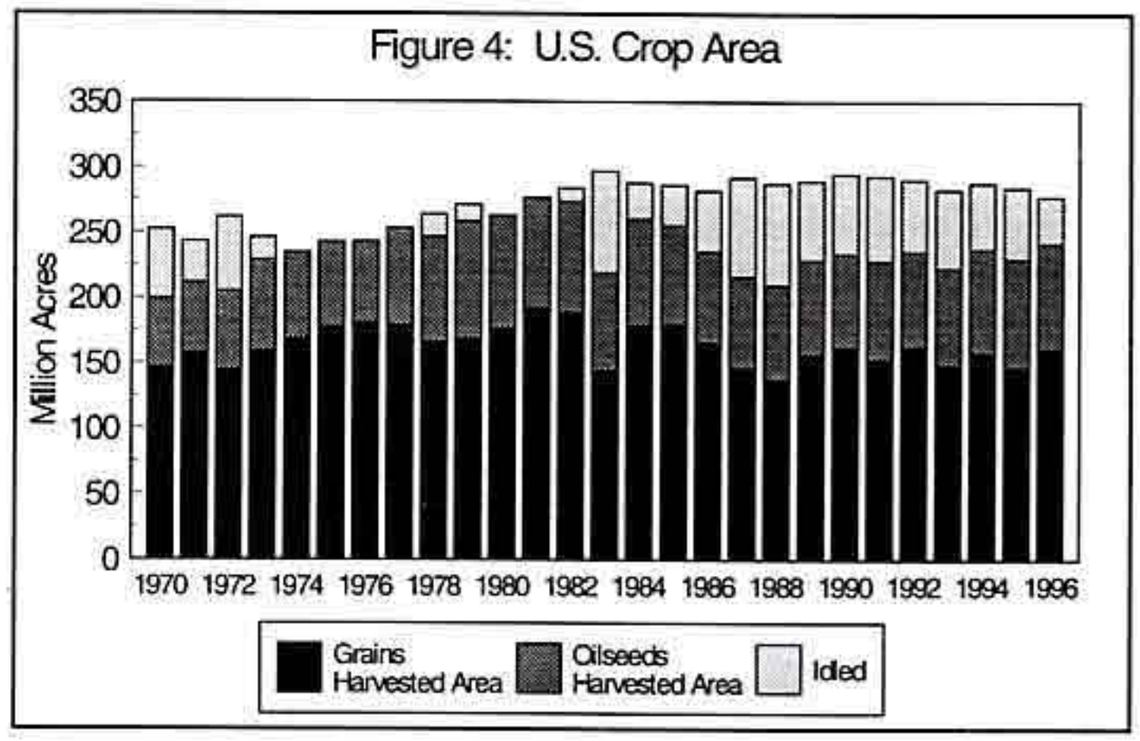
Total cropland in China is generally thought to be underestimated. Most of the unreported land is reclaimed land that has not been included in official statistics because farmers and local governments find it in their interest not to report this land. While the Chinese State Statistical Bureau (SSB) reports 237 million acres of land in crop production, the Land Administration census suggests that this figure should be 306 million acres. Taking reclaimed land into consideration, the net loss is only 11 million acres. The effects of decreased area are further offset by increased multiple cropping during a year. After accounting for increased multiple cropping, the net loss in area is only 3 million acres. Furthermore, only a fraction of this land is lost to non-farming purposes. Most of the land has been diverted to inland fishery production, reforestation, and crops such as vegetables and tree fruits.

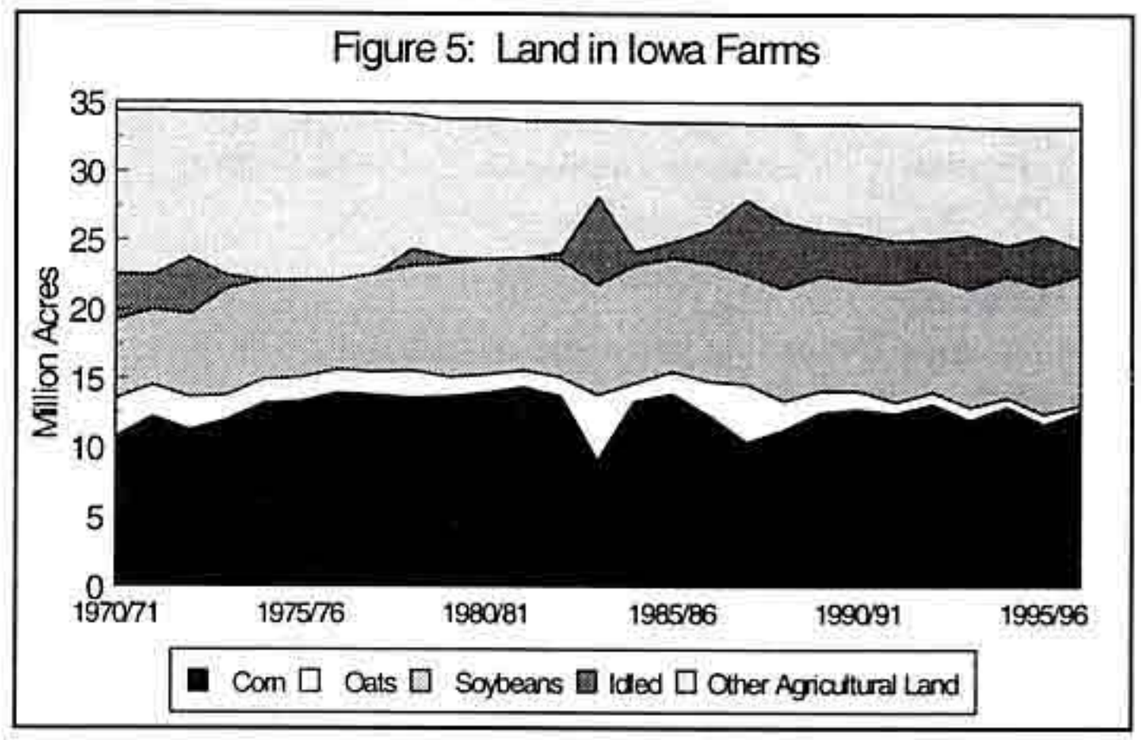
Other developing countries and economies in transition also have reserves of land that could be brought into crop production. In its document, "Agriculture: Towards 2010," the Food and Agriculture Organization of the United Nations estimates that potential land exceeds land in use by 4.5 billion acres in developing countries and in 1996, Russia and Ukraine, alone, planted area was 16 percent (29 million acres) less than in 1987.

U.S. and Iowa

Agricultural land use in the United States has changed under the past farm bill programs. Under the new farm bill, only the long-term land retirement programs remain (Conservation Reserve and Wetlands Reserve); the yearly set-asides are gone. Historically, the United States reached peak harvested grain and oilseeds area in 1981 at 277 million acres (Figure 4). Harvested area combined with idled area peaked in 1983 at 297 million acres (partly due to high slippage in the payment-in-land program), and in 1996 it was 277 million acres. Harvested area has risen to 242 million acres, the highest level since the late 1980s.

In Iowa, planted area has continued to increase and is at its highest level (22.6 million acres) since 1984/86, when over





23 million acres were planted (Figure 5). Corn area in Iowa has remained relatively constant, changing mainly with USDA yearly program set-asides. Oat area has continued modest declines while a strong trend has developed in soybean area.

In 1970 soybean area was 5.7 million acres (30 percent of total planted area), 7 million acres in 1973, and grew to 8 million acres in 1979. In 1995/96 soybean area broke the 9 million acre mark, and, in 1996, 9.5 million acres were planted (42 percent of total planted area). This shift from grains to oilseeds follows the global pattern discussed earlier in this article.

Conclusions

The major cause of a decline in world grains area has been a shift to oilseeds. Yield growth has been sufficient to compensate for the loss of grains area harvested. Although, with current low stockholding levels, periodic shortages can be expected; the potential for chronic future food shortages is

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ameliorated by a significant reserve of potential arable land and yield growth potential. While some land—in the United States and the world at large—has been lost to government set-aside and to urbanization, the loss of this land is minor in comparison to total area. The loss of land does have consequences for the distribution of land qualities. If better quality land may be lost to long-run retirement and urban development, more environmentally sensitive and poorer quality land may have to be brought into production. ◆

EMERGING ISSUES

Transportation Changes Increase Risks for Country Elevators

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Introduction

Farmers face increasing price and output risk. The increased price risk stems from the reduction in and eventual elimination of flexible government payments, increased volatility in grain purchases by importing countries and virtual worldwide elimination of grain reserves. Increased output risk comes from changing weather patterns and elimination of government constraints on acres planted in certain crops.

Country elevators face these same forces which increase their price and transportation risks. Country elevators are able to reduce their exposure to price risks by hedging their grain purchases on the Chicago Board of Trade. Hedging eliminates the risk from the volatility of world grain markets, but subjects the hedger to the less volatile "basis" risks. However, country elevators have no similar mechanism to protect themselves from the transportation risks arising from volatile changes in export sales and in grain production levels.

Rail-Car Shortages

Railroad grain-car shortages have plagued the grain industry for over 100 years. Since the early 1970s, the basic cause of grain-car shortages has been dramatic increases in grain export demand over short delivery periods. The most recent grain-car shortage problems were in late 1995 and early 1996. U.S. farmers harvested a huge 10.1 billion bushel corn crop in the fall of 1994. Grain exports were up 33 percent in 1995 over 1994; rail shipments to export ports were up 73 percent and barge shipments were up 25 percent. Despite these major increases in both rail and barge shipments to export ports, grain shippers wanted to ship even larger quantities during the last half of 1995 and the first half of 1996.

A huge increase in the demand for grain transport results in dramatic increases in barge rates. For example, in the fall of 1995, barge rates from McGregor, Iowa, increased almost 33 cents per bushel–more than double their rates prior to the increase in exports. While railroad rates also increased, the total cost of shipping by barge to New Orleans exceeded the cost of shipping by rail. These huge increases in barge rates and as well as barge shortages sent grain shippers rushing to the telephone to order large numbers of rail cars, and grain-car shortages followed. The Upper Mississippi River was frozen during the winter and railroads were expected to carry both the railroad and barge shares of grain exports.

Railroad efforts to increase rail car efficiency have created changes in the manner in which railroads operate. Railroads have initiated shuttle trains, car pools, reduced loading and unloading times, and 100-car train rates. These larger trains are committed and distributed to shippers who made prior commitments to the railroad. The result is that fewer rail cars are available to shippers who have not made prior commitments.

Almost all the new cars purchased since 1988 have been heavier and larger than the standard 263,000 pound gross weight cars. Approximately 25 percent of the entire grain-car fleet has 286,000 pound gross weight limits. These heavier cars cannot be used on most branch lines unless the lines are upgraded, or the cars are light-loaded to 263,000 gross weight. With the current emphasis on rail-car efficiency, these cars are not likely to be light-loaded and, therefore, are likely to be used only for mainline service. Assuming all future orders are for heavy cars, the share of cars available to branch line elevators will continue to decline.

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Grain-car supply is also affected by the trend toward market based methods of allocating railroad cars and providing guaranteed car supplies to shippers. This trend includes the BN, CP and the UP guaranteed car supply programs and other forms of guaranteed car supply. These market-based methods of allocating car supplies require grain shippers to do advanced planning and make advance commitments.

Another major force affecting the railroad grain-car supply is the manner in which elevators and farmers sell grain. For years, elevators have sold grain when the "basis" narrows or improves. Increasingly, farmers are hedging their grain and selling when the basis improves. Basis is defined as the nearby commodity futures price minus the local price the elevator (farmer) could receive for the grain. Normally, the local price is lower than the nearby futures price by the cost of transporting the grain to Chicago and the interest cost of holding the grain to the nearby contract expiring data.

Since a hedge consists of taking opposite positions in the cash and futures markets, the elevator (farmer) profits when the basis strengthens; i.e., the cash price increases relative to the futures price. When the basis increases to the level that sellers believe is very strong, many farmers and shippers sell large amounts of grain, which, in turn, tends to create excess demand for cars and grain car shortages. If the cash price rises above the futures price—i.e., the market is inverted—it is more profitable to sell almost all of the grain now rather than holding it for sale at a later date. However, elevators that sell large amounts of grain in strong or inverted basis markets without having a guaranteed supply of rail cars face a huge risk. They may fail to obtain the necessary cars and therefore fail to deliver by the contractual delivery date. This usually results in penalties for failure to fulfill the terms of the contract. Moreover, if the grain is stored outside, the elevator faces the risk that the grain will deteriorate as the late winter and spring temperatures rise. This situation occurred in the winter of 1996. Many elevators lost large amounts of money because the amount of grain sold exceeded the capacity of the grain transportation system to move it in the contracted time periods.

Increased Farmer Transportation Capacity

A recent survey of 3,500 farmers determined how and where farmers haul their grain from farms. Table 1 shows that semis (large capacity, 18 wheel trucks) haul more corn from farms than any other type of vehicle. Semis and tractor-wagons haul almost the same percent of soybeans from farms. The numbers in parentheses show the average miles each vehicle hauled corn and soybeans to market. Semis haul an average of about 37 miles per trip compared to 4.9 miles for tractor-wagons.

Table 1. Percent of corn and soybeans (and miles) hauled from farms by vehicle type, 1994/95 crop year

	Percent (miles)			
Type of Vehicle	Corn		Soybeans	
Tractor-wagons	32.0	(4.9)	34.5	(4.9)
Single axle truck	11.0	(8.1)	12.2	(10.2)
Tandem axle truck	19.8	(10.7)	19.1	(12.4)
Semis	37.2	(37.2)	34.2	(36.6)

Table 2 shows where farmers haul their corn and soybeans. Twenty-five years ago, almost 100 percent of the corn and soybeans were delivered to country elevators. Now, only 70 percent of the corn and 75 percent of their soybeans are delivered to country elevators. About 30 percent of the corn and 25 percent of the soybeans bypass country elevators on their way to other markets. On average, farmers haul their grain 7.5 miles to country elevators and 30-70 miles to other markets. The large increase in the number of farmer-owned semis makes these longer distance deliveries possible.

Table 2. Percent of corn and soybeans (and miles) delivered to destinations, 1994/95 crop year

	Percent (miles)			
Destination	Corn		Soybeans	
Country elevators	69.8	(7.5)	74.5	(7.5)
Processors	10.3	(49.7)	7.6	(31.7)
Mississippi River	10.6	(44.7)	8.6	(52.1)
Missouri River	4.6	(49.9)	4.1	(72.9)
Other	4.7	(9.4)	5.2	(39.5)
TOTAL	100.0	(17.7)	100.0	(15.9)

Table 3 shows that the number of farmer-owned semis is expected to double by the year 2000. The number of wagons and single-axle trucks are expected to decline sharply. Thus, country elevators face the risk that farmers who own semis will increasingly bypass local elevators and haul their grain to more distant markets.

Table 3. Expected change in the number farmer-owned grain hauling vehicles, 1995-2000.

Vehicle Type	1995-2000
	(Percent change)
Wagons	-18
Single axle trucks	-31
Tandem axle trucks	5
Semis	103

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Elevator Costs

An analysis of 10 Iowa elevators indicates the following:

- Absent major expansion programs, few, if any grain handling costs vary directly with bushels received. For the 10 elevators in the analysis, bushels received increased 67 percent between the 1993/94 and 1994/95 crop years. Yet, labor costs increased only 8.6 percent; this 8.6 percent is approximately equal to increased wage rates and fringe benefits.

- Therefore, the 67 percent increase in receipts was essentially handled by the same labor force. Total variable costs increased only 8.7 percent. About the only increase in variable inputs was a slight increase in electricity use

"Country elevators face the risk that farmers who own semis will increasingly bypass local elevators and haul their grain to more distant markets."

- Given the fixed nature of elevator costs, per bushel handling costs vary inversely with the number of bushels handled. With the 67 percent increase in bushels handled from 1993/94 to 1994/95, average total handling costs declined 33 percent from 15 cents in 1993/94 to 10 cents in 1994/95

- There are major differences in the cost per bushel among the 10 elevators. In 1993/94, the lowest-cost elevator had total grain handling costs of 12 cents per bushel while the highest-cost elevator had a total cost of 21 cents. In 1994/95, total costs per bushel ranged from 8 cents to 13 cents. In general, the elevators with the lowest cost had the largest storage capacity, the largest number of bushels handled, and were located on a rail line. The elevators with the highest costs were older elevators with relatively small storage capacity, low bushel receipts, and were not served by a rail line.

- Firms with multiple elevator locations can reduce per bushel handling costs by closing high-cost elevators and diverting the bushels from the closed elevators to their nearby lower-cost elevators. This diversion will lower the handling cost of the remaining elevators by increasing their bushels handled. An alternative to closing is to keep high-cost elevators open only during harvest or keep them open during harvest and then only one or two days per week during the remainder of the year. In this latter case, one crew of workers can be used to operate two or three elevators.

Conclusions

Volatility in grain production and exports increases the basis and quantity risks faced by country elevators. The inability of railroads to profitably supply cars to handle peak shipping periods increases the risk that elevators without a guaranteed car supply will default on sales contracts that call for delivery during peak periods. This suggests that grain elevators need to develop the ability to forecast peak shipping periods, obtain a guaranteed car supply for those peak periods, and consider grain sales strategies that do not rely exclusively on the "basis" to determine when to sell grain and to order grain cars. Finally, major incentives for grain firms, including farmer-owned cooperatives, to dramatically change the structure of the grain elevator industry include the increasing amount of grain hauled from farms in semis and the major impact of increased bushel receipts on elevator grain handling costs.

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Implications for U.S. Pork Trade Following Taiwan's Export Ban

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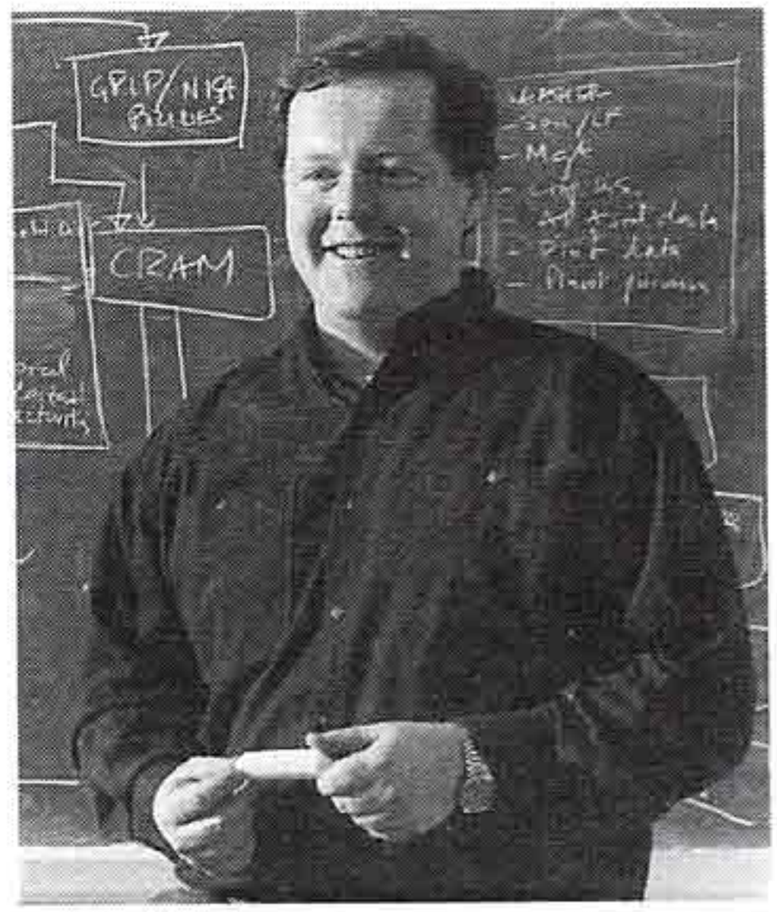
Taiwan announced on Friday, March 21, 1997, an indefinite ban on pork exports after an outbreak of foot and mouth disease. It is neither clear at this time how long the ban will last nor the full impacts of this event. Although a terrible blow to Taiwanese producers, Iowa's primary agriculture will likely encounter increased demand, as the U.S. pork industry is well positioned to increase world market share. Iowa State University's FAPRI staff is engaged in analysis of this event.

Japan, which accounts for more than 90 percent of Taiwan's pork export market, followed suit with a ban imposed on pork imports from Taiwan. Taiwan's projected share in the world pork trade this year is in the neighborhood of 16 percent, representing 367 thousand of the 1.86 million metric tons net pork trade. The key suppliers to Japan's pork import demand (mostly frozen boneless cuts) are Taiwan, with a market share of 46 percent, followed by the United States and Denmark, with almost equal shares of 20 percent each, Canada with 5 percent; and other countries at 7 percent. Who among these main pork suppliers have capability to fill the vacuum created in the Japanese pork import market? It depends primarily on who has excess production capacity and comparative advantage in shipping. On both counts, U.S. pork producers are well positioned to capture a large share of this market opportunity.

Also, Taiwan's pork production is more like an assembly point, since most of the main feed ingredients are imported. In the case of feed crops, most are from the United States. In 1996, Taiwan imported 96 percent of its total corn supply of 6.25 million metric tons, 99 percent of its total soybean supply of 2.58 million metric tons, and 97 percent of 0.40 million metric tons of fishmeal. Although export demand for feed crops will be initially affected by Taiwan's contracting pork industry, potential expansion of domestic use in the United States offers a shift from feed crop exports to exports of pork products that have higher added value and are less expensive to transport.

FAPRI is currently analyzing the full implications of this development in the world market in general, and the United States in particular; but results are not yet finalized for this publication. Watch for a complete CARD briefing paper on this issue on the CARD Web site, at www.ag.iastate.edu/card/fapri/. ◆



Dermot J. Hayes, is the head of CARD's Trade and Agricultural Policy Division and oversees the FAPRI work. He is a native of Ireland who moved to the United States in 1981 and came to Iowa State University if 1986. Hayes is a professor in ISU's economics department.

The decision to accept a position with CARD in 1986 was made carefully by Hayes "I wanted my research to have a greater impact and more relevance for worldwide agricultural decision makers. CARD has the reputation of providing extremely important data and analysis. By being here, I know my research has a significance I can be proud of," Hayes explained.

While the projects Hayes is involved with are relevant to Iowa agriculture, he particularly concentrates on export issues. He stated, "Meat exports have gone up by an average of 20 to 30 percent per year, since I have been here. This is a structural change. We need to understand why it is happening, where it is going, and what it means to Iowa producers. That is one focus of my research here at CARD and FAPRI."

Tracking annual projections for international export markets is an activity that Hayes oversees. In the summer of 1996, he traveled to China twice to investigate the import markets for grains and meats, testing that country's level of acceptance for trade. "We simply asked whether the Chinese would be interested in buying U.S. meat, and they asked us how much we could send. They are so ready for trade that we only needed to ask the right questions to set up the exchange. The future of trade from Iowa to China is extremely important," Hayes said.

Hayes has worked closely with colleagues Darnell Smith and William Meyers to produce analyses on the impacts of the 1996 farm bill. "I admire the work that Darnell and Willi have done for Iowa's agricultural industry and U.S. agricultural policies. I hope to continue to uphold the same level of quality and credibility in the CARD-FAPRI policy research," Hayes said.

"The research I enjoy doing most," Hayes explained, "is model development." He plans to continue to focus on the research that serves agricultural audiences well. Hayes is optimistic about the future of Iowa agriculture, partly because of the developing trends he sees in world trade markets.

Hayes has seen the positive results from CARD's communication with Iowa farmers, the State of Iowa, and U.S. policy makers. He describes the attitude of CARD's staff, "We are working to improve the flow of information to decision makers in Iowa and the nation, so those decision makers can be prepared to establish the best policies and practices for our success in future agricultural activities. We are proud of the research and outreach we pursue here."

Iowa Ag Review is published by the Food and Agricultural Policy Research Institute (**FAPRI**) at Iowa State University, a program of the Center for Agricultural and Rural Development (**CARD**). FAPRI is organized cooperatively by CARD at Iowa State University and the Center for National Food and Agricultural Policy at the University of Missouri-Columbia. It provides economic analysis for policymakers and others interested in the agricultural economy. Analysis that has been conducted jointly with the University of Missouri is identified here as FAPRI analysis. This publication presents summarized results that emphasize the Iowa implications of ongoing agricultural policy analysis, analysis of the near-term agricultural situation, and discussion of new agricultural policies currently under consideration.

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