ECONOMIC IMPACT

OF

THE CORN AND ETHANOL INDUSTRY

IN MINNESOTA

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Economic Impact of the Corn and Ethanol Industry in Minnesota

Abstract

Minnesota's corn industry consists of corn production and processing. In 2007, Minnesota harvested 1.139 billion bushels of corn, a second record-high, ranking the state the fourth largest corn producer in the U.S. In the same year, Minnesota processed 252 million bushels or 22 percent of the annual corn crop into ethanol and other corn products, with an estimated ethanol production of 670 million gallons.

The objectives of this economic impact analysis are to assess the economic contributions of corn and ethanol production in Minnesota, including the output and employment impacts generated by the corn and ethanol industry.

The economic impact[1)] as defined in this analysis includes the direct, indirect, and induced impacts. ***Direct impact*** represents the effect of corn and ethanol production output. ***Indirect Impact*** represents the effect on all other economic sectors due to purchases by the corn industry to generate the afore-mentioned output. ***Induced impact*** represents the effect on all economic sectors due to the expenditures of new income generated by the direct and indirect impacts. ***Total impact*** is the sum of direct, indirect and induced impacts.

Based on the 2007 output value of corn and ethanol production in Minnesota, the total economic impact is derived from a $4.38 billion corn crop and $1.68 billion in ethanol and its by-products. The direct impact to Minnesota's economy is $6.06 billion. Adding indirect and induced impacts, the accumulative total economic impact or "multiplier effect" is estimated at $12.06 billion, with an employment impact of 70,225 jobs.

[1)] The impact analysis was performed using The IMPLAN Program (www.implan.com). IMPLAN is an input-output economic assessment system, which allows users to build economic models to estimate the impacts of economic activities at the state, county, or local levels.

Economic Impact of the Corn and Ethanol Industry in Minnesota

Keywords and definitions

1. ***Corn production***: Farm-level corn crop production.
2. ***Corn processing***: All value-added industrial processing of corn into ethanol and other products, including corn sweeteners, corn oil, corn starch, and protein feeds.
3. ***Ethanol production***: Corn processing into ethanol and its by-products.
4. ***Output impact***: The output impact measures the change in production output of all industries due to the change in production of a certain economic sector or sectors. (In this study, it's the corn production and ethanol production industry/sectors.)
5. ***Employment impact***: Employment impact measures the change in the number of jobs of all economic sectors due to the change in production output of a certain economic sector or sectors. (In this study, it's the corn production and ethanol production industry/sectors.)
6. ***Direct impact***: The effect of change in corn and ethanol production output.
7. ***Indirect Impact***: The effect on all other economic sectors due to purchases by corn and ethanol industry to generate the afore-mentioned output.
8. ***Induced impact***: The effect on all economic sectors due to the expenditures of new income generated by the direct and indirect impacts.
9. ***Total impact***: The sum of direct, indirect and induced impacts.
10. ***Output multiplier***: Total output impact.
11. ***Employment multiplier***: Total employment impact.

For this analysis, ***Minnesota Corn and Ethanol Industry*** is defined as being composed of two sectors: on-farm corn production and corn processing into ethanol and by-products.

The economic impacts include three scenarios: ***Corn Production Impact***, ***Ethanol Production Impact***, and ***Combined Total Impact of Corn and Ethanol Production***.

Economic impact model

Economic impact model is the basis for an input-output analysis to assess the effect of changes in output and employment of a production sector or sectors in an economy. In this study, the ***IMPLAN Program and Database*** is used to build the economic impact model.

IMPLAN (Impact Analysis for Planning) is an economic impact assessment modeling system widely used in the U.S. by economic forecasters and analysts for policy-making purposes. IMPLAN, as a dynamic economic modeling tool, applies input-output relationships or inter-linkages of output-producing industries or sectors in a functioning economy of a region, and estimates the economic impact of an industry or sector output.

ECONOMIC IMPACT SUMMARY

Three Impact Scenarios (2007):

1. Minnesota Corn Production – Output & Employment Impacts

The impact is based on the value of corn production in 2007:
- Total production: 1,138,800,000 bushels
- Price received by growers: $3.85/bushel
- Value of production: $4,384,380,000 ($4.38 billion)

	Direct Impact	Indirect Impact	Induced Impact	Total Impact
Output Impact *(Billion $)*	**$4.38**	**$2.20**	**$3.21**	**$9.80**
Employment Impact *(# of Jobs)*	**24,577**	**13,371**	**27,971**	**65,920**

2. Minnesota Ethanol Production – Output & Employment Impacts

The impact is based on the value of ethanol production plus by-products in 2007:

- Ethanol production (670 million gallons) x price ($2.12/gallon) = $1,420.4 million
- DDG production (2,250,000 tons) x price ($113.37/ton) = $255.08 million
- Total value: $1,420.4 million + $255.08 million = $1,675.48 million ($1.68 billion)

	Direct Impact	Indirect Impact	Induced Impact	Total Impact
Output Impact *(Billion $)*	**$1.68**	**$0.37**	**$0.22**	**$2.27**
Employment Impact *(# of Jobs)*	**1,445**	**913**	**1,948**	**4,305**

3. Minnesota Corn & Ethanol Production – Combined Total Impacts

The impact is based on the combined value of corn and ethanol production in 2007:

- Value of corn production: $4,384,380,000 ($4.38 billion)
- Value of ethanol & by-products: $1,675,480,000 ($1.68 billion)
- Combined total value: 6,060,860,000 ($6.06 billion)

	Direct Impact	Indirect Impact	Induced Impact	Total Impact
Output Impact *(Billion $)*	**$6.06**	**$2.57**	**$3.43**	**$12.06**
Employment Impact *(# of Jobs)*	**26,022**	**14,284**	**29,919**	**70,225**

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Introduction: The Corn and Ethanol Industry in Minnesota and Economic Impact

Corn production is the largest agricultural sector in Minnesota. Over 30 percent of Minnesota's farmland is cultivated for corn, the largest acreage of any crop in the state. In 2007, Minnesota harvested 1.139 billion bushels of corn, a second record-high, ranking the state the fourth largest corn producer in the U.S. From 1990 to 2007, corn production in Minnesota has increased almost 50 percent, from 763 million bushels in 1990 to 1,139 million bushels in 2007.

Ethanol production in Minnesota has also undergone phenomenal growth. In 2007, Minnesota processed 252 million bushels or 22 percent of the annual corn crop into ethanol and other corn products, with an estimated ethanol production of 670 million gallons. This is a huge increase from the 11 million gallons of ethanol output in 1990.

Minnesota has 31,782 corn farms[2)] and 17 ethanol plants[3)] that produced an annual output value of $4.38 billion and $1.68 billion respectively. The combined total output, or direct impact, was $6.06 billion in 2007.

The objectives of this economic impact analysis are to assess the economic contributions of corn and ethanol production in Minnesota, including the output and employment impacts generated by corn and ethanol combined.

The analysis is performed with the IMPLAN (Impact Analysis for Planning) Program and Database. IMPLAN is an economic impact assessment modeling system that allows the user to build economic input-output models to estimate the impacts of economic changes at state, county, or regional levels.

The IMPLAN model helps measure the output and employment impacts of an economic or industry sector or multiple sectors or industries. In this study, output is the value of production of Minnesota's corn and ethanol industry. ***Output impact*** is the change of production levels of all industries due to the change in production of the corn and ethanol industry. Employment is the number of jobs in the corn and ethanol industry. ***Employment impact*** represents the change in the number of jobs of all industries due to the change in production of the corn and ethanol industry.

The economic impact as defined in this study includes the direct, indirect, and induced impacts. ***Direct impact*** represents the effect of corn and ethanol production output. ***Indirect Impact*** represents the effect on all other economic sectors due to purchases by the corn and ethanol industry to generate the afore-mentioned output. ***Induced impact*** represents the effect on all economic sectors due to the expenditures of new income generated by the direct and indirect impacts. ***Total impact*** is the sum of direct, indirect and induced impacts.

Three economic impact scenarios are presented in this analysis:

1. Corn production and economic impacts;
2. Ethanol production – including by-products – and economic impacts; and
3. Combined total of corn and ethanol production and economic impacts.

The following chapters examine industry statistics of corn and ethanol – including production, utilization, processing, prices, value-added, and industry trends, and estimate the economic impacts of the dynamic corn and ethanol industry to Minnesota's state economy.

[2)] Ag Census 2002. [3)] In 2008, Minnesota has 18 operating ethanol plants.

MINNESOTA CORN STATISTICS

	2007	1990
Corn Production	1,139 million bushels	763 million bushels
National Ranking in Corn Production	No. 4	No. 4
Corn Acres		
Planted	8.4 million acres	6.7 million acres
Harvested	7.8 million acres	6.2 million acres
Corn Output Value	$4.38 billion	$1.65 billion
Corn Utilization		
Feed use	223 million bushels	231 million bushels
Processing	252 million bushels	34 million bushels
Corn Processed for Ethanol	250 million bushels	4.4 million bushels
Export (domestic & international)	554 million bushels	384 million bushels
Corn Prices	$3.85/bushel	$2.17/bushel
Total Economic Impact (Multiplier Effects)		
• Output impact	$9,797 million	N/A
• Employment impact	65,920 jobs	N/A

Economic Impact of the Corn and Ethanol Industry in Minnesota

MINNESOTA ETHANOL STATISTICS

	2007	1990
Ethanol Production	670 million gallons	11 million gallons
National Ranking in Ethanol Production	No. 5	No. 4
Ethanol Consumption	256 million gallons	20 million gallons
Net Ethanol Export/Import	414 million gallons exported	9 million gallons imported
Ethanol Plants	17 plants	5 plants
Co-op ownership	10 plants	1 plant
Co-op members	4,880 members	3,000 members
Corn Processed for Ethanol	250 million bushels	4.4 million bushels
Ethanol Output Value	$1,675 million	$19 million
Ethanol Prices	$2.12/gallon	$1.33/gallon
Ethanol Producer Payment	$15 million	$2 million
Total Economic Impact (Multiplier effects)		
• Output impact	$3,971 million	$29 million
• Employment impact	24,174 jobs	166 jobs

ethanol
Fuel For Clean Air

Economic Impact of the Corn and Ethanol Industry in Minnesota

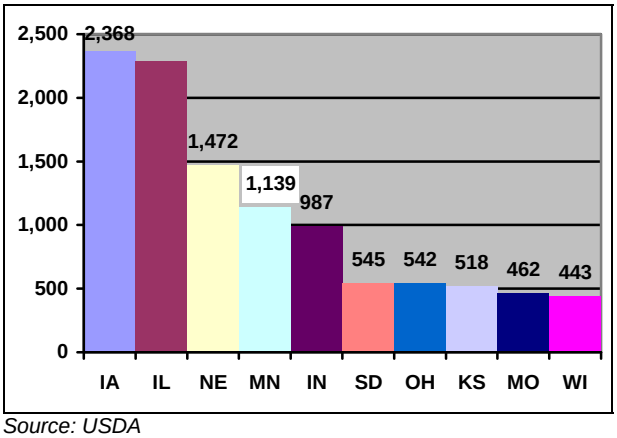
I. Minnesota Corn Production and Economic Impact

A. Corn Production

Minnesota ranks No. 4 in corn production among all U.S. states. In 2007, Minnesota produced 1.139 billion bushels of corn from 7.8 million harvested acres, contributing 9 percent of the total U.S. corn production. Only Iowa, Illinois, and Nebraska produced more corn than Minnesota.

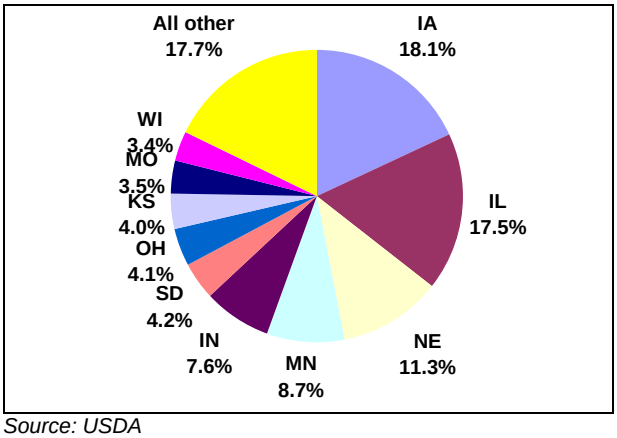
Minnesota corn production has increased at an average annual rate of 9.4 percent from 1990 to 2007. This is the highest growth rate among the top five corn states, and higher than the U.S. national average of 5.02 percent. The annual growth for the other top corn states during the same time period averaged 7.1% for Iowa, 5.1% for Illinois, 4.9% for Nebraska, and 4.5% for Indiana.

Chart-1: U.S. Top Corn States *(million bushels)*



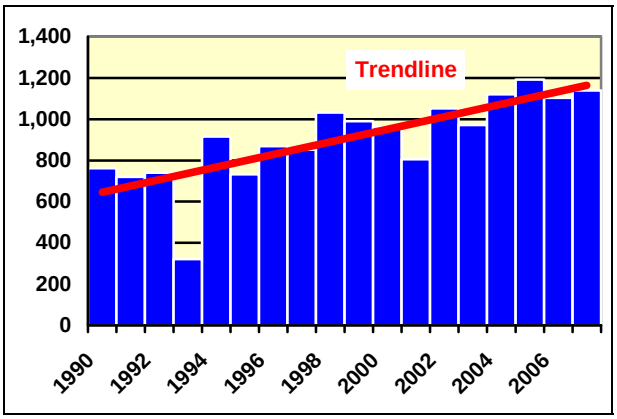
Source: USDA

Chart-2: U.S. Top Corn States *(% share)*



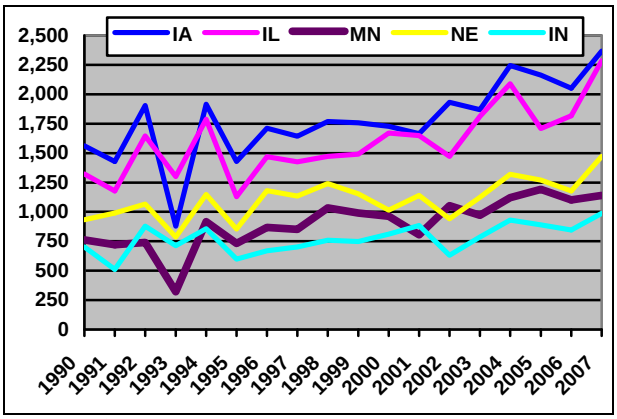
Source: USDA

Chart-3: MN Corn Production Trend *(mil. bu.)*



Source: USDA

Chart-4: Top 5 States Production Trends *(mil. bu.)*



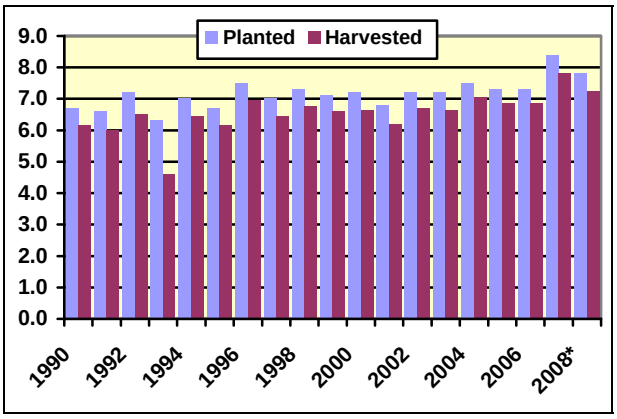
Source: USDA

I. Minnesota Corn Production and Economic Impact *(continued)*

B. Corn Acres

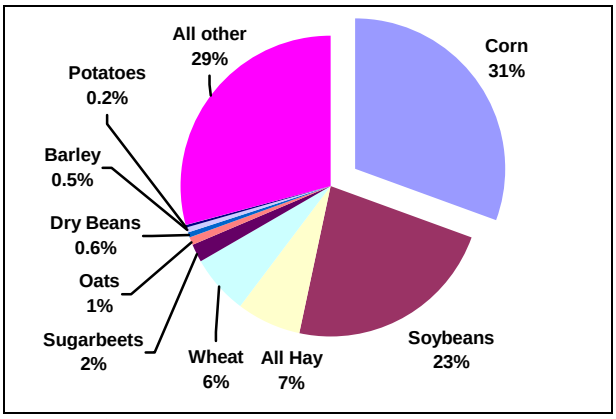
Minnesota has 27.4 million acres of farm land, and corn accounted for 31 percent of the total in 2007. In 1990, Minnesota had 6.7 million planted acres of corn crop; by 2007, corn acres increased to 8.4 million, a 25 percent growth. For comparison, other crops, such as soybeans and wheat, underwent acreage changes of a 32% increase (soybeans) and a 40% decrease (wheat) respectively. Nationwide, from 1990 to 2007, U.S. corn acreage increased 26%, while soybeans increased 10%, and wheat decreased 22%.

Chart-5: MN Corn Acres *(million acres)*



Source: USDA

Chart-6: MN Crop Acres *(2007)*

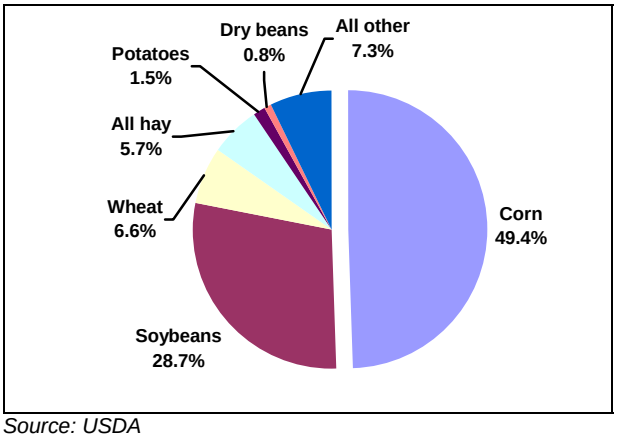


Source: USDA

C. Corn – Value of Production

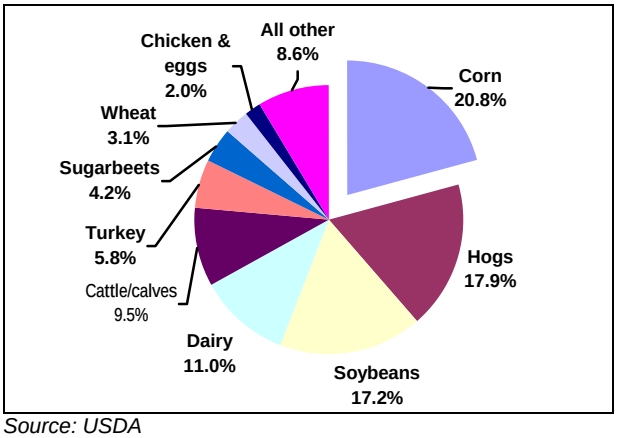
Corn is Minnesota's No. 1 agricultural crop, generating $4.38 billion in farm marketing. This represents almost 50 percent of Minnesota's total crop value in 2007. Due to the rise of corn prices in recent years, the value of corn production climbed 38 percent between 2006 and 2007, from $3.19 billion to $4.38 billion.

Chart-7: MN Crop Value *(2007 % share)*



Source: USDA

Chart-8: MN Cash Receipts: All Products *(2006)*



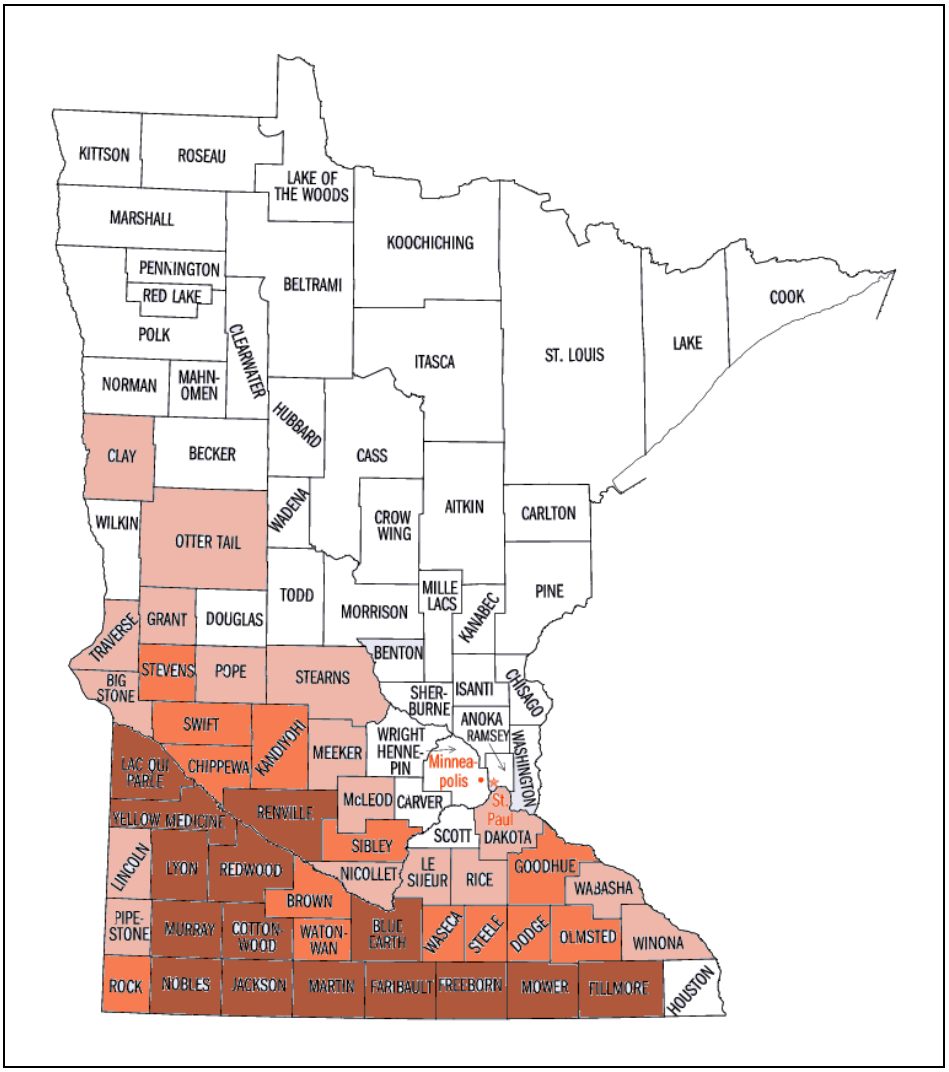
Source: USDA

I. Minnesota Corn Production and Economic Impact *(continued)*

D. Top Corn Counties

Minnesota's top corn-producing counties are located in the southern and western regions of the state. Renville is the No. 1 corn county with 43.6 million bushels of production, followed by Martin (41.2 million bushels), Faribault (39.2 million bushels), Redwood (38.3 million bushels), and Mower (34.4 million bushels).

Map-1: MN Top Corn Counties



Top 15 Corn Counties:

1. Renville
2. Martin
3. Faribault
4. Redwood
5. Mower
6. Freeborn
7. Nobles
8. Cottonwood
9. Jackson
10. Blue Earth
11. Yellow Medicine
12. Lyon
13. Fillmore
14. Murray
15. Lac Qui Parle

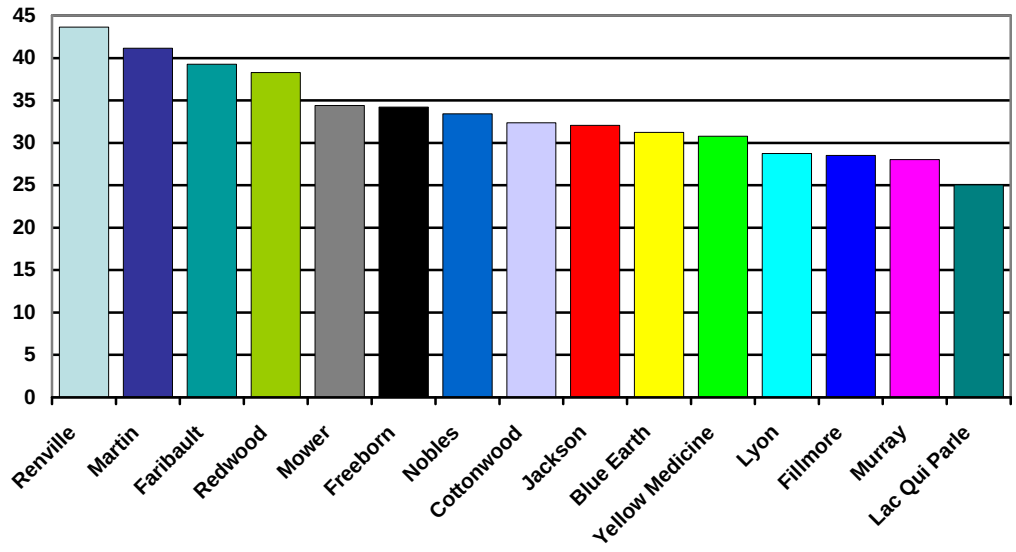
Over 25 million bu.
20-25 million bu.
10-20 million bu.

Source: AMS, MDA

I. Minnesota Corn Production and Economic Impact *(continued)*

Minnesota's top 15 corn counties produced 44 percent of the total annual corn crop in the state in 2007. About 77 Minnesota counties produce corn (among 87 counties), compared to 75 counties that produce soybeans – Minnesota's #2 agricultural crop.

Chart-9: MN Top 15 Corn Counties – 2007 *(million bushels)*



Source: USDA

Table-1: Minnesota Top Corn Counties: 1990 & 2007 Production

Million bushels

2007 Rank	County	2007 Production	1990 Production	1990-2007 % Increase
1	Renville	43.65	26.97	61.81%
2	Martin	41.17	27.99	47.10%
3	Faribault	39.25	26.73	46.81%
4	Redwood	38.30	25.88	47.97%
5	Mower	34.40	24.41	40.94%
6	Freeborn	34.20	26.57	28.71%
7	Nobles	33.42	23.12	44.51%
8	Cottonwood	32.37	19.22	68.44%
9	Jackson	32.05	23.71	35.14%
10	Blue Earth	31.23	23.81	31.15%
11	Yellow Medicine	30.77	18.41	67.14%
12	Lyon	28.76	18.24	57.65%
13	Fillmore	28.51	18.52	53.94%
14	Murray	28.03	17.66	58.73%
15	Lac Qui Parle	25.04	12.95	93.38%
	State Total	**1,138.80**	**762.60**	**49.33%**

Source: USDA

I. Minnesota Corn Production and Economic Impact *(continued)*

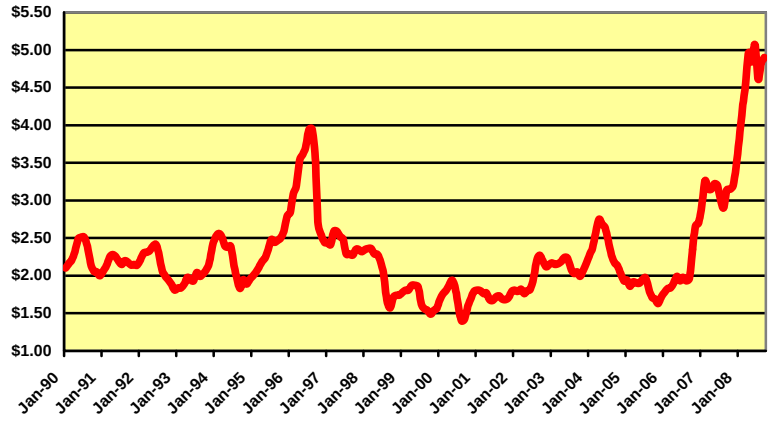
E. Corn Prices

Corn prices received by Minnesota growers averaged $4.64 per bushel in 2008 (January-September average), up from $3.85 in 2007 and $1.71 in 2000. Corn prices have been reaching historical highs since 2007 due to strong demand from international markets and unprecedented growth in the domestic biofuels industry. Various other factors also play a role, including tightened global food supply and higher input cost such as energy and fertilizer.

As corn prices more than doubled since 2000, Minnesota producers have seen unprecedented increase in farm income from corn that also served as a stimulus for expanded corn production and acreage. Prices are predicted to remain strong in the foreseeable future which would further boost the corn production sector in Minnesota and U.S.

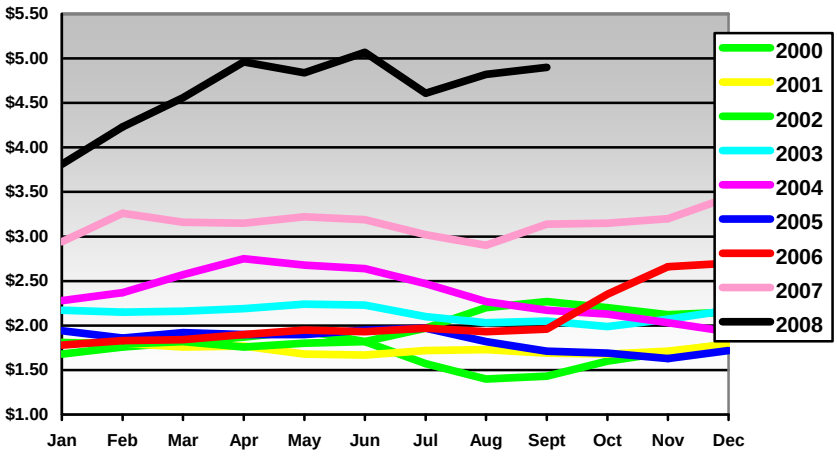
It is important to point out the cost of corn production has been increasing. Rising costs for energy, fertilizer, land, and seed genetics are predicted to continue for 2008 and 2009.

Chart-10: Minnesota Corn Prices Received by Growers *(monthly prices-$/bushel)*



Source: USDA

Chart-11: Minnesota Corn Prices Received by Growers *(monthly prices-$/bu.)*



Source: USDA

I. Minnesota Corn Production and Economic Impact *(continued)*

Minnesota corn prices are generally $0.15 lower than the national average. Among America's five leading corn-producing states, Minnesota has the lowest corn price while Illinois has the highest, with an average price difference of $0.22 per bushel. That translates into $203 million in lost cash value annually for Minnesota corn farmers.

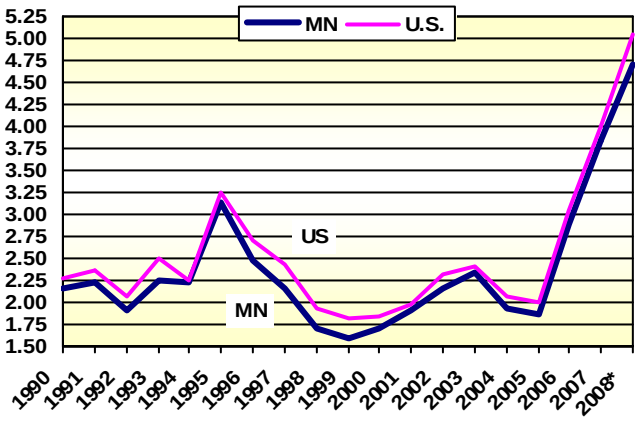
Table-2: U.S. Top 5 Corn States: Comparing Corn Prices *(Dollar per Bushel)*

Year	Price Rank					U.S. Average	High	Low
	1	2	3	4	5			
	IL	IN	NE	IA	MN			
1990	2.36	2.31	2.28	2.21	2.17	2.28	2.36	2.17
1991	2.46	2.45	2.34	2.30	2.22	2.37	2.46	2.22
1992	2.11	2.09	2.09	2.00	1.91	2.07	2.11	1.91
1993	2.57	2.51	2.52	2.44	2.26	2.50	2.57	2.26
1994	2.27	2.25	2.33	2.22	2.23	2.26	2.33	2.22
1995	3.30	3.38	3.22	3.20	3.14	3.24	3.38	3.14
1996	2.79	2.78	2.64	2.60	2.47	2.71	2.79	2.47
1997	2.53	2.53	2.32	2.33	2.15	2.43	2.53	2.15
1998	2.04	2.11	1.88	1.86	1.71	1.94	2.11	1.71
1999	1.91	1.88	1.75	1.72	1.60	1.82	1.91	1.60
2000	1.91	1.90	1.90	1.75	1.71	1.85	1.91	1.71
2001	2.04	1.98	1.94	1.90	1.90	1.85	2.04	1.90
2002	2.35	2.41	2.32	2.22	2.15	1.98	2.41	2.15
2003	2.42	2.53	2.39	2.37	2.35	2.32	2.53	2.35
2004	2.14	1.99	2.02	1.99	1.94	2.42	2.14	1.94
2005	2.08	2.00	1.92	1.94	1.86	2.06	2.08	1.86
2006	3.07	3.17	3.00	3.03	2.89	2.00	3.17	2.89
2007	4.05	4.05	4.00	4.00	3.85	3.04	4.05	3.85
Average	**2.43**	**2.45**	**2.43**	**2.41**	**2.38**	**2.42**	**2.45**	**2.38**
Price difference between IL & MN					**0.22**			
Price difference between US & MN					**0.15**			

Source: USDA, NASS

Chart-12: Corn Prices – MN & U.S.

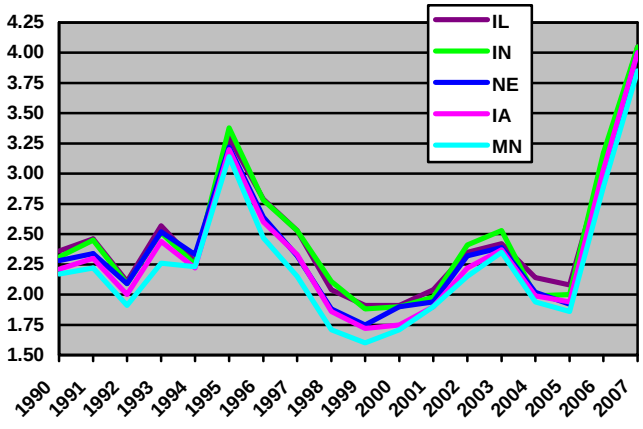
Annual average grower prices ($/bu)



Source: USDA.

Chart-13: Corn Prices – U.S. Top Corn States

Annual average grower prices ($/bu)



Source: USDA.

I. Minnesota Corn Production and Economic Impact *(continued)*

G. Economic Impact of Corn Production in Minnesota

To assess the statewide economic impact of corn production in Minnesota and the level of output and employment multipliers associated with it, this analysis attempted at measuring the ***Direct***, ***Indirect***, and ***Induced*** impacts. ***Direct Impact*** represents the effect of corn production output. ***Indirect Impact*** represents the effect on all other economic sectors due to purchases by the corn industry to generate the afore-mentioned output. ***Induced Impact*** represents the effect on all economic sectors due to the expenditures of new income generated by the direct and indirect impacts. ***Total Impact*** is the sum of direct, indirect and induced impacts.

In addition, **Output Impact** or **Output Multiplier** and **Employment Impact** or **Employment Multiplier** represent both the value of output and job creation of corn production.

The analysis is performed with the IMPLAN Program, and the impact is based on the value of corn production in 2007:

- *Total production: 1,138,800,000 bushels*
- *Price received by growers: $3.85 per bushel*
- *Value of production: $4,384,380,000 ($4.38 billion)*

Table-3: Minnesota Corn Production: Output & Employment Impacts

	Direct Impact	Indirect Impact	Induced Impact	Total Impact
Output Impact *(Billion $)*	**$4.38**	**$2.20**	**$3.21**	**$9.80**
Employment Impact *(# of Jobs)*	**24,577**	**13,371**	**27,971**	**65,920**

Chart-14: Output Impact *(Billion $)*

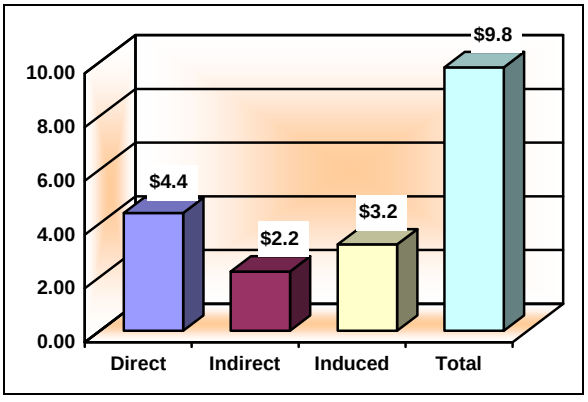
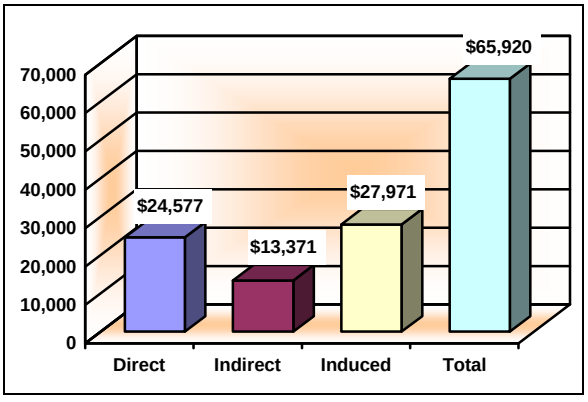


Chart-15: Employment Impact *(# of jobs)*



I. Minnesota Corn Production and Economic Impact *(continued)*

Minnesota corn production's total output impact is estimated at $9.8 billion, of which, Agriculture is the largest impact sector, at $4.5 billion, followed by the Finance, Insurance, and Real Estate (FIRE) sector at $1.3 billion, and the Service sector at $975 million.

Corn production's total employment impact is estimated at 65,920 jobs, of which, Agriculture is the largest impact sector with 26,328 jobs, followed by the Service sector with 12,781 jobs, and the Finance, Insurance, and Real Estate (FIRE) sector with 6,896 jobs.

Table-4: Output Impact by Sector

Sector	Impact *(Million $)*
Agriculture	$4,547
FIRE*	$1,280
Services	$975
Manufacturing	$905
Construction	$673
TCPU*	$311
Wholesale/retail trade	$269
All other	$836
Total	**$9,797**

**FIRE: Finance, insurance, and real estate*
**TCPU: Transportation, communication, and public utilities*

Chart-16: Output Impact by Sector *(Million $)*

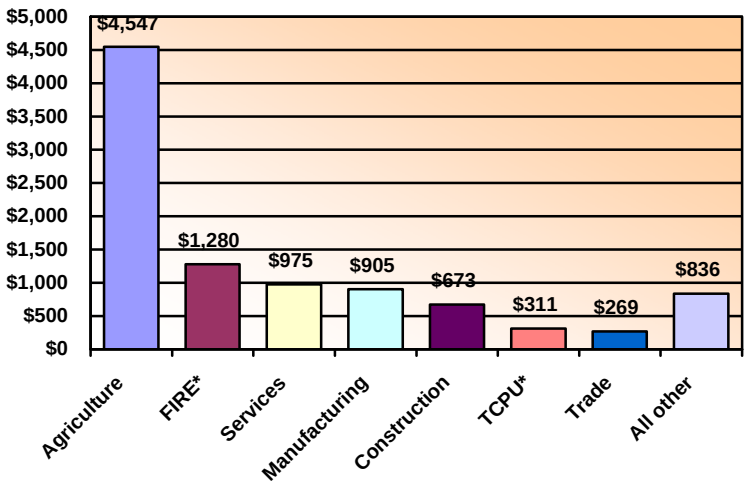
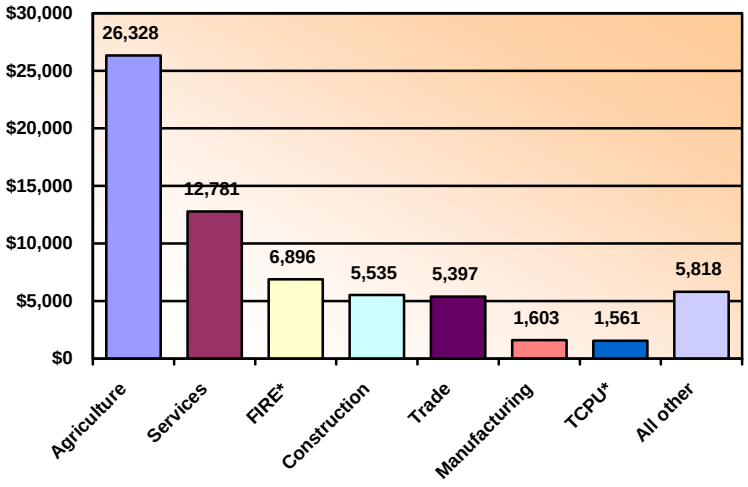


Table-5: Employment Impact by Sector

Sector	Impact *(# of jobs)*
Agriculture	26,328
Services	12,781
FIRE*	6,896
Construction	5,535
Trade	5,397
Manufacturing	1,603
TCPU*	1,561
All other	5,818
Total	**65,920**

**FIRE: Finance, insurance, and real estate*
**TCPU: Transportation, communication, and public utilities*

Chart-17: Employment Impact by Sector *(# of jobs)*



II. Minnesota Corn Utilization

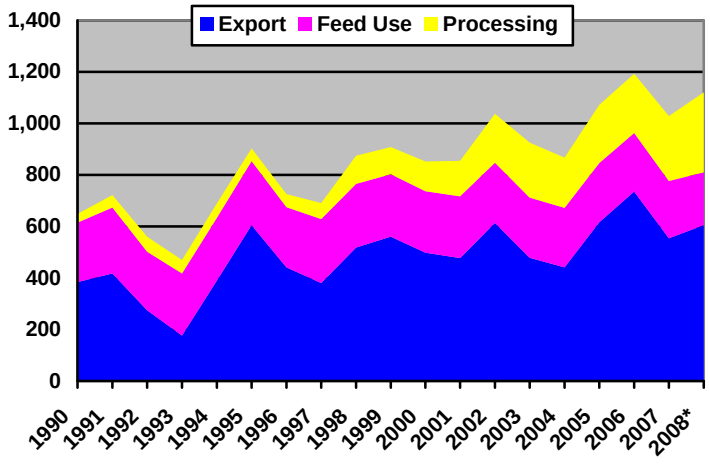
Minnesota corn utilization includes corn feed use, corn exports to domestic and international markets, and corn processing for ethanol and other value-added products, such as corn sweeteners, corn starch, corn oil, and protein feeds. From 1990 to 2007, corn utilization has increased nearly 60 percent, from 649 million bushels to 1,029 million bushels. The largest increase comes from corn processing, with a growth rate of 641 percent, while corn export has a growth rate of 44 percent and corn feed use of -3.5 percent.

Table-6: MN Corn Utilization *(million bushels)*

Year	Production	Export	Feed use	Processing
1990	763	384	231	34
1991	720	417	256	49
1992	741	274	228	58
1993	322	176	241	52
1994	916	390	243	56
1995	732	605	248	50
1996	869	441	234	50
1997	851	380	248	63
1998	1,033	518	247	110
1999	990	560	242	106
2000	964	498	239	115
2001	806	477	240	138
2002	1,052	614	233	190
2003	971	478	234	214
2004	1,121	441	231	195
2005	1,192	616	230	226
2006	1,103	736	227	229
2007	1,139	554	223	252
2008* *(Projected)*	1,120	605	205	310

Source: PRX

Chart-18: MN Corn Utilization Trend *(million bushels)*



**2008: Projected* *Source: PRX*

Minnesota Corn Utilization Trend

(% increase/decrease)

Average annual growth rate 1990-2008:

>> Corn production: 9%
>> Corn exports: 8%
>> Corn feed use: -0.5%
>> Corn processing: 15%

II. Minnesota Corn Utilization *(continued)*

In 2007, corn exports accounted for nearly one-half of Minnesota's annual corn crop, at 554 million bushels, followed by corn processing at 22 percent or 252 million bushels, and corn feed use at 20 percent or 223 million bushels. In 1990, however, the percentage share was 51 percent for corn exports, 30 percent for corn feed use, and only 5 percent for corn processing.

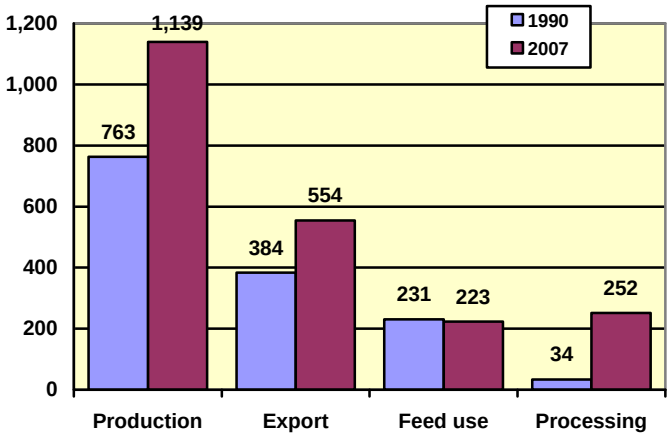
Table-7: Minnesota Corn Utilization:

1990 and 2007 Comparison *(Million bushels)*

	1990	2007	% change
Corn Production	763	1,139	49.3%
Corn Exports	384	554	44.3%
Corn Feed Use	231	223	-3.5%
Corn Processing	34	252	641.2%

Source: PRX, MDA/AMS

Chart-19: MN Corn – 1990 & 2007 *(Million bushels)*

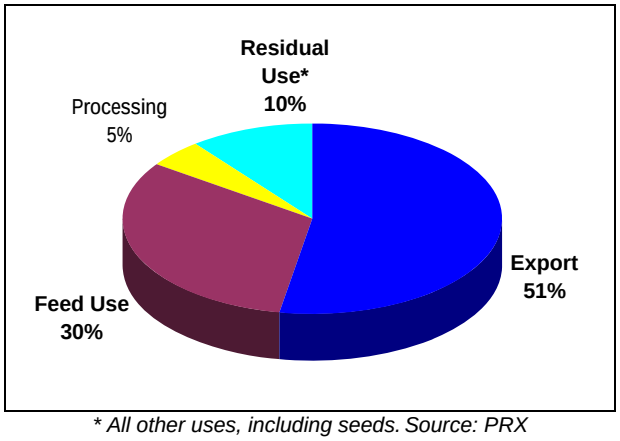


Source: PRX, MDA/AMS

The most noticeable percent change is in feed use and processing. Feed use declined from 30 percent of total utilization in 1990 to 20 percent in 2007, while processing rose from 5 percent of total utilization in 1990 to 22 percent in 2007.

Chart-20: MN Corn Utilization

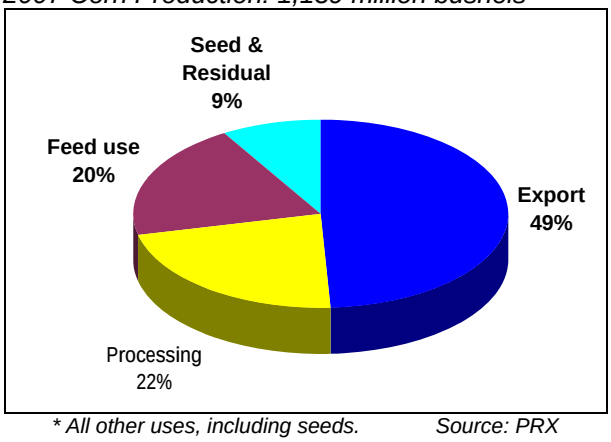
1990 Corn Production: 763 million bushels



** All other uses, including seeds. Source: PRX*

Chart-21: MN Corn Utilization

2007 Corn Production: 1,139 million bushels



** All other uses, including seeds. Source: PRX*

II. Minnesota Corn Utilization *(continued)*

The following data shows U.S. corn utilization in 1990 and 2007, for comparison.

In 1990, U.S. corn feed use accounted for one-half of the annual crop in 1990, a much larger portion than Minnesota's 30 percent; corn exports accounted for 22 percent, much smaller than Minnesota's 51 percent; and corn processing accounted for 18 percent – again much larger than Minnesota's 5 percent.

In 2007, U.S. corn feed use accounted for 37 percent of annual crop in 1990, much higher than Minnesota's 20 percent; corn exports accounted for 19 percent, much smaller than Minnesota's 49 percent; and corn processing accounted for 35 percent, again larger than Minnesota's 22 percent.

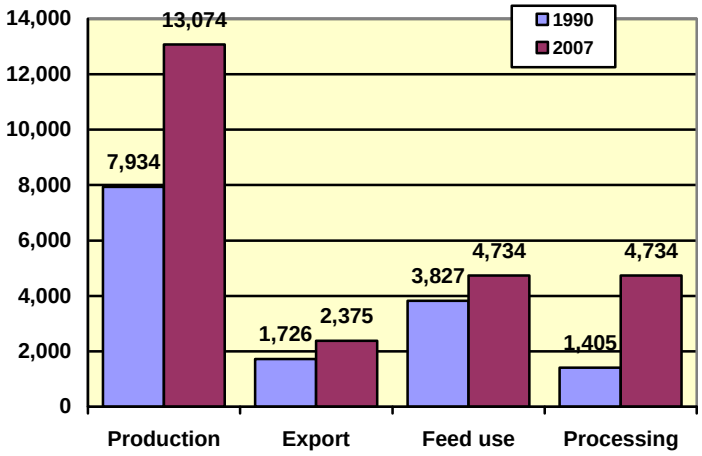
Table-8: U.S. and Minnesota Corn Utilization:

1990 and 2007 Comparison *(Million bushels)*

	1990	2007	% change
Corn Production			
U.S.	7,934	13,074	64.8%
MN	763	1,139	49.3%
Corn Exports			
U.S.	1,726	2,375	37.6%
MN	384	554	44.3%
Corn Feed Use			
U.S.	3,827	4,734	23.7%
MN	231	223	-3.5%
Corn Processing			
U.S.	1,405	4,734	211.4%
MN	34	252	641.2%

Source: PRX, MDA/AMS

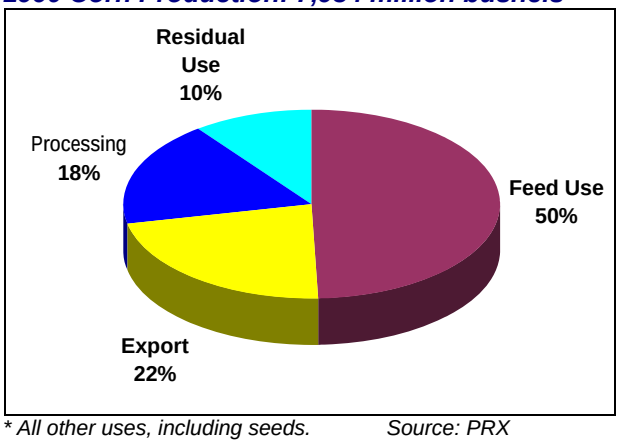
Chart-22: US Corn – 1990 & 2007 *(million bushels)*



Source: PRX, MDA/AMS

Chart-23: U.S Corn Utilization

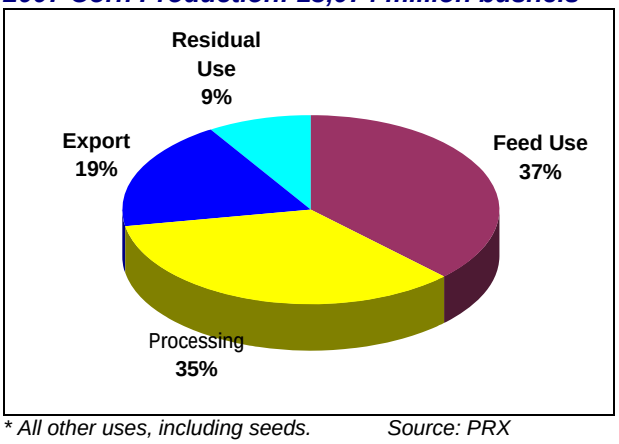
1990 Corn Production: 7,934 million bushels



** All other uses, including seeds.* *Source: PRX*

Chart-24: U.S Corn Utilization

2007 Corn Production: 13,074 million bushels



** All other uses, including seeds.* *Source: PRX*

II. Minnesota Corn Utilization *(continued)*

A. Corn Feed Use

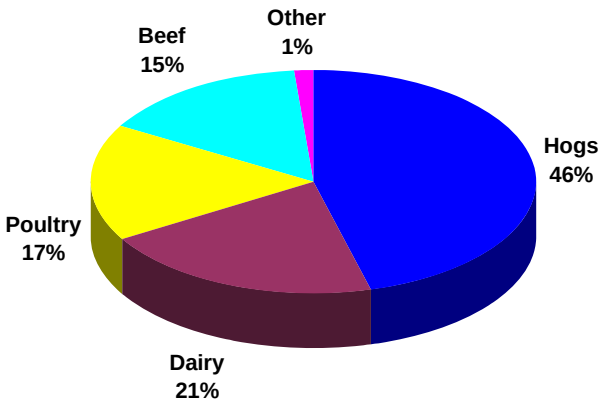
In 2007, corn feed use accounted for 20 percent of Minnesota's annual corn crop, at 223 million bushels. Hogs are the largest corn-consuming animal sector, at 46 percent; followed by dairy, 21 percent; poultry, 17 percent; and beef, 15 percent. From 1990 to 2007, total feed use experienced slight declines, since every livestock sector has either remained stable or declined in feed consumption.

Table-9: MN Corn Feed Use by Livestock Sector *(million bushels)*

Year	Hogs	Dairy	Poultry	Beef	Other	Total Feed Use	% of Corn Crop
1990	100	47	42	39	3	231	30.3%
1991	116	52	46	40	3	256	35.6%
1992	101	47	40	37	3	228	30.8%
1993	109	49	42	39	3	241	74.8%
1994	110	49	42	38	3	243	26.5%
1995	110	50	44	42	3	248	33.9%
1996	101	50	43	36	3	234	26.9%
1997	117	51	45	34	3	248	29.1%
1998	119	49	44	33	3	247	23.9%
1999	113	49	44	35	3	242	24.4%
2000	115	46	44	35	3	239	24.8%
2001	116	45	45	34	3	240	29.8%
2002	99	36	36	30	3	233	22.1%
2003	102	34	35	30	3	234	24.1%
2004	106	35	36	29	3	231	20.6%
2005	106	34	35	29	3	230	19.3%
2006	103	47	40	34	3	227	20.6%
2007	102	46	38	34	3	223	19.6%
2008* *(Projected)*	92	44	36	31	3	205	18.3%

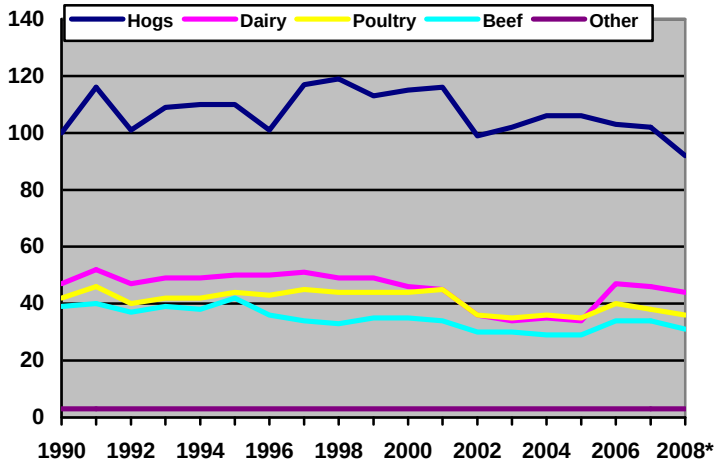
Source: PRX, MDA/AMS

Chart-25: MN Corn Feed Use *(2007)*



Source: PRX, MDA/AMS

Chart-26: MN Corn Feed Use Trend *(Million bushels)*



Source: PRX, MDA/AMS

II. Minnesota Corn Utilization *(continued)*

B. Corn Export

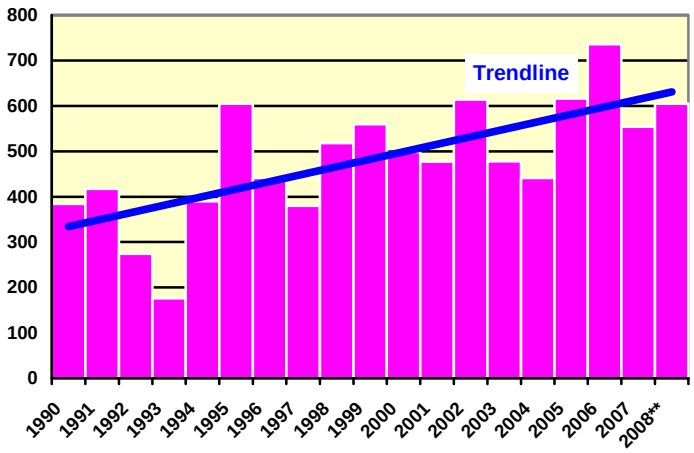
In 2007, corn exports to domestic and international markets accounted for 554 million bushels or nearly one-half of Minnesota's corn crop. For international markets, corn is the second largest export commodity for Minnesota's agriculture (after soybeans), with an estimated export value of $948 million, or 26 percent of Minnesota's total agricultural exports. The largest foreign market for Minnesota corn is Japan, with a market-share of 26 percent, followed by Mexico (14%), Korea (8%), and Taiwan (7%). From 1990 to 2007, Minnesota's corn exports to domestic and international markets grew an average of 8 percent a year.

Table-10: MN Corn Export – Domestic & International Markets *(million bushels)*

Year	Production	Exports	% Corn Crop
1990	763	384	50.3%
1991	720	417	57.9%
1992	741	274	37.0%
1993	322	176	54.7%
1994	916	390	42.6%
1995	732	605	82.7%
1996	869	441	50.7%
1997	851	380	44.7%
1998	1,033	518	50.1%
1999	990	560	56.6%
2000	964	498	51.7%
2001	806	477	59.2%
2002	1,052	614	58.4%
2003	971	478	49.2%
2004	1,121	441	39.3%
2005	1,192	616	51.7%
2006	1,103	736	66.7%
2007	1,139	554	48.6%
2008* *(Projected)*	1,120	605	54.0%

Source: PRX

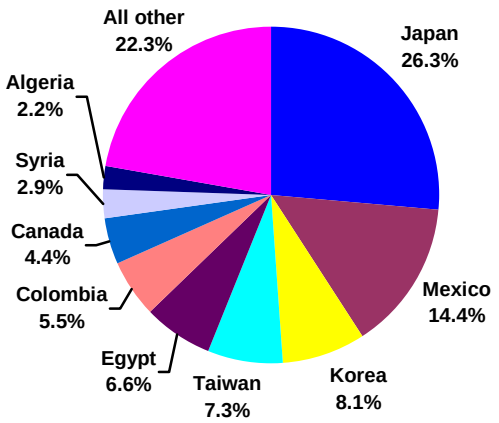
Chart-27: MN Corn Export* Trend *(million bushels)*



**To domestic & international markets **2008: Projected*
Source: PRX

Chart-28: Top Export Markets for MN Corn *(2007)*

Metric Tons



Source: MDA/AMS

II. Minnesota Corn Utilization *(continued)*

C. Corn Processing

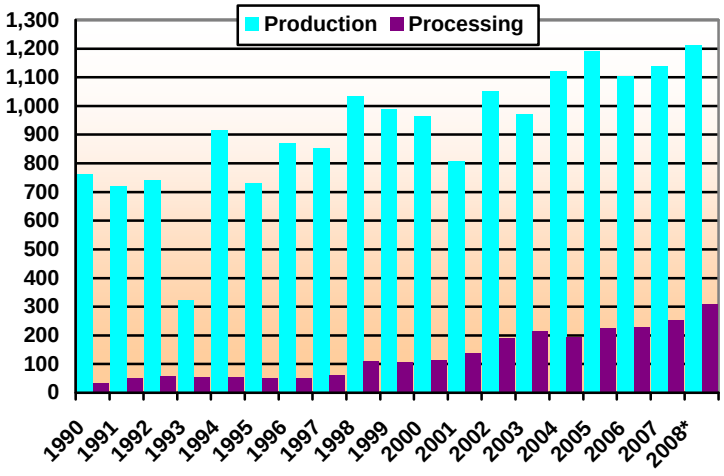
In 2007, corn processing accounted for 252 million bushels; more than 22 percent of Minnesota's annual corn crop. Most of the corn is processed into ethanol and DDG (Distillers Dried Grains), as well as other value-added corn products including corn sweeteners, corn starch, corn oil, and corn gluten feed and meal. From 1990 to 2007, corn processing underwent phenomenal growth, due to the rapid expansion for ethanol production, which represents 83 percent of total corn processing.

Table-11: MN Corn Processing *(million bushels)* **2008: Projected*

Year	Corn Production	Corn Processing	Ethanol Use	Other Processing	% Corn Processed
1990	763	34	4.4	29.6	4.5%
1991	720	49	6.8	42.2	6.8%
1992	741	58	13.8	44.2	7.8%
1993	322	52	15.2	36.8	16.1%
1994	916	56	16.4	39.6	6.1%
1995	732	50	20.4	29.6	6.8%
1996	869	50	27.6	22.4	5.8%
1997	851	63	44.8	18.2	7.4%
1998	1,033	110	49.6	60.4	10.6%
1999	990	106	76	30	10.7%
2000	964	115	81.5	27	11.9%
2001	806	138	93.3	37.2	17.1%
2002	1,052	190	170	70	18.1%
2003	971	214	194	70.4	22.0%
2004	1,121	195	180	45	17.4%
2005	1,192	226	185	59	19.0%
2006	1,103	229	196	33	20.8%
2007	1,139	252	210	42	22.1%
2008*	1,120	310	268	42	27.7%

Source: PRX

Chart-29: MN Corn Processing *(million bushels)*



**2008: Projected* *Source: PRX*

II. Minnesota Corn Utilization *(continued)*

Among the top corn-producing states in the U.S., Minnesota has the lowest level of corn processing, as well as lowest corn prices. The following tables compare the top U.S. corn states by examining corn production and processing, and therefore the correlation between local demand (processing) and local prices.

Table-12: Top Five States: Corn Production *(Million bushels)*

Year	Rank (2007)					U.S. Total	MN % of U.S. Total	IA % of U.S. Total	IL % of U.S. Total
	1	2	3	4	5				
	IA	IL	NE	MN	IN				
1990	1,562	1,321	934	**763**	703	7,934	**9.6%**	19.7%	16.6%
1991	1,427	1,177	991	**720**	511	7,475	**9.6%**	19.1%	15.7%
1992	1,904	1,646	1,067	**741**	878	9,477	**7.8%**	20.1%	17.4%
1993	880	1,300	785	**322**	713	6,338	**5.1%**	13.9%	20.5%
1994	1,915	1,786	1,147	**916**	858	10,051	**9.1%**	19.1%	17.8%
1995	1,427	1,130	855	**732**	599	7,400	**9.9%**	19.3%	15.3%
1996	1,711	1,469	1,180	**869**	670	9,233	**9.4%**	18.5%	15.9%
1997	1,642	1,425	1,135	**851**	702	9,207	**9.2%**	17.8%	15.5%
1998	1,769	1,473	1,240	**1,033**	760	9,759	**10.6%**	18.1%	15.1%
1999	1,758	1,491	1,154	**990**	748	9,431	**10.5%**	18.6%	15.8%
2000	1,728	1,669	1,014	**964**	810	9,915	**9.7%**	17.4%	16.8%
2001	1,664	1,649	1,139	**806**	885	9,503	**8.5%**	17.5%	17.4%
2002	1,932	1,472	941	**1,052**	632	8,967	**11.7%**	21.5%	16.4%
2003	1,868	1,812	1,124	**971**	787	10,089	**9.6%**	18.5%	18.0%
2004	2,244	2,088	1,320	**1,121**	929	11,807	**9.5%**	19.0%	17.7%
2005	2,163	1,709	1,271	**1,192**	889	11,114	**10.7%**	19.5%	15.4%
2006	2,050	1,817	1,178	**1,103**	845	10,535	**10.5%**	19.5%	17.2%
2007	2,368	2,284	1,472	**1,139**	987	13,074	**8.7%**	18.1%	17.5%

Source: NASS/USDA.

While Minnesota produced 9 percent of the U.S. total corn crop in 2007, its corn processing only accounted for 7 percent of the U.S. total. For comparison, Iowa – the top corn production and processing state – had a production share of 18 percent and processing share of 27 percent; and Illinois – the No. 2 corn production and processing state – had a 17.5 percent production share and 15 percent processing share.

II. Minnesota Corn Utilization *(continued)*

Table-13: Top Five States: Corn Processing *(Million bushels)*

Year	Rank (2007)					U.S. Total	MN % of U.S. Total	IA % of U.S. Total	IL % of U.S. Total
	1	2	3	4	5				
	IA	IL	NE	IN	MN				
1990	416	380	54	145	**34**	1,405	**2.4%**	29.6%	27.0%
1991	457	407	63	152	**49**	1,514	**3.2%**	30.2%	26.9%
1992	461	429	71	147	**58**	1,542	**3.8%**	29.9%	27.8%
1993	490	441	70	152	**52**	1,592	**3.3%**	30.8%	27.7%
1994	515	468	121	159	**56**	1,694	**3.3%**	30.4%	27.6%
1995	479	429	126	153	**50**	1,607	**3.1%**	29.8%	26.7%
1996	500	463	136	163	**50**	1,693	**3.0%**	29.5%	27.3%
1997	558	504	143	169	**63**	1,781	**3.5%**	31.3%	28.3%
1998	587	485	154	155	**110**	1,826	**6.0%**	32.1%	26.6%
1999	572	519	179	173	**106**	1,910	**5.5%**	29.9%	27.2%
2000	588	536	190	177	**115**	1,968	**5.8%**	29.9%	27.2%
2001	593	536	205	182	**138**	2,038	**6.8%**	29.1%	26.3%
2002	642	557	214	183	**144**	2,175	**6.6%**	29.5%	25.6%
2003	691	560	279	186	**214**	2,550	**8.4%**	27.1%	22.0%
2004	668	520	270	217	**195**	2,789	**7.0%**	24.0%	18.6%
2005	846	593	336	191	**226**	2,975	**7.6%**	28.4%	19.9%
2006	877	614	443	243	**229**	3,483	**6.6%**	25.2%	17.6%
2007	1,199	651	590	266	**252**	4,375	**5.8%**	27.4%	14.9%

Source: PRX.

Table-14: Top Five States Corn Processing as % of Production *(%)*

Year	Rank (2007)					U.S.
	1	2	3	4	5	
	IA	NE	IL	IN	MN	
1990	26.6%	5.8%	28.8%	20.6%	**4.5%**	17.7%
1991	32.0%	6.4%	34.6%	29.7%	**6.8%**	20.3%
1992	24.2%	6.7%	26.1%	16.7%	**7.8%**	16.3%
1993	55.7%	8.9%	33.9%	21.3%	**16.1%**	25.1%
1994	26.9%	10.5%	26.2%	18.5%	**6.1%**	16.9%
1995	33.6%	14.7%	38.0%	25.5%	**6.8%**	21.7%
1996	29.2%	11.5%	31.5%	24.3%	**5.8%**	18.3%
1997	34.0%	12.6%	35.4%	24.1%	**7.4%**	19.3%
1998	33.2%	12.4%	32.9%	20.4%	**10.6%**	18.7%
1999	32.5%	15.5%	34.8%	23.1%	**10.7%**	20.3%
2000	34.0%	18.7%	32.1%	21.9%	**11.9%**	19.8%
2001	35.6%	18.0%	32.5%	20.6%	**17.1%**	21.4%
2002	33.2%	22.7%	37.8%	29.0%	**13.7%**	24.3%
2003	37.0%	24.8%	30.9%	23.6%	**22.0%**	25.3%
2004	29.8%	20.5%	24.9%	23.4%	**17.4%**	23.6%
2005	39.1%	26.4%	34.7%	21.5%	**19.0%**	26.8%
2006	42.8%	37.6%	33.8%	28.8%	**20.8%**	33.1%
2007	50.6%	40.1%	28.5%	27.0%	**22.1%**	33.5%

Source: PRX.

III. Minnesota Ethanol Production and Economic Impact

A. Corn Processing for Ethanol

Minnesota ranks No. 5 in ethanol production in the U.S., but No. 6 in all corn processing, following Iowa, Illinois, Nebraska, Indiana, and South Dakota. In previous years, Minnesota ranked No. 5, but was surpassed by South Dakota in 2007.

Ethanol production consumes the bulk of processed corn in Minnesota, estimated at 83 percent of all processing in 2007, according to industry sources. Minnesota's ethanol program is the driving force in the rapid development of this industry which adds value to Minnesota's No. 1 agricultural crop and creates a wide range of economic activities for the state.

The ethanol production expansion has been most rapid since the late 1990's, when ethanol processing capacity entered a new phase of a high rate of growth, due to state and federal legislation and initiatives.

It should be noted that ethanol production capacity and actual production may not be equal, as new ethanol plants come on-line throughout the year and their annual production output may not reach full capacity for that year. However, this analysis uses the annual capacity as a guideline.

Table-15: Minnesota Corn Processing *(million bushels)*

Year	Corn Processing - All	Ethanol Use	Other Processing	Ethanol % of All Corn Processing
1990	34	4.4	29.6	12.9%
1991	49	6.8	42.2	13.9%
1992	58	13.8	44.2	23.8%
1993	52	15.2	36.8	29.2%
1994	56	16.4	39.6	29.3%
1995	50	20.4	29.6	40.8%
1996	50	27.6	22.4	55.2%
1997	63	44.8	18.2	71.1%
1998	110	49.6	60.4	45.1%
1999	106	76	30	71.7%
2000	115	81.5	27	70.9%
2001	138	93.3	37.2	67.6%
2002	190	170	70	89.5%
2003	214	194	70.4	90.7%
2004	195	180	45	92.3%
2005	226	185	59	81.9%
2006	229	196	33	85.6%
2007	252	210	42	83.3%
2008*	310	268	42	86.5%

**2008: Projected* *Source: PRX*

III. Minnesota Ethanol Production and Economic Impact *(continued)*

B. Minnesota Ethanol Program

The original goal of the Minnesota Ethanol Program was to help farmers look for new market opportunities for low-priced corn and promote local processing. Then ethanol legislation in the 1990's established further incentives in compliance with the Clean Air Act, as well as aiming to achieve an annual production capacity of 220 million gallons to meet Minnesota's ethanol consumption demand to the level of self-sufficiency.

Background:

The 20-cent ethanol producer payment legislation in 1986 initially provided the security required by lenders to invest in small farmer-owned ethanol plants. 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 an advantage for local processing.

The producer payment was proposed as a 10-year payment (sunset in ten years), $3 million per plant incentive bill to spur the development of a renewable fuels industry. At the time, it was hoped that ten years of payments would allow plants to retire debt, increase efficiency and develop new products and markets, so they could survive the competition and price fluctuations in the agricultural and petroleum markets. Unique aspects of the ethanol industry made these incentive payments necessary, but the ethanol industry was projected to contribute over $350 million in increased economic activities in the state.

Since low commodity prices were common in the 1980's and 1990's, these new corn processing plants represented a new strategy for the long-term profitability of farmers and rural communities. Local processing could allow farmers to participate in the more profitable end of agriculture, and promote farmer investments in processing and marketing of the state's No. 1 agricultural commodity. It was hoped that such initiatives could allow farmers to make it on their own and reduce the need for financial aid in times of prevailing low profitability and revenue loss.

Program Goals:

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 Co-ops (NGCs). These businesses were designed to provide farmer-members greater direct cash return for their crops;
4. To replace 10 percent of imported petroleum used for gasoline (estimated at $100 million annual savings); and
5. To help the Twin Cities Area meet U.S. EPA standards for carbon monoxide.

Economic Impact of the Corn and Ethanol Industry in Minnesota

LEGISLATIVE SUMMARY OF THE MINNESOTA ETHANOL PROGRAM

In ***1980,*** Minnesota passed legislation offering a 4 cent per gallon pump tax credit for 10% ethanol blends.

By ***1986,*** forty percent of the state's gasoline was blended with 10% ethanol, but little ethanol was produced in Minnesota. Legislation reduced the pump tax credit to 2 cents and initiated a 20 cent per gallon cash incentive payment for ethanol produced in the state.

In ***1987***, legislation provided $100,000 annually for an ethanol promotion program to be administered by the MN Department of Agriculture. The Minnesota Ethanol Commission was established to promote the production and use of ethanol in Minnesota.

In ***1989,*** the mandatory pump labeling requirement for ethanol blends was discontinued in favor of voluntary labeling that was more consistent with other retail norms.

In ***1992,*** a minimum 2.7% oxygen content requirement for gasoline was made effective year-round in the Twin Cities in 1995 and then statewide in 1997. A federal program previously requited 2.7% oxygen in the Twin Cities during the winter months.

In ***1993,*** funding was provided for $500,000 loans to assist ethanol plant developers.

In ***1994*** 1) a phase out of the pump tax credit was made to coincide with phasing in the statewide oxygen requirement; 2) a stock loan program would participate with banks loaning money to qualified farmers who wished to buy stock in ethanol plants.

In ***1995***, a statutory goal to develop 220 million gallons of Minnesota ethanol production was established.

In ***1998***, the production goal was increased to 240 million gallons, and approval for producer payments to the 15th ethanol plant (last plant authorized to receive payment).

In ***2000*****,** the content of non-ethanol oxygenates such as MTBE in gasoline sold in Minnesota was restricted to 1/3%. Zero percent allowed for sale after July 2005.

In ***2003***, fourteen plants remained with a production capacity of 360 million gallons. Of the $70 million allotted for 2002-2003 biennial ethanol producer payments, $20 million was un-allotted by the governor. Producer payments were reduced to 13 cents per gallon for fiscal years 2004 through 2007. Ethanol production goal was to increase to 480 million gallons by 2008. The 2.7% oxygenate requirement for gasoline was replaced by 10% ethanol requirement.

In ***2004***, Gopher State Ethanol closed; 13 plants remained with 400 million gallons of ethanol production capacity.

In ***2005*****,** law required 20% ethanol content in all gasoline by 8/30/2013**.** This requirement would expire on 12/31/2010 if by that date: 20% of gasoline volume is ethanol, or if EPA has not granted a waiver for E20 under 211(4)(f) of the Clean Air Act. It was also a goal of the state that 20% of liquid fuel (gasoline and diesel) is derived from renewable sources by 2015. Three new plants opened increasing the state's production capacity to 550 million gallons per year.

III. Minnesota Ethanol Production and Economic Impact *(continued)*

Results to date:

1. An estimated 252 million bushels of corn (22 percent of Minnesota's crop) is made into ethanol, livestock feed and other corn products (2007);
2. Minnesota's 17 plants produced 670 million gallons of ethanol in 2007;
3. Ten of Minnesota's 17 ethanol plants are organized as farmer co-ops;
4. Ten percent of Minnesota's gasoline is replaced by ethanol; and
5. The Twin Cities Area meets EPA's carbon monoxide standard and has achieved "attainment" status (the continued use of ethanol is required to keep emissions low).

Table-16: Ethanol Production vs. Ethanol Use *(million gallons)*

Year	Production	Estimated Consumption	% Ethanol Produced in Minnesota
1986	1	25	4%
1987	1	25	4%
1988	8	18	44%
1989	10	17	59%
1990	11	20	55%
1991	17	32	53%
1992	35	58	60%
1993	38	99	38%
1994	41	125	33%
1995	51	137	37%
1996	69	145	48%
1997	112	177	63%
1998	124	200	62%
1999	190	240	79%
2000	220	248	89%
2001	252	254	99%
2002	300	258	116%
2003	359	261	137%
2004	400	262	153%
2005	420	260	161%
2006	550	256	215%
2007	670	256	261%
2008*	850	259	329%
2013**	1,120+	533	210%

** Projected*
***2013: Estimated consumption based on 2005 legislation of 20%-blend-ethanol requirement in all motor gasoline by 2013*

Source: MDA/AMS

III. Minnesota Ethanol Production and Economic Impact *(continued)*

C. Value of Corn *(raw commodity versus value-added)*

Processing corn into various food and industrial products instead of exporting corn as raw commodity adds value to each bushel of corn. In addition to fuel ethanol, corn processing also produces high-protein livestock feeds plus corn sweeteners, starch, oil, and carbon dioxide.

Due to in-state corn processing, over $500 million was added to the value of corn crop (commodity) in Minnesota in 2007 alone, a remarkable result not only for Minnesota's corn farmers and ethanol plants, but also for the agricultural, manufacturing, transportation, supply and service industries in Minnesota.

The following tables calculate value-added benefits of corn processing in two scenarios: high corn price (May 2008 cash price) and low corn price (July 2000 cash price).

In the High Corn Price Scenario, when corn is $5.00/bushel as a raw commodity and $8.35/bushel as a final processed product (from dry milling process), the difference is $3.35. Therefore corn processing adds $3.35 per bushel or increases the value of corn by 67 percent.

In the Low Corn Price Scenario, when corn is $1.48/bushel as a raw commodity and $4.20/bushel as a final processed product (from dry milling process), the difference is $2.72. Therefore corn processing adds $2.72 per bushel or increases the value of corn by 184 percent. Corn processing is even more important in times of low corn prices.

Table-17: Value of Corn – High Price Scenario, May 2008 *(Per bushels of corn)*

- *Corn as raw commodity: $5.00/bushel*
- *Corn after processed (value-added): $8.35/bushel*

	Corn	Corn Processing: Value-Added				
		Wet-Milling				Dry-milling
Products	Raw Commodity	Starch & Products	Ethanol & Products	Sweeteners & Products: Corn Syrup	Sweeteners & Products: HFCS	Ethanol & DDG
Corn	$5.00					
Corn Oil		$1.40	$1.40	$1.40	$1.40	
Gluten Feed		$0.56	$0.56	$0.56	$0.56	
Gluten Meal		$0.61	$0.61	$0.61	$0.61	
Starch		$5.52				
Ethanol			$6.59			$6.94
Corn Syrup				$12.54		
HFCS					$6.29	
DDG						$1.41
Total Value	**$5.00**	**$8.09**	**$9.16**	**$15.11**	**$8.85**	**$8.35**

Computation based on following prices:
- Corn prices (Minneapolis Grain Exchange)
- Corn oil prices (Midwest)
- Gluten feed prices (Midwest)
- Gluten meal prices (Midwest)
- Starch prices (Midwest)
- Ethanol prices (Mpls/St. Paul)
- Corn syrup prices (Midwest)
- HFCS prices (Midwest)
- DDG prices (Minnesota)

Source: MDA/AMS

III. Minnesota Ethanol Production and Economic Impact *(continued)*

Table-18: Value of Corn - Low Price Scenario, July 2000 *(Per bushels of corn)*

- *Corn as raw commodity: $1.48/bushel*
- *Corn after processed (value-added): $4.20/bushel*

Products	Corn	Corn Processing: Value-Added				
		Wet-Milling				Dry-milling
	Raw Commodity	Starch & Products	Ethanol & Products	Sweeteners & Products		Ethanol & DDG
				Corn Syrup	HFCS	
Corn	$1.48					
Corn Oil		$0.21	$0.21	$0.21	$0.21	
Gluten Feed		$0.22	$0.22	$0.22	$0.22	
Gluten Meal		$0.26	$0.26	$0.26	$0.26	
Starch		$4.02				
Ethanol			$3.43			$3.61
Corn Syrup				$4.10		
HFCS					$4.91	
DDG						$0.59
Total Value	**$1.48**	**$4.71**	**$4.12**	**$4.79**	**$5.60**	**$4.20**

Computation based on following prices:
- Corn prices (Minneapolis Grain Exchange)
- Corn oil prices (Midwest)
- Gluten feed prices (Midwest)
- Gluten meal prices (Midwest)
- Starch prices (Midwest)
- Ethanol prices (Mpls/St. Paul)
- Corn syrup prices (Midwest)
- HFCS prices (Midwest)
- DDG prices (Minnesota)

Source: MDA/AMS

III. Minnesota Ethanol Production and Economic Impact *(continued)*

Ethanol Production – Costs and Returns

The following PRX (The ProExporter Network) model provides dry-mill producer margins of corn processing into ethanol and DDG. The year 2005-2006 witnessed the highest returns for ethanol plants, while 2007-2008 is projected to be lower, with ethanol prices heavily discounted and corn prices going up.

Table-19: Ethanol Industry Model Returns*

Item	Unit	Crop Year (September-August) 2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008**
Production Costs, Commodity Specific Values									
Corn	$/bu.	1.79	1.92	2.32	2.50	2.05	2.01	3.13	4.42
Natural Gas	$/mil. BTU	4.92	6.22	5.00	5.33	6.57	8.17	6.86	9.19
Output Value									
Ethanol (U.S. Spot, RFN)	$/ga.	1.52	1.48	1.15	1.52	1.51	2.49	2.06	2.16
DDG	$/ton	79	87	102	105	75	81	105	142
Production Costs, Converted to dollars per gallon, 40 million-gallon plant									
Corn	$/ga.	0.64	0.69	0.83	0.89	0.73	0.72	1.12	1.58
Natural Gas	$/ga.	0.15	0.19	0.17	0.18	0.22	0.28	0.23	0.31
Other operating costs	$/ga.	1.17	1.25	0.20	0.20	0.20	0.20	0.21	0.23
Interest & depreciation	$/ga.	0.04	0.03	0.22	0.22	0.22	0.22	0.23	0.25
Total Cost	$/ga.	1.13	1.22	1.42	1.49	1.38	1.42	1.79	2.37
Output Value									
Ethanol	$/ga.	1.52	1.48	1.15	1.52	1.51	2.49	2.06	2.16
DDG	$/ga.	0.24	0.26	0.31	0.32	0.23	0.25	0.32	0.43
Total Value	$/ga.	1.76	1.75	1.46	1.84	1.73	2.73	2.38	2.59
Return to Capital									
Without state incentives	$/ga.	0.59	0.5	0.04	0.35	0.36	1.32	0.58	0.22
Ethanol Output Target									
Dry mills, output	million ga.	452	1,050	1,643	2,098	2,461	3,147	4,495	6,974
	million bu.	167	387	606	772	903	1,152	1,642	2,529
Wet mills, output	million ga.	1,321	965	1,319	1,527	1,212	1,355	1,334	1,326
	million bu.	490	356	487	562	445	496	487	481
Total Output	million ga.	1,772	2,014	2,962	3,625	3,673	4,501	5,829	8,300
	million bu.	657	743	1,093	1,334	1,348	1,648	2,129	3,010

**PRX model ethanol return is a generalized monthly estimate for the farm belt, cents per gallon after all costs. **Year to date*

Source: PRX

III. Minnesota Ethanol Production and Economic Impact *(continued)*

D. Ethanol Plants

In 2007, Minnesota had 17 ethanol plants with 670 million gallons of production capacity. In addition, four new plants were under construction with a total 400 million gallons of production capacity. At the time of completion of this report in August 2008, Minnesota had 19 operating plants with 850 million gallons of production capacity, while 3 new plants were being built with an additional 270-million-gallon production capacity. By 2013, when 20%-ethanol-blend mandate takes effect, Minnesota would have at least 1.12 billion gallons of ethanol production capacity.

Minnesota has one wet-mill plant (Marshall); one plant utilizing cheese whey as feedstock (Melrose); and all others operating as dry mill plants.

Table-20: Minnesota Ethanol Plants – August 2008

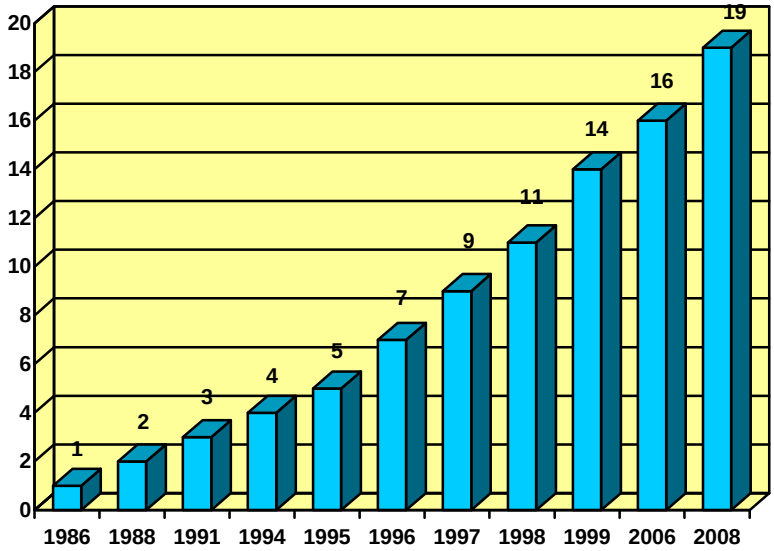
City (plant name)	Ethanol Capacity *Million gallons/year*	Corn Use *Million bushels/year*	Start-up Year	Co-op Members[3)]
Marshall (ADM)	40	14.8[2)]	1988	(Public Corp)
Morris (DENCO)	25	9	1991	Corporation
Winnebago (Corn Plus)[1)]	49	17.4	1994	750
Winthrop (Heartland)[1)]	100	37	1995	692
Benson (CVEC)	46	17	1996	850
Claremont (Al-Corn)	43	15	1996	512
Bingham Lake (Ethanol2000)	35	13	1997	241
Buffalo Lake (MN Energy)	19	7	1997	325
Melrose (Dairy Proteins)	3	Cheese whey	1986	(Regional Co-op)
Preston (Pro-Corn)	42	16	1998	159
Luverne (Corn-er Stone)	22	8	1998	197
Little Falls (CMEC)	22	8.1	1999	820
Albert Lea (Exol/Agri Resources)	41	15.2	1999	496
Lake Crystal[1)]	56	20	2005	Private LLC
(Granite Falls Energy)	48	18	2005	LLC
Atwater (Bushmills Ethanol)[1)]	49	18	2005	LLC
(Heron Lake Bioenergy)	50	18	2007	LLC
Otter Tail (Fergus Falls)	55	20	2008	LLC
Otter Tail (Buffalo Lake Energy)[1)]	110	40	2008	LLC
TOTAL	**850**	**308**		**5,042 members**

Source: MDA/AMS

[1)] Expanded production capacity or new plant since 2007.
[2)] The Marshall Plant grinds at least 40,000,000 bushels of corn for starch, sweeteners and other products.
[3)] Plants organized as New Generation Farmer Co-ops (NGC) may be combined with, converted to or organized as limited liability companies or business structures that are generally designed to:
- Built by farmers and local businessmen to process member crops;
- Return more cash to farmers than conventional markets would provide;
- Controlled by farmer/local board members so that member profits remain a top priority; and
- Create a stable source of local jobs and economic development.

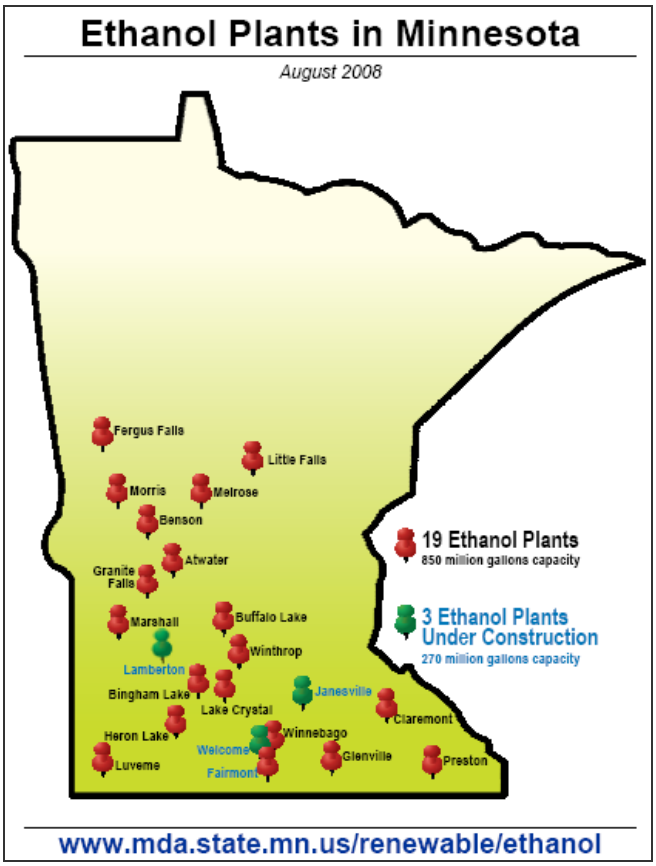
III. Minnesota Ethanol Production and Economic Impact *(continued)*

Chart-30: Number of Ethanol Plants in Minnesota



Source: MDA/AMS

Map-2: Minnesota Ethanol Plants Location



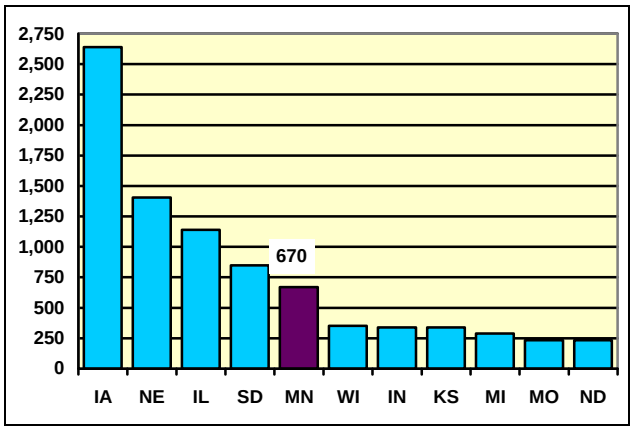
Source: MDA/AMS

III. Minnesota Ethanol Production and Economic Impact *(continued)*

E. Minnesota Ethanol Production and Consumption Trend

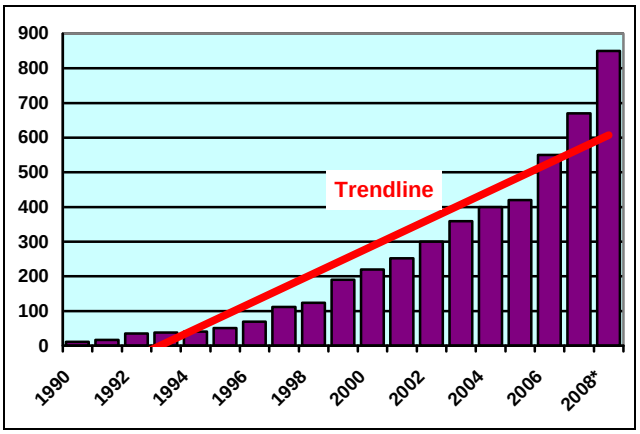
Minnesota ranks No. 5 in ethanol production in the U.S., following Iowa, Nebraska, Illinois, and South Dakota. From 1990 to 2007, ethanol production in Minnesota achieved an annual average growth rate of 28 percent, while ethanol consumption increased at an annual average rate of 19 percent. Production capacity is projected to continue to expand, while consumption is projected to slow down, until the 20%-ethanol-blend requirement takes effect in 2013.

Chart-31: U.S. Top Ethanol States *(million gallons)*



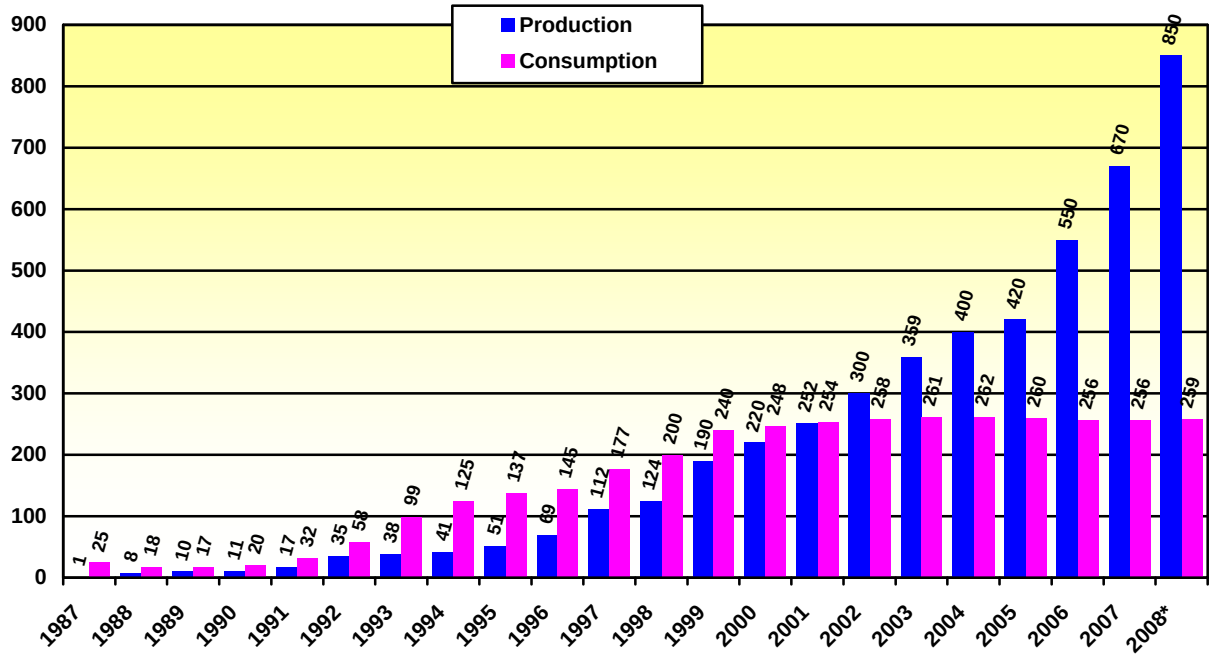
Source: PRX; MDA/AMS

Chart-32: MN Ethanol Production *(million gallons)*



Source: MDA/AM

Chart-33: Minnesota Ethanol Production & Consumption *(million gallons)*



Source: MDA/AMS

III. Minnesota Ethanol Production and Economic Impact *(continued)*

F. Minnesota E-85 Program

What is E-85?

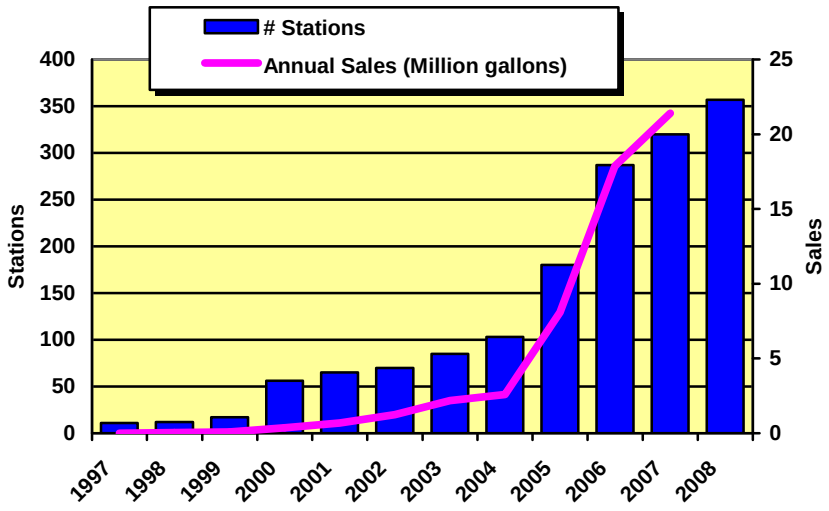
E-85 is a motor fuel blend of 85 percent ethanol and 15 percent gasoline. As an alternative to gasoline, E-85 ethanol burns cleaner than gasoline, and is a renewable, domestic, environmentally friendly fuel that enhances the nation's economy and energy independence.

- Minnesota is the national leader in E-85 development.
- As of October 2008, Minnesota has 357 E-85 stations, the highest number in the nation. (In the distant second is Illinois, with 188 stations, and Missouri, with 112 stations. The U.S. has a total of 1,802 E-85 stations.)
- In 2007, Minnesota sold 21 million gallons of E-85, compared to 18 million gallons in 2006 and 8 million gallons in 2005.
- Total sales have been increasing at an average annual rate of 50% since 1997.

2006 Statistics:

- Approximately 150,000 flex-fuel vehicles (FFV) have been registered in Minnesota. (About 6 million are on U.S. roadways).
- Approximately 18.2 million gallons of E-85 were sold in 2006. This represents a 125% and 600% increase over 2005 and 2004 totals, respectively.
- In 2006, the average price of E-85 was 37 to 39 cents per gallon LESS than 87-octane gasoline. This is important as today's Flexible Fuels Vehicles experience a 15% to 20% MPG reduction.
- Approximately $1 million was invested by E-85 Team members in 2006 in directly funding E-85 station grants, consumer education/marketing tactics, special events, and program staff.
- A minimum of $8 million has been invested in MN E-85 development since 1998.

Chart-34: MN E-85 Sales Growth *(1997-2008)*



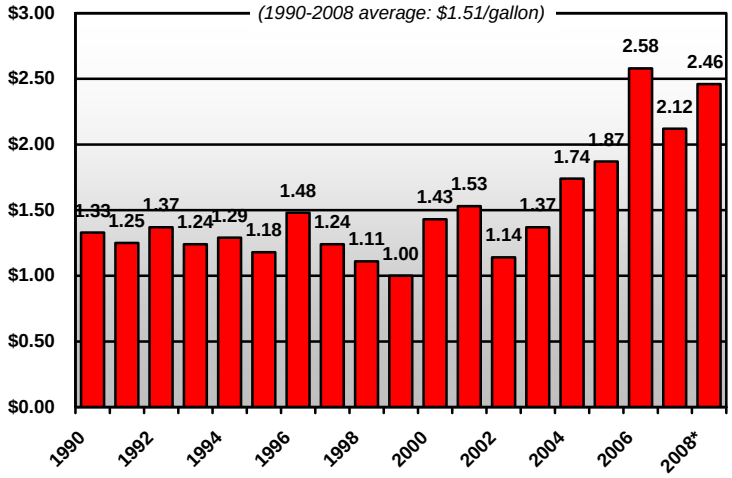
Source: Minnesota Department of Commerce

III. Minnesota Ethanol Production and Economic Impact *(continued)*

G. Minnesota Ethanol Prices

Minnesota ethanol prices (wholesale/rack) averaged $2.49 per gallon in 2008, up from $2.12 in 2007 and $1.43 in 2000. The historical high is $3.86 per gallon (summer of 2006), and historical low is $0.91 per gallon (winter of 2002). In most recent years – 2006, 2007, and 2008 – ethanol prices have been moving upward due to increased consumption demands and higher petroleum and corn prices. The 2008 prices peaked at $2.97 in July, compared to a low of $2.15 in January.

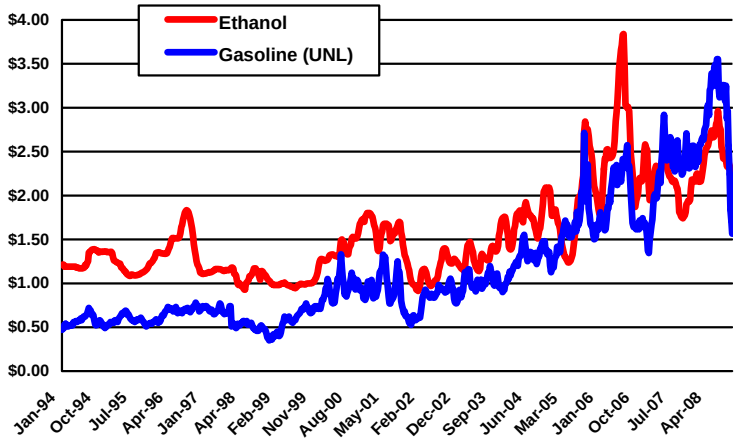
Chart-35: Minnesota Ethanol Prices – Annual Average *($/gallon)*



Rack prices: Wholesale bulk prices at the terminal. **2008: Jan-Oct*
Source: Axxis Petroleum.

Historically, Minnesota ethanol prices were higher than gasoline, with a price difference ranging from $0.30 to $1.30 per gallon. However, since the spring of 2007, this pattern reversed, and gasoline prices climbed higher than ethanol. In fact, gasoline prices averaged $0.42 per gallon higher than ethanol from summer of 2007 to fall of 2008.

Chart-36: Minnesota Ethanol & Gasoline Price Trend *($/gallon)*



Source: Axxis Petroleum.

III. Minnesota Ethanol Production and Economic Impact *(continued)*

H. Minnesota DDG Production and Prices

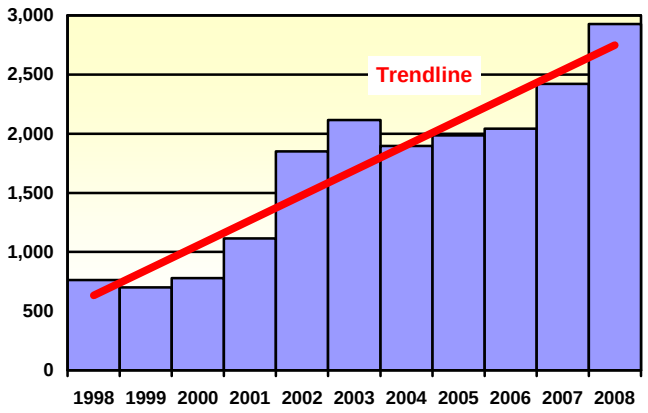
In 2007, Minnesota DDG production was estimated at 1.1 million metric tons (MT), up from 928,000 MT in 2006. Since 1998, DDG production has been increasing at an average annual rate of 16 percent. Minnesota consumes about half of its DDG production as animal feed and exports the rest to domestic and international markets.

Table-21: MN DDG Statistics

Year	DDG Production *(1,000 MT)*	Corn Displaced by DDG *(Million bu.)*	DDG fed to animals *(1,000 MT)*	DDG Export *(1,000 MT)*	Dry Mill Corn Use *(Million bu.)*
1998	347				45
1999	319				41
2000	354				46
2001	506				66
2002	841	40			109
2003	962	45			125
2004	862	41			119
2005	902	13			124
2006	928	21	443	496	128
2007	1,101	32	632	470	152
2008	1,330	44	743	588	183

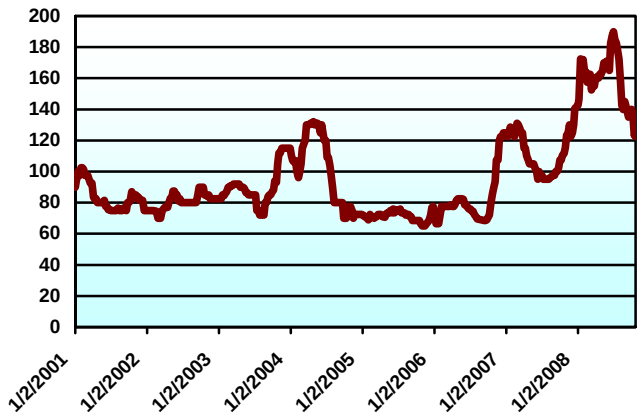
Source: PRX; MDA/AMS

Chart-37: MN DDG Production *(million pounds)*



**2008: Projected* *Source: PRX*

Chart-38: MN DDG Prices *(weekly, $/ton)*



Source: USDA

III. Minnesota Ethanol Production and Economic Impact *(continued)*

I. Ethanol's Economic Contribution and Producer Payment

Minnesota's ethanol industry generates an annual production output estimated at $1.68 billion, of which, $1.42 billion comes from ethanol and $255 million from DDG. Ethanol production is a significant economic contributor to the state's agricultural and manufacturing industries, as well as many rural communities, where ethanol plants are located.

In addition, Minnesota's ethanol industry adds more than $500 million to the value of corn crop (commodity), or about $2 per every bushel of processed corn.

While annual ethanol producer payments totaled $15 million in 2007, it brought a $1.68 billion economic benefit to the state. Over the past decades, the highest producer payment per annum was $35 million, which occurred in 2000. In that year, ethanol production output totaled $365 million – more than ten times of the producer payment. The 2007 ethanol production output of $1.68 billion was 110 times over the producer subsidy of $15 million for the year.

Table-22: MN Ethanol Output Value and Producer Payment

Year	Value of Production: Ethanol & By-products *(Million $)*	Producer Payment *(Million $)*
1990	$19.39	$2.20
1991	$28.79	$3.36
1992	$60.89	$4.95
1993	$61.96	$3.60
1994	$69.09	$4.80
1995	$78.54	$6.46
1996	$136.91	$10.80
1997	$185.48	$14.20
1998	$172.09	$22.03
1999	$242.41	$27.62
2000	$365.13	$34.86
2001	$454.56	$34.56
2002	$422.92	$33.68
2003	$604.05	$15.35
2004	$831.69	$22.34
2005	$892.52	$22.05
2006	$1,575.19	$18.15
2007	$1,675.48	$15.17

Source: MDA/AMS

III. Minnesota Ethanol Production and Economic Impact *(continued)*

J. Economic Impact of Ethanol Production in Minnesota

The economic impact of ethanol production in Minnesota is measured to include the **Direct**, **Indirect**, and **Induced** impacts. **Direct Impact** represents the effect of ethanol production output. **Indirect Impact** represents the effect on all other economic sectors due to purchases by the ethanol industry to generate the afore-mentioned output. **Induced Impact** represents the effect on all economic sectors due to the expenditures of new income generated by the direct and indirect impacts. **Total Impact** is the sum of direct, indirect and induced impacts.

In addition, **Output Impact** or **Output Multiplier** and **Employment Impact** or **Employment Multiplier** represent both the value of output and job creation of the ethanol production.

The analysis is performed with the IMPLAN Program, and the impact is based on the value of ethanol and DDG production in 2007:

- *Ethanol production: 670,000,000 gallons (670 million gallons)*
- *Ethanol price: $2.12 per gallon*
- *Value of ethanol: 670 million gallons X $2.12 = $1,420,400,000 ($1.42 billion)*
- *DDG production: 2,250,000 tons (2.25 million tons)*
- *DDG price: $113.37 per ton*
- *Value of DDG: 2.25 million tons X $113.37 = $255,082,500 ($255.08 million)*
- *Output value of ethanol and DDG: $1,675,482,500 ($1.68 billion)*

Table-23: MN Ethanol Production Output & Employment Impact

	Direct Impact	Indirect Impact	Induced Impact	Total Impact
Output Impact *(Billion $)*	**$1.68**	**$0.37**	**$0.22**	**$2.27**
Employment Impact *(# of Jobs)*	**1,445**	**913**	**1,948**	**4,306**

Chart-39: Output Impact *(Billion $)*

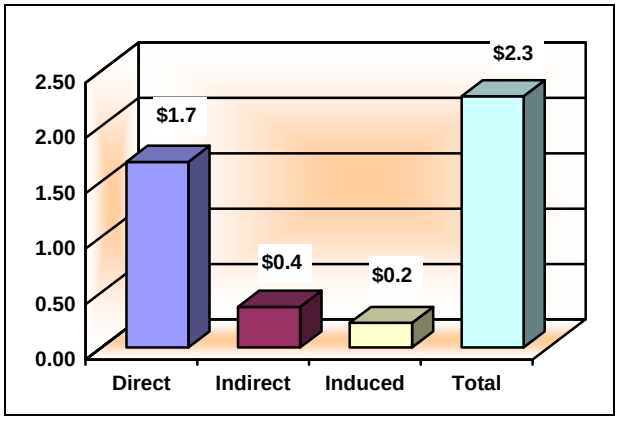
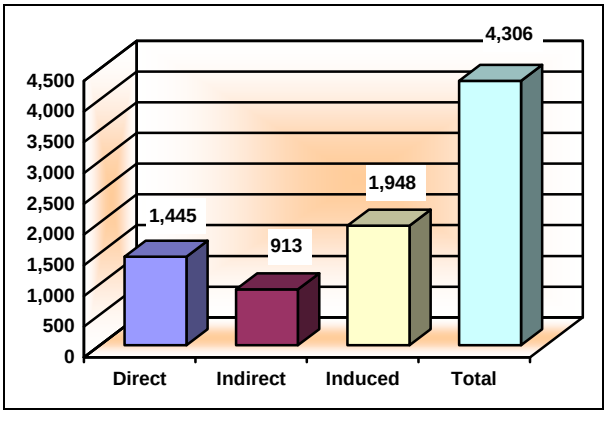


Chart-40: Employment Impact *(# of jobs)*



III. Minnesota Ethanol Production and Economic Impact *(continued)*

With a total output impact estimated at $2.27 billion, Manufacturing is the largest impact sector with $1.9 billion, followed by Finance, Insurance, and Real Estate (FIRE) with 162 million, and the Service sector with $93.4 million.

Ethanol's total employment impact is estimated at 4,306 jobs, of which, Manufacturing is the largest impact sector with 1,535 jobs, followed by the Service sector with 1,257 jobs and Finance, Insurance, and Real Estate (FIRE) with 715 jobs.

Table-24: MN Ethanol Production – Output & Employment Impacts by Sector

Ethanol Economic Impact by Sector: *Output & Employment Impacts*

Sector	Output *(Million $)*	Employment *(# of Jobs)*
1. Manufacturing	$1,897 million	1,535 jobs
2. Finance, Insurance, and Real Estate (FIRE)	$162 million	715
3. Service	$93 million	1,257
4. Wholesale & Retail Trade	$45 million	510
5. Transportation, Communication, and Public Utilities (TCPU)	$25 million	136
6. Agriculture	$3 million	22
7. Construction	$2 million	16
8. All Other	$41 million	116
Total	**$2,268 million**	**4,306 jobs**

Chart-41: Output Impact by Sector *(million $)*

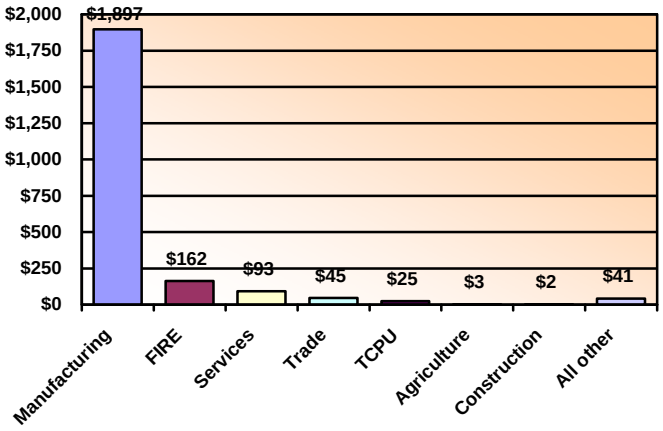
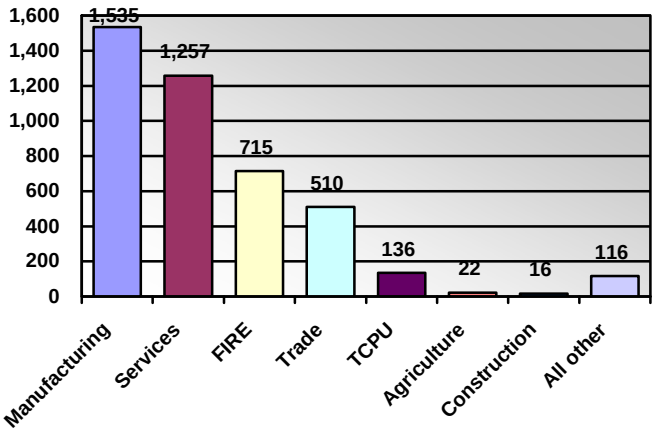


Chart-42: Employment Impact by Sector *(# jobs)*



IV. Combined Total Economic Impacts of Minnesota Corn and Ethanol Production

This last impact analysis combines both corn and ethanol production in one impact model to generate industry-wide total output and employment impacts for 2007. Again, the **Direct**, **Indirect**, **Induced,** and **Total** impacts are assessed based on the value of the combined corn and ethanol production output.

The importance of the corn and ethanol industry in Minnesota is evident in the statistics shown in the following table, where the "Combined Total Value" is used as the basis of the impact model.

Table-25: Minnesota Corn and Ethanol Industry

2007	Key Statistics
Corn Production	
Output	1.14 billion bushels
Value	$4.38 billion
Ethanol production	
Output	670 million gallons
Value	1.68 billion
DDG production	
Output	2.25 million tons
Value	$255 million
Combined Total Value *(IMPLAN model direct impact)*	**$6.06 billion**
Corn processed for ethanol	
Quantity	$250 million bushels
Value (as raw commodity)	$963 million
Value-added to corn via ethanol production	$713 million
Value-added per bushel	$2.85
Ethanol producer payment	$15 million

IV. Combined Total Economic Impacts of Minnesota Corn and Ethanol Production *(continued)*

The corn and ethanol industry in Minnesota generates a "multiplier effect" that reaches far beyond the agricultural production and processing sectors. The combined total economic impacts are significant, as they spread to many other economic activities, such as supply and service industries, transportation, trade, construction, etc.

The economic impact model provides a combined total output impact that includes corn and ethanol impacts on all economic sectors due to the increased production output associated with the corn and ethanol industry in Minnesota. It also provides a combined total employment impact or the number of jobs in all economic sectors associated with corn and ethanol production from direct, indirect, and induced impacts.

The combined total economic impacts are based on the total value of corn and ethanol production in Minnesota in 2007:

> Value of corn production: $4,384,380,000 ($4.38 billion)
> Value of ethanol & by-product: $1,676,480,000 ($1.68 billion)
> Combined total value: 6,060,860,000 ($6.06 billion)

Table-26: MN Corn & Ethanol Production –
Combined Output and Employment Impacts

	Direct Impact	Indirect Impact	Induced Impact	Total Impact
Output Impact *(Billion $)*	**$6.06**	**$2.75**	**$3.43**	**$12.06**
Employment Impact *(# of Jobs)*	**26,022**	**14,284**	**29,919**	**70,225**

Chart-43: Output Impact *(Billion $)*

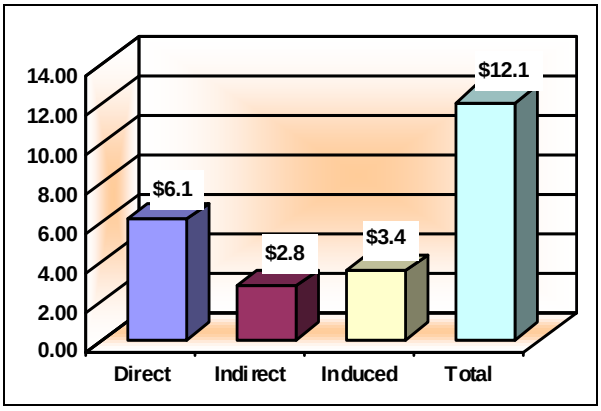
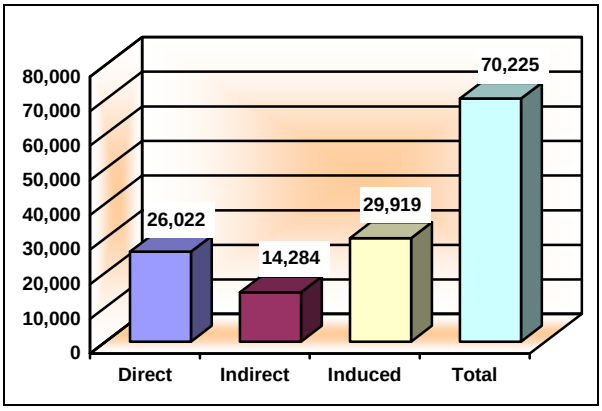


Chart-44: Employment Impact *(# of jobs)*



IV. Combined Total Economic Impacts of Minnesota Corn and Ethanol Production *(continued)*

With a combined total output impact at $12 billion, Agriculture is the largest impact sector with $4.5 billion, followed by Manufacturing with $2.8 billion, and Finance, Insurance, and Real Estate (FIRE) with $1.5 billion.

The combined total employment impact is estimated at 70,225 jobs, of which, Agriculture is the largest impact sector with 26,350 jobs, followed by Service sector with 14,475 jobs, and Finance, Insurance, and Real Estate (FIRE) with 7,758 jobs.

Table-27:

Minnesota Corn & Ethanol Production:
Combined Economic Impact by Sector – Output and Employment Impacts

Sector	Output *(Million $)*	Employment *(# of Jobs)*
2. Agriculture	$4,549.93	26,350
1. Manufacturing	$2,802.22	3,138
3. Finance, Insurance, and Real Estate (FIRE)	$1,474.70	7,758
4. Service	$1,074.14	14,475
7. Construction	$674.84	5,552
5. Wholesale & Retail Trade	$544.68	4,858
6. Transportation, Communication, and Public Utilities (TCPU)	$336.24	1,696
8. All Other	$608.17	6,198
Total	**$12,064.92 million**	**70,225 jobs**

Chart-45: Output Impact by Sector

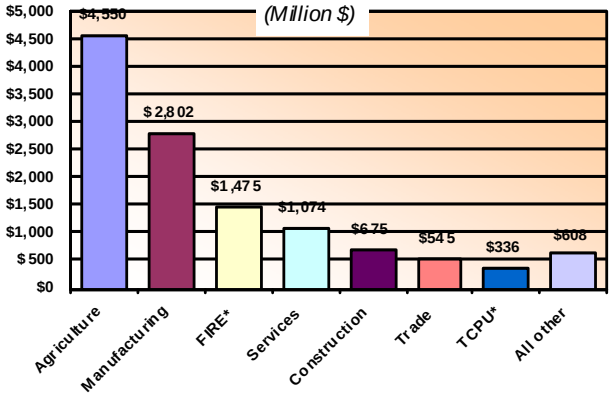
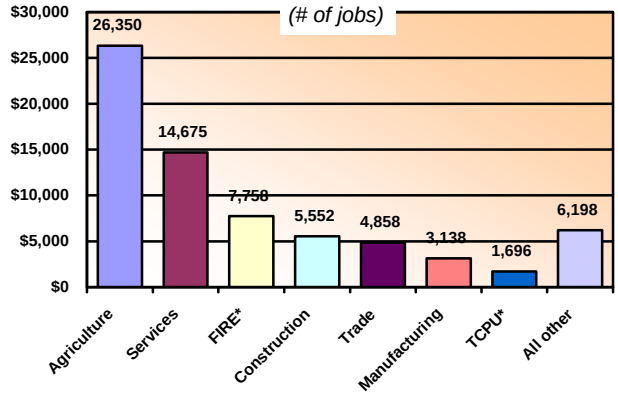


Chart-46: Employment Impact by Sector



V. Conclusion

Minnesota's corn and ethanol production contributes significantly to the state economy, as seen in the three impact scenarios: corn production, ethanol processing, and combined corn and ethanol production. The total output impact includes direct, indirect, and induced impacts on all economic sectors due to the increased output associated with corn and ethanol production. Total employment impact represents the number of jobs in all economic sectors associated with corn and ethanol production, including direct, indirect, and induced impacts.

1. Minnesota Corn Production Economic Impact

- **Total annual output impact: $9.8 billion.**
- **Total annual employment impact: 65,920 jobs.**

2. Minnesota Ethanol Production Economic Impact

- **Total annual output impact: $2.27 billion.**
- **Total annual employment impact: 4,306 jobs.**

3. Combined Total Economic Impacts of Minnesota Corn and Ethanol Industry

- **Total annual output impact: $12.1 billion.**
- **Total annual employment impact: 70,225 jobs.**

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