Value Enhanced Corn Report 2005/06

Context/Novecta

US GRAINS COUNCIL VALUE ENHANCED GRAIN REPORT 2006

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INTRODUCTION AND CONTRIBUTOR RECOGNITIONS

Crop Study

VEC and commodity corn samples were collected from eight major corn producing states. Samples were collected for white, waxy, hard endosperm, high oil, low temperature dried, high extractable starch, non-GMO, and commodity. Sample collection was coordinated by the Association of Official Seed Certification Agencies (AOSCA) and collected by the respective state crop improvement association. Samples were analyzed at the Illinois Crop Improvement Association laboratories located in Champaign, IL. Over 200 samples were collected and analyzed to determine quality factors. While this is not a statistically valid representation of the VEC crop, it does give an indication of the 2005 VEC crop quality factors. (See Detailed Methodology in the appendix for additional information).

Grower Participant Study

Telephone interviews were conducted with 987 randomly selected growers from Iowa, Illinois, Indiana, Kansas, Michigan, Minnesota, Missouri, North Dakota, Nebraska, Ohio, South Dakota, and Wisconsin. In order to be included in the survey, growers had to meet the following criteria:

- Be the primary decision maker about the types of corn planted on their farm
- Planted a minimum of 100 corn acres (40.5 HA) in 2005
- Not be affiliated with a marketing, marketing research, or advertising agency

(See Detailed Methodology in the appendix for additional grower demographics).

Channel Participant Study

To obtain information from various sectors of the VEC industry, 87 individuals were surveyed via telephone from four sectors of the VEC channel: trait/seed providers, channel participants, (elevator, grain handlers, etc.), grower groups or associations, and other areas (i.e. research institutions, improvement associations, consultants, etc.). Individuals were asked to give their best estimate regarding acreages, premiums, future growth potential of VEC traits, and general information about the current status of VEC. (See Detailed Methodology and Participants sections in the appendix for additional participant details).

EXECUTIVE SUMMARY

The U.S. Grains Council is pleased to provide you the 2005–2006 VEC Quality Report. The purpose of this report is to facilitate the development of the VEC market by providing information to U.S. domestic and export grain customers, as well as those involved with the production and marketing of VEC. The Report is designed to provide information to evaluate the VEC products by showing the comparative quality results for VEC and commodity crops. Test results are available from the 2005 crop showing the quality advantages of the VEC products. In addition to test results, the Report provides a framework for understanding changes in quality from year to year and key drivers of those changes. The Report also provides information on the production, testing, and handling developments associated with the major VEC products. Pipeline VEC products are also covered in this Report.

The Report includes sample test results of corn collected and analyzed specifically for this report, in addition to the United States Department of Agriculture (Federal Grain Inspection Service division) sample results for the 2005 crop. Analysis of these results assists customers in understanding quality differences between corn types, enabling them make better purchasing decisions.

Market Developments

The VEC market continued to adjust to changing demand and customer preferences in 2005. Segregated non-GMO corn continues to be a significant VEC product in terms of product volume. Producers continued to realign their production practices and the types of corn they produce to the changing market.

As shown in Figure 1, production of some of the main VEC products declined again in 2005, with the most significant decreases seen in high oil corn. However, this acreage reduction was due primarily to challenges at the production level (producer premiums and agronomic performance), rather than a lack of interest by end-users.

Overall, VEC production is expected to be stable in 2006, despite some fluctuations in individual product acreage. Supply forces are causing higher premiums for high oil corn. This will also likely be the case with non-GMO corn as growers have more options for biotech (input) traits than at any point in history. (It is important to note that many of the VEC products are non-GMO in addition to having other unique traits.) The nutritionally enhanced corn category is receiving renewed consideration from a few major seed technology providers and has the potential to grow.

Premium levels are expected to be up slightly. Increased demand for certain traits is fueling the premium increases. Note that the premiums identified in Figure 1 are the projected average premiums that were paid for the 2005 crop. Actual premiums paid to producers will vary, especially for VEC products not grown under contract. In years of short supply caused by weather or disease problems, premiums on these products can increase dramatically as the marketing year progresses. Users should further expect a merchandising cost to be added to these premiums, which will vary with the volume and amount of segregation required.

Despite some of the setbacks in individual VEC product performance and fluctuations in VEC premiums, producer interest in VEC remains fairly strong. While the total VEC market share is roughly 8% compared to total U.S. corn production, 38% of non-VEC growers when surveyed plan to grow VEC in the future. This indicates that producers continue to look for ways to participate in the VEC market. Approximately one out of every five producers surveyed grew some type of VEC in 2005. Some growers have tried growing VEC and exited. Others continue to grow VEC year after year. Of those surveyed, over 70% of VEC growers indicated they plan to continue. The economics of the VEC production on individual farms plays a critical role in determining the producers' involvement in VEC production.

Other developments, such as ethanol production, which can compete for VEC acres, are having a major impact on U.S. corn production in general. The explosion of ethanol is also affecting transportation (basis) changes in many parts of the Corn-belt. It is predicted that ethanol production will consume over 23% of the U.S. corn crop by the year 2015.

Developments in grain testing technology also continues to change the way VEC products are produced, handled, and utilized.

The outlook for VEC is strong, particularly in the 5+ year range as seed technology companies begin to focus more on output trait technology. Major initiatives are underway looking at corn and how it can benefit the areas such as renewable fuels, bioplastics, livestock production, and human and animal health. Biotechnology, which has had a historical impact on how growers grow corn, will undoubtedly affect how corn is utilized.

Figure 1: VEC Summary

Product	Estimated 2001 Acres (000)	Estimated 2002 Acres (000)	Estimated 2003 Acres (000)	Estimated 2004 Acres (000)	Estimated 2005 Acres (000)	Projected 2005 Producer Premiums (per bushel)
White	900-925	780-900	860-900	700-750	600-700	$0.20 - $0.40
Waxy	450-500	500-525	500-550	500-600	500-600	$0.15 - $0.30
Hard Endosperm/Food Grade	1200-1500	1200-1500	1200-1500	1200-1500	1200-1550	$0.10 - $0.30
High Oil	475-600	270-300	200-300	150-200	75-125	$0.20 - $0.40
Nutritionally Enhanced	100-175	80-95	75-90	75-90	75-90	$0.20 - $0.25
Non-GMO	400-700	300-600	250-600	300-575	300-575	$0.05 - $0.20
High Extractable Starch	~100+	125-175	125-160	100-200	150-250	$0.05 - $0.15
Organic	90-110	100-120	110-130	120-140	130-140	$1.00 - $5.00
Product	**Estimated 2001 Hectares (000)**	**Estimated 2002 Hectares (000)**	**Estimated 2003 Hectares (000)**	**Estimated 2004 Hectares (000)**	**Estimated 2005 Hectares (000)**	**Projected 2005 Producer Premiums (per metric ton)**
White	365-375	316-365	348-365	284-304	243-284	$7.87 - $15.75
Waxy	182-203	203-213	203-223	203-243	203-243	$5.90 - $11.81
Hard Endosperm/Food Grade	486-608	486-608	486-608	486-608	486-628	$3.94 - $11.81
High Oil	192-243	109-122	81-122	61-81	30-51	$7.87 - $15.75
Nutritionally Enhanced	41-71	32-39	30-37	30-37	30-37	$7.87 - $9.84
Non-GMO	162-284	122-243	101-243	122-233	122-233	$1.97 - $7.87
High Extractable Starch	~41+	51-71	51-65	41-81	61-101	$1.97 - $7.87
Organic	37-45	41-49	45-53	49-57	53-57	$39.37 - $196.85

Sources: Industry Data and USDA/NASS

Supply Chain Recommendations

Seed Technology Providers:

- Communicate with growers and end-users on what type of product is desired.
- Communicate with consumers on biotechnology and potential benefits of VEC products.
- Work to educate growers on value per acre versus yield alone.

Growers:

- Be part of the supply chain and view VEC as a way to differentiate your operation.
- Pay attention to your grain customer and work to deliver products that meet their needs.
- Educate yourself on how to produce a high quality product and being prepared to compete in a global market.

Grain Handlers/Exporters:

- Communicate with growers and end-users on VEC opportunities.
- Work to develop VEC programs well in advance to planting to increase likelihood of success.
- Educate yourself on meeting customer specifications and develop the infrastructure to deliver.

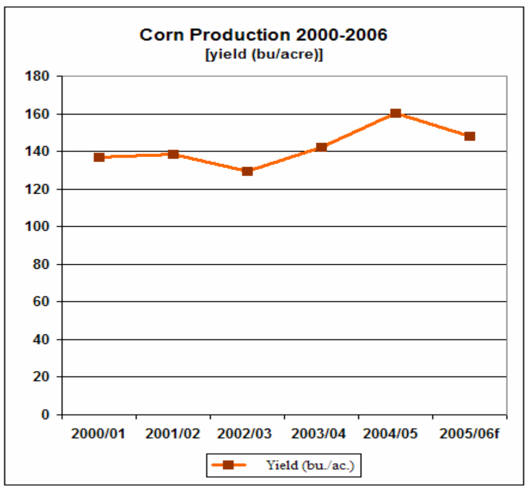
End Users:

- Seek to understand the value VEC products can bring to your operation and your customers.
- Determine realistic product specifications and volume requirements.
- Seek to understand timeline, potential cost, and logistical issues involved in VEC contracting.
- Communicate to the supply chain on objectives.

2005/06 U.S. CORN CROP REVIEW

KEY POINTS
- USDA expects 11.1 billion bushels (302 mmt) to be produced in 2005/06 season.
- Total corn supply expected to be 13.2 billion bushels (359 mmt).
- The average U.S. corn yield was approximately 148 bushels per acre (9.28 mt/hectares)
- Exports are expected to increase 1.95 billion bushels (50 mmt.).
- Total corn usage is projected to show an increase of 2.6% or 273 million bushels (6.9 mmt).
- Harvested area for the 2006/07 corn crop is also expected to be below 2005/06.
- USDA projects the share of ethanol in total corn use to rise to 23 percent by 2014/15

Figure 2:



Overall Corn Crop

The USDA expects 11.1 billion bushels (282 mmt.) to be produced in the 2005/06 growing season. This will be a 6 percent drop from the record 11.8 billion bushels (300 mmt.) produced in 2004/05. A regional drought in the central corn-belt lowered corn production in northern Illinois and adjacent areas. This may help to explain how even though the harvested-to-planted ratio in the U.S. was higher than normal, and planting conditions for corn were exceptionally good, yields were lower than in 2004/05, (see figure 2). A return to average planting conditions is likely to contribute to reduced corn acreage in coming years.

Figure 3:

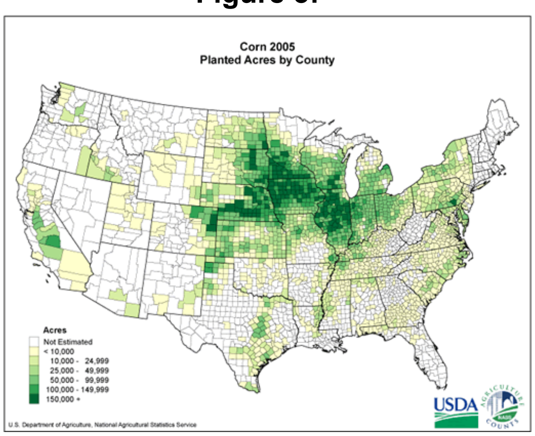


Figure 3 shows the 2005 corn production by county. The US corn-belt still largely determines world corn prices. Total corn supply, (i.e. production, beginning stocks and imports), for 2005/06 is projected at 13.2 billion bushels (335 mmt.), an increase of 500 million bushels (12.7 mmt.) from 2004/05. Total corn usage is projected to show an increase of 2.6% or 273 million bushels (6.9 mmt). The decrease in production and increase in use is projected to lead to an ending stock that of 2.3 billion bushels (58.4 mmt.). This will represent a change of 287 million bushels (7.3 mmt.) from the 2004/05 year. Total domestic usage is expected to increase 137 million bushels (3.5 mmt), and the projected use of corn to produce ethanol is expected to increase by 277,000 bushels (7,000 mt). Exports are expected to increase from to 1.95 billion bushels (49.5 mmt.) in 2005/06. The average price for the 2005 crop is expected to be between $1.95 and

$2.05 per bushel ($76.77 and $80.70/mt), at the farm level. The average U.S. corn yield was approximately 148 bushels per acre (9.28 mt/hectares), down 7.8% from 2004/05, but up 3.75% from the average of years 2001 through 2004, (See figure 4).

Typically, U.S. weather conditions have been used to predict corn prices. However, the future use of corn for ethanol production may also have significant impact on future price projections. According to the USDA, (released in February 2006), the share of ethanol in total corn use will rise from 12 percent in 2004/05 to 23 percent in 2014/15.

Figure 4: Corn Supply, Demand, and Price, 2001/02-2005/06

ACRES: Totals may not add due to rounding.	2001/02	2002/03	2003/04	2004/05	2005/06f
Area planted (mil. ac.)	75.8	78.9	78.6	80.9	81.8
Area harvested	68.8	69.3	70.9	73.6	75.1
Yield (bu./ac.)	138.2	129.3	142.2	160.4	147.9
Supply	*Million Bushels*				
Production (mil. bu.)	9,507	8,967	10,089	11,807	11,112
Beginning stocks	1,899	1,596	1,087	958	2,114
Imports	10	14	14	11	10
Total Supply	11,416	10,578	11,190	12,776	13,236
Usage					
Feed & residual	5,825	5,563	5,795	6,162	6,000
Ethanol fuel		996	1,168	1,323	1,600
Food, seed & other industrial		1,344	1,369	1,363	1,385
Total food, seed & industrial	2,045	2,340	2,537	2,686	2,985
Total Domestic Use	7,870	7,903	8,332	8,848	8,985
Exports	1,925	1,588	1,900	1,814	1,950
Total Use	9,795	9,491	10,232	10,662	10,935
Ending stocks	1,621	1,087	958	2,114	2,301
Season avg. farm price ($/bu.)	$1.90	$2.32	$2.42	$2.06	$2.00

HECTARES: Totals may not add due to rounding.	2001/02	2002/03	2003/04	2004/05	2005/06f
Area planted (mil. hectares)	30.7	31.9	31.8	32.7	33.1
Area harvested	27.8	28.0	28.7	29.8	30.4
Yield (kilo./hc.)	1420.7	1329.2	1461.8	1648.9	1520.4
Supply	*Million Metric Tons*				
Production	241.5	227.8	256.3	299.9	282.3
Beginning stocks	48.2	40.5	27.6	24.3	53.7
Imports	0.3	0.4	0.4	0.3	0.3
Total Supply	310.7	287.8	304.5	347.7	360.2
Usage					
Feed & residual	148.0	141.3	147.2	156.5	152.4
Ethanol fuel	0.0	25.3	29.7	33.6	40.6
Food, seed & other industrial	0.0	34.1	34.8	34.6	35.2
Total food, seed & industrial	51.9	59.4	64.4	68.2	75.8
Total Domestic Use	199.9	200.7	211.6	224.8	228.2
Exports	48.9	40.3	48.3	46.1	49.5
Total Use	248.8	241.1	259.9	270.8	277.8
Ending stocks	41.2	27.6	24.3	53.7	58.4
Season avg. farm price ($/mt.)		11.4	9.4	19.8	22.2
	$74.80	$91.33	$95.27	$81.10	$78.74

Source: NASS/World Agricultural Supply and Demand Estimates,

f/ Acreage, yield, production, and beginning stocks are estimates from the National Agricultural Statistics Service. Imports, use, ending stocks, and season average farm price are projections from the ***World Agricultural Supply and Demand Estimates*****, February 9, 2006**. The season average price is the mid-point of the projected range from the same report.

Outlook for 2006/07

Acreage

According to World Agricultural Supply and Demand Estimates (WASDE), April 10, 2006, higher energy costs are expected to contribute to lower corn plantings. The WASDE expects corn production costs to rise with higher fuel, fertilizer, and drying costs. Harvested area for the corn crop is also expected to be below 2005, but higher than years before 2005.

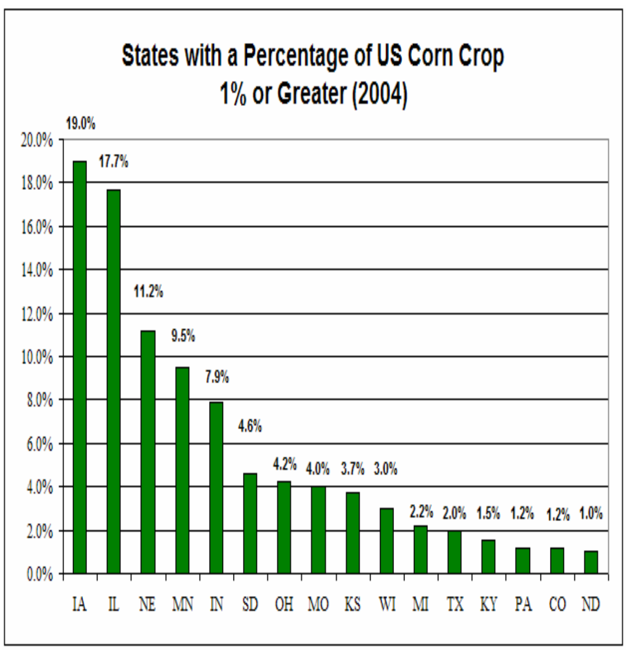
According to the USDA, corn producers' returns are being protected by marketing loan program benefits and by higher crop insurance coverage as yield gains and strong futures prices boost crop insurance yield and revenue protection.

The Future of Corn Supply, Demand, and Price

Corn Supplies: Corn supply is expected to be nearly unchanged, even with lower production. Beginning stocks are forecast up 300 million bushels (7.6 mmt), to 2.4 billion bushels (61 mmt.). According to the USDA/NASS this forecast of beginning stocks is the largest since the 1988/89 season. This will nearly offset reduced production, leaving 2006/07 corn supplies nearly unchanged at 13.2 billion bushels (335 mmt).

Corn Use: Feed and residual are expected to remain the largest single component of corn disappearance for 2006/07. However, it is expected to drop by 50 million bushels (1.27 mmt). Declines in feed and residual will be offset by an expected increase in corn use for ethanol production up 550 million bushels (14 mmt.) and feed, seed and other industrial uses being up 10 million bushels (254,000 mt.). This will have a positive net effect on the total domestic use of approximately 510 million bushels (13 mmt.). Early indicators for 2006/07 also point to notable gains in corn exports.

Figure 5: Percentage of State's Corn Crop Production



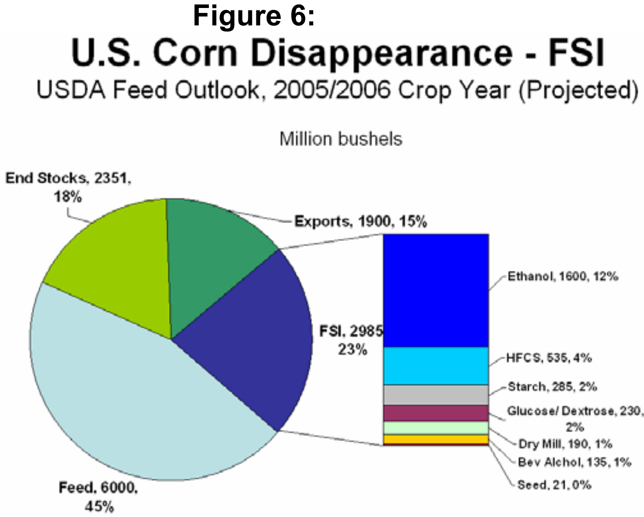
Corn Ending Stocks and Market Prices: The WASDE projects ending stocks for corn to drop significantly to 1.7 billion bushels (44 mmt.) in 2006/07. The stocks-to-use ratio is projected at 15.0 percent, down from 22.2 percent forecasted for 2005/06. The average price received by growers is projected at $2.15 per bushel ($84.64 mt.), up $0.15 ($5.90 mt.) from the forecast of 2005/06.

Figure 5 illustrates the percentages of the 2004/05 corn crop production in each of the major states (*states with less than one percent are not shown*). The sum of states with percentages greater than 5%, (Iowa 19%, Illinois 17.7%, Nebraska 11.2%, Minnesota 9.5%, and Indiana 7.9%) equals 65% of the US corn crop.

Grain Consumption Factors

To understand grain movement it is important to understand corn production and consumption. Figure 6 identifies the corn usage for the forecasted 2005/06 US corn harvest. It is expected that the industrial use for corn will continue to grow. This increase in corn consumption is driven primarily by the growth in ethanol production. This is discussed in more detail below. Feed use is expected to decline partly due to the increase in DDGS available to the market which displace corn in the animal diet. Corn exports are expected to be flat to slightly higher. Corn yields are expected to continue upward. Overall corn consumption will track higher and reduce ending stocks. China is expected to increase corn imports from the U.S. These trends indicate an increase in corn price in coming years.

Figure 6:



Ethanol Expansion: On August 8, 2005, the Energy Policy Act of 2005 (H.R. 6) was signed into law. This energy legislation included a nationwide renewable fuels standard (RFS) with a target of 7.5 billion gallons (28.4 billion liters) of ethanol and biodiesel by 2012. With current growth of ethanol production, this target will almost certainly be surpassed. In 2006, the U.S. will be producing over 4 billion gallons (15 billion liters) of ethanol. Analysts expect this to grow to around 11 billion (41.6 billion liters) by 2015. Ethanol production utilizes roughly 13% of the U.S. corn crop. The demand for corn will rise from the current 1.5 billion bushels (38 mmt.) to over 3 billion bushels (76 mmt.) in that same period and growing from 13% to 23% of the U.S. corn crop. Corn used for ethanol will surpass total corn exports within the next 5-10 years.

Exports have remained steady with little change in the percent of total corn supply usage. Food, Seed and Other Industrial uses has changed slightly from 14% in 1997/98 to the current 2005/06 forecast of 13%. Feed and Residual usage has decreased from 63% in 1997/98 to approximately 55% for the forecasted year. The disappearing percentages are showing up in the use of corn for ethanol production (See figure 7).

Figure 7: Total Domestic Use of Corn Supply

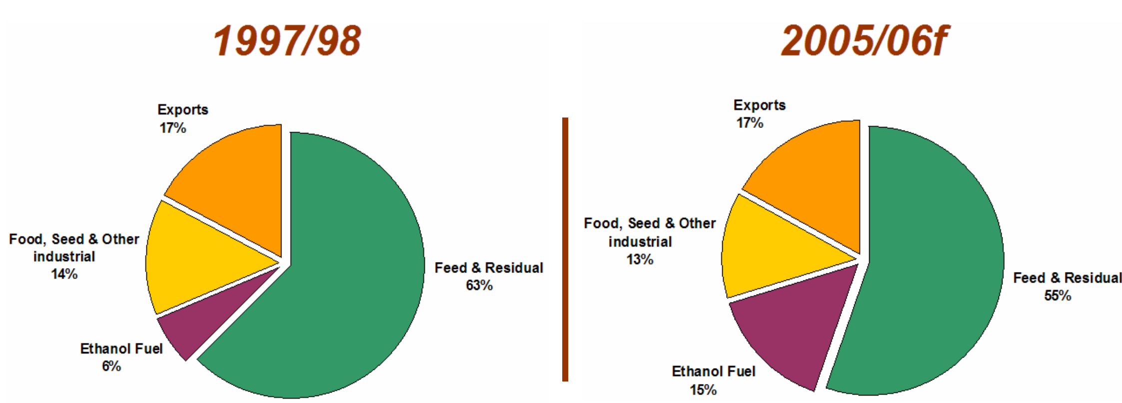
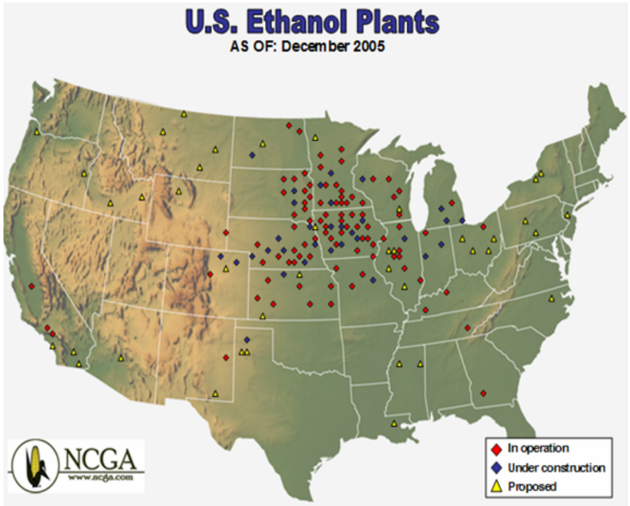
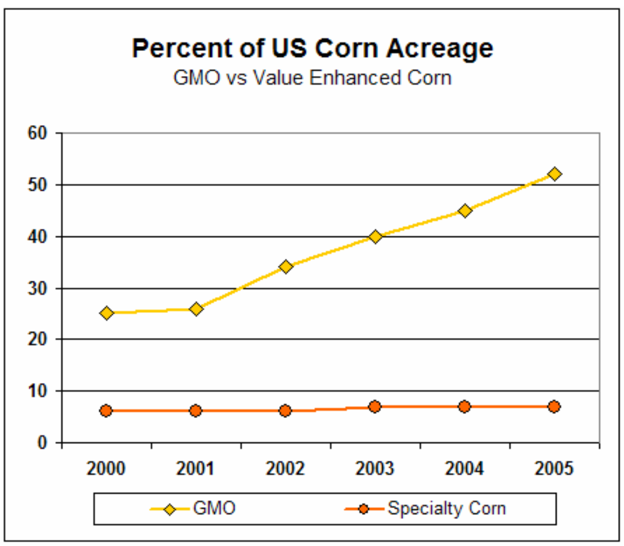


Figure 8:



The Impact of Ethanol Production on Transportation. The majority of ethanol expansion has been in the central corn-belt. However, more plants are being planned for areas outside of the corn-belt, (See figure 8). This expansion not only increases the demand for corn, but will create demand for modes of transportation. This comes at a time when service by rail is strained and there are labor shortages for the trucking industry. It is predicted that there will be 20% more demand on rail to move corn, ethanol, and DDGS, and 50% more demand for trucks to move corn from the farm and elevator to the ethanol processor and DDGS, (*Source, The ProExporter Network, 2006*).

Figure 9:



Sources: USDA/NASS and Context Sources

<u>GMO vs. Non-GMO</u>

In the early years of VEC, it was projected that specialty corn would represent over 20% of the US corn crop. However, as of 2005 VEC represents approximately 8% of the US corn crop. When non-VEC corn is doing well many growers, do not plant specialty corn as biotech traits offer comparable prices, higher yields, and the decreased hassles with herbicide tolerance and insect resistance.

Acceptance Issues: Figure 9 shows the comparable acceptance of GMO corn versus VEC. Individuals surveyed believe the world is becoming more comfortable with the idea of GMO products in their cereals and tortillas. Surveyed individuals also believe it isn't a matter of "if", but "when" specialty corns are stacked with GMO traits. However, many consumers continue to be reluctant to purchase food products with GMO corn. The reluctance to use GMO corn in food products has helped maintain the value of the non-GMO characteristic in the world corn market. Though the GMO acceptance issues may disappear in the future, it will likely remain a viable market for some time to come.

Competition with stacks: Growers have embraced input traits in corn for several years. As VEC has had a sluggish showing each year, GMOs continue upward. The herbicide tolerance and insect resistance are too attractive to resist. As end-users become more accepting of GMO crops, the flat trend of VEC with added traits such as herbicide tolerance and insect resistance will likely surge upward. Most individuals surveyed believe that it is only a matter of time until most VEC has stacked traits such as herbicide tolerance, insect resistance, drought tolerance and added health benefits.

(VEC) OVERARCHING ISSUES

History

KEY POINTS

- As a percent of total corn planted, VEC has experienced little growth over the last few years.
- Management, contracts, premiums and yields have made VEC unique from commodity corn.
- VEC has mostly been flat over the years from 1995 to 2005.
- The average VEC premium is between $0.10 and $0.30 per bushel ($2.54 and $7.62 mt.)
- Several individuals surveyed felt that premiums are no longer high enough.
- Across the board VEC yields have been improving.
- 2005/06 growth projections are similar to 2001/02.

Throughout the years, markets have emerged for different types of specialty corn or what is commonly called Value Enhanced Corn (VEC). These enhancements or value added characteristics fall into two groups related to either compositional or handling differences that have made them more valuable to the end-users in various markets. Growers, end-users and consumers have slowly moved towards an acceptance, and in some cases, a demand for specific quality traits that increase value for various participants in the supply chain. Some of the specialty types that have become available in the VEC market are shown in figure 10.

Many of the markets for VEC have included:

- livestock feed
- cornstarch
- emulsifiers, thickeners, and stabilizers
- adhesive
- masa, tortilla chips, snack foods, and grits
- organic food products
- simply not being modified genetically, (see figure 10 for VEC trait history and uses).

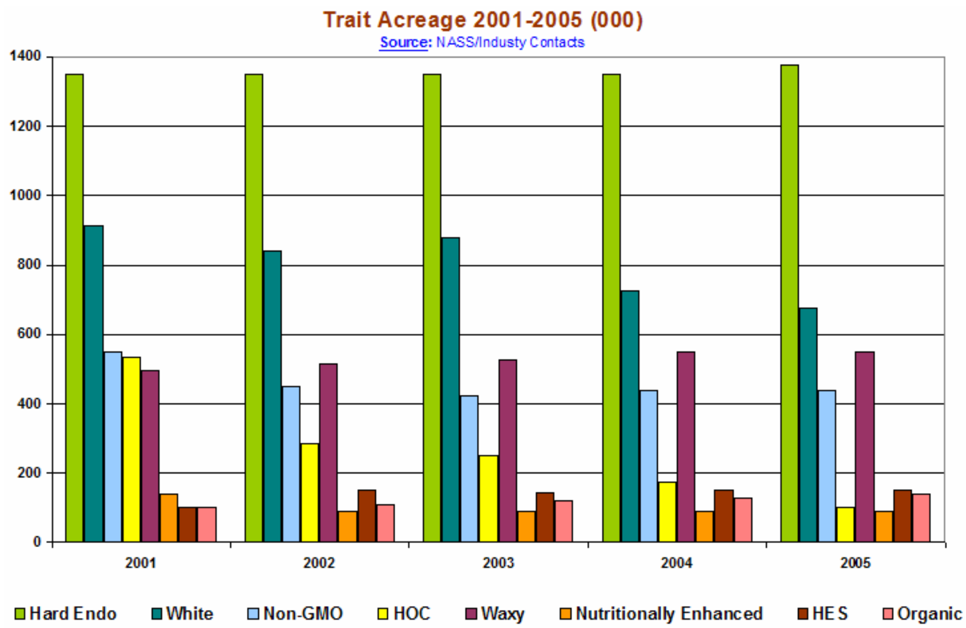
Figure 10:

Corn Trait	Value Enhanced Trait History and Uses — PRIMARY USES: Food Processing	Feed Manufacturing	Consumer Goods	Industrial Processes	Estimated Year of Introduction
CURRENT PRODUCTS					
White	(x)				Pre 1980
Waxy	(x)			(x)	Pre 1980
Hard Endosperm	(x)				Pre 1980
Post Harvest Pesticide Free	(x)		(x)		Pre 1980
Nutritionally Enhanced		(x)			1980's
Organic	(x)				1990's
High Lysine non-GMO		(x)			1990's
High Oil		(x)			1990's
Non-GMO	(x)				1990's
High Extractable Starch	(x)				2000's
High Fermentable				(x)	2000's
PIPELINE PRODUCTS					
Low Phytate		(x)			??
High Amylase				(x)	??
High Lysine GMO		(x)			??

Sources: Industry Data and USDA/NASS

Some VEC traits have not been as successful as planned. Poor trait performances in conjunction with crop management needs and IP requirements have limited the growth of VEC and participation in the VEC industry. High oil corn is an example of a technology that was expected to be widely adopted, but instead has steadily lost acreage each year following its peak in 2001. As a percent of total corn planted, VEC has experienced little growth over the last few years. The following graph demonstrates VEC acreage trends from 2001 to 2005.

Figure 11:



The traits that have made VEC distinct and attractive to the end-user, (i.e. organic, non-GMO, pesticide free, hard endosperm, etc.), have necessitated special handling and identity preservation issues involved in the production and management of VEC. The following factors have made VEC unique for growers to produce and end-users to purchase:

- management
- contracts
- premiums
- yields

Management

Specialty corn requires increased levels of management. The increased management begins with the genetic supplier and seed producer. It continues with the grower, then on to grain handlers, transporters, exporters, and ultimately, end-users. Some of these increased levels of management have included growing conditions that require isolation from other corn crops, combine cleaning procedures, separate storage and transportation, drying levels and contracts.

Contracts

Many growers may have limited or no experience with contacting. Contracting, which guarantees a market, could be beneficial to the grower. However, growers who produce under contract must be aware that contracts may specify production practices, grain quality and quantity as well as time and place of delivery. Some growers have been reluctant to participate in contracts due to the desire to have more market flexibility and not be tied to any preseason agreements, (*see Channel section for additional contract information*).

Premiums

To encourage grower participation in VEC production, contractors have offered growers incentives or financial premiums. Since 2001, premiums for specialty corn have ranged from $0.05 to $5.00 per bushel ($1.97 to $196.84 mt.), with the average being between $0.10 and $0.30 per bushel ($3.94 and $11.81 mt.), (See figure 12 Grower Premiums 2001–2005*).*

Figure 12:

Grower Premiums 2001-2005

(per/bu)	White	Waxy	High Oil	Hard Endo/Food Grade	Nutritionally Enhanced	Non-GMO	High Extractable Starch	Organic
2001	$0.25 - $0.35	$0.20 - $0.35	$0.20 - $0.35	$0.10 - $0.20	$0.19 - $0.35	$0.07 - $0.12	$0.07 - $0.12	n/a
2002	$0.25 - $0.35	$0.15 - $0.35	$0.20 - $0.35	$0.10 - $0.20	$0.19 - $0.35	$0.07 - $0.15	$0.05 - $0.16	n/a
2003	$0.30 - $0.50	$0.10 - $0.30	$0.15 - $0.30	$0.10 - $0.30	$0.15 - $0.25	$0.05 - $0.15	$0.05 - $0.17	$0.98
2004	$0.25 - $0.40	$0.15 - $0.20	$0.15 - $0.30	$0.10 - $0.30	$0.20 - $0.23	$0.05 -$0.20	$0.05 - $0.18	n/a
2005	$0.20 - $0.40	$0.15 - $0.30	$0.20 - $0.40	$0.10 - $0.30	$0.20 - $0.25	$0.05 - $0.20	$0.05 - $0.15	$1.00 - $5.00
(per/mt)	White	Waxy	High Oil	Hard Endo/Food Grade	Nutritionally Enhanced	Non-GMO	High Extractable Starch	Organic
2001	$9.84 - $13.78	$7.87 - $13.78	$7.87 - $13.78	$3.94 - $7.87	$7.48 - $13.78	$2.76 - $4.72	$2.76 - $4.72	n/a
2002	$9.84 - $13.78	$5.90 - $13.78	$7.87 - $13.78	$3.94 - $7.87	$7.48 - $13.78	$2.76 - $5.90	$1.97 - $6.30	n/a
2003	$11.81 - $19.68	$3.94 - $11.81	$5.90 - $11.81	$3.94 - $11.81	$5.90 - $9.84	$1.97 - $5.90	$1.97 - $6.69	$38.58
2004	$9.84 - $15.75	$5.90 - $7.87	$5.90 - $11.81	$3.94 - $11.81	$7.87 - $9.05	$1.97 -$7.87	$1.97 - $7.09	n/a
2005	$7.87 - $15.75	$5.90 - $11.81	$7.87 - $15.75	$3.94 - $11.81	$7.87 - $9.84	$1.97 - $7.87	$1.97 - $5.90	$39.37 - $196.85

Sources: Industry Data and USDA/NASS

Several individuals surveyed felt that premiums are no longer high enough to encourage participation. However, increasing premiums to encourage growers to produce VEC could have negative impact on the participation of end-users who are inclined to seek lower prices. This tension has likely hindered the progress of VEC production. Since 1995, the growth projections for most VEC varieties have been either flat or down. Figure 13 shows the VEC growth projections for the 2001/02 and 2005/06 seasons.

Figure 13:

Growth Projections

Corn Trait	2001 Growth Projections	2005 Growth Projections
Waxy	Flat-Down	Flat-up
High Oil (HOC)	Down	Down
Nutritionally Enhanced	Down	Flat-up
White	Flat - Up	Flat
Hard Endosperm/Food Grade	Flat	Flat
Non GMO		Flat
High Extractable Starch (HES)		Flat
Post Harvest Pesticide Free		Flat
High Fermentable		Flat-up
Organic		Up

Sources: Industry Contacts and USDA/NASS

Yields

Historically, VEC has had lower yield potential than non-VEC. This is primarily due to plant breeding factors. A hybrid that has been selected for specialty traits such as higher oil content may not be the hybrid with the highest yield potential. Oftentimes, plant breeders need to make compromises when selecting for a specific trait. These compromises may take the form of plant characteristics that lead to lower yields, and substandard agronomic performance. Without significant premium compensation, lower yields may deter growers from participating in VEC production.

However, across the board VEC yields have been improving. With continued hybrid development, the yield difference of VEC corn versus non-value enhanced corn is decreasing.

Trends

Key Points:

- Output traits have been developed more collaboratively than input traits.
- Near Infrared Transmittance technology (NIRT) has become more widely adopted as a grain composition measurement tool.
- Additional calibrations have been developed allowing for more traits to be analyzed.
- The technology is allowing for segregation at the point of grain delivery.
- Near Infrared Transmittance technology analyzes whole grain, enabling results to be produced in less than a minute without sample grinding.
- Industry standardization of measurement tools will be important as volumes increase.
- Non-GMO lateral flow or strip tests are the most common testing method utilized to determine if GMO grain is present.
- GMO testing and sample preparation costs are still an issue and most grain handlers implement random testing program as a result.

<u>Technology Push vs. End-User Pull</u>

In the past, trait providers such as Monsanto, Pioneer/DuPont, BASF, Dow, and Syngenta have developed traits based on technology and research discoveries. These providers have traditionally focused on input traits and grower problems such as insects, weeds, and crop yields. However, with output traits, providers believe they have taken a more collaborative approach with growers and end-users.

Most seed providers and grain handlers surveyed felt that the trait development process has been a collaborative effort between trait providers and the end-users. However, some interviewees also felt that even though there is greater collaboration in the development of output traits, the technology push is still much greater than the market pull. This is best exemplified by the future of GMO inclusion in value enhanced products. However, Organic corn is one VEC crop where end-user pull is equal to or greater than technology push, (see Organic Corn section for details).

<u>Measurement Capabilities</u>

Figure 14: Near Infrared Whole Grain Analyzer

Near Infrared Transmittance Technology (NIRT). Though Near Infrared Transmittance Technology for grain testing has been utilized for decades, there have been recent improvements. With the advances in NIRT, improvements are making grain composition testing, such as protein, starch, and oil tests relatively simple and more cost effective. More recent developments are allowing for the testing of fatty acids, including oleic, linolenic, and omega 3 fatty acids. Many other potential uses for the technology are under development.

NIRT technology is attractive because whole grains can be tested in one instrument and all information required can be obtained in just one test. As a result, the industry has become more analytical when looking at raw commodities in general. This rapid analysis capability is impacting how VEC is handled. For instance, it is now possible for grain handlers and processors to determine the composition from samples of each load of grain at the scale. This allows for the segregation and value determination at the scale, which eliminates the need for contracting because the end-user can now determine the composition and move the product to the appropriate channel. Several grain processors in the industry are currently utilizing NIRT technology in this fashion and given the proven difficulty of producing grain under contract, it could become more widespread.

A critical marketplace issue is getting more accurate grain composition information and developing the technology to measure it. It is important to understand that if quality characteristics cannot measured, they cannot be improved and value cannot be well defined.

NIRT is the key technology that allows for the marketing of grain based on many of the key end use quality attributes. This technology has made a dramatic impact on the adoption of VEC. Current beneficiaries of this technology have been seed companies, grain handlers and end-users. However, research on NIRT technology at the farm level in harvesting equipment is currently underway. This information can be utilized to make better cropping decisions in addition to understanding the value of the crop before it is marketed to the grain elevator or end-user. The grain could also be segregated at the combine. While the immediate value is being explored as part of crop research, it is possible that applications will exist for commercial grain production in the near future.

Genetically Modified Organism (GMO) Testing: Concern has been raised globally as to whether GMO products are safe in the human food chain. These questions have led to the thought that there may be a need to further regulate and perhaps label seed, feed, and food products to inform the consumer whether the products being marketed are made with GMO ingredients.

Examples include:

- Food manufacturers need to demonstrate that a food product does or does not contain a GMO.
- A seed company needs to ensure that it is producing and marketing pure seed.
- A grower producing a non-GMO crop needs to provide evidence that the seed purchased has not been genetically modified.
- A grain handler must verify that he is meeting the needs of a non-GMO corn buyer.

When GMOs are undesirable , the grain handling system must employ testing techniques such as immunoassays (detection of the protein produced by the inserted gene) or PCR (polymerase chain reaction for detection of DNA segments). Immunoassays can be both qualitative and quantitative.

Figure 15: Lateral Flow Strip Test

ELISA Test: The simplest method is an ELISA test, known in the grain handling industry as strip tests or lateral flow tests. Strip tests result in a simple "yes" or "no" answer for the presence of the target GMO trait such as StarLink®, Roundup Ready®, YieldGuard Corn Borer®, etc. Strip tests are relatively inexpensive, typically less then $5 per test, and can be performed in a matter of minutes. They are simple to run and require very little investment

in equipment. The grain industry uses these tests to determine the presence of GMO's.
Strip tests are limited to proteins of specific events (e.g. Bt or Roundup Ready) and thus, they are not useful in detecting all GMO events. It is important to note that testing sensitivities vary by target GMO trait. For instance, current strip test technology for LibertyLink® can detect 1 in 70 kernels and StarLink® can be detected at a level of 1 in 800 kernels. Regardless, these quick tests are the tests of choice particularly at the first point of origination to determine the presence of an event in a sample, it will not define specific quantity. If the exact amount of GMO is needed then Polymerase Chain Reaction (PCR) is the appropriate test.

Polymerase Chain Reaction (PCR) Testing: PCR is a quantitative method that will provide the percent of the sample that contains the target GMO trait. PCR amplifies or copies the small segments of DNA. These tests are considered to be expensive costing more than $100 per sample, and relatively time consuming requiring hours to complete. However, real time PCR is being researched and may be available in the future. DNA tests using PCR (Polymerase Chain Reaction) technology are most often used for breeding, production and marketing decisions involving seed, grain, food ingredients, and finished food products.

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StarLink corn seed was registered and annually renewed for domestic animal feed and non-food, industrial use in the USA in 1998, 1999 and 2000. The US registration was voluntarily withdrawn by Aventis CropScience in mid-October, 2000.
Roundup Ready® and YieldGard® are trademarks of Monsanto Technology LLC.

Grower Survey

Key Points

- The percent of growers producing VEC is increasing while total acreage is decreasing.
- VEC represents approximately 8% of total corn production in the U.S.
- 16% of producers reported growing some type of VEC.
- Non-GMO corn has gained the biggest percentage of growers, while high oil growers have seen the biggest decline.
- The percentage of growers producing specific VEC types other than non-GMO has mostly decreased with the exception of waxy corn.
- Most respondents believed their VEC performs comparable to somewhat lower than commodity corn yields.
- Over 90% of growers believe VEC production will remain the same or increase.
- Producers' planting decisions are based mainly on market access, yields, and costs.
- Seventy-one percent of VEC producers plan to plant VEC again in 2006/07.
- The majority of growers that plan to increase their VEC acres cite "profits" as the reason.
- The majority of VEC growers believe the input costs of producing VEC are comparable to commodity costs.
- In 2005, growers' main concerns were GMO contamination and yield differences.
- Growers indicated that VEC premiums for 2005/06 VEC averaged $0.15 per bushel.
- When asked whether the availability of GMO technology would impact their decision to produce VEC, 42% of growers said it would have no effect; 32% reported that they would be more likely to plant VEC; and 26% said they would be less likely to plant VEC.
- Growers are not apt to invest in capital equipment that will accommodate producing VEC.
- VEC producers store 77% of their VEC production on-farm.
- VEC growers tend to be more educated, have larger farms, and be younger than growers that produce only commodity corn.
- Growers dry their VEC at lower temperatures than commodity corn.
- The most popular type of on-farm drying equipment is In-bin Heated.
- Grower groups have the opportunity to fill a role as a grower support.

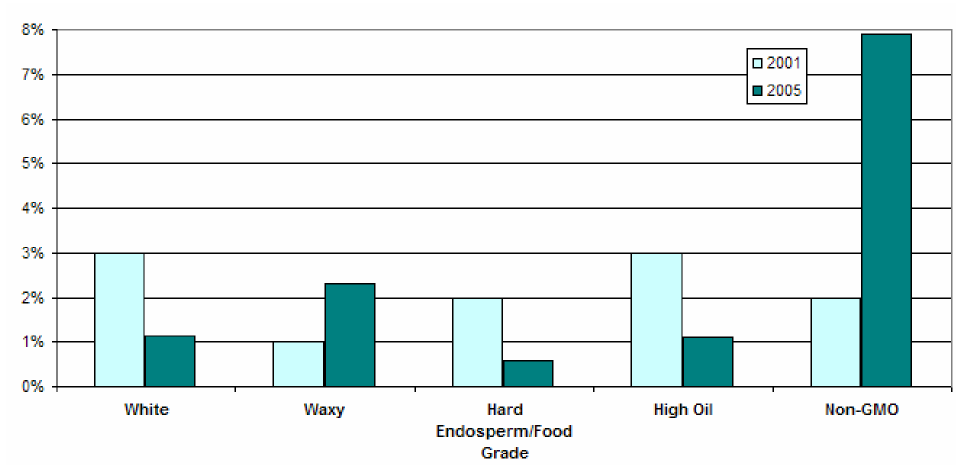
In 2006, 987 growers from Iowa, Illinois, Indiana, Kansas, Minnesota, Missouri, N. Dakota, Nebraska, Ohio, S. Dakota, and Wisconsin responded to the survey that provides vital insight into the VEC market.

<u>Production</u>

As the percent of growers producing VEC is increasing, total production of VEC is on the decline. In 2001/02 VEC represented just over 7% of total corn production. By last year, VEC represented approximately 8% of total corn production. Surveyors were asked about non-GMO corn, but it was impossible to determine if growers marketed the corn as non-GMO or simply planted non-GMO varieties. All other VEC types combined represent only 5.1% of all corn produced in 2005/06. Growers list low yields as the most common deterrent to planting VEC.

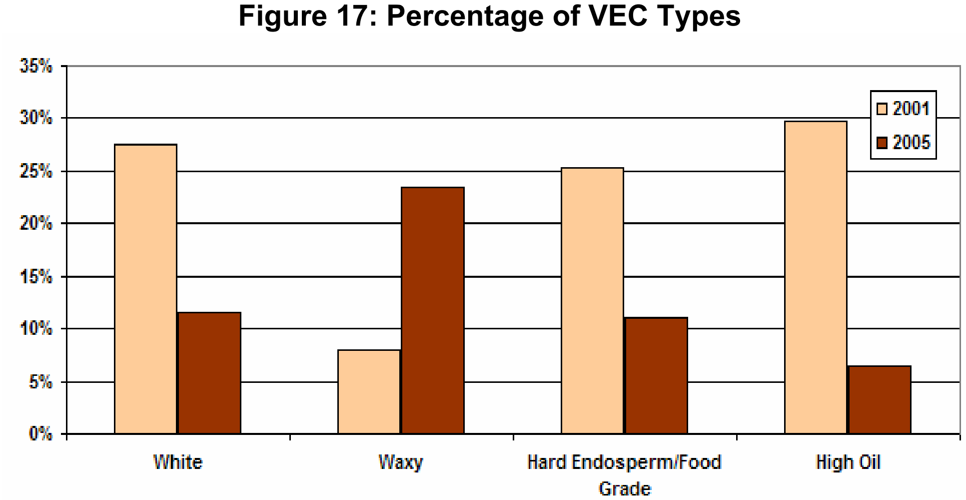
Grower attitudes towards producing VEC have changed considerably since producers were last surveyed in 2001/02. This past season, 16% of producers reported growing some type of VEC compared to 12.3% in 2001/02. The most common reason growers say they will plant VEC is crop rotation. The percentage of surveyed growers planting different types of VEC has changed as well. Among surveyed growers, non-GMO corn has gained the biggest percentage of corn growers, while High oil growers have seen the biggest decline, (See figure 16).

Figure 16: Percent of Growers Planting VEC 2001/02 vs. 2005/06



The percentage of growers producing specific VEC types other than non-GMO has mostly decreased with the exception of Waxy corn (see figure 17).

Figure 17: Percentage of VEC Types

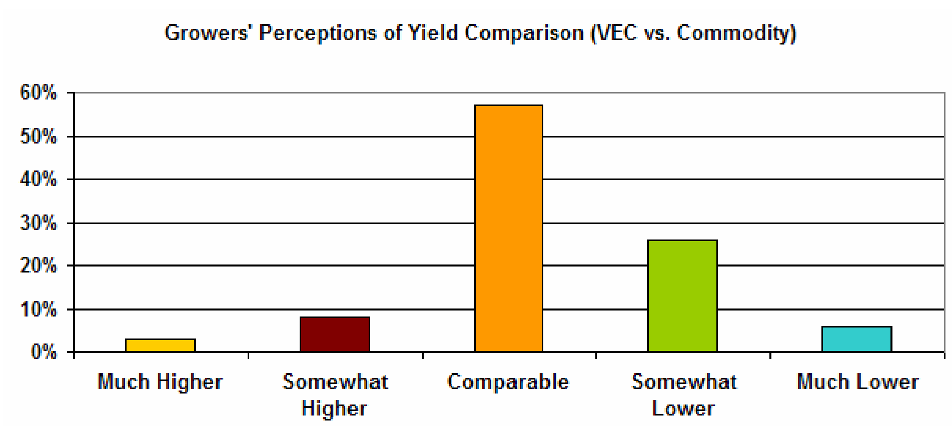


Yields

When respondents were asked how they felt their VEC crop yields compared to commodity corn yields, most believed their VEC performs comparable to somewhat lower than commodity corn yields. The following are the respondents' beliefs about VEC yields compared to commodity corn yields in categories ranging from "much higher" to "much lower", (See figure 18):

- 3% VEC yields are much higher
- 8% VEC yields are somewhat higher
- 57% VEC yields are on par
- 26% VEC yields are somewhat lower
- 6% VEC yields are much lower.

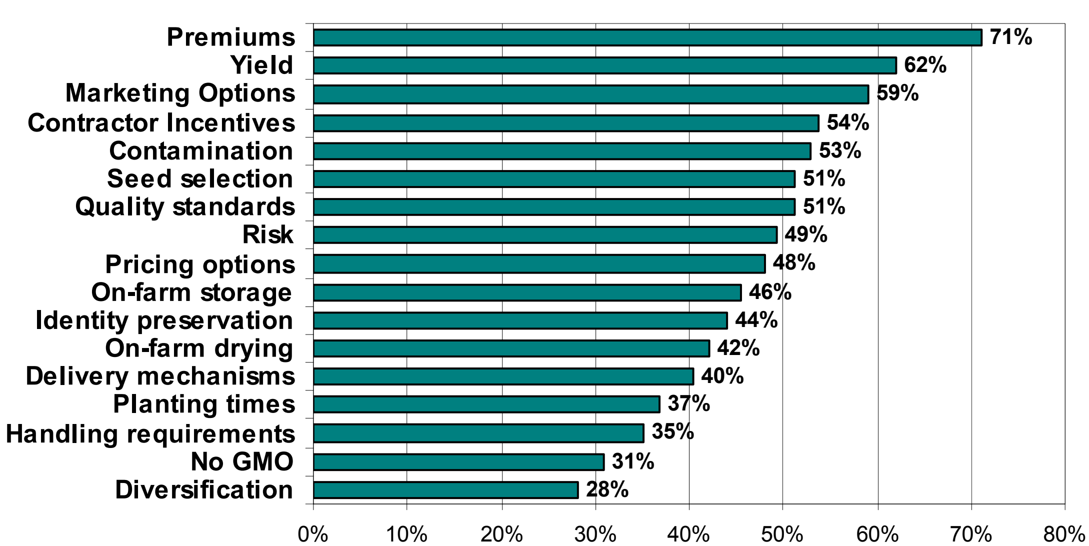
Figure 18:



Planting Decisions

Producers' planting decisions are based mainly on market access, yields, and costs. Twenty-two percent of growers currently producing VEC corn will not do so in 2006. Growers list premiums and yield as their top two concerns when making a planting decision. Figure 19 shows the percentage of producers that think certain factors are of high importance when deciding not to plant VEC. Producers' opinions regarding the relative risk of VEC vs. commodity corn were split between 'more risky' and 'same amount of risk'.

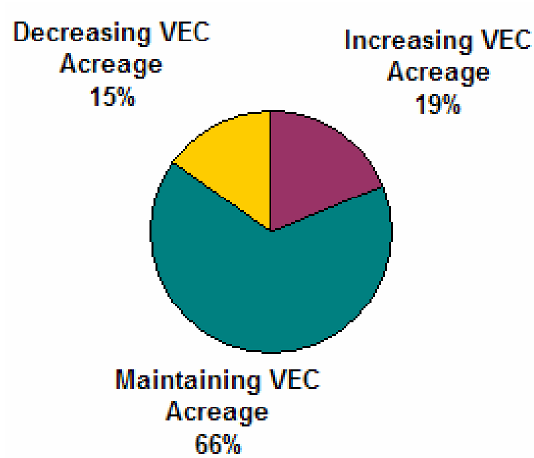
Figure 19: Reasons Producers Decide Not to Plant VEC



Thirteen percent of producers who did not plant VEC in 2005 had planted VEC in prior years. Producers who did not plant VEC in 2005 but had in the past cite indicated marketing options, yields, low premiums, and high input cost as reasons for not planting VEC this year.

Seventy-one percent of VEC producers plan to plant VEC again in 2006, citing the following advantages: profitability; diversification; increase marketing options; and favorable pricing mechanisms. The majority of growers that plan to increase their VEC acres cite "profits" as their main reason to plant more. While 71% of VEC growers plan to have VEC acres again in 2006 those growers are planning on 29.6% fewer acres than 2005. Among those growers, 19% plan on increasing acreage, 65% plan on maintaining current acreage, and 15% plan on decreasing their VEC acreage, (See figure 20).

Figure 20: Growers Use of VEC Acreage 2005/06



Growers who plan to grow fewer VEC acres list crop rotation and input costs as the main reasons to scale back. Both growers planting more VEC acres and those planting fewer VEC acres list crop rotation, profits, premiums, yield, and performance as reasons for their decision.

Outlook

As producers look to 2006, 71% of those who planted VEC in 2005 will continue production; with 22% discontinuing VEC production. This may lead to more efficient producers, in terms of yields for both VEC producers and commodity corn producers. Within the next three years, 38% of producers that did not plant VEC in 2005 are planning to enter VEC production.

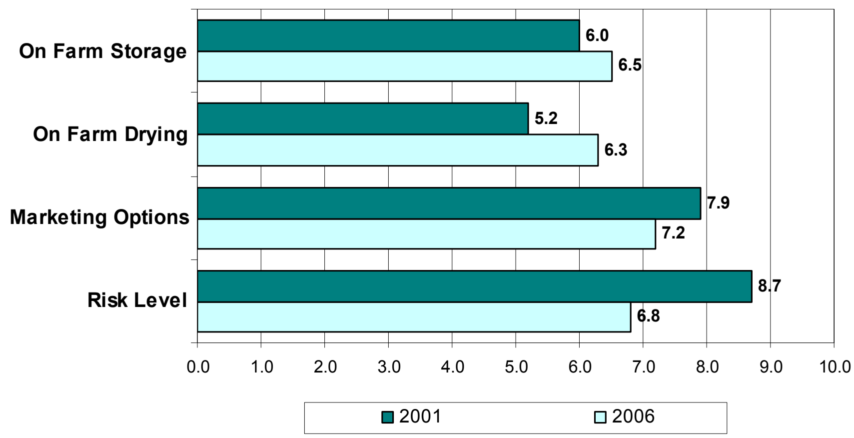
Growers appear confident about the future of VEC production. Ninety percent of producers believe VEC production will either remain the same or increase, with only 11% believing VEC production will decrease. However, growers' opinions are mixed on which types of VEC will increase and which will decrease. Growers believing that VEC production will increase think that high starch, high oil and non-GMO types will lead the increase. At the same time, growers who believe VEC production will decrease, believe high oil and white corn will lead the decline.

Constraints to Production

Although most growers report experiencing no problems with VEC production, 15% report having some type of problem. "Problems with harvesting" was the issue listed the most among growers reporting problems. Other issues included lower than expected output, not meeting quality standards, standability, and drought.

The majority (66%) of VEC growers believe the input costs of producing VEC are comparable to costs of commodity corn. The following chart shows how constraints to planting VEC have changed over the past six years. Factors that concerned growers in 2001 seem to have lost importance in 2006.

Figure 21: 2001 vs. 2006 Constraints to Acreage



In 2005, growers' main concerns where GMO contamination (35%) and yield differences (27%). Other grower concerns in 2005 were ability to meet delivery time, pests, contractor default, markets, testing methods, weather, and decaying premiums.

When asked whether the availability of GMO technology would impact their decision whether or not to produce VEC, 42% of growers said it would have no effect; 32% reported that GMO technology would lead them to be more likely to plant VEC; and 26% said the availability of GMO technology would make them less likely to plant VEC. The GMO issue of most concern is contamination, but growers were also concerned with lack of pest control options with VEC. Other GMO related concerns include yield, performance, quality standards, segregation, and insecticide use. The survey showed growers were worried about not having certain GMO traits with VEC production. Thirty-three percent were concerned about not having the Roundup Ready trait, 24% were worried about corn rootworm resistance, and 18% were concerned with ECB resistance. The least important traits were Herculex® and LibertyLink®.

Economics and Marketing

Premiums are an important factor for growers who are considering VEC. Growers surveyed indicated that premiums received for 2005/06 VEC averaged $0.15 per bushel ($5.90mt) across all types. White corn premiums averaged $0.25 per bushel ($9.84 mt), waxy corn premiums averaged $0.20 per bushel ($7.87) and food grade corn average $0.10 per bushel ($3.93) in 2005.

Profitability is another important factor. Most VEC growers thought value enhanced corn production is more profitable than commodity corn. In fact, 44% would rate VEC somewhat more profitable to much more profitable than commodity corn. An additional 42% feel VEC

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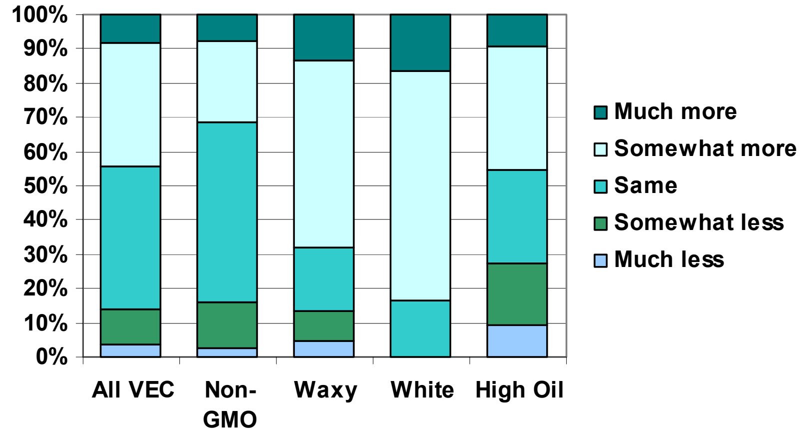
production is as profitable as commodity corn. Other producers feel VEC is less profitable than commodity corn. The following figure shows how producers rate individual VEC types' profitability compared to commodity corn.

Figure 22: VEC Profitability Compared to Commodity Corn



In order to be profitable growers must have a good marketing strategy. Growers rate marketing options a 7.2 on a scale of one to ten when deciding to plant VEC, but they clearly want to keep their options for marketing open. Growers report that they only contracted 31% of their 2005 VEC crop. Forty-one percent of the contracted VEC crop was produced under an identity preservation system.

As growers are concerned about the risk of VEC production, 71% purchased crop insurance to mitigate exposure to loss.

Growers are not apt to invest in capital equipment that will accommodate producing value enhanced corn. Eighty-two percent of producers have not invested in any other grain handling, transportation, harvesting, or grain storage equipment that would accommodate producing value enhanced corn. However, twenty-seven percent plan on upgrading or investing in new equipment to be able to produce VEC. This is up 12 percentage points from the 15% of growers planning new investments in 2001/02. In the next three years 65% of producers report that they will not upgrade or invest in any new equipment to accommodate VEC production.

<u>On-farm Storage and Drying</u>
VEC producers store 74% of their total corn production and 77% of their VEC on-farm. Total corn production stored on farm in 2000 was 67%. Nearly all VEC producers (94%) have the capability to store their grain on-farm. This is up from 93% in 2000. Reported storage capacity among VEC producers excluding non-GMO is 86,500 bushels compared to 63,700 bushes for non-GMO producers. VEC grower's storage capacity is spread across an average 7.5 grain bins per farm. Eighty-five percent of producers have on-farm drying facilities, down from 88% reported in 2000. Producers report that more than 70% of their production is dried on farm, as compare to 40% in 2000. Growers dry their VEC at lower temperatures than commodity corn. The most popular type of on-farm drying equipment is In-bin Heated (39%) followed by Continuous Flow (26%), Batch (15%), and In-bin Air (15%). See figure 23 for a comparison of drying methods and drying temperatures growers used for commodity corn and VEC.

Figure 23: Percent Drying Methods and Temperatures

	Commodity Corn				Value Enhanced Corn			
	Continous Flow	Batch	In-Bin Heated	In-Bin Air	Continous Flow	Batch	In-Bin Heated	In-Bin Air
Dried On-Farm	86%	63%	66%	78%	82%	67%	63%	85%
Dried Off-Farm	8%	19%	13%	15%	8%	18%	7%	13%
Not Dried	6%	18%	21%	7%	9%	13%	29%	1%
Temperature	161	114	101	Ambient	138	131	93	Ambient

Source: Report Survey

Demographics

VEC growers tend to be more educated, have larger farms, and be younger than growers that produce only commodity corn. In terms of education 34% of VEC growers had at least a four year degree, as opposed to 22% of non-VEC producers. VEC growers' farm size is generally larger than their non-VEC counterparts. Forty-one percent of VEC growers' farms are larger than 500 acres compared to only 28% of non-VEC producers having a 500 acre plus farm. VEC growers are slightly younger than non-VEC growers with most being younger than 55.

Growing groups

Grower groups are structured in informal and formal organizations. The informally organized groups consist of a few neighbors getting together to raise certain crops as a group in hopes of improving premium opportunities. The formally organized grower groups are organizations which work for a larger constituency of member growers to build prospects that will increase member profits and net worth by providing them with opportunities to produce, or invest in, value added agriculture. Most organized groups have a goal to participate in the supply chain rather than being contract growers. If a VEC contractor were to request grower groups to produce VEC, the grower group would not likely be interested without a multiple year contract.

Grower groups have the opportunity to fill a role as a grower support system to assist with IP needs of VEC growers. In affect, they can take the role of insuring proper identity preservation and help member growers manage IP programs. They could also work to help the end-user understand the implications and requirements of IP. This is essential because, while end-users want IP, many do not understand the ramifications of IP on the growers and handlers. This lack of understanding groups and the success of IP could be improved with the support of grower groups.

Channel (Grain Elevators) **Issues**

Key Points

- Grain handling industry is in a period of slow growth.
- Recent developments in biotechnology have had a major impact on VEC production.
- The value that is shared across the value chain varies by trait.
- Transportation is a major factor in the success or failure of handling VEC.
- VEC requires a different mindset and management philosophy.
- Traceability continues to garner attention in production agriculture.

Channel Attitudes

Overview. While it is clear that opportunities continue to exist, the grain handling industry appears to be in a period of slow growth related to VEC for export. The majority of growth products are being utilized primarily in the domestic U.S. market. High fermentable corn is an example of a growth product which is being utilized by the growing dry mill ethanol industry in the U.S. However, in general, there is an underlying concern that growers are losing interest in VEC and are reluctant to participate in contracting programs. There are several factors driving this concern.

Biotechnology. Recent developments in biotechnology have had a major impact on VEC production. New seed technology that delivers herbicide tolerance and insect resistance in addition to ease of use at the farm level has slowed growth. This technology has brought improved yields when compared to the non-GMO seed products, the platform for most VEC. The adoption of biotech seed corn technology has been rapid and continues to increase. Seed technology providers are addressing this concern and are beginning to develop seed products that contain both the new input technology and the functional traits.

Value Proposition.
The value that is shared across the value chain varies by trait. The value is impacted by many factors, but is typically driven by the end-user. These values often reflect the value of substitute material that compete with the value of the trait exhibited in VEC. For example, the value of high oil corn is impacted by the price of #2 yellow corn and the price of alternative feed energy sources. These fluctuations in values are a factor in the grain system's desire to develop the infrastructure to handle VEC products.

Transportation is a major factor in the success or failure of handling VEC. For truck markets, distance from farm to delivery location can dictate whether or not a particular grower will participate in producing VEC. The same can be said for grain elevators and the distance to deliver IP grain. Demurrage, which is defined as the extra time beyond what is allowed to load and unload the cargo, is a concern for export grain handlers. Barge and ships must be coordinated in specific delivery windows in order to meet an export customer's needs. (More detail is covered in the Identity Preservation section of this report.)

VEC requires a different mindset and management philosophy. Most grain handling systems are designed to handle commodity corn and are built for throughput and turnover of a commodity product due to low margins. It takes planning, commitment from management, and resources to handle VEC. In some cases grain handlers have dedicated facilities to VEC's to gain efficiencies in handling.

Many U.S. grain handlers continue to see VEC as an opportunity to differentiate themselves in the market and gain market share by offering multiple products. However, grain handlers see the current struggle to hold onto VEC growers given factors such as new stacked input trait seed technology. Higher value products are needed on the market to help drive adoption. Seed technology providers indicate that the product pipeline contains such products.

Domestically, the growth in the dry grind ethanol industry will undoubtedly impact many grain handlers in efforts to compete for corn. However, this also creates an opportunity to work together to deliver higher value products, such as high fermentable starch corn. Given corn yield trends and the trend of more corn on corn (corn planted in fields that were corn the previous planting season), the supply of corn is expected to increase over the long term. However, USDA reports that corn acreage in 2006 will be down due primarily to high fertilizer and fuel prices.

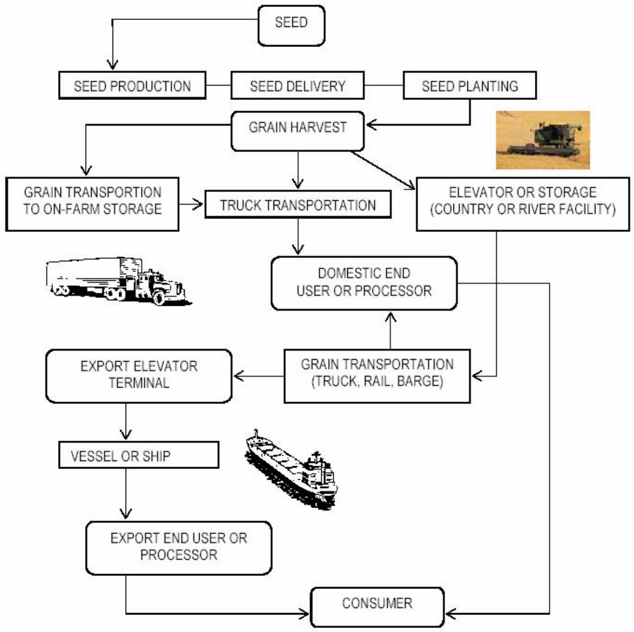
<u>Traceability</u>

Overview. Traceability continues to garner attention in production agriculture. Issues in the livestock and meat processing sector, such as "Mad Cow Disease" (Bovine Spongiform Encephalopathy/BSE), bioterrorism, and food safety, are beginning to impact the grain production sector. Systems have been developed to trace livestock production, track food shipments, and to inform consumers about food attributes such as country of origin, animal welfare, and genetic composition. Food producers have built traceability systems or purchased systems designed by industry to track the grain in a food product back to the farm.

Traceability Definition. International Organization for Standardization (ISO), which develops voluntary international standards for products and services, defines traceability as the "ability to trace the history, application, or location of that which is under consideration." This definition is certainly broad. It does not specify a standard measurement for "that which is under consideration" (a truckload of corn), a standard location size (crop field), a list of processes that must be identified (pesticide applications), or a standard identification technology (record-keeping). It does not specify which type of system is necessary for preserving the identity of VEC crops or controlling the quality of grain used in a particular food product.

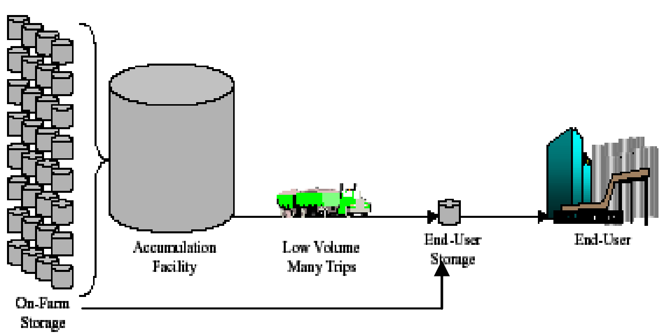
The definition of traceability is intentionally broad because crop and food production is a biological system and inherently complex. As a result, no traceability system is complete. A system for tracking every input and process to meet every objective would be enormous and very costly (See figure 24). As a result, different systems have been developed to address the varying degrees of traceability.

Figure 24: Traceability Flow Chart



Grain handlers often blend shipments to achieve product that meets customer specifications. Once blended tracking is more difficult to achieve in cases of quality or contamination issues. Blending is done in order to capture a margin by buying lower quality grain purchased at a lower price and blending with a higher quality grain. End use customers have not demanded nor are they willing to pay for the level of traceability that makes blended tracking feasible. However, current systems do allow for the trace-back to a group of growers, typically referred to in the grain handling industry as a batch, bin, or lot of grain (see figure 25). Some VEC that is exported identifies the growers of the product and the hybrid that was planted.

Figure 25: Traceability



Risk Management: Traceability systems can help isolate the source and extent of a potential problem. This helps reduce the production and distribution of non-conforming product, which, in turn, reduces the potential for bad publicity, potential liability, or, in the worst case, a product recall, such as StarLink® or Bt10. These potential liabilities have created the growth of third-party certification services and a trend toward documented, verified systems.

Market Differentiation: U.S. is currently the major world supplier of corn for grain. With increasing world competition, the grain industry needs to deliver product that meets customer expectations. This is the case with VEC, where grain handlers seek to meet customer demand for specific characteristics. Customers, particularly in the export market, are now beginning to demand more information on the product origin, product content, and production method. The only way this can be done is through some level of traceability, where records are kept along the chain.

U.S. grain companies are embracing systems and management practices that allow for traceability. Archer Daniels Midland (ADM), for example, has completed a USDA – Process Verification Program at two river elevator facilities, one inland (country) elevator, and three export elevators at the Port of New Orleans. Consolidated Grain & Barge has a number of elevator facilities that are ISO 9000 certified. There are examples of regional cooperatives who have also become ISO 9000 certified.

The U.S. grain handling infrastructure is capable of adopting the systems necessary to meet customer demand. The biggest question now is who is willing to pay for these systems. This could become a cost of doing business or the end-user could be willing to pay a premium for added assurances that are provided by traceability.

U.S. Government Regulations: The U.S. Government has already taken steps to require traceability as determined in the Bioterrorism Act of 2002 administered by the U.S. Food & Drug Administration (More information can be found at http://www.fda.gov/oc/bioterrorism/bioact.html). While this does not directly affect the grain handling industry, it does impact animal feed processors in the U.S. Product from feed mills must be traceable by lot and records must be maintained in a one step back and one step forward fashion. Farms who supply feed processors grain are currently exempt from this regulation. This regulation has played a role in the feed processing industry and adoption of quality management systems.

As previously mentioned, there has been a growth in third-party certification efforts by both industry and government. These systems have been voluntary and are typically audited to provide for a degree of verification. There is the potential for government to begin to require that the grain handling system adopt mandatory traceability systems. For example, the USDA requires that companies producing organic foods certify their production. However, if there is no marketing or product labeling claim, there has been little need to verify the product. This is changing with the advent of both organic and non-GMO production, where labeling claims are being made.

But if the grain industry continues to adopt voluntary systems, government intervention may not be necessary. With recent developments of animal health issues, such as BSE and Avian Flu, the U.S. government is closely monitoring the private sector's ability to voluntarily provide for traceability. Government has been working with private sector to develop these systems. However, if additional problems arise, it is possible that government will take a more proactive role which may include mandating traceability. While this affects the livestock and meat production sector in the short term, it could have implications for the grain handling sector.

Future Developments: Technology does exist that would enable for the tracing of VEC back to its origin. Electronic coding systems, from barcode systems to technologies like radio-frequency identification devices (RFID's), are potentially viable options that are available; however, they come at a cost that today, is not attractive to the grain handling system given the current low margins in the grain trade. As these technologies continue to develop and issues such as food safety continue to surface, the grain handling system may begin to adopt these new technologies.

Levels of Traceability:

Figure 26: Levels of Traceability

	LEVELS OF TRACEABILITY							
	White	Waxy	Hard Endo	High Oil	Nutritionally Enhanced	High Extractable Starch	Non-GMO	Organic
Government Requiring Traceability								X "Must be USDA certified"
Majority bushels requiring traceability by end use customer	X						X	
Limited bushels requiring traceability by end use customer		X	X	X	X	X		

Sources: Industry Contacts and USDA

Industry Players: Several companies operating throughout the supply chain have begun to focus on the issue of traceability in the grain production sector.

Software and Enabling Companies: There are companies that offer software to manage grain at the handling facility and provide for traceability of product. There have also been companies formed to provide systems that enable growers and grain handlers to provide verification and documentation throughout the production chain.

Associations:
Industry associations are addressing issues of grain quality and certification for producing higher value crops.

Quality Management Systems: United States Department of Agriculture, International Organization for Standardization (ISO), American Institute of Baking (AIB), and others have developed quality management systems that are capable of addressing the issue of verifying the production and handling of VEC crops. In some instances, grain handling and processing companies have developed their own internal systems to manage VEC. All of these systems focus on documentation and record-keeping, which is the critical component of any traceability system. These systems are typically audited programs that allow for verification and certification that determine the process by which a product is produced.

Contracting

Overview: A production contract is an agreement in which a grower (or group of growers) agrees to raise a crop in a manner established by the contractor, to deliver the crop to the contractor, and to then receive payment from the contractor. Production contracts are different than marketing agreements, cash-forward contracts, futures contracts and other selling arrangements that involve the sale of grain produced and owned by the grower.

There are two types of grower contracts: The first contract is a “harvest delivery contract” where the grower delivers the grain directly to the delivery point at harvest. The operation at the delivery point then dries and cleans the grain to the buyer specifications. The second contract is a “buyer’s call contract.” This contract requires the producer of the grain to dry the grain to certain moisture specification and store the grain in a segregated manner to maintain purity. Later in the year, following harvest, when the buyer needs additional grain the growers will be contacted to deliver. The timing of this delivery may or may not be a predetermined date.

The majority of VEC production is grown under contract, however, there is a significant portion that is grown on speculation. Within the grain industry, this is commonly referred to as “wildcat” production (see figure 27).

Figure 27:

2005 VEC Contract vs. Open Market

Contract vs. Open Market Growing 2005

Open Market	Contr.	On the Farm	Open Market	Contr.	On the Farm	Open Market	Contr.	On the Farm
White			Waxy			High Oil		
25%	75%	0%	25%	75%	0%	5%	70%	25%
Hard Endo/Food Grade			Nutritionally Enhanced			Non-GMO		
50%	50%	0%	10%	60%	30%	no data	no data	no data
High Extractable Starch			High Fermentable			Organic		
25%	75%	0%	95%	5%	0%	40%	60%	0%

Sources: Industry Data and USDA/NASS

Risk and Reward: Contract language and structure will often vary by value chain and VEC trait so careful attention needs to be paid to understanding which party is responsible for what and who is potentially at risk for failing to meet obligations. For instance, below are some common issues that are typically addressed in a production contract:

General factors:
- Conditions in which the agreement can be cancelled
- How much notice must be given in order to cancel the contract
- Parties needed to approve the contract
- Factors that may require the investment in equipment or facilities
- The duration of the contract

Management and production factors:
- Identification of specific corn hybrids to be grown, if applicable
- Identification of buyers-call (delivery windows typically determined by the contractor) or harvest delivery
- Chemical or other crop input limitations
- Awareness of potential on-site audits
- Field isolation requirements

Delivery and testing:

- Where the crop is to be delivered (in some cases there may be transportation or trucking will be compensated)
- Identification of any grain testing requirements and who is responsible
- Identify what happens if tests indicate "off spec" product or there is a dispute over test results
- Determination of penalties or contingency plans if the delivered crop does not meet the contract specifications or is rejected at the point of delivery.

Payment:

- How pricing of the VEC grain is determined
- How premiums will be determined

Contract Regulations: Some states have passed, or are looking at, legislation that impacts production contracts. For instance, the state of Illinois passed legislation effective January 1, 2005 that applies to the wording and provisions of grain production contracts. According to the state of Illinois, the law was designed to spread the risk more equitably between the signing parties. It also offers extended protection for specialty contract growers by:

- Requiring an index to make it easier to locate particular clauses. The index must include:
    - Names of the parties of the contract
    - Definition section
    - Cancellation, renewal and amendment provisions
    - Compensation information
    - Provisions subject to change
    - Provisions relative to production guidelines
- Allowing for the discussion of the terms of the contract with other parties, but not to release proprietary information to competing companies.
- Protecting from cancellation of long term contracts.
- Requiring contract language to be easily understood.

Additional states may follow suit as the need to identify potential risks becomes more defined. Growers organizations have been the key in ensuring certain information is being shared and expectations are clear in production contracts.

Production Contract Management: Production contracts are typically managed by the state or federally licensed grain merchandiser on behalf of the contracting company. In most cases, the same party(ies) act as merchandisers for both commodity and VEC grain. Managing VEC crops often requires different skills as compared to non-VEC production. There is an increased need for communication between the contracting parties. The contracting company agrees to pay a premium for the grain, thus incentivizing growers to sign production contracts. Typical VEC premiums for the 2005 are identified in the following figure.

Figure 28:

Grower Premiums 2005

	White	Waxy	High Oil	Hard Endo/Food Grade	Nutritionally Enhanced	Non-GMO	High Extractable Starch	Organic
(per/bu)	$0.20 - $0.40	$0.15 - $0.30	$0.20 - $0.40	$0.10 - $0.30	$0.20 - $0.25	$0.05 - $0.20	$0.05 - $0.15	$1.00 - $5.00
(per/mt)	$7.87 - $15.75	$5.90 - $11.81	$7.87 - $15.75	$3.94 - $11.81	$7.87 - $9.84	$1.97 - $7.87	$1.97 - $5.90	$39.37 - $196.85

Sources: Industry Data and USDA/NASS

Future: Success in getting targeted volumes of VEC production to meet customer demand has been historically mixed. One developing trend is the testing of VEC as it comes across the scale at the processor or elevator. Near Infrared Transmittance technology is enabling the grain industry to quickly analyze for grain composition. (This is covered in greater detail in the Grain Measurement section of this report.) Some U.S. domestic processors are analyzing grain at the scale and paying premiums based on a composition. This has allowed for the elimination of the need to contract for VEC with individual growers.

Another factor that could influence contracting is farm size. Farm sizes in the U.S. continue to grow. The need to spread costs over more acres has driven the consolidation of farms. The advent of biotechnology has also been identified as a factor influencing the expansion of farm size. As farms get bigger, VEC production has the potential to lag as it generally requires more time and management.

Identity Preservation

Overview:
The grain handling sector is critical to the success of VEC adoption and use, in order to sufficiently store and deliver the volume of product needed by end-users. As previously mentioned the U.S. grain handling system was not built to segregate multiple products. Facilities have had to make changes in their infrastructure to handle VEC and in some cases have dedicated entire facilities to alleviate the challenges that exist with handling non-VEC and VEC.

Fully quantifying the costs of an IP system is a difficult task. Costs to identity preserve (IP) can be categorized as direct and hidden. It is important to address both direct and hidden IP costs and demonstrate the significance of local supply conditions and facility capabilities. Assessing both direct and hidden IP costs is complicated by the challenge of generalizing across grain supply chains. Differences in local grain production and supply conditions and facility configurations at the farm, elevator, and processor will create variation in IP costs.

Grain Handler IP Costs:
In traditional commodity supply chains, the grain handlers role is critical as they have to source grain from many individual farms while supplying a relatively few end use customers. As mentioned, facility capabilities and logistics of commodity grain handling have been optimized and elevator managers have built margins by increasing grain throughput. However, grain handlers that choose to participate in IP supply chains have adapted their management and facilities. Grain handlers in IP supply chains must understand supply and demand well in advance to planting of the crop, in addition to physical handling and logistics, and information sharing. All of these variables can lead to additional expense. Ultimately, the value of the IP information must exceed expenses plus a competitive margin. Consequently, the costs of IP are central in determining return-on-investment for any grain handler looking to participate in IP.

IP costs can be categorized as management/coordination, logistical, and opportunity costs. Coordination costs are incurred as grain handlers coordinate with growers to produce the grain, verify that these farms have the proper production practices, and in many cases sign a production contract. For many IP programs, there are additional coordination costs (depending on the specific value chain), for the additional communication with growers, other grain handlers, and end-users.

Handling and logistical costs specific to IP programs may include investments such as compositional analysis and other testing equipment (e.g. GMO testing). They may also involve seasonal expenses for labor, maintenance (clean-out) costs, and management related issues that may arise. Reconciling payment to growers for IP crops typically takes more time and attention than commodity crops.

Managing storage space with IP grain can sometimes create opportunity cost. Storage margin costs are lost revenues from under-utilized storage capacity. For instance, storage space partially filled with VEC is a potential loss due to the inability to store with non-VEC product. Another opportunity cost is a result of scheduled deliveries from the elevator to another intermediary or the end-user. Each scheduled delivery forces the elevator manager to release stock at specific times which relinquishes the option to hold grain on which you might be able to capture an improved margin at a later point in time. Opportunity costs exist for deliveries in which there is a "basis" and “carry” in the market. This is simply a positive net difference between current price and expected future price minus storage and interest costs.

Transportation:
Transportation is still a major issue that requires a great deal of coordination when handling VEC. For instance, barges and/or ships need to be coordinated in a given window of time to meet specific export customers’ needs. If there are any failures or delays in filling barges and/or ships it can create what is called demurrage costs, defined as the extra time beyond what is allowed to load and unload the cargo. The term demurrage is likewise applied to the payment for such delay, and it may become due, either by the ship's detention, for the purpose of loading or unloading the cargo, either before, during or after the voyage, or in waiting for convoy. At the writing of this report, shipping costs remain relatively high which has created additional concern as it relates to demurrage.

Identity Preservation Summary:
It is extremely difficult to define the costs for IP as there are many variables. There are cost calculators that have been developed that attempt to define those costs. One example was developed by the National Corn Growers Association and can be found at http://lepton.marz.com/ncga/IP/IPCalc.asp. This website calculator is designed for growers.

Costs will vary by specific value chain, which will impact the variability in the ultimate value of the IP product. It is understood that given the appropriate location, facility capability, management and labor capabilities, and end-user commitment, IP crops have the opportunity to drive additional value. As the ability to develop seed products with specific characteristics continues to improve, the ability to identity preserve product will continue to be important in order to compete in the global marketplace.

End-user attitudes (demand):
End-users are still interested in VEC traits. However, these traits must work economically and logistically within their operations. End-users face many of the same issues as the supply chain when handling VEC. Competing with VEC are alternative ingredients in which the values often fluctuate. This has contributed to the challenge of committing to a supply of VEC as much as two years in advance of utilization. Successful value chains understand this issue and commitments are made well in advance of the planting season.

End-users seeking a Non-GMO product are concerned about supply in the U.S. Often end-users will seek to source a specific trait such as hard endosperm corn and an added benefit due to the fact that the majority of that type of corn is also non-GMO. This has been the case for many years as end-users realize value in product other than the value of the specific trait. It is assumed that VEC will be of higher quality as it is not blended with other grain and is typically handled in a more delicate manner.

There are some signs of potential growth within certain segments of end use. For instance:

- The livestock and poultry industry may find renewed value in nutritionally enhanced products as the price of waste fat is high.
- The dramatic increase in biodiesel production plants has contributed to this thinking. If alternative energy sources, such as fat, are not available or are priced out of the market then the livestock and poultry industry may look at nutritionally enhanced products to take their place.
- The organic industry continues to grow as more consumers are concerned about how their food is produced. This industry continues to grow at double digit rates and has attracted the attention of large food companies.

How to Buy

Most grain handlers typically offer contracts to growers for the amount of VEC product needed by the end-user with a small increase to protect them from a bad growing season (i.e. drought). In a good growing season this can lead to a surplus of VEC production. As discussed, some VEC is not grown under contract so availability will vary year by year based on many factors. When entering into a contract, it is extremely important to communicate quality needs and what documents are needed to meet the buyer's needs and the sellers capabilities to source the grain. Each industry has different specifications (i.e. composition, percent stress cracks, kernel size, grain moisture). Buyers need to forecast their needs well in advance of planting season in the U.S. Planting typically begins in April each year and it is best if grain handlers can offer a contract the previous fall (October). The earlier commitments can be made, the higher likelihood of success.

Some grain companies have websites that can provide a potential buyer with prices and quantities of VEC available. The USDA is also an excellent resource for more information in regard to the export of grain. More information can be found at:

http://www.gipsa.usda.gov/GIPSA/webapp?area=home&subject=grpi&topic=is-iop

(VEC) 2005/06 CROP REVIEW

Key Points:

- The majority of VEC is flat or down.
- Most VEC acreage remains steady or slightly increased.
- High oil corn continues to lose crop share.
- High fermentable corn demand is expected to increase due to expanding ethanol production.
- Organic corn is projected to continue gaining market share.
- The average premiums ranged between $0.10 and $0.30 per ($3.93 and $11.81 mt.).
- Report samples indicate VEC crops may have less BCFM than commodity corn, greater test weight, lower moisture levels, fewer stress cracks, comparable percent thins and slightly higher density.
- Samples reported by FGIS indicate VEC crops may have greater test weight, less BCFM, and lower moisture levels.
- FGIS data indicated that white, waxy and high oil corn samples had lower levels of aflatoxin.
- Premiums from 2001 and 2005 seem relatively similar to previous years.
- The projected growth for most VEC crops is flat or down with the exception of Organic corn.
- Contacts indicated that grower premiums continue to have an impact on VEC participation.
- The acceptance of GMOs and the ability to manage weeds and insects with less labor is also affecting growth projections.

Acreage.
Figure 29 illustrates the estimated acreages of the main VEC crops in 2005. White waxy corn was not included in this table because it is a small niche market with little data being collected to track its production. High Fermentable corn (HFC) acreage is also not included in the report due to the lack of production tracking data. When contacts were asked about HFC, they indicated that most of what is called HFC is all high yielding varieties that growers tend not to track. However, these same individuals indicated that HFC supplies continues to be sufficient for market needs.

Figure 29:

Trait Acreage 2005 (000)								
Type	White	Waxy	High Oil	Hard Endo/Food Grade	Nutritionally Enhanced	Non-GMO	High Extractable Starch	Organic
Acres	600-700	500-600	75-125	1200-1550	75-90	300-575	150-250	130-150
Hectares	243-284	203-243	30-51	486-628	30-37	122-233	61-101	53-61

Sources: Industry Data and USDA/NASS

Figure 30: VEC Production 2001 vs. 2005

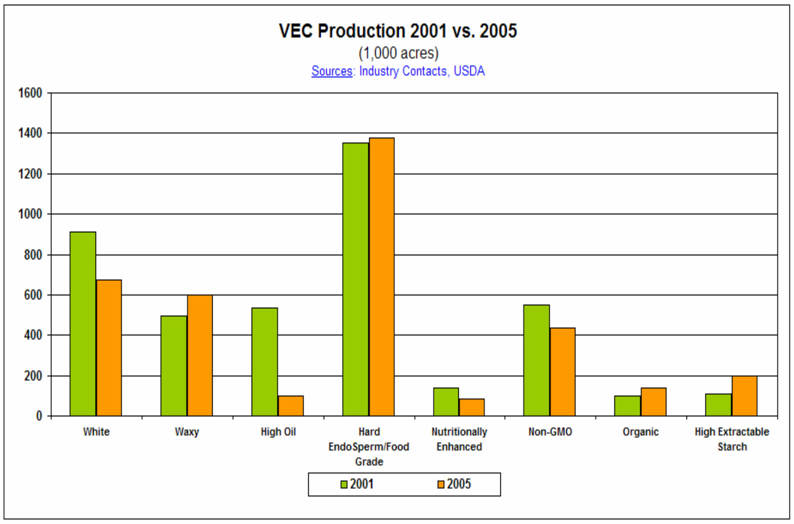
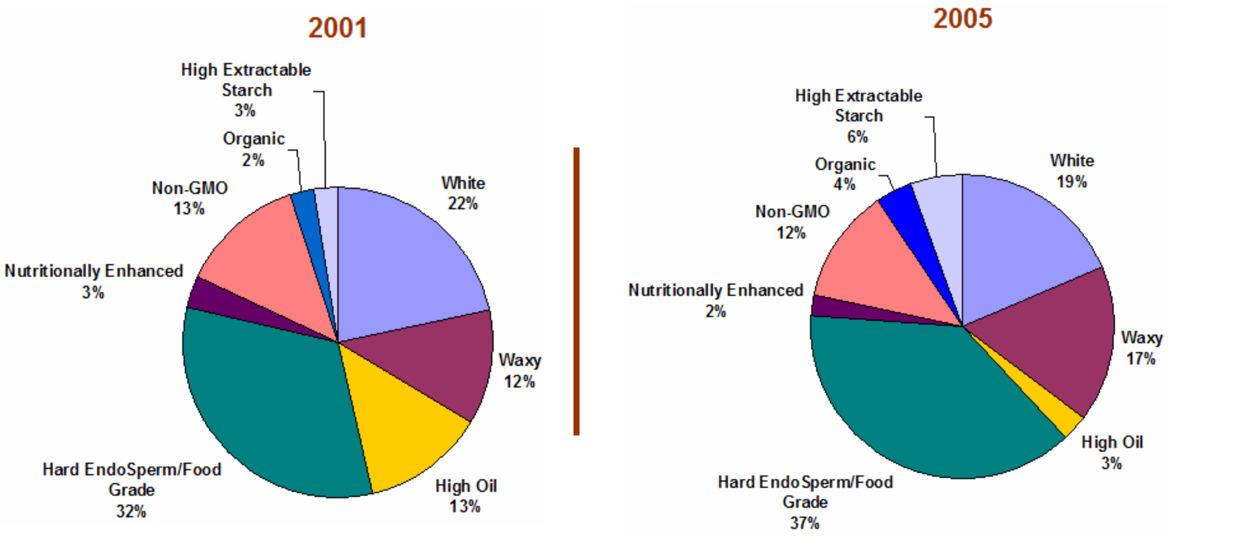


Figure 30 illustrates the estimated changes in individual VEC production from 2001 to 2005, and figure 31 is a comparison of each VEC product's estimated percentage of the overall VEC acreage estimate. Hard Endosperm/Food Grade and waxy corn showed the greatest increase of 5 percentage points each. High oil had the greatest loss dropping 10 percentage points. All other VEC crops either dropped or increased in a range of 1 to 3 percentage points. Nutritionally Enhanced and Non-GMO corn each lost one percentage point, and White corn lost 3 percentage points. Organic corn gained 2 percentage points and High Extractable Starch corn gained 3 percentage points.

Figure 31: Trait Percentage of Overall VEC Crop, 2001 vs. 2005



Premiums.

Grower premiums are affected by so many variables that it is difficult to make trend comparisons from year to year. However, premiums from 2001 and 2005 seem relatively similar to previous years. Surveyors indicate that many growers feel the premiums are insufficient and some end-users seem reluctant to pay for the added value of some VEC crops (see figure 32 for premium details 2001-2005).

Figure 32:

		White	Waxy	High Oil	Hard Endo/Food Grade	Nutritionally Enhanced	Non-GMO	High Extractable Starch	Organic
		Grower Premiums 2001 and 2005							
Premium (per/bu)	2001	$0.25 - $0.35	$0.20 - $0.35	$0.20 - $0.35	$0.10 - $0.20	$0.19 - $0.35	$0.07 - $0.12	$0.07 - $0.12	n/a
	2005	$0.20 - $0.40	$0.15 - $0.30	$0.20 - $0.40	$0.10 - $0.30	$0.20 - $0.25	$0.05 - $0.20	$0.05 - $0.15	$1.00 - $5.00
Premium (per/mt)	2001	$9.84 - $13.78	$7.87 - $13.78	$7.87 - $13.78	$3.94 - $7.87	$7.48 - $13.78	$2.76 - $4.72	$2.76 - $4.72	n/a
	2005	$7.87 - $15.75	$5.90 - $11.81	$7.87 - $15.75	$3.94 - $11.81	$7.87 - $9.84	$1.97 - $7.87	$1.97 - $5.90	$39.37 - $196.85

Sources: Industry Data and USDA/NASS

Grade Factors

Grade Factor Descriptions:

BCFM – The amount of broken corn or foreign matter. This includes all matter that passes readily through a 12/64 round-hole sieve and all matter other than corn that remains in the sieved sample after sieving according to procedures prescribed in FGIS instructions.

TEST WEIGHT – The weight of the volume of grain that is required to fill a Winchester bushel (2,150.42 cubic inch) to capacity.

MOISTURE – Water content in grain as determined by an approved device according to procedures prescribed in FGIS instructions.

STRESS CRACKS – Small numbers of stress cracks occur naturally in all corn (usually less than 3% due to field drying). However, stress cracking is greatly increased during post-harvest handling. High drying and cooling rates are the major factor in stress crack development. When moisture is removed from the kernel too quickly, the structure of the kernel fails and stress cracks form. In order to maintain quality and therefore maximize premiums, producers must strive to minimize the increase in the number of stress cracks caused by drying and cooling.

DAMAGED KERNELS – Kernels and pieces of corn kernels that are badly ground-damaged, badly weather-damaged, diseased, frost-damaged, germ-damaged, heat-damaged, insect-bored, mold-damaged, sprout-damaged, or otherwise materially damaged.

HEAT-DAMAGED KERNELS – Kernels and pieces of kernels which are puffed or swollen and materially discolored by external heat caused by artificial drying methods.

PERCENT THINS – The percentage of thins provides an indication of kernel size. In general, millers like larger kernels because large kernels have less surface area relative to kernel volume. Since all surface area is covered with pericarp, small kernels will tend to have a high percentage of fiber relative to endosperm.

AFLATOXIN – Aflatoxin is a naturally occurring toxic chemical by-product from the growth of the fungus Aspergillus flavus on corn and other crops. Grain containing aflatoxin is toxic to animals, especially young animals and poultry; therefore, facilities that handle grain routinely test loads before accepting delivery.

The following data relates crop grade factors for the 2005/06 crop. Data from 182 samples taken from the 2005/06 VEC crop across various regions in the US, give indication that on average VEC crops may have less broken corn foreign matter (BCFM), greater test weight, lower moisture levels, fewer stress cracks comparable percent thins and slightly higher density. Samples reported by FGIS indicate VEC crops have a tendency to have greater test weight, less BCFM, and lower moisture levels. FGIS data also indicated that white, waxy and high oil corn had lower levels of aflatoxin (See figures 33 - 37 below for VEC Report and FGIS sampling data details).

Figures 34-38 represent sample data that is presented as an indicator of trends in crop quality rather than definitive results, due to sample size.

Figure 33: 2005 Crop Grade Factors

2005 Crop Grade Factors (VEC Report Samples)

	Number of Samples	Broken Corn Foreign Matter (BCFM)	Test Weight (TW)	Moisture (M)	STRESS CRACK	THINS	DENSITY
#2 Yellow	68	0.8%	58.9	10.6%	17.0%	44.1%	1.28
VEC Average	182	0.3%	60.2	10.4%	8.1%	44.8%	1.29

Source: VEC Report Samples Across Corn-belt

2005 Crop Grade Factors (FGIS DATA)

	Number of Samples	Broken Corn Foreign Matter (BCFM)	Test Weight (TW)	Moisture (M)	Damaged Kernel Total (DKT)	Heat Damage (HT)	Aflatoxin (AFLA)
#2 Yellow	131029	2.11	57.3	14.36	2.74	0.02	10.43
VEC Average	1017	1.20	58.6	12.81	2.07	0.00	3.84

Source: USDA/FGIS Data

Figure 34:

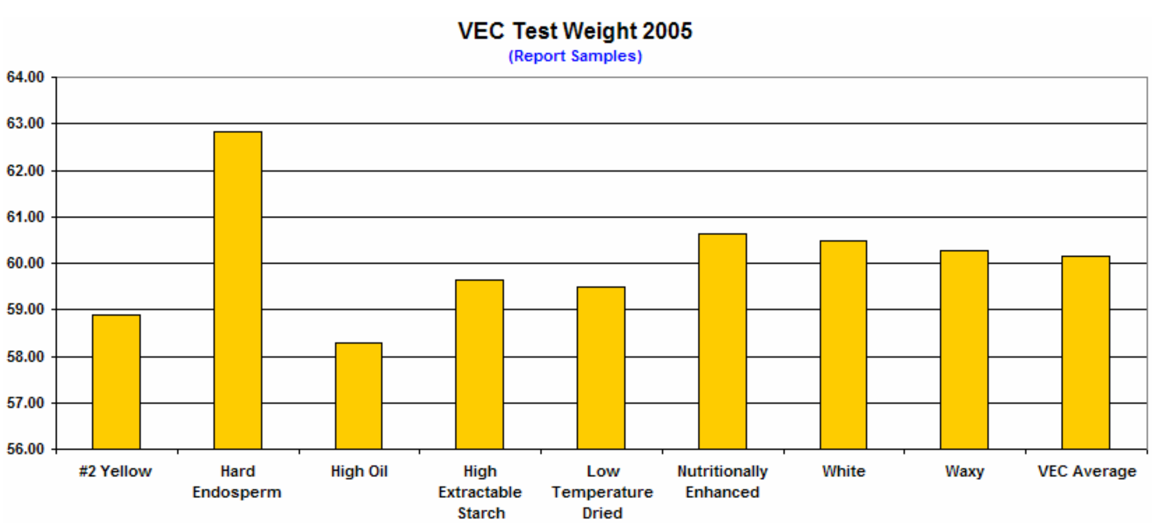


Figure 35:

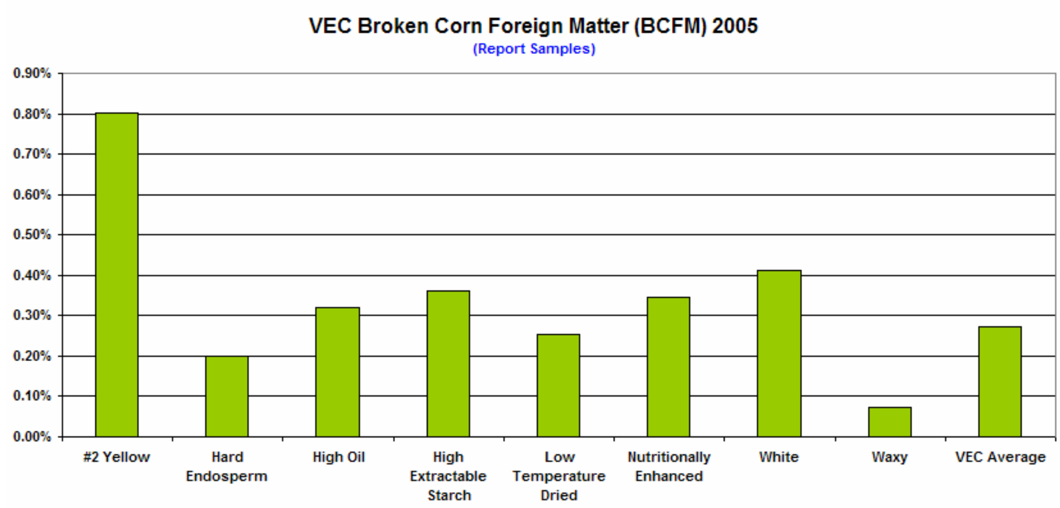


Figure 36:

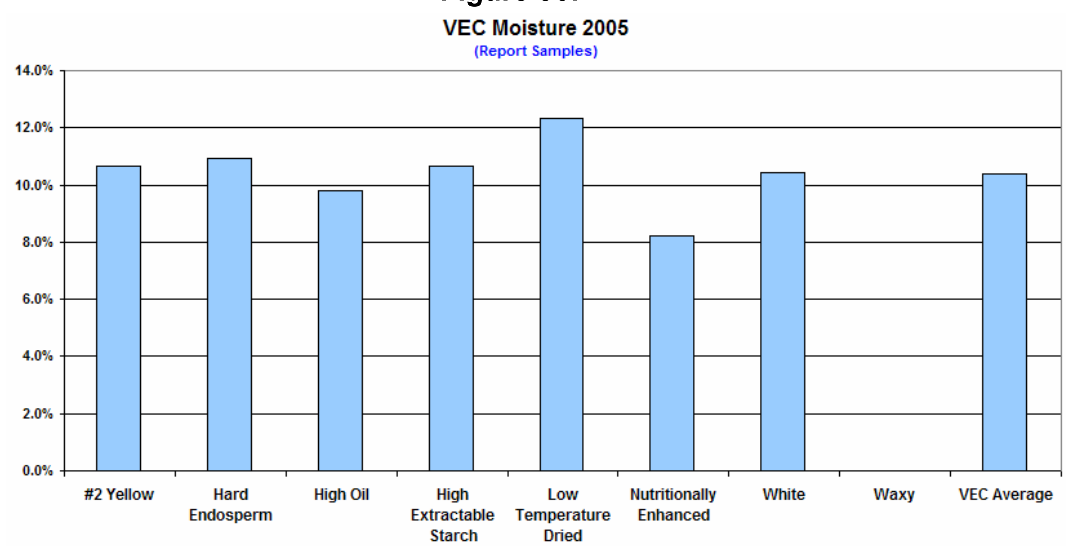
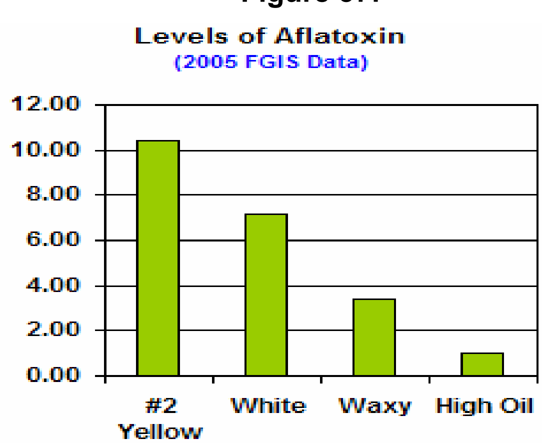


Figure 37:



According to 2005 FGIS samples, VEC crops such as white, waxy and high oil corn had lower levels of aflatoxin that regular non-VEC corn.

Growth Projections.
As is illustrated in figure 38, the projected growth for the majority of VEC crops is flat or down with the exception of Organic corn. However, contacts considered Waxy and Nutritionally Enhanced corn to be flat-up. Growth projections have had little change since the previous 2001/02 VEC report. Contacts indicated that grower premiums continue to have an impact on VEC participation. The acceptance of GMOs and the ability to manage weeds and insects with less labor is also affecting growth projections.

Figure 38: VEC Growth Projections 2001 vs. 2005

Growth Projections		
Corn Trait	2001 Growth Projections	2005 Growth Projections
Waxy	Flat-Down	Flat-up
High Oil (HOC)	Down	Down
Nutritionally Enhanced	Down	Flat-up
White	Flat - Up	Flat
Hard Endosperm/Food Grade	Flat	Flat
Non GMO		Flat
High Extractable Starch (HES)		Flat
Post Harvest Pesticide Free		Flat
High Fermentable		Flat-up
Organic		Up

Sources: Industry Contacts and USDA/NASS

(VEC) TRAIT REVIEW

Overview

The follow section reviews many of the VEC traits. The traits will be reviewed in three separate groupings: Major, Minor and Pipeline, (See figure 39). Major traits will have a full review including field sampling. The Minor traits will be reviewed without sampling, and Pipeline traits will be reviewed mainly for potential uses and projected strengths, see the following chart for trait categories:

Figure 39:

MAJOR Review	MINOR Review	PIPELINE Review
Full review with sampling	*Full review without sampling*	*Review with projections*
White corn	**Post Harvest Pesticide Free corn**	**High Amylase corn**
Waxy corn	**Organic corn**	**High Lysine corn**
Hard Endosperm corn	**High Fermentable corn**	**Low Phytate corn**
High Oil corn	**Low Temperature Dried corn**	
Nutritionally Enhanced corn	**White Waxy corn**	
High Extractable Starch corn		
Non-GMO corn		

Major Traits Review

White Corn

KEY POINTS:

- 2005/06 acreage is down slightly between 600,000 to 700,000 (243,000 to 283.500 HA).
- Grower premiums for 2005 were $0.20 to $0.40 per bushel ($7.87 to $15.75 mt.).
- Growth projects remain flat.
- Higher Test Weight than #2 yellow and overall VEC corn average
- As compared to #2 yellow corn, white corn is higher in density, lower in moisture, lower in stress cracks, lower in percent thins, higher in protein and oil, and lower in starch basis.
- As compared to the overall VEC crop, white corn was higher in density, slightly lower in moisture, lower in percent things and comparable in protein, oil and starch.

Definition

White food corn hybrids are dent corn with specific endosperm (starch) traits. White corn has a white kernel color, whiter starch, and contains high amounts of vitreous endosperm relative to the amount of floury endosperm. Kernel hardness is typically high, which makes it especially desirable for dry milling and alkaline processing (food use). White corn may not contain more than 5.0 percent of other corn colors. White kernels of corn with a slight tinge of light straw or pink color are also considered white corn. White corn types are equal to yellow types in carbohydrate content but are deficient in vitamin A.

Desired Qualities:

The following list indicates the desired qualities for white corn.

- *Low BCFM*—Indicator of handling damage, impacts storability, increase yield of large grits in dry milling.
- *Low total damage*—Indicator of mycotoxins.
- *Test weight* greater than 60 lb per bushel (1072 kilograms per mt.) for dry milling—Provides more grits for dry milling, provides more consistent cooking for masa uses.
- *True density* greater than 1.30 for dry milling—Larger grits for dry milling, Indicator of high percentage of vitreous endosperm.
- High percentage of vitreous endosperm—Indicator of hardness, vitreous endosperm is the source of large grits in dry milling.
- *Low stress crack index*—Indicator of low multiple stress cracks and low dryer damage, increase yield of large grits in dry milling.

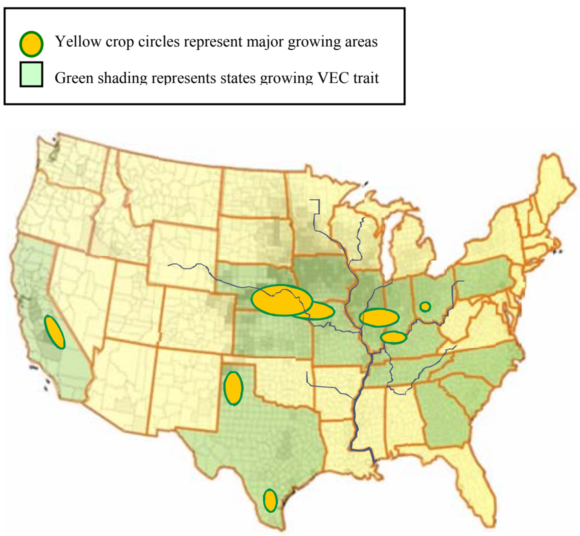
Production

White corn requires special isolation to maintain purity. Growers must minimize crop pollen contamination from yellow corn and in some cases GMOs. End-users prefer less than 2-3% of other colored corn to meet quality objectives.

Handling and drying at harvest also increase management costs. Low temperature drying is necessary to reduce stress cracks in white corn. Many growers try to let the corn field dry as much as possible to reduce dryer time. However, leaving corn standing in the field can cause some losses due to molds, insect infestation, and ear droppage. The end-user often tests for the presence of diseases, molds and mycotoxin organisms. Aflatoxin and Fumonisin are two important mycotoxins that can be a problem in white corn production areas. These quality issues are the same for both domestic use and the export market.

Kernel red streak (KRS) can also be an issue for those processing the corn in alkaline cookers (wet millers.) Dry millers are generally not concerned with it because it does not permeate the pericarp, thus is removed from the kernel during degerming, when the germ and pericarp (bran) are removed. Not all alkaline cookers remove all of the pericarp. The remaining pericarp portion that has KRS will turn black in the cooking process, resulting in a darker off-color in the finished product.

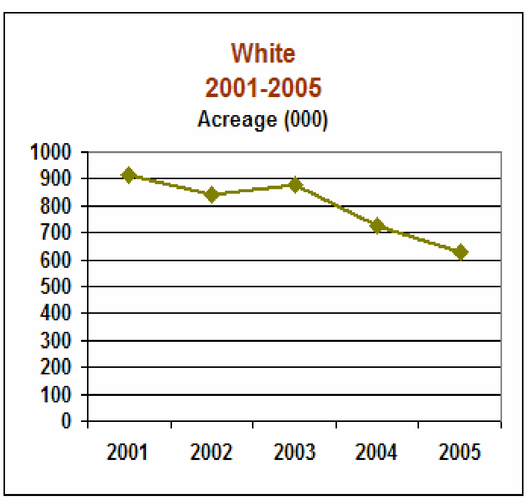
Figure 40: White Corn growing areas 2005



Regional production areas

As shown in figure 40, the main areas of white corn production are eastern Illinois, southwest Indiana, western Kentucky, western Tennessee, Nebraska, Texas, southwest Iowa and northwest Missouri. There is some production in Ohio, California, Pennsylvania, Georgia, North Carolina and South Carolina. Frito Lay has a large production location near their facilities at Sidney, Illinois and in central Nebraska near their Gothenburg, plant. The production areas in southeastern Illinois and southwestern Indiana provide white corn for Azteca and what is considered as "the river market." Another production area is concentrated within 50 miles of Decatur, IL. Other areas in Illinois with white corn production grown under contract are Jerseyville, Kankakee and Beardstown. Most of the white corn is produced under contract with major buyers or end-users. Wildcat production is minimal due to stability in the market and more accurate production demand estimates.

Figure 41:



Source: Industry Data, USDA/NASS

Area under production

It is estimated that between 600 and 700 thousand acres were planted in white corn in the 2005 season, (243,000 and 284 hectares), (See figure 41).

Volume available

Domestic demand for white is estimated at twice that of the export demand. The domestic demand was approximately 70 million bushels (1.8 mmt.) and the export demand was approximately 35 million bushels, (0.9 mmt.) The export market is highly dependent upon production in Mexico and South Africa. If these two countries have a poor crop, it will increase the demand for more white corn from the United States.

Politically, trade negotiations and existing agreements such NAFTA also play key roles in the export market.

Premiums

In recent years, the yield of white corn has been nearly equal to yellow corn in some production areas. The average grower premiums ranged from $0.20 - $0.40 per bushel ($7.87 - $15.75 per mt.), depending upon the established contract and quality measures set by the buyer. The end-user or processor will often pay an additional premium, which can range as high as $0.30 ($11.81/ha) on top of base contracted premiums, to growers for certain qualities. These qualities include #1 grade, hardness, cleanliness, kernel size, kernel color, and fewer stress cracks. Buyers may require proof that a certain hybrid has been used as contracted.

Seed Suppliers 2005

In some cases buyers request specific white corn hybrids to be grown. The largest suppliers of white seed corn include Pioneer, Syngenta, NC+, Monsanto, Hoegemeyer, Great Lakes, and Trisler. There are no white corn hybrids currently marketed in the United States that are classified as GMOs. However, seed companies continue to develop new hybrids.

Grain 2005

The largest processors of white corn grain in the United States are Frito Lay, and Azteca Milling. These companies grow nearly all of their white corn under contract. Others processors include: Quaker Oats, ADM Milling, Cargill, Louis Dreyfus, Bartlett Grain, Scoular Grain, O' Malley Grain, De Bruce Grain, Bunge, and Rovey Grain.

General Grower Economics 2005

Isolation may be a concern for growers needing to minimize contamination from yellow corn pollen. To maintain necessary isolation requirements, growers may have to rent adjacent acreages or pay neighboring growers to keep other corn types a recommended 660 feet (200 meters) from their white corn fields. These isolation requirements may add to the grower's production costs.

Another factor that may increase production costs is low temperature drying, which is necessary to reduce stress-cracks. Low temperature drying is a time management factor for growers due to drying volume limitations. The reduced dryer throughput increases the length of the harvest period and possibly increases the risk of adverse weather conditions creating crop losses later in the fall. Leaving corn standing in the field longer than usual may cause losses due to molds and insect infestation. Oftentimes growers try to let the corn field dry as much as possible to reduce fuel cost and dryer time.

Yields are always an important concern for growers. Elite new yellow hybrids generally have higher yields than white hybrids. On average, white corn hybrids yield no more than 5% less than yellow corn hybrids.

Primary uses

Food: White food corn is typically contracted and sold to dry-mill processors or used in alkaline cooking processes for making masa, tortilla chips, snack foods, and grits. One of the export markets for white corn is for starch.

Starch: White food grade corn has limited wet milling use for food grade starch.

Paper: Paper uses also exist for white corn.

Economics for end-users

The pricing of contract corn is calculated by figuring the amount of grain needed to meet the company's required volume and quality levels. Larger kernels, harder texture, and low damage are key input costs for end-users. The costs of raw product range from minute to about 65% of the finish product costs, depending upon the product manufactured and the volume of the material going through the plant.

Handling and Channel Issues

Processing practices that preserve grain identity from planting through processing must be followed. Nearly all white corn is delivered to a specified delivery point where it is dried and cleaned. For several large end-users, the specified delivery point is their processing plant. Some growers choose to dry their corn on the farm and buyers call for delivery as needed.

Compositional analysis

Sample data is presented as an indicator of trends in crop quality rather than definitive results, due to sample size.

According to data reported by FGIS, white corn samples had higher moisture content, greater test weight and lower levels of aflatoxin than #2 yellow corn, (see figure 42 for details).

Figure 42: White Corn Grade Factors

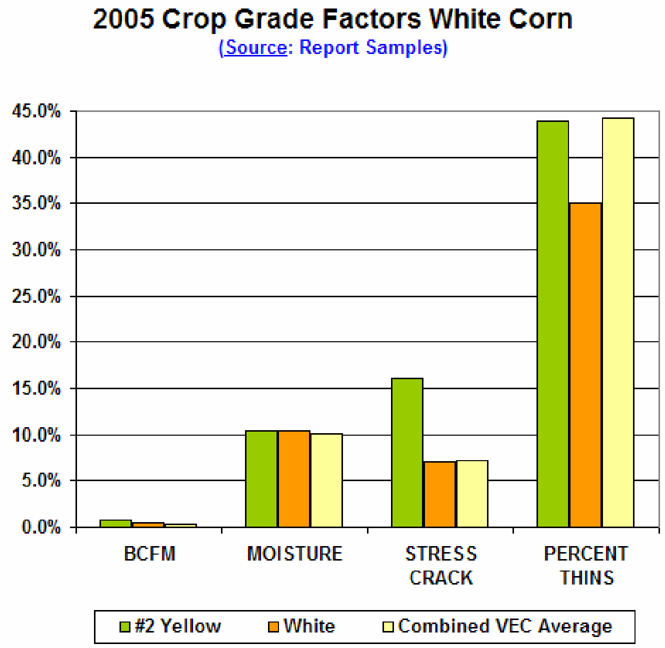
2005 Crop Grade Factors

	White Corn Compared to #2 Yellow Corn									
	Number of Samples	Broken Corn Foreign Matter (BCFM)	Damaged Kernel Total (DKT)	Heat Damage (HT)	Moisture (M)	Test Weight (TW)	Aflatoxin (AFLA)	Waxy	Oil	Protein
#2 Yellow	146815	1.42	2.25	0.01	13.19	58.25	58.32	98.90	4.43	6.30
White	298	1.90	2.75	0.01	13.96	59.83	7.14	99.40	0.00	0.00

Source: USDA/FGIS Data

Figure 43 illustrates crop grade factors taken from grower samples across the US corn-belt. As compared to #2 yellow corn, white corn is slightly lower in BCFM, stress cracks, percent thins, and aflatoxin, (See figure 37 for aflatoxin).

Figure 43:



As compared to the overall VEC crop, white corn was higher in density, slightly lower in stress cracks, and lower in percent thins, (See figure 43).

White corn was also higher in test weight and density than both #2 yellow and the overall VEC average, (See figures 44 and 45).

Figure 44:

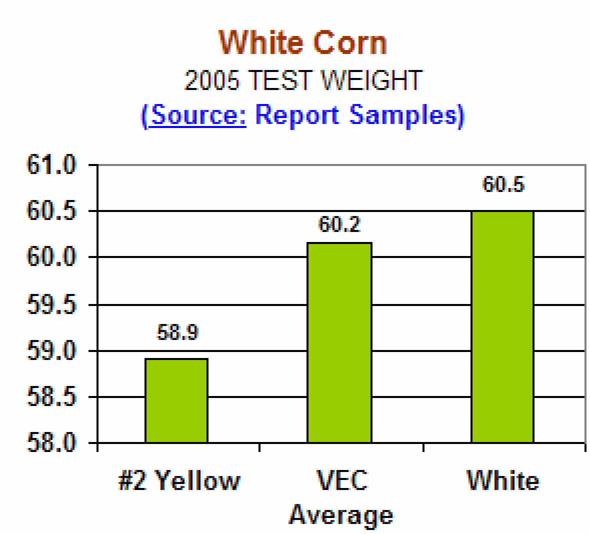
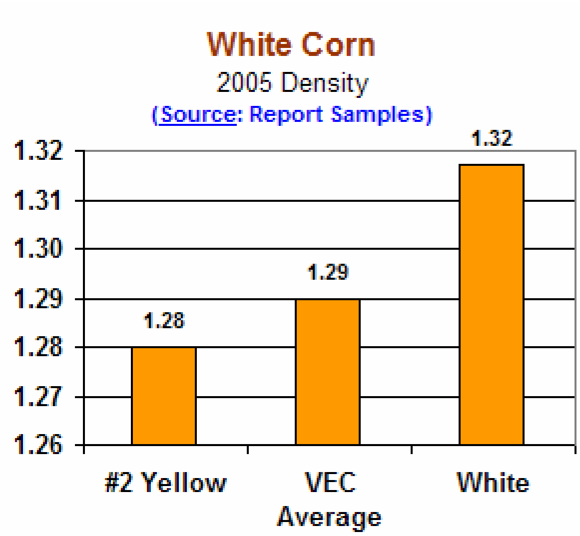


Figure 45:



Market Trends

The current market trend is up due to growth in the Mexican and snack foods industry. In previous years, Mexico hasn't been able to produce enough white corn to meet domestic demands. Mexico and South Africa are the two largest importing countries. The export market for U.S. white corn is down. However, predictions are for an improved demand of white corn for the export market due to population increase and economic improvement in many developing countries.

Grower Attitudes in 2005

Some growers in the white corn production areas grow white corn every year. Others may switch to yellow corn due to the perceived advantages of newer genetics. There are also a reduced number of wildcat growers due to the uncertainty of the export market. However, some growers see white corn as much lower a risk than in the past due to the improved yields. Premiums are the driving economic force to produce white corn and are often the reason for a positive or negative grower attitude.

Future Outlook

The white corn market is expected to see new hybrids, with better quality. Most of the growth is expected to be in the export market. At this time, current white corn production meets the domestic demand. Exports are expected to be up from the 2004/05 level of 29 million bushels (736,600 mt) to 35 million bushels (889,000 mt) in 2005/06. Some believe that if there is no change in NAFTA there will be an increase in white and yellow corn.

A factor for gauging the increase in the domestic market is the expansion of the U.S. Latino population. Mexico continues to be a major white corn importer. South Africa, while typically a white corn exporter, will import US white corn when their supply is limited. White corn continues to be appealing for food production. However, currently, the market for white corn is relatively flat.

Waxy Corn

Key Points:

- Projections for 2006 are expected to remain close to 2005 with a potential slight increase.
- The market has been is relatively stable and currently stands at approximately 500,000 acres (202,000 hectares).
- 2005 grower premiums were between $0.15 – $0.30 per bushel ($5.90 - $11.81 per mt.).
- The majority of the contracted acres are located near U.S. domestic processing facilities unless the grain is destined for the export market.
- A few major companies dominate the starch production for food and industrial uses.
- Most waxy corn production occurred in Indiana near Hammond, Lafayette, Indianapolis and Madison. Production also occurred in central Illinois, Kansas City to northwest Missouri, southwest Iowa and eastern Iowa, southern Minnesota, southern Michigan and a little in Nebraska, Ohio and Kentucky.

Definition

Waxy corn is different from typical dent corn because it contains 98-100% amylopectin starch versus 75% in commodity corn. Elite yellow dent hybrids are converted through traditional breeding methods to waxy corn hybrids. Most of the waxy corn acreage is yellow waxy with a small amount that is white waxy. Newer waxy hybrids are reported to be more competitive with dents in yield.

Desired Qualities:

Since most waxy corn is utilized by the wet milling industry, the desired traits in waxy corn relate to its performance in wet milling applications.

- Low BCFM—Indicator of handling damage, impacts storability. Improves wet milling efficiencies.
- Low total damage—Indicates a reduced probability of mycotoxins.
- Test weight of 56 to 60 pounds per bushel (1000 to 1072 kilograms per mt.) for wet milling— Steeps poorly if too hard, steep tanks are volume limited.
- Low stress crack index—Indicator of low multiple stress cracks and low dryer damage.

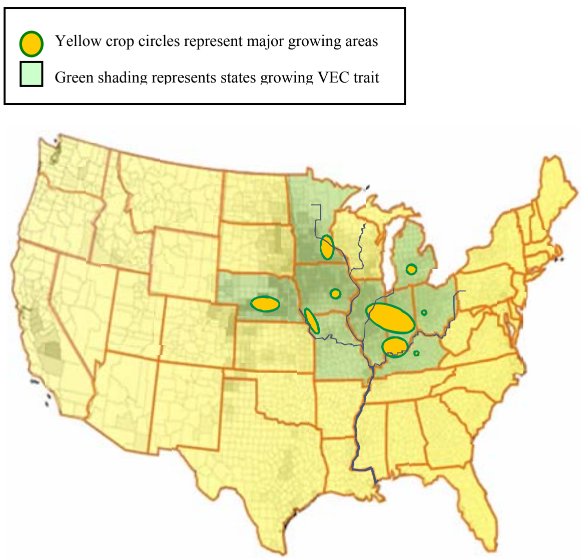
Production

Waxy corn is usually grown under contract for wet-corn millers or exporters. Buyers and end-users require high levels of purity. Purity level requirements range from a low of 95% to 98% purity. This level of purity necessitates isolation from other corn. Waxy corn cannot be planted on land that was planted to corn the previous year unless that corn was waxy. The isolation distance minimizes cross pollination with other corn that might reduce purity levels. There is a near zero tolerance for GMO contamination by many end-users. Buyers call contracts may stipulate a 0% allowance for any unapproved GMO event. If the corn does not meet contract criteria, the premiums are reduced and/or the corn is rejected by the buyer. A simple iodine test is often performed on each truckload of grain arriving at the point of delivery to check for purity levels.

Since waxy corn is not enhanced with GMO events, which reduce or eliminate pest problems, waxy corn production may require the application of pesticides to control corn pests. This may create an added production expense. The exception to this would be corn that is produced for a very small organic waxy corn market.

In recent years seed providers have improved the agronomics of waxy hybrids to the point where the yield difference of waxy versus other elite yellow hybrids is minimized. There is still a recognized yield difference between the new waxy hybrids and the elite yellow hybrids. There is still some wildcat production of waxy corn.

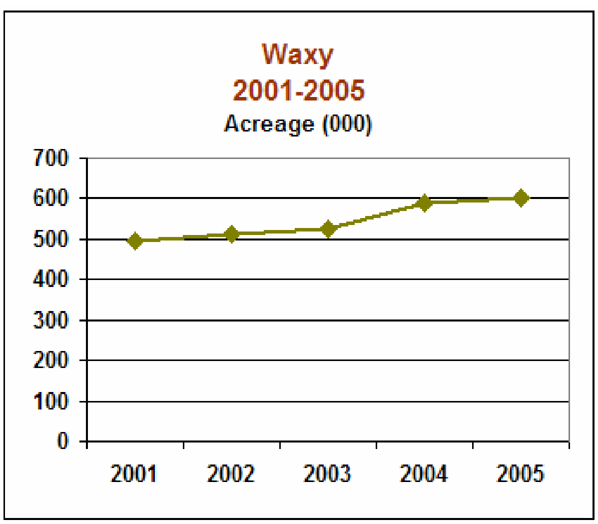
Figure 46: Waxy corn growing areas



Regional production areas

As is illustrated in figure 46, most of the waxy corn production occurred in Indiana near Hammond, Lafayette, Indianapolis and Madison. Production also occurred in central Illinois, Kansas City to northwest Missouri, southwest Iowa and eastern Iowa around Cedar Rapids, southern Minnesota, southern Michigan and a little in Nebraska, Ohio and Kentucky.

Figure 47: Waxy Corn Acreage 2001-2005



Source: Industry Data, USDA/NASS

Area under production

The amount of land devoted to production of waxy corn in 2005 is uncertain. There isn't any individual or group tracking these figures. However, figure 47 represents the estimated acreages from industry contacts for 2001 thru 2005. The 2005 estimates ranged 500,000 acres to 600,000 acres, (202,000 to 243,000 hectares).

Premiums

The grower premiums varied with the production area and the type of contract. The majority of the respondents (buyers and sellers), preferred a "Buyers Call Contract". Most premiums were paid using local cash price as the base plus an additional amount for quality. The premiums ranged from $0.10 to $0.30 per bushel ($3.93 to $11.81 per mt.) with the average being $0.20 ($7.87 mt).

Seeds Suppliers 2005

Most waxy hybrids came from Pioneer and Monsanto. Other companies who provided waxy corn hybrids include: Syngenta, Brown Seed Company, AgriGold, Moews, Becks, Burrus. Seed companies continue develop new waxy hybrids.

Grain 2005

In 2005, grain quality varied from good to poor depending upon the geographic location. Most areas reported very good grain quality deliveries. Purity did not seem to be an issue with grain buyers.

General Grower Economics 2005

The 2005 cost of production was up due to increased fuel and fertilizer prices. Crop isolation is generally necessary in waxy corn production which may have created an additional production cost for some growers. If growers had storage and signed up for a buyers call contract, they could have made up to $0.30 per bushel ($11.81 per mt.). This premium could make growers an additional $20 - $30 per acre (.08 - .12 per hectare) over non-VEC crops.

Primary uses

Stabilizer and Thickener: Food thickeners, pie filling, freeze stability for fast food, salad dressing, gums and corn starch are some of the major food uses.

Adhesive: Other uses include remoistening adhesives in the manufacture of gummed tape, and for other applications in the paper industry.

Emulsifier: It is also used as an emulsifier for salad dressings.

Livestock Feed: A small percentage is used for livestock feed.

Economics for end-users

The economics of waxy corn really depends on the products made as to the profitability of the plant. Some manufacturers reported that the raw product is a good percentage of the cost of the final product. The size of the plant also affects profitability.

The waxy corn segment is, for the most part, a non-GMO market. Some processors responding to consumer preferences, are sensitive to any form of GMO contamination.

Handling and channel issues

Maintaining purity is the main concern for the waxy corn industry. Grain identity must be preserved from planting through processing for maximum value.

Compositional analysis

Sample data is presented as an indicator of trends in crop quality rather than definitive results, due to sample size.

According to data reported by FGIS, waxy corn samples had fewer BCFM, lower damaged kernel total, comparable heat damage, lower moisture content, greater test weight, (See figures 48. 49 and 50 for details). The FGIS data also indicated lower levels of aflatoxin than #2 yellow corn, (see figure 37 for details).

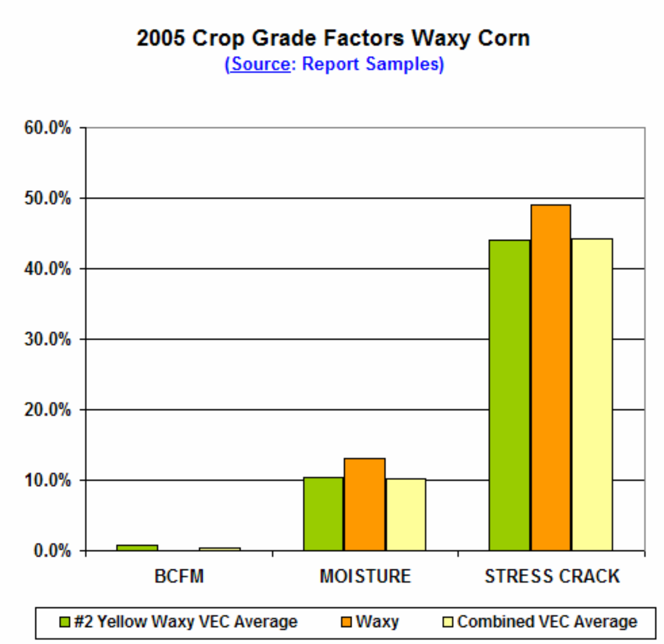
Figure 48:

2005 Crop Grade Factors (FGIS)

	Corn Type Average									
	Number of Samples	Broken Corn Foreign Matter (BCFM)	Damaged Kernel Total (DKT)	Heat Damage (HT)	Moisture (M)	Test Weight (TW)	Aflatoxin (AFLA)	Waxy	Oil	Protein
#2 Yellow	131029	2.11	2.74	0.02	14.36	57.29	10.43	98.42	4.55	8.94
Waxy	700	1.20	2.64	0.00	13.97	58.24	3.37	98.88		

Source: USDA/FGIS Data

Figure 49:

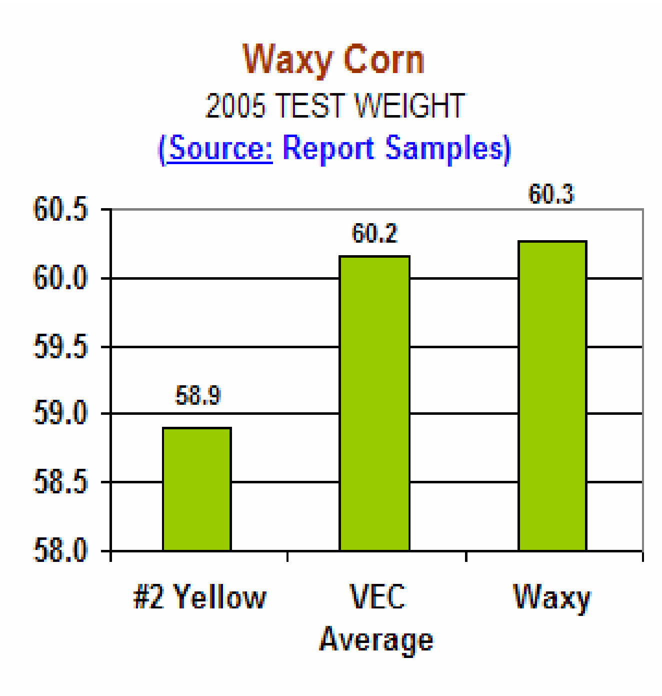


Data samples collected for this report had similar results to the FGIS data. Figure 49 demonstrates the differences in test weight between #2 yellow corn, the overall VEC average and waxy corn.

Market trends

US domestic use is expected to have a slight 3-4% increase. The export market should be relatively flat. Very few new products will be available on the market as most seed companies view waxy as a mature market. In 2005 there seemed to be some softening in the market. There is some speculation that demand is down because some end-users are using non-VEC corn starch as a substitute for making some products. No waxy hybrids are GMO, but it is possible waxy seed products will become available in the future.

Figure 50:



Grower attitudes 2005

Some growers near production areas continue to grow waxy corn each year, and will likely continue growing it into the future. However, growers want higher premiums. There is very little wildcat acreage planted since the export market has declined. Growers with a recognize yield difference will likely drop out of waxy contracting unless new hybrids are available in their growing area.

Future outlook

Historically, waxy corn has not been projected to grow since 1999. The market is stable with very small increases or decreases. There could be some changes in the future depending upon the market. However, at this time there doesn't seem to be any new uses that would increase demand.

Hard Endosperm/Food Grade Corn

Key Points

- Estimated to be somewhere between 1.2 and 1.5 million acres (486,000 and 607,000 hectares).
- Grower premiums were between $0.10 and $0.30 per bushel ($3.93 and $11.81 per mt.).
- Forecasted to remain steady with little or no change for future crops.

Definition
Hard endosperm corn contains high amounts of hard or (horny) endosperm relative to the amount of floury endosperm. Hard endosperm is a characteristic that is important to dry milling and alkaline cookers. The goal of the dry mill process is to keep the horny endosperm in large pieces and to remove the germ and pericarp to yield a low-fat low-fiber product. If the kernels are significantly soft or broken, there is less opportunity for millers to produce large grits. Product composition and color, as well as process stability, can also be affected by hardness and breakage.

Desired Qualities for Dry Milling:

- High percentage of hard endosperm—Indicator of hardness, vitreous (horny) endosperm is the source of large grit yields for dry milling
- *Low BCFM*—Indicator of handling damage, impacts storability, increases grit yield for dry milling.
- *Low mycotoxins*— Must be below 20 ppb
- *High Test weigh*t -- greater than 60 lb per bushel (1072 kilograms per mt.) for dry milling—Provides more grits for dry milling, provides more consistent cooking for alkaline cookers.
- *True density* - greater than 1.30 g/cm3 for dry milling
- *Low stress crack*s—Indicator of low multiple stress cracks and low dryer damage, increases yields in dry milling. .

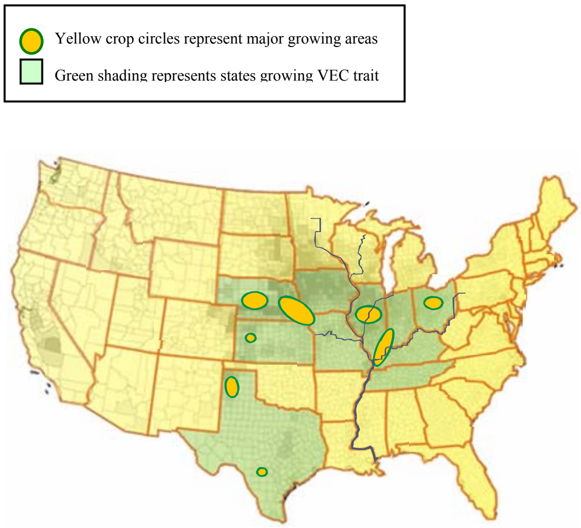
Desired Qualities for Alkaline Cooking:

- High percentage of hard endosperm
- Low stress cracks
- Uniform kernel size with high test weight
- Minimal dent in kernel crown

Production
Since 2001 acres planted to yellow hybrids with food grade characteristics have been estimated to be between 1.2 and 1.5 million acres (486,000 and 607,000 hectares). There was a continuation of this trend in 2005 and it is expected to remain the same for 2006.

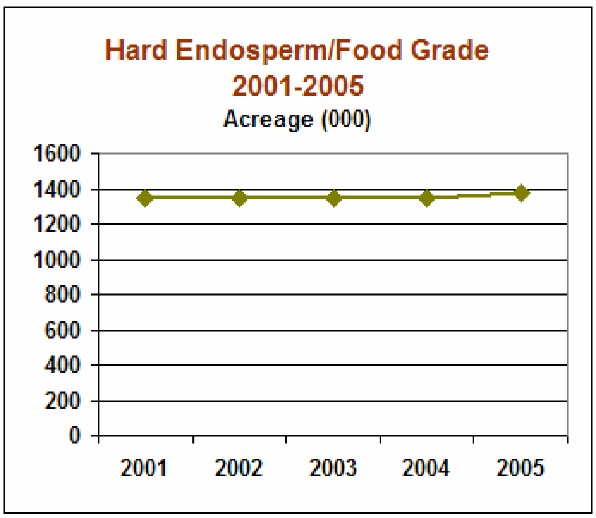
Because premiums on food grade corn are generally not as high as other VEC, growers typically, view a hybrid's food grade characteristic as a secondary factor to its agronomic characteristics. Growers will plant the hybrid knowing that the grain may or may not be sold for food purposes. One of the reasons acres have been stable over the last several years is the high quality of the Hard Endosperm/Food Grade Corn compared to the non-VEC crop observed over the last three years.

Figure 51: Hard Endosperm/Food Grade Corn growing areas



Regional production areas
Since the 2001 VEC report Hard Endosperm corn has remained fairly steady. The areas of production remain similar to previous years with crops being scattered throughout the Midwest and South. The highest concentrations are in Illinois, western and southern Indiana, central Ohio, northwest Missouri, southwest Iowa, southeast Nebraska and west central Nebraska, (See figure 51).

Figure 52: Hard Endosperm/Food Grade Corn Acreage 2001-2005



Source: Industry Data, USDA/NASS

Area under production
Hard endosperm corn was estimated to have been grown on 1.2 to 1.5 million acres (486,000 and 607,000 hectares) in 2005. This is a slight increase of 50,000 acres (20,000 hectares) from 2004 and all previous years since 2001, (See figure 52).

Premiums
Premiums for Hard Endosperm Food Grade corn are estimated up about 10 cents from last year back to premium prices of 2003 at $0.10 to $0.30 per bushel ($3.93 to $11.81 per mt.). Premiums appear to be meeting needed production incentives as the crop remains steady with a slight increase of 50,000 acres (20,000 hectares). This is likely to remain steady even though fuel and other production costs may increase since there is less risk with this crop as it has multiple uses and can be marketed for food, feed or ethanol production. Growers who chose to produce for the open market have less risk with multiple markets to sell their corn.

Seed suppliers 2005
The seed providers for Hard Endosperm/Food Grade corn are: Pioneer, Lewis, Mycogen, Burrus, Midwest Seed Genetics, Pfister, and Wilson.

Hard Endosperm/Food Grade hybrids are typically standard hybrids with high yield characteristics. Thus, there are little yield differences between Hard Endosperm/Food Grade Corn and other conventional hybrids.

Even though some food grade products have transgenic biotech traits such as Roundup Ready®, Liberty Link®, and Bt, the resistance to biotechnology continue to persist and create a market for non-GMO products. Consumers in Europe and Japan remain resistant to goods with biotech food sources, and export buyers continue to seek food grade corn that is non-GMO.

Grain 2005

Major U.S. end-users of food grain corn are Frito Lay, Azteca, ADM, Bungee, Cargill and Con Agra. A small percentage of hard-endosperm corn is exported primarily to Japan. Because this corn is directly used in food applications, end-users continue to be more selective in identifying approved hybrids for processing.

General grower economics 2005

Food grade hybrids are typically contracted and sold to domestic and export dry-mill processors. Processors require consistent grain with desirable milling qualities. Contractors often add extra quality incentive premiums to producers for this reason. Many of the same growers produce these hybrids year after year and it is typically dictated by proximity to a dry or alkaline cooking facility or tributary to the export market.

Primary uses

Cereal: Flaking grits are used for corn flakes, corn meal and corn flour.
Brewing beer: brewer grits are used for the production of beer.
Prepared mixes: corn meal and corn flour for corn bread, corn muffins, pancakes and waffles.

Economics for end-users

The dry milling industry continues to consolidate in the U.S. There are approximately 10 mills that account for more than 80% of production. This is also true for Japanese dry millers who have experienced consolidation as the dry mill market is considered to be a mature market.

Dry millers and alkaline cookers will continue to look at processing efficiencies and will look at corn as the main raw ingredient. Some export buyers of hard endosperm and food grade corn also desire the corn be non-GMO.

Handling and channel issues

Food grade corn is grown for human consumption and therefore quality needs to be maintained throughout the entire value chain. Hard endosperm and food grade corn needs to be IP'd in order to maintain value. However, the thresholds for commingling with other types of corn is not as stringent as some VEC types, unless the buyer also wants the product to be non—GMO. Grain handlers can move hard endosperm into other markets such as livestock feed if needed.

Compositional analysis

Sample data is presented as an indicator of trends in crop quality rather than definitive results, due to sample size.

FGIS data was only available for white, waxy and high oil corn. Thus, comparison could not be made between the data collected for this report and FGIS data. However, as demonstrated in the following figure, samples taken for this report indicate that Hard Endosperm corn has greater test weight, comparable density, less BCFM, fewer stress cracks and lower percent thins.

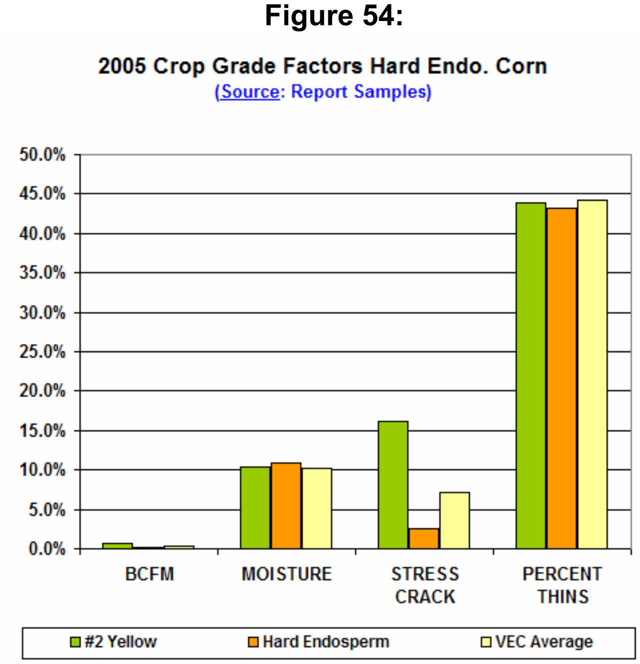
Figure 53:

2005 Crop Grade Factors (Project Data) Hard Endosperm/Food Grade Corn

	TEST WEIGHT	DENSITY	BCFM	MOISTURE	STRESS CRACK	PERCENT THINS
#2 Yellow	58.7	1.28	0.7%	10.4%	16.1%	44.0%
Hard Endosperm	62.8	1.28	0.2%	10.9%	2.6%	43.2%
VEC Average	60.1	1.29	0.3%	10.1%	7.2%	44.3%

Source: Project sampling in US locations.

Figure 54:



As the figure 54 shows, data samples collected for this report had similar results to the FGIS data. Hard endosperm corn had slightly lower BCFM, higher moisture levels, lower amounts of stress cracks and lower percent thins than #2 yellow corn.

As compare to the overall VEC crop, hard endosperm corn had higher moisture levels, lower stress cracks, and lower percent thins.

Based on data samples from the report and FGIS data, hard endosperm corn greater test weight and lower density than #2 yellow corn, (See figures 55 and 56).

Figure 55:

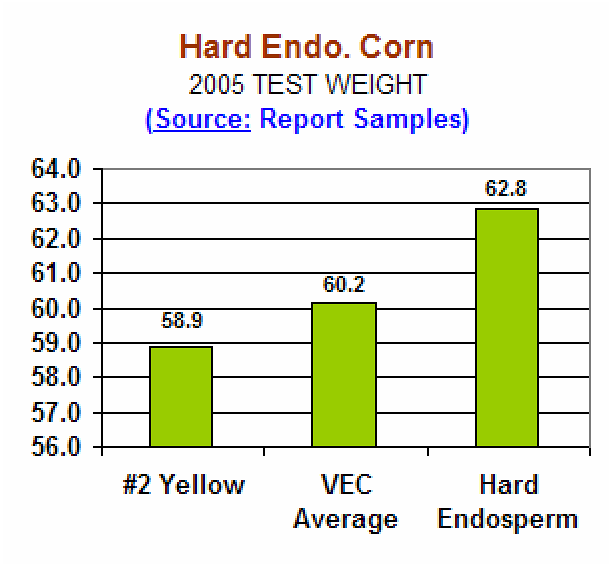
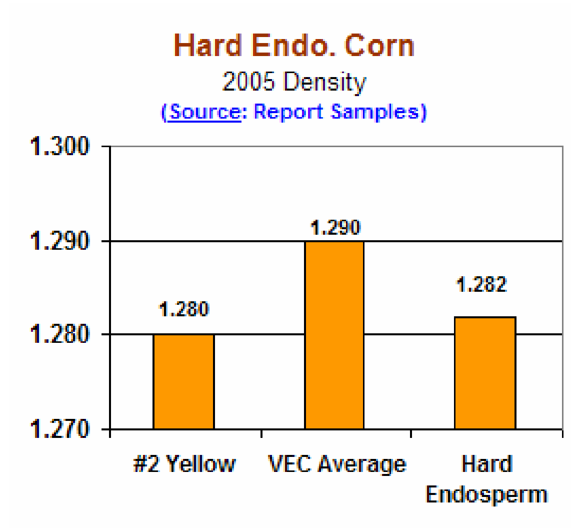


Figure 56:



Market trends/Future Outlook

Food processor have developed markets in the snack food industry where food grade corn is used in alkaline cooking processes for making masa, tortilla chips, snack foods, and grits. Use of food grade corn is presently driven by eating habits. Growth is expected to occur in Mexican foods and the snack food markets. However, food grade corn acreage is expected to remain relatively flat, (See figure 57).

News releases on Tortilla-info.com indicated that:

> "'Tortillas, and related by-products (tortilla chips, tostadas and taco shells) comprise the record-breaking $6.1 billion tortilla industry', (**Tortilla Industry Association's (TIA).** The continued popularity of tortillas has contributed to the more than eight percent industry growth annually for nearly a decade."

Figure 57:

Corn Trait	Growth Projections						
	1999 *Growth Projections*	2000 *Growth Projections*	2001 *Growth Projections*	2002 *Growth Projections*	2003 *Growth Projections*	2004 *Growth Projections*	2005 *Growth Projections*
Hard Endosperm/Food Grade	Down	Down	Flat	Flat	Up	Flat	Flat

Sources: Industry Contacts and USDA/NASS

Grower attitudes 2005

Many growers are willing to grow food grade hybrids as yields and premiums have been sufficient to make a profit.

High Oil Corn

Key Points:

- TopCross High Oil Corn acreage continues to decline.
- The 2005 crop is estimated at 100,000 acres (40,000 hectares).
- Premiums for 2005 High Oil were similar to up from 2004 at $0.20 - $0.40 per bushel ($7.87 - $15.75 per mt.).
- Growth projections for 2006 are down.
- Little new research is being done on high oil corn.

Definition

High oil corn (HOC) typically has oil content of 6% or higher on a dry weight basis, compared to yellow dent corn which has oil content approximately 4%. The added oil makes this a high-energy feed that can be used to increase growth performance in livestock or poultry, or to replace more expensive energy sources in feed rations. HOC is valued for its high energy content and elevated amino acid levels. Most of it is fed to poultry and swine with the larger marketed share being exported to Japan and a few other countries.

Most high oil corn seed is marketed as TopCross. This seed contains 90% male sterile and 10% pollinators within each bag of seed. The TopCross® system produces kernels that exhinbit larger germs. The germ contains the oil component of the kernel. This results in a higher oil content plus elevated levels of essential amino acids .

In general, high oil corn has some additional benefits such as reducing dust in feeding operations, improved palatability, and requires less energy to grind. These attributes add value but are often situation dependent.

Desired Qualities. The following list indicates the desired qualities for high oil corn. Since high oil corn is used almost exclusively in livestock feed applications, the desired qualities relate to its performance as a feed ingredient.

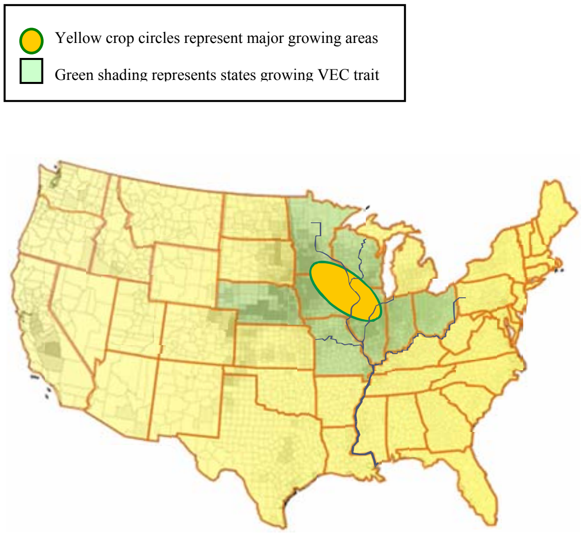
- *High oil content*—Impacts feed energy level
- *Low BCFM*—Indicator of handling damage, impacts storability
- *Amino acid concentration*—Essential amino acids such as lysine and methionine.

Production

Special manaqement is required to grow HOC, including field isolation to prevent cross pollination, early planting for early harvest and planting on good soils. Planning acres produced to match storage of product is important as most HOC is grown under a buyers call contract. Crop scouting is important to protect from insect damage.

Though there are end users who desire HOC, overall HOC crop production continues to decrease. Several significant factors are still influencing high oil corn supply and demand. Yield of high oil corn is lower than non-VEC corn and few seed companies offer TopCross hybrids nor are they developing new hybrids. Even though premiums are typically higher compared to other VEC crops, HOC production is not attracting new growers. Unless new hybrids are developed, the production of TopCross High Oil Corn is expected to continue to decline.

Figure 58: High Oil Growing Areas



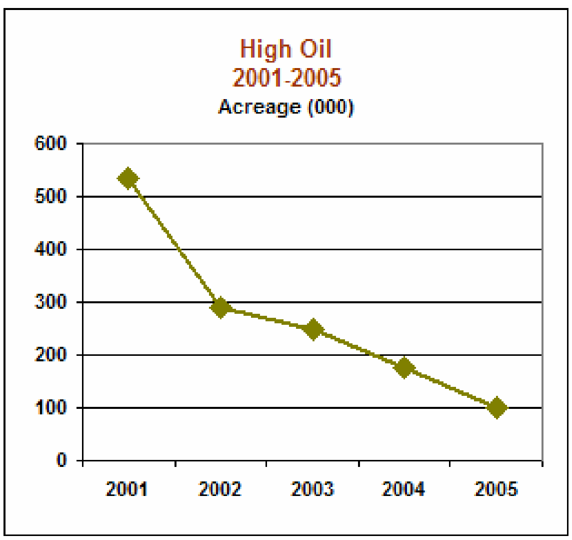
Regional production areas

High oil corn is grown broadly across the Midwest. Most of the contracted acres are grown in southern Minnesota, northern and eastern Iowa, and central and northern Illinois, (See figure 58).

Area under production

HOC continues to lose grower participation each year. In 2005, the acreage planted to HOC was estimated at 75,000 - 125,000 acres, (30,000 - 51,000 hectares). This is a significant decrease from the acreage estimates of the 2001/02 VEC report of 470,000 - 500,000 acres, (190,000 to 202,000 hectares), (see figure 59).

Figure 59: High Oil Corn



Sources: Industry Data and USDA/NASS

Premiums

Over the past few years grower premiums have remained up with a slight spike in 2002 at $0.35 per bushel ($13.76 per mt), and another significant spike in 2005 with some growers getting premiums as high as 0.50 per bushel ($19.68 per mt.). However, grower participation continues to drop.

Seeds suppliers 2005

Seed companies are required to pay a $15 per unit seed royalty premium on TC Blend high oil corn seed. The seed company can choose whether to pass along the entire royalty premium ($15 per unit) to the grower. The $15 is equal to about $5.50 per acre (2.23/ha) or $0.035 per bushel (.0008.mt). Major suppliers of high oil seed corn include Wyffels, Pfister, and AgriGold. In the last two years, Monsanto, Pioneer, Croplan Genetics, and Novartis (Syngenta) have discontinued selling and/or actively doing research with TopCross high oil corn**.**

General grower economics 2005

It is difficult to capture value in high oil corn. It is much like replacing a commodity with another commodity. The challenge becomes a battle of lowest price. Feed fat has managed to gain the edge over HOC which has made value capture difficult.

Primary uses

Animal Feed: High oil corn is primarily used as an ingredient in animal feed. In feeding applications, the higher oil content in the kernel increases the metabolizable energy value of the corn. Since oil contains 2.25 times the energy of starch the gross energy content of high oil corn is improved. Essential amino acid levels are also higher which reduces the need for synthetic amino acids in the animal diet.

Economics for end-users

The primary users of HOC are monogastric animals (swine and poultry). The value for end users is dictated by the price of corn and the price of alternative energy sources such as fat (typically in the form of choice white grease). When fat prices are high, HOC is an attractive alternative. For export markets, the value of a high quality product such as low BCFM or in some cases non-GMO status also has value to end users.

Handling and channel issues

High oil corn is distinct and must be kept separate from regular corn to maintain its value. The cost associated with Identify Preservation varies from location to location, but may also have an impact on grower participation in High Oil Corn production. Growers must keep their crops isolated by 660 feet (200 meters) from the nearest corn field.

Compositional analysis

Sample data is presented as an indicator of trends in crop quality rather than definitive results, due to sample size.

According to data reported by FGIS, HOC samples had fewer BCFM, lower damaged kernel total, less heat damage, lower moisture content, greater test weight, oil and lower levels of aflatoxin than #2 yellow corn, (see figure 60 for details).

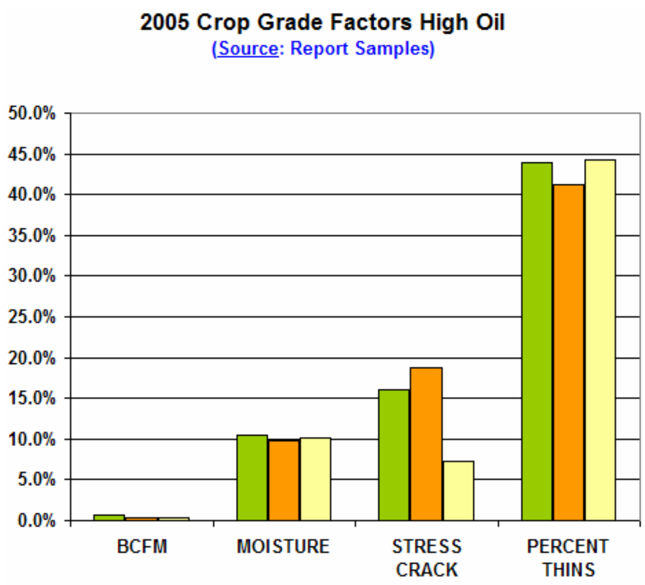
Figure 60:

2005 Crop Grade Factors (FGIS)

	Corn Type Average							
	Number of Samples	Broken Corn Foreign Matter (BCFM)	Damaged Kernel Total (DKT)	Heat Damage (HT)	Moisture (M)	Test Weight (TW)	Aflatoxin (AFLA)	Oil
#2 Yellow	131029	2.11	2.74	0.02	14.36	57.29	10.43	4.55
High Oil	19	0.49	0.82	0.00	10.50	57.59	1.00	8.74

Source: USDA/FGIS Data

Figure 61:



As the figure 61 shows, data samples collected for this report had similar results to the FGIS data. HOC had slightly lower BCFM, lower moisture levels, higher amounts of stress cracks and was lower as was percent thins than #2 yellow corn.

As compare to the overall VEC crop, HOC had lower moisture levels, higher stress cracks, and lower percent thins.

Based on data samples from the report and FGIS data, HOC had lower test weight, lower density and lower amounts of aflatoxin than #2 yellow corn, (See figures 62, 63. Also see figure 37 for aflatoxin).

Figure 62:

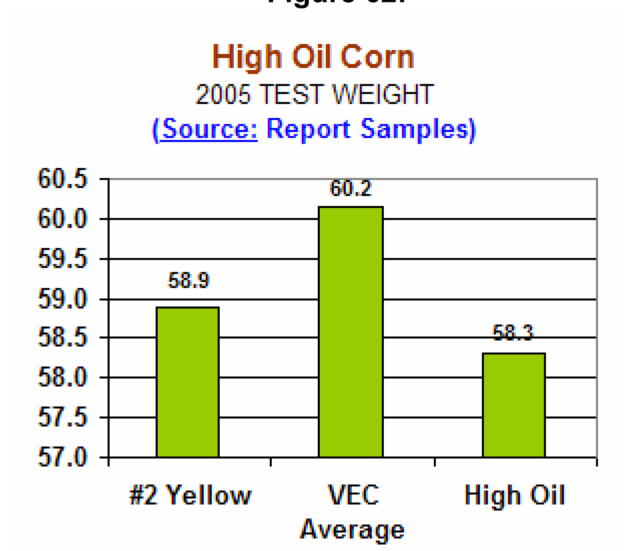
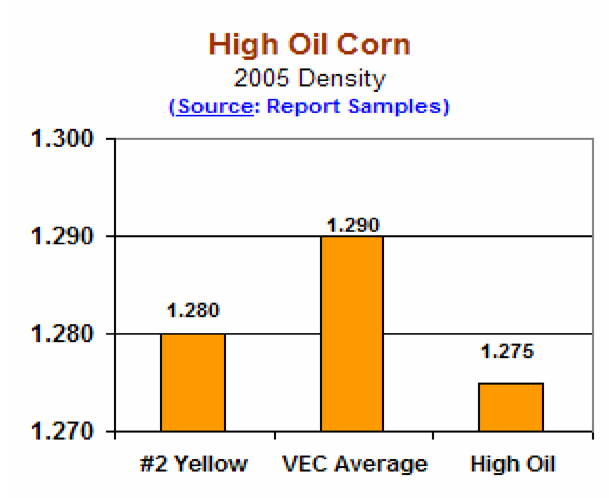


Figure 63:



Grower attitudes 2005

Growers will continue to drop high oil corn acreage unless new hybrids are introduced. The TopCross production system has experienced product performance problems in some areas. This has created a perception that the risk is not worth the potential premium.

Future outlook

High oil corn continues to drop market share with projected growth for next year to be down. It is possible that nutritionally enhanced products will take the place of TopCross High Oil Corn.

Nutritionally Enhanced Corn

Key Points:

- Production acreage is estimated at 75,000 to 90,000 acres (30,000 to 36,000 hectares) in 2005.
- Premiums for Nutritionally Enhance Corn were between $0.20 and $0.25 per bushel ($7.87 and $9.84 per mt.).
- Growth projections are flat to up.

Definition

Nutritionally enhanced corn is best described as corn with modified qualities developed for specific feed uses. Some have higher protein or specific amino acid levels while others have higher oil levels offering a greater metabolizable energy value in feed rations. High oil corn is not reported as part of nutritionally enhanced corn for this report.

Nutritionally enhanced corn includes four main types of products.

- The opaque-2, or high lysine, corn. This should not be confused with the transgenic version of high lysine corn still under development. Most of it is grown on the same farm where it is fed. It is primarily fed as silage to dairy.

- A nutritionally enhanced corn that has increased protein (lysine, methionine, and cystine) levels and is primarily used as silage for dairy. A hybrid of this type has applications in the wet milling industrial and food market, drymilling for grits and cereal, and for silage or feed applications.

- The third type has elevated amino acid profiles as well as an increase in metabolizable energy.

- An emerging category is High Available Energy (HAE). This approach involves use of a proprietary NIRT technology to characterize hybrids for higher levels of energy digestibility. This product category will target pork and poultry markets.

Desired Qualities.

The desired traits of nutritionally enhanced corn are similar to high oil corn, as it is also used nearly exclusively in livestock feed applications.

- *Low BCFM*—Indicator of handling damage, impacts storability, reduced rate of mold growth
- *Low total damage*—Indicates reduced probability of mycotoxins
- *Protein content*—Impacts feed value and the concentration of amino acids
- *High oil content*—Impacts feed energy level
- *Amino acid concentration*—Impacts feed value by reducing the need for synthetic amino acids

Production

The initial market enthusiasm for nutritionally enhanced corn products has not resulted in significant increases in acreage. In fact, since 1999 there has been a continued drop in acreage of nutritionally enhanced corn. Estimated acreage for 2005 was 75,000 to 90,000 acres

(30,000 to 36,000 hectares). The slower than anticipated development of hybrids with improved yield and other agronomic characteristics have been partly to blame.

On-farm use of nutritionally enhanced corn has grown slightly as the contracted and open market acreage have become closer than previous years, (See figure 64). In 2001, roughly 75% of nutritionally enhanced corn was contracted as compared to 30% in 2005.

Growers continue to be discouraged from planting nutritionally enhanced corn by lower than desired premiums, which growers feel do not adequately compensate for production yield loss and identity preservations costs. This is not likely to improve as end-users show continued resistance to increased costs.

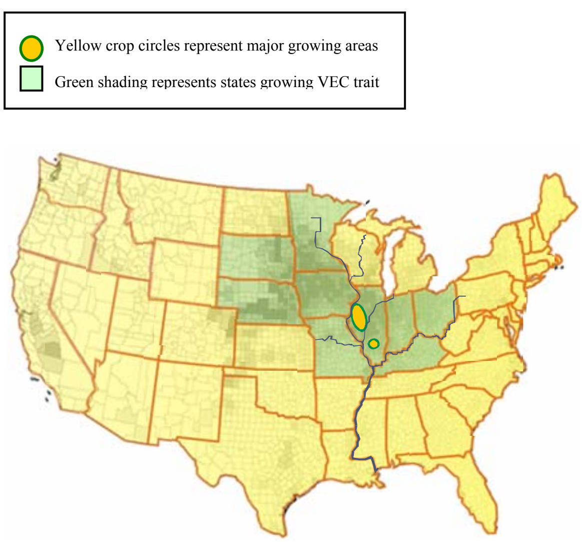
The new High Available Energy (HAE) category, however, characterizes high yielding hybrids for energy digestibility, which eliminates grower concerns about yield and agronomic performance in hybrids. Pioneer has developed breeding technology to elevate digestibility levels in hybrids with lower levels of digestibility, which will increase the number of hybrids available.

Figure 64:

	Contract vs. Open Market Growing														
	2001			2002			2003			2004			2005		
Corn Trait	Open Market	Contr.	On the Farm	Open Market	Contr.	On the Farm	Open Market	Contr.	On the Farm	Open Market	Contr.	On the Farm	Open Market	Contr.	On the Farm
Nutritionally Enhanced	5%	75%	20%	75%	0%	25%	75%	0%	25%	40%	35%	25%	40%	30%	30%

Sources: Industry Data and USDA/NASS

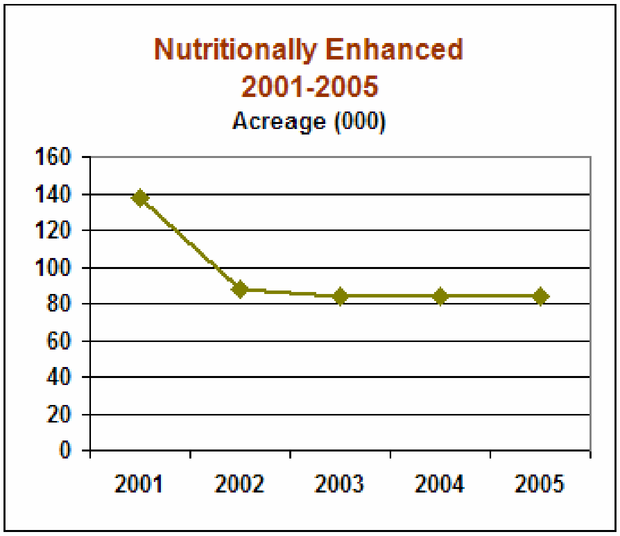
Figure 65: Nutritionally Enhanced Corn Growing Areas



Regional production areas
Production of Nutritionally Enhanced corn occurred across the central portion of the corn-belt with specific growing areas being identified as Western, Central, and Southern Illinois, (See figure 65).

Area under production
Acreage used to produce nutritionally enhanced corn has remained steady for the past 4 years. In 2003 through 2005 estimated acreages for nutritionally enhanced corn were between 75,000 and 90,000 acres, (30,000 and 36,000 hectares), (See figure 66).

Figure 66:



Source: Industry Data, USDA/NASS

Premiums
Premiums for 2005 were in the range of $0.20 to $0.25 per bushel, ($7.87 to $9.84 per mt). This range is similar to the previous years back to 2000.

Seeds Suppliers 2005
Some of the major seed supplier of nutritionally enhanced corn are: Pioneer, BASF, Becks, Wyffels and Burrus. Trait providers continue to develop new hybrids.

Primary uses
Livestock Feed: Nutritionally enhanced grains produced by these specialty corns offer major advantages over No. 2 yellow corn because they contain more protein, essential amino acids, and energy (oil) which can help livestock feeders reduce reliance on costly ingredients and supplements. HAE hybrids offer higher levels of digestible energy (DE)

Economics for end-users
Similar to High Oil Corn, economics for nutritionally enhanced corn are driven by alternative feed ingredients. The price of fat and synthetic amino acids in addition to the price of corn determines value.

Handling and channel issues
The practices that are required for successful nutritionally enhanced corn production are essentially the same as those used for normal yellow dent corn. However, management practices that preserve grain identity from planting through feeding should be followed to capture maximum value. Since the corn is intended as animal feed, it is processed by feed manufacturers usually involving cracking or grinding.

In order to retain the value of nutritionally enhanced corn, it would need to be completely segregated from all other types of corn from the field to the user. However, the feed processor might choose to blend it with other types of corn to achieve a cost reduction and specific nutritional objectives.

Compositional analysis

Sample data is presented as an indicator of trends in crop quality rather than definitive results, due to sample size.

Figure 67:

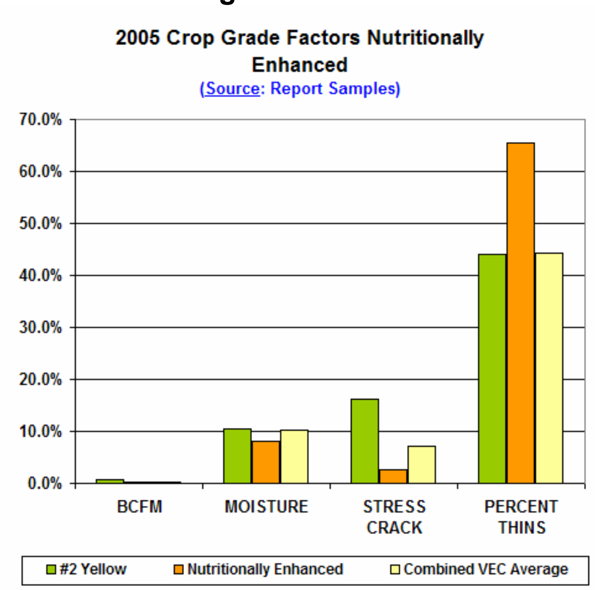


Figure 67 illustrates crop grade factors taken from grower samples across the US corn-belt. As compared to #2 yellow corn, nutritionally enhanced corn is slightly lower in BCFM, moisture, stress cracks, but higher in percent thins.

As compared to the overall VEC crop, nutritionally enhanced corn was lower in moisture and stress cracks, but higher in percent thins.

Nutritionally enhanced corn was also higher in test weight and density than both #2 yellow and the overall VEC average, (See figures 68 and 69).

Figure 68:

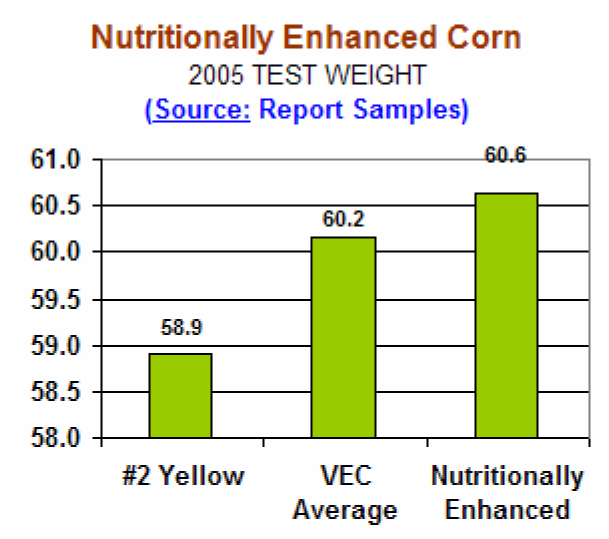
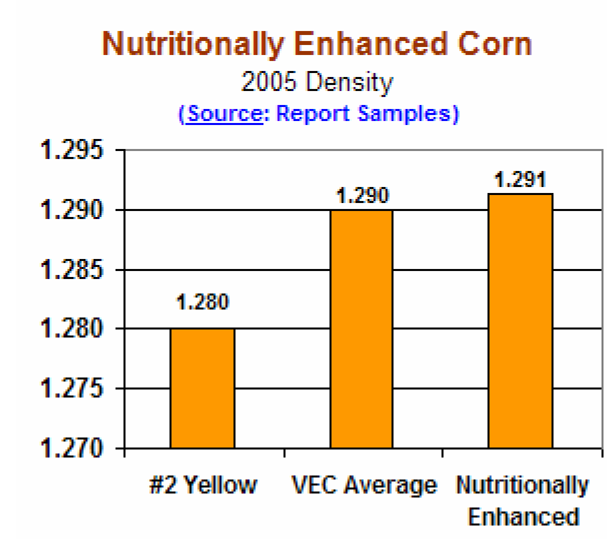


Figure 69:



Market trends/Future outlook

Agronomic performance issues have resulted in nutritionally enhanced corn to not be widely adopted. However, the demand for such product could improve, particularly if alternative energy sources, such as fat, continue to climb. The recent developments in biodiesel plants that use waste fat in their process, has the potential to increase the value of waste fat. This would be in direct competition to the livestock industry which could then improve demand of nutritionally enhanced corn.

Several major seed companies are looking to develop new hybrids that are nutritionally enhanced. This renewed focus has the potential to drive more acres.

Growth projections for nutritionally enhanced corn appear flat with a slight upward potential.

Figure 70:

Corn Trait	Growth Projections						
	1999 *Growth Projections*	2000 *Growth Projections*	2001 *Growth Projections*	2002 *Growth Projections*	2003 *Growth Projections*	2004 *Growth Projections*	2005 *Growth Projections*
Nutritionally Enhanced	Up	Up	Down	Down	Up	Flat	Flat-up

Sources: Industry Contacts and USDA/NASS

Grower attitudes 2005

Many nutritionally enhanced hybrids have performed poorly and growers are not excited about growing them. Seed companies will be challenged to prove newer hybrids can perform better.

High Extractable Starch Corn

Key Points:

- The 2005 acreage estimates are between 100,000 and 300,000 acres (40,000 and 121,000 hectares).
- Premiums are reported to be around $0.05 to $0.15 per bushel ($1.84 to $5.51 per mt.).
- The market has shown a slight increase with growth projections being flat.

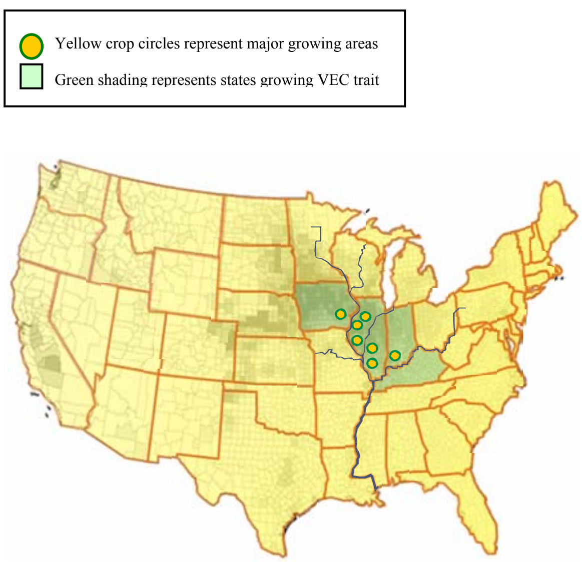
Definition

Most non-VEC is composed of approximately 66% starch, (dry matter basis). High Extractable Starch (HES) is a regular hybrid corn with normal levels of oil and protein, and with starch yields greater than 68%. When processed, HES corn yields more starch, and mills easier than some other corn types. Because of these attributes, wet millers receive a greater return on their investment than they would if using corn with lower starch yields.

Production

Production practices required for successfully producing HES corn are essentially the same as those used for non-VEC. Growers should follow recommended agronomic practices, including the maintenance of good soil fertility and pest control to minimize stress, and maximize yield potential and kernel quality.

Figure 71: High Extractable Starch Growing Areas



Regional production areas

Production of HES occurred primarily in the central corn-belt around wet corn millers and tributary to Illinois and Mississippi river system for export. (See figure 71).

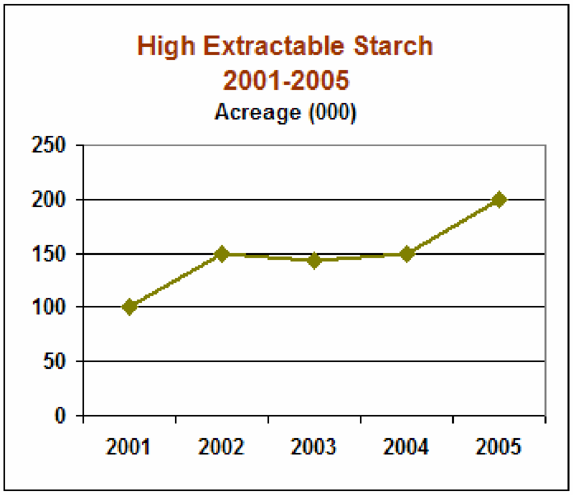
Area under production

Estimates for the 2005 HES acreage are between 150,000 and 250,000 acres (60,000 and 101,000 hectares), which is an estimated increase of 50,000 acres (20,000 hectares), over 2004, (See figure 72).

Premiums

Grower premiums have been estimated between $0.10 to $0.15 per bushel, ($3.93 to $5.90 per mt.) with no premium in some situations. LG Seeds had a contract offer in cooperation with Cargill for HES corn using their varieties LG-2553 and LG-2640. Growers were given a $0.12 premium per bushel ($4.72 per mt.) product delivered to Cargill's processing plants.

Figure 72: High Extractable Starch Acreage



Source: Industry Data, USDA/NASS

Seeds Suppliers 2005

Over the last several years, trait providers have begun the process of screening existing hybrids to better understand and quantify starch extractability. Traits providers include: Pioneer and Monsanto. Most seed companies focused first on their elite, high yielding products. Today, as a result, most of the HES identified corn hybrids are among the highest yielding hybrids available to growers. Yield parity of HES products creates an improved opportunity to deliver value. Some seed companies are breeding for starch extractability.

Grain 2005

The HES market is a result of wet millers trying to get the most value from their grind. The fact that HES is non-GMO is an added value that many end-users prefer. Export markets for HES have shown some recent growth. Countries such as Japan have interest in HES due to the higher quality, more consistent grain, as well as in some cases being non-GMO.

General grower economics 2005

Growers must focus on yield and agronomic productivity. Even though, on occasion, the market may provide a 10-15 cent premium for HES, growers are becoming more apprehensive due to the inability to use products with input traits, thus the economics are not as attractive.

Primary uses

Consumer Goods: Basic consumer necessities such as paper and textiles with major uses for corn starch in sizing, surface coating and adhesive applications.

Adhesives: Corn starches, dextrins (a roasted starch), and adhesives. Special types used in the search for oil as part of the "drilling mud" which cools down superheated oil drilling bits.

Food: Many of today's instant and ready-to-eat foods are produced using starches which enable them to maintain the proper textural characteristics during freezing, thawing and heating.

*Feed: U*sed in feed and pet food applications where physical properties of starch are desired.

Industrial Chemicals and Plastics: Raw material for the production of industrial chemicals and plastics which are today made from petroleum feedstocks.

O*ther:* Agents in flocculating, anti-caking, mold-release, dusting powder and thickening.

Handling and channel issues

The practices required for successfully producing HES corn are essentially the same as those used for non-VEC corn. However, IP management practices must be followed from planting through delivery. It is important to note that improper handling or drying can significantly impact the level of extractability of HES, (e.g. excessive high temperature drying can reduce extractability up to 4-6 percentage points.)

End-user contracts usually require more from the grower than simply planting a specific set of hybrids. Many contracts for HES corn contain additional harvest, storage and handling requirements as well as identifying specific hybrids. End-users often test loads before entering the processing facility.

Compositional analysis of 2005/06

Sample data is presented as an indicator of trends in crop quality rather than definitive results, due to sample size.

Figure 73:

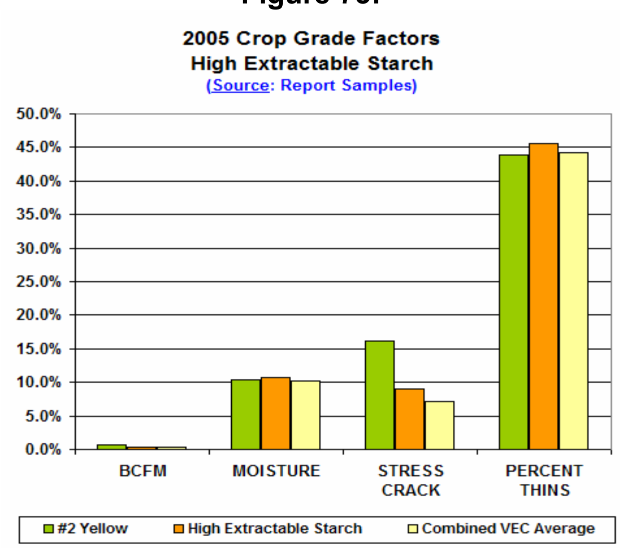


Figure 73 illustrates crop grade factors taken from grower samples across the US corn-belt. As compared to #2 yellow corn, HES corn is slightly lower in BCFM, higher in moisture, lower in stress cracks, but higher in percent thins.

As compared to the overall VEC crop, HES corn was higher in moisture stress cracks, and percent thins.

HES corn was also higher in test weight and lower density than #2 yellow corn, (See figures 74 and 75).

Figure 74:

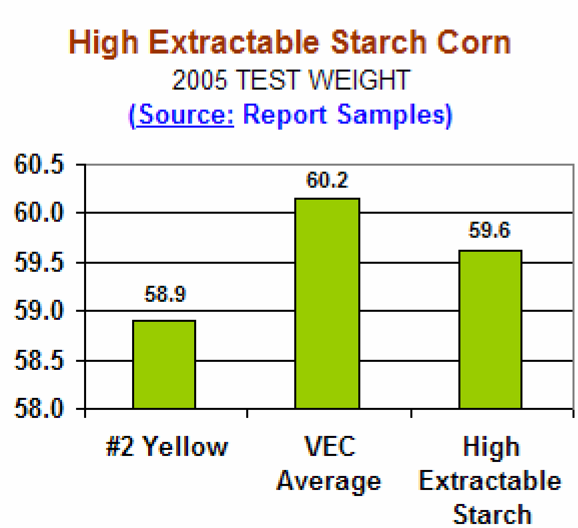
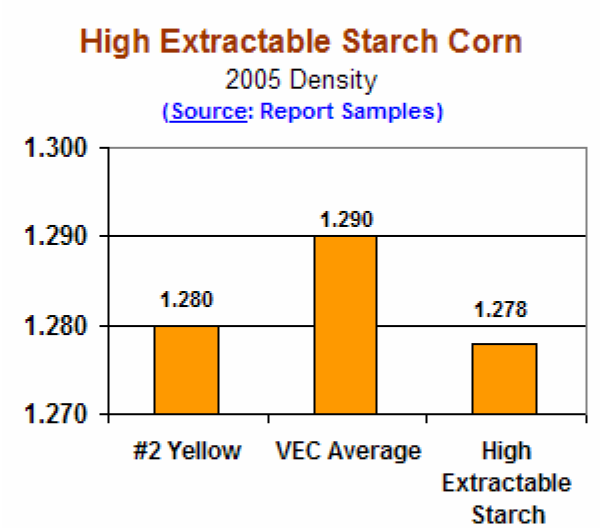


Figure 75:



Market trends
Value from HES corn processing is still in the development stages, but growth can be expected as near infrared grain analysis is used to develop starch standards. Japan continues to be interested in HES as a source of consistent, high quality corn and for its non-GMO status.

Grower attitudes 2005
Growers who are located near a domestic wet miller or tributary to the export market will participate in HES production. New hybrids with increased value will help with grower participation.

Future outlook
As shown in Figure 76, growth projections for HES are flat, and have been flat for the past few seasons. This is primarily due to the relatively new development of this product. If new hybrids that offer increased levels of starch extractability and deliver more value growth in this sector is possible.

Figure 76:

Corn Trait	Growth Projections		
	2003 *Growth Projections*	2004 *Growth Projections*	2005 *Growth Projections*
High Extractable Starch (HES)	Flat	Flat	Flat

Sources: Industry Contacts and USDA/NASS

Non-GMO Corn

Key Points:

- 300,000 to 550,000 acres (121,000 to 223,000 hectares) in production
- Non-GMO is grown mostly for export purposes.
- Most is produced in areas tributary to the Illinois and Mississippi Rivers.
- Demand is steady with projected growth being flat.
- Premiums for 2005 were between $0.05 and $0.20 per bushel ($1.97 and $7.87 per mt.).

Definition

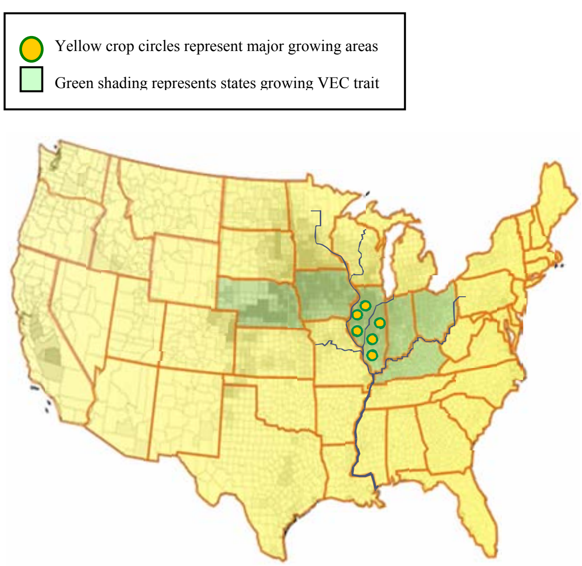
Non-GMO (genetically modified organism) corn is any corn hybrid that has NOT been genetically modified through biotechnology procedures to add a specific characteristic. All modification has occurred through traditional plant breeding. Genetic modifications for current hybrids have focused on insect and chemical resistance traits.

Production

The distinction of Non-GMO includes common yellow corn without genetic modification as well as other VEC types that are not genetically modified, (i.e. organic and other food grade corns that are used for human consumables).

Non-GMO production has seen some decrease in recent years due to the continued GMO acceptance of many end-users and the desire by growers to use stacked input traits that provide higher yield potentials. Non-GMO crops have historically had lower yields than GMO varieties. In the past, hybrid varieties that have been selected for having the highest output traits, such as higher oil and starch, were not the same varieties with the highest yield potential. Thus, non-GMO crops have suffered acceptance by growers due to the effect that yield drag has on profitability. The decreased labor required to produce GMOs as compared to Non-GMO crops is also very enticing to growers and is likely having an effect on the participation and production of Non-GMO crops. However, there remains, and will likely continue to remain, a strong market for Non-GMOs in Japan, and other export countries.

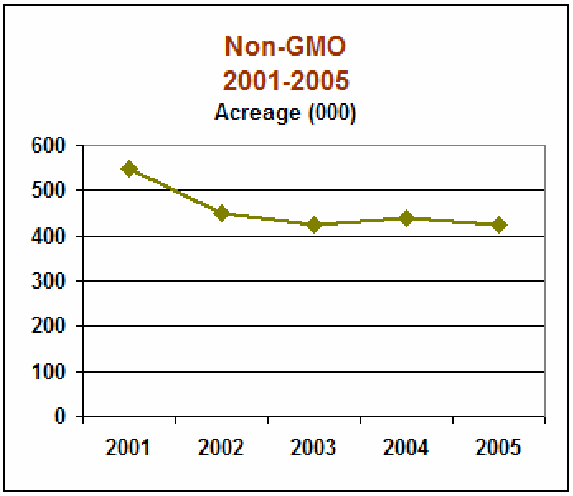
Figure 77: Non-GMO Growing Areas



Regional production areas

Most Non-GMO corn is produced in areas tributary to the Illinois and Mississippi river system. Thus, the crop can then be exported to Europe and other countries such as Japan. Most Non-GMO corn production occurred in Ohio and Illinois. It was also grown in lesser amounts in Indiana, Iowa and Nebraska, (See figure 77).

Figure 78: Non-GMO Acreage 2001-2005



Source: Industry Data, USDA/NASS

Area under production
In 2005 there was an estimated 300,000 to 550,000 acres (121,000 to 223,000 hectares) in production. Since 2002, production of Non-GMO corn has remained relatively steady, (see figure 78 Non-GMO acreage 2001-2005).

Volume available
Demand for Non-GMO corn is primarily an export market. As US growers have shown hesitation with participation in this product countries such as Japan have been looking to other countries for Non-GMO sources.

Premiums
In the last few years, best premiums for Non-GMO corn has been around \$0.15 to \$0.20 per bushel (\$5.90 to \$7.87 per mt.). In 2005, the estimated premiums paid to growers for non-GMO corn were similar to previous years and ranged between \$0.05 – \$0.20 per bushel (\$1.97 - \$7.87 per mt.) depending upon quality and contract measures set by the buyer.

Seeds suppliers 2005
When considering all of the VEC varieties available, it is reasonable to say that most all major traits providers have some form of Non-GMO product that they are providing or developing.

Some of the major seed suppliers are: AgriGold, Wyffels, Pioneer (DeKalb), Becks, Syngenta (Garst, NK)

Grain 2005
Non-GMO grain consumption is occurring in foreign markets primarily in Japan, but also includes other export countries.

General grower economics 2005
Non-GMO corn production has several factors that impact grower economics. Growers must be given some form of compensation for these factors in order to maintain their participation in the production of Non-GMO crops. Some of the factors that Non-GMO growers struggle with are: yield drag, crop isolation and Identity Preservation requirements. These factors each add some level of cost to grower production in the form of time or money. Without significant grower premiums to compensate for these added costs, the value of Non-GMO production may seem less appealing to growers. When Non-VEC prices are good, the better yields and decreased hassles draw growers away from Non-GMO production.

Primary uses
Non-GMO corn can be used for any purpose for which non-VEC corn is used. It is especially desired by buyers and users that wish to avoid GMO corn out of concern (so far not scientifically founded) that it may cause harm to those who consume it or products made from it. The only differentiating characteristic is the fact that such corn has not undergone genetic modification via biotechnology.

Economics for end-users
End-users typically look for the highest quality for the lowest price. End-users of Non-GMO corn are finding the US market growing slightly smaller with a push for higher grower premiums. Many growers are not satisfied with the level of premium offered and hesitate to participate in Non-GMO production without increase incentives. However, many end-users are reluctant to pay higher prices in order to keep their production costs down. Some end-users have begun looking for other sources of Non-GMO corn. This could have a negative impact on the Non-GMO market as end-users find other Non-GMO sources, premiums remain steady, and growers seek other economic opportunities arise.

Handling and channel issues
Non-GMO corn can be dried using conventional methods. Low-temperature drying is recommended for increased storability due to low breakage, fines, improved aeration, and less opportunity for fungal growth. Management practices that preserve grain identity from planting through processing must be followed and chemical pesticides must not be used in bin structures where corn is to be stored.

Compositional analysis of 2005/06

Sample data is presented as an indicator of trends in crop quality rather than definitive results, due to sample size.

Figure 79:

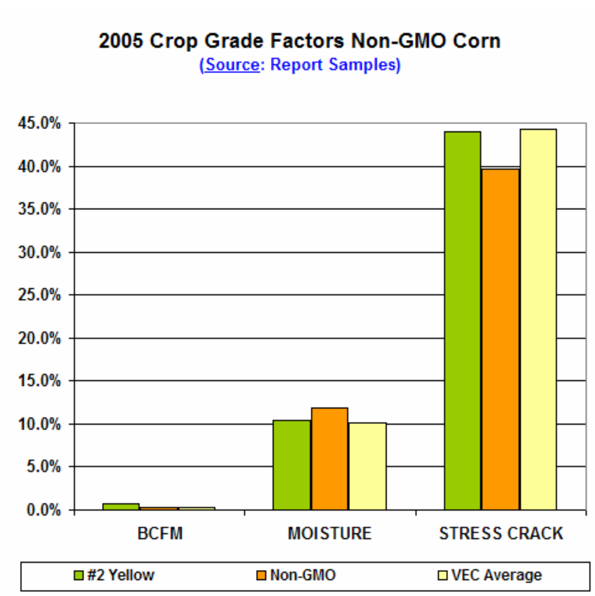
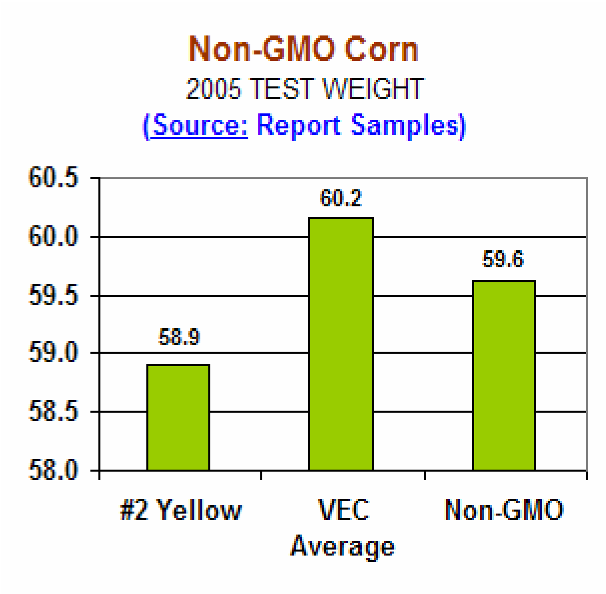


Figure 79 illustrates crop grade factors taken from grower samples across the US corn-belt. As compared to #2 yellow corn, non-GMO corn is slightly lower in BCFM, higher in moisture, and lower in stress cracks.

As compared to the overall VEC crop, non-GMO corn was higher in moisture, but lower in stress cracks.

Non-GMO was also higher in test weight and than #2 yellow, but lower than the overall VEC average, (See figures 80). Density of sampling data was not available.

Figure 80:



Market trends
The market for Non-GMO corn remains strongest outside the US. It is expected that this trend will continue and demand for Non-GMO corn will remain steady, as in previous years.

Grower attitudes 2005
Growers who have been able to profit from premiums and product demand have demonstrated a continued interest in growing Non-GMO corn. Production of Non-GMO corn is most enticing where there is access to transportation opportunities that promote participation in the export market. Many growers are concerned about perceived low premiums.

Figure 81: Growth Projection for Non-GMO corn 2002-2005

Corn Trait	Growth Projections			
	2002 Growth Projections	2003 Growth Projections	2004 Growth Projections	2005 Growth Projections
Non GMO	Down	Up	Flat	Flat

Sources: Industry Contacts and USDA/NASS

Future outlook
For the next several years it is expected that there will be a continued demand for Non-GMO corn. However, growth projections remain flat. The main force behind the interest in Non-GMO production is export market concerns of GMO products in human foods. This market could drop when this reluctance disappears. However, this is not expected to occur in the near future.

Minor Traits Review

Post Harvest Pesticide Free Corn

Key Points:

- PHPF remains a small niche market
- PHPF corn is believed to be grown in the northern corn-belt mostly Iowa and western Illinois.
- Contracted acreage is not expected to increase unless longer storage time is necessary due to large corn crop surpluses.
- Growth projections remain flat

Definition

The trait of Post Harvest Pesticide Free (PHPF) Corn is a value added handling procedure. PHPF corn is not treated with pesticides after harvest.

Production

During seasons where large amounts of surplus are carried over into the next season corn must be stored in farm bins or elevator storage tanks. When storage persists for extended periods the crop is at risk of infection by small insects such as weevils or mites. Such insects damage corn kernels, and can cause significant loss of condition, quality and economic value. These pests can be controlled by the use of pesticides and fumigants. Currently, few growers apply post harvest pesticides unless necessary, because some users prefer their corn to be free of any contact with such chemicals. Some growers and handlers of corn may attempt to control storage pests through an aeration process using cold temperatures to discourage the pests. Most simply limit the time the corn is to be stored.

Regional production areas

It is believed that very little pesticide preservation is occurring anymore. Contracted corn that is specifically certified as PHPF is believed to be produced in the northern portion of the corn-belt; Iowa and Western Illinois.

Area under production/Volume available

Neither acreage or volume data were available. However, both amounts are believed to be relatively small.

Premiums

End-users who wish to obtain PHPF corn usually work out arrangements with suppliers well in advance to insure the corn they receive has not been treated. End-users wishing to ensure that pesticides have not be used to preserve grain may be willing to pay a premium for this corn.

Grain 2005

End-users of PHPF corn may be the same buyers who contract for organic corn.

General grower economics 2005

Most growers do not use pesticide preservation unless long term storage is expected and the management of insects and other pests are a concern. Rather than using pesticides, some growers attempt to control storage pests through an aeration process using cold temperatures. Other growers try to limit their storage time.

Corn stored with pesticides can be sold on the corn market. However, the pesticide applied corn must be segregated from PHPF corn. Some end-users of feed and food consumption will not accept corn product that has been treated with pesticides. The grower must then choose another market such as ethanol production. The use of pesticides may also affect grower premiums and incur added segregation costs.

Primary uses

PHPF corn is generally used in food and livestock feed products. However, it can be used for any application where the user prefers the corn to be free of any contact with pesticides after harvest.

Economics for end-users

End-users of PHPF corn contract with growers well in advance to prevent use of pesticides post harvest. Some end-users may pay a premium to cover potential storage losses if significant storage time is expected. However, end-users prefer to eliminate or reduce storage time in order to maintain product quality.

Market trends and Future outlook

Figure 82: Growth Projections of PHPF Corn 2003-2005

Corn Trait	Growth Projections		
	2003 *Growth Projections*	2004 *Growth Projections*	2005 *Growth Projections*
Post Harvest Pesticide Free	Flat	Flat	Flat

Sources: Industry Contacts and USDA/NASS

This is a small niche market that has remained relatively flat for the past few years, (see figure 82). The key drivers of potential growth are the organic market and export markets such as Japan, who are concerned about chemical residues.

Organic Corn

Key Points:

- Demand for Organic corn continues to grow approximately 20% annually.
- Organic corn supply is increasing by 6-10%.
- Organic corn was grown on an estimated 150,000 acres (61,000 hectares) in 2005.

Definition

Organic corn is non-genetically modified corn. The goal of organic corn production is to maintain soil productivity, supply plant nutrients, and control insects, weeds and other pests without the use of "synthetic" fertilizers, herbicides, insecticides, or fungicides. The crop management practices emphasize building the soil with organic amendments using crop rotations, crop residues, legumes, animal manures, mechanical cultivation, and approved mineral-bearing rocks.

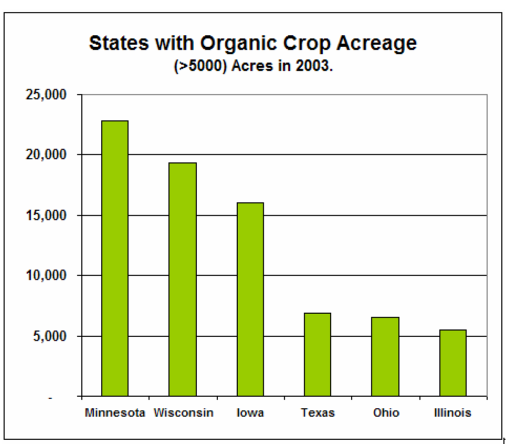
Production

Skepticism about the use of genetically engineered crops in food production has assisted in creating a demand for “Organic” and “Non-GMO” crops. While agricultural technology strides have improved yields and the ability to feed the world’s growing population, many consumers prefer to have organic food free of these improvements. In fact, over 66% of U.S. consumers reported using organic products at least occasionally, (The Hartman Group’s report, *Organic Food & Beverage Trends 2004: Lifestyles, Language and Category Adoption)*.

Since 2001, the demand for organic corn has increased approximately 20% annually with the supply side increasing at only about 6-10% annually. Roughly, 60% of all organic corn is grown under contract with 40% being placed on the open market.

Organic corn generally yields about 10% less than non-VEC, depending on hybrids grown, soil fertility status, and weed and pest management practices. In order to have a grower’s corn be certified as organic, no GMO crops can be grown on the preferred land in the previous two growing seasons.

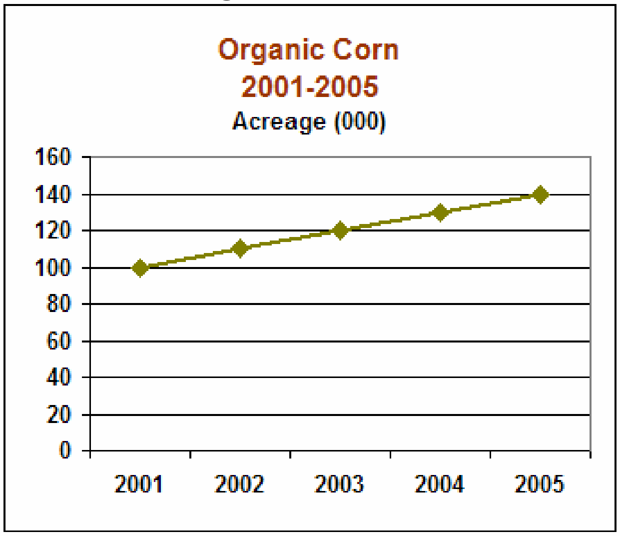
Figure 83:



Regional production areas

Organic farming has been one of the fastest growing segments of U.S. agriculture for over a decade. Certified organic cropland for grains, fruits, vegetables and other crops more than doubled from 1992 to 1997, and doubled again for many crops between 1997 and 2003. However, the latest data from the USDA (2003), estimates that the overall adoption level is still only about 0.4% of all U.S. cropland. The main regions of organic corn production are Minnesota, Wisconsin, Iowa, Texas, Ohio and Illinois with lesser amounts be produced in California, Colorado, Texas and the northeastern US, (See figure 83).

Figure 84:



Source: Industry Data, USDA/NASS

Area under production
The supply of organic corn increases 6-10% annually and is estimated to be planted on about 150,000 acres (61,000 hectares) across the US, (See figure 84).

Volume available
The average yield is about 120 bushels an acre (7.5 mt/ha), with the annual organic crop coming in at about 18 million bushels or (.46 mmt.)

Premiums
In comparison to other VEC types, Organic corn premiums appear to be phenomenal. Premiums for organic corn in 2005 were at $5.00 per bushel ($196.84 per mt.) as compared to $0.15-$0.40 per bushel ($5.90 - $15.75 per mmt.) for other VEC crops. However, organic crops tend to be more labor intensive, especially in the first few years of production. This issue along with an estimated 10% yield difference to non-VEC, may cause grower hesitation and impact participation in the production of organic corn.

Seed Suppliers 2005
Some of the larger suppliers of organic seed are Scoular, Clarkson Grain and SunRich. Other providers of organic corn seed are Blue River Hybrids, Doebler's Great Harvest Organics and Merit. .

Grain 2005
Organic marketing occurs in two general avenues, indirect and direct. Indirect or wholesale markets include cooperatives, wholesale produce operations, brokers, and local milling operations. The direct marketing industry is made up of roadside stands, farmers markets and Community Supported Agriculture farms (CSAs). Many supermarket chains also buy direct from growers or wholesalers of organic products.

General grower economics 2005
Organic fields must be kept free of chemical fertilizers and pesticides for four years before certification can occur. This is an increased cost to the grower due to the need for alternatives to pesticides and chemical fertilizers. In addition, the organic grower must consider the cost of cover crops if used. Growers cannot use a GMO crop in either of the previous two crops on the land to be used for organic corn.

Primary uses
Organic corn has applications in food products where no genetic modification or chemical inputs are desired.

Economics for end-users

For the end-user, receiving organic products means paying a significant added cost for production and delivery. However, the product is driven by a specific demand from consumers who are willing to pay more for this specialty product. For instance, some areas of the US have experienced organic milk prices as high as $8.00 a gallon ($30.28/liter) compared to under $3.00 a gallon ($11.36/liter) for non-organic milk.

Handling and channel issues

Quality is of particular importance in the organic market place and representative grain samples are often collected and sent to potential buyers throughout the harvest, drying, and storage process. Management practices that preserve grain identity must be followed from planting through storage and delivery to the buyer.

Field drying is often preferred for best kernel quality. Corn can also be machine dried using conventional methods. Low-temperature drying is recommended for increased storability due to low breakage, improved aeration, less potential for fungal growth and contract penalties.

Grower attitudes 2005

Based on the evidence of supply and demand statistics of organic corn, it appears that growers have been reluctant to participate in this market. There are several factors that may be affecting growers' decisions to participate in organic corn production.

- Growers may not want to deal with the learning curve required to grow organics
- Growers have total responsibility for crop quality, IP, etc
- Organic corn is commonly marketed by contract
- Organic farming is not as convenient as conventional farming
  - Need to contract with a manure seller
  - More cultivation required
  - May need to use cover crops
  - Added labor for weeding
- Social factor…"real farmers don't grow organics"

(*Lynn Clarkson, Clarkson Grain Company*)

Even though only a few growers have been involved in organic corn production, the number is increasing. Larger farms are seeing the financial opportunities and are beginning to enter the market. One contact at the Iowa Department of Entomology and Grain Inspections indicated that their biggest use of time in 2004/05 was the certification of organic grain production.

Future outlook

Demand for organic corn will likely grow in the future. It is a consumer demand market where the consumer perceives added value tied to health and social issues. Supporters of organic corn are pushing to have 10% of the US corn crop be organic by 2010; though 5% is more likely. It is also likely that the demand for organic corn will continue to outpace supply until more growers recognize the economic advantages in the organic market.

High Fermentable Corn

Key Points:

- Grower premiums for HFC was between $0.05 - $0.08 per bushel ($1.97 - $3.15 per mt.).
- Increased demand for HFC will be pushed by the expansion in the ethanol industry.

Definition

The booming demand for ethanol has led to the characterization of certain corn hybrids as High Fermentable Corn (HFC). These hybrids, when processed through a dry grind ethanol facility, increase ethanol output by up to 5%. The hybrids used as HFC are generally elite hybrids that growers are already planting.

Production

Production of HFC is difficult to measure due to the flexible nature of the crop. Growers generally use elite hybrids that are comparable to non-VEC crops. Growers of HFC have the flexibility of pursuing various market with the decision based on best economics. Premiums for HFC tend to be low. Many growers may decide to market their HFC as regular commodity or non-VEC when the economics are more favorable to do so.

Regional production areas

Most High Fermentable Corn production occurred in areas close to ethanol plants. Currently the majority of ethanol production occurs in Iowa, Minnesota, Wisconsin, Illinois, Nebraska, and South Dakota with lesser amount in Kansas and Indiana.

Premiums

Over the past three years, HFC has brought premiums between $0.05 and $0.08 per bushel ($1.97 and $3.15 per mt.). Best premiums for 2005 were at $0.08 per bushel ($3.15 per mt.). End-users are not expected to increase premiums for current HFC hybrids.

Seeds Supplies 2005

Monsanto, Pioneer and Syngenta control the larger share of HFC germplasm. There are a number of input traits that accompany HFC which maintain high yield potential. Trait providers such as Monsanto and Pioneer screen for enhanced ethanol yield. In addition to fermentation yield prediction, Pioneer also provides data on dry milling characteristics of hybrids for processors that use germ removal technology. Other providers include: Trisler and Midwest Seed Genetics.

General grower economics 2005

For growers of HFC there is as much value in the crop being suitable for non-VEC uses, (i.e. livestock feed) as there is for VEC channels such as ethanol production. The deciding factor is the best economics of either market.

Primary uses

The main use for high fermentable corn is dry grind ethanol. There is considerable interest today by seed companies to market specific hybrids for enhanced ethanol production. Corn hybrids are being developed with higher fermentable starch content for dry grind ethanol production.

Pioneer has demonstrated that corn hybrids differ in ethanol yield potential for dry grind processing. Commercial testing of grain from these hybrids now designated as "High Total Fermentables" (HTF) has shown that ethanol yields can vary by nearly 7% in commercial corn hybrids. Even a 2% improvement in ethanol yield potential could mean an increase of $1M-$2M in profitability for a 40 million gallon (151 million liter) per year ethanol production facility.

Monsanto's efforts have also focused on the dry grind industry for ethanol. They have developed a list of high fermentable corn hybrids for ethanol production marketed as "Processor Preferred".

Syngenta entered the market in 2004 with the NK Brand Extra Edge corn hybrid geared towards dry grind ethanol production.

In response to rising demand, U.S. ethanol production broke both monthly and annual production records for 2005. For the year, 95 ethanol refineries located in 19 states produced a record 4 billion gallons (15 billion liters), an increase of 17% from 2004 and 126% since 2001. In 2005, dry mill ethanol refineries accounted for 79% of production capacity, and wet mills 21%. In 2005, 14 new ethanol refineries were completed and brought online. At the end of 2005, 29 ethanol refineries and nine expansions were under construction.

End-user Economics

These hybrids, when processed through a dry grind ethanol facility, increase ethanol output by up to 5%. Based on a 40 million gallon (151 million liter) facility, it can add several million dollars in revenue. However, most ethanol facilities do not have a lot of grain storage capability so segregating grain is an issue. Today, most HFC is commingled with Non-HFC grain which reduces the added efficiencies. In some geographies, ethanol plants are located in areas where many HFC hybrids are grown due to their elite genetics status. In these areas, ethanol facilities are likely capturing added value without the need to coordinate or contract with growers for HFC deliveries.

Market trends

The projected increase in HFC is correlated with an increased demand for ethanol. The demand for ethanol is expected to increase the use of the US corn crop for ethanol production to 23% by 2015.

Grower attitudes 2005

Growers will continue to grow HFC because hybrids are elite genetics. The question remains whether they will grow HFC under contract with ethanol facilities as some growers don't perceive the level of premiums as adequate to offset the costs of IP. However, growers who are investors in ethanol facilities may view this differently. Even with low premiums, growers who are investors may be willing to contract HFC for ethanol production if there is an opportunity from improved dividends.

Future outlook

Seed companies continue to profile existing germplasm to identify hybrids with a high fermentable starch component. It is possible that new hybrids will become available that are bred to provide even greater efficiencies in ethanol production.

Seed companies are working with enzyme suppliers to better understand how specific hybrids might react differently to certain enzyme combinations. Efforts are underway to develop technologies to utilize the fiber component in corn for added ethanol production.

Low Temperature Dried (LTD) Corn

Key Points:

- Typically grown in the northern corn-belt.
- Grown on less that 50,000 acres (<20,000 hectares)
- Premiums are dependent on corn variety and potential use.

Definition

Low Temperature Dried (LTD) corn is a handling characteristic, where corn is dried using temperatures less than 120°F (49°C). Low temperature drying make the kernel less susceptible to stress cracks, and more durable for shipping and milling. LTD corn is sometimes used for the same purposes as hard-endosperm corn, such as dry milling, and it is used to lower kernel damage during shipments. Some of the other specialty corns may also use low temperature drying. However, for the purpose of this report, LTD corn is commodity corn dried at moderate to low temperatures.

Desired Qualities

The following list indicates the desired qualities for LTD corn.

- *Low BCFM*—Indicator of handling damage, impacts storability, reduce rate of mold growth
- *Low total damage*—Indicates low probability of mycotoxins
- *Low stress crack index*—Indicator of low multiple stress cracks and low dryer damage

Production

The effectiveness of low temperature drying is dependent on the corn variety as well as the climate conditions where the corn is grown. The best conditions would include 70% relative humidity to allow for proper field drying. Growers prefer to lower production costs and improve kernel integrity with field drying. However, weather conditions and delivery schedules may not permit this. In order to make delivery schedules, avoid mold, ear droppage and other weather damage, growers use mechanical dryers to complete the drying process. However, as storage bins increase in size some growers have had difficulty mechanically drying corn without damage. In part, this is due to the design of many storage bins which allows condensation to collect at the top of the bin during the drying process. The condensation that collects at the top of the bin drips onto the top layer of corn and damages a certain percentage. Changes in the ventilation system can alleviate this problem and allow for more effective corn drying.

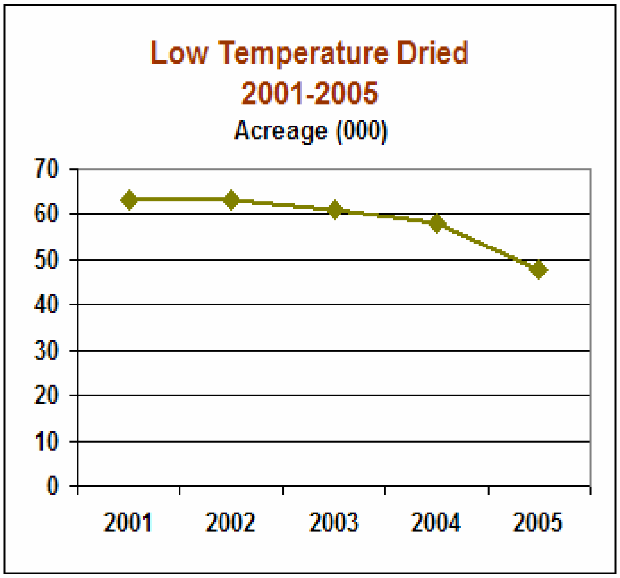
Regional production areas

LTD corn is dependent on the climate conditions, and was identified to generally grown in the northern corn-belt. The main growing regions included Central Illinois, Indiana, and Nebraska.

Area under production

Corn that is specifically contracted as LTD corn is estimated at less than 50,000 acres (<20,000 hectares), (See figure 85).

Figure 85: Low Temperature Dried Corn Acreage



Source: Industry Data, USDA/NASS

Premiums

Premiums for LTD corn are dependent upon market where the crop is intended to be used. However, premiums of up to $0.20 per bushel have been reported ($7.87 per mt.).

Seeds 2005/Seed suppliers

There are no specific hybrids that are classified as LTD.

Grain 2005

LTD corn is primarily used by dry millers to subsidize production when hard endosperm corn is not available. It also may be used by grain handlers to lower BCFM levels during shipments.

General grower economics 2005

When weather conditions are good, growers can take advantage of field drying which lowers drying costs and alleviates potential damage during handling. However, when growing conditions require mechanical drying, the rising cost of fuels and damage from poor ventilation may have an adverse affect on the growers' economics.

Primary uses

LTD is primarily used for dry milling purposes.

Economics for end-users

The value to the end-user is inherent in the handling efficiencies in processing.

Handling and channel issues

LTD allows for improved storability due to low breakage, less fines, and less opportunity for mycotoxins. These characteristics typically qualify LTD as number one grade, which may maintain product value and improve grain handler margins.

Market trends

The uses and demand of LTD corn is expected to remain flat. However, one of the main uses of LTD corn is as a supplement or replacement for hard endosperm corn which was estimated to be up in acreage in 2005.

Grower attitudes 2005
Growers who live in regions where growing conditions are favorable to LTD corn, (i.e. 70% humidity) may produce LTD corn if premiums are attractive and weather conditions allow for field drying. Growers also like the fact that this product can be sold into multiple markets.

Figure 86: Growth Projection of LTD Corn

Corn Trait	Growth Projections		
	2003 *Growth Projections*	2004 *Growth Projections*	2005 *Growth Projections*
Low Temperature Dried	n/a	Flat	Flat

Sources: Industry Contacts and USDA/NASS

Future outlook
Figure 86 indicates growth projection for LTD corn. LTD corn is expected to remain flat. This is likely due to the fact that this product's value is based on a handling characteristic rather than an output trait, such as hard endosperm corn. Consequently LTD corn has limited value to end-users.

WHITE WAXY

Key Points
- Future growth projections are flat
- Production occurred in Indiana and Illinois
- Premiums are estimated at $1.00 per bushel ($39.36 per mt.).
- Acreage estimates are less than 50,000 acres (<20,000 hectares).

Definition
Waxy corn contains 98-100% amylopectin starch versus 75% in non-VEC. White Waxy corn also has a clear tasteless starch paste desired by some food processors. The carotenoid component of corn starch contributes a corn flavor that some end-users do not want. Food products made with white waxy corn take advantage of its carotenoid-free tasteless starch.

Production
White Waxy corn is a small niche market that has remained relatively consistent.

Regional production areas
Most White Waxy Corn production occurred in Indiana and Illinois as the corn will go to north or central Indiana for production usage.

Area under production
Acreage estimates are less than 50,000 acres (<20,000 hectares).

Premiums
Estimated premiums for White Waxy Corn are $1.00 per bushel ($39.36 per mt.).

General grower economics 2005
White waxy corn is contracted and maintained through usual identity preservation processes.

Primary uses
Food products

Market trends/Future Outlook
Without major new uses for white waxy corn it is expected to remain a flat niche market.

Trait Development

<u>High Amylase Corn</u>

Key Points:

- High Amylase corn will be grown to improve efficiencies in ethanol production.
- Syngenta hopes to market high amylase corn in the next few years.

Definition

High amylase corn is a hybrid developed with an amylase gene. Currently, the enzyme "alpha-amylase" is added to ground corn to help speed starch conversion into sugars that can be fermented for ethanol production. Corn used in the production of ethanol, having the added benefit of the amylase enzyme, would be more efficient in breaking down starch into sugars, and save steps in the ethanol production process.

Trait Developers 2005

Syngenta is developing corn enhanced through biotechnology that expresses high levels of amylase. Syngenta hopes to market high-amylase corn within the next few years.

Projected value

By using high amylase corn, it is estimated that improved process efficiencies and increased per bushel ethanol yield could lead to substantial savings in the cost of ethanol production. It is also hoped that this new hybrid will replace the need for current amylase additives in ethanol production, and convince ethanol producers to buy high amylase corn where the enzyme is already.

Primary uses

Nearly all high amylase corn is expected to be used in ethanol production.

Projected handling and channel issues

Grain identity must be preserved from planting through storage for maximum value.

Future outlook

If high amylase corn produces the expected efficiencies and ethanol production grows as expected, widespread production of the new corn is possible.

High Lysine Corn

Key Points:
- Regional production will include eastern Iowa, Illinois, and parts of Indiana.
- Nearly all high-lysine corn is expected to be fed on-farm.

Definition
High lysine corn provides higher levels of lysine than conventional corn, and may reduce the need for synthetic lysine supplements in livestock feed. Lysine is essential in the diets of animals as a critical building block for proteins and muscle.

Trait Developers 2005
The high lysine technology is being developed by Renessen and will be sold through the Monsanto seed dealer network. The Mavera™ high value corn with lysine contains a transgenic trait for lysine (LY038) that was approved by USDA in February 2006. The lysine trait will be stacked with other Monsanto agronomic corn traits.

Future Production
During the first 2-3 years, the primary market for high lysine corn will be for export purposes. High lysine corn will be produced in eastern Iowa, Illinois, and parts of Indiana on a limited number (likely around 10,000 acres (4,000 hectares)) of corn acres.

Projected value
When included as part of an animal's diet, corn produced containing high lysine will augment lysine levels in animal feed, and reduce the need for purchasing synthetic lysine supplements. Growers may also receive premiums for producing a specific brand and for IP costs.

Projected general grower economics 2005
The soft texture of high-lysine corn may help speed drying and allow growers to save time and fuel costs. No additional costs will be added to the cost of the seed for the corn grower.

Primary uses
Animal feed: Nearly all high-lysine corn is expected to be fed on-farm.

Projected handling and channel issues
Grain identity must be preserved from planting through storage for maximum feed value. High-lysine corn can be stored as high moisture corn in air-tight silos, where it is expected to maintain consistent lysine levels of above 40%.

Future outlook
Renessen anticipates that the product demand high in both the domestic and export market.

Low Phytate Corn

Key Points:

- Not being commercially produced in the US.
- Possibly available in 3 to 5 years.

Definition
Low Phytate or High Available Phosphorus corn provides more available phosphorus than standard yellow corn when fed to livestock.

The value of low phytate corn comes from:

- reducing the need to add supplemental phosphorus to livestock and poultry rations
- reducing the amount of phosphorus in livestock and poultry waste.

Production
There is no current commercial production in the U.S.

Primary uses
Animal Feed: Low Phytate corn is primarily used for livestock feed in areas that are highly sensitive to phosphorus levels in manure.

Future outlook
This has been an experimental product for many years, but is expected to be produced commercially in 3-5 years. Agronomic performance is the primary concern.

Research Review

Key Points:

- Renessen is developing High Lysine hybrids and looking at Corn Fraction Technology.
- Syngenta's research and development is focusing on improved agronomic properties as well as applications for food, animal feed and renewable fuels.

Renessen is building a pilot plant in Eddyville, Iowa to study a novel technology that will combine new biotech corn hybrids having increased oil and nutrient densities with new "corn fractionation technology" designed specifically for integration with dry mill ethanol production.

Syngenta has research and development focused on improving agronomic properties as well as applications for food, animal feed and renewable fuels.

Dow AgroSciences is developing products that have human health benefits. For instance, Dow has created canola and sunflower oils that contain no trans fatty acids.

Meristem Therapeutics, is working with the corn plant for uses in pharmaceutical purposes such as drugs to fight systic fibrosis. Plant made pharmaceuticals (PMP's) may create an opportunity to add value in production agriculture. However, previous efforts to use corn for these purposes have proven difficult.

Hoegemeyer has patented a new system, that blocks pollen contamination from one type of corn to another. This all-natural system works by not accepting the pollen from corn plants that do not have the system incorporated in it.

APPENDIX

Detailed Methodology

Grower Survey

Study Methodology

To gather information for this study, telephone interviews were conducted with 987 randomly selected growers. To participate in this study, growers were required to meet the following criteria:

- Be the primary decision maker about the types of corn planted on their farm
- Planted a minimum of 100 corn acres (40 hectares) in 2005
- Not be affiliated with a marketing, marketing research, or advertising agency

Given the regional concentration of VEC growers, no state or regional quotas were imposed. Rather growers were selected randomly from a purchased list, where the number of names available for selection in each state was proportional to the number of acres in each state. The number and percent of growers interviewed in each state is shown below:

Figure 87: Number of Growers Interviewed by State ~

	IA	IL	IN	KS	MI	MN	MO	ND	NE	OH	SD	WI	Total
VEC Producers	26	35	17	2	0	26	13	2	18	7	6	9	161
Non-VEC Producers	159	140	67	42	24	95	40	18	101	40	52	48	826
Total	185	175	84	44	24	121	53	20	119	47	58	57	987

Figure 88: Percent of Growers Interviewed by State ~

	IA %	IL %	IN %	KS %	MI %	MN %	MO %	ND %	NE %	OH %	SD %	WI %	Total %
VEC Producers	16	22	11	1	0	16	8	1	11	4	4	6	100
Non-VEC Producers	19	17	8	5	3	12	5	2	12	5	6	6	100
Total	19	18	9	5	2	12	5	2	12	5	6	6	100
US Corn Acres*	19	18	8	5	3	11	5	2	12	5	6	5	100

**Based on 2005 USDA estimates. Percentages are based to the total corn acres planted in the states listed above only, which represent 85% of all U.S. corn acres.*

Statistical Testing

To compare differences between exclusive groups of producers that include VEC versus non-VEC and Non-GMO producers versus other types of VEC producers, statistical tests were performed to determine if observed differences are random or patterned. Random differences occur by chance and do not indicate any typical behavior on which predictions may be drawn. Patterned differences note tendencies of one group to exemplify a behavior different from another group. Predictions may be drawn based on patterned differences, with a limited degree of confidence.

All statistical tests were performed at a minimum of 95 percent level of confidence. The margin of error associated with sample sizes of 987 is 3.1 percentage points (total sample), 826 is 3.4 percentage points (non-VEC producers), and 161 is 7.7 percentage points (VEC producers).

T-tests were used to determine the differences between averages for the groups of interests and F-tests were used to determine the differences between proportions for the groups of interests.

<u>Inquiry</u>

During the screening process, growers were grouped into two different categories: VEC producers and Non-VEC producers. VEC producers were required to have planted some type of VEC in 2005, with no minimum acres set on the amount of VEC planted. Included in this group were growers who produced non-GMO corn. Non-VEC producers did not plant any VEC in 2005, but may have planted VEC in the past or intend to plant VEC in the future.

VEC growers were polled about following types of information:

- Types of VEC planted
- Acres planted to VEC
- Incentives and constraints to planting VEC
- VEC and commodity corn yield
- VEC premium
- Storage and drying capabilities
- GMO concerns
- Future VEC planting intentions
- General demographic information (i.e., age, education, percent of income from farming)
- General farming operation information (i.e., total farmland, other crops produced, livestock, irrigation, land ownership, GMO use)

Non-VEC growers were polled about the following types of information.

- Past VEC usage
- Future VEC use intentions
- General demographic information (i.e., age, education, percent of income from farming)
- General farming operation information (i.e., total farmland, other crops produced, livestock, irrigation, land ownership, GMO use)

<u>VEC Producer Profile</u>

There are some key characteristics distinguish VEC producers from non-VEC producers. VEC producers on average have more corn acres and report higher yields for their commodity corn than non-VEC producers. They also are more likely to have livestock. Demographically, VEC producers are younger than and their farming income accounts for a larger portion of their household income than non-VEC producers, (See figure 88).

Figure 89:

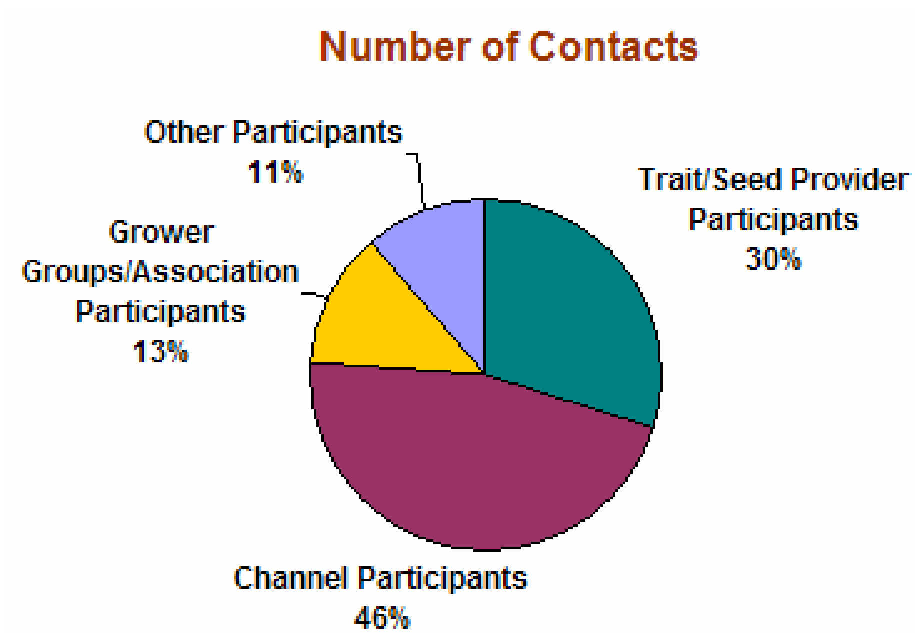
	Non-VEC Producer	VEC Producer	Non-GMO VEC Producer	Other VEC Producer
Average corn acres	459	563	508	648
Average corn yield	145	152	154	148
Livestock	51%	59%	62%	58%
% Of household income from farming	72%	81%	80%	82%
55 years or less	53%	65%	67%	64%
College degree or more	22%	35%	41%	29%

Information Collection

Various sectors of the VEC industry were contacted by phone to obtain information regarding key points in the report, (See participants section of this report for individual participant details). Individuals were surveyed from four main sectors: 26 were trait/seed providers, 40 were channel participants, (elevator, grain handlers, etc.), 11 were from different grower groups or associations, and 10 were from other areas, (i.e. research institutions, improvement associations, consultants, etc.). See the following chart for contact type percentages.

Individuals were asked to give their best estimate regarding acreages, premiums future growth potentials, and general information about the current status of VEC. The 2005/06 VEC report is a compilation of the information obtained from participant interviews.

Figure 90:



Participants

Grower Participants

USGC Corn Sampling Project

Cooperators

The following list of cooperators supplied corn samples to be analyzed for this report and are recognized for their contribution and assistance.

State	Cooperator	Contact	City
Illinois	Illinois Crop Improvement Association	Dennis Thompson	Champaign
	Consolidated Grain & Barge		Mound City
	Consolidated Grain & Barge		Naples
	Consolidated Grain & Barge		Princeton
	Consolidated Grain & Barge	David Ksiazkiewicz	Utica
	Consolidated Grain & Barge		Uniontown
	Effingham Clay Service Company – Glen Elliott	Kim Holsapple	Charleston
	Effingham Clay Service Company – Rob Apple		Charleston
	Effingham Clay Service Company		Neoga
	Effingham Clay Service Company		Toledo
	Frito Lay	Lance Knutson	Sidney
	GPCI	Ray Billman	Tolono
	GROWMARK, Inc.	Larry Keene	Jacksonville
	H & B Specialties	Dan Heffelmire	Pleasant Plains
	Ludlow Coop	Myron Rust	Paxton
	Ursa Farmers Coop	John Benz	Ursa
	Ursa Farmers Coop – Casady Farm		Warsaw
	Ursa Farmers Coop – Gray Farm		Warsaw
	Ursa Farmers Coop – John & Jim Jefferson		Warsaw
	Ursa Farmers Coop – Kenny Crosland		Warsaw
	Ursa Farmers Coop – Whitworth Farms		Warsaw
	Walk Stock Farm	Dave Walk	Neoga
Indiana	Indiana Crop Improvement Association	Larry Svajgr	Lafayette
	ADM		Frankfort
	AG Plus LP		South Whitley
	Azteca Milling		Evansville
	Becks Hybrids		Atlanta
	Central States Enterprises		Montpelier
	Consolidated Grain & Barge		Aurora
	Consolidated Grain & Barge		Jeffersonville
	Stan Anderson		Frankfort
	Tate & Lyle		Lafayette
	Villwock Farms		Edwardsport
Iowa	Iowa Crop Improvement Association	Del Koch	Ames

State	Cooperator	Contact	City
Minnesota	Minnesota Crop Improvement Association	Gary Beil	St. Paul
	Alan Loge		Willmer
	Backman Seeds		Herman
	Behm Seed		Atwater
	Cal Spronk		Edgerton
	Dennis Deml		Ellendale
	Ivanhoe Seed		Ivanhoe
	James Boots		Redwood Falls
	Jim Ehrich		Elmone
	John Angell		Blooming Prairie
	Knewtson Seed		Good Thunder
	Nelson Seed Farm		St. James
	Rick & Mike Peterson		Redwood Falls
	SunRich		Hope
	Zimmerman Seed		Racine
Missouri	Missouri Crop Improvement Association	Richard Arnett	Columbia
	B.J. Bailey		Oregon
	Charles Henkebein		Chaffe
	Consolidated Grain & Barge		Scott City
	Kenny McNamer		Gorin
	Rhineland Grain		Rhineland
	Sam Creed		Fairfax
Nebraska	Nebraska Crop Improvement Association	Steven Knox	Lincoln
	Aurora Coop		Aurora
	Blane Anthony		Talmage
	Blue Valley Seeds		Dewitt
	Broberg Farms		Tilden
	Cole Seed Farm		Plattsmouth
	Frito Lay		
	Joel Maschmann		Deshler
	Norm Ralfing		Talmage
	Scoular Company		Omaha
	Thimm Farms		Beatrice
	Wehnes & Sons		Inland
Ohio	Ohio Seed Improvement Association	John Armstrong	Dublin
	Consolidated Grain & Barge		Cincinnati

Trait/Seed Provider Participants

Contact	Company/Organization
Chris Hoegemeyer	Hoegemeyer
Chuck Brown	Brown Seed Co.
Chuck Hill	AgriGold
Darrell Honn	Golden Harvest
David Hughes	Hughes Hybrids, Inc.
Dennis Penland	Syngenta
Don Burrus	Burrus
Doug Rushing	Renessen
Gary Powell	Syngenta
Jack McKown	Hoblit Seed Company
Jerry F. Strissel	Syngenta
Jerry Weigel	BASF Plant Science
Jim Graeber	Syngenta
Joe Byrum	Monsanto
John McKinney	Illinois Crop Improvement Association
Larry Stenberg	Dow
Lynn Nelson	Corn States Hybrid Service
Maury Johnson	Blue River Hybrids
Morrie Bryant	Pioneer Hi-Bred Intl.
Paige Johnson	North Central Iowa Coop
Randy Hedges	Mycogen
Ross Allen	Pioneer Hi-Bred Intl.
Russ Sanders	Pioneer Hi-Bred Intl.
Steve Petersen	Monsanto
Tex Young	Great Lakes Hybrids
Tim Tierney	Pioneer Hi-Bred Intl.

Channel (Grain Handler/End User) Participants

Contact	Company/Organization
Bill Lee	Chia Hsin Food & Synthetic Fiber Co., Taiwan
Bo DeLong	DeLong & Co
Cari Garcia-Manns	Traders Group
Carl Wargel	Bunge
Chen Fuzhan	Guangdong Haid Industrial Co., Ltd, Taiwan
Dan Hammes	Quality Technology International
Dan Heffelmeyer	H & B Specialties
Don Schlatter	Bartlett Grain
Dustin Haaland	CHS Inc.
F.P. Huang	Tradigrain Inc., Taiwan
Gary Apel	National Starch
Gerald McMillan	Clarkson Grain
Jeff Friesth	VeraSun Fort Dodge
Jennetta Fowler	Missouri Food & Fiber
Jim Stitzlein	Consolidated Grain and Barge
John Benz	Ursa Farmers Cooperative
John Trewartha	Specialty Grains
Kent Savage	Cargill Inc.
Laverne Klecker	Sun Rich Seed
Leo Andreasic	O'Malley Grain Inc.
Lloyd Lipska	Frito Lay
Lynn Clarkson	Clarkson Grain
Mark Heckman	Penford Products
Mark Sackmaster	Cenex Harvest States (CHS)
Mike Schultz	Archer Daniel Midland
Nick Huston	Colusa Elevator Co.
Randy Osterbur	Osterbur & Associates
Rod Schlatter	Bartlett Grain Co.
Roger Miller	Grand Prairie Coop
Stephen Liu	M.A. Cargill Trading Ltd., Taiwan
Sung Jin Kim	Samyang Genex Corp., South Korea
Takao Yoshida	JTC International
Terry Gilbert	Cargill
Tim Hancock	Kirby Grain
Tim Lange	De Long Grain Co.
Tom Cleveland	Tall Corn Ethanol
Tom McKenna	Scoular
Tony Utsuno	Quality Technology International
Travis Kainuma	Tomen Grain
Wyatt Muse	The Andersons

Grower Groups/Associations Participants

Contact	Company/Organization
Bob Bendfeldt	Kearney Area Ag Producers Alliance
Dave Dvorak	Innovative Growers
Don Mason	Iowa Corn Growers Association
Enid Schlipf	Illinois Ag Guild, LLC
Jamie Cline	Missouri Corn Growers Association
Jerry Hay	Indiana Corn Growers Association
Marge Lauer	Kearney Area Ag Producers Alliance
Melanie Batalis	Indiana Corn Growers Association
Phil Thornton	Illinois Corn Growers Association
Vivian Jennings	Assoyia, LLC and Iowa Quality Ag Guild
Yvonne Simmon	Minnesota Corn Growers Association

Other Participants

Contact	Company/Organization
Brian Buckallew	Novecta
Cherry Rath	South Dakota Development Center
Chris Morley	Chris Morley Consulting
Dr. Cheng-Taung Wang	Livestock Research Institute, Taiwan
Eileen Wuebker	Iowa Crop Improvement Association
Frank Lin	Council of Agriculture, Taiwan
Jeremy Hollowpeter	SunRich
Kim Spangler	Channel Group
Larry Darrah	University of Missouri (retired)
Ray Hansen	AgMrc

VEC Seed Suppliers

Company: AgReliant Genetics
Contact: Craig Newman
Address: 1122 East 169th
Westfield, IN 46074
Phone: 317-896-5552
Fax: 317-896-9209
Web Site: www.agreliantgenetics.com
Email: craig.newman@agreliantgenetics.com
Types:

Company: AgReliant Genetics LLC
Contact: Ron Bells
Address: 4640 East State Road 32
Lebanon, IN 46052
Phone: 765-482-9833
Fax: 765-482-9448
Web Site: www.limagrain.com
Email: ron.bell@agreliantgenetics.com
Types:

Company: AgriGold Hybrids
Contact: Chuck Hill
Address: R.R. 1, Box 203
St. Francisville, IL 62460
Phone: 800-262-7333
Fax: 618-943-7333
Web Site: www.agrigold.com
Email: chuck.hill@agrigold.com
Types: Waxy, High Oil, Hard End/Food Grade, White, High Extractable Starch, High Feed Value

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Company: Beck's Superior Hybrids
Contact: Jeff Norman
Address: 6767 E. 276th St.
Atlanta , IN 46031
Phone: 800-937-2325
Fax: 317-984-8798
Web Site: www.beckshybrids.com
Email: jnorman@beckshybrids.com
Types: White, Waxy, Hard End/Food Grade, Nutritionally Enhanced, Nutrition Density, High Extractable Starch

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Company: Blue River Hybrids
Contact: Maury Johnson
Address: 27087 Timber Road
Kelley, Iowa 50134
Phone: 800-370-7979
Fax:
Web Site: www.blueriverorgseed.com
Email: maury@blueriverorgseed.com
Types: Organic

Company:	BPS/ExSeed Genetics	**Contact:**	Jerry C. Weigel
Address:	26 Davis Drive Research Triangle Park, NC 27709	**Phone:** **Fax:**	919-547-2554 919-547-2431
Web Site:	www.exseed.com		
Email:	weigelg@basf-corp.com		
Types:			

Company:	Burrus Power Hybrids	**Contact:**	Don Rhoads
Address:	826 Arenzville Road Arenzville, IL 62611	**Phone:** **Fax:**	217-997-5511 217-997-5522
Web Site:	www.burrusseed.com		
Email:	corndr@burrusseed.com		
Types:	Hard End/Food Grade		

Company:	Cargill/Illinois Cereal Mills	**Contact:**	John Morris
Address:	616 South Jefferson Avenue PO Box 550 Paris, IL 61944	**Phone:** **Fax:**	217-466-7770 217-463-1644
Web Site:	www.cargilldci.com		
Email:	john_morris@cargill.com		
Types:			

Company:	Croplan Genetics	**Contact:**	Bruce Drzycimski
Address:	31928 Champion Boulevard Slater, IA 50244	**Phone:** **Fax:**	515-685-2517 515-685-2517
Web Site:	www.croplangenetics.com		
Email:	bdrzy@cnxlol.com		
Types:	White, High Oil, Nutritionally Enhanced		

Company:	Syngenta Seeds, Inc	**Contact:**	Dennis Penland
Address:	4853 84th St. Urbandale, IA 50322	**Phone:** **Fax:**	800-831-6630 515-685-5080
Web Site:	www.syngenta.com		
Email:	dennis.penland@syngenta.com		
Types:	White, Waxy, High Oil, Hard End/Food Grade		

Company:	Golden Harvest	**Contact:**	Darrell Honn
Address:	27525 135th Ave north Cordova, IL 61242	**Phone:** **Fax:**	309-737-9055 309-654-2256
Web Site:	www.goldenharvestseeds.com		
Email:	darrell.honn@ghseeds.com		
Types:	Hard End/Food Grade, High Extractable Starch, Non-GMO, White		

Company:	Great Lakes Hybrids	**Contact:**	Tex Young
Address:	9915 West M-21 Ovid, MI 48866	**Phone:** **Fax:**	800-257-7333 517-725-8356
Web Site:	www.glh-seeds.com		
Email:	tex.young@greatlakeshybrids.com		
Types:	White, Waxy, High Oil, Hard End/Food Grade, Process Preferred		

Company:	Gutwein/Garst Seed Co.	**Contact:**	Fred Gutwein Jr.
Address:	15691 W. 600th South Street Francesville, IN 47946	**Phone:** **Fax:**	219-567-9141 219-567-2645
Web Site:	www.gutwein.com		
Email:	fred.gutwein@gutweinseed.com		
Types:	White, Waxy, High Oil, Hard End/Food Grade		

Company:	Hoblit Seed Company	**Contact:**	Jack McKown
Address:	P.O. Box 487 2189 1900th Avenue Atlanta, IL 61723	**Phone:** **Fax:**	217-648-2392 217-648-2920
Web Site:			
Email:	hoblit@abelink.com		
Types:	High Oil, Hard End/Food Grade, High Extractable Starch, Process Preferred		

Company:	Hoegemeyer Hybrids	**Contact:**	Chris Hoegemeyer
Address:	1755 Hoegemeyer Road Hooper, NE 68031	**Phone:** **Fax:**	402-654-3399 402-654-3342
Web Site:	www.hoegemeyer.com		
Email:	chris@hoegemeyer.com		
Types:	White, Waxy		

Company:	Hughes Hybrids, Inc.	**Contact:**	David Hughes
Address:	206 North Hughes Road Woodstock, IL 60098	**Phone:** **Fax:**	815-338-1141 815-338-1122
Web Site:			
Email:	dhughes@stans.com		
Types:	Hard End/Food Grade, Nutritionally Enhanced		

Company:	LG Seeds	**Contact:**	Jim Nelson
Address:	22827 Shissler Road Elmwood, IL 61529	**Phone:** **Fax:**	309-742-2211 309-742-8371
Web Site:	www.lgseeds.com		
Email:	jim.nelson@lgseeds.com		
Types:	White, Waxy, High Oil		

Company: Mycogen
Contact: Terry Gardner
Address: 9330 Zionsville Rd.
P.O. Box 21428
Indianapolis, IN 46268
Phone: 800-692-6436
Fax: 317-337-4900
Web Site: www.mycogen,com
Email: TJgardner@Dow.com
Types: Nutritionally Enhanced

Company: Mycogen Seeds
Contact: Mike Leachworth
Address: P.O. Box 139
Sidney, IL 61877
Phone: 217-688-2361
Fax: 217-688-2770
Web Site: www.dowagro.com
Email: releonard@dow.com
Types: White, Waxy, High Oil, Hard End/Food Grade

Company: National Starch & Chemical
Contact: Richard Lafave
Address: 8777 Purdue Road
Suite 220
Indianapolis, IN 46268
Phone: 317-656-2213
Fax: 317-656-2216
Web Site: www.nationalstarch.com
Email: richard.lafave@nstarch.com
Types:

Company: Novartis Seeds, Inc.
Contact: Jim Graeber
Address: 1301 W. Washington
Bloomington, IL 61701
Phone: 309-823-9499
Fax: 309-823-9419
Web Site: www.syngenta.com
Email: jim.graeber@syngenta.com
Types: Waxy, Hard End/Food Grade

Company: Ottilie Seeds
Contact: Jim Ottilie
Address: 1462 Sanford Avenue
Marshalltown, IA 50158
Phone: 641-753-5561
Fax: 641-753-5563
Web Site: www.ottilieseed.com
Email:
Types: Hard End/Food Grade, Nutritionally Enhanced

Company: Pfister Hybrid Corn Company
Contact: Rick Lohnes
Address: 187 N. Fayette Street
El Paso , IL 61738
Phone: 309-527-6000
Fax: 309-527-5676
Web Site: www.pfisterhybrid.com
Email: sales1@elpaso.net
Types: White, High Oil, Hard End/Food Grade

Company:	Sieben Hybrids, Inc.	**Contact:**	Phil Jordan
Address:	1421 Gorman Dr. Geneseo, IL 61254	**Phone:** **Fax:**	309-944-5131 309-944-6090
Web Site:	www.siebenhybrids.com		
Email:	sieben@siebenhybrids.com		
Types:	High Oil, Conventional and Trade Seed		

Company:	Syngenta Seeds, Inc.	**Contact:**	Jerry F. Strissel
Address:	1605 12th Street Harlan, IA 51537	**Phone:** **Fax:**	712-733-8510 712-733-8511
Web Site:	www.zimmermanbrand.com		
Email:	jerry.strissel@syngenta.com		
Types:	White		

Company:	Trisler Seed Farms, Inc.	**Contact:**	Scott N. Davis
Address:	3274 E. 800 N. Road Fairmount, IL 61841	**Phone:** **Fax:**	217-288-9301 217-288-9095
Web Site:	www.trisler.com		
Email:	trisler@trisler.com		
Types:	White, High Oil, Hard End/Food Grade, yellow waxy		

Company:	Whisnand Hybrids	**Contact:**	Myron Shonkwiler
Address:	1220 East State Route 133 Arcola, IL 61910	**Phone:** **Fax:**	217-268-3714 217-268-3291
Web Site:			
Email:			
Types:	White, Hard End/Food Grade		

Company:	Wilson Genetics L.L.C.	**Contact:**	Larry Wilson
Address:	Zimmerman Brand 5147 W. Franklin Road Evanville, IN 47712	**Phone:** **Fax:**	812-985-2449 812-985-3309
Web Site:	www.zimmermanbrand.com		
Email:	larrywilson@wilsongenetics.com		
Types:	White, Hard End/Food Grade		

Company:	Wyffels Hybrids, Inc.	**Contact:**	Bill Wyffels
Address:	13344 US West 6 Geneseo, IL 61254	**Phone:** **Fax:**	800-369-7833 309-944-8338
Web Site:	www.wyffels.com		
Email:	wwyffels@wyffels.com		
Types:	High Oil, Hard End/Food Grade		

VEC Merchandisers

Company: Archer Daniel Midland/Growmark
Address: 4666 Faries Parkway
Decatur, IL 62525
Web Site:
Email: h_cooklin@corp.admworld.com
Types:
Contact: Henry Cooklin
Phone: 217-451-4955
Fax: 217-424-5990

Company: Bartlett Grain Company
Address: P.O. Box 157
408 Washington
Hamburg, IA 51640
Web Site:
Email:
Types: white
Contact:
Phone: 712-382-1238
Fax: 712-382-2001

Company: Cargill Dry Corn Ingredients, Inc.
Address: 616 South Jefferson Avenue
PO Box 550
Paris, IL 61944
Web Site:
Email: john_morris@cargill.com
Types:
Contact: John Morris
Phone: 217-466-7770
Fax: 217-463-1644

Company: Cargill, Inc.
Address: P.O. Box 5606, MS 6
Minneapolis, MN 55440
Web Site:
Email: bob_neal@cargill.com
Types:
Contact: Robert Neal
Phone: 952-742-5905
Fax: 952-742-5383

Company: Cerestar USA, Inc.
Address: Commodities Department
1100 Indianapolis Boulevard
Hammond, IN 46320
Web Site: www.cerestarusa.com
Email: DPenland@us.ebsworld.com
Types:
Contact: Dennis Penland
Phone: 219-473-2589
Fax: 219-473-7753

Company: CHS Inc.
Address: 5500 Cenex Drive
Inver Grove Heights , MN 55077
Web Site: www.chsinc.com
Email: dustin.haaland@chsinc.com
Types: High Extractable Starch, Hard Endo/Food Grade, Nutritionally Enhanced, White
Contact: Dustin Haaland
Phone: 651-355-6147
Fax: 651-355-6857

Company:	Clarkson Grain Company	**Contact:**	Lynn Clarkson
Address:	320 East South St. Cerro Gordo, IL 61818	**Phone:** **Fax:**	217-763-2861 217-763-2111
Web Site:	www.clarksongrain.com		
Email:	lynn@clarksongrain.com		
Types:	All non-GMOs (conventional or certified), White dent, Yellow & Red flint, Blue dent, Organic, Yellow & White waxy, White Cuzco		

Company:	Consolidated Grain and Barge Co.	**Contact:**	Jim Stitzlein
Address:	3164 Southside Avenue Cincinnati, OH 45204	**Phone:** **Fax:**	513-557-5085 513 244-6200
Web Site:	www.cgb.com		
Email:	stitzlej@cgb.com		
Types:	Nutritionally Enhanced, Non-GMO, High Oil, Post Harvest Pesticide Free, Low Temperature Dried corns, Hard Endo/Food Grade, High Extractable Starch, Waxy, White and Selected single hybrid for certain uses.		

Company:	Grand Prairie Coop, Inc.	**Contact:**	Roger Miller
Address:	P.O. Box E 1 South Calhoun Tolono, IL 61880	**Phone:** **Fax:**	217-485-6630 217-485-5143
Web Site:	www.grandprairiecoop.com		
Email:	rmiller@net66.com		
Types:	waxy, high extractable starch		

Company:	Identity Seed & Grain	**Contact:**	Dave Kemmerer
Address:	3950 S. Banana River Boulevard Cocoa Beach, FL 32931	**Phone:**	321-783-7333
Web Site:		**Fax:**	321-799-0405
Email:	isgdave@att.net		
Types:	Waxy, High Amylose		

Company:	Illinois Corn Marketing Board	**Contact:**	Phil Thornton
Address:	P.O. Box 487 Bloomington, IL 61702	**Phone:** **Fax:**	309-827-0912 309-827-0916
Web Site:	www.ilcorn.org		
Email:	pthornton@ilcorn.org		
Types:			

Company:	Kearney Area Ag Producers Alliance	**Contact:**	Marge Lauer
Address:	2215 2nd Ave Kearney, NE 68847	**Phone:** **Fax:**	308-234-2712 308-234-2712
Web Site:	www.kaapa.com		
Email:	info@kaapa.com		
Types:			

Company:	Kirby Grain & Fertilizer/ The DeLong Co.	**Contact:**	Keith Mohler
Address:	101 Mifflin Street, Box 62 Kirby, OH 43330	**Phone:** **Fax:**	419-273-2581 419-273-3204
Web Site:			
Email:	delongco@udata.com		
Types:			

Company:	Conserv FS, Inc.	**Contact:**	Jim Jones
Address:	410 North Main Sycamore, IL 60178	**Phone:** **Fax:**	815-895-8891 815-895-7856
Web Site:			
Email:	northernjj@yahoo.com		
Types:	High Oil		

Company:	Osterbur & Associates	**Contact:**	Randy Osterbur
Address:	1739 Oak Street Suite A Quincy, IL 62301	**Phone:** **Fax:**	800-445-0227 217-222-2579
Web Site:			
Email:	Osterbur@adams.net		
Types:			

Company:	Pioneer Hi-Bred International, Inc.	**Contact:**	Morrie Bryant
Address:	7100 NW 62nd Ave. P.O. Box 1150 Johnston, IA 50131	**Phone:**	515-334-6646
Web Site:		**Fax:**	515-334-6544
Email:	Morrie.Bryant@pioneer.com		
Types:	White, Waxy, Hard Endo/Food Grade		

Company:	Quality Technology International, Inc.	**Contact:**	Tony Utsuno
Address:	2250 Point Blvd. Suite 322 Elgin, IL 60123	**Phone:** **Fax:**	847-649-9300 847-649-9309
Web Site:	www.qtitech.com		
Email:	tonyu@qtitech.com		
Types:	HES, Hard Endo, High Oil, Non-GMO		

Company:	Specialty Grains, Inc.	**Contact:**	John Trewartha
Address:	231 N. Sangamon Ave. P.O. Box 209 Gibson City, IL 60936	**Phone:** **Fax:**	217-784-4400 217-784-4492
Web Site:	www.sgigrain.com		
Email:	sgigrain@aol.com		
Types:	White, Waxy, Hard End/Food Grade, Nutritionally Enhanced, High Amylose		

Company:	The Andersons	**Contact:**	Neill McKinstray
Address:	480 W. Dussel Drive P.O. Box 119 Maumee, OH 43537	**Phone:** **Fax:**	419-893-5050 419-891-6513
Web Site:	www.andersonsinc.com		
Email:	neill_mckinstray@andersonsinc.com		
Types:			

Company:	The DeLong Company, Inc.	**Contact:**	Bo DeLong
Address:	601 Delco Drive Clinton, WI 53525	**Phone:** **Fax:**	608-676-2255 608-676-4176
Web Site:	www.DeLongCompany.com		
Email:	DeLong@inwave.com		
Types:	white, waxy, hard endo/food grade yellow, 1# & #2 in containers		

Company:	Tomen America, Inc.	**Contact:**	Tak Mori
Address:	2215 Sanders Road Suite 103 Northbrook, IL 60062-6134	**Phone:** **Fax:**	847-849-4010 847-509-8623
Web Site:	www.tomenamerica.com		
Email:	cgofe@ml.ov.tomen.com		
Types:	white, waxy, high amylose		

VEC Exporters

Company:	Tate and Lyle	**Contact:**	Don Wenneker
Address:	2200 E. Eldorado Street Decatur, IL 62521	**Phone:** **Fax:**	217-421-3074 217-421-2409
Web Site:	www.tateAndlyle.com		
Email:			
Types:	waxy		

Company:	Advance Trading, Inc.	**Contact:**	
Address:	1619 Commerce Parkway P.O. Box 1027 Bloomington, IL 61702	**Phone:** **Fax:**	309-664-2310 309-663-2375
Web Site:	www.advance-trading.com		
Email:	info@advance-trading.com		
Types:			

Company:	AGRI Industries	**Contact:**	Jerry Vanderkamp
Address:	700 Southeast Dalbey Dr Ankeny, IA 50021	**Phone:**	515-946-2267
Web Site:		**Fax:**	515-964-2250
Email:			
Types:			

Company:	Archer Daniels Midland Co.	**Contact:**	
Address:	4666 Faries Parkway Decatur, IL 62525	**Phone:**	217-424-5200
Web Site:		**Fax:**	217-424-4291
Email:			
Types:	White, Waxy, High Oil, Hard End/Food Grade, Nutritionally Enhanced, High Amylose		

Company:	Bunge North America	**Contact:**	Tom Erickson
Address:	750 First St NE Suite 1070 Washington DC 20002	**Phone:**	202-216-2000
Web Site:	www.bungenorthamerica.com	**Fax:**	202-216-1785
Email:	rachelgaylord@bunge.com		
Types:			

Company:	Cargill, Inc.	**Contact:**	Robert Neal
Address:	P.O. Box 5606, MS 6 Minneapolis, MN 55440	**Phone:**	952-742-5905
Web Site:		**Fax:**	952-742-5383
Email:	bob_neal@cargill.com		
Types:			

Company:	Clarkson Grain Company	**Contact:**	Lynn Clarkson
Address:	320 East South St. Cerro Gordo, IL 61818	**Phone:** **Fax:**	217-763-2861 217-763-2111
Web Site:	www.clarksongrain.com		
Email:	lynn@clarksongrain.com		
Types:	Non-GMO, White, Yellow and red flint, Blue dent, Organic, Yellow waxy, White waxy, White Cuzco		

Company:	ConAgra Trade Group inc.	**Contact:**	
Address:	11 ConAgra Drive Suite 5022 Omaha, NE 68102	**Phone:** **Fax:**	402-595-5871 402-943-5366
Web Site:	www.conagra.com		
Email:			
Types:			

Company:	Consolidated Grain and Barge Co.	**Contact:**	Jim Stitzlein
Address:	5848 Old Route 54 New Berlin, IL 62670	**Phone:** **Fax:**	217-783-3980 217-483-4908
Web Site:			
Email:	stitzlej@cgb.com		
Types:	White, Waxy, High Oil, Hard End/Food Grade, Nutrition Density		

Company:	Growmark, Inc.	**Contact:**	Larry Keene
Address:	1701 Towanda Ave. P.O. Box 2500 Bloomington, IL 61702	**Phone:** **Fax:**	309-557-6401 309-557-6944
Web Site:	www.growmark.com		
Email:	lkeene@growmark.com		
Types:	White, Hard End/Food Grade, Non-GMO, Nutri-Dense		

Company:	Louis Dreyfus Corporation	**Contact:**	David Lyons
Address:	1350 I Street NW Suite 1260 Washington, DC 20005	**Phone:** **Fax:**	202-842-5114 202-842-5099
Web Site:			
Email:	lyonsd@ldcorp.com		
Types:	White		

Company:	The Scoular Co.	**Contact:**	Greg Lickteig
Address:	2027 Dodge St. Omaha, NE 68102	**Phone:** **Fax:**	800-488-3500 402-342-4493
Web Site:	www.scoular.com		
Email:	lickteig@scoular.com		
Types:	White, Waxy, High Extractable Starch,	(Kevin Dvorak) for Organic	