

**Economic Impact of the  
Ethanol Industry in Minnesota:**

**PRESENT SITUATIONS AND FUTURE OPPORTUNITIES**

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# **Economic Impact of the Ethanol Industry in Minnesota**

## **Executive Summary**

This document, expanded and revised many times since January 1994, began with the purpose of projecting the impact of increased ethanol production on the State of Minnesota. The study was based on a mid – 1990’s scenario that assumed the annual production and use of 200 million gallons of ethanol made from Minnesota-grown crops. The 200 million gallons per year would provide enough ethanol to replace 10% of the 2.0 billion gallons of gasoline used in the state (today, the state uses over 2.4 billion gallons of gasoline). Minnesota Has had lower corn prices and higher gasoline prices than other leading corn growing states, such as Iowa and Illinois. (pp. 24 and 25). Compared to one-third of corn crop exports on a national level, Minnesota exported two-thirds of its corn as an unprocessed, raw commodity.

### **LEGISLATION**

Depressed agricultural prices and long gas lines in Minnesota prompted legislation in 1980 that defined "agricultural alcohol" and created a 4¢ per gallon gas tax credit as incentive for retailers to blend ethanol in gasoline. After achieving a significant ethanol market by 1985, the blenders’ tax credit was reduced to 2¢ per gallon. In 1986 20¢ per gallon producer payment was created to provide the incentive for developers to build ethanol plants in the state. In June of 1988, the first New Generation Coop (NGC) ethanol plant was built. This plant accounted for most of the state's production. Unfortunately, ethanol blending decreased due to the reduction in the tax credit and ethanol was unfairly blamed for a variety of problems. In addition, no new plants were being developed.

In 1987, the Minnesota Department of Agriculture initiated a program to provide public education and to promote the growth of the ethanol industry. The Federal Clean Air Act Amendments of 1990 required carbon monoxide non-attainment areas to use an average of 2.7% oxygen in gasoline for the winter months. The Twin Cities Area, including Minneapolis and St. Paul, was out of compliance with EPA carbon monoxide standards and therefore was required to use oxy-fuel starting as of the winter of 1992. In 1991 the state legislation required a year-round 2.7% minimum oxygen content for gasoline sold in the Twin Cities by 1995, and statewide requirement by 1997.

This legislation set the stage for opponents to launch a series of attempts to repeal the oxy-fuel law. In the mean time, annual ethanol use exceeded 50 million gallons in 1992 and then grew to 100 million gallons in 1993. The state's 2.7% oxygen content requirement for gasoline prevailed and ethanol was the only oxygenate used. Today, ethanol replaces almost 10% (240,000,000 gallons) of the gasoline sold in Minnesota. In 1995 two more New Generation Coop (NGC) ethanol plants began production and since that time ten additional plants were built or expanded for a statewide total of 240 million gallons of ethanol production capacity. Twelve of Minnesota's fourteen ethanol plants are designed to be like NGCs, owned by over 8,000 farmers.

### **BENEFITS**

Ethanol as a gasoline additive produced in the state provides the following benefits for Minnesota, its citizens, the economy and our quality of life:

- It is made from corn and other biomass products which reduce CO<sup>2</sup> emissions and global warming.
- It is produced domestically, reducing our state’s and nation's oil imports.
- It contributed to fuel self-sufficiency and improved the Minnesota’s balance of payments.
- Rich in oxygen, it helped the Twin Cities to become “in attainment” for carbon monoxide in 1999.

- It added value to Minnesota crops, helping rural economies and enhancing farmers' financial independence as federal farm programs were phased out.
- It provided 8,000 farmers with ownership and control of the processing and marketing of 13% of the state's corn crop in 1999.

## **State Economic Parameters**

To gauge the major benefits of 100% market penetration by ethanol blends, this study estimated the economic impact according to the categories below (figures vary between wet mills and dry mills):

Balance of Trade (Dollars saved on imported oil)	\$100 million/year (see Page 7)
Value Added (Value of ethanol & by-products less value of corn)	\$118-145 million/year (see Page 8)
Jobs Created (including construction & service jobs)	4,746-5,138 (see Page 10)
Capital Investment (Plants, equipment, design, etc.)	\$300-400 million (see Page 12)
Total Economic Impact	\$403-437 million (see Page 12)

## **Ethanol in Minnesota**

Ethanol consumption in the state has increased twelve-fold since 1988, to an estimated 240 million gallons per year in 2000 replacing nearly 10% of the 2.5 billion gallons of gasoline we use. About 97 % of the states gasoline is now blended with ethanol. In-state ethanol production capacity in the year 2000 has exceeded 240 million gallons per year. Some of the fourteen existing plants are considering further expansion. There are about 80 million bushels utilized in 12 dry mill corn-ethanol plants. About 55 million additional bushels are used in the state's single wet mill. While most of the wet mill product is starch and sweeteners about 11 million bushels are converted to ethanol.

An expanded ethanol industry has helped add value to our most abundant crop, created jobs, stimulated the rural economy, enhanced manufacturing infrastructure and expanded the tax base. State support for both the production and use of fuel ethanol provided confidence to bankers and investors who built the ethanol plants. Consumers were educated on the benefits of using ethanol in their gasoline. The state's Oxy-Fuel Hot Line, established in 1992, allowed consumers to talk to Department of Agriculture staff about problems they assumed, or had been told, were caused by ethanol blends. Staff worked with consumers and their mechanics to determine the real cause of the problems experienced. As time went on, opposition to the use of ethanol faded and the blend market steadily improved.

## **Analysis**

According to this study the increased utilization of corn, Minnesota's largest crop, in the production of ethanol and other related products will provide the state with a net monetary gain of at least \$259-\$295 million a year (difference between dry mills and wet mills). Properly developed, the ethanol industry could stimulate hundreds of millions more in economic activities via capital investment in ethanol plant construction and equipment, new payrolls within and in support of an expanded fuel industry, and an improved state balance of payments due to reduced dependence on imported petroleum products.

Ethanol is ethyl alcohol (C<sub>2</sub> H<sub>5</sub> OH), a fuel made primarily from corn and other grains. It offers a number of environmental and economic benefits, especially for Minnesota farmers. Fuel ethanol:

- Can be made from potatoes, cheese whey, sugar beets, forest products; or other renewable resources including residue and waste from crops and products.
- Is produced domestically, making it independent of imports.
- Enhances our fuel self-sufficiency and our balance of payments.
- Is rich in oxygen, helpful in reducing CO and other toxic emissions from automobiles.
- Is a new market for corn and other crops that will enhance overall farm income.

Titled the "Economic Impact of the Ethanol Industry in Minnesota: Present Situations and Future Opportunities", the study postulated that the above benefits would arise from a best-case scenario in which all of the ethanol is produced from Minnesota crops and used as an additive to gasoline at a 10% blend ratio. This scenario has actually been realized.

The study postulated that the state would annually save \$100 million on imported oil, but given the crude oil and gasoline price spikes of late 1999 and early 2000, these estimates are probably understated. Another \$118-\$145 million (difference between dry mills and wet mills) would come in the form of value added to the unprocessed corn -- some 80 million bushels per year -- by producing ethanol and its co-products: gluten feed and meal, distillers dried grains (DDG), corn oil, etc. Again in mid 2000 these estimates seem understated as the cash value of rural Minnesota corn plummeted to \$1.25 per bushel in many locations and the rack price of ethanol exceeded \$1.40 per gallon.

Equally impressive were the following benefits a 200 million gallon ethanol industry would contribute to Minnesota and its citizens:

- A \$300-\$400 million net capitol investment in plant construction and equipment.
- 4,746 to 5,138 new jobs, which include all production, construction, and support/service jobs.
- The total annual payroll of \$115 to \$124 million including construction and support/service jobs.
- The state will benefit from the total multiplier effect of \$403 to \$437 million for all economic sectors including agriculture, manufacturing, transportation, wholesale and retail trade, services, utilities, as well as finance, insurance, and real estate.

The importance of the study in dramatizing the state (and the nation's) dependence on imported petroleum, is underscored by the chart (on Page 20) tracking weekly prices of ethanol, gasoline, corn and MTBE (a gasoline oxygenate derived from petroleum and methanol) in the days bracketing the war in the Persian Gulf.

During the Persian Gulf war, the price of unleaded regular gasoline in the Twin Cities area shot up some 66%. Petroleum additives ethanol and MTBE also showed dramatic price increases providing a market hedge for farmers invested in ethanol facilities.

The price of ethanol has historically followed the price of gasoline, up and down, so it was no surprise that the same results held true in this case. If the price of ethanol did not increase with gasoline, marketers of gasoline would have switched to ethanol blends and caused shortages of the limited supplies of ethanol. It is questionable whether they would then have passed on this lower product cost to the consumer.

Minnesota agriculture was doubly vulnerable to the market dislocation triggered by the Gulf War as the farm segment was held hostage to higher petroleum prices without the countervailing economic force

that higher ethanol-from-corn prices might have provided. The blunt truth is that Minnesota is crop rich and energy poor.

"If ethanol production is not dramatically increased in Minnesota," says the MDA report, "we will face the inefficient reality of exporting two-thirds of our corn as a raw commodity, while importing ethanol from Iowa and Illinois."

"The irony of this is that Minnesota has lower corn prices than either of those two states. We have the opportunity to add value to our most abundant crop, create jobs, stimulate rural economic development and expand the tax base by encouraging the agricultural processing industry."

Several graphs in the study document these contentions: one (Page 33) shows that Illinois, with 1996 corn production of 1.468 billion bushels, processed 16% (or 234 million bushels) of its corn crop; and Iowa, a 1.711 billion bushel producer, converted 9% of that harvest (150 million bushels) at home; while Minnesota processed only a scant 3% (27 million bushels) of its 869 million bushels corn crop to produce ethanol.

In 1996, Minnesota was responsible for only 4% of national ethanol production, while Iowa fully 25% and Illinois a whopping 38% (Page 24).

Finally, in calculating wet mill output, this study only included the ethanol portion of wet mill production. In reality, ethanol generally represents only one-third of the bushels of corn processed and income generated by wet mills. These wet mills also produce syrup, starch and sweeteners, generating much more economic benefit than ethanol alone. In 1993, 84% of the 38 million gallons, or 32 million gallons of ethanol production capacity in Minnesota, were from the wet mill process." In 2000, nearly 60 million bushels of Minnesota corn will undergo wet milling but nearly 80 million bushels will be processed in dry mills representing 215 of our 245 million gallons of ethanol production capacity.

## **Related Information From Other Sources**

In 1997 Minnesota's Office of the Legislative Auditor published an ethanol program audit, based on 180 million gallons of state ethanol production capacity. Their study concluded that, after subtracting the cost of the state ethanol producer payments the program "will generate an estimated \$341 to \$549 million in annual statewide economic benefits."

In June of 2000, an industry survey of the thirteen, corn to ethanol plants in Minnesota was conducted by the Minnesota Coalition for Ethanol. (One of the state's plants makes ethanol from cheese whey and was not included in the survey) Results from that 13 plant survey include one large wet mill; therefore, figures can not be attributed solely to ethanol production.

The data from that study is listed below:

### **Economic Impact**

Total Project Cost	\$564 million
Annual Payroll	\$25 million
Average Annual Salary	\$33,330
Jobs in plant	750
Taxes Paid Annually	\$15 million
Annual Purchases	\$535 million
Coop/LLC Members	8,750

### **Products Manufactured**

Ethanol	244,000,000 gallons
Dried Distillers Grain	620,000 tons
Wet Distillers Grain	9,000 tons
Distillers Syrup (feed)	41,000 tons
Industrial Corn Starch	144,000,000 pounds
Wet mill feed by products	430,000,000 tons
Corn Syrup	1,500,000,000 pounds
High Fructose Corn Syrup	850,000,000 pounds

## **The Larger Context**

Minnesota's \$20-plus billion agribusiness sector can boast first, second or third place ranking in fourteen agricultural products that are produced nationwide. Minnesota's total farm cash receipts ranked 7th in the nation in 1999. Yet, into the first decade of the 21st century the state's farm economy is still experiencing a long period of low commodity prices. For many, the production of farm commodities has become a non-profit business. The only long-term salvation for farm commodity producers may be to participate in the profits realized from the processing and marketing of their crops.

Ethanol blends comprise over 97% of all gasoline sold in the state. In addition to the state oxygenated fuel requirement, the increase in ethanol market share was partially due to heightened demand triggered by positive state and federal legislation and the vigorous educational efforts of state agricultural interests and the Minnesota Department of Agriculture. For 2000, ethanol consumption in Minnesota was projected to be about 240 million gallons.

Conversion of cellulose to ethanol has been an illusive goal for federal, state and private sector researchers alike. But the commercialization of that technology seems to be closer than ever before. Development of this technology will allow the production of ethanol from many waste materials and energy crops. Waste or byproduct options include; municipal solid waste, food processing waste and the cellulose portions of byproducts from timber and corn processing facilities. Eventually ethanol may be made from energy crops such as grass, legumes and trees.

## IMPACT OF ETHANOL ON MINNESOTA'S ECONOMY

The following statistics are developed to measure the economic impacts of the ethanol industry on the state economy. The information illustrates three scenarios: ethanol consumed at previous and current levels, and ethanol with 100% market penetration. (**Assuming all ethanol consumed in Minnesota is produced in Minnesota**).

### *BALANCE OF TRADE*

	<u>25% Market Share</u>	<u>50% Market Share</u>	<u>100% Market Share</u>
<b><u>Fuel Without Ethanol</u></b>			
Gasoline consumed*	2,000 million gallons 1)	2,000 million gallons	2,000 million gallons
Total Gasoline spending 2) (imported product cost)	\$1,000 million	\$1,000 million	\$1,000 million
<b><u>Fuel With Ethanol (10% blend)</u></b>			
Gasoline consumed	1,950 million gallons	1,900 million gallons	1,800 million gallons
Ethanol consumed	50 million gallons	100 million gallons	200 million gallons
Total Gasoline spending	\$975 million	\$938 million	\$900 million
<b>Dollars Saved on Imported Oil, or Impact on Trade Balance</b>	<b>\$25 million</b>	<b>\$50 million</b>	<b>\$100 million</b>

\* *Approximate Minnesota consumption on an annual basis.*

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**Notes:**

- 1) *Source: Minnesota Department of Public Service.*
- 2) *Ditto.*

## IMPACT OF ETHANOL ON MINNESOTA'S ECONOMY (continued)

### ETHANOL INDUSTRY'S VALUE-ADDED

<u>Economic Benefits</u>	<u>25% Market Share</u>	<u>50% Market Share</u>	<u>100% Market Share</u>
Corn use	20 million bushels	40 million bushels	80 million bushels 1)
Ethanol production	50 million gallons	100 million gallons	200 million gallons
Value of ethanol production 2)	\$62 million	\$123 million	\$247 million
A. <u>Wet Milling</u>			
Value of by-products*	\$24 million	\$49 million	\$98 million
-- Gluten feed 3)	\$9 million	\$18 million	\$36 million
-- Gluten meal 4)	\$6 million	\$11 million	\$22 million
-- Corn oil 5)	\$9 million	\$18 million	\$35 million
-- CO2 6)	\$1 million	\$2 million	\$4 million
B. <u>Dry Milling</u>			
Value of by-products	\$18 million	\$36 million	\$71 million
-- DDG 7)	\$17 million	\$34 million	\$67 million
-- CO2	\$1 million	\$2 million	\$4 million

\* Excluding solubles and steep water which also have a market value.

#### Notes:

- 1) 80 million bushels are approximately 9% of Minnesota's average annual corn production (916 million bushels, 1994). For comparison, 80 million bushels of corn at \$2.50/bushel, if exported, would bring \$200 million to our farmers. When processed, it would bring more than \$400 million to the state, plus jobs and other economic benefits as summarized on Page 12.
- 2) At the March 1995 market price of \$1.23 per gallon for ethanol.
- 3) At the March 1995 market price of \$82 per ton for gluten feed.
- 4) At the March 1995 market price of \$216 per ton for gluten meal.
- 5) At the March 1995 market price of \$0.28 per pound for corn oil.
- 6) Since CO2 price varies from \$3 to \$40 per ton, a \$9 per ton quote is used for the purpose of analysis.
- 7) At the March 1995 market price of \$94 per ton for DDG.

## IMPACT OF ETHANOL ON MINNESOTA'S ECONOMY (continued)

### ALL INDUSTRIES' TOTAL VALUE-ADDED & OUTPUT\*

	<u>25% Market Share</u>	<u>50% Market Share</u>	<u>100% Market Share</u>
<b><u>Total Value Added</u></b> 1)			
(For corn milling industry and all other supporting economic sectors)			
A. Wet Milling	\$67 million	\$134 million	\$268 million
B. Dry Milling	\$62 million	\$124 million	\$248 million
<b><u>Total Industry Output</u></b> 2)			
(Including output of corn milling industry and all other supporting economic sectors)			
A. Wet Milling	\$163 million	\$326 million	\$653 million
B. Dry Milling	\$151 million	\$301 million	\$603 million

\* This analysis is performed using the IMPLAN (Impact Analysis for Planning) regional input/output estimation model developed by the University of Minnesota.

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#### Notes and Remarks:

1) Including ethanol industry and all supporting industries value-added output from direct, indirect, and induced economic impacts.

2) Including ethanol industry and all supporting industries total output value from direct, indirect, and induced economic impacts.

## IMPACT OF ETHANOL ON MINNESOTA'S ECONOMY (continued)

### *JOBS AND PAYROLL \**

<u>Jobs Created</u> <sup>1)</sup> (Including all production jobs and support/service jobs 2))	<u>25% Market Share</u>	<u>50% Market Share</u>	<u>100% Market Share</u>
A. Wet Milling	1,285	2,569	5,138
B. Dry Milling	1,187	2,373	4,746
 <b><u>Increased Payroll</u></b> (Including all production jobs and support/service jobs)			
A. Wet Milling	\$31 million	\$62 million	\$124 million
B. Dry Milling	\$29 million	\$57 million	\$115 million

\* This analysis is performed using the IMPLAN (Impact Analysis for Planning) regional input/output estimation model developed by the University of Minnesota.

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#### Notes and Remarks:

- 1) Calculation is based on the total impact on the job market for all economic sectors
- 2) A "primary" job in manufacturing generates additional jobs in all other economic sectors, including transportation, distribution, marketing, communication, public utilities, wholesale and retail trade, finance, insurance, and services.

## IMPACT OF ETHANOL ON MINNESOTA'S ECONOMY (continued)

### *FISCAL IMPACT*

	<u>25% Market Share</u>	<u>50% Market Share</u>	<u>100% Market Share</u>	
<b><u>State Tax Revenues</u></b>	A. Wet Milling	\$9 million	\$18 million	\$36 million
	B. Dry Milling	\$8 million	\$15 million	\$30 million
1. Payroll tax				
A. Wet Milling	\$2 million	\$4 million	\$9 million	
B: Dry Milling	\$2 million	\$4 million	\$8 million	
2. Taxes on increased dividends or personal income for stock holders	\$2 million	\$4 million	\$8-9 million	
3. Local property tax	\$4-5 million	\$7-10 million	\$14-19 million	
<b><u>Ethanol Subsidy</u></b>	\$10 million	\$20 million	\$30 million	
-- Producer's payment 1)	\$10 million	\$20 million	\$30 million	
-- Blender's credit 2)	\$0 million	\$0 million	\$0 million	
<b><u>State &amp; Local Fiscal Impact 3)</u></b>				
A. Wet Milling	-\$1 million	-\$2 million	\$6 million	
B. Dry Milling	-\$2 million	-\$5 million	\$0.3 million	

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**Notes and Remarks:**

- 1) There is a \$30 million cap of producer payment per year.
- 2) Blenders' credit will phase out by 1997.
- 3) State & local fiscal impact equals state & local tax revenues minus ethanol subsidy.

## IMPACT OF ETHANOL ON MINNESOTA'S ECONOMY (continued)

### OVERALL ECONOMIC IMPACT\*

<b><u>Economic Gains for MN</u></b> (Dry mill -- Wet mill difference)	<b><u>25% Market Share</u></b>	<b><u>50% Market Share</u></b>	<b><u>100% Market Share</u></b>
Balance of trade 1)	\$25 million	\$50 million	\$100 million
Industry capitol investments 2)	\$75-100 million	\$150-200 million	\$300-400 million
Value-added (ethanol & by-products) 3)	\$34-41 million	\$68-81 million	\$136-162 million
Jobs created 4)	1,187-1,285	2,373-2,569	4,746-5,138
Payroll -- wages and salaries 5)	\$29-31 million	\$57-62 million	\$115-124 million
State & local fiscal impact 6)	(\$1-2 million)	(\$2-5 million)	\$0.3-6 million
<b>TOTAL MULTIPLIER EFFECT TO THE STATE ECONOMY**</b> (Dry mill -- wet mill difference)	<b>\$101-109 MILLION</b>	<b>\$202-218 MILLION</b>	<b>\$403-437 MILLION</b>

\* This analysis is performed using the IMPLAN (Impact Analysis for Planning) regional input/output estimation model developed by the University of Minnesota.

\*\*The overall economic impacts include the direct, indirect and induced short-term and long-term effects on all the following economic sectors: agriculture, manufacturing/processing, transportation/distribution, construction, wholesale and retail trade, services, utilities, and finance, insurance & real estate, etc.

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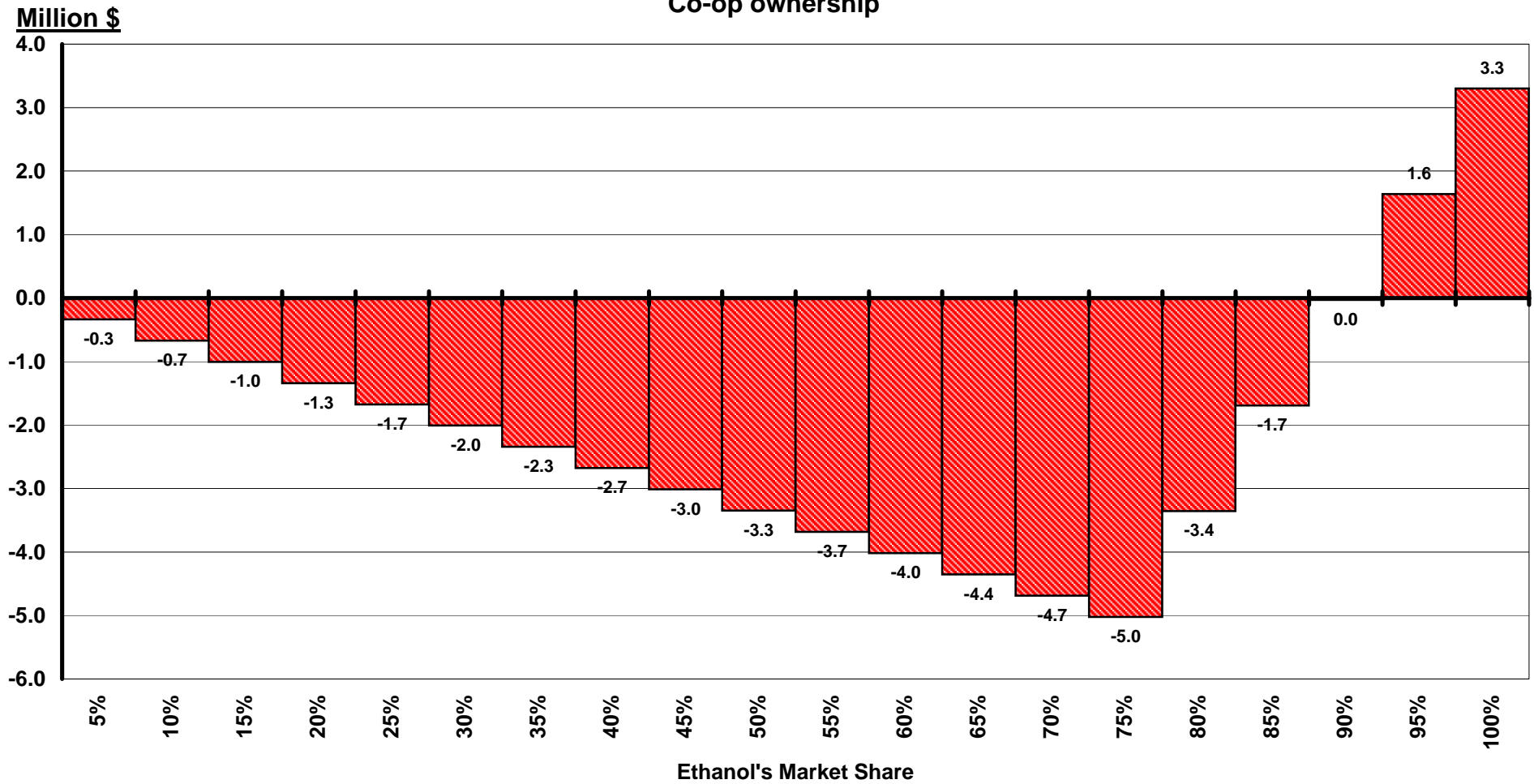
#### Notes:

- 1) Balance of trade is derived from dollars saved on import oil when ethanol is used. Please see Page 7.
- 2) For ethanol industry, to produce one gallon of ethanol, \$1.5-\$2 of capitol investment is required.
- 3) Please see Page 8 for value of ethanol production and value of by-products (wet milling).  
Value-added = Value of ethanol + Value of by-products - Value of corn (at an average market price of \$2.28/bushel)
- 4) Please see Page 10.
- 5) Please see page 10.
- 6) Please see Page 11.

# State & Local Fiscal Impact of Ethanol Production in Minnesota

\$30 million cap for producer payment, no blenders' credit

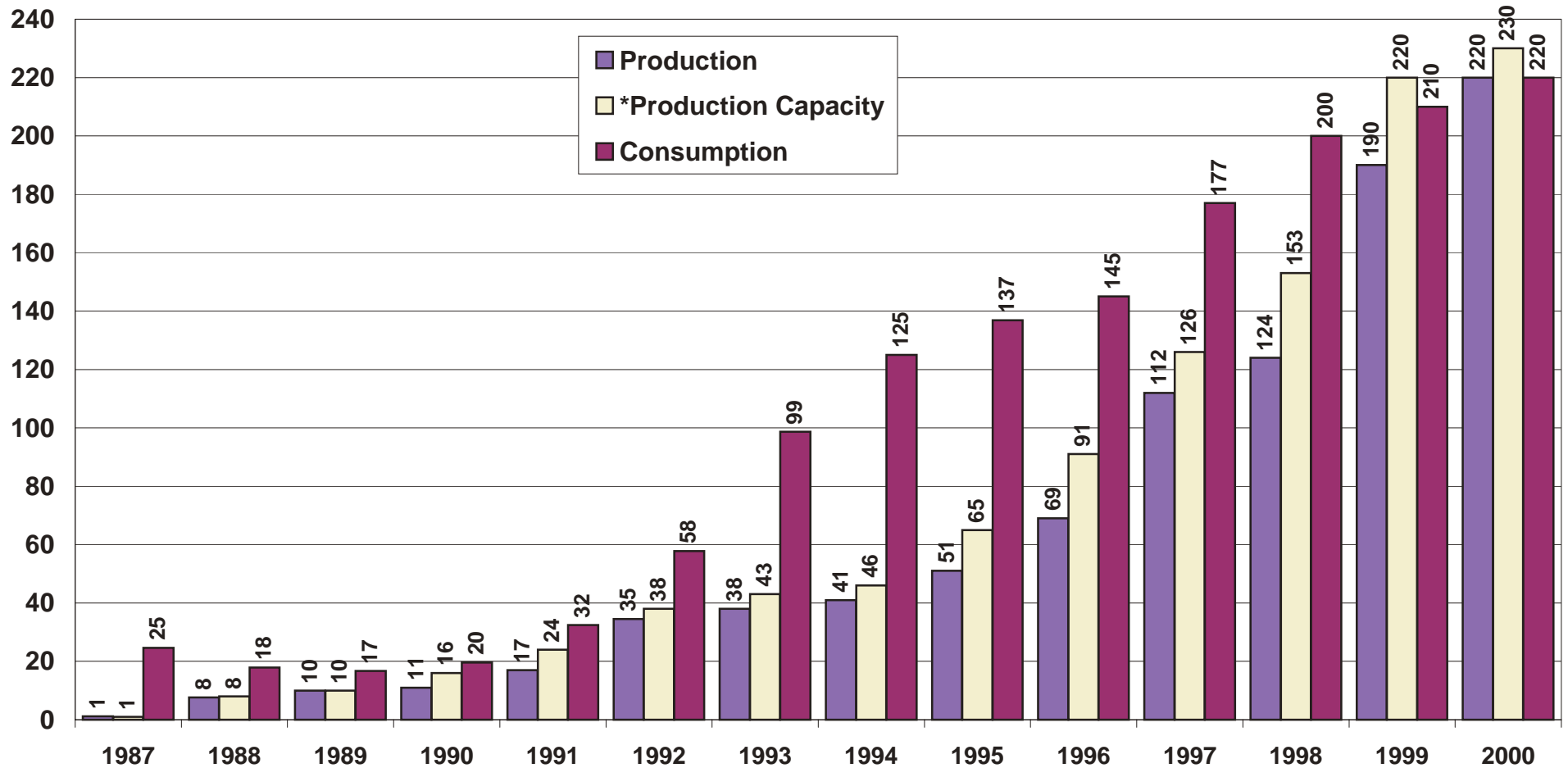
Co-op ownership



## Minnesota Ethanol Production & Consumption (Fiscal Year)

*Fiscal year ends on June 30 of the year indicated*

**Million Gallons**



*\*Indicates the potential capacity of the new ethanol plants that are built by the end of the fiscal year.*

# The Minnesota Ethanol Program

## Ethanol Production -vs- Market Penetration

<b>Year</b>	<b>Production</b>	<b>Estimated Consumption</b>	<b>% MN Ethanol Produced Here</b>
<b>1986</b>	<b>1 mm gal.</b>	<b>25 mm gal</b>	<b>4 % of total</b>
<b>1994</b>	<b>24 mm gal.</b>	<b>125 mm gal.</b>	<b>20 % of total</b>
<b>2000</b>	<b>220 mm gal.</b>	<b>200+ mm gal.</b>	<b>100 % of total</b>

## Ethanol Plants & Capacities in 2001.

<b>City &amp; (plant name)</b>	<b>Capacity Gallons/year</b>	<b>mm. bushel corn/year</b>	<b>Start-up year</b>	<b>New Generation Co-op** Members</b>
Marshall (MCP)	40 million	15 *	1988	4,000
Morris (DENCO)	17 million	6.5	1991	359
Winnebago (Corn Plus)	40 million	15.0	1994	750
Winthrop (Heartland)	30 million	11	1995	692
Benson (CVEC)	21 million	7.8	1996	650
Claremont (AI-Corn)	18 million	6.7	1996	354
Bingham Lake (Ethanol2000)	28 million	10.3	1997	241
Buffalo Lake (MN. Energy)	13 million	5.0	1997	325
Melrose (Protein Products)	2.6 million	cheese whey	1986	(private)
Preston (Pro-Corn)	21 million	8.0	1998	163
Luverne (Corn-er Stone)	20 million	7.4	1998	197
Little Falls (CMEC)	20 million	7.4	1999	718
Albert Lea (Exol/Agri Resources)	40 million	14.0	1999	496
St. Paul (Gopher State Ethanol)	13 million	5.0	1999	(private)
<b>Current TOTAL</b>	<b>303.6 mm gal.</b>	<b>119 mm bus.</b>		<b>8,945 memb.</b>

Processing corn products instead of exporting raw corn doubles the value of each bushel. In addition to fuel ethanol, corn plants produce 1,400,000 tons of high protein livestock feed plus other products including; industrial ethanol, starch, sweeteners and carbon dioxide.

\* MCP. can also grind 40,000,000 bushels of corn for starch, sweeteners and other products. Therefore, total corn milling capacity in Minnesota is 160 million bushels, or 20% of the state's average (800 million bushel) corn crop.

\*\* Plants organized as New Generation Farmer Co-ops (NGC) may be combined with or converted to limited liability companies or partnerships that are generally designed to:

- 1) be built by farmers to process member crops,
- 2) return more cash to farmers than conventional markets would provide,
- 3) be controlled by farmer board members so that farmer profits remain a top priority,
- 4) create a stable source of local jobs and economic development.

For questions on this information call Ralph Groschen 651-297-2223

# The Minnesota Ethanol Program.

## **A. Background:**

The 20-cent ethanol producer payment legislation initially provided the security required by lenders to invest in these small farmer owned ethanol facilities. In addition to opposition from the petroleum industry, bankers were concerned that these plants could not compete in the market with large agribusiness processors. At the time, most ethanol production occurred in large mills outside the state. Minnesota corn prices were among the lowest in the country, which was advantageous to local processing by farmers.

Although these ventures have been successful to date, margins have been squeezed by periods of record high corn prices and low ethanol prices. It is hoped that ten years of payments will allow plants to retire debt, increase efficiency and to develop new products so they can survive the competition and price fluctuations in agricultural and petroleum markets. Unique aspects of the ethanol industry made these incentive payments necessary, but our ethanol industry will contribute over \$350 million in net annual benefit to the state.

Since low farm commodity prices are common, these new corn plants may represent a new strategy for the long-range profitability of farmers and farm communities. Vertical integration from the bottom up could allow farmers to participate in the more profitable end of agriculture. Promoting farmer investments in the processing and marketing of other crop or livestock enterprises may not require the high level of state funding as did ethanol. It is hoped that such initiatives can reduce the need for continual funding of farm financial crisis measures allowing farmers to make it on their own.

## **B. The main components of the Minnesota Ethanol Program are:**

1. Oxygenated fuel statute that requires state-wide oxy-fuel (ethanol blend) use,
2. The 20 cent per gallon ethanol producer incentive provides payment for ethanol produced,
3. \$550 million in total corn/ethanol plant project spending for construction and startup costs.
  - ◆ \$370 million in private sector financing was contingent on local equity capitol.
  - ◆ \$180 million in local equity capitol raised by over 8,000 farmers and local businesses.
4. \$400 million worth of corn is committed for processing annually by local farmers.

## **C. The goals of the program include:**

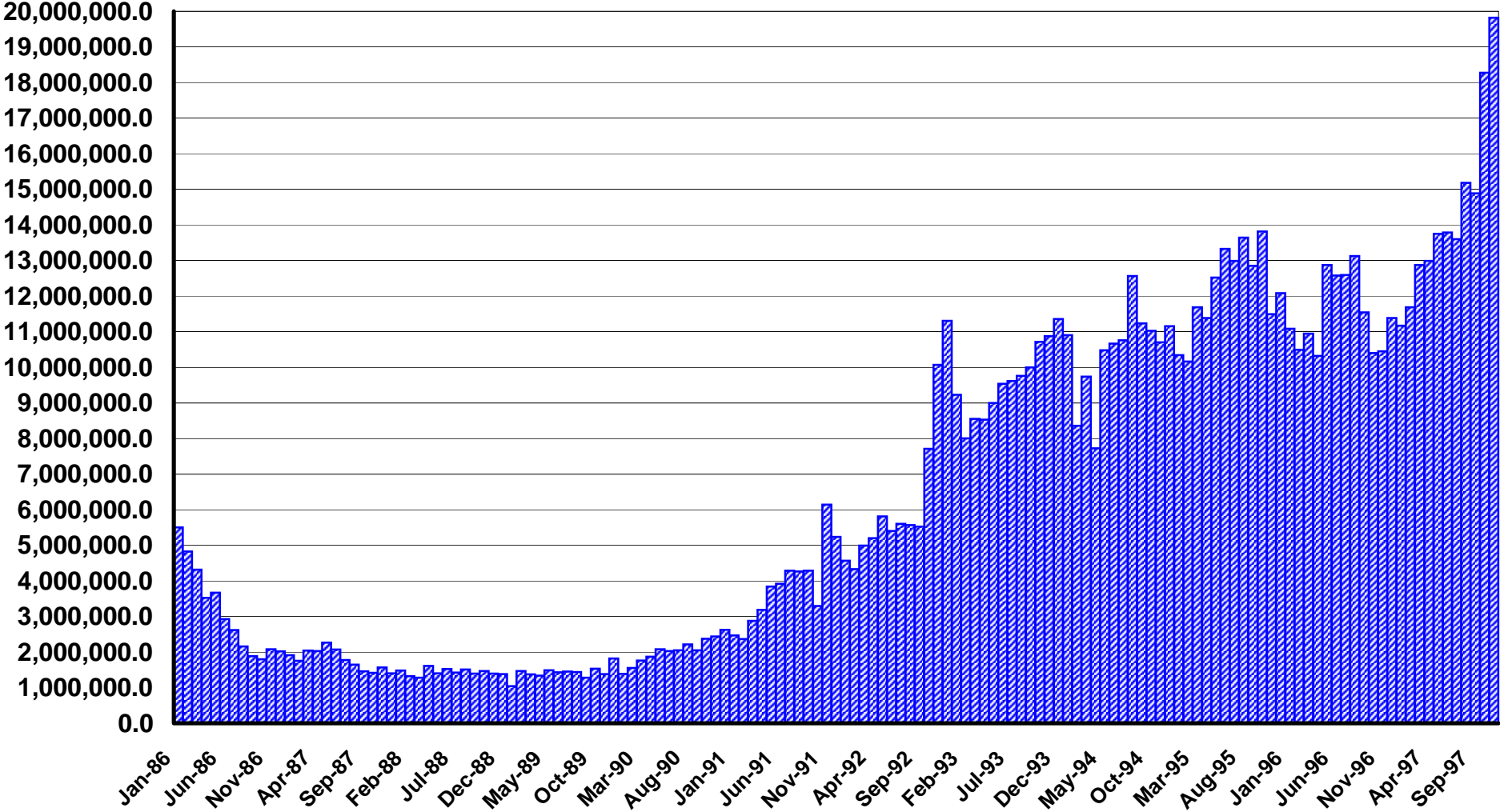
1. To build a new market for the state's largest crop (corn).
2. To develop corn processing/ethanol production facilities in Minnesota.
3. To increase the number of New Generation Farmer Coops (NGCs). These businesses were designed to provide farmer members greater direct cash return for their crops.
4. To replace 10% of imported petroleum we use for gasoline. (\$100 million annual savings)
5. To help the Twin City Area meet U.S. EPA standards for carbon monoxide.

## **D. Results to date:**

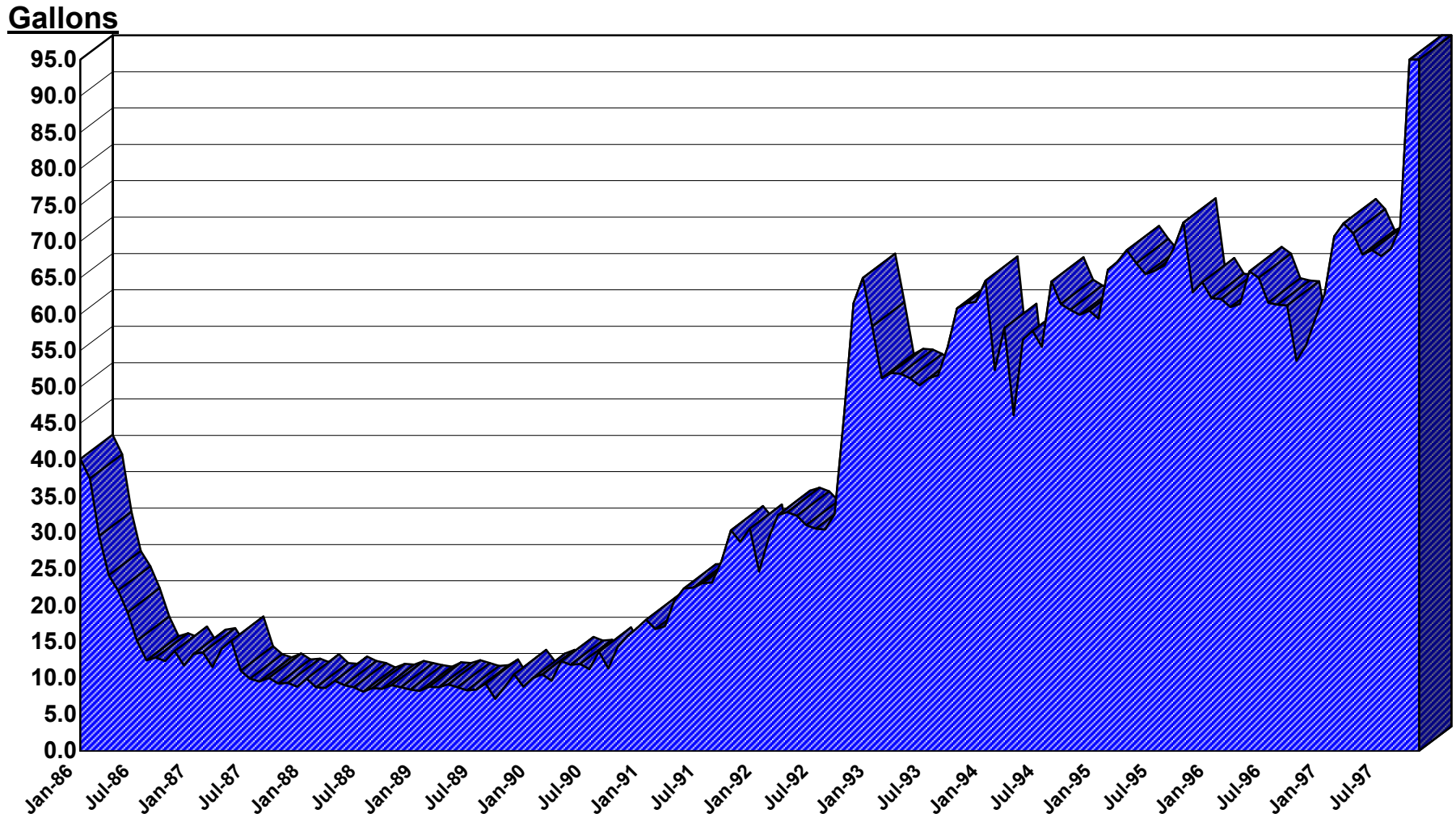
1. 145 million bu. of corn (14% of MN. crop) is made into ethanol and other products.
2. Minnesota's 14 plants can produce 300 million gallons of ethanol /yr.
3. Twelve of Minnesota's 14 ethanol plants were organized as NGCs\*\*. (see C. 3. above)
4. Nearly 10% of our gasoline is being replaced by ethanol each year.
5. The Twin Cities Area met EPA's carbon monoxide standard and has recently achieved "attainment" status. The continued use of ethanol was required to keep emissions low.

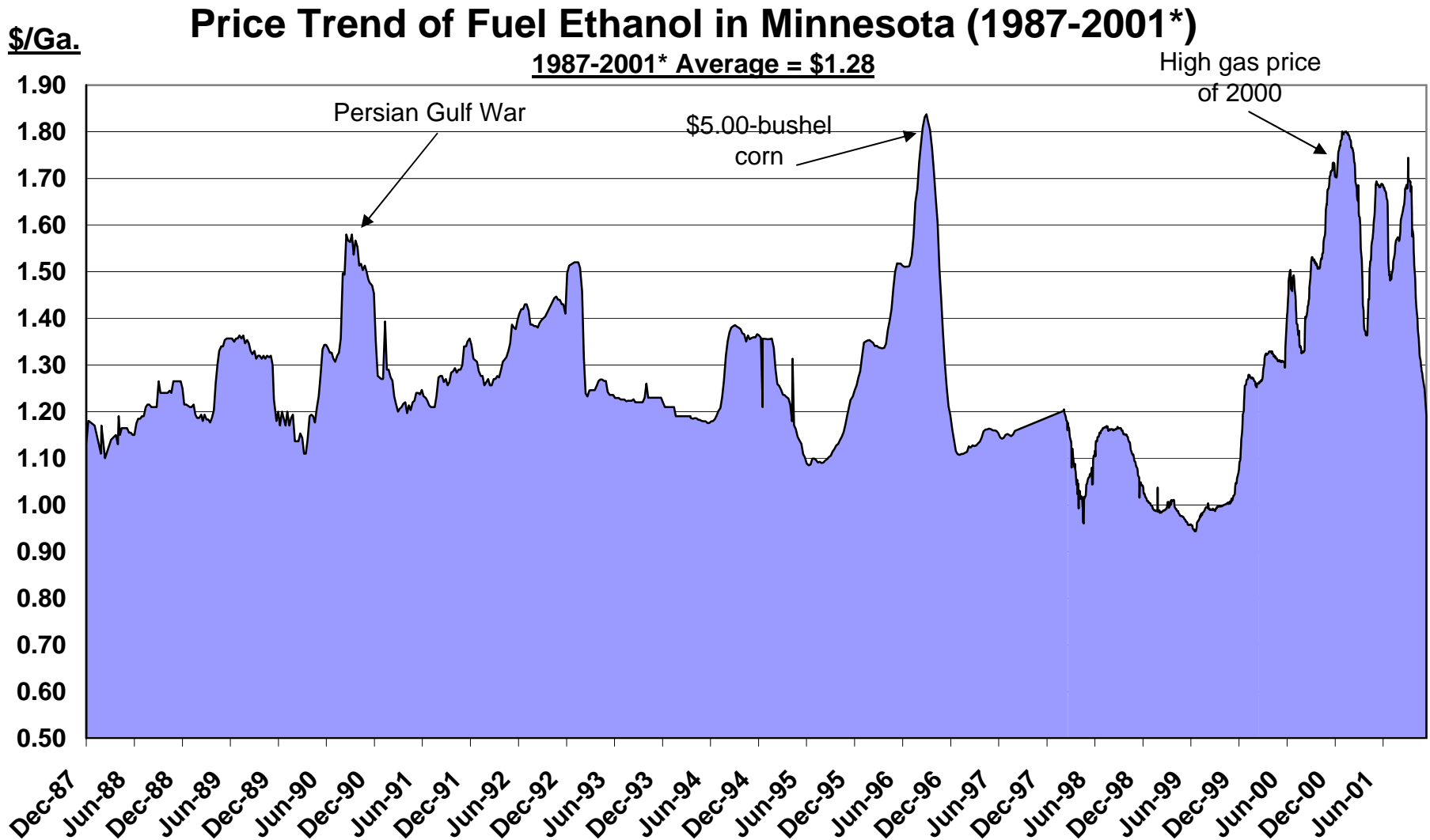
# Ethanol Consumption in Minnesota (Monthly)

Gallons



## Ethanol Market Share in Minnesota (Monthly)

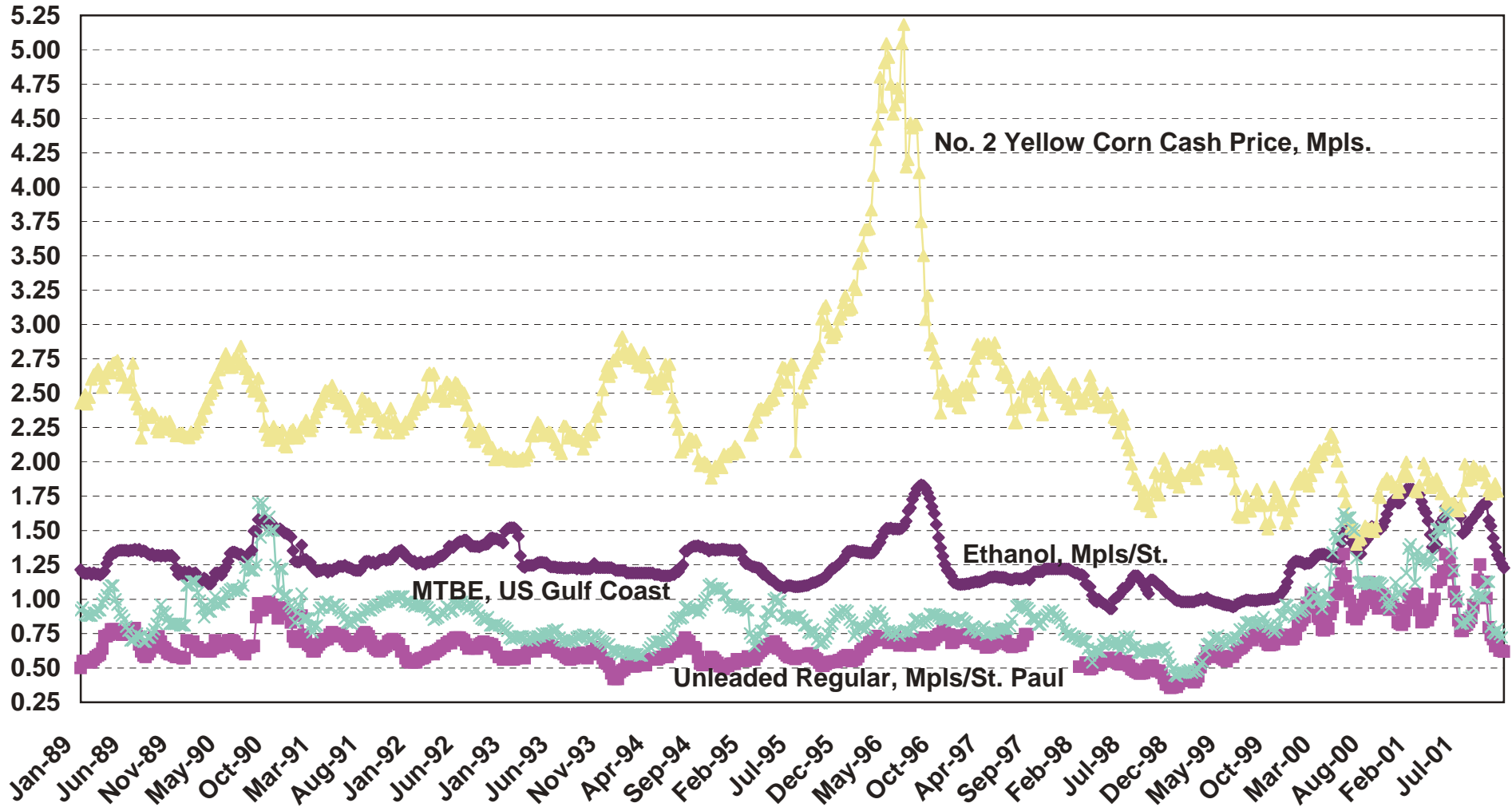




\*January - November 2001

## Corn, Ethanol, MTBE & Gasoline Prices (1989-2001\*)

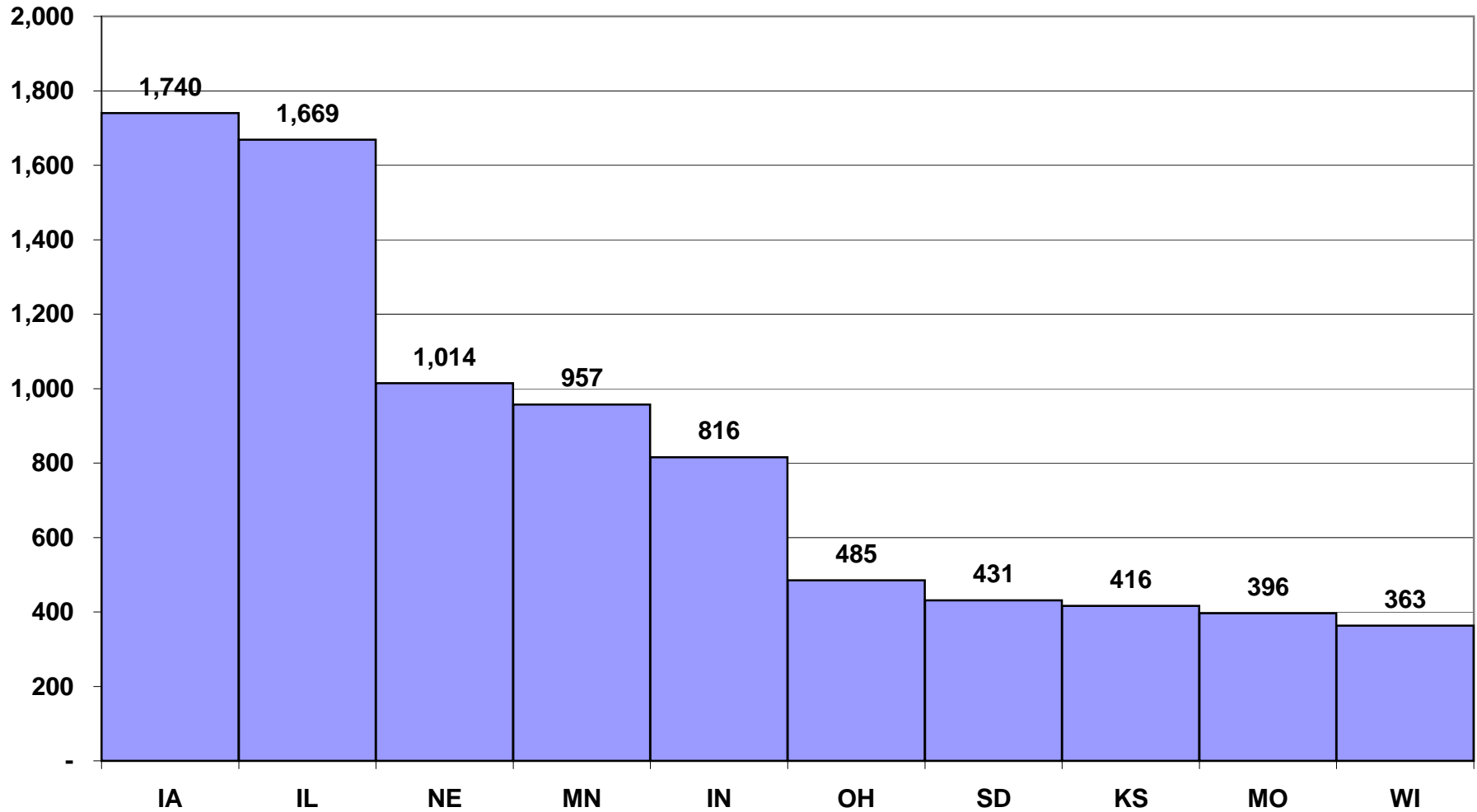
Dollars



\* January - November 2001

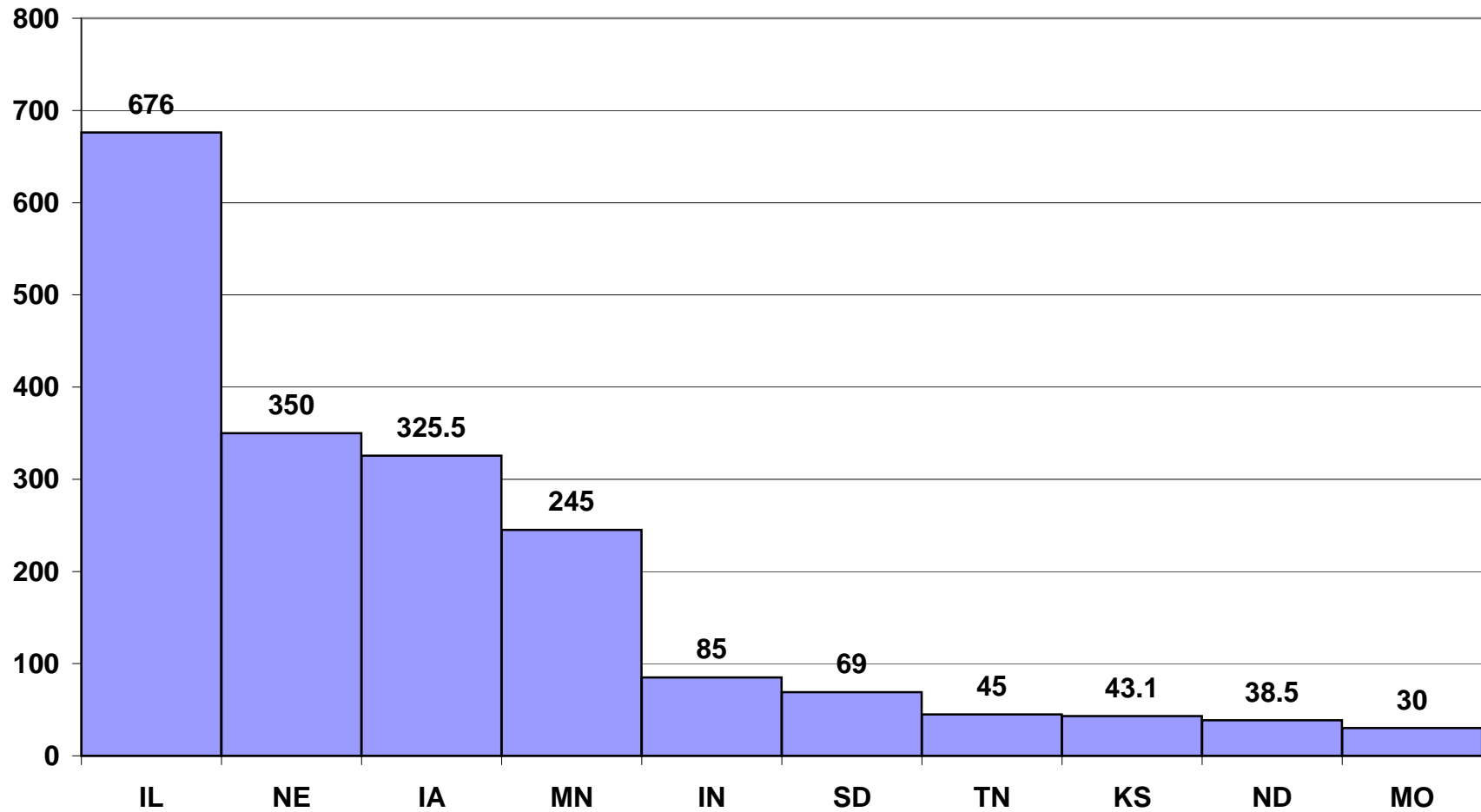
## State Ranking in Corn Production (2000)

Million Bushels

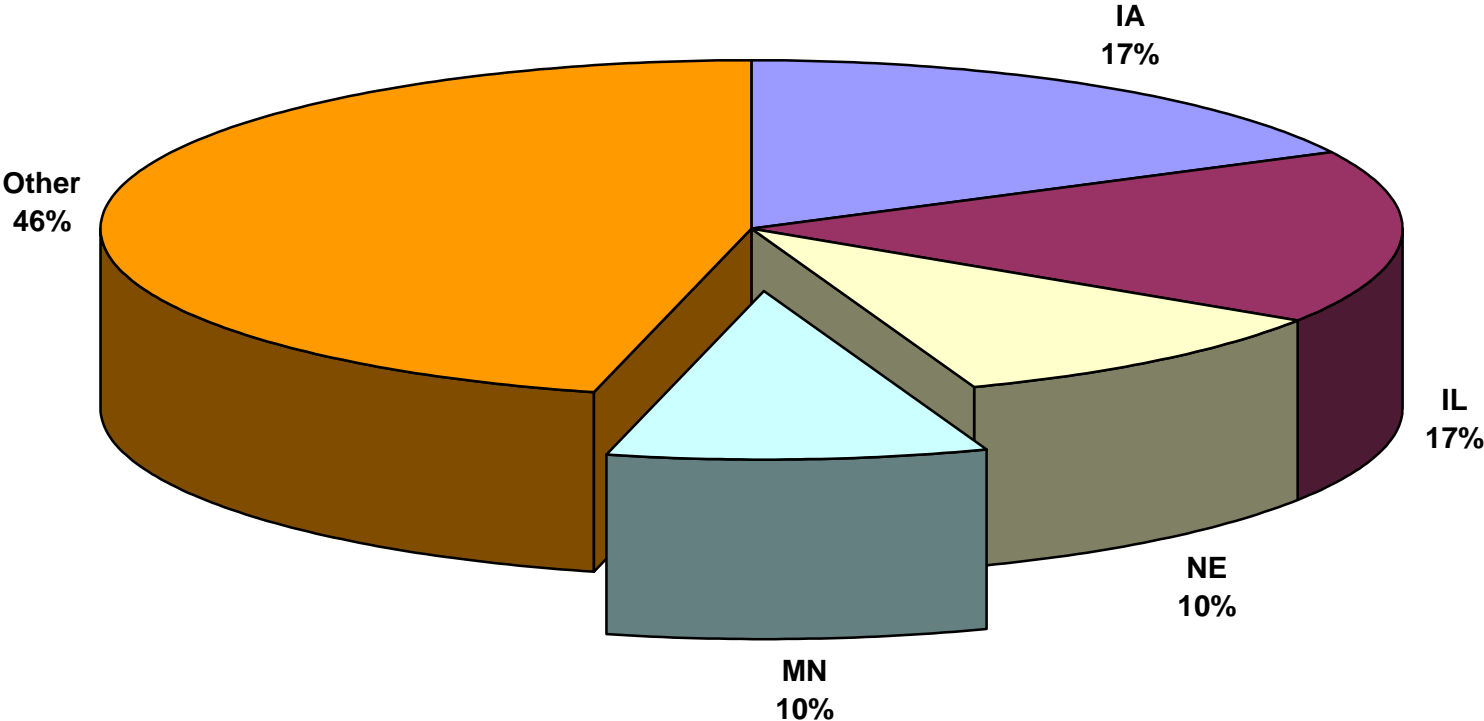


## State Ranking in Ethanol Production (2000)

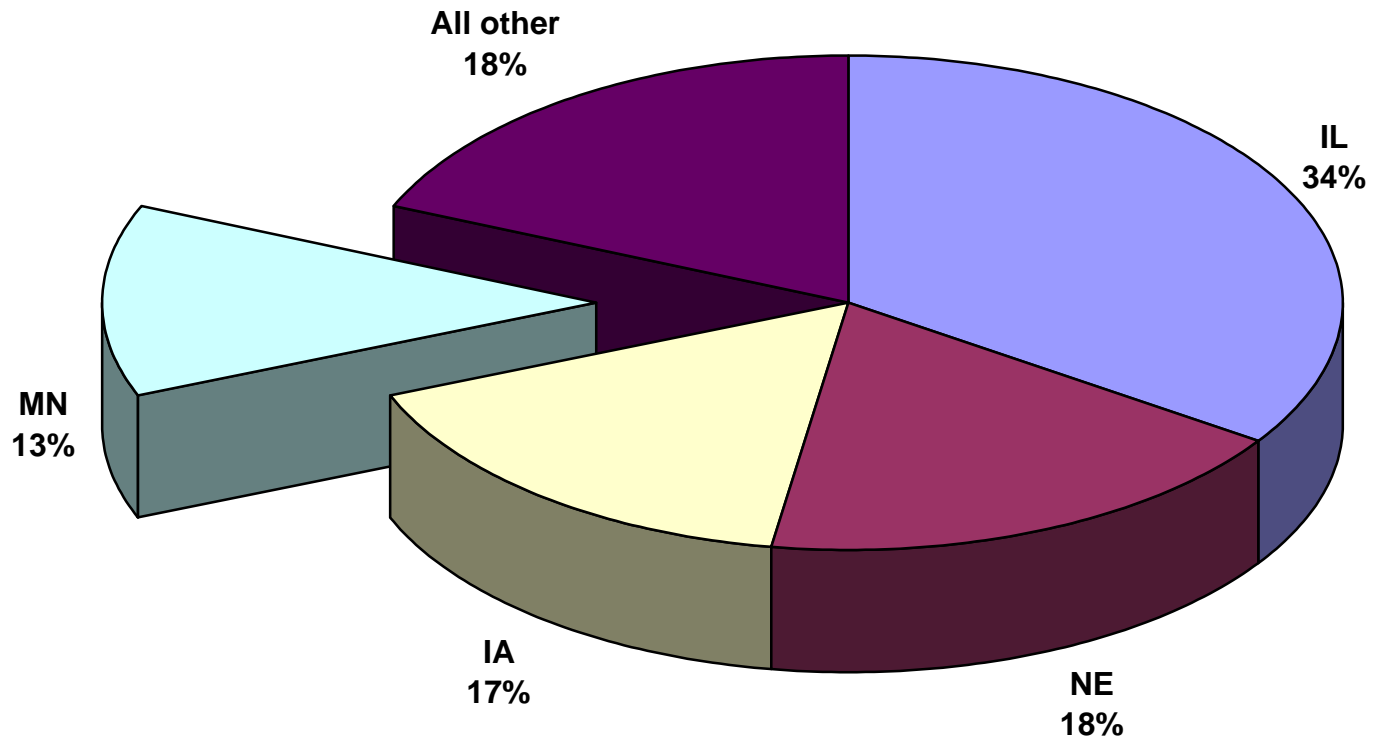
Million Gallons



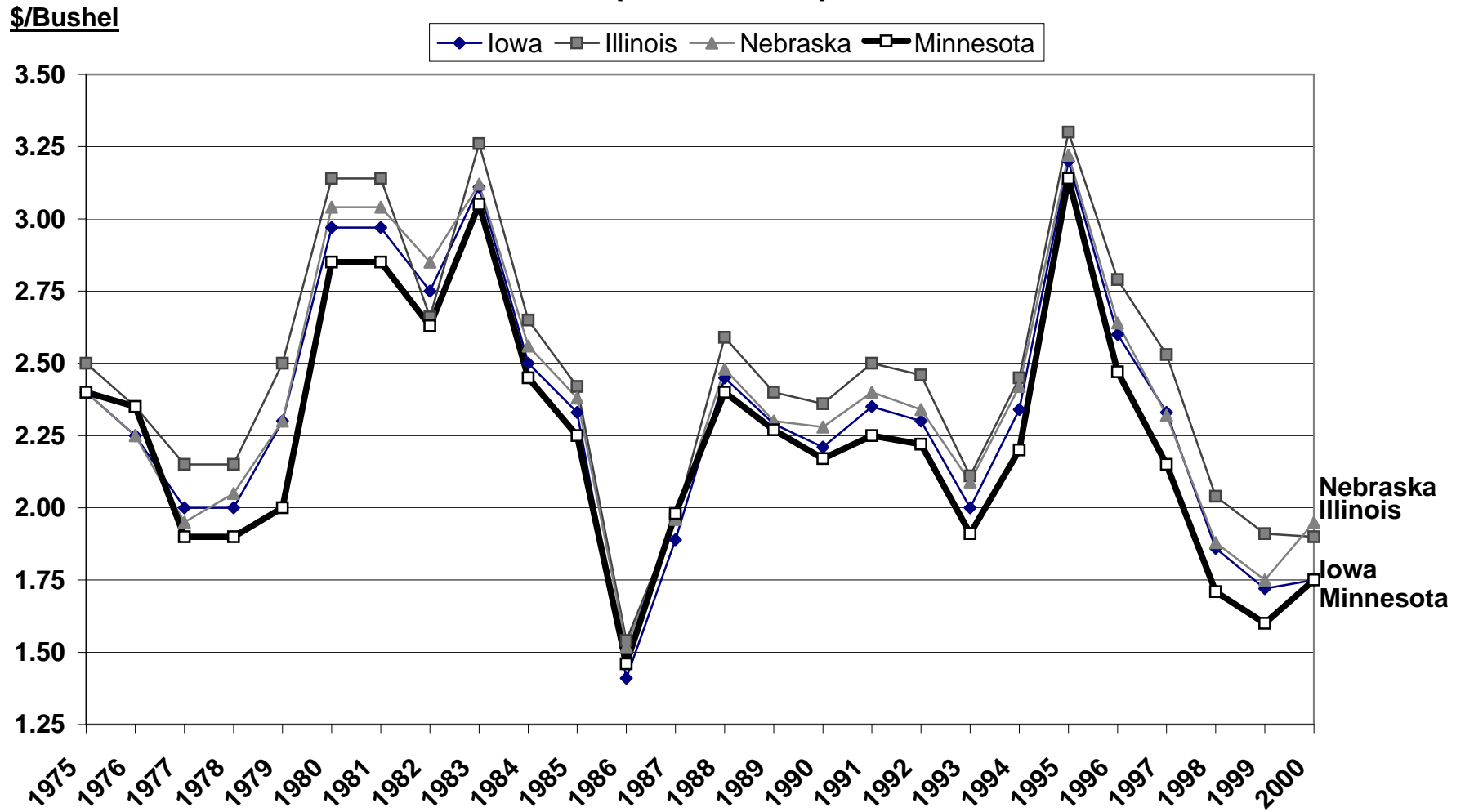
### Corn Production in 4 States -- % of U.S. Total (2000)



## Ethanol Production in 4 Corn States -- % of U.S. Total (2000)

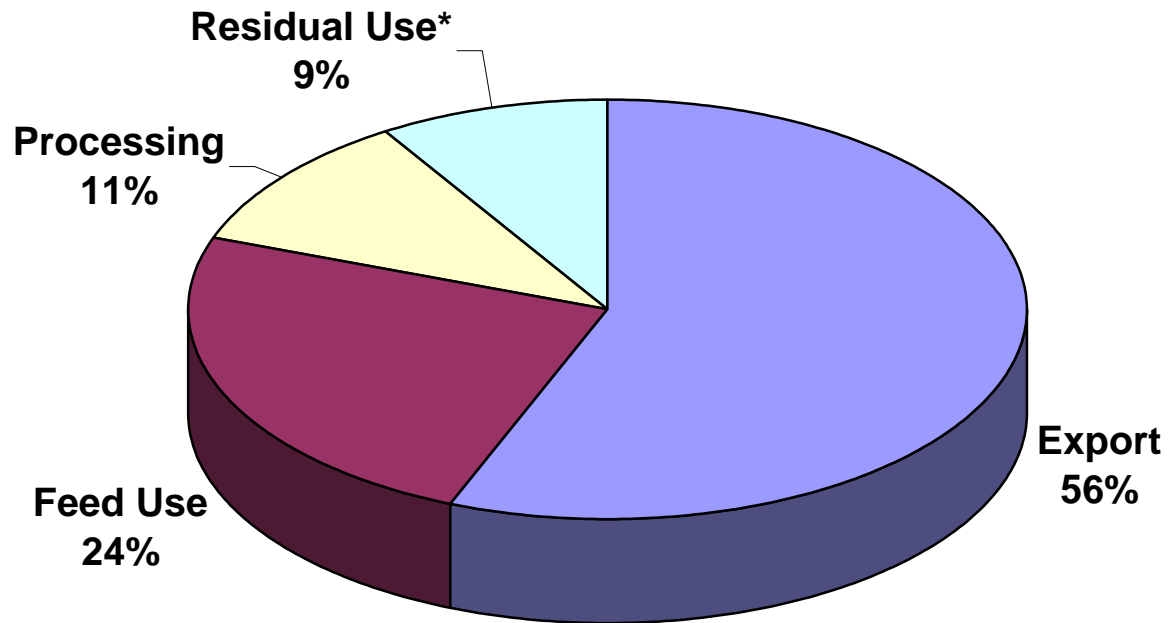


## Corn Prices: Iowa, Illinois, Minnesota & Nebraska (1975-2000)



# Minnesota Corn Utilization

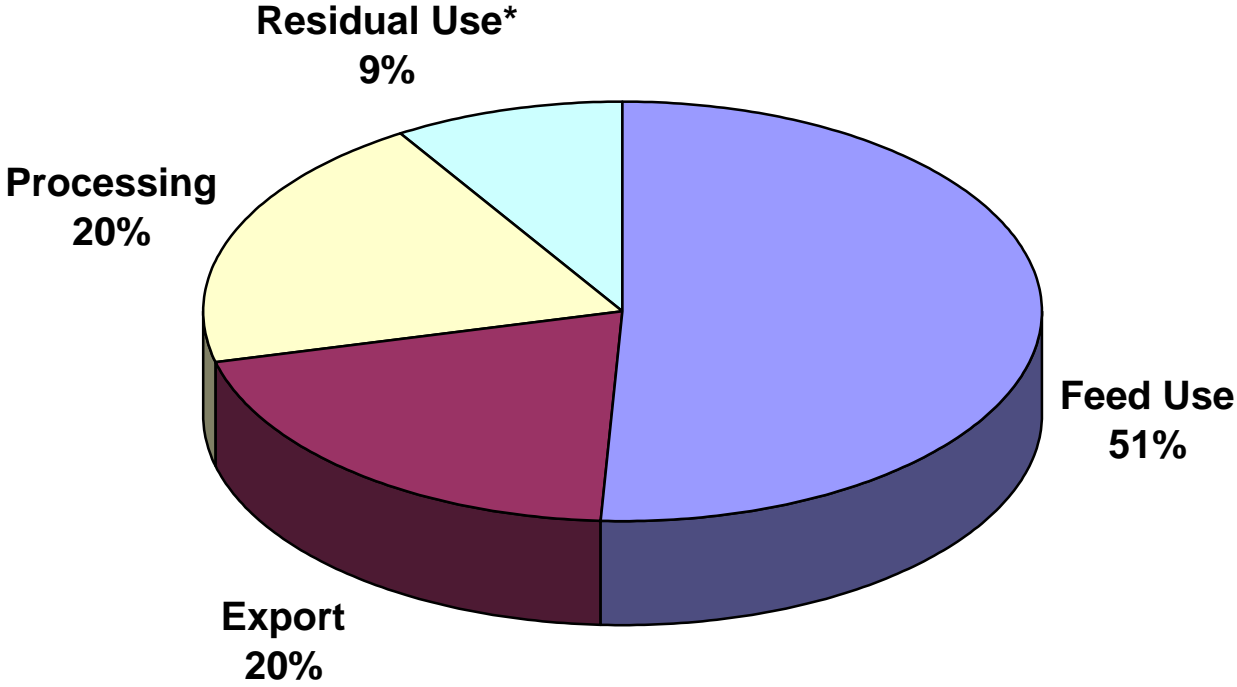
1999-2000 Crop Year



\* All other uses.

# U.S. Corn Utilization

1999-2000 Crop Year



\* All other uses.

# Value of Corn

## Raw Commodity vs. Value-Added

(per bushel of corn)

### Dec. 2000 Prices

Products	Corn	Value-Added				Ethanol & DDG
	Raw Commodity	Wet-Milling			Dry-Milling	
		Starch & Products	Ethanol & Products	Sweeteners & Products		
Corn Syrup	HFCS					
Corn	\$1.85					
Corn Oil		\$0.16	\$0.16	\$0.16	\$0.16	
Gluten Feed		\$0.35	\$0.35	\$0.35	\$80.00	
Gluten Meal		\$0.35	\$0.35	\$0.35	\$0.35	
Starch		\$4.06				
Ethanol			\$4.46			\$4.24
Corn Syrup				\$5.30		
HFCS					\$4.91	
DDG						\$0.76
<b>Total Value</b>	<b>\$1.85</b>	<b>\$4.92</b>	<b>\$5.32</b>	<b>\$6.16</b>	<b>\$85.43</b>	<b>\$4.99</b>

Computation based on the following:

Corn: \$1.85/bu. cash price (Minneapolis Grain Exchange).  
 Corn oil: 1.6 lb./bushel, \$0.10/lb. (Wall Street Journal).  
 Gluten feed: 10.9 lb./bu., \$64/ton, Illinois (USDA, Grain & Feed Market News).  
 Gluten meal: 2.6 lb./bu., \$270/ton, Illinois (USDA, Grain & Feed Market News).  
 Starch: 31.5 lb./bu., \$0.1288/lb. (USDA, ERS).  
 Ethanol: 2.45 (wet-mill)/2.58 (dry-mill) ga./bu., \$1.73/ga. (Mpls/St. Paul market, CPC).  
 Corn syrup: 40 lb./bu., \$0.1326/lb. (Milling & Baking News).  
 HFCS: 33.3 lb./bu. 55% HFCS (dry weight), \$0.15/lb. (Milling & Baking News).  
 DDG: 18 lb./bu., \$84/ton (USDA, Grain & Feed Market News).

### Sept. 2001 Prices

Products	Corn	Value-Added				Ethanol & DDG
	Raw Commodity	Wet-Milling			Dry-Milling	
		Starch & Products	Ethanol & Products	Sweeteners & Products		
Corn Syrup	HFCS					
Corn	\$1.86					
Corn Oil		\$0.27	\$0.27	\$0.27	\$0.27	
Gluten Feed		\$0.36	\$0.36	\$0.36	\$0.36	
Gluten Meal		\$0.34	\$0.34	\$0.34	\$0.34	
Starch		\$3.92				
Ethanol			\$4.37			\$4.15
Corn Syrup				\$4.56		
HFCS					\$4.33	
DDG						\$0.68
<b>Total Value</b>	<b>\$1.86</b>	<b>\$4.90</b>	<b>\$5.35</b>	<b>\$5.54</b>	<b>\$5.31</b>	<b>\$4.83</b>

Computation based on the following:

Corn: \$1.86/bu. cash price (Minneapolis Grain Exchange).  
 Corn oil: 1.6 lb./bushel, \$0.17/lb. (Wall Street Journal).  
 Gluten feed: 10.9 lb./bu., \$66.50/ton, Illinois (USDA, Grain & Feed Market News).  
 Gluten meal: 2.6 lb./bu., \$265/ton, Illinois (USDA, Grain & Feed Market News).  
 Starch: 31.5 lb./bu., \$0.1246/lb. (USDA, ERS).  
 Ethanol: 2.45 (wet-mill)/2.58 (dry-mill) ga./bu., \$1.6945/ga. (Mpls/St. Paul market, CPC).  
 Corn syrup: 40 lb./bu., \$0.114/lb. (Milling & Baking News).  
 HFCS: 33.3 lb./bu. 55% HFCS (dry weight), \$0.13/lb. (Milling & Baking News).  
 DDG: 18 lb./bu., \$75/ton (USDA, Grain & Feed Market News).

# Value of Corn

## Raw Commodity vs. Value-Added

(per bushel of corn)

### Dec. 1998 Prices

Products	Corn	Value-Added				Ethanol & DDG
	Raw Commodity	Wet-Milling			Dry-Milling	
		Starch & Products	Ethanol & Products	Sweeteners & Products		
				Corn Syrup	HFCS	
Corn	\$1.87					
Corn Oil		\$0.47	\$0.47	\$0.47	\$0.47	
Gluten Feed		\$0.39	\$0.39	\$0.39	\$0.39	
Gluten Meal		\$0.38	\$0.38	\$0.38	\$0.38	
Starch		\$3.81				
Ethanol			\$2.68			\$2.55
Corn Syrup				\$4.02		
HFCS					\$3.31	
DDG						\$0.71
<b>Total Value</b>	<b>\$1.87</b>	<b>\$5.05</b>	<b>\$3.92</b>	<b>\$5.26</b>	<b>\$4.55</b>	<b>\$3.26</b>

Computation based on the following:

Corn: \$1.87/bu. cash price (Minneapolis Grain Exchange).  
 Corn oil: 1.6 lb./bushel, \$0.30/lb. (Wall Street Journal).  
 Gluten feed: 10.9 lb./bu., \$71/ton, Illinois (USDA, Grain & Feed Market News).  
 Gluten meal: 2.6 lb./bu., \$292.50/ton, Illinois (USDA, Grain & Feed Market News).  
 Starch: 31.5 lb./bu., \$0.12/lb. (USDA, ERS).  
 Ethanol: 2.45 (wet-mill)/2.58 (dry-mill) ga./bu., \$1.04/ga. (Mpls/St. Paul market, CPC).  
 Corn syrup: 40 lb./bu., \$0.105/lb. (Milling & Baking News).  
 HFCS: 33.3 lb./bu. 55% HFCS (dry weight), \$0.10/lb. (Milling & Baking News).  
 DDG: 18 lb./bu., \$84.50/ton (USDA, Grain & Feed Market News).

### Dec. 1999 Prices

Products	Corn	Value-Added				Ethanol & DDG
	Raw Commodity	Wet-Milling			Dry-Milling	
		Starch & Products	Ethanol & Products	Sweeteners & Products		
				Corn Syrup	HFCS	
Corn	\$1.62					
Corn Oil		\$0.34	\$0.34	\$0.34	\$0.34	
Gluten Feed		\$0.33	\$0.33	\$0.33	\$0.33	
Gluten Meal		\$0.31	\$0.31	\$0.31	\$0.31	
Starch		\$3.73				
Ethanol			\$2.77			\$2.63
Corn Syrup				\$4.30		
HFCS					\$4.05	
DDG						\$0.76
<b>Total Value</b>	<b>\$1.62</b>	<b>\$4.71</b>	<b>\$3.75</b>	<b>\$5.28</b>	<b>\$5.03</b>	<b>\$3.39</b>

Computation based on the following:

Corn: \$1.62/bu. cash price (Minneapolis Grain Exchange).  
 Corn oil: 1.6 lb./bushel, \$0.22/lb. (Wall Street Journal).  
 Gluten feed: 10.9 lb./bu., \$61/ton, Illinois (USDA, Grain & Feed Market News).  
 Gluten meal: 2.6 lb./bu., \$235/ton, Illinois (USDA, Grain & Feed Market News).  
 Starch: 31.5 lb./bu., \$0.12/lb. (USDA, ERS).  
 Ethanol: 2.45 (wet-mill)/2.58 (dry-mill) ga./bu., \$1.0732/ga. (Mpls/St. Paul market, CPC).  
 Corn syrup: 40 lb./bu., \$0.1075/lb. (Milling & Baking News).  
 HFCS: 33.3 lb./bu. 55% HFCS (dry weight), \$0.12/lb. (Milling & Baking News).  
 DDG: 18 lb./bu., \$84.50/ton (USDA, Grain & Feed Market News).

## Value of Corn

### Raw Commodity vs. Value-Added (per bushel of corn)

#### July 1995 Prices

Products	Corn	Value-Added				
	Raw Commodity	Wet-Milling			Dry-Milling	
		Starch & Products	Ethanol & Products	Sweeteners & Products		Ethanol & DDG
			Corn Syrup	HFCS		
Corn	\$2.68					
Corn Oil		\$0.43	\$0.43	\$0.43	\$0.43	
Gluten Feed		\$0.45	\$0.45	\$0.45	\$0.45	
Gluten Meal		\$0.28	\$0.28	\$0.28	\$0.28	
Starch		\$4.26				
Ethanol			\$2.83			\$2.69
Corn Syrup				\$4.56		
HFCS					\$6.16	
DDG						\$0.88
<b>Total Value</b>	<b>\$2.68</b>	<b>\$5.42</b>	<b>\$3.99</b>	<b>\$5.72</b>	<b>\$7.32</b>	<b>\$3.56</b>

Computation based on the following:

Corn: \$2.68/bu. cash price (Minneapolis Grain Exchange).  
 Corn oil: 1.6 lb./bushel, \$0.27/lb. (Wall Street Journal).  
 Gluten feed: 10.9 lb./bu., \$83/ton, Illinois (USDA, Grain & Feed Market News).  
 Gluten meal: 2.6 lb./bu., \$213/ton, Illinois (USDA, Grain & Feed Market News).  
 Starch: 31.5 lb./bu., \$0.14/lb. (USDA, ERS).  
 Ethanol: 2.45 (wet-mill)/2.58 (dry-mill) ga./bu., \$1.10/ga. (Mpls/St. Paul market, CPC).  
 Corn syrup: 40 lb./bu., \$0.13/lb. (Milling & Baking News).  
 HFCS: 33.3 lb./bu. 55% HFCS (dry weight), \$0.23/lb. (Milling & Baking News).  
 DDG: 18 lb./bu., \$98/ton (USDA, Grain & Feed Market News).

#### July 1996 Prices

Products	Corn	Value-Added				
	Raw Commodity	Wet-Milling			Dry-Milling	
		Starch & Products	Ethanol & Products	Sweeteners & Products		Ethanol & DDG
			Corn Syrup	HFCS		
Corn	\$5.18					
Corn Oil		\$0.40	\$0.40	\$0.40	\$0.40	
Gluten Feed		\$0.58	\$0.58	\$0.58	\$0.58	
Gluten Meal		\$0.40	\$0.40	\$0.40	\$0.40	
Starch		\$5.87				
Ethanol			\$3.95			\$3.76
Corn Syrup				\$5.26		
HFCS					\$6.86	
DDG						\$1.45
<b>Total Value</b>	<b>\$5.18</b>	<b>\$7.26</b>	<b>\$5.34</b>	<b>\$6.64</b>	<b>\$8.24</b>	<b>\$5.20</b>

Computation based on the following:

Corn: \$5.18/bu. cash price (Minneapolis Grain Exchange).  
 Corn oil: 1.6 lb./bushel, \$0.25/lb. (Wall Street Journal).  
 Gluten feed: 10.9 lb./bu., \$106/ton, Illinois (USDA, Grain & Feed Market News).  
 Gluten meal: 2.6 lb./bu., \$308/ton, Illinois (USDA, Grain & Feed Market News).  
 Starch: 31.5 lb./bu., \$0.19/lb. (USDA, ERS).  
 Ethanol: 2.45 (wet-mill)/2.58 (dry-mill) ga./bu., \$1.53/ga. (Mpls/St. Paul market, CPC).  
 Corn syrup: 40 lb./bu., \$0.13/lb. (Milling & Baking News).  
 HFCS: 33.3 lb./bu. 55% HFCS (dry weight), \$0.21/lb. (Milling & Baking News).  
 DDG: 18 lb./bu., \$161/ton (USDA, Grain & Feed Market News).

# Value of Corn

## Raw Commodity vs. Value-Added

(per bushel of corn)

### October 1993 Prices

Products	Corn	Value-Added				Ethanol & DDG
	Raw Commodity	Wet-Milling			Dry-Milling	
		Starch & Products	Ethanol & Products	Sweeteners & Products		
				Corn Syrup	HFCS	
Corn	\$2.27					
Corn Oil		\$0.34	\$0.34	\$0.34	\$0.34	
Gluten Feed		\$0.41	\$0.41	\$0.41	\$0.41	
Gluten Meal		\$0.38	\$0.38	\$0.38	\$0.38	
Starch		\$3.58				
Ethanol			\$2.94			\$3.10
Corn Syrup				\$4.76		
HFCS					\$7.83	
DDG						\$1.06
<b>Total Value</b>	<b>\$2.27</b>	<b>\$4.71</b>	<b>\$4.07</b>	<b>\$5.89</b>	<b>\$8.96</b>	<b>\$4.16</b>

Computation based on the following:

Corn: \$2.266/bu. cash price (Wall Street Journal).  
 Corn oil: 1.55 lb./bushel, \$0.22/lb. (Wall Street Journal).  
 Gluten feed: 10.9 lb./bu., \$76.69/ton, Illinois (USDA, Grain & Feed Market News).  
 Gluten meal: 2.6 lb./bu., \$296.2/ton, Illinois (USDA, Grain & Feed Market News).  
 Starch: 31.5 lb./bu., \$0.11/lb. (USDA, ERS).  
 Ethanol: 2.45 (wet-mill)/2.58 (dry-mill) ga./bu., \$1.20/ga. (Mpls/St. Paul market, CPC).  
 Corn syrup: 40 lb./bu., \$0.12/lb. (Milling & Baking News).  
 HFCS: 33.3 lb./bu. 55% HFCS (dry weight), \$0.24/lb. (Milling & Baking News).  
 DDG: 18 lb./bu., \$117.5/ton (USDA, Grain & Feed Market News).

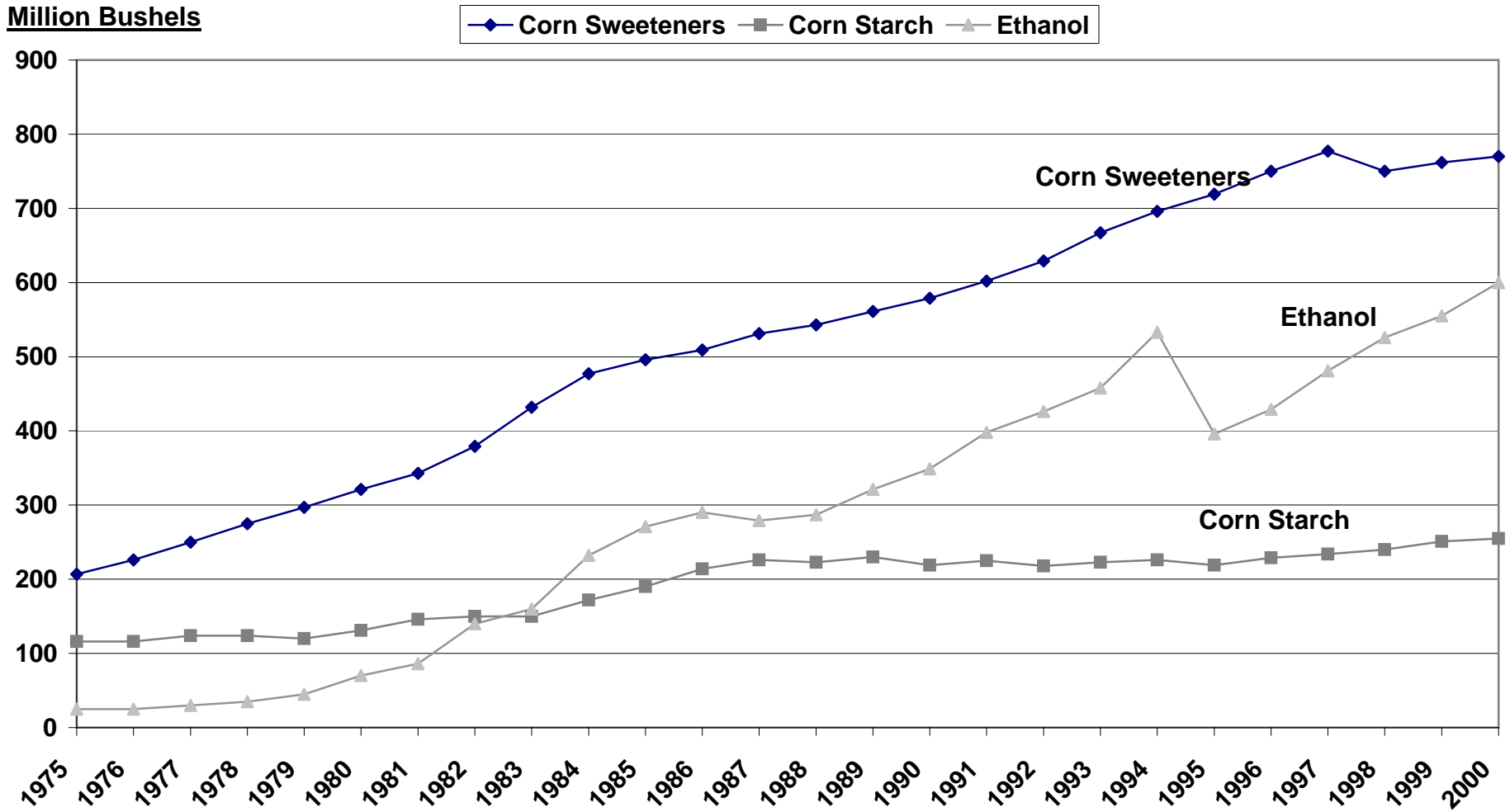
### October 1994 Prices

Products	Corn	Value-Added				Ethanol & DDG
	Raw Commodity	Wet-Milling			Dry-Milling	
		Starch & Products	Ethanol & Products	Sweeteners & Products		
				Corn Syrup	HFCS	
Corn	\$1.93					
Corn Oil		\$0.41	\$0.41	\$0.41	\$0.41	
Gluten Feed		\$0.44	\$0.44	\$0.44	\$0.44	
Gluten Meal		\$0.29	\$0.29	\$0.29	\$0.29	
Starch		\$3.71				
Ethanol			\$3.34			\$3.52
Corn Syrup				\$4.86		
HFCS					\$6.70	
DDG						\$1.08
<b>Total Value</b>	<b>\$1.93</b>	<b>\$4.85</b>	<b>\$4.48</b>	<b>\$6.00</b>	<b>\$7.84</b>	<b>\$4.60</b>

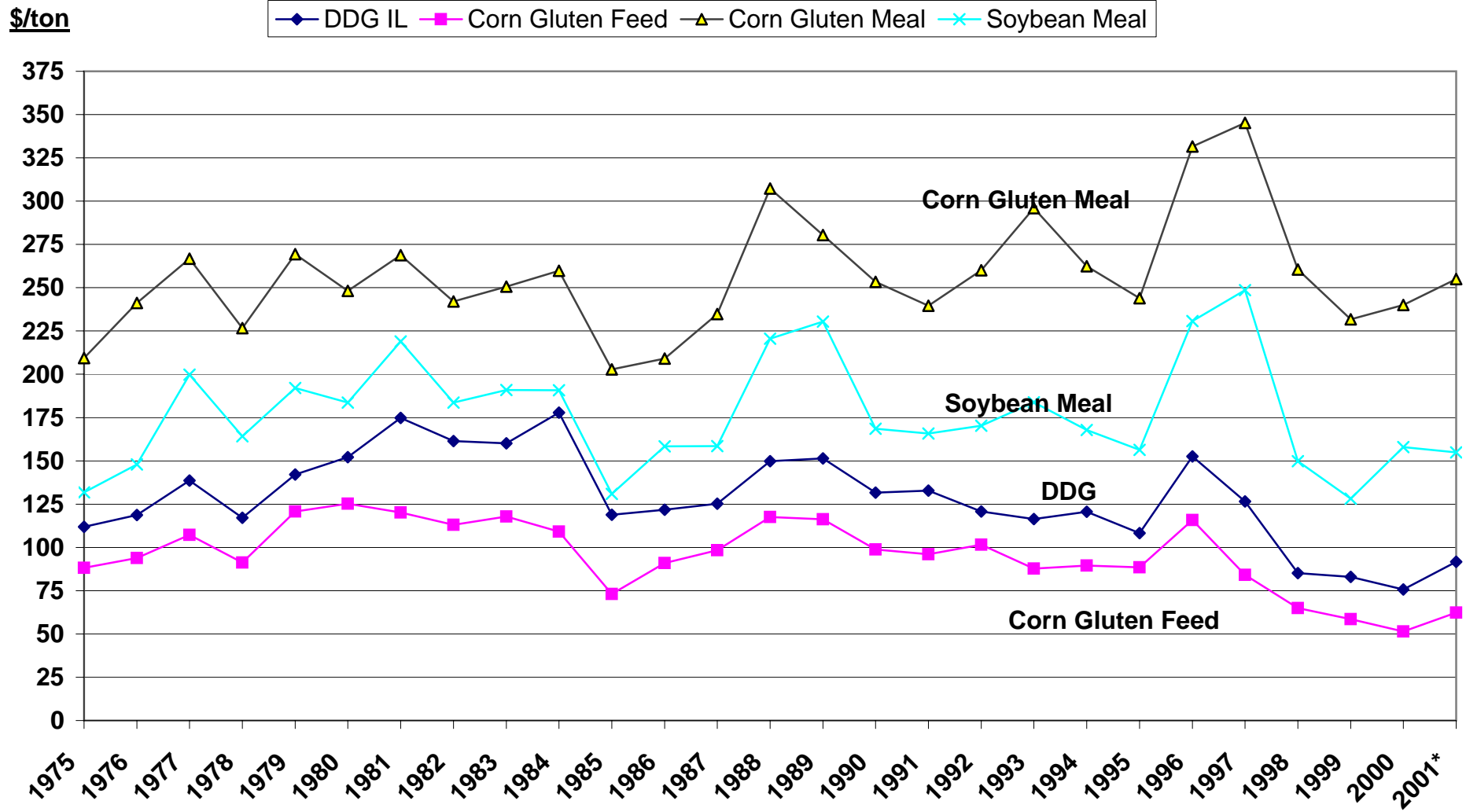
Computation based on the following:

Corn: \$1.929/bu. cash price (Wall Street Journal).  
 Corn oil: 1.55 lb./bu., \$0.27/lb. (Wall Street Journal).  
 Gluten feed: 13.5 lb./bu., \$86/ton, Illinois (USDA, Market News).  
 Gluten meal: 2.65 lb./bu., \$226.9/ton, Illinois (USDA Market News).  
 Starch: 31.5 lb./bu., \$0.12/lb. (USDA, ERS).  
 Ethanol: 2.45 (wet-mill)/2.58 (dry-mill) ga./bu., \$1.36/ga. (Mpls/St. Paul market, CPC).  
 Corn syrup: 40 lb./bu., \$0.12/lb. (Milling & Baking News).  
 HFCS: 33.3 lb./bu. 55% HFCS (dry weight), \$0.20/lb. (Milling & Baking News).  
 DDG: 18 lb./bu., \$120.5/ton (USDA, Grain & Feed Market News).

## Industrial Uses of Corn in the U.S. (1975-2000)

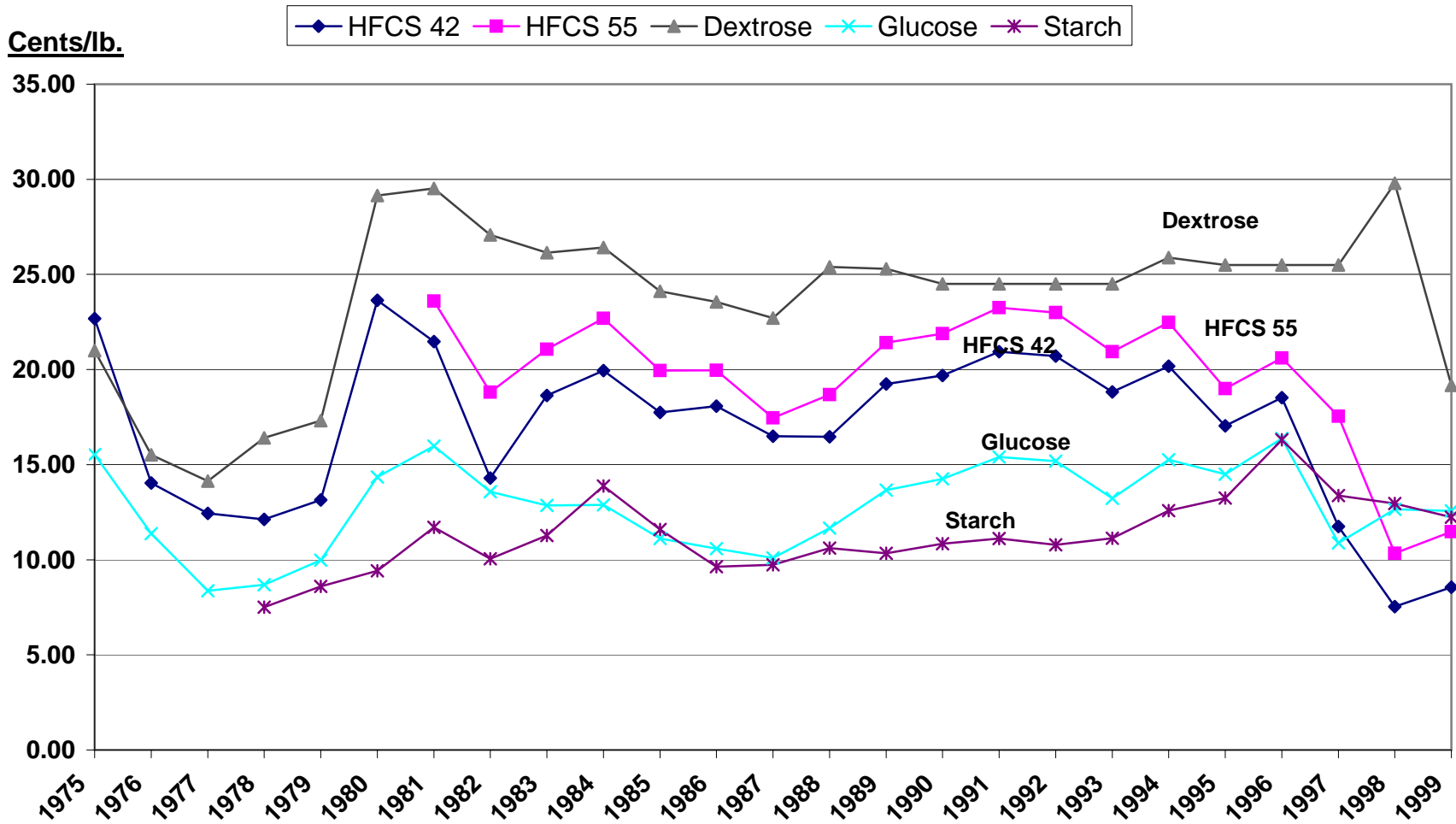


## Protein Feed Prices, 1975-2001

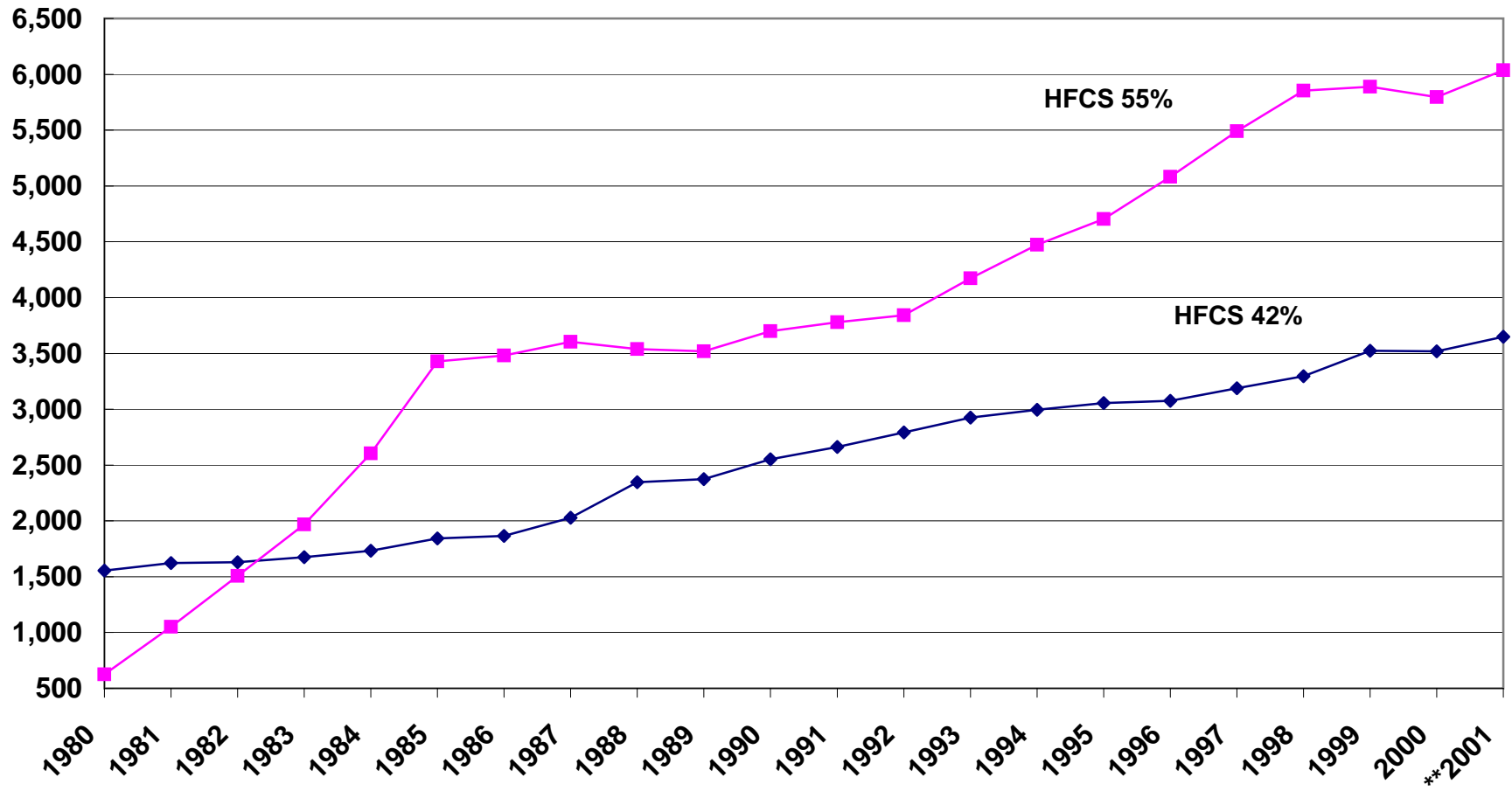


\*January-November 2001

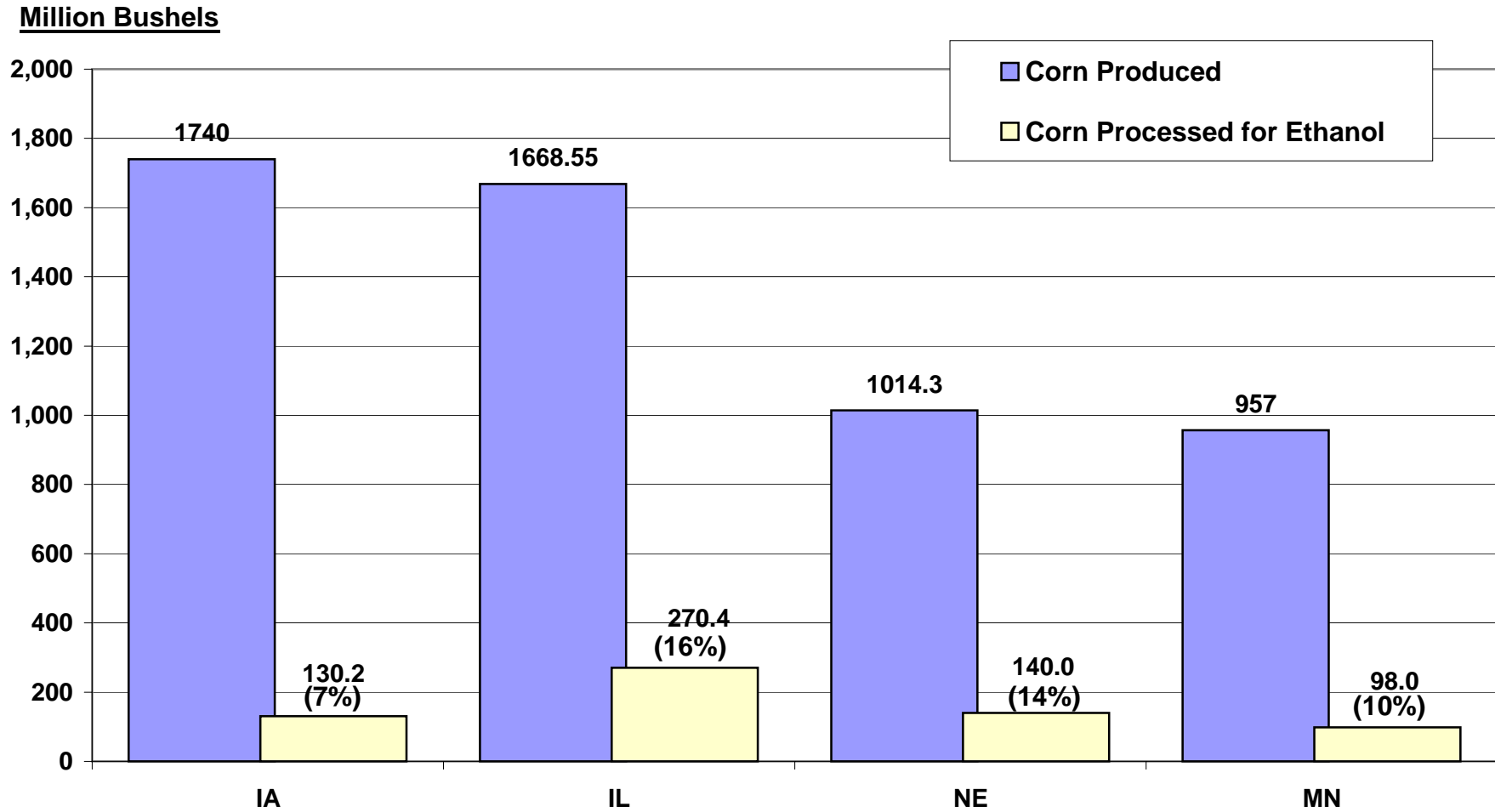
## Value-Added corn Products Prices (1975-2000)



## HFCS Production in the U.S. (1,000 short tons, dry weight)

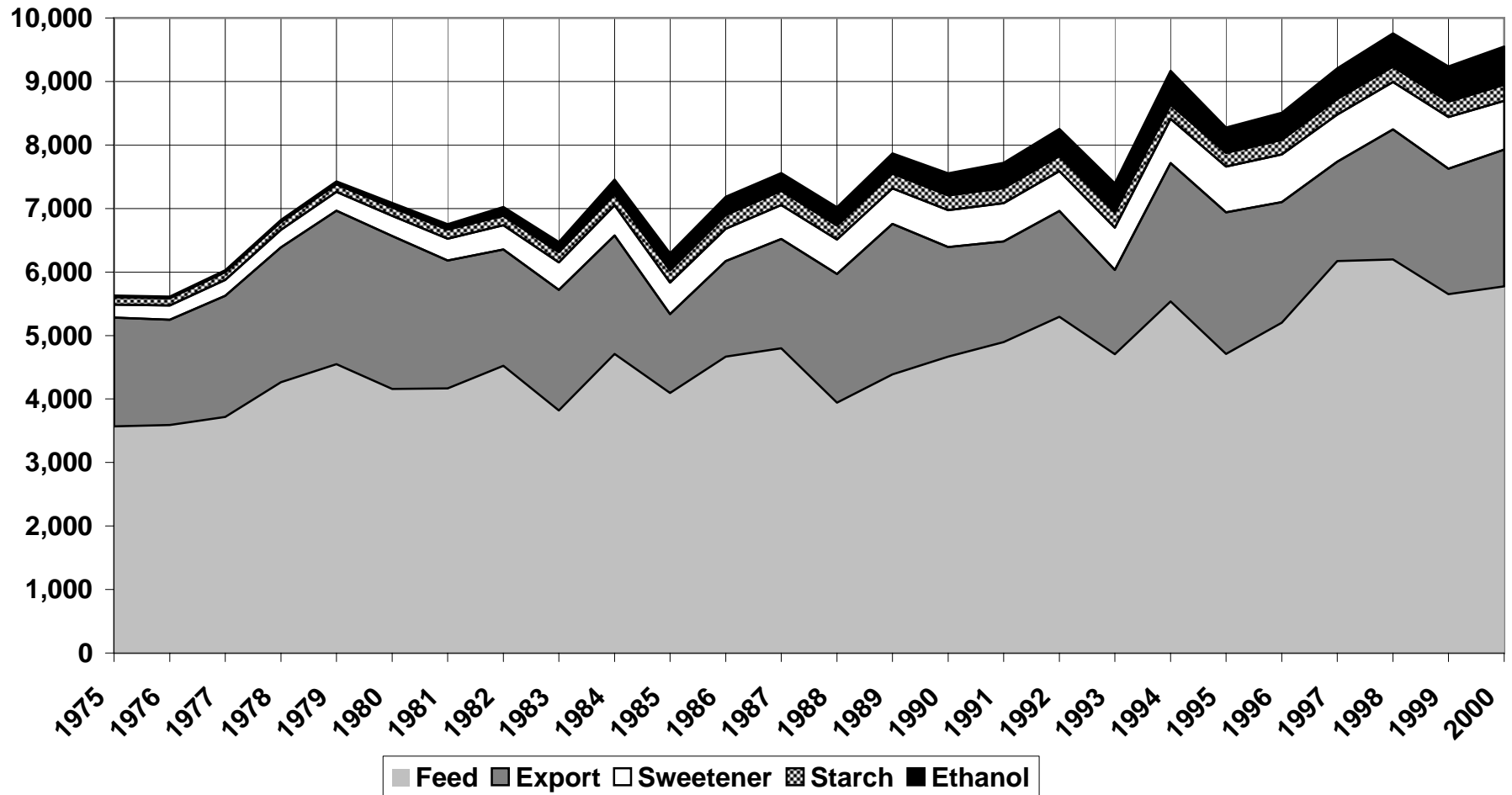


## Corn Produced & Processed for Ethanol (2000)

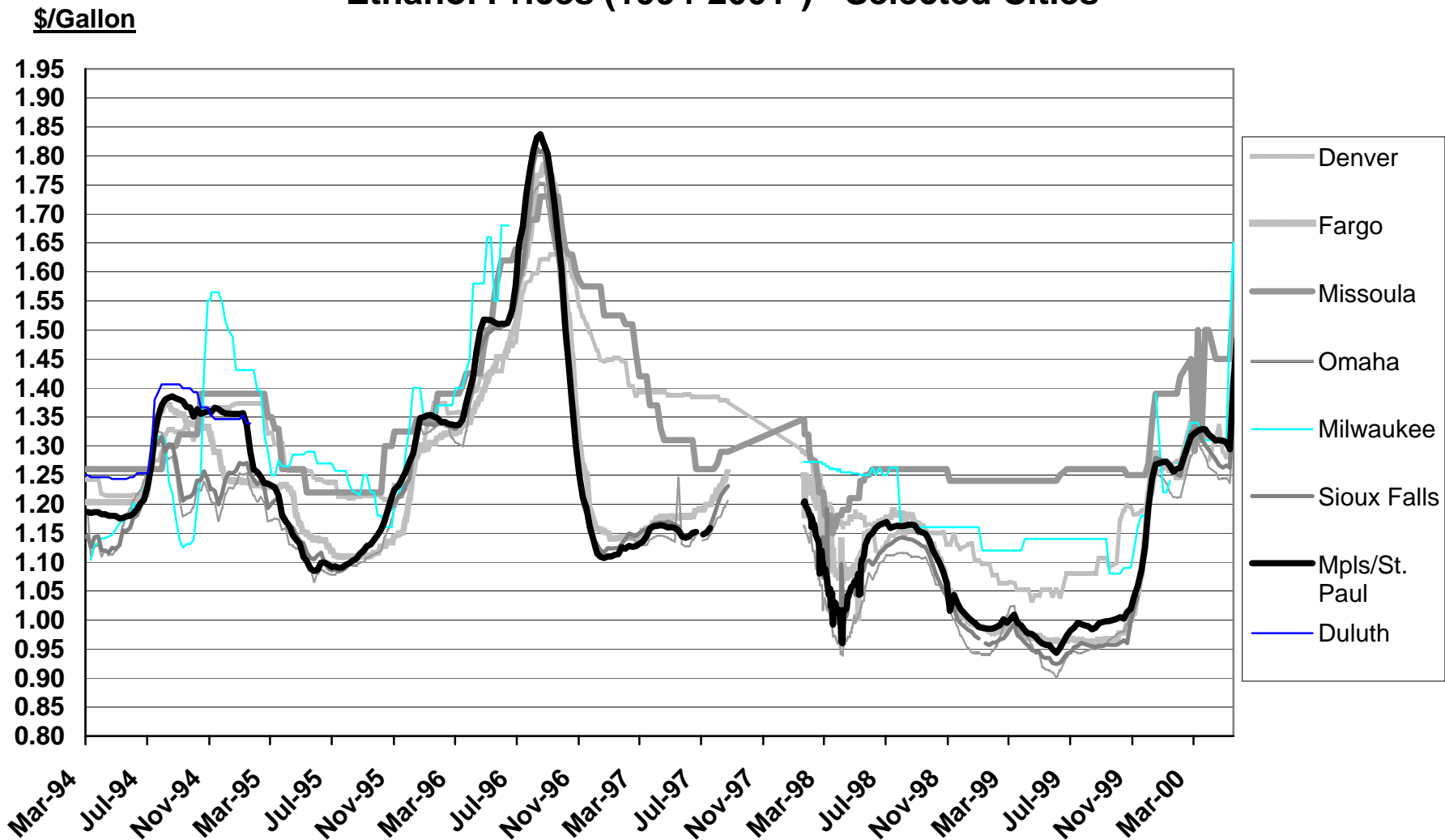


## Corn Utilization Trend, U.S. (1975-2000)

Million Bushels

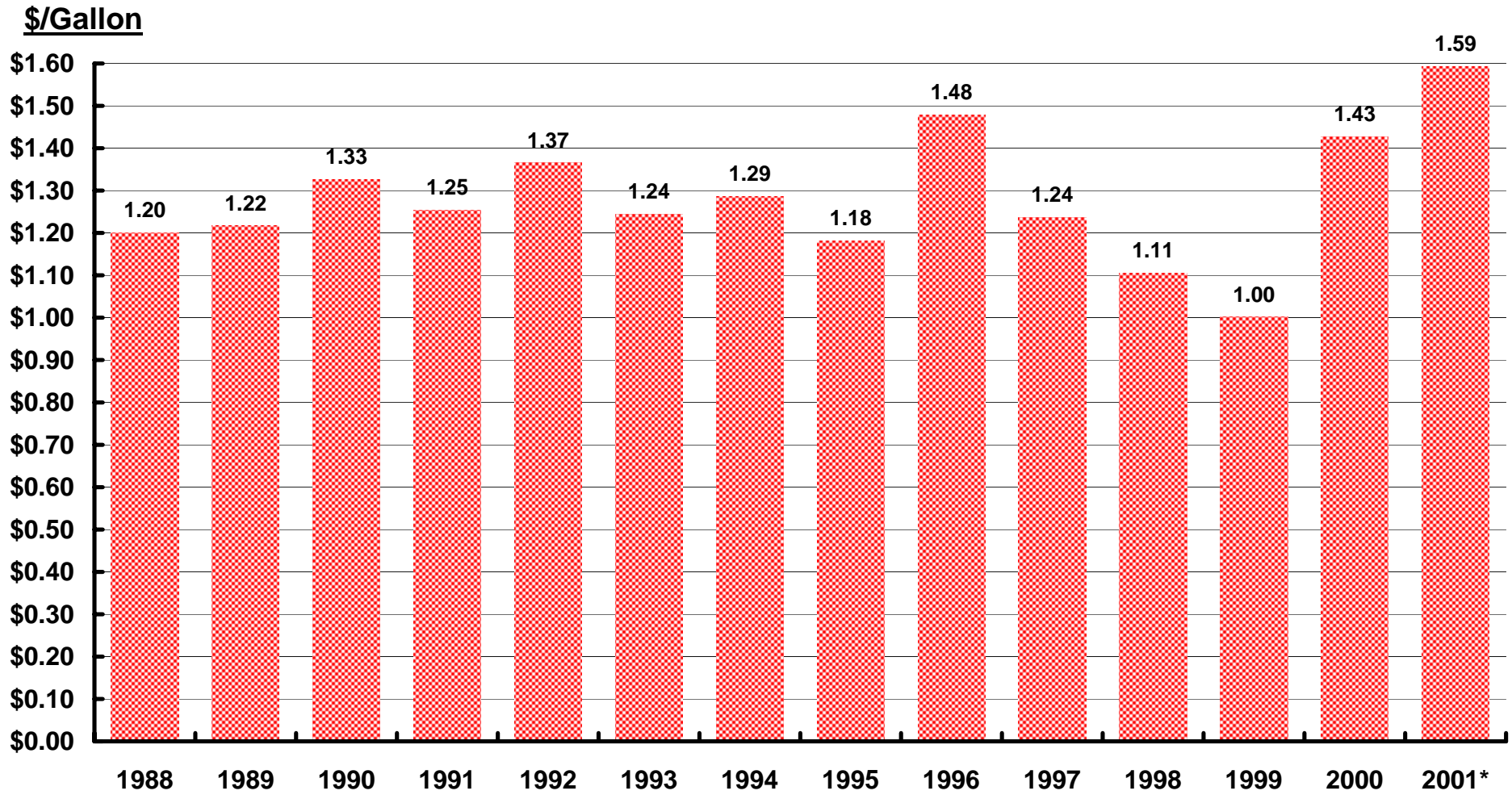


## Ethanol Prices (1994-2001\*) - Selected Cities



\* January - November 2001

## Minnesota Ethanol Prices, Annual Average



\*2001 - January to November average.