# *Risks of Growing Value-Enhanced Corn and Soybeans in Illinois*

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**Risks of Growing Value-Enhanced Corn and Soybeans in Illinois.** By Sharon K. Bard, Lowell D. Hill, Steven L. Hofing, and Robert K. Stewart, Ag Education & Consulting, LLC, Savoy, Illinois.

# Preface and Acknowledgements

This report summarizes the findings of a project that explored the risks involved with growing value-enhanced corn and soybeans in Illinois. The project was designed to: 1) identify the risks in value-enhanced grain production; 2) identify risk management tools that could be used to manage those risks; and 3) generate recommendations for potential enhancements to current risk management tools for value-enhanced grain production.

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# Executive Summary

## Purpose of this Study

Changing consumer preferences and technological advances have altered the production and marketing of commodity grains such as corn and soybeans. Specialized traits and customized management and handling practices that add value to certain end uses have been introduced into corn and soybeans. The term value-enhanced grains (VEG) has become a common descriptor for these non-commodity products. Many different types of VEG are now being grown for specific end uses.

Production of these new value-enhanced types of corn and soybeans often requires different production practices, quality considerations, marketing methods, and contractual relationships than those used for commodity grain production. As a result, the VEG production system has created a new set of risks for VEG growers. Unfortunately, these new risks cannot always be managed effectively with the current risk management tools available for commodity corn and soybean production.

The main objective of this study was to further the understanding of the risks involved in value-enhanced grain production and articulate the issues surrounding the management of these risks. The project's focus was on production of value-enhanced corn and soybeans in Illinois.

## Methodology

To meet the study's objective, several sources of data were employed. Data used to characterize the risks associated with VEG production were collected through two producer focus groups, review of contracts for specialty corn and soybean production, and a mail survey of more than 900 Illinois agricultural producers. In addition, results from the University of Illinois Value Project and the U.S. Grains Council's Value-Enhanced Grains Quality Reports were used to supplement the description of the VEG production and marketing in Illinois. Two brainstorming sessions were also held with research experts to evaluate and analyze the risks involved in VEG production and the risk management tools employed by producers.

## Characteristics of the Value-Enhanced Grain Market

The market channel for value-enhanced grains differs from the market channel for commodity corn and soybeans in several dimensions. VEG is stored on the farm more frequently, and there are usually fewer handlers involved in the transfer process from the producer to the end user. Quality requirements for VEG are more stringent than for commodity grains. Quality and purity are more easily preserved by segregation from the field to the final user, which limits the opportunities for commingling and blending. In VEG production and marketing, contracts often replace the open market price determination associated with generic commodities.

In 2000, an estimated 18% and 11% of total planted corn and soybean acres in Illinois, respectively, were planted with specialty corn and soybean types. The most prevalent VEG types planted in Illinois in 2000 were non-GMO corn and soybeans, high oil or high oil/high oleic corn, and STS soybeans. While VEG production is distributed throughout the state, its location is driven by market availability, profitability, and environmental adaptability of varieties. Yield drag, or a lower

yield than a generic commodity grain variety, is an issue for many of the VEG types. However, exact estimates for yield drag are difficult to determine for each VEG type because yield drag depends on the seed variety, the variety's adaptation to the geographical region, and the weather during the growing and harvesting period.

Producers growing value-enhanced grains appear to be younger, have more college education, operate larger farms and have more on-farm storage than growers not interested in producing VEG. In addition, VEG producers rely more heavily on on-farm income and are more likely to carry revenue-based crop insurance products than non-VEG producers. The predominant reason to grow VEG is for the greater opportunity to increase farm income.

## Risks and Risk Management in Value-Enhanced Grain

Nine main sources of risks were identified related to the production and marketing of value-enhanced grain. These risk sources are base price (market price that any premium is added onto), price premium, market access, quality, yield, contract, relationship, product liability, and investment. Some of these risks are unique to VEG while others are also prevalent in commodity grain production. For example, the base price risk for commodity and specialty grains are similar, whereas price premium risk is solely a property of VEG production.

Tools for managing these VEG production risks vary from traditional tools used to manage commodity grain production risk (e.g., forward pricing to manage base price risk) to tools unique to VEG production (such as VEG production contracts to manage price premium risk). However, there are very few management tools for many of the risks unique to VEG production. For example, there are few risk management tools to help manage quality, contract, and market access risk.

The majority of the producers perceive VEG production to be riskier than commodity production. Producers who never have grown VEG think VEG production is riskier than current VEG growers do. However, past VEG growers' perception of VEG production risk is higher than either current or non-growers of VEG. Reasons for risk perceptions can be defined in economic terms—those who consider VEG production to be less risky feel that the benefits outweigh the costs. Producers believing that VEG production is riskier state that the costs are greater than the benefits of commodity production. Premium uncertainty as a result of not meeting quality standards appears to be the most important of the four risk factors cited in the AEC Producer Survey. The other three factors were yield uncertainty, risk of contamination from other crops, and strength and commitment of the buyer or contractor.

Value-enhanced grains are often produced and delivered to the end user in a coordinated system. The members of that coordinated system consist of input suppliers, producers, originators (elevators and merchandisers), and end users (processors and livestock feeders). As the system's coordination increases (such as with specialty grains), the roles, relationships and risks of each of the segments change.

The level of coordination affects how the risks are transferred up and down the market channel and the level of risk faced by each segment. In a more coordinated system, elevators and merchandisers experience increased exposure to risks associated with contracted volume, market access, and contamination risks. Highly coordinated systems may also expose end users to new types of risks including reliance on unique suppliers and contract risks.

## Recommendations for Changes to Risk Management Tools

Work done as a part of this project showed that there is a need for new risk management tools to help producers manage risks associated with VEG production. There are government supported yield and revenue-based crop insurance products available for use with some types of VEG. However, there are several problems with using the traditional crop insurance products for value-enhanced corn and soybeans. These problems relate to the characteristics of VEG. Settlement prices used with traditional crop insurance products do not account for price premiums when used to insure VEG. Settlement prices are based on commodity grain price and therefore may not reflect the higher value of the VEG being insured. The actual production history used to set a yield guarantee level is often based on commodity grain yields and not on the yield of the VEG type that is being insured. The expected yield performance of the VEG may not be reflected in the actual production history for the insured farm. Finally, there are limited quality loss provisions in traditional crop insurance. Quality problems in VEG may significantly impact producer returns.

Our recommendations for potential crop insurance products are twofold: first, the adaptation of traditional crop insurance products to VEG; and second, the development of broader value-chain based insurance products.

The recommendations for the adaptation of traditional crop insurance products to VEG involve two main components. The first recommendation is to adjust grain prices used in yield and revenue insurance for the price premiums associated with VEG. This would impact the guarantee levels and indemnity payments. The second recommendation is to adjust the actual production history (APH) for yield differences associated with VEG. If only APH is adjusted, moral hazard may ensue. When only the APH is adjusted, producers may be tempted to not report the type of VEG being raised and insure the crop with a standard commodity grain policy. Adjusting the APH and prices concurrently will encourage more participation in the VEG insurance program by offsetting some of the APH yield difference with a higher settlement price accounting for the higher VEG value.

The recommendations for broader value chain based insurance products involve the development of group insurance plans for producers of VEG and supply insurance for buyers of VEG. Group crop insurance plans for producers could be developed for producers raising VEG for specific markets. The crop insurance would be customized for the unique crop type and risks faced by the producers in the group. Since the insurance plans would be unique for specific markets and producer groups, they could offer risk protection on factors that are not feasible to cover with traditional crop insurance. Grain elevators, merchandisers, or processors that typically buy grain directly from producers would likely manage the group insurance plans. Supply insurance for buyers of VEG could also be developed to manage supply quantity and quality risks. Supply insurance would be beneficial for VEG users, and it would likely help to foster the development of the VEG market. End users may be more willing to use VEG if they had access to risk management tools to offset some of the risks associated with using VEG.

# Introduction

Corn and soybean production is changing. Due to consumer preferences and technological advances, the traditional bulk commodity production and marketing system is no longer valid for all the corn and soybeans produced in the Midwestern part of the U.S. Plant breeders have introduced unique, economically important attributes into corn and soybeans, and measurement technology has advanced to enable identification of these attributes to the marketplace. In addition, desired end use properties have proliferated, and grain buyers and processors have become more sophisticated in their procurement process and utilization. These changes have created products with enhanced end use value, hence the term Value-Enhanced Grains (VEG).

In a recent survey, more than twenty value-enhanced corn and soybean types have been identified in current production in Illinois (Swanson, et al.). Table 1 lists types of corn and soybeans considered to be VEG and that are considered VEG in this study. For the purposes of this report the term, "commodity grains" refers to corn or soybeans marketed on the basis of standard USDA grade factors. VEG is corn or soybeans with particular characteristics that add end user value. VEG is marketed based on attributes beyond standard grade factors.

**Table 1. Value-Enhanced Corn and Soybeans**

| Corn | Soybeans |
|---|---|
| Non-GMO | Seed |
| High Oil | Non-GMO |
| High Oleic, High Oil | STS |
| Yellow Food Grade | Tofu (Clear Hilum) |
| White Food Grade | Organic |
| Waxy | High Protein/High Isoflavone |
| High Extractable Starch | Low Linoleic Acid |
| Organic | High Sucrose |
| High Lysine | High Oil |
| Nutritionally Dense | Low Saturated Fat |
| High Amylose | High Oleic |
| Seed | Food Grade |
| Red/Blue | |
| Low Stress Crack | |
| Low Temperature Dried | |
| Post-Harvest, Pesticide-Free | |

Production of these new value-enhanced types of corn and soybeans has created a new set of risks for the growers. VEG producers are no longer targeting delivery of corn that meets the minimum quality specifications for No. 2 yellow grade corn, and soybeans that meet No. 1 yellow soybean standards. Their objectives are now to deliver a VEG with specific levels of attributes desired by the end user. These specifications have increased producers' exposure to events beyond their control. These additional sources of risk cannot always be managed effectively by the risk management strategies normally employed by commodity producers.

In recent years, crop insurance has become an important tool to help manage production risk and to some extent market risk. However, the existing policies may not be adequate for the new forms of risk. For example, Representative Earl Pomeroy (D-ND) stated in his testimony that federal crop insurance does not adequately cover losses related to quality changes, nor does it "consider discounts due to...factors that elevators...routinely use to discount." (Sparks Policy Report) He further stated that the mission of the crop insurance program must extend to the elevator. Although

the Agricultural Risk Protection Act encouraged greater participation by growers, the costs of the insurance programs and questions about which risks to insure are topics of continued discussion and concern.

## Project Objectives

The main objective of this study is to further the understanding of the risks involved in value-enhanced grain (VEG) production and articulate the issues surrounding the management of these VEG-unique risks. The project's focus is on production of value-enhanced corn and soybeans in Illinois and involves the following specific objectives:

1. Describe value-enhanced corn and soybean production in Illinois,

2. Characterize the risks associated with VEG production,

3. Explain the strategies employed for managing risk unique to VEG production,

4. Develop a perspective of VEG market channel models and market coordination mechanisms and how they apply to VEG risk and risk management, and

5. Develop recommendations for how risks unique to VEG production can be managed by existing or new government-supported risk management products such as crop yield and revenue insurance.

Risks associated with VEG production and tools designed to manage the risks may exist or be applicable within a single production cycle or across multiple production cycles. This report will review these topics both in the multiple year framework and the single crop year context, but will focus on the single crop year in its detailed discussion and recommendations.

## Research Methodology

There has been substantial research conducted on the risks involved in the production of commodity products. However, little is known about how risks and the management of those risks differ between production of commodity corn and soybeans and their value-enhanced counterparts. Therefore, to meet the objectives of this study, data on VEG production and risk management were collected. To understand the issues involved and help identify the universe of risks and impact of VEG production and contracts on the producers, two focus groups with producers were conducted. These focus groups allowed interaction between the researcher and the participants to clarify and expand on responses to questions posed to the participants. Results from the focus groups then helped define questions for a producer survey.

While the focus groups provided a detailed, qualitative perspective of the research issues, a mail survey provided data for a quantitative analysis of the risks unique to VEG production and the manner in which producers manage the risks. More than six thousand Illinois producers of corn and soybeans were sent a mail questionnaire asking about their corn and soybean production, their perceptions of risk associated with VEG production, their experiences with VEG production and ways in which they manage risk. This survey is referred to as the AEC Producer Survey in this report.

To enhance the understanding of how producer contracts affect producers' risk position, producer contracts for value-enhanced corn and soybean grain were reviewed. Once the focus groups and mail surveys were conducted and the contracts were reviewed, summaries of these data were summarized and presented to research experts in the area of value-enhanced grain production and risk management in two brainstorming sessions. These results provided the backdrop for analysis of the issues surrounding risks unique to VEG production and the implementation of tools for managing VEG risk. In addition, the data assisted in the conception and formulation of recommendations for innovative methods for managing risk unique to VEG.

Since production of value-enhanced corn and soybeans has significantly impacted the grain production and processing system, VEG production has been an important topic of discussion and research over the past five to seven years. Results from two projects studying VEG production are included as part of this study. They provide additional evidence for the findings of the primary data, in addition to supplemental information on production of value-enhanced corn and soybeans.

The most comprehensive VEG data source available is an annual report commissioned by the U. S. Grains Council. The report has been published annually since the 1995-96 crop year and collects data on value-enhanced corn (VEC) quality and production. The annual reports contain results from surveys of VEC producers from seven Midwestern states. Data such as VEC yield drag, reasons for growing and not growing VEC, and characteristics of value-enhanced corn growers are available from the surveys, and are reviewed for this study.

A second important data source is information gathered by a University of Illinois (UI) project for value-enhanced grain and livestock production called the "Illinois Specialty Farm Products" project (also referred to as the Value Project). The Value Project mailed a survey to producers throughout Illinois during the winter of 2000-2001 and received 11,079 usable responses. The Value Project survey obtained information on producer demographics, grain and livestock production, and reasons for growing and not growing specialty crops and livestock.

## Presentation of Data Collected as Part of this Project

The report draws heavily upon primary data collected for this project—two focus groups, a producer survey, and a review of specialty grain contracts. Selected results from these three data sources are interspersed throughout the report to validate conclusions. Four appendices follow the main body of the report. The first appendix highlights the findings of the producer survey regarding how the Illinois producers perceive the risk associated with VEG. The remaining three appendices present detailed summaries of the focus groups, contract review, and the producer survey.

# Market Channels for Value-Enhanced Grains

Most corn and soybeans grown as VEG are moved through market channels that maintain some level of segregation between grains with different characteristics. The alternative marketing channels for grain can be classified into four categories for ease of description. (Table 2) There are many variations that fall between the classifications, on a continuum varying from a channel where there is complete control from seed to consumer, to a channel that consists only of a standard grade commodity grain.

**Table 2. Alternative Marketing Channels for U.S. Grain**

| Differentiating Characteristics | Level I Identity Preserved (IP) | Level II Specialty Grains | Level III Super Commodity | Level IV Standard Grades |
|---|---|---|---|---|
| Relative Value/Premium | High | Medium | Low | None |
| Buyer Control | Variety<br>Production Practices<br>Certification<br>Other | Min/Max Attributes | Attribute Preferences | Grades Only |
| Attribute Testing | Buyer's Discretion | Cost/Value Driven | Efficient/Consistent | Grade-Driven |
| Types of Producer Contracts | Acreage Production Bushels | Production Bushels Normal/Open | Normal/Open | Normal/Open |
| Producer Linkages | High | Moderate | None | None |
| Minimum Segregation | Farm | 1st Point of Sale | Merchandiser-Determined | Merchandiser-Determined |
| Product Volumes | Low | Moderate | High | Very High |

**Source: U.S. Grains Council**

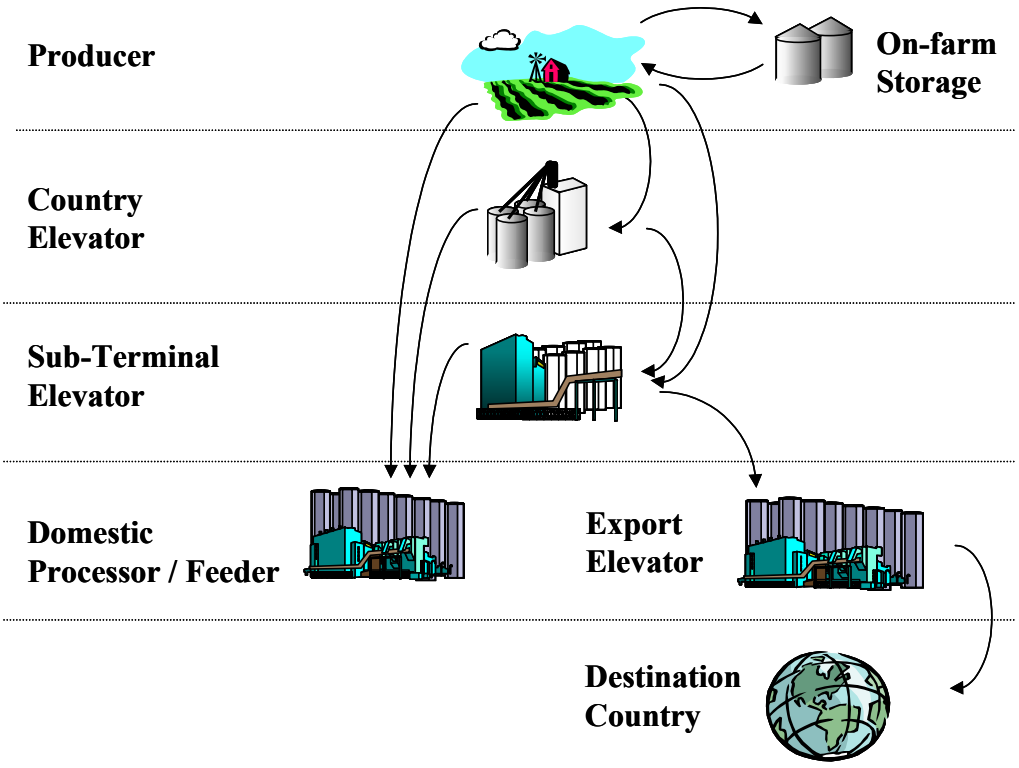
To understand the unique aspects of the market for VEG and the associated requirements for institutions, contracts, and risk management strategies, it is necessary to describe the traditional market channel for generic commodities as a base of comparison with the changing market channels for VEG.

## The Traditional Market Channel for Corn and Soybeans

The physical transfer of the commodity from farm to processor is independent of the title transfer of the commodity in traditional markets. As the markets have developed and adopted alternative pricing options, production, storage, and delivery decisions are often independent of when and how title to the grain is transferred.

Immediately following harvest, producers must either: 1) store on farm or at the elevator; or 2) sell to the elevator, domestic processor/feeder or sub-terminal elevator. If stored on farm, the grain may be delivered to the buyer in the future. Pricing and title exchange may occur several months prior to planting, or several months after delivery, or any time in between, under a number of alternative pricing strategies.

The market channel for generic grains and oilseeds (Figure 1) involves numerous transfers and handlings. The number of times the grain is handled, blended, and commingled remains high, even when moving within a vertically integrated market channel, where elevator, transport, and export facilities are owned by the same firm.




Source: Ag Education & Consulting

**Figure 1. Flow of Grain to Major End Uses**

## Commodity Grains: The Physical Market Channel

Producers deliver grain directly from the combine (by truck and wagon) to the country elevator, or they may condition and store for later delivery (usually by truck). When producers deliver grain to the country or sub-terminal elevator, it is evaluated for quality and condition, and these results become the basis for price differentials from the overall market price level.

The country elevator performs many of the same physical functions as the producer. The physical transfer to the next market point (by truck or rail) may be immediate or the grain may be stored for future delivery. Inbound grain is conditioned (dried, screened or cleaned) as needed. Segregation based on moisture and damage is fairly common at the country elevator. However, most deliveries from producers are commingled in the dump pit and the storage bins. Silos, metal tanks, or covered bunkers contain a mix of different qualities as a result of random or intentional commingling of individual loads with a range of moisture, test weight, damage, broken kernels and foreign material. A wide range of other attributes, though seldom measured as the grain is received, is also randomly mixed during receiving and storing. For example, the grain delivered from different producers and different fields may differ widely in the levels of constituents such as starch, oil, and protein. These differences become a blended average as the different lots are received and mixed on the basis of grade factors, with no information as to differences in composition. When grain is delivered to the next point in the market channel, it is again evaluated for quality and condition, then priced accordingly.

The river or inland sub-terminal elevators receive grain from producers as well as from country elevators (primarily by truck although a few receive by rail). They customarily apply U.S. grades to receipts as a basis for establishing quality price differentials even if the firms are vertically integrated.

Destination grades usually prevail. Outbound shipments move by unit trains or barge. There is little opportunity for blending at the river elevator. Large inland sub-terminals have more flexibility in blending diverse qualities to achieve a uniform grade level, but neither river nor inland sub-terminals have sufficient bins for extensive segregation, such as found at the export elevator.

Export elevators receive grain in large volume units from many geographical regions, by rail and barge. Information on origin grade factors usually precedes arrival of a barge or train, allowing segregation on these attributes as the grain is received and stored. Export elevators generally have a large number of individual bins to facilitate segregation and blending on the basis of grade factors. Some facilities have as many as 100 bins, each designed to hold approximately one barge load of corn or other grain. Supplemental quality information may be provided from samples obtained prior to or during shipment of the barge or railcar. This allows segregation on some factors other than those obtained in the grades. Outbound quality is controlled to meet contract specification insofar as supplies of each quality are available. Shipping bins, where grain may be returned to the house for cleaning or blending, are used by most export elevators to assure that each sublot meets USDA and contract specifications.

Domestic processors receive grain from producers, country elevators, and sub-terminal elevators by truck, rail and barge. Direct contact with producers and knowledge of geographical differences allow processors to specify attributes in addition to grade factors, but this is not common with commodity corn and soybeans. The value of uniformity during processing encourages the processors to segregate grain with different quality attributes and blend prior to processing. This may allow differentiation among qualities to match different processes or may allow a greater uniformity to avoid high or low values of a particular shipment that might reduce efficiency during processing.

## Commodity Grains: The Financial Market Channel

The physical marketing functions described above are often separated from the financial functions of transfer of title and price determination. Strategies for transferring title between producer and first handler include: 1) cash sale at delivery; 2) storage under warehouse receipt; 3) several types of forward contracts; and 4) deferred pricing. Sale at the time of delivery is the most simple of the transaction alternatives. The producer delivers the grain and receives payment within a few hours or days at the price posted in the elevator at time of delivery.

Producers may also store grain at the local elevator under a warehouse receipt. This receipt is a legal document verifying that the grain quantity and quality described in the warehouse receipt is in the storage facilities of the country elevator. The grain belongs to the producer until sold or retrieved. Storage at the elevator allows the producer to speculate on price without investing in storage and conditioning facilities and transfers responsibility for maintaining quality to the elevator. The warehouse receipts are controlled and supervised under Illinois warehouse laws.

Forward contracts between producers and country elevators and between country elevators and their buyers can take many forms. A flat price contract (pre or post planting or harvest) sets a fixed price for grain delivered to the elevator. The contract may specify acres or bushels, and may specify a delivery date or time period. Basis contracts tie delivery price to a futures price on The Chicago Board of Trade plus or minus a specified differential.

Deferred price (also called price later) contracts allow the producer to deliver the grain at harvest but delay the decision of setting the price. The elevator takes title to the grain at the time of delivery and may sell or store the grain. The date for establishing the sale price is at the producer's option, subject to some time limits established by the buyer. The posted price at the elevator on the day the producer selects to consummate his sales transaction becomes the price received by the producer.

## The VEG Market Channel for Corn and Soybeans

The transfer of VEG through the market channel differs from the commodity market channel in several important ways. Producers are often required to plant designated varieties and use buyer directed production and harvesting techniques. The VEG is stored on the farm more frequently than commodity grains. Date of delivery to the first handler is often at the buyer's option rather than the farmer's choice. Processors more frequently take delivery directly from producers for VEG than for commodities, and transfer through multiple handlers is much less frequent with VEG than with commodity grains. Truck, rail, and barge still provide the primary means of transport, but the use of containers is often needed to assure complete purity. The facilities and equipment required for traditional corn and soybeans are also required for VEG, but they must be used in a manner so as not to contaminate the VEG shipments during harvest and transfer through the market channel.

USDA grades are still the basis for most quality determination, but other attributes (such as nutrient composition) are almost always included. Because quality and attributes must be verified prior to entering the market channel, quality measurements are more stringent and often applied prior to delivery from farm bins. Identity of the grain is maintained through use of containers, designated rail cars, or designated barges. This sometimes eliminates the need for quality measurement at later points in the market channel.

Commingling and blending are carefully controlled; and in the pure IP system, steps are taken to avoid any mixing. Segregation by special attribute is mandatory and, in general, eliminates the practice of blending to meet minimum levels of quality. The blending income, which is an important source of revenue for grain firms handling generic commodities, must be replaced by higher handling margins.

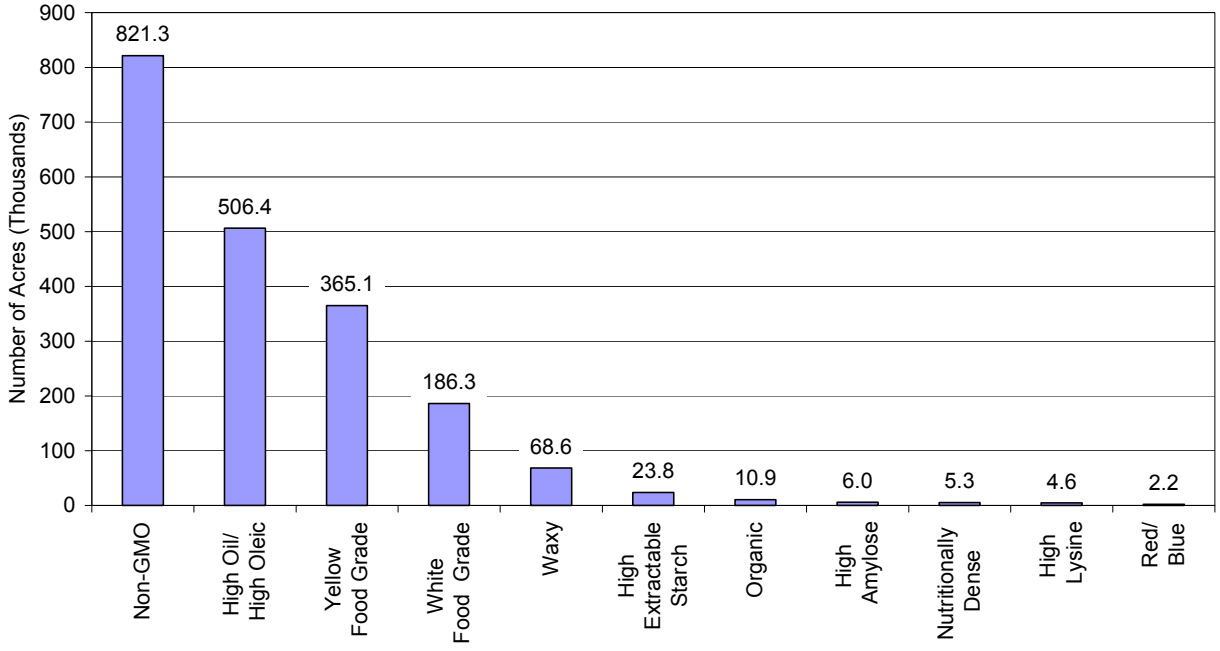
In VEG production and marketing, contracts replace the open market price determination associated with generic commodities. However, most contracts offer the producer the full range of pricing alternatives found with generic commodities. Price later, price at delivery, futures and basis contracts are often included as options for establishing the base price. Discounts are often attached to traditional grade factors, although the limits are often more stringent than with commodity grains. The premium associated with each VEG is specified in the contract as an addition to the base price. The base price is usually tied to a price on the Chicago Board of Trade. Transfer of title may occur at several points in the series of physical and financial transactions, and is (or should be) specified in the contract. Title transfer may be specified at the time of planting, explicitly or implicitly, at the time of delivery, or at the time of payment.

# Production and Marketing of Value-Enhanced Corn and Soybeans in Illinois

## Illinois Production of Value-Enhanced Corn and Soybeans

The market for and production of value-enhanced corn and soybean types in Illinois is a significant part of the state's grain production system. Through a special project titled "Illinois Specialty Farm Products" (also referred to as the Value Project), the University of Illinois has assessed the market for and production of value-enhanced corn and soybeans in the state.

The project conducted a survey of Illinois producers during the winter of 2000-2001 and obtained 11,079 responses (Swanson, et al.). From the survey results, it was estimated that between 4,500 and 6,500 Illinois farmers produced some type(s) of value-enhanced corn and between 3,500 and 5,500 Illinois producers grew some type(s) of value-enhanced soybeans during 2000. Figure 2 shows the production of value-enhanced corn in Illinois in 2000, as estimated by the report[1]. It shows that farmers grew more non-GMO corn than any other value-enhanced corn type. High oil or high oleic high oil corn was the second most frequently grown value-enhanced corn type grown in 2000. Illinois producers grew approximately 365,000 and 186,000 acres of yellow and white food grade corn, respectively, that year. While production of waxy corn was estimated to be around 69,000 acres, production of the other value-enhanced corn types was estimated to be less than 25,000 acres per corn type.

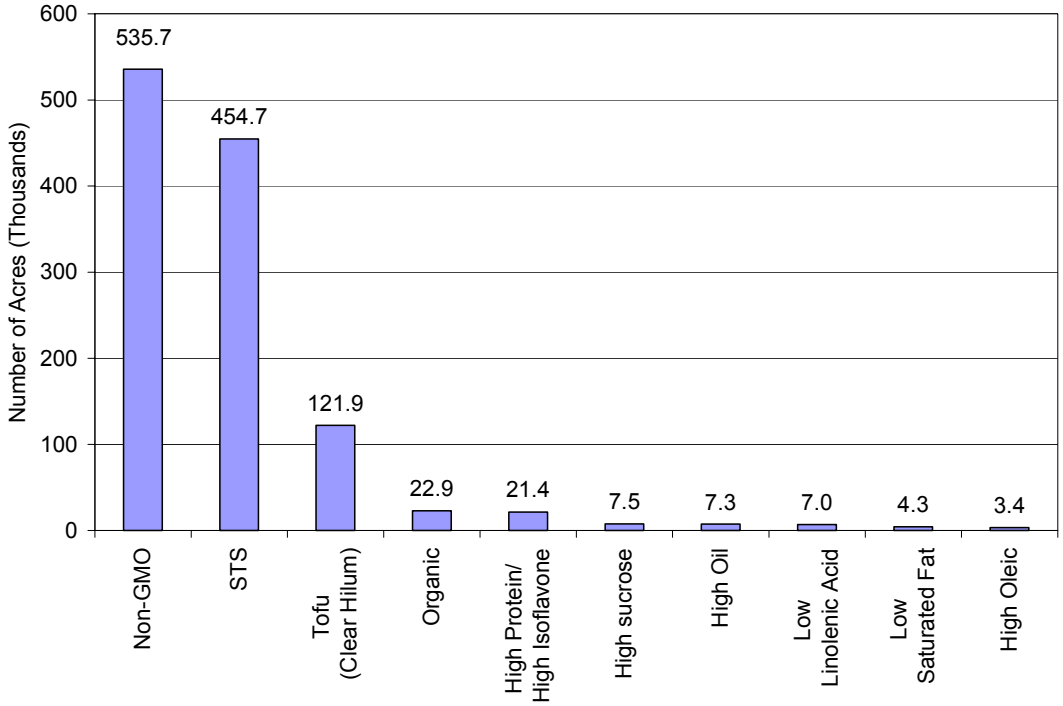



**Source: Data compiled by Dr. M. Samy from the University of Illinois Value Project Farm Survey 2000**

**Figure 2. Estimated Value-Enhanced Corn Production in Illinois, 2000**

[1] Using NASS data for corn and soybean production in Illinois in 2000 and the reported acreage of VEG production from the farm survey, the study extrapolated survey results to an estimate of the statewide acres of VEG production.

Production of value-enhanced soybeans in Illinois is presented in Figure 3. According to this study, the largest value-enhanced soybean acreage in 2000 was non-GMO soybeans. The second most frequently grown value-enhanced soybean type was STS soybeans, and they were grown on about 455,000 acres. Illinois farmers produced about 122,000 acres of tofu or clear hilum soybeans in 2000, and acreage for the remaining types were less than 25,000 acres for each type.




**Source: Data compiled by Dr. M. Samy from the University of Illinois Value Project Farm Survey 2000**

**Figure 3. Estimated Value-Enhanced Soybean Production in Illinois, 2000**

For analytical purposes, Illinois can be divided into eight production regions as seen in Figure 4. According to the University of Illinois Farm Survey, Illinois producers of non-GMO corn and soybeans in 2000 were located throughout the state. However, production of the other VEG types appears to be more geographically constrained. High oil corn was predominately produced in the northern part of the state, while yellow and white food grade corn production was located primarily in the Eastern, Southern, Lower Illinois River Valley, and Western regions of Illinois. Producers in the Eastern, Western, and Lower Illinois River Valley regions produced most of the waxy corn, and high starch corn was produced primarily in the Lower Illinois River Valley and Western regions of the state.

The production of STS soybeans was located throughout Illinois in 2000, but it was concentrated in the Eastern and Upper Illinois River Valley regions of the state. Tofu soybean production was predominately in the North and Northwestern regions.

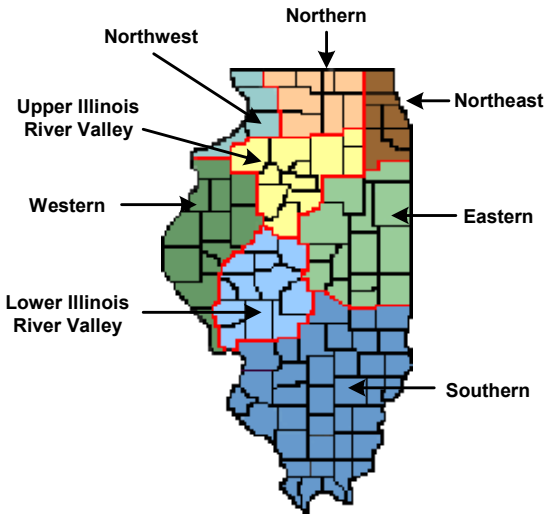



**Figure 4. Production Regions in Illinois**

Production location is driven primarily by three factors—market availability, cost of production or profitability, and environmental adaptability of varieties or yield drag. Specific types of VEG are produced in areas in which there are readily available markets, the premium and cost of production make it a profitable enterprise, and the available varieties are adapted to the growing environment such that substantial yield drag is not expected.

Table 3 shows the 2000 regional production data estimated by the University of Illinois Farm Survey for value-enhanced corn and Table 4 shows the regional production data estimated by the University of Illinois Farm Survey for value-enhanced soybeans. According to the extrapolated survey results, over two million acres of value-enhanced corn and 1.2 million acres of value-enhanced soybeans were grown in the state in the year 2000. Most of that production was concentrated in the Illinois River Valley regions as well as the Eastern and Southern regions.

**Table 3. Extrapolated Value-Enhanced Corn Acreage for 2000**

| Region | Non-GMO | High Oil, High Oil/ High Oleic | Yellow Food Grade | White Food Grade | Waxy | High Starch | Organic | High Amylose | Nutritionally Dense | High Lysine | Red/ Blue | Total[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Northwest | 32,757 | 25,746 | 1,044 | 337 | 707 | 0 | 0 | 0 | 0 | 24 | 0 | 60,615 |
| Northern | 74,720 | 82,297 | 4,629 | 0 | 4,127 | 3,413 | 6,528 | 0 | 0 | 0 | 0 | 175,714 |
| Northeast | 9,073 | 7,482 | 563 | 0 | 19 | 0 | 1,126 | 0 | 0 | 0 | 0 | 18,262 |
| Western | 97,761 | 79,768 | 56,325 | 13,725 | 8,713 | 10,189 | 0 | 0 | 196 | 0 | 0 | 266,678 |
| Upper IL River Valley | 123,458 | 82,078 | 15,597 | 1,466 | 2,311 | 0 | 558 | 1,227 | 1,262 | 0 | 319 | 228,276 |
| Lower IL River Valley | 135,083 | 74,932 | 92,903 | 41,961 | 21,478 | 8,727 | 1,681 | 1,227 | 227 | 0 | 0 | 378,219 |
| Eastern | 160,736 | 102,922 | 102,366 | 51,970 | 29,417 | 1,496 | 1,047 | 3,167 | 2,439 | 4,137 | 1,826 | 461,522 |
| Southern | 187,701 | 51,213 | 91,637 | 76,846 | 1,843 | 0 | 0 | 406 | 1,150 | 458 | 38 | 411,293 |
| State Total[1] | 821,289 | 506,439 | 365,065 | 186,304 | 68,615 | 23,825 | 10,940 | 6,027 | 5,275 | 4,618 | 2,183 | 2,000,578 |

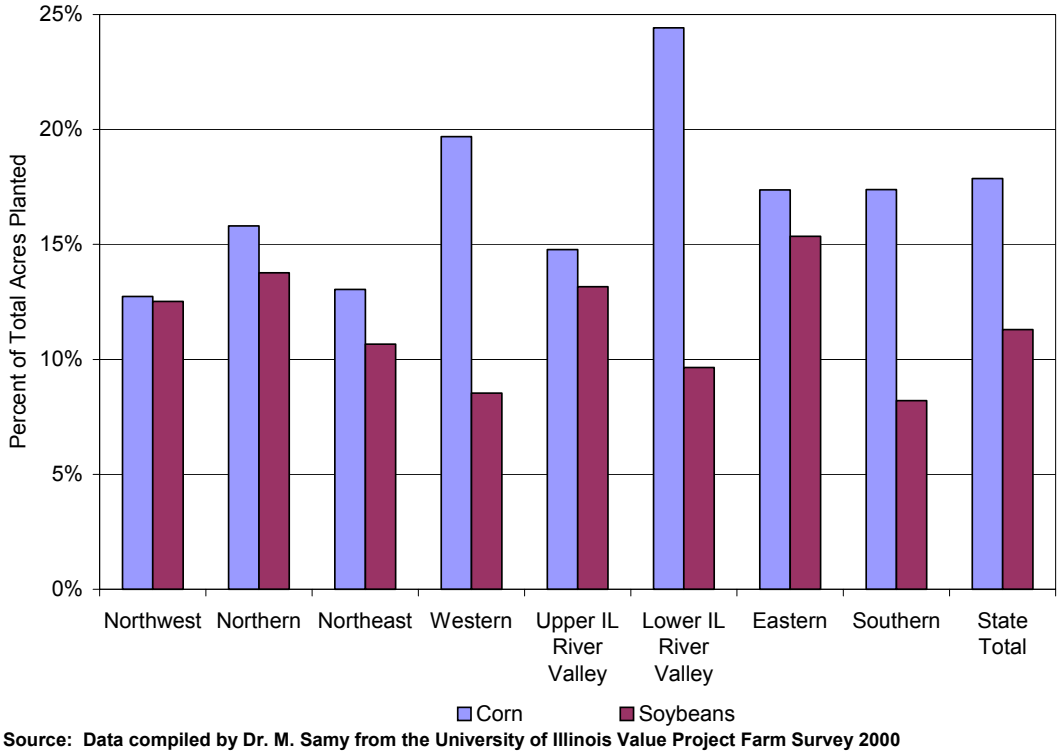
Source: Data compiled by Dr. M. Samy from the University of Illinois Value Project Farm Survey 2000
[1] The sum of the acres may not equal the total due to rounding.

**Table 4. Extrapolated Value-Enhanced Soybean Acreage for 2000**

| Region | Non-GMO | STS | Tofu | Organic | High Isoflavone | High Sucrose | High Oil | Low Linolenic | Low-Saturated Fat | High Oleic | Total[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Northwest | 11,723 | 12,902 | 8,527 | 0 | 0 | 0 | 421 | 0 | 0 | 0 | 33,572 |
| Northern | 32,635 | 27,199 | 36,237 | 3,673 | 446 | 372 | 1,673 | 465 | 1,394 | 0 | 104,094 |
| Northeast | 1,869 | 6,435 | 5,853 | 600 | 0 | 281 | 0 | 507 | 657 | 0 | 16,202 |
| Western | 32,228 | 49,805 | 16,445 | 687 | 0 | 0 | 0 | 0 | 245 | 2,128 | 101,538 |
| Upper IL River Valley | 78,706 | 56,627 | 22,653 | 8,130 | 666 | 797 | 3,149 | 0 | 0 | 962 | 171,690 |
| Lower IL River Valley | 66,347 | 45,668 | 11,416 | 8,041 | 1,499 | 2,953 | 0 | 227 | 1,022 | 0 | 137,172 |
| Eastern | 158,999 | 182,137 | 13,089 | 1,725 | 17,851 | 297 | 1,728 | 5,755 | 967 | 288 | 382,836 |
| Southern | 153,195 | 73,908 | 7,723 | 38 | 898 | 2,818 | 321 | 0 | 43 | 43 | 238,987 |
| State Total[1] | 535,701 | 454,681 | 121,943 | 22,895 | 21,360 | 7,518 | 7,291 | 6,953 | 4,328 | 3,421 | 1,186,092 |

Source: Data compiled by Dr. M. Samy from the University of Illinois Value Project Farm Survey 2000
[1] The sum of the acres may not equal the total due to rounding.

The production estimates from the UI Farm Survey show that, as a percent of total planted corn and soybean acres in the state, 18% of the Illinois corn acreage and 11% of the Illinois soybean acreage were planted to value-enhanced types in 2000. Figure 5 shows that there is considerable variability among the regions in terms of VEG's share of total acres. The Lower Illinois River Valley region shows the highest share at 24% of total corn acreage in VEG.




**Source: Data compiled by Dr. M. Samy from the University of Illinois Value Project Farm Survey 2000**

**Figure 5. Value-Enhanced Corn and Soybean Acreage Grown in Illinois by Region, 2000**

An important issue for VEG producers is the difference in yield between value-enhanced corn and soybeans and the commodity grains. Three sources of survey data provide producer perceptions on their yield for selected value-enhanced corn and soybeans. The first source is the U.S. Grains Council annual producer survey. The Council has collected data on producers' perceptions of their value-enhanced corn yield as a percent of their commodity corn yield for the 2000 and 2001 corn crops, and these data encompass seven Midwestern states. A second source is the University of Illinois Farm Survey, which inquired about yields for producers' commodity and value-enhanced corn and soybeans. The third source of information about VEG yield is from the Illinois producer survey conducted for this project (hereafter referred to as the AEC Producer Survey), and it inquired about 2001 production. Producers were asked about their perception of yield of their value-enhanced crop compared to their commodity crop. Table 5 and Table 6 summarize the producers' perceptions of average yield of selected value-enhanced grains as a percent of commodity corn or soybeans. Of these reported types, nutritionally dense and white corn experienced the lowest value-enhanced corn yield as a percent of commodity corn yield in 2000 and 2001 according to the respondents' perceptions. Tofu soybeans appear to have had the lowest yield as a percent of commodity soybean yield of the four specialty soybeans as reported by the respondents.

**Table 5. Producers' Perceptions of Selected Value-Enhanced Corn Types Yield as Percent of Commodity Corn Yield**

| | 2000 | | 2001 | | |
|---|---|---|---|---|---|
| VE Corn Type | UI Farm Survey | USGC VEG Survey | USGC VEG Survey | AEC Producer Survey | Average Perception (2000-2001) |
| Food Grade/Hard Endosperm | 98.8% | 104.0% | 103.0% | 95.4% | 100.3% |
| White | 91.6% | 98.0% | 96.0% | 87.8% | 93.3% |
| Waxy | 97.8% | 95.0% | 97.0% | 87.6% | 94.4% |
| High Oil | 96.8% | 99.0% | 97.0% | 93.2% | 96.5% |
| High Starch | N/A | N/A | 100.0% | 98.1% | 99.1% |
| Non-GMO | 97.3% | 100.0% | 100.0% | 99.9% | 99.3% |
| Nutritionally Dense | 76.8% | N/A | N/A | 81.7% | 79.2% |

**Source: UI Value Project Farm Survey, USGC VEG Survey, and AEC Producer Survey**

**Table 6. Producers' Perception of Selected Value-Enhanced Soybean Types Yield as Percent of Commodity Soybean Yield**

| | 2000 | 2001 | |
|---|---|---|---|
| VE Soybean Type | UI Farm Survey | AEC Producer Survey | Average Perception (2000-2001) |
| Tofu | 94.2% | 87.6% | 90.9% |
| STS | 97.8% | 98.1% | 98.0% |
| High Protein | | 91.7% | 91.7% |
| Non-GMO | 97.3% | 99.7% | 98.5% |

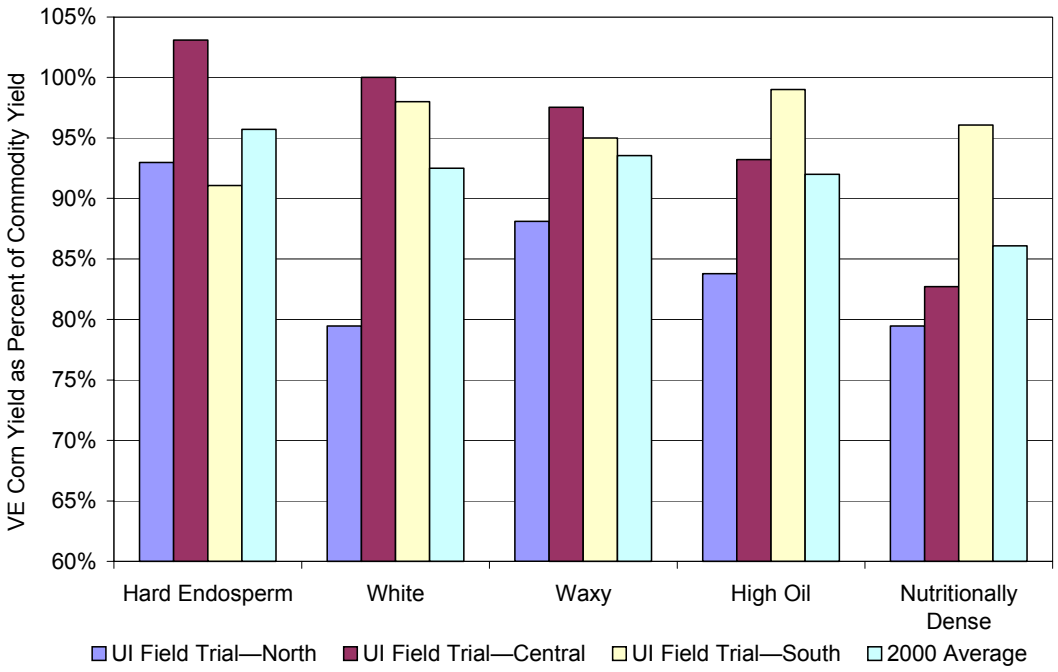
**Source: UI Value Project Farm Survey and AEC Producer Survey**

Another source of information is the on-farm research program conducted by the University of Illinois Value Project in 2000 and 2001. Northern Illinois' value-enhanced corn yields, expressed as a percent of commodity corn yields, experienced the lowest yields of the three Illinois regions in both 2000 and 2001, except for hard endosperm corn in 2000 and high starch corn in 2001 (Table 7, Figure 6, Table 8, and Figure 7). In 2000, nutritionally dense corn produced the lowest average yield as a percent of commodity corn yield of the reported value-enhanced corn types. White corn had the lowest average yield as a percent of commodity corn yield for the reported types across the three regions in 2001.

**Table 7. Yield for Selected Value-Enhanced Corn Types as Percent of Commodity Corn Yield, 2000**

| | UI On-Farm Research Program—North | UI On-Farm Research Program—Central | UI On-Farm Research Program—South | 2000 Average |
|---|---|---|---|---|
| Hard Endosperm | 93.0% | 103.1% | 91.1% | 95.7% |
| White | 79.5% | 100.0% | 98.0% | 92.5% |
| Waxy | 88.1% | 97.5% | 95.0% | 93.5% |
| High Oil | 83.8% | 93.2% | 99.0% | 92.0% |
| Nutritionally Dense | 79.5% | 82.7% | 96.1% | 86.1% |

Source: UI Value Project Results of On-Farm Specialty Corn and Soybean Research Program 2000



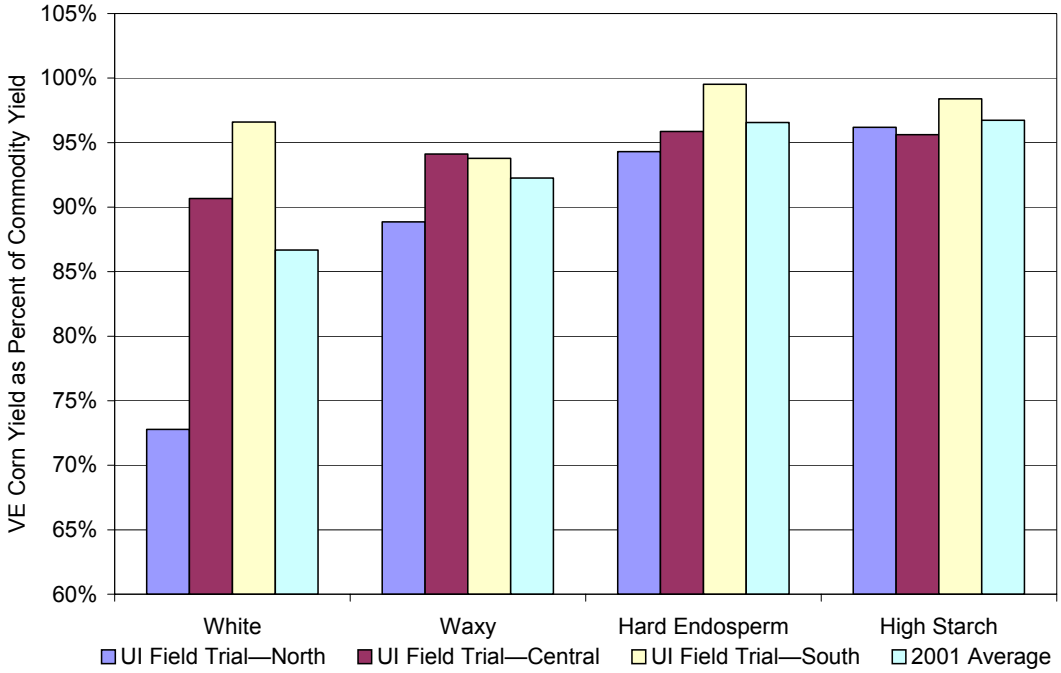

**Source: Data compiled from University of Illinois Value Project 2000 On-Farm Specialty Corn and Soybean Research Program**

**Figure 6. Yield for Selected Value-Enhanced Corn Types as Percent of Commodity Corn Yield, 2000**

**Table 8. Yield for Selected Value-Enhanced Corn Types as Percent of Commodity Corn Yield, 2001**

| | UI On-Farm Research Program—North | UI On-Farm Research Program—Central | UI On-Farm Research Program—South | 2001 Average |
|---|---|---|---|---|
| White | 72.8% | 90.7% | 96.6% | 86.7% |
| Waxy | 88.9% | 94.1% | 93.8% | 92.3% |
| Hard Endosperm | 94.3% | 95.9% | 99.5% | 96.6% |
| High Starch | 96.2% | 95.6% | 98.4% | 96.7% |

Source: UI Value Project Results of 2001 On-Farm Research Program for Value-Enhanced Corn and Soybeans




**Source: Data compiled from University of Illinois Value Project 2001 On-Farm Research Program for Value-Enhanced Corn and Soybeans**

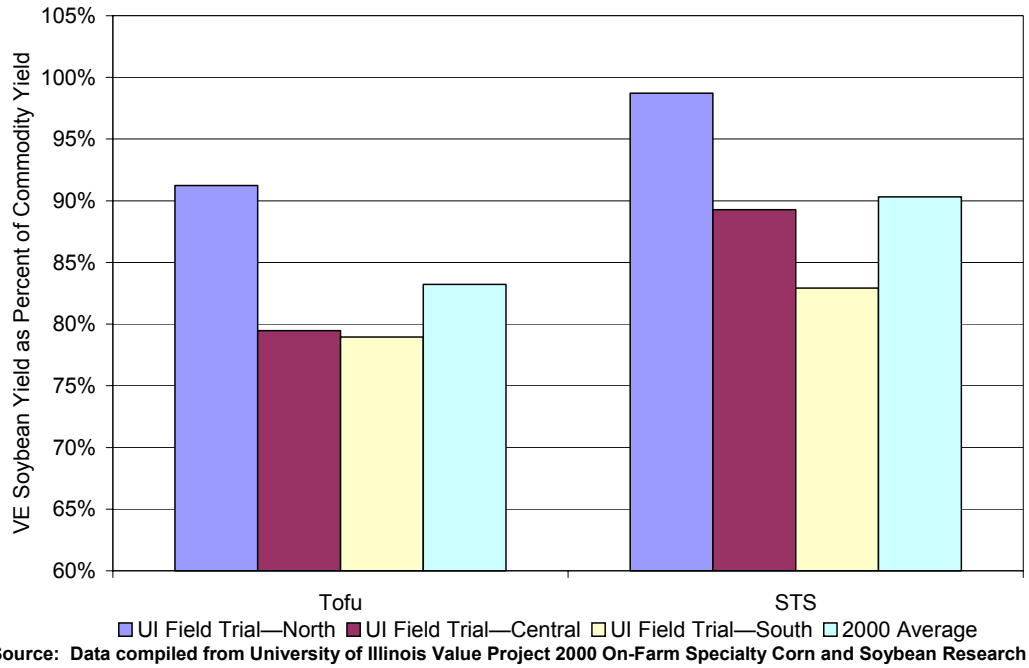
**Figure 7. Yield for Selected Value-Enhanced Corn Types as Percent of Commodity Corn Yield, 2001**

Tofu, STS and high protein soybeans were tested on farm as part of the University of Illinois Value Project (Table 9, Figure 8, Table 10, and Figure 9). Yields from tofu soybeans were lower than STS soybeans in 2000 and lower than high protein soybeans in 2001. Tofu soybean yields ranged from 79.5% to 93.7% of commodity soybean yields during 2000 and 2001. STS soybeans exhibited a wider yield as a percent of commodity soybean yield in 2000, ranging from 82.9% to 98.7%. In 2001, high protein soybean yields ranged from 93.3% to 97.3% of commodity soybean yields.

**Table 9. Yield for Selected Value-Enhanced Soybean Types as Percent of Commodity Soybean Yield, 2000**

| | UI On-Farm Research Program—North | UI On-Farm Research Program—Central | UI On-Farm Research Program—South | 2000 Average |
|---|---|---|---|---|
| Tofu | 91.2% | 79.5% | 79.0% | 83.2% |
| STS | 98.7% | 89.3% | 82.9% | 90.3% |

Source: UI Value Project Results of On-Farm Specialty Corn and Soybean Research Program 2000



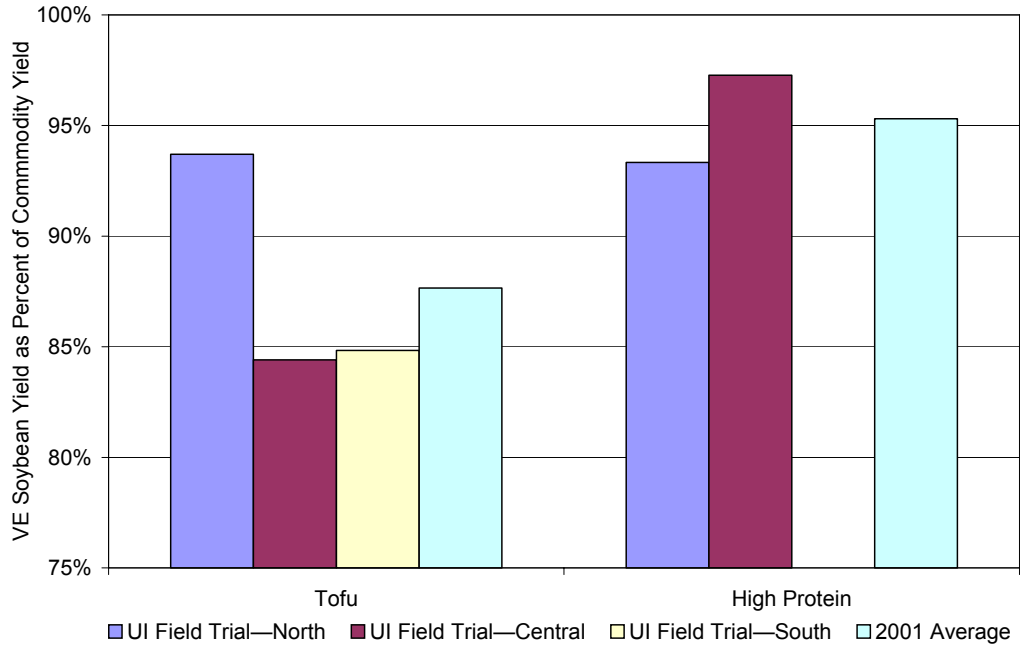

**Source: Data compiled from University of Illinois Value Project 2000 On-Farm Specialty Corn and Soybean Research Program**

**Figure 8. Yield for Selected Value-Enhanced Soybean Types as Percent of Commodity Soybean Yield, 2000**

**Table 10. Yield for Selected Value-Enhanced Soybean Types as Percent of Commodity Soybean Yield, 2001**

| | UI On-Farm Research Program—North | UI On-Farm Research Program—Central | UI On-Farm Research Program—South | 2001 Average |
|---|---|---|---|---|
| Tofu | 93.7% | 84.4% | 84.8% | 87.6% |
| High Protein | 93.3% | 97.3% | | 95.3% |

Source: UI Value Project Results of 2001 On-Farm Research Program for Value-Enhanced Corn and Soybeans




**Source: Data compiled from University of Illinois Value Project 2001 On-Farm Research Program for Value-Enhanced Corn and Soybeans**

**Figure 9. Yield for Selected Value-Enhanced Soybean Types as Percent of Commodity Soybean Yield, 2001**

Yield performance from the four different sources of yield data is, in part, a function of the varieties used, their adaptation to geographical regions, the year in which they are grown, and the different regions and climates included in the comparisons. Table 11 summarizes the ranges of yield as a percent of commodity corn and soybean yields for the selected value-enhanced corn and soybean types. White and nutritionally dense corn exhibited the widest yield range of value-enhanced corn yield while STS soybeans had the widest range of value-enhanced soybean yields. Non-GMO soybeans and corn exhibited the smallest range of yield as a percent of commodity grain for the VEG products in 2000 and 2001.

**Table 11. Range of Yield as a Percent of Commodity Grain Yield for Selected Value-enhanced Corn and Soybean Types, 2000 and 2001**

| | Yield Range, Percent | |
|---|---|---|
| **Value-Enhanced Type** | **Low** | **High** |
| **Corn** | | |
| Hard Endosperm/Food Grade | 91 | 104 |
| White | 73 | 100 |
| Waxy | 88 | 99 |
| High Oil | 84 | 99 |
| High Starch | 96 | 100 |
| Nutritionally Dense | 77 | 96 |
| Non-GMO | 97 | 100 |
| **Soybean** | | |
| Tofu | 79 | 94 |
| STS | 83 | 99 |
| High Protein | 92 | 97 |
| Non-GMO | 97 | 100 |

**Sources: USGC VEG Survey, University of Illinois Value Project Farm Survey and On-Farm Research Program, AEC Producer Survey**

## Illinois Markets for Value-Enhanced Corn and Soybeans

As part of the University of Illinois Value Project, grain marketers were surveyed regarding what types of VEG they handle. Consistent with Illinois production of VEG, it appears that the largest VEG markets are for non-GMO corn and soybeans. The market for non-GMO grains has increased significantly over the past three to four years, and the change has been driven most significantly by the Japanese and European markets.

The largest number of value-enhanced corn handlers accept delivery of non-GMO, high oil, and yellow and white food grade corn. These handlers are dispersed throughout the central part of Illinois with some marketers located east of St. Louis and other value-enhanced corn marketers located in the northern part of the state. Grain merchandisers handling other value-enhanced corn types are more widely distributed across the state but are concentrated in central Illinois. Figure 10 shows the Illinois markets for the value-enhanced corn types in 2001.

Grain merchandisers handling non-GMO soybeans are distributed throughout Illinois, while marketers accepting STS soybeans are primarily in the Upper Illinois River Valley and Eastern regions of the state. The other value-enhanced soybean types are handled by grain merchandisers located across central Illinois. However, a few handlers in the northern part of the state are accepting tofu (clear hilum) soybeans. Figure 11 shows the Illinois markets for value-enhanced soybeans in 2001.

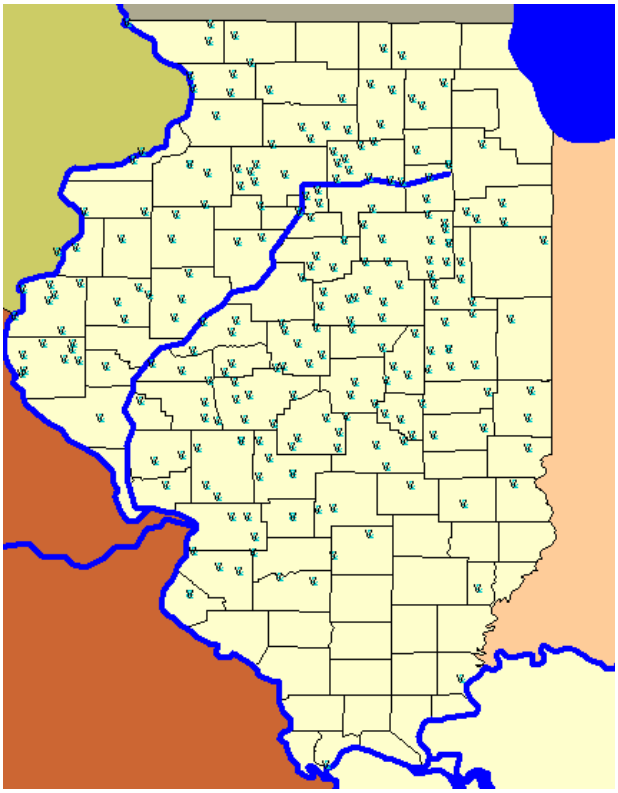


**Figure 10. Value-Enhanced Corn Markets in Illinois, 2001**

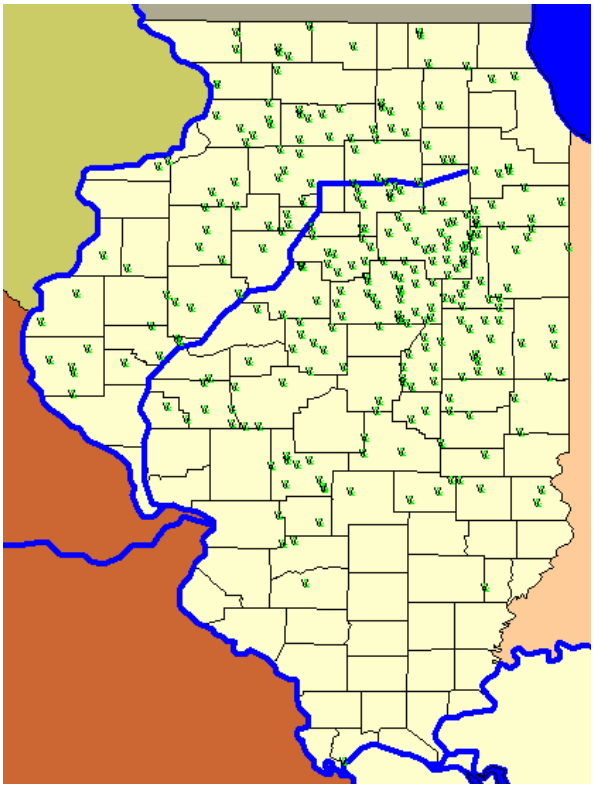


**Figure 11. Value-Enhanced Soybean Markets in Illinois, 2001**

**Source: Data compiled by Dr. M. Samy from the "Value-Enhanced Corn and Soybean Production in Illinois", University of Illinois, 2001**

# Socioeconomic Characteristics of Illinois Value-Enhanced Grain Producers

Strategies for managing risk in production agriculture are affected by producer characteristics such as experience and farm size. Having an awareness of age, education, farm size, attitudes toward the VEG market, and reasons for growing and not growing VEG provides the backdrop for understanding the manner in which a producer may manage risk. Three studies provide this information.

1. Beginning in 1995, the U.S. Grains Council has conducted an annual survey of producers throughout the Midwest. The surveys have collected data on corn acreage, value-enhanced corn production, reasons for growing and not growing value-enhanced corn, storage, and market expectations.

2. The 2000 Farm Survey conducted by the University of Illinois Value Project gathered information on producer age, education, off-farm income, farm size, on-farm storage, view of agriculture's future, and strategies for increasing income.

3. The third source of information is the data collected through the focus groups and mail survey as part of this project (AEC Project). The focus group participants provided their ages and farm sizes, and answered questions about reasons for growing and not growing VEG and risk perceptions. The survey collected information pertaining to farm size and perceptions of the risk and benefits involved in growing VEG. (Appendices B and D present detailed summaries of the results of the focus groups and producer survey, respectively.)

Based on the three sources of information, a profile of the producers growing VEG emerges. The distinguishing characteristics for VEG growers appear to be:

**Age**—VEG producers are younger than the producers not interested in growing VEG.

**Education**—VEG producers have more college education than producers not interested in VEG.

**Farm size**—VEG producers operate larger farms than producers not interested in VEG.

**On-farm storage**—VEG producers have more on-farm storage capacity than non-VEG producers. However, this capacity difference may be due to larger farm size, not due to the simple desire to have proportionately greater storage capacity.

**Off-farm income**—VEG producers rely less on income from off-farm employment than non-VEG producers.

**Use of crop insurance**—VEG producers are more likely to carry revenue-based crop insurance than non-VEG producers.

**Income strategy—**VEG producers are more likely to consider producing specialty crops or joining producer alliances to increase income than non-VEG producers.

**Future of VEG**—VEG producers and those interested in producing VEG are more likely to believe that producers of the future will produce more commodities closely tailored to the demand of end use markets. Producers not interested in growing VEG believe that the production of selling standard commodities on the open market will remain a viable strategy.

The U.S. Grains Council surveys and the UI Farm Survey asked producers about their reasons for growing and not growing value-enhanced corn or crops, respectively. The results indicated similar reasons for growing the VEG products. The predominant reason for growing VEG is for the premiums or expected higher income. Other reasons include previous good experience, to be part of an emerging market, to test what the net return would be, to gain experience with producing VEG, and for diversification.

Producers responding to the U.S. Grains Council surveys have indicated the primary reason for not growing VEG is the lack of sufficient premiums. The respondents have also indicated that they do not grow value-enhanced corn because there are no markets in their area or that they are happy with their current hybrids or returns. The Illinois producers responding to the Value Project survey stated that the most frequent reason for not growing VEG is the lack of markets for the specialty crops. Other reasons included uncertainty of profits and inadequate information about risk.

The focus group participants for the AEC Project were asked why they grow VEG. They stated their predominant reason for growing VEG is income opportunity. The survey respondents were asked about their level of agreement with factors often given for growing VEG. Table 12 summarizes the AEC producer survey responses for the five factors given as possible benefits for growing VEG. The average scores are presented for producers who have never grown VEG, current VEG producers, producers not currently growing VEG but who have grown it in the past, and all the respondents. The factor with the highest average score for each group is in blue. Current VEG producers indicated that they felt the greatest benefit from producing VEG is the greater opportunity to increase farm income. However, the other groups, along with all the respondents, responded that the ability to diversify production provides the largest benefit from VEG production. Except for the "access to new technology" benefit, the current VEG growers consistently rated the other benefits with more positive perceptions than the non-VEG or past VEG producers did.

**Table 12. Average Score for Level of Agreement with Benefits of Growing VEG**

| | Average Score (Scale: 1=Strongly Disagree to 5=Strongly Agree) | | | |
|---|---|---|---|---|
| Benefit | Non-VEG Producers | Current VEG Producers | Past VEG Producers | All Respondents |
| Greater Access To Grain Markets | 2.56 | 2.68 | 2.49 | 2.59 |
| Greater Opportunity To Increase Farm Income | 3.32 | **3.64** | 3.42 | 3.46 |
| Greater Access To New Technology | 3.33 | 3.26 | 3.19 | 3.28 |
| Greater Ability To Diversify Production | **3.46** | 3.60 | **3.53** | **3.53** |
| Greater Ability To Integrate Vertically Up/Down The Value Chain | 3.28 | 3.28 | 3.21 | 3.26 |

**Source: AEC Producer Survey**

Figure 12 shows the distribution of responses for the "greater opportunity to increase farm income" factor. Almost 59% of the non-VEG producers either disagreed or were uncertain about the income potential for VEG production while 60.2% of the current VEG producers believed that there is greater opportunity for increased income through VEG production. About 48% of the past VEG producers felt that VEG production provided greater income opportunity.

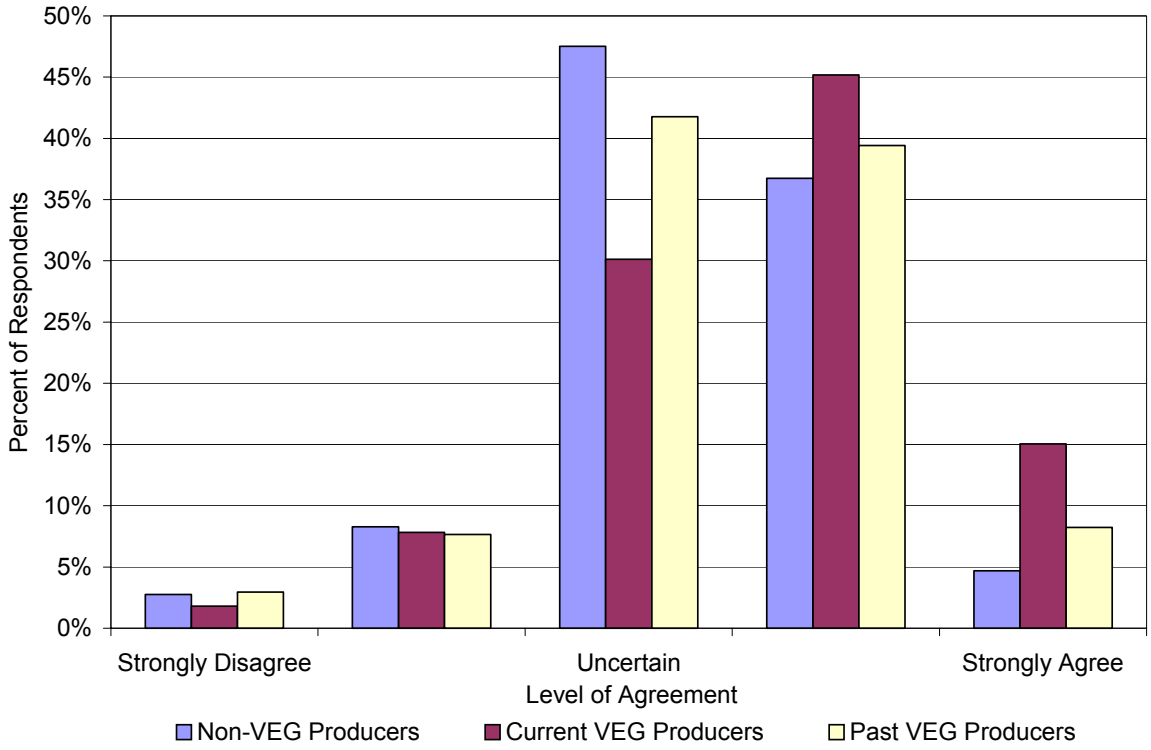



**Figure 12. VEG Offer Greater Opportunity to Increase Farm Income**

**Source: AEC Producer Survey**

# Risks and Risk Management Tools

## Risk in Production Agriculture

Grain production is a risky business. In addition to the typical risks non-production firms face, producers encounter unique risks that have been challenging to manage historically. Unlike other business models where companies have some control over the price they set for their products (with the goal of covering costs and receiving a small profit), traditional crop producers sell their products in commodity markets in which they have little control over their sale price. Much of the production process is also beyond the control of the producer. Yield and quality are highly susceptible to weather elements such as moisture and temperature.

To help evaluate and manage effectively risks faced by agricultural producers, the sources of risk in production agriculture are often categorized into the following five categories:

1. Market—This involves the uncertainty surrounding the price received for the crop or livestock product and prices paid for variable inputs. The relevant time horizon begins once the commitment to production commences and ends when all the product has been sold.

2. Production—This risk manifests itself in yield variability, and the source stems primarily from weather-related events such as drought or flooding, extreme temperatures (hot and cold), hail, and tornadoes. Other production-related risks include disease, insects, plant-related problems (e.g. poisonous plants) and technology.

3. Financial—This risk category addresses the manner in which a producer capitalizes the operation with debt and equity. Debt financing is affected by interest rate and cash flow fluctuations, while equity financing is affected by the probability of loss of equity.

4. Business or Institutional—Risk sources falling into this category are wide-ranging. Sources include government policy and regulation, political, macroeconomic, social, natural contingencies, and legal. Changes in any of these areas are beyond the control of the agricultural producer but can greatly affect available inputs and their costs, production practices, available markets for outputs, and financial circumstances.

5. Human or Personal—These sources of risk are often overlooked but can adversely affect an agricultural producer. These sources include labor availability, personal events such as injury and death, and asset-related events such as fire, theft, or other loss. These losses can also generate liabilities for the firm.

These sources of risk are incurred by both commodity and value-enhanced growers of soybeans and corn. In addition, some of these risks are relevant within a single crop year, while other risks span multiple crop years or the lifetime of the operation. It is important to understand the complete set of risks agricultural producers face and how these risks impact producer decision-making. However, the objective of this study is to go beyond the universe of risks commodity producers face and to identify risks unique to value-enhanced corn and soybean production in Illinois, and issues surrounding the management of those risks. Therefore, the focus of the remainder of this report will be on an extension of the above-described risks.

## Risks in Value-Enhanced Grain Production

The previous section described five categories of risk common to all sectors of production agriculture. However, when thinking about the types of risks faced by VEG producers, it is useful to break these risk categories down into subcategories that identify unique VEG risks. Through the analysis of data collected for this project (focus groups, contract reviews, survey, discussions with economists and industry experts), nine risks unique to VEG production were identified. The nine types of risks, as well as the main risk category in which they fall, are listed Table 13.

**Table 13. Risks in Value-Enhanced Grain Production**

| Risk | Category |
|---|---|
| Base Price | Market Risk |
| Price Premium | Market Risk |
| Market Access | Market Risk |
| Quality | Production Risk |
| Yield | Production Risk |
| Contract | Business Risk |
| Relationship | Business Risk |
| Product Liability | Business Risk |
| Investment | Financial Risk |

The following sections define these risks and identify how these can be different for commodity and VEG production. The current risk management tools available for managing these risks are also described. The discussion reviews these topics both in the multiple year and the single crop year context, but focuses on the single crop year.

## Base Price Risk

### Definition

The base price is the base grain market price that any premium is added onto to determine the final market price of a VEG. Most value-enhanced grains are priced at a premium over the commodity grain price. Therefore, the base price is often the commodity grain price. Base price risk is the risk of lower than expected grain prices other than changes in expected market price premiums.

### Components

The base price can be determined by using either the futures price for the underlying commodity from the Chicago Board of Trade (CBOT) or the local cash price. The difference between the local cash price and the futures price for the same commodity is called the basis. The basis for a given location fluctuates with local demand and supply, transportation costs, and other factors. The basis can be either positive or negative, implying that the local cash price may be above or below the futures price.

Base price risk is the risk or volatility associated with the underlying pricing mechanism for the base price. If the base price is based on the futures price, the base price risk is the risk associated only with the futures price. If the base price is based on the local cash price, then the base price risk is a function of both the basis and the futures price. The risk associated with changes in the basis is often small relative to the risk of changes in the futures contract. Basis levels change over time but not in the same magnitude as futures prices.

## Differences in Commodity and VEG

In most cases, the base price risk is similar for both commodity grain and VEG. The pricing structure for many VEG products is tied to a futures price or the local cash commodity price. For example, a VEG contract may be priced at 30 cents over the December futures price. In this case, the futures price volatility would impact the VEG producer the same as a producer pricing commodity grain using the same December futures price. This type of VEG pricing system would not have basis risk like commodity grain sold at the local cash price since changes in the local basis do not affect the price. Other VEG contracts may be priced at a specified premium over the local cash price. In this case, the VEG producer would have a basis risk equal to the commodity producer.

There are several issues related to VEG pricing specifications that affect price risk. First, VEG pricing tied to a specific futures contract month may limit the pricing options for a producer and increase price risk. The pricing options available to the producer may be limited by the VEG contract. Second, the timing of the pricing may be limited by the contract. VEG contracts may include a pricing window that defines the time period during which the grain must be priced. For example, a contract may specify that the grain must be priced between harvest and March of the following year. The pricing window for the VEG may affect the producer's ability to market the grain. Focus group respondents indicated that the narrow pricing window for some products is a drawback to raising VEG.

## Risk Management Tools

Many of the same types of risk management tools can be used interchangeably for commodity grain and VEG. The following types of marketing tools are commonly used for both commodity and VEG marketing.

- Hedging with futures contracts
- Forward contracts
- Basis contracts
- Options on futures contracts

There are several issues that may impact the use and effectiveness of these marketing tools when used to price VEG. First, these contracts may require producers to estimate total production before harvest in order to lock in a volume to price. Producers may be less certain about expected yields on VEG and therefore lock in a smaller portion of their expected production to account for this uncertainty. For example, producers may be comfortable with forward pricing 75% of their expected commodity grain production but not comfortable with pricing at this level for VEG production given yield variability. By forward pricing at a lower percentage level, they may be increasing their price risk on VEG. Second, producers may also be leery of overcommitting on forward contracts for VEG given the higher cost to fill contracts that they cannot cover due to underproduction. Due to the higher value of the VEG and the limited supply, it will cost producers more to fill contracts they could not fill if their production is lower than expected. Finally, the types of marketing tools available may be limited by the VEG contract. Forward or deferred price contracts may not be available on the VEG type produced.

Crop revenue insurance products have become a useful tool for many commodity grain producers to manage both price and yield risk. These products guarantee a minimum revenue per acre. These products have been used on a limited basis in VEG.

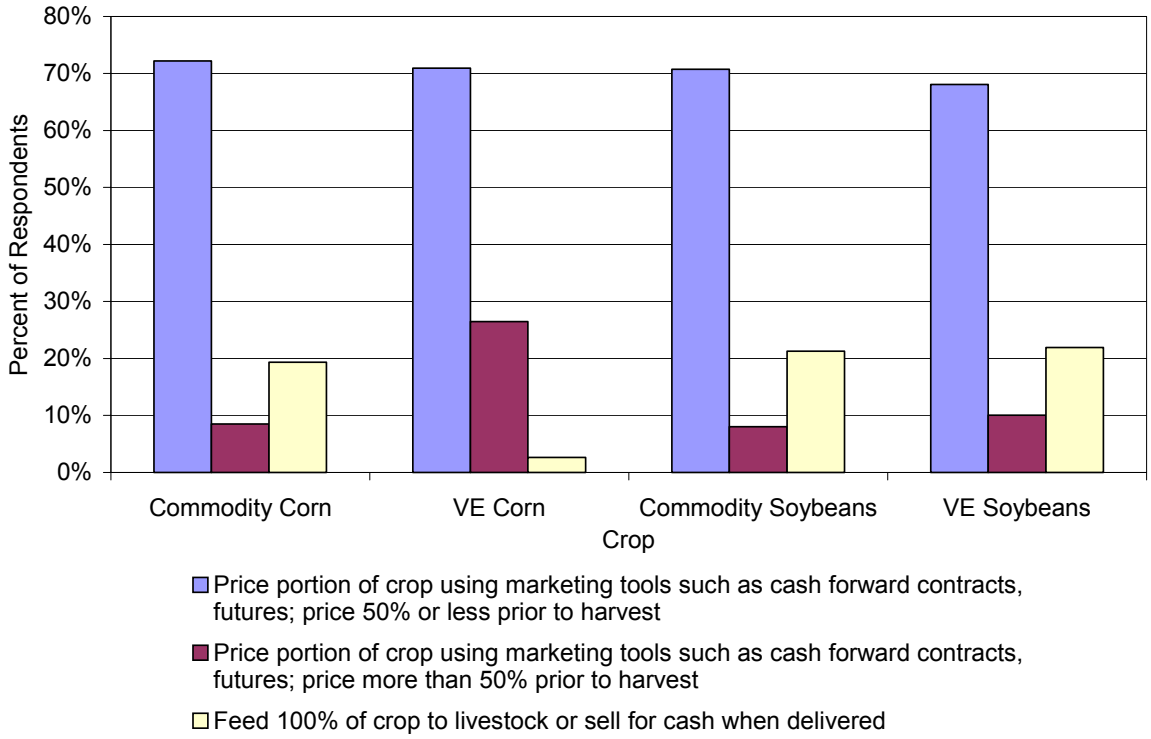
Crop revenue insurance can serve as a useful tool to cover the base price risk in both commodity and VEG. However, since these products are based on the futures price, they only cover the futures price component of price risk and not basis risk. Local price swings due to changes in the basis are not covered in the policies. Crop revenue insurance policies are designed to allow producers to forward contract their crop more aggressively than if they did not have crop insurance. Without insurance, producers may be reluctant to forward contract a high percentage of their crop since there is a risk that they will not produce enough to cover the contract. In addition, if prices move higher by the time of delivery, they may be forced to pay a price higher than the contracted price to fill their contract. Crop revenue insurance is designed to cover shortfalls in the forward contract since the policies cover both yield and price changes.

Producers need to be able to forward contract their VEG production in order to fully utilize the benefits of crop revenue coverage. In other words, they need to be able to lock in the base price of the VEG early in the growing season. Producers that do not have the ability to forward contract their production will not be able to take full advantage of the benefits of crop revenue coverage.

Results from the producer survey show that there are some differences in the use of price risk management tools between commodity and VEG growers. The producer survey asked the respondents how they marketed their crop. The marketing options presented in the survey were: 1) feed to livestock; 2) sell for cash price when delivered; 3) price prior to harvest with marketing tools such as cash forward contracts, futures and/or options; and 4) price after harvest with marketing tools such as cash forward contracts, futures and/or options. The respondents were then summarized into the following three categories.

1. Those who did not use marketing tools (100% of their crop was either fed to livestock or sold for cash when delivered),
2. Those who used marketing tools such as cash forward contracts, futures and/or options but priced 50% or less of the crop prior to harvest, and
3. Those who used the marketing tools but priced more than 50% of their crop prior to harvest.

Categorization in this manner permits evaluation of the extent of use of marketing tools when yield outcome is uncertain prior to harvest. Figure 13 shows that the majority of the respondents in each of the four crop types utilizes marketing tools but prices no more than 50% prior to harvest. Pricing prior to harvest is greater for producers of value-enhanced corn and soybeans than for production of commodity corn and soybeans. The figure shows that 26% of the respondents growing value-enhanced corn marketed over 50% of their crop prior to harvest while only 9% of the commodity corn growers priced over 50% of their crop prior to harvest.




**Source: AEC Producer Survey**

**Figure 13. Marketing Method of Survey Respondents**

## Price Premium Risk

### Definition

Price premium risk is the risk of a change in premium without a change in quality within the crop year. Changes in price premium as a result of changes in quality is a quality risk not a premium risk. Changes in quality risk may affect the price premium. To help clarify the different sources of risk, the two risk categories have been separated for the purpose of this study.

### Components

Using the definition of price premium risk above, the sources of price premium risk are fairly limited. VEG raised under contract will typically have a set premium schedule in the contract. If the price premium for a given quality level decreases, this is a contract default on the part of the buyer. This type of price premium change would be a contract risk versus premium risk. It affects the premium level received but the real source of risk is the strength of the contract.

A more likely source of price premium risk is the risk faced by a grower producing VEG for the open market. This type of grower is also known as a speculative grower or "growing on spec." The speculative grower does not have a contract guaranteeing a premium. The premium level is set by the market at the time of sale and may be higher or lower than was expected when the crop was planted.

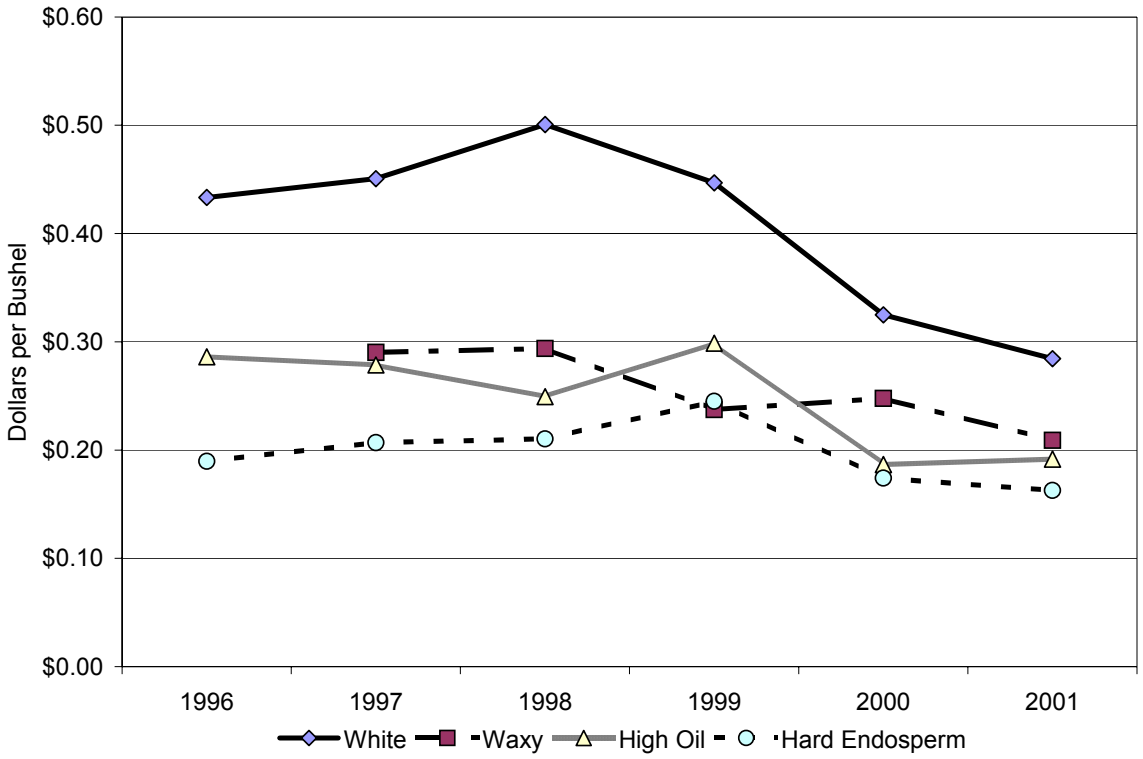
In the producer survey for this project, the respondents were asked about their problems with expected premiums. While the VEG producers growing at least a portion of their VEG type under contract experienced lower than expected premiums (32% of the producers), a higher portion of VEG growers with no contract received lower than expected premiums (48%) (Table 14). This could indicate that producers growing VEG under no contract made their decision to produce VEG with an expectation of premium they would receive for the crop, but their actual receipts fell short of their projection. For the VEG growers with contracts, their lower than expected premiums are most likely due to quality issues, not due to changes in premiums.

**Table 14. VEG Producers' Problems with Lower than Expected Premiums**

| | No Contract | | Grown under Contract | | |
|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | Total |
| Problems with Lower than Expected Premium | 108 | 48.2% | 98 | 32.3% | 206 |
| No Problems with Lower than Expected Premium | 116 | 51.8% | 205 | 67.7% | 321 |
| **Total** | **224** | | **303** | | |

**Source: AEC Producer Survey**

Another component of price premium risk is premium decay over time. This is the risk that premiums may decline over multiple crop years. Figure 14 shows the average premium received by Midwestern producers for white, waxy, high oil and hard endosperm corn from 1996 through 2001 (U.S. Grains Council 2001-2002 VEG Quality Report). This indicates a downward trend over this time horizon of the average premiums received for these types of corn. This risk of premium decay can only be managed with contracts that cover multiple crop years. Most contracts are for a single year. Long-term premium risk affects growers who have invested in facilities or equipment to handle the specialized crop.




**Source: U.S. Grains Council 2001-2002 VEG Quality Report**

**Figure 14. Average VEG Premiums Paid to Producers**

Price premiums for VEG often decline or decay over time for two main reasons. First, competition among producers that are willing to grow the VEG puts downward pressure on the premiums. New VEG products may have higher premiums associated with them since the yield performance and market for the product is unknown. As more producers become familiar with the products, they may be willing to grow the products for a lower premium. Second, competition from other feed ingredients or processed products may drive down the premiums over time. Premiums for high oil corn have been pressured by low feed fat prices. The value of high oil corn in a feed ration is dependent on the prices of other potential ingredients in the ration. The values of VEG products that are designed to replace other ingredients or processed products are affected by the prices of those competing products.

### Differences in Commodity and VEG

Price premium risk is solely a property of VEG production. Commodity grain by definition does not receive a price premium.

### Risk Management Tools

The main risk management mechanism for managing price premium risks is the use of production contracts. Growers raising VEG under contract face significantly less premium risk than speculative growers since the premiums are usually specified in the contract. Longer-term premium risks are harder to manage since most contracts are for a single crop year.

## Market Access Risk

### Definition

Market access risk is the risk of not having a viable market for the crop.

### Components

Short-term market access risk is the risk of not having a market during the crop year for either a VEG crop not grown under contract or the over-production of a VEG crop. This is mainly a problem for VEG grown without a contract. For example, if a producer grows white corn without a contract, he faces the risk of not having a market for the crop and/or not receiving the premium level he expected for the crop. Short-term market access for commodity grain is typically not an issue.

Long-term market access relates to the risk of markets for a grain product disappearing over multiple crop years after a producer has made investments to produce this product. VEG products that require specialized equipment, production skills, or grower certification create these types of long-term market access risks. For example, a grower of organic soybeans has to certify his farm as organic. The certification process takes several years and may cost the producer in terms of lower production levels and management time. Loss of the organic market for his crops is a long-term risk.

Currently, long-term market access is mainly an issue for VEG but it may become an issue for commodity grain as well. As the grain marketing system becomes more coordinated, it may start to resemble the livestock industry in the U.S. Many hog producers are now finding it more difficult to find viable markets for their hogs. Producers are aligning themselves with coordinated systems to ensure a market for their production.

## Quality Risk

### Definition

Quality risk is the risk of an unexpected quality level in the grain that affects the grain's value through discounts or reduced premiums. Quality risk also includes the risk of the grain being rejected by the buyer due to low quality or contamination. As mentioned in the premium risk section, quality risk may affect the premium level. For the purpose of this study, premium risk and quality risk are defined separately.

### Components

There are several sources or components of quality risk:

**Variety risk**—Quality performance can vary significantly by variety. Even when two varieties of the same corn type are planted in the same field and raised under the same growing conditions they can have significant differences in quality.

**Growing condition quality risk**—Quality can be adversely affected by poor weather and growing conditions during the growing season. Many quality factors including chemical composition and test weight are affected by growing conditions. These conditions are often out of the control of the producer.

**Contamination risk**—Contamination can be the result of operator error at the farm level but it can also occur due to pollen drift and seed impurities that are out of the producer's control. The risk of the crop being contaminated in the field or after harvest can have significant consequences for some products such as non-GMO corn and soybeans.

**Operator error based quality risk**—Quality can be lower than expected due to operator error at the farm level. Errors in combine settings, dryer temperatures, or segregation procedures can affect quality results.

**Storage quality risk**—Once the grain is harvested there is also a risk that the quality will deteriorate in storage. Storage risk will vary with the initial quality characteristics of the grain, the storage conditions, and the duration of storage.

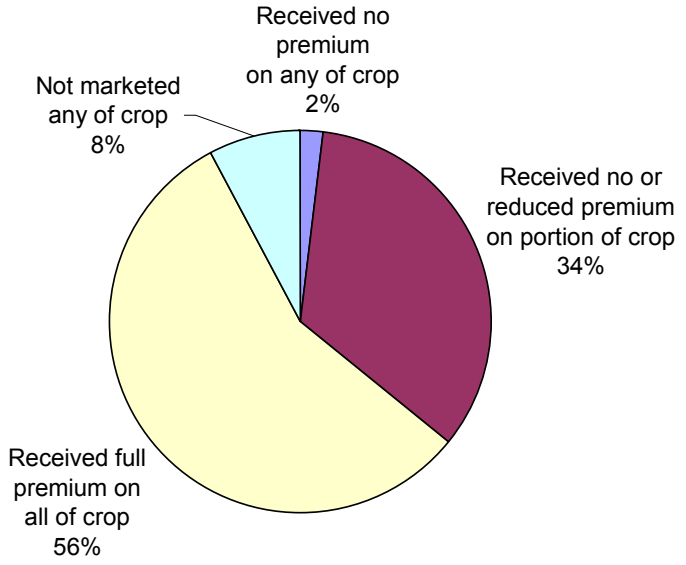
**Measurement risk**—This is the risk that sampling or measurement error may give erroneous quality results when the grain is tested. The invalid quality results may lead to lower than expected premiums, discounts, or rejection of the grain.

**Rejection risk**—Often there are varying degrees of penalties for grain that does not meet the buyer's specifications. The ultimate penalty is rejection. The buyer may not accept the grain forcing the producer to find another outlet for the grain and possibly forcing the producer to default on a contract to deliver the grain at the desired quality level.

Focus group participants stated that they had experience with the following:

- Inconsistent grading of the same field of corn
- Fields of VEG rejected due to neighbors' fields being GMO grain
- Wind damage
- Grain going out of condition (spoiling) before buyer takes delivery on grain

Producers growing VEG under contract were asked in the survey done for this report what percentage of their crop they did not receive any premium, a reduced premium, or the full premium. They were also asked if they had not yet marketed their crop. Figure 15 shows that 56% of the VEG producers received the full premium on 100% of their crop, while 34% of the growers received no or a reduced premium on a portion of their crop. Eight percent of the VEG producers had not yet marketed their crop while 2% received no premium on their contracted production.




**Source: AEC Producer Survey**

**Figure 15. Premiums Received by VEG Producers**

Table 15 also presents results from the producer survey. These results show that the majority of producers did not experience problems with their crop being rejected due to quality standards, GMO contamination, delivery schedule, storage or harvest. The factor that caused the largest percentage of producers' problems was their delivery schedule. However, it is unknown whether the problems were due to the VEG going out of condition before the buyer would take delivery or due to the inconvenience of the delivery schedule. Based on the remarks made in the focus groups and on the producer survey, it is most likely that the problems with delivery schedules are not related to quality, but to inconvenience.

**Table 15. Problems with Issues Related to Quality**

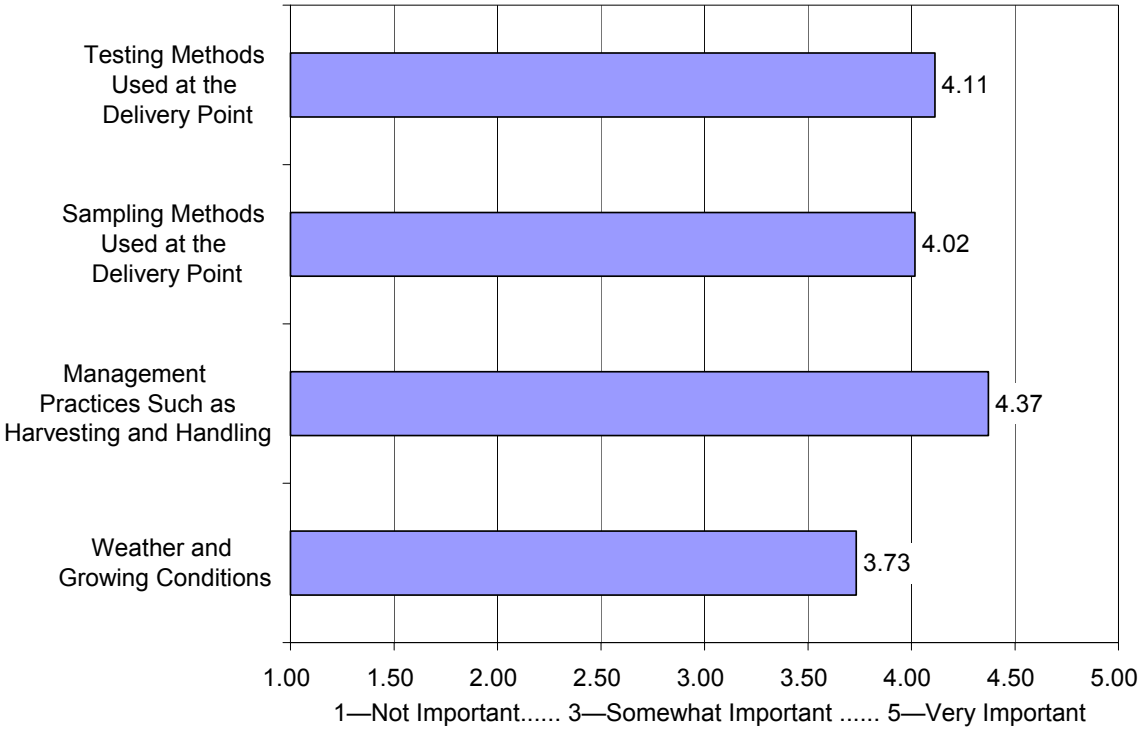
| | Yes | | No | |
|---|---|---|---|---|
| **Problem** | **Number** | **Percent** | **Number** | **Percent** |
| Crop Rejected Due to Not Meeting Quality Standards | 118 | 22.4% | 409 | 77.6% |
| GMO Contamination | 44 | 8.3% | 483 | 91.7% |
| Problem with Delivery Schedule | 208 | 39.5% | 319 | 60.5% |
| Storage | 55 | 10.4% | 472 | 89.6% |
| Harvesting | 65 | 12.3% | 462 | 87.7% |

**Source: AEC Producer Survey**

It is important to distinguish between quality losses that are outside the control of the operator (e.g. weather) and those related to management practices (e.g. drying practices). Some risks associated with quality changes can be controlled by harvesting, conditioning, and storing practices. For example, moisture content, breakage, and storage molds are directly related to harvest moisture, drying practices and management of storage. Other attributes are determined by environmental conditions. Development of field fungi, low test weight, and chemical composition are influenced

primarily by factors outside the control of the operator. There are some gray areas of overlap. For example, some of these attributes are also influenced by the variety selected for planting, weather conditions may dictate less than optimal harvest moisture, and breakage can be influenced by environmental stress as well as by drying temperature.

Present and past VEG growers were asked in the producer survey about their perception of how important specific factors are in meeting quality specifications (Figure 16). While the average responses were rated between somewhat to very important, the respondents rated management practices as the most important factor affecting quality specifications. Management practices is the one factor completely under the producer control while the others are either beyond anyone's control or controlled by other parties.




**Source: AEC Producer Survey**

**Figure 16. Risk Factors Affecting Meeting Quality Specifications**

## Differences in Commodity and VEG

There are some major differences in the type and impact of quality risks for commodity grain and VEG. Quality variability in commodity grains only has a negative impact on the value of the grain. Shipments of commodity grain that exceed minimum quality requirements do not receive a premium while those that are lower than minimum requirements receive a discount. This differs from many VEG products that can receive a premium for high quality levels. There are discounts on low quality levels in VEG but also the opportunity to receive a premium for high levels. Many premium schedules are based on a sliding scale where a higher premium is available for higher quality levels.

Discounts and lost premiums can be considered the financial impact of quality risks. Elevator managers are free to set commodity grain discounts according to their assessment of the effect on value and competition from other buyers. Discounts vary over time and among elevators, and are influenced by the general level of quality within a region. For example, if mold damage is at a very

low level in current receipts, elevator managers may ignore that grade factor, knowing they will be able to blend off the minor damage and receive no discounts from their buyers. Discounts are relatively stable from year to year, and producers will be able to estimate their risks of losses once they determine the general quality of their crop.

The critical quality traits in commodity grain production are limited to the standard grade factors such as test weight, damage, and BCFM. The critical quality factors in VEG are often product specific. For high oil corn it is oil content. For high protein soybeans it is protein content. Critical quality factors in VEG may also be related to how the grain was raised versus the tested quality. For example, some products may be required to be grown organically or not treated with pesticides after harvest.

Critical quality traits in commodity grain are usually well understood by producers and fairly easy to observe. Producers know what causes damage and breakage, and they can often observe any quality problems in their grain prior to delivery. Important quality traits in VEG are not usually observable by producers, and the producers may not understand the drivers of those traits. Often, VEG attributes require specialized testing equipment to measure levels of the attributes, and the producers do not have access to the testing equipment to measure the attributes. Specialized physical traits may also be unfamiliar to producers. This lack of familiarity and testing capability create an added dimension of quality risk in many types of VEG.

Low quality levels in commodity grain rarely result in rejection of the shipment. High damage levels in corn or soybeans often result in severe discounts in commodity shipments but rarely are shipments rejected for quality problems. In contrast, quality problems in a VEG shipment will more likely result in rejection. There are several reasons for this difference. First, poor quality commodity grain shipments can be more easily blended with other higher quality lots to achieve an average desired quality. High volumes in the commodity system and the ability to direct different shipments to different end uses allows for blending of various quality levels. VEG shipments are often relatively small and headed for a specific end use with specific quality requirements, reducing the ability to blend. Second, some VEG attributes such as non-GMO have very low tolerance levels and any shipments that do not meet the standards are rejected.

Another critical difference between VEG and commodity quality risk is the delivery requirements on VEG. Many VEG contracts are buyer's call, which means the grower must store the grain on farm until the buyer requests delivery. This may affect the risk of the grain going out of condition in storage. A producer of commodity grain can usually deliver grain at any time. If they observe a quality problem developing in the stored grain, they can deliver it to mitigate the problem. A VEG producer may have to continue storing VEG even though it may be going out of condition until the buyer calls for the grain to be delivered.

## Risk Management Tools

Quality risk is an area where there are very few risk management tools available for producers to utilize. Crop insurance is one tool available to producers that may help to manage quality risks. However, current policies have limited quality coverage. Most crop insurance policies only cover loss of value due to quality losses prior to harvest, and the coverage is limited to standard grade factors such as test weight and damage. Payments are only made for severe quality problems in the field. Quality deterioration during handling or storage is not covered, and thus there is little opportunity to shift the risk of quality deterioration after harvest.

There are several ways for producers to reduce quality risks. However, none of these practices will eliminate them. Similar to yield risk, producers may be able to reduce quality risk related to varietial differences by planting several varieties to increase diversification. Producers may be able to use written management guidelines designed to reduce the risk of contamination in grains that need to be segregated from harvest through delivery. Management practices such as maintaining proper fertility levels and field selection may reduce some quality trait risks. Other management practices such as the use of low temperature drying techniques and monitoring the quality of the grain in storage may reduce other quality risks. Knowledge and experience that producers gain from raising a certain grain type over time is often critical to their continued long-term success. Producers without this experience may face higher quality risks.

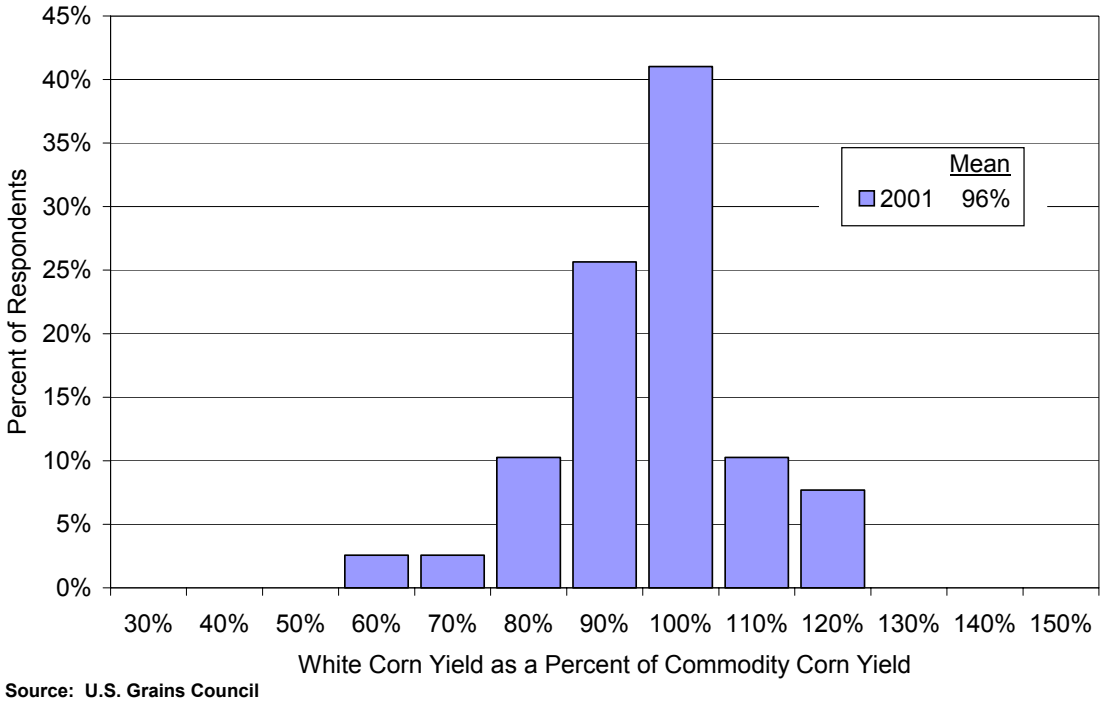
Producers may also be able to manage some of the risks associated with quality measurement and sampling. They may be able to request that grain samples be saved so that they can be retested if problems arise. They may be able to request re-sampling of shipments or bins if testing results are unfavorable.

# Yield Risk

## Definition

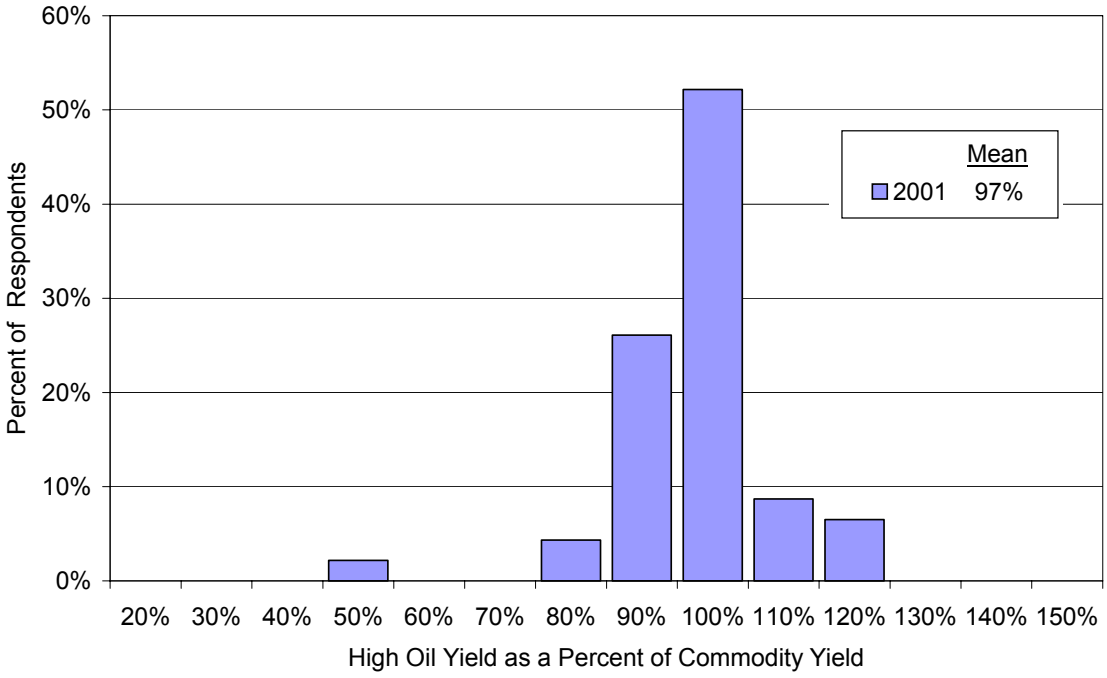
Yield risk is simply the risk of lower than expected production. Yield risk should not be confused with an expected yield drag. Many types of VEG have an expected yield drag. For example, a producer of white corn may expect to have a 5% yield drag or yield deficiency compared to his standard yellow corn varieties. However, the expected yield drag is not a risk since it was known ahead of time. Yield risk is a result of unexpected yield variability. In the example above, having a yield drag of more than 5% is the yield risk.

As part of the US Grains Council VEG Quality report, producers were asked about yield drag on their value-enhanced corn types. Figure 17 and Figure 18 show the yield drag of white corn and high oil corn yield as a percent of commodity corn for 2001. The average yield drag for each type is less than 5%. However, some producers have experienced yields for white and high oil corn as low as 60% and 50% of their commodity corn yields, respectively, and these extremes may be considered yield risk instead of yield drag.




**Source: U.S. Grains Council**

**Figure 17. White Corn Yield Distribution**




**Source: U.S. Grains Council**

**Figure 18. High Oil Corn Yield Distribution**

## Components

There are several sources or components of yield risk.

**Weather**—Weather conditions including rainfall, temperatures, wind, and hail are typically the most critical drivers of yield. Yields can be adversely affected by poor weather conditions resulting in lower than expected yields.

**Variety risk**—Yield performance can vary significantly by variety. Even when two varieties of the same corn type are planted in the same field and raised under the same growing conditions they can have significant differences in yield. Top yielding varieties do not always perform well in all weather conditions, soil types, or geographical regions. Relative variety performance often changes with growing conditions. Proper variety selection is a critical driver of yield but the selection process is complicated by the fact that relative performance may change with growing conditions.

**Unknown yield drag**—One of the major components of yield risk in growing a new type or variety of VEG is the unknown yield drag. Yield drag varies with variety, weather, soil types, and climate. There may be limited information on the expected yield drag when the producer decides to grow a new product or variety.

**Soil fertility**—Soil fertility levels are an important driver of yield. Low soil fertility levels increase the risk of low yields.

**Pest pressure**—Pest pressure from weeds and insects can affect yields and may differ among types and varieties.

**Field operation timing**—The timing of field operations including planting, spraying, and harvesting can be critical to yield performance.

VEG growers responding to the producer survey were asked about problems related to lower than expected yields. Only 25% of the respondents indicated that they had encountered problems related to lower than expected yields. This result could indicate that while the VEG producers may expect some form of yield drag, only one quarter of the growers have had problems above and beyond their expectation of yield drag.

*Focus group participants made the following comments related to yield risk:*

- *They have had problems with the standability of the corn, or in other words, the corn's ability to remain upright during strong winds or adverse weather.*
- *There often is a lack of production information about approved seed varieties for VEG production such as yield drag and variability, and hidden problems related to disease and pest resistance.*

## Differences in Commodity and VEG

There are several yield risk differences between commodity grain and VEG. Both crop types are affected by weather conditions. However, VEG varieties are often more sensitive to poor weather conditions than commodity grain. Yield differences between value-enhanced corn types and standard commodity corn often widen in drought conditions. VEG types such as high oil corn are more sensitive to poor conditions during pollination.

Both commodity grain and VEG have variety risks. Performance can vary widely in both commodity and VEG varieties. Proper variety selection is critical in both VEG and commodity production. Variability in commodity yields across varieties is often overlooked when comparing VEG and commodity yields. When we compare the VEG yield on a farm with the commodity yields on that same farm, we are typically comparing a single VEG variety with the average of several commodity varieties. Comparing the VEG yield to the average commodity yield may overstate the variability in the VEG yield. The true yield drag of a VEG product depends on the specific commodity variety to which the VEG product is compared. Given the variability in yield performance across the commodity varieties, the yield drag of the VEG will also vary depending on the comparison that is made.

Some VEG contracts require that specific varieties be grown. Producers may increase their yield risk by limiting their production to these varieties. With limited variety diversification, producers may be at higher risk of low yields due to specific weather events that affect those specific varieties.

Unknown yield drag is a problem unique to VEG. In many cases a producer raising VEG for the first time or raising a new type of VEG will have little information to predict the expected yield drag, unlike commodity grain where producers have several years of experience. Higher than expected yield drag is one of the main reasons producers quit raising VEG and return to commodity production.

Unlike commodity production, VEG yields that are higher than expected may cause problems for producers if the contract specifies the number of bushels to be delivered. Some types of VEG may not be acceptable for blending with commodity grain or general use, resulting in even greater penalty for over-production under a bushel-based contract. There may be no market for production over the contracted amount or the premium may be lower for the production overage. Over-production is not a serious problem but it can be a unique risk for VEG. Under-production may also result in a penalty to producers.

Pest pressure risk is similar for VEG and commodity grain. What may be different for some types of VEG are the practices that producers can use to control pests. Some types of VEG may include production requirements limiting the use of pesticides. Requirements limiting the use of some pest control measures may increase the risk of pest problems. The response to stress may differ with VEG and producers may not have had past history to predict the potential impact.

In commodity grain production, the timing of field operations is at the discretion of the producer. Although often contingent on weather conditions, the producer decides when to plant and harvest. VEG contracts may include stipulations regarding allowable planting dates and harvest moisture contents. Following these stipulations may affect yields. For example, if producers are required to let the corn dry in the field until it reaches 15% moisture, field losses may occur. Delaying planting until the required time may result in missed planting opportunities due to changes in the weather.

## Risk Management Tools

Yield risk is an area where more risk management tools are becoming available. Although primarily designed for commodity grain, crop insurance policies now available give producers many options for managing yield risk. Yield risk can be managed in conjunction with price risk with insurance products such as crop revenue coverage, revenue assurance, income protection, and group income protection. Yield risk alone can be managed with multi-peril and group risk plans.

Crop insurance allows producers to guarantee a minimum yield or revenue per acre. Yield guarantees for most products are based on the actual production history (APH) of the farm. Other policy types based on the county average yield are available. The APH is based on a minimum of the prior four years of yield history for the insured crop. The APH can include up to the last ten years of crop yields. Producers can select the coverage level. Coverage levels typically range from 50% to 85% of the APH. Crop insurance premium levels increase with coverage levels.

Crop insurance coverage includes protection from unavoidable production losses caused by adverse weather conditions, fire, wildlife damage, pests (damage that is not due to management neglect), disease (damage that is not due to management neglect) and other naturally occurring perils. Losses caused by human error and poor farming practices are not covered.

Crop insurance is becoming widely used in Illinois. Data from the Risk Management Agency (RMA) shows usage of Federal Crop Insurance Corporation (FCIC) backed crop insurance policies by county in Illinois. This data was summarized for the year 2000 by the growing regions shown in Figure 19. These regions correspond to the regions used to summarize the VEG production data collected in the University of Illinois VEG survey.

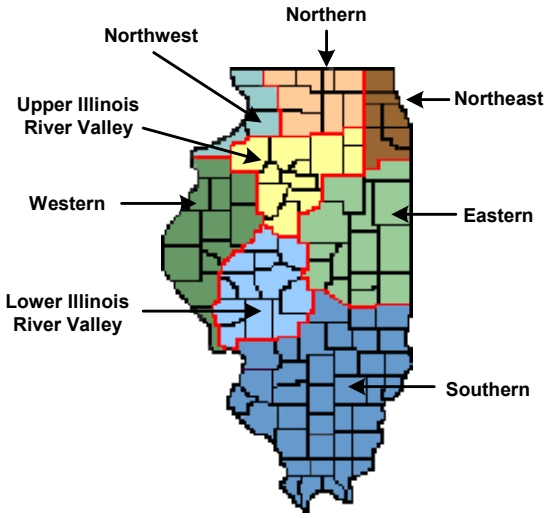
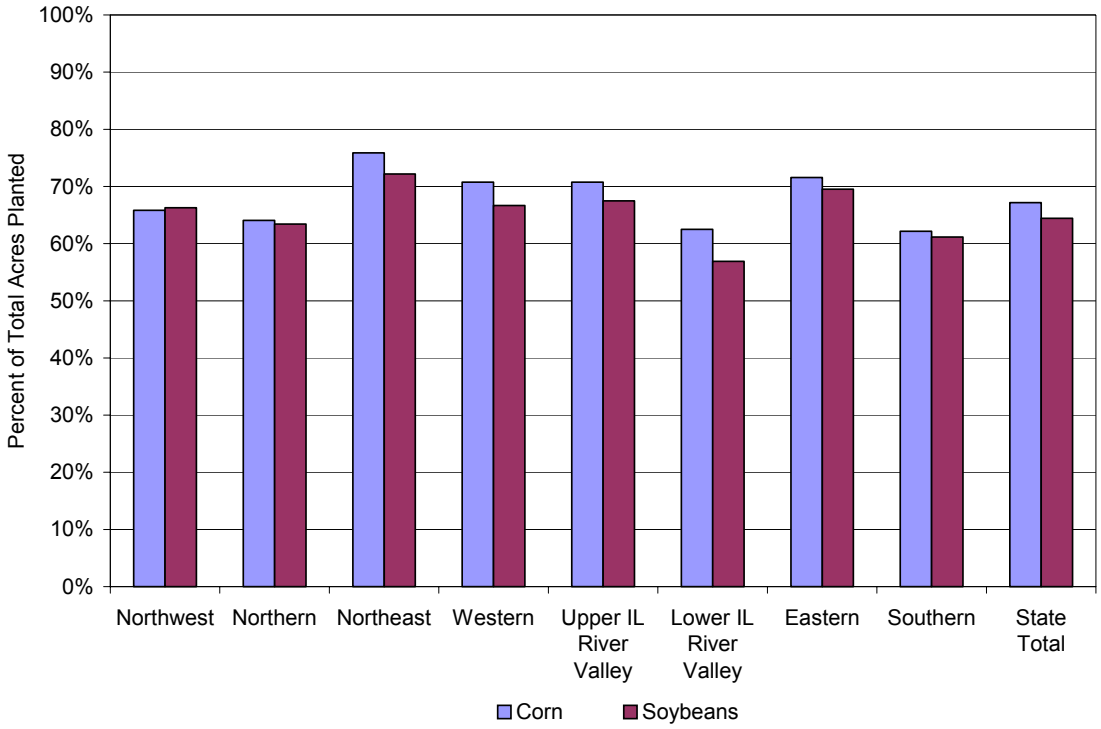



**Figure 19. 2000 Growing Regions**

Figure 20 shows the percent of total planted corn and soybean acres insured with all FCIC insurance products in 2000. The figure shows that there is some variation in insurance usage by region. The Northeastern region had the highest usage with 76% of all corn acres being covered by some form of FCIC insurance, while only 57% of the total soybean acres in the Lower Illinois River Valley were covered by some form of FCIC insurance. For the state as a whole, 67% of the total corn acres and 64% of the total soybean acres were covered by some form of FCIC backed insurance.

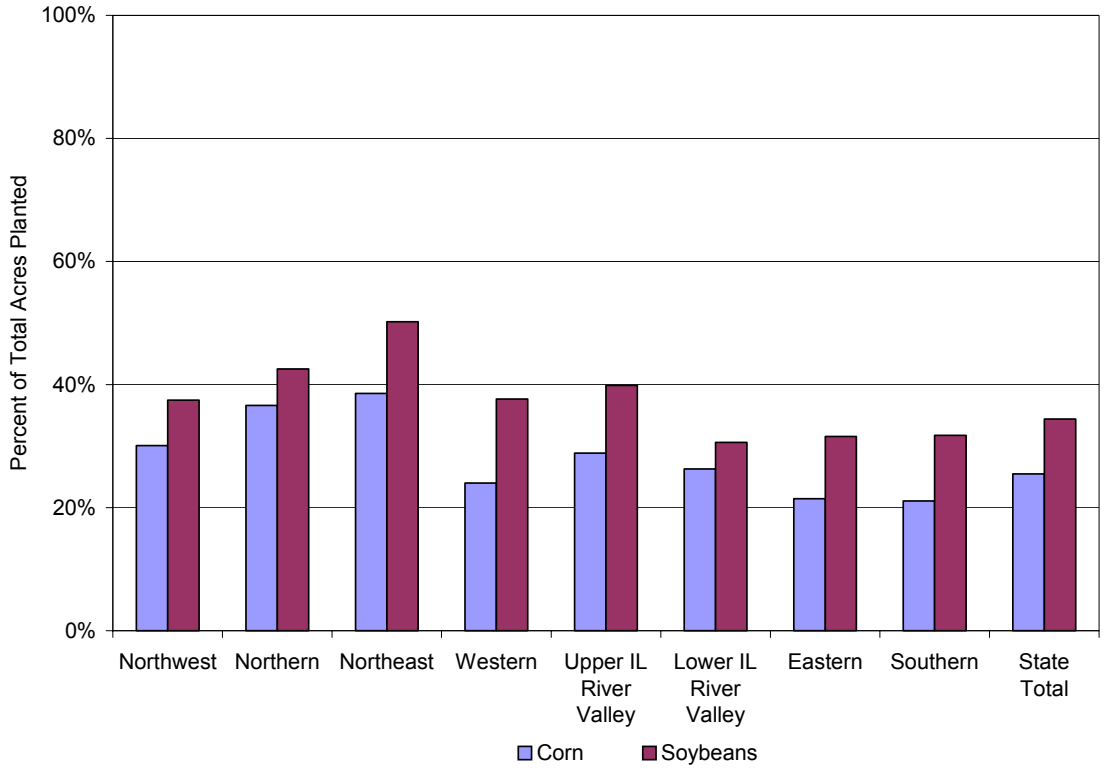



**Source: USDA/RMA *Summary of Business* Data; USDA/NASS & IL Dept. of Ag. *2001 Illinois Annual Summary***

**Figure 20. Share of Total Planted Acres Insured with All FCIC Products, Illinois 2000 Crop**

When compared to the level of VEG production by region, there does not appear to be a relationship between VEG production levels and crop insurance usage. Regions that showed a high level of VEG production in the 2000 University of Illinois survey did not have a significantly different level of crop insurance usage than other regions.

Figure 21 shows the share of total planted acres insured with revenue products such as crop revenue coverage, revenue assurance, income protection, and group risk income protection. There was a slightly higher usage of revenue products in soybeans than corn. For the state as a whole, some form of revenue-based insurance covered 25% of the total corn acres and 34% of the total soybean acres.




**Source: USDA/RMA *Summary of Business* Data; USDA/NASS & IL Dept. of Ag. *2001 Illinois Annual Summary***

**Figure 21. Share of Total Planted Acres Insured with FCIC Revenue Products Illinois 2000 Crop**

There are several problems with using most current crop insurance products for VEG. First, a producer's APH may not be representative of the yields expected on a VEG product if they are switching from commodity to VEG production or vice versa. Written agreements can be used to modify producers' APH if they are now growing a lower yielding crop. However, there is no formal system to adjust a producer's APH up or down as they change from raising one grain type to another. Second, indemnity payments are based on commodity prices. In other words, if a producer of a high value VEG crop suffers a yield loss and is due an insurance payment, the producer will receive a payment based on the yield coverage at the commodity grain price. Payments are not adjusted for any premiums associated with the grain type covered. Finally, as stated earlier in the quality risk section, crop insurance does not cover any quality losses beyond test weight and damage. Other quality traits such as chemical composition and milling characteristics may significantly affect crop value in VEG.

Even though crop insurance is the main tool for managing yield risk, there are many management practices that producers can also use to help manage yield risk. Some of these practices are listed below.

**Variety selection**—Selecting varieties designed for specific growing areas and soil types.

**Variety diversification**—Using multiple varieties to reduce variety risk (within the limits of a contract for VEG).

**Geographic diversification**—Spreading out farming area to reduce local weather risks.

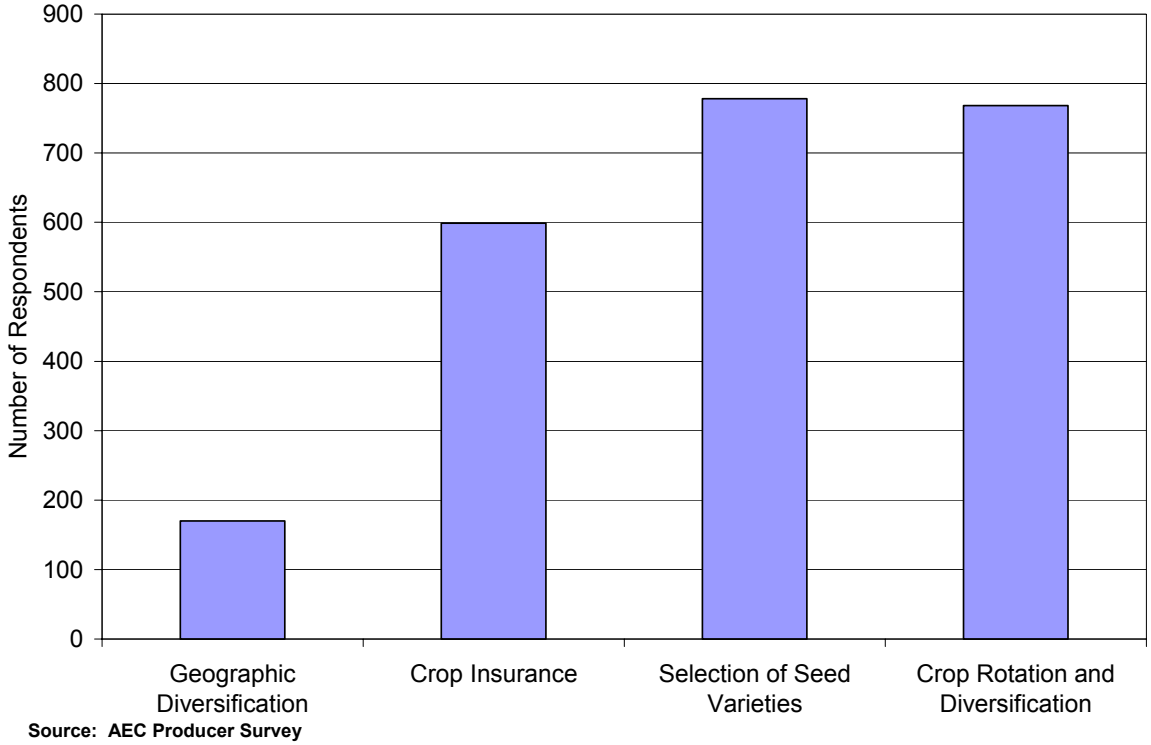
**Fertility**—Maintaining proper fertility levels.

**Pests**—Managing weed and insect levels to optimize yield.

**Equipment capacity**—Having sufficient machinery capacity to accomplish field operations during critical periods.

**Management practices**—Using good management practices for the specific crop type and growing conditions.

The producer survey asked about the methods producers use to manage yield risk. The respondents could indicate that they use any of the methods. As shown in Figure 22, the most frequent method employed by the respondents is the selection of seed varieties, followed closely by crop rotation and diversification. Crop insurance is used by 68% of the survey respondents.




Source: AEC Producer Survey

**Figure 22. Methods for Reducing Yield Risk**

Yield risks can also be managed with different rental arrangements on rented land. Share rental arrangements help reduce yield risk since the producer and landowner share the yield risk. Most 50/50 share rental arrangements call for the producer and landowner to each receive 50% of the production and pay for 50% of the input costs. Variable cash rental arrangements that adjust the rental payment for yield also help reduce yield risks.

Share rent arrangements may add a layer of complexity in VEG production. When VEG is grown under contract there may need to be contracts with both the producer and landowner. Landowners may not want to take on the added risks associated with VEG production including yield, premium, and quality. In a typical cash rental arrangement, the type of crop grown does not affect the landowner.

## Contract Risk

### Definition

Contract risk is the risk of contract default by the producer or the contractor.

As part of this project, contracts for VEG products were evaluated. See Appendix C for a detailed writeup of contract terms and the associated risks. Nine risks associated with different contract terms were categorized, and they are as follows:

- Price
- Delivery terms
- Contamination
- Financial or investment
- Landlord
- Quantity
- Quality
- Legal
- Insurance

However, these risks fall within one or more of the risk categories discussed in this section. For example, price risk as identified in the contract review encompasses both base price and premium risks previously described in this section. While these risks are created by the contracts' terms, they in themselves are not contract risk. Contract risk directly addresses the legal agreement between the producer and contractor and is defined as the risk of contract default by the producer or the contractor.

### Components

There are several components of contract risk.

**Contract default**—Default by contractor during the crop year.

**Contract termination of multiple one-year contracts after several years**—Termination of a single year contract after the producer has grown under contract for multiple years.

**Not understanding contract terms**—Producer may not understand contract terms or "fine print" and therefore may incur costs or be subject to conditions that were not expected.

**Producer contract violations**—Contract default as a result of producer actions. Producers risk the consequences of intentionally or accidentally violating contract terms.

**Payment risk**—Producers face risk of non-payment for the grain they deliver, if the buyer encounters financial adversity, bankruptcy, loss of market, etc.

As part of the producer survey, VEG growers were asked if they had had problems with contract default with buyers. Only 39 of the 527 respondents or 7.4% indicated they had experienced problems with contract default.

### Differences in Commodity and VEG

There is a greater use of contracts in VEG production than in commodity grain production. Therefore, many of the risks related to contracts are specific to VEG. Buyer default on specific contract terms such as premium levels is solely a risk in VEG production. Contract termination after multiple years of contracting is mainly a VEG risk also. The VEG contract may be the producers' only access to the VEG market and therefore a contract termination may result in the producers having to exit the market. VEG contract terms may be complex and difficult to understand resulting in added risks to the VEG grower. Commodity contracts for sale of grain are typically straightforward and only deal with quantities to deliver, delivery timing, and price.

Payment risk is a type of contract risk that is applicable to both VEG and commodity production. Both VEG and commodity grain producers face the risk of not being paid for their grain after delivery. The level of payment risk hinges on the financial strength of the buyer.

### Risk Management Tools

There are few tools to manage contract risks. Producers need to read and understand contract terms. Knowledge about the contractor and the contract terms will also reduce the risk of "fine print" obligations and "surprises."

There is a mechanism to manage payment risk in Illinois. The Illinois Grain Insurance Fund is designed to protect producers from grain buyer default. Producers who sell grain to licensed grain dealers in Illinois may be covered against payment default depending on how the grain was sold to the dealer. The level of coverage depends on the mechanism used to sell the grain to the dealer and when delivery occurred. Payments are made to commodity grain producers based on the local commodity price on the date of failure. The Illinois Department of Agriculture is currently dealing with how to value VEG that may be involved with a buyer in default.

## Relationship Risk

### Definition

Relationship risk is the risk of adversely affecting critical relationships with buyers, suppliers, or other resource providers that are critical to the success of the farm operation.

### Components

There are several sources of relationship risk. All of them deal with losing access to critical resources.

**Landlord**—Access to land

**Lender**—Access to capital

**Supplier**—Access to critical supplies including genetics, production technology, and knowledge

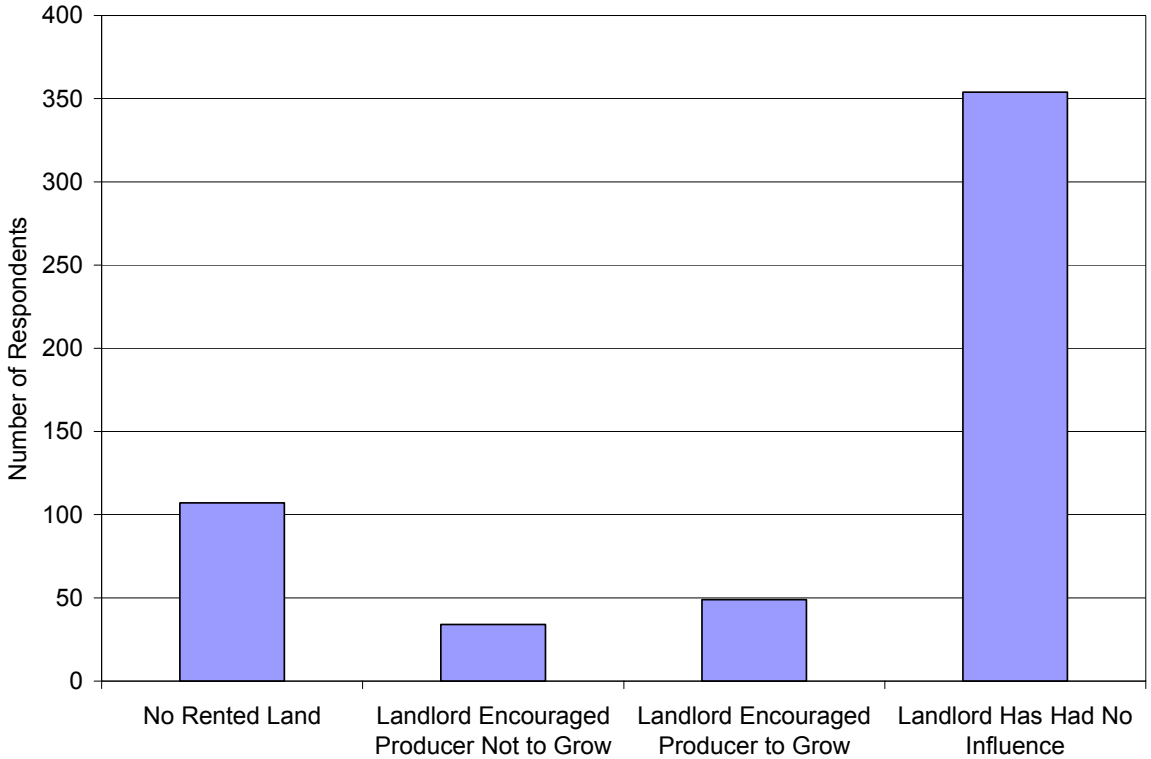
**Buyer/processor**—Access to markets, revenue opportunities, and market knowledge

## Differences in Commodity and VEG

Access to critical resources through relationships is important for both commodity and VEG growers. However, some of the relationship risks are unique to VEG production. In order to grow grain for a VEG market, producers may need to maintain relationships with key buyers and input suppliers. Changes within the buyer or input supplier organizations, such as personnel changes, reorganization or mergers, can potentially result in lost relationships and a lost link to the VEG market.

The fact that a producer is growing VEG can affect relationships with resource providers. VEG growers may have greater access to production technology, testing results, and other resources when they are part of a VEG production system. Relationships with landlords and lenders may be influenced by a producer's participation in VEG. How those relationships are affected depends on the lenders' and landlords' perceptions of the risks and returns associated with VEG. They may perceive VEG production as a competitive advantage or an additional source of risk.

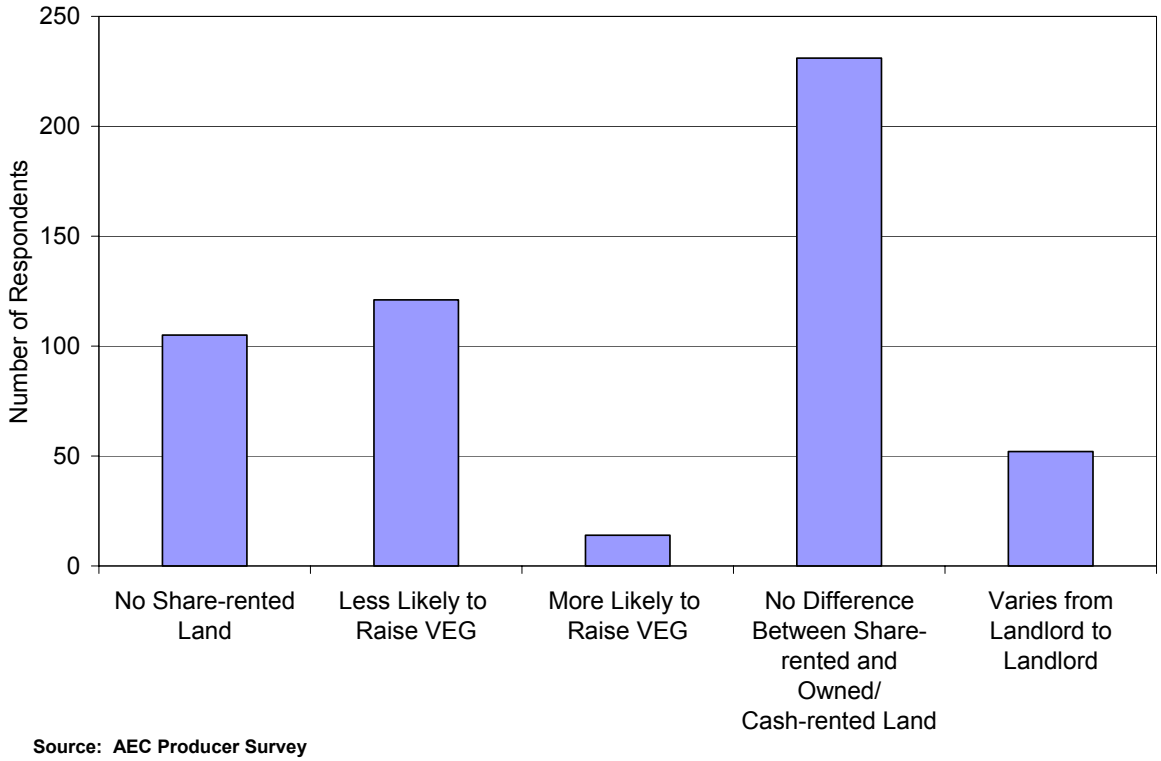
To evaluate the influence of landlords on producer decisions about VEG production, the producer survey asked about the manner in which landlords affect the decision to grow or not to grow VEG. Of the producers who either had grown or were currently growing VEG, the majority responded that their landlord(s) had no influence on the decision to grow VEG. As shown in Figure 23, only 34 producers stated that their landlord discouraged them to grow VEG.




**Source: AEC Producer Survey**

**Figure 23. Landlord's Influence on VEG Production Decisions**

The survey also explored whether there was any difference between producer decisions about growing VEG on share-rented versus cash-rented or owned land, each of which present different sets of risks (Figure 24). The majority of the respondents who have share-rented ground indicated that there was no difference in their decisions where to grow VEG on share-rented versus owned or cash-rented land. However, 29% of the respondents reported that they were less likely to raise VEG on share-rented land.




**Source: AEC Producer Survey**

**Figure 24. Likelihood of Raising VEG on Share-Rented Land Than on Owned or Cash-Rented Land**

## Product Liability Risk

### Definition

Product liability risk is the risk that a producer may be liable for any problems associated with the grain they have sold. This may include liability for contamination or food safety problems.

### Differences in Commodity and VEG

Once commodity grain is delivered to an elevator or other destination and commingled with other grain, it becomes nearly impossible to trace any problems associated with that grain back to individual producers. Samples from individual producer shipments are rarely maintained to assist in tracing problems to individual shipments. The risk of a product liability problem on commodity grain is very low.

Product liability risk can be a real risk in some types of VEG. Through samples taken at the delivery point and record keeping systems, there are often ways to trace quality problems back to the farm level. In addition, shipments of VEG often have special quality requirements that could be jeopardized with contaminants from a single shipment. For example, a river elevator accepted food grade corn from individual producers to fill a barge for export. The food grade corn was raised

under contract requiring the corn to not contain any StarLink corn. However, the corn was not tested for StarLink when it was delivered to the elevator. The policy was to take a sample from each truckload to trace any problems encountered in the barge shipment farther down the marketing channel. If StarLink corn was found in the barge shipment when it reached its destination, the source of contamination may be traced back to individual farm shipments. The producer(s) with the contaminated load(s) may then be liable for contaminating the entire barge shipment and the resulting loss in value for the entire shipment. Individual producer liability in this case would hinge on the wording of the food grade corn contract.

End user concerns over GMO's and GMO contamination have made contamination and liability risk more relevant in recent years. GMO contamination can come from impure seed, pollen drift, and grain segregation problems. The many sources of contamination and the ability to trace problems back to individual farms are increasing the risk to producers.

## Investment Risk

### Definition

Investment risk is the risk associated with returns on a long-term asset.

### Components

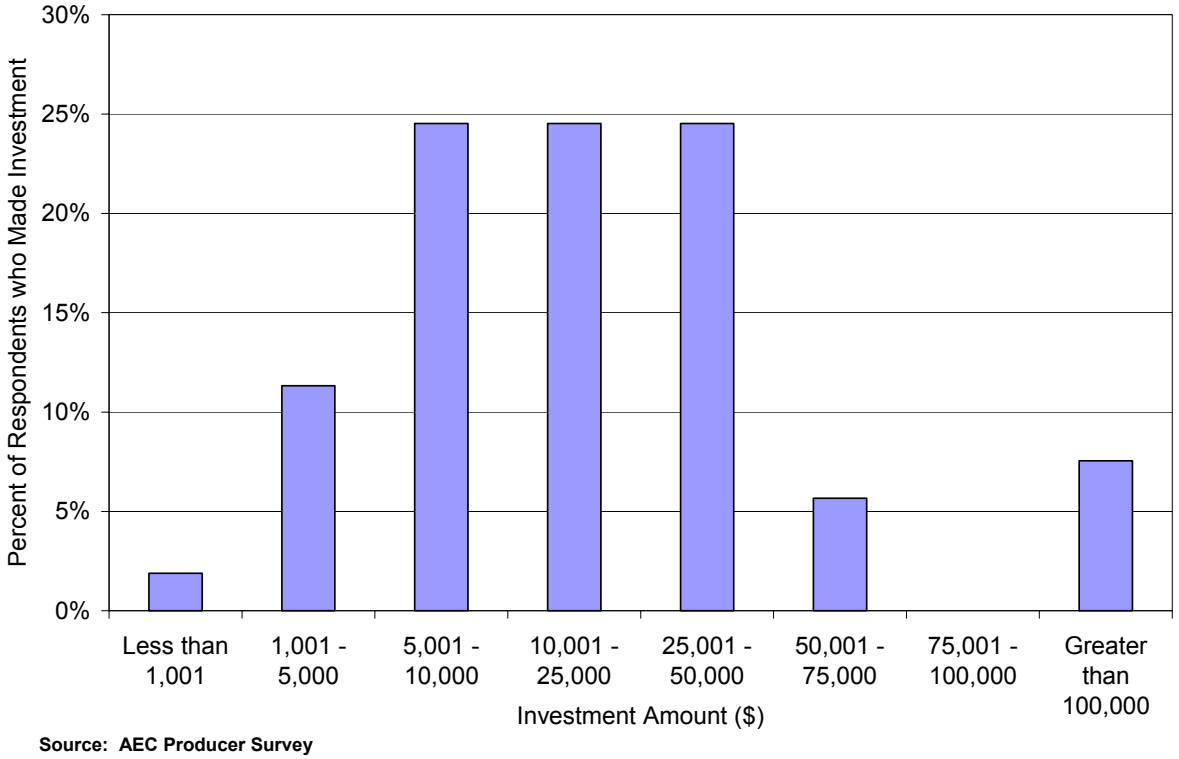
Both commodity and VEG production may require producers to invest in facilities and equipment such as grain dryers, storage bins, and harvesting equipment. This equipment is often purchased in order to lower costs or take advantage of opportunities. Storage equipment may be added to reduce storage costs paid to an elevator, take advantage of higher market prices later in the year, or allow the producer to participate in a VEG market. The expected returns to these activities are the producer's expected return on the investment in the storage equipment. The investment risk relates to changes in these returns over time.

There are two main components of investment risk: variability in returns and loss of the asset. Variability in returns is the result of annual change in the costs or revenue associated with the asset. Loss of the asset may be a result of fire, theft, natural disaster, or other peril. Loss of the asset is often covered by property insurance.

### Differences in Commodity and VEG

VEG production may include several sources of added investment risk. Production of some VEG types may require investment in specialized equipment or facilities. Long-term returns on these investments may be uncertain since production contracts are typically for a single year. If the producer loses the contract or if the economics of the product become less favorable, the returns on the investment may be affected.

The producer survey asked the current and past VEG growers if they had made capital investments in order to produce VEG. Sixty-two producers or 12% of the respondents had made additional capital investments, averaging $32,682. Seventy-five percent of the investments were from over $5,000 up to $50,000 with the lowest and highest investments being $100 and $250,000, respectively (Figure 25).




**Source: AEC Producer Survey**

**Figure 25. Investments Made for VEG Production**

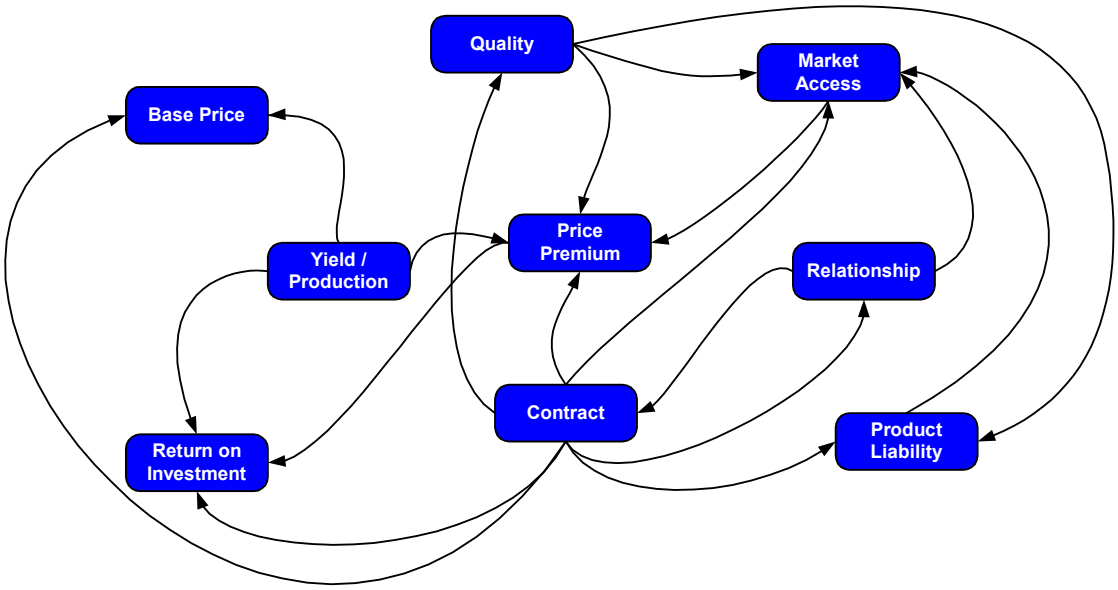
In order to participate in some VEG systems, producers have to invest in the system. VEG production may require an investment in a marketing cooperative, processing plant, or livestock operation. Investments in these types of organizations are risky especially if they are new ventures.

## Relationships Among the Risk Factors

As noted in the risk factor discussion above, many of the risk factors involved in raising VEG are interrelated. Figure 26 illustrates how these risk factors are related.

Quality affects several other factors. The quality of a producer's grain affects which markets he can access. Both the current crop quality and historical quality performance may affect market access. A producer with a reputation for producing high quality grain in the past may have better access to markets that demand high quality. Quality levels also affect premiums because the level of premium is often tied to quality levels. Quality may affect product liability. One of the desired quality factors may be GMO free, and if GMO grain is found in the shipment, the producer may be liable for the GMO contamination.

Premium levels affect a producer's returns and provide an incentive for them to grow the VEG. Premiums are a return on the producer's investment in time, knowledge, equipment, facilities, or other assets needed to participate in the VEG market.




Source: Ag Education & Consulting

**Figure 26. Risk Factor Interrelationships**

The amount of yield risk a producer is willing to accept affects the premium levels received for the VEG production. Producers that grow VEG with lower yield variability and yield drags receive lower premiums. Regional yields affect the base price of commodity grain. Price changes are generally inversely related to yield changes. This relationship holds true for regional yield changes but not for yield changes on an individual farm. Regional droughts that affect production levels will generally result in higher prices but localized production problems generally do not affect prices. Yields also affect producer returns and their return on their investment.

Contracts and contract specifications affect many of the other risk factors. Contracts specify which quality attributes are important and what quality levels are acceptable. Contracts indicate what premium levels will be paid and how the base price will be determined. Contracts may indicate if there is specialized equipment needed or investment in a marketing cooperative required in order to participate. Contracts create formal relationships between producers and buyers, impacting relationship risk. Contracts give producers access to markets. In many cases the only way to access some markets may be to have a production contract. Loss of a contact may mean loss of market access. Finally, contracts may include language relating to product liability. Contracts may specify that producers are liable for problems related to the grain after it is delivered.

Market access is linked to other risk factors as mentioned above. It is also linked to premium levels. Producers without market access will not be able to capture premiums on their VEG production.

Relationships affect a producer's ability to access markets and find production contracts. Producers that have good relationships with suppliers, elevators, and processors may be able to access markets and production contracts that are not available to other producers.

Finally, producers willing to take on product liability risk may have better market access. Some VEG markets may require that producers accept this risk.

# Risks Across the Value Chain

The previous chapter dealt with risks at the production level. Given that VEG is often produced as part of a coordinated system, it is useful to look at how VEG production, marketing, and usage affects risks at other stages in the value chain as well. This section will identify differences in risks for commodity and coordinated VEG for the different players in the value chain and illustrate these risks with a set of examples.

## The Value Chain

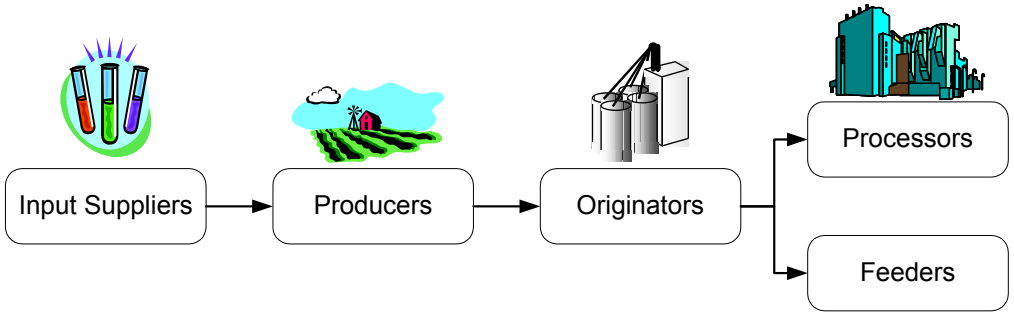
To frame this discussion of risks across the value chain, it is useful to start with a common understanding of the grain value chain. Figure 27 illustrates the basic structure of the grain value chain, consisting of:

**Input Suppliers** are suppliers of genetics, biotechnology, seed, pesticides, fertilizers, fuel, and other resources to producers.

**Producers** are corn and soybean growers.

**Originators** are elevators and merchandisers that perform functions such as grain drying, storage, logistics, and marketing. Originators include firms involved with exporting grain.

**Processors and Feeders** are the main users of grain. They include both foreign and domestic grain users. Nearly all corn and soybeans go to processors for conversion into other products or directly into animal feed.




Source: Ag Education & Consulting

**Figure 27. Grain Value Chain**

The following sections outline the risks in each of these value chain segments for commodity and VEG.

## Input Supplier Risks

Even though the actions of input suppliers occur before production, the type of system that they are involved with affects the suppliers' risks and concerns. In a commodity system, input suppliers are mainly concerned with how their products perform relative to their competitors at the producer level. They consider the producer to be their customer, not segments farther down the value chain. They are worried about maintaining relationships with producers but not about having links to other segments of the value chain.

In a coordinated system, the input supplier is concerned with actions at the producer level as well as those farther down the value chain. Seed companies involved with VEG may be concerned about getting their varieties on approved hybrid lists of processors. Companies with varieties not on the list may lose volume as producers switch to approved hybrids. Seed companies involved with VEG are concerned about quality traits and how their products perform for end users. They are also more concerned about seed purity as some VEG systems move to strict limits for unapproved biotechnology traits.

Some input suppliers may take control of the coordinated system through contract coordination. DuPont is a supplier of seed and genetics. However, the company has also become involved with contract production of high oil corn and the marketing and delivery of that corn to end users. Input suppliers may play a key role in VEG systems since they provide the critical seed traits to make the VEG product unique. However, to capture value from these traits, they may have to work with segments beyond the farm level.

Table 16 summarizes some of the risks in commodity and coordinated VEG systems at the input supplier level.

**Table 16. Risk Factors at the Input Supplier Level**

| Traditional/Commodity | Coordinated VEG |
|---|---|
| Performance of Products At The Producer Level | Having Their Hybrids on Processor's Approved Hybrid Lists |
| Relationships With Producers | Relationships With End Users |
| Understanding Producer Needs | Performance of Seed on Quality Traits |
| Yield Performance | Seed Purity/Contamination |
| | Market Access |
| | Understanding End User Needs |

## Producer Risks

Producer risks in commodity and VEG systems were contrasted in detail in the previous chapter. In general, the most visible producer risks in a commodity system are yield and price. Producer risks in VEG systems can become much more complex.

Table 17 summarizes the risks in commodity and coordinated VEG systems at the producer level.

**Table 17. Risk Factors at the Producer Level**

| Traditional/Commodity | Coordinated VEG |
|---|---|
| Yield | Base Price |
| Price | Premium |
| Buyer/Payment Default | Quality |
| | Yield |
| | Contract |
| | Market Access |
| | Relationship |
| | Investment |
| | Product Liability |
| | Buyer/Payment Default |

## Originator Risks

When handling only commodity grains, the main concern of a grain elevator or merchandiser is to maintain volume through their facility or trading company. Profit margins are small for these businesses and often the best way to increase profitability is to increase volume. Elevator operators are also concerned with quality deterioration in storage. Blending different qualities of grain to standard grade is an important factor affecting income for the elevator. Finally, elevator operators are concerned about access to growers and markets for grain. However, grower and market access tend to be stable in the short-run for commodity grain.

Originator risks change when they become involved with VEG marketing systems. If they are involved with VEG contracts with processors or export buyers, they face risks in filling contracted volume. The originators may have contracts with producers to raise the VEG but if production problems occur, those contracts may not be fulfilled, leaving originators unable to meet their obligations to buyers. Market access risk for originators in VEG may be significant. For example, an elevator may have set up a system to supply tofu soybeans to a foreign buyer. If that buyer decides to switch to a different supplier, the elevator may not be able to find a market for tofu soybeans. Access to VEG markets often requires personal contacts with buyers that may take time to develop.

Like growers, originators also face segregation risks. They must maintain the segregation of different grains that they handle. With segregation, the originators may also become liable for contamination. They must have testing capabilities to test for desired attributes, and this may require an investment in specialized testing equipment and employee training. Inaccurate test results affect originators' ability to deliver the quality of grain demanded by end users. Originators also face risks in maintaining qualified growers of VEG. They may incur added costs in recruiting and training new growers. As the grower base turns over, the originators incur more costs by recruiting new VEG growers. Data from the U.S. Grains Council's VEG Quality Report show that the VEG grower base has a 30% turnover rate. Each year originators must find new growers to replace those who have stopped growing VEG.

Table 18 summarizes some of the risks in commodity and coordinated VEG systems at the originator level.

**Table 18. Risk Factors at the Originator Level**

| Traditional/Commodity | Coordinated VEG |
|---|---|
| Loss of Throughput/Volume | Ability To Fill Contracted Volume |
| Deterioration In Storage | Access To End Use Markets |
| Access To Growers | Ability To Segregate |
| Access To Markets | Testing Capability/Accuracy |
| Costs | Retaining Qualified Growers |
| | Liability For Contamination |

## Processor and Livestock Feeder Risks

When they use commodity grain, the main concern processors or livestock feeders have, regarding the grain they use, is access to a low cost, consistent supply of grain that is also consistent in quality. Without access to grain, their businesses do not exist. Grain processors are volume driven businesses that try to maximize throughput. Problems with grain supply or grain quality that affect throughput are risks to a processor.

The end users of VEG also face new types of risk when they use some types of VEG. For end users who can choose between using VEG and commodity grain, they face the risk that the added value they get out of the VEG will not cover the added costs. For example, a hog feeder has the option of feeding commodity corn or high oil corn. When they feed high oil corn, they are expecting lower total feed costs or improved feeding efficiency to cover the added cost of the high oil corn. Unlike commodity corn, getting a stable supply of some types of VEG may be an issue for end users. Many end users would like to have a year-round supply of VEG when they decide to switch from a commodity grain. Having to switch back and forth between supplies of commodity and VEG adds costs and inefficiency. For many types of VEG, there may not be year-round supplies available. In addition, problems in the supply chain can make the VEG unavailable after the end user had planned to use it. End users also face some of the same risks that other players in the supply chain do when using VEG. They need access to qualified suppliers, and they must maintain segregation between different types of grain if they are handling more than one type. End users must also be able to meet their consumer specifications. Finally, they often are concerned about contamination and food safety liability.

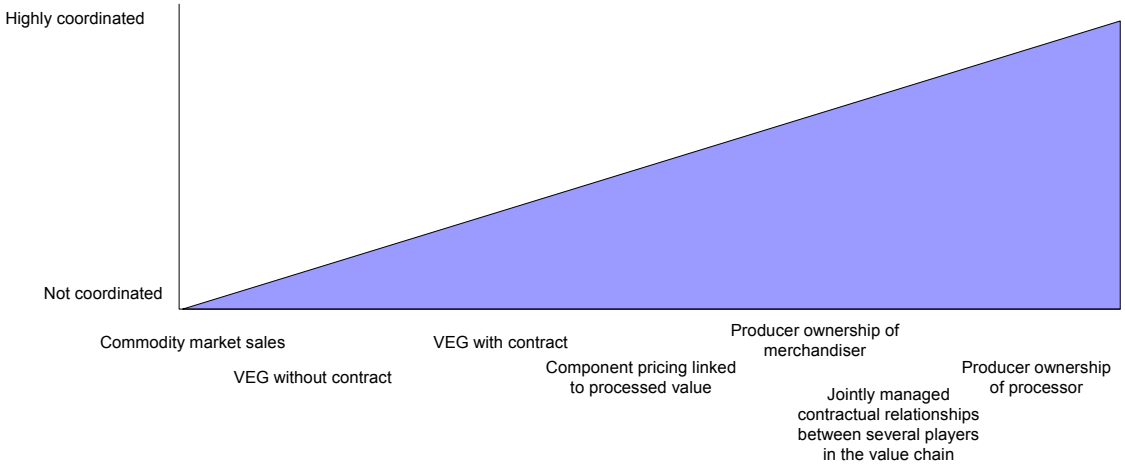
Table 19 summarizes some of the risks in commodity and coordinated VEG systems at the processor or feeder level.

**Table 19. Risks Factors at the Processor/Feed Level**

| Traditional/Commodity | Coordinated VEG |
|---|---|
| Access To Low Cost Supply | Performance Of VEG Relative To Commodity Grain |
| Access To A Desired Quality Supply Based on Standard Grade Factors | Ability To Get Volume Needed For Production |
| Loss of Throughput/Volume | Variability In Specific Quality Traits |
| Liability For Contamination | Access To Quality Suppliers |
| | Reliability of Uniform Supply |
| | Liability For Contamination |
| | Ability To Meet End Users' Specifications |

## Illustration of Value Chain Risks in Coordinated Systems

Not all coordinated VEG systems are the same. The level of coordination varies significantly, as illustrated in Figure 28. Traditional commodity based systems are not coordinated while systems that involve contractual relationships between several players in the value chain are highly coordinated.




**Source: Ag Education & Consulting**

**Figure 28. Coordination Continuum**

The degree of coordination is not always tied to the type of grain produced. For example, the same type of grain may be grown under different levels of vertical integration. In addition, the level of coordination is not always due to ownership across the segments of the value chain. Highly coordinated systems may be structured with contractual relationships between the parties instead of through an ownership interest. The coordination efforts may start at the producer level and move from the producer to the processor to create a market for the producers' grain or may be initiated by the end users to develop a coordinated supply network back through the system.

As the level of coordination changes, the types and levels of risk change. As the level of coordination increases, more risks are often transferred between the parties. However, systems with a higher level of coordination do not necessarily decrease the level of risks for producers.

## Examples of Coordinated Systems in VEG Production

The examples below illustrate the various levels of coordination that can occur in the production and marketing of VEG. These examples will be used to illustrate how producers' risks can vary with the level of coordination. High oil corn is used as the example product in each of the examples. Note, however, that many other products could be produced under the systems described.

### *Example No. 1: Non-Coordinated VEG Production*

Producer A raised high oil corn without a contract, and the corn was sold to a local livestock feeder. A premium was paid to the producer based on the oil content of the corn. The premium was based on a sliding scale with a higher premium paid for higher oil content. The corn was sold on a cash basis at the time of delivery. The producer incurred added costs for seed due to the technology fees associated with high oil corn.

Other examples of non-coordinated systems:

- Raising non-GMO corn or soybeans on the open market with the expectation of selling the grain for a premium.

- Receiving a premium for desired traits like low stress cracks or high test weight as the grain is delivered. The grain is not produced under contract.

### *Example No. 2: Moderately Coordinated VEG Production*

Producer B raised high oil corn under contract with a large regional grain elevator. The producer has no ownership interest in the elevator. The contract was a buyer's call contract with delivery to be made in March of the year following the crop's production. The contract included an approved list of hybrids that could be planted as well as other requirements for production and segregation practices. The contract specified the base corn price at 10 cents under the futures contract for the month in which the grain is to be delivered (for this example, the futures contract is for March). The producer could lock in the base price any time between April of the crop year and the delivery date. A premium schedule was included in the contract. The premium ranged from $0 to $0.25 per bushel based on oil content. The producer incurred added costs for seed due to the technology fees associated with high oil corn and may have added costs for segregation and delivery requirements.

Other examples of moderately coordinated systems:

- Marketing soybeans based on a processed value. The price of the soybeans is based on the estimated yield and value of the meal and oil generated from the soybeans.

- Corn or soybeans grown under contract with a limited number of contract stipulations.

### *Example No. 3: Highly Coordinated VEG Production*

Producer C raised high oil corn under contract with a large hog production cooperative. The producer has an ownership interest in the cooperative. The cooperative is owned by 20 local grain producers. As part of the ownership agreement, each of the producer owners is committed to deliver a set amount of corn to be fed at the hog facility. The amount of corn delivery commitment is set relative to the ownership interest of the producers. This year all the owners agreed to deliver high oil corn. The producers are not paid for the corn, but instead receive a share of the profits from the hog production unit. However, they are compensated for quality differences in the corn they deliver. A premium schedule based on a sliding scale of oil content is used to compensate producers for the quality they deliver. The premiums earned on the delivered grain are added to the individual producer's returns from the hog unit. If a producer is not able to deliver the required amount of corn to the unit due to production shortfalls or other reasons, the producer must buy corn from the open market to fill the requirement. Delivery of the grain is coordinated by the producers and occurs year round.

Other examples of highly coordinated systems:

- Production systems that involve contractual or ownership relationships between several of the participants in the value chain. Producers may raise corn under contract with an elevator who is also under contract to supply grain to a processor. A central player or chain captain is managing all of the relationships.

- Contractual arrangements that have a high degree of specification and require a high level of interaction between the two parties.

- Processor owns the chain from the production of the crop to the retail level. The processor leases the cropland, and hires custom operators to handle production and delivery.

## How the Level of Coordination Affects Risk

The types and level of risks that producers of VEG face are affected by the type of coordinated system used to produce and market the VEG. Even though the grain product produced may be the same, the system may have a significant effect on the risk level for the producer and the optimum risk management strategies. Table 20 shows a comparison of the various risks faced by producers in each of the examples.

**Table 20. Risk Comparison by System**

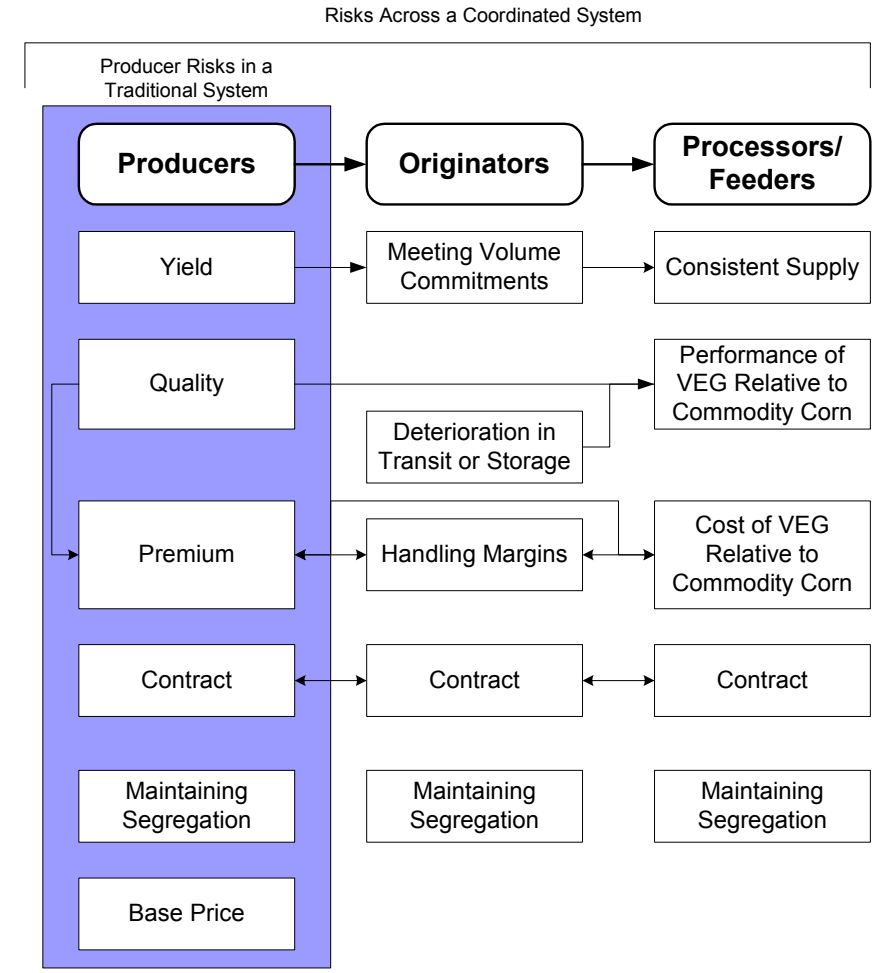
| Example | Example #1<br>High Oil Corn Raised Without a Contract | Example #2<br>High Oil Corn Raised Under Contract | Example #3<br>High Oil Corn Raised for a Producer-Owned Hog Production Unit |
|---|---|---|---|
| Base corn price | Base price risk is similar to commodity corn production. | | There is no base corn price risk. The producers now face hog price risk. |
| Premium | The premium risk is twofold. There may not be any market for high oil corn once the corn is harvested. The producer may have to sell the corn as commodity corn on the open market without a premium. The producer's price may be discounted due to high oil content if detected and not desired in the commodity channel. The other premium risk is the variability in premium due to variations in oil content. | The main premium risk is associated with potential oil level variability and premium. There is also a risk of the elevator defaulting on the contract and forcing the producer to sell the grain on the open market. | The premium risk is associated with the variability in oil content. Default on the contract is limited to the default of the hog cooperative. |
| Quality | Producers face oil content variability. Storage associated quality problems are not as much of an issue since the producer can deliver the grain at any time (assuming a market can be found for the corn). | Producers face oil content variability as well as the risk of the corn going out of condition while in storage. The corn must be stored until March. | The producers face quality trait risks from two directions. One as a corn producer being compensated for oil content and the second as a hog feeder. The corn quality of all the other producers will affect the performance and costs of the hog unit as well as his own quality. Storage associated quality problems may be a major issue for these producers since the corn must be stored year round.<br>Quality of the hogs produced is now a risk for the producers. |
| Market access | Market access for corn | Market access if there is a default on the corn | Access to hog processing capacity and wholesale markets |
| Yield | Yield risks would be similar for each of these systems. Yield risks may be slightly higher for those producers raising corn under contracts that require only specific hybrids to be grown. | | |

As shown in the examples above, coordinated production and marketing systems can be used to transfer some types of risks. Much of the premium risk is transferred to the buyer when producers raise VEG under a contract. Yield risk can also be transferred to the buyer when acreage based contracts are used. Risks may be transferred back to the VEG producers in some relationships. The VEG producers who receive a portion of the hog farm or processing plant profits in return for delivery of grain may reduce their price risk but take on other risks.

Different types of coordinated systems may have higher risks in one area and lower risks in another. It may be difficult to say that one system carries a higher absolute level of risk than another. For example, producers raising VEG for sale on the open market face a significant premium risk since they are not guaranteed a market outlet for their crop. The producer with ownership in a marketing cooperative or processing plant faces the business risks associated with those firms but may reduce their price and premium risks for the grain.

Risks in coordinated systems are often linked to actions or markets outside the production sector. VEG producer returns may be linked to product prices such as hog, soybean meal, soybean oil, or ethanol prices. These prices do not directly affect producer returns in a traditional grain system but may under certain types of coordinated arrangements. Contract default by the grain buyer may affect the grower's ability to find a market for the VEG. The performance of other firms in the coordinated system directly affects the returns to the VEG grower.

Figure 29 illustrates the differences between risks in traditional and coordinated systems. In a traditional system, producers only face the risk in the production sector such as yield and base price. However, when producers move into coordinated systems producers participating in a coordinated system may experience risks associated with storage, volume commitments and consistent supply they may also face risks typically associated with other sectors in the system.




**Source: Ag Education & Consulting**

**Figure 29. Traditional vs. Coordinated View of Risks**

# Risk Management Strategies for Value-Enhanced Crops

The development of effective risk management strategies for VEG is critical to the continued development of the sector. The proportion of producers engaged in VEG production in Illinois is estimated at more than 37%, but if the risks inherent in VEG cannot be reasonably managed, development of this important sector of agriculture may be curtailed regardless of opportunity.

Our recommendations for potential crop insurance products are twofold: first, the adaptation of traditional crop insurance products to VEG and second, the development of broader value chain based insurance products.

## Adaptation of Traditional Crop Insurance Products

Currently there are several different types of federal crop insurance products available. These insurance products and their characteristics are shown in Table 21.

**Table 21. Federal Crop Insurance Products**

| Product | Crop Revenue Coverage (CRC) | Group Revenue Insurance Plan (GRIP) | Group Risk Plan (GRP) | Income Protection (IP) | Multiple Peril Crop Insurance (MPCI) | Revenue Assurance (RA) |
|---|---|---|---|---|---|---|
| Coverage | individual revenue | county revenue | county yield | individual revenue | individual yield | individual revenue |
| Insurance Units | basic, optional, enterprise | one unit per county | one unit per county | enterprise | basic, optional, enterprise, whole farm | basic, optional, enterprise, whole farm |
| Price Reference for Guarantee | higher of the projected harvest price and the fall harvest price | projected harvest price | 60-100% of the FCIC price | projected harvest price | 60-100% of the FCIC price | projected harvest price (or same as CRC if Fall Harvest Price Option is selected) |
| Yield Reference for Guarantee | 50-85% of producer's APH | 70-90% of the expected county yield | 70-90% of the expected county yield | 50-85% of producer's APH | 50-85% of producer's APH | 65-85% of producer's APH |
| Guarantee | higher of the projected harvest price and the fall harvest price x APH x coverage level | projected harvest price x expected county yield x coverage level | expected county yield x coverage level | projected harvest price x APH x coverage level | APH x coverage level | projected harvest price x APH x coverage level (or same as CRC if Fall Harvest Price Option is selected) |
| Gross Revenue | actual yield x harvest price | county average yield x harvest price | not applicable | actual yield x harvest price | not applicable | actual yield x harvest price |
| Loss Due If | gross revenue is less than the final guaranteed revenue | the county level gross revenue is less than the guaranteed revenue | average county yield is less than the guaranteed yield (expected county yield x level) | gross revenue is less than the guaranteed revenue | actual yield is less than the yield guarantee | gross revenue is less than the guaranteed revenue |
| Indemnity Payment | gross revenue less final guarantee | county level gross revenue less guarantee | (county yield less guarantee) x price election | gross revenue less guarantee | (actual yield less guarantee) x price election | gross revenue less guarantee |

**Price Definitions**

| | | |
|---|---|---|
| Projected harvest price: | Corn | Average of the daily settlement prices in February for the CBOT December corn futures contract |
| | Soybeans | Average of the daily settlement prices in February for the CBOT November soybean futures contract |
| Fall harvest price: | Corn | Average of the daily settlement prices in November for the CBOT December corn futures contract |
| | Soybeans | Average of the daily settlement prices in October for the CBOT November soybean futures contract |
| FCIC price: | Market prices set by the Federal Crop Insurance Corporation in the spring prior to insurance closing date<br>The FCIC price does not change during the year. | |

Each of these insurance products basically guarantees the producer some revenue or yield level based on price and/or yield guarantees. The main differences between the insurance products are the price and yield references. For the Group plans, the yield reference is the county average yield for the crop. The individual producer's actual yield is the yield reference for all the other insurance products. The FCIC price is the reference price for GRP and MPCI. The FCIC price is set in the spring and is the expected average price for the crop. The December corn futures contract and the November soybean futures contract on the Chicago Board of Trade are the reference prices for the other insurance products. The differences between the CRC, IP, and RA products relate to when the futures price is referenced. This can be in the spring, at harvest, or the higher of the two prices.

The Actual Production History (APH) is used to set the guarantees under all FCIC-backed insurance plans except the Group plans, which are based on county level yields. The APH is based on a minimum of four and up to ten years of yield records for each insurance unit. If at least four successive years of records are not available, a transition or "T" yield for each missing year must be substituted. Each county has a different T yield. It is based on the historical county average yield for the past ten years. T yields are discounted when a producer has less than three years of yield records. Once four years or more of production history are available, the APH is the simple average of all of the yearly reported yields. The four years of history will eventually build to ten years. After ten years of history are reached, the APH becomes a moving ten-year average yield. As each new year of production history is added the oldest record is dropped out of the calculation.

Current FCIC-backed crop insurance products cover losses associated with the following perils:

- Adverse weather conditions
- Fire
- Insects, but not damage due to insufficient or improper application of pest control measures
- Plant disease, but not damage due to insufficient or improper application of disease control measures
- Wildlife
- Earthquake
- Volcanic eruption
- Failure of the irrigation water supply, if applicable, due to unavoidable cause of loss occurring within the insurance period

Besides covering yield losses, the current insurance products also cover some quality traits. However, the coverage is only on test weight and damage. Loss occurs only if the grain does not meet U.S. No. 4 quality levels. Quality losses are only covered on problems that occurred in the field. Damage or test weight problems associated with drying or storage conditions are not covered.

## Potential Problems with Using Existing Crop Insurance Products for VEG

There are several potential problems with using existing FCIC-backed crop insurance products to insure VEG. These problems relate to the characteristics of VEG.

### *Differences in Commodity and VEG Value*

First, grain prices used to set guarantee levels and payment rates are based on commodity grain prices. VEG may have a significantly higher value than commodity grain. If a VEG producer that has crop insurance suffers a yield loss, the price used to set the indemnity payment may be lower than the market price for the VEG.

For example, assume a producer raised a value-enhanced corn product that had a $0.30 per bushel premium. He insured the crop with CRC at the 85% coverage level. Both the projected and actual harvest prices were $2.00 per bushel. His APH was 150 bushels per acre, giving him a revenue guarantee of $255 per acre (150 × 2.00 × 85%). He had an actual yield of 100 bushels per acre. The actual gross revenue was $200 per acre, giving him an insurance payment of $55 per acre. Table 22 shows the details of this example using the base commodity price and the VEG price. Given that the actual value of the crop was $0.30 per bushel over the commodity price, the actual value of the loss would have been more than $55 per acre. If a premium of $0.30 per bushel over the commodity price had been used to determine the payment, the payment would have increased to $63.25 per acre. It is also useful to note the actual coverage level achieved. The expected revenue for the producer was $345 per acre using the expected premium and APH. However the covered revenue level was $255 per acre, making the actual coverage level only 74% versus the 85% coverage level used in the insurance policy.

**Table 22. Crop Revenue Coverage Example**

| | Using Base Price | Using VEG Price |
|---|---|---|
| APH, Bushels/Acre | 150 | 150 |
| Price For Guarantee, $/Bushel | 2.00 | 2.30 |
| Coverage Level | 85% | 85% |
| Revenue Guarantee, $/Acre | 255.00 | 293.25 |
| | | |
| Actual Yield, Bushels/Acre | 100 | 100 |
| Harvest Price, $/Bushel | 2.00 | 2.30 |
| Gross Revenue, $/Acre | 200.00 | 230.00 |
| Insurance Payment, $/Acre | 55.00 | 63.25 |
| | | |
| Expected Revenue | | 345.00 |
| Covered Revenue | 255.00 | |
| Actual Coverage Level | | 74% |

**Source: Ag Education & Consulting**

By using current crop insurance products to insure VEG, producers may not be getting the coverage levels they need due to the higher value of the crop. For VEG with a significant premium level over commodity grain, the indemnity payment will not cover the actual value of the loss.

### *Actual Production History*

The second major problem with using current crop insurance products for VEG is the calculation of the APH. The APH for the farm or insurance unit may have been established based on commodity grain yields versus the VEG type being insured. The VEG may not have the same expected yield as commodity grain. Some VEG products have an expected yield drag of over 10% compared to commodity grain. Insuring these types of grains with standard insurance products without adjusting the APH may result in higher than expected yield losses on the part of the insurance company. Current policies require growers to report which types of grain they are raising so that their APH might be lowered as part of a specially written policy if they are growing a low yielding grain type. However, growers may not report the grain type given the advantage of keeping the higher APH.

The source data for the APH can also be a problem when growers switch to raising commodity grain after raising a type of low yielding VEG. Growers that have been raising a relatively low yielding VEG for several years will have a lower APH than if they had been growing standard commodity grain. This low APH is appropriate if the growers continue to raise the same type of grain. However, if they switch to raising a higher yielding VEG or commodity grain, the APH established on their farms will result in lower coverage levels than may be appropriate for the types of grain they are raising. For example, a producer may have been raising a VEG that typically yields 10% less than commodity corn for the last ten years, resulting in an APH of 140 bushels per acre. That APH will be used in the following year even if the producer now switches to higher yielding commodity corn. Assuming the 10% yield drag is accurate, the producer's APH would have been 155.6 bushels per acre (140/(100% - 10%)) if commodity yields were used.

### *Limited Quality Loss Provisions*

Existing policies only cover severe quality problems that result in corn or soybeans not meeting the grade requirements for U.S. No. 4 at the time of harvest. Quality traits other than grade factors are often critical to the value of VEG. Quality factors such as oil content, purity, stress cracks, and splits are often important in determining the value of VEG. Quality levels are important to VEG producers since they often affect the premium levels received. Quality loss provisions in current insurance products do not cover the types of quality factors that may be economically important to growers.

## Recommended Enhancements to Crop Insurance Products for VEG

There are several potential enhancements that could be made to current FCIC-backed crop insurance products that would address some of the problems discussed above. These enhancements will not solve all the problems or cover all the production risks associated with VEG but they will make crop insurance a more useful tool for managing yield and/or price risk in VEG.

We recommend that reference prices used to set revenue guarantees and indemnity payments be adjusted for the premiums associated with VEG and that the APH be adjusted for yield differences. Given the complexity of quality trait coverage, we do not recommend that additional quality traits be added to crop insurance coverage for specific types of VEG. We believe that it is important that prices used to set coverage levels be adjusted if the APH is adjusted. If only the APH is adjusted, producers will be encouraged not to report the types of grain they are growing since their APH may be reduced without any corresponding change to prices. They may be better off staying with standard commodity grain coverage since they are able to maintain their APH. Changing the APH and prices together will encourage more participation in the programs by offsetting some of the

yield difference in the APH with a higher settlement price that accounts for the higher value of the VEG. For VEG products that have a premium but have a very low yield drag, it may be appropriate to only adjust the settlement prices but not the APH.

These enhancements respond to some of the issues that producers from the focus groups and survey raised regarding crop insurance for VEG. Producers indicated that it was important that insurance settlement prices be adjusted for premiums. This was the highest rated crop insurance enhancement in the producer survey (Table 23) and was also mentioned in the focus groups.

**Table 23. Importance of Provisions for VEG Crop Insurance by Producer Group**

| | Average Rating (Scale: 1=Not Important to 5=Very Important) | | | |
|---|---|---|---|---|
| Provision | Non-VEG Producers | Current VEG Producers | Past VEG Producers | Grand Total |
| Adjustment For VEG Yield History | 3.75 | 3.53 | 3.89 | 3.69 |
| Cover Grain Quality Variations | 3.81 | 3.68 | 3.99 | 3.79 |
| Cover Contamination Risk | 3.84 | 3.65 | 3.91 | 3.78 |
| Adjusted Price Election For Expected Contract Premium | 3.90 | 3.78 | 4.05 | 3.88 |
| Other | 2.96 | 3.00 | 3.40 | 3.03 |

**Source: AEC Producer Survey**

The AEC producer survey asked the respondents if they are interested in crop insurance specifically designed for VEG. Of the producers who responded to the question, 24% were interested in VEG crop insurance. However, of the respondents who currently grow VEG, 39% were interested in crop insurance designed specifically for VEG.

Depending on its structure, the VEG insurance may guarantee a favorable return to producers, encouraging them to raise VEG for sale on the open market. This may create an oversupply, distorting the market. Therefore, we believe it may be necessary that producers who purchase VEG crop insurance products be required to have a contract for their production or be feeding the VEG on farm.

We believe that the price and APH adjustments for VEG coverage could be applied to all of the standard yield and revenue products except for the group plans. Since the group plans are based on county average yields, an adjustment factor for VEG yields may not be as easy to apply.

The following sections provide details on these recommendations and the implementation of these concepts.

### *Adjusting Reference Prices for Premiums*

We recommend that reference prices used to set revenue guarantees and indemnity payments be adjusted for the premiums associated with qualified VEG products. To be qualified, the products have to meet the following qualifications:

- The grain has to be grown under contract with a buyer or grown for on-farm usage.
- There has to be a published market premium available for the product in the spring.
- Historical yield data needed to generate the adjustment to APH must be available.

Not all VEG products will qualify. VEG premiums used to adjust reference prices will be set by RMA at the beginning of the year prior to the sales closing date for the insurance product. The premiums may be used to adjust both futures prices used in revenue insurance products and FCIC prices used for yield only insurance products. The VEG premium levels should not be adjusted up or down with the market during the growing season. They should be set once per year and held constant for the policy. The premiums should be set slightly under the market level so that insurance fraud is discouraged. Information sources for setting the premium levels may include published rates, production contracts, and research publications. VEG products eligible for the annual premium adjustment should have a lower limit on the premium level. For example, premium levels lower than $0.05 per bushel may not be accounted for. We anticipate that premium adjustment could be made on VEG products that do not have a yield adjustment.

### *Adjusting APH for Standardized Yield Differences*

The APH issue is considerably more important in determining how traditional crop insurance products might be designed to accommodate VEG. It will have a much more significant effect on risk exposure for the insurer and, if incorrectly calculated, could actually affect the supply of the product.

There are many calculation approaches for adjusting APH for VEG. However, it is our belief that the one with the most potential is as follows.

1. Producer establishes an APH for commodity corn or soybeans in the same way as currently done.
2. A "yield adjustment" is developed and maintained for each VEG product and then applied to the APH for calculation of guarantees.

In order to be qualified for an APH adjustment, the VEG products have to meet the following qualifications.

- The grain has to be grown under contract with a buyer or grown for on-farm usage.
- Historical yield data on the VEG products have to be available from qualified sources.

As with the premium adjustments, not all VEG products are candidates for APH adjustments. VEG products with very low yield drags may not qualify. Yield adjustments may also be discounted somewhat from actual observations to discourage abuse.

There are several potential alternatives for developing the yield adjustment or standardized yield drags. Seed companies could be required to provide yield data on their products in order to qualify their hybrids for insurance coverage. Seed company yield data would be used to generate the yield adjustments for the various VEG products. Seed companies could be required to provide annual updates to the yield drag estimates so that they are kept current. We do not expect that the yield adjustments or insurance policies would be variety specific but rather product specific (i.e. white corn). However, in order to qualify for the insurance product, a producer may have to grow a variety that was included in the data set used to generate the APH adjustment. The APH adjustment may be based on the average yield drag for the varieties submitted to represent the specific VEG product. Yield data for the yield adjustments could also come from University trials or other research. The University of Illinois publishes test plot data for many types of VEG. The test plot data for both corn and soybeans is available for the 2001 crop from 68 different locations in the

state. The data are unique in that they include yield results for VEG products and common commodity varieties so that yield comparisons can be made. Finally, yield data may be available from the farm purchasing the insurance if they have yield records for both the VEG product and commodity grain.

Table 24 summarizes yield drag data collected as part of the VEG Quality Report. These yield estimates are based on producer survey responses. The results show the average VEG yields relative to commodity corn raised on the same farms. These results show that yield drags can vary from year to year for a specific product. However, they do give a general indication of the types of yield drag levels that can be expected.

**Table 24. VEG Yield as Percent of Commodity Yield**

| Year | White | Waxy | Hard Endosperm | High Oil | Nutritionally Enhanced | High Amylose |
|---|---|---|---|---|---|---|
| 1997 | 95% | 94% | 99% | 100% | 95% | 60% |
| 1998 | 94% | 91% | 100% | 100% | 101% | 70% |
| 1999 | 92% | 98% | 102% | 99% | 100% | 69% |
| 2000 | 98% | 95% | 104% | 99% | 92% | 66% |
| 2001 | 96% | 97% | 103% | 97% | 89% | not available |

**Source: U.S. Grains Council VEG Quality Report**

Table 25 shows an example of how both the base APH and prices could be adjusted for VEG. The APH in the example is 150 bushels/acre for commodity yields. The yield adjustment for a particular type of VEG is 10%. In other words, this VEG typically yields 10% less than commodity corn. The yield adjustment is used to create an adjusted APH for this farm. The new APH is 135 bushels/acre. The base corn price is $2.00 and the premium for this VEG is $0.30 making the final corn price $2.30. The revenue guarantee equals the adjusted APH × the final corn price × the guarantee level. A change in the yield or base price that results in a revenue level of less than $264 per acre will result in an insurance payment.

**Table 25. VEG Crop Revenue Coverage Example**

| | |
|---|---|
| APH for commodity corn, bushels/acre | 150.0 |
| Yield adjustment, % | 10% |
| Yield adjustment, bushels/acre | 15.0 |
| Adjusted VEG APH, bushels/acre | 135.0 |
| Base corn price | 2.00 |
| Premium | 0.30 |
| Final corn price | 2.30 |
| Expected revenue, $/acre | 311 |
| Guarantee level | 85% |
| Revenue guarantee, $/acre | 264 |

**Source: Ag Education & Consulting**

Another important issue is the method by which a producer adjusts a VEG-based APH to a commodity yield. Data show that producers often move in and out of VEG production. Producers that were raising a low-yielding VEG product should have the ability to adjust their APH up if they switch to commodity grain production. By not adjusting their APH, these producers are penalized with low APH, and they may be less likely to buy insurance due to the low coverage level.

Table 26 shows a method for determining a commodity APH based on a VEG yield history and a VEG yield adjustment for a farm unit. The farm level APH in this example is 140 bushels per acre. This is based on four years of growing the same VEG. The standard yield adjustment for this VEG is 10%. Using these assumptions we can determine that the APH for commodity corn on this farm would be 155.6 bushels per acre. This is the APH that should be used if the farm were to raise commodity corn.

**Table 26. Calculation of Commodity APH Based on VEG APH and Yield Adjustment**

| | |
|---|---|
| Farm APH For VEG, Bushels/Acre | 140.0 |
| Yield Adjustment, % | 10% |
| Farm APH For Commodity, Bushels/Acre | 155.6 |

**Source: Ag Education & Consulting**

If a system is developed to adjust a producer's commodity APH for VEG production, we suggest that the APH should be tracked in terms of commodity yield potential regardless of the types of VEG grown. This will reduce confusion as producers raise different types of VEG and switch from raising VEG to commodity grain. The calculation of a producer's APH needs to account for the types of grain raised each year in the span of crop years used to generate the APH. Tracking the APH on a commodity yield potential basis allows producers and insurance providers to have a uniform base yield on which to base any future yield adjustments.

Table 27 illustrates an example of how yield records for a farm unit's APH could be adjusted to standard commodity yield. In this example the producer raised three different types of VEG in different years. Standardized yield adjustments are used to adjust the actual yield to a commodity based yield. The actual ten year average yield is 151.9 bushels per acre. After the yield adjustments are made, the adjusted APH increases to 160.2 bushels per acre. Going forward, this adjusted APH could be used as the basis for setting the APH for any type of VEG given it had a known yield adjustment.

**Table 27. Tracking Farm Unit APH based on a Standard Commodity Yield**

| Crop Year | Actual Yield History, bu/ac | Corn Type | Standardized Yield Adjustment | Adjusted APH, bu/ac |
|---|---|---|---|---|
| 1992 | 141.0 | Commodity | 0% | 141.0 |
| 1993 | 125.0 | Commodity | 0% | 125.0 |
| 1994 | 153.0 | Commodity | 0% | 153.0 |
| 1995 | 167.0 | Commodity | 0% | 167.0 |
| 1996 | 125.0 | High Amylose | 35% | 192.3 |
| 1997 | 157.0 | Commodity | 0% | 157.0 |
| 1998 | 176.0 | Commodity | 0% | 176.0 |
| 1999 | 171.0 | Commodity | 0% | 171.0 |
| 2000 | 136.0 | White | 5% | 143.2 |
| 2001 | 168.0 | Waxy | 5% | 176.8 |
| APH for 2002 | 151.9 | | | 160.2 |

**Source: Ag Education & Consulting**

In order for this type of APH tracking and calculation system to work, standardized yield adjustments will be needed for any VEG type grown. This may not be the case. In the event that there is no standardized adjustment and the product does yield significantly lower than commodity grain, that yield record could be left out of the APH calculation.

This type of tracking system may not be needed if the producer only raised VEG on a portion of their total acres in a given year. The example above assumed that the producer raised VEG on all crop acres of the insured unit in the years that VEG production was indicated. If a producer has commodity grain yield records for all years, then the commodity APH could be maintained with commodity yield data only.

### *Insurance Product Changes to Handle Quality Risk*

We do not recommend that the current crop insurance products be modified to handle the specific quality risks associated with VEG. There are several reasons why insuring the risk of quality trait problems in VEG is difficult.

**Critical quality traits differ by VEG product and by user.** It would be difficult to write standardized polices that insure quality trait levels given these differences. Different users often have different requirements and place different values on the same levels of quality. The risk associated with quality traits are often specific to the production contract.

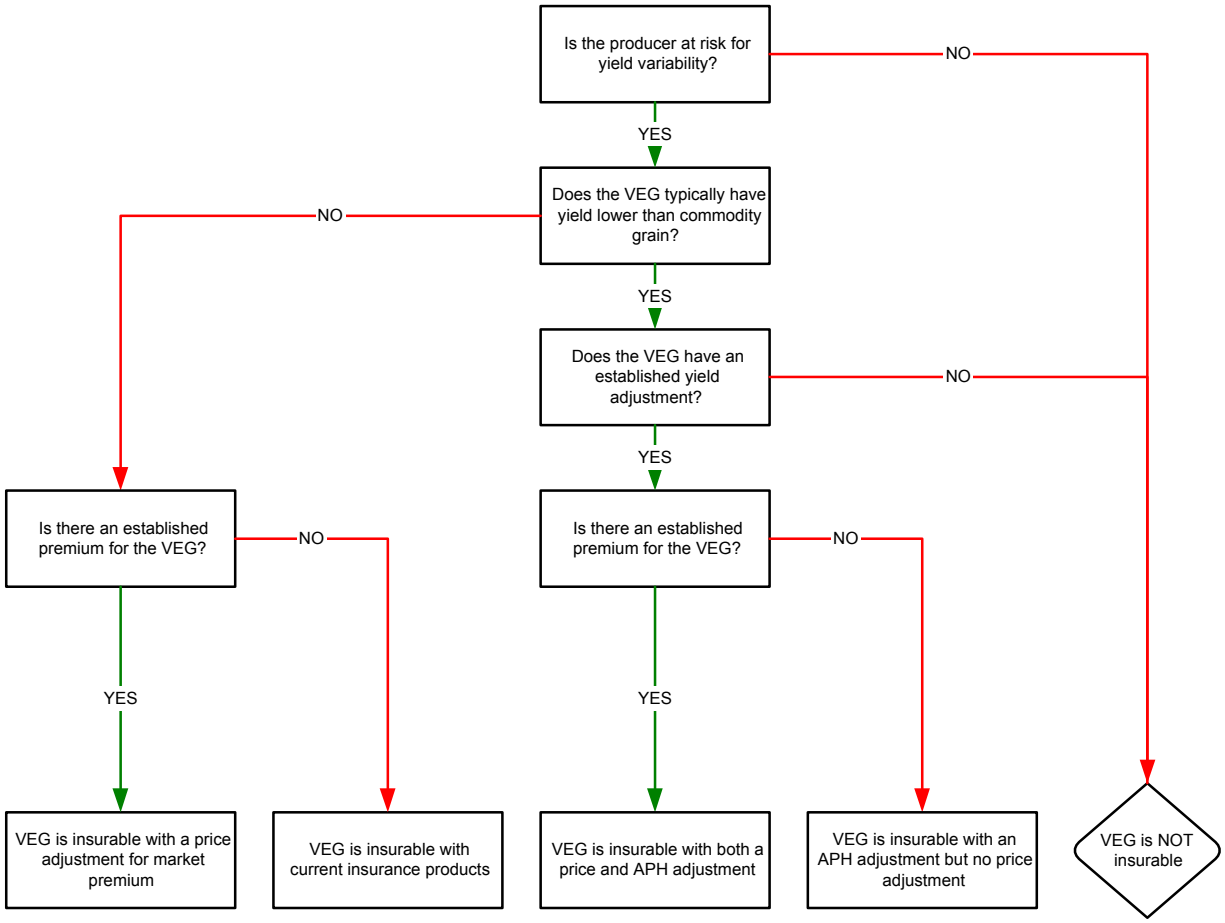
**Many of the quality traits are affected by management actions.** Quality traits such as breakage, stress cracks, GMO contamination, and foreign material are often affected by management practices rather than weather. These risks are outside of the perils covered by current policies.

**Variable value differences.** Many quality traits affect the grain value over a continuum. In order to provide coverage for these types of traits, set discount or premium schedules would be needed for each of the insured traits.

**Specialized testing required.** Specialized testing equipment and analysis techniques are often required for the types of quality traits important in VEG. Standardized sampling and testing procedures would need to be followed.

### *VEG Crop Insurance Coverage Options*

Several crop insurance coverage options are possible for VEG based on the recommended enhancements. The options available for individual types of VEG depend on the characteristics of the VEG products including the yield performance relative to commodity grain and market premiums. Figure 30 shows a process for determining the type of insurance coverage that may be available for crops with different yield and pricing characteristics.




**Source: Ag Education & Consulting**

**Figure 30. VEG Crop Insurance Decision Process**

## Analysis of Value-Enhanced Grain Crop Insurance

The following sections demonstrate the impact of the proposed crop insurance changes by showing how indemnity payments compare under standard crop insurance and VEG insurance. In these examples, the term VEG insurance is used to describe proposed crop insurance products that incorporate the modifications suggested in the previous sections. This includes grain prices adjusted for market price premiums and yield histories adjusted for expected yield deficiencies. Examples of both yield and revenue coverage are included in the discussion.

### VEG Insurance to Insure VEG versus Standard Insurance to Insure Commodity

Analysis of the proposed VEG insurance showed that it provides similar coverage of expected revenues from VEG production as standard crop insurance covers expected revenue from commodity grain production. Expected revenue is defined as the APH multiplied by the base market price defined under the insurance product. The actual coverage level is defined as the actual revenue after indemnity payments divided by the expected revenue.

Using these definitions, an analysis of standard and VEG crop revenue coverage insurance showed that actual coverage levels for VEG insurance used to insure VEG were similar to the actual coverage levels provided by standard crop insurance used to insure commodity grain. For example,

the analysis showed that when insured at the 85% level, both the standard and VEG insurance provided a minimum of 85% of the actual coverage level when applied to VEG and commodity grain, respectively. These results were expected since an objective in designing VEG insurance was to provide coverage levels on VEG comparable to coverage levels achieved with standard crop insurance on commodity grain. The adjustment of both the APH and market price used in the VEG insurance makes the minimum actual coverage levels comparable to the coverage levels that can be achieved with standard crop insurance and commodity grain.

## VEG Insurance to Insure VEG versus Standard Insurance to Insure VEG

A more interesting comparison can be made between insuring VEG with the proposed VEG insurance versus standard insurance. This comparison is useful for two reasons. First, some types of VEG may be currently insurable with standard crop insurance policies. Second, if the VEG insurance is developed, producers may still have the option of insuring VEG production with standard insurance. Therefore, it is useful to compare the expected insurance payment levels under different price and yield scenarios for both standard and VEG insurance.

White, waxy, and high lysine corn can be insured currently with standard FCIC-backed crop insurance products according to the Coarse Grain Provisions. Depending on the Special Provisions that vary by county, other value-enhanced corn types such as high oil and high protein may also be insured with standard crop insurance policies. Corn types not included in the provisions may be insured under written agreements that are used to modify standard policies.

Some of the value-enhanced corn types that can be insured with standard crop insurance policies commonly yield less than standard yellow corn. For example, waxy corn typically yields 5% less than standard yellow corn. Waxy corn can be insured with standard crop insurance policies without adjusting a producer's APH. White, high lysine, high protein, and high oil corn also tend to have lower yields than standard yellow corn but may be insurable with standard crop insurance policies.

In the examples below, returns from growing waxy corn insured with standard and VEG crop insurance are compared. Please note that waxy corn is the only insured grain in both examples. The comparisons are made between insuring waxy corn production with standard crop insurance versus insuring waxy corn with VEG insurance. A comparison of insuring commodity corn with standard insurance versus waxy corn with VEG insurance is not included in these examples. The VEG insurance includes the recommended adjustments to APH and market price premium appropriate for the VEG product. Comparisons for both yield and revenue based insurance are made with multiple peril crop insurance (MPCI) and crop revenue coverage (CRC).

### *Example No. 1—Yield Based Crop Insurance Comparison for Waxy Corn*

Table 28 the assumptions for the MPCI example. The producer's APH is 150 bushels per acre. Under the standard insurance, no adjustment is made to the APH, but under the VEG insurance, a 5% reduction is made to the APH for the expected yield difference from commodity corn. The yield coverage level under both insurance types is the same at 75%. Given the difference in APH, the yield guarantee under the standard insurance is 113 bushels per acre while the yield guarantee under VEG insurance is 107 bushels. The indemnity price for the VEG insurance is $0.30 per bushel higher than the standard indemnity price, accounting for the expected market premium for the waxy corn.

**Table 28. MPCI Example Assumptions for the Waxy Corn Example**

| | Standard Insurance | VEG Insurance |
|---|---|---|
| APH, Bushels/Acre | 150 | 150 |
| Yield Adjustment | 0% | 5% |
| Adjusted APH | 150 | 143 |
| Yield Coverage Level | 75% | 75% |
| Yield Guarantee, Bushels/Acre | 113 | 107 |
| Indemnity Price, $/Bushel | $1.90 | $2.20 |
| VEG Price Premium, $/Bushel | | $0.30 |

**Source: Ag Education & Consulting**

There is a benefit and a drawback of using VEG insurance. The benefit is a higher indemnity price used to make insurance payments. For each bushel of yield loss below the guarantee, the VEG insurance option will provide an additional $0.30 per bushel payment. The drawback of the VEG insurance coverage is the lower yield guarantee, a result of the APH adjustment.

Given that market price premiums on value-enhanced corn are typically set to cover reductions in yield, the VEG insurance coverage as outlined in this example may be a better alternative to standard insurance for a producer of waxy corn. The producer's APH is adjusted lower but the market price premium is expected to cover the yield adjustment. However, analysis of this example under different pricing and yield scenarios shows that the waxy corn producer may receive a lower insurance indemnity payment under the VEG insurance compared to the standard insurance under certain circumstances.

Table 29 shows the crop insurance payments under both types of insurance with an actual yield of 90 bushels per acre, given the assumptions outlined in Table 28. Note that the 90 bushels per acre yield is used under both types of insurance since it is the same waxy corn that is being grown under the standard and VEG insurance. VEG insurance results in a lower insurance payment per acre than the standard insurance. The bushels per acre yield guarantee with the standard insurance is 113. An indemnity payment under the standard coverage pays on 23 bushels per acre (the 113 bushel yield guarantee less the actual 90 bushel yield) at a rate of $1.90 per bushel (the indemnity price). The VEG insurance policy pays on only 17 bushels per acre (107 guarantee less 90 actual) at the indemnity rate of $2.20 per bushel. The indemnity payment difference of $6 per acre can be broken down into two sources as shown in the lower portion of the table. The first source is the result of the lower yield guarantee. With an actual yield of 90 bushels per acre, the VEG insurance coverage pays on 6 fewer bushels per acre due to the APH yield adjustment. When valued at the standard price of $1.90 per bushel, this can be valued at $11 per acre. The second component of the indemnity payment difference is the result of the VEG price premium paid on the bushels. This is

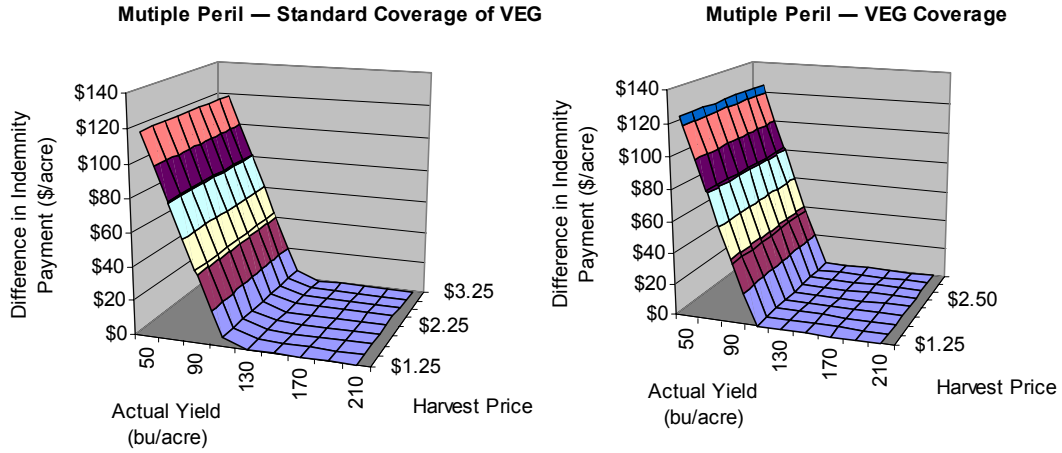
calculated by multiplying the bushels paid under the VEG coverage by the VEG price premium, totaling $5 per acre. Summed together, the two sources equal the difference in insurance payments. These calculations show that the VEG insurance option will have a lower insurance payment as long as the value of the yield guarantee difference is greater than the value of the VEG price premium paid on the bushels.

**Table 29. MPCI Payments with an Actual Yield of 90 Bushels per Acre**

| | Standard Insurance | VEG Insurance | Difference |
|---|---|---|---|
| Bushels Paid | 23 | 17 | -6 |
| Indemnity Price, $/Bushel | $1.90 | $2.20 | $0.30 |
| Indemnity Payment per Acre | $43 | $37 | -$6 |
| Difference in Bushels Paid, Bushels/acre | | | -6 |
| Indemnity Price, Standard Insurance | | | $1.90 |
| Result of Lower Yield Guarantee | | | -$11 |
| Bushels Paid under VEG Insurance | | | 17 |
| VEG Price Premium, $/bushel | | | $0.30 |
| Result of VEG Price Premium Paid on Bushels | | | $5 |

**Source: Ag Education & Consulting**

Determining which insurance option results in the higher insurance payment depends on the crop yield used in this example. Figure 31 shows the indemnity payments under the VEG and standard coverage by actual yield and harvest price. Harvest price does not affect the indemnity payments under MPCI so the graphs are flat across the range of harvest prices. Indemnity payments do not start until the actual yield falls below the yield guarantees. Note that the standard coverage payments start at higher yield levels. However, the VEG coverage results in higher payments at very low yields.

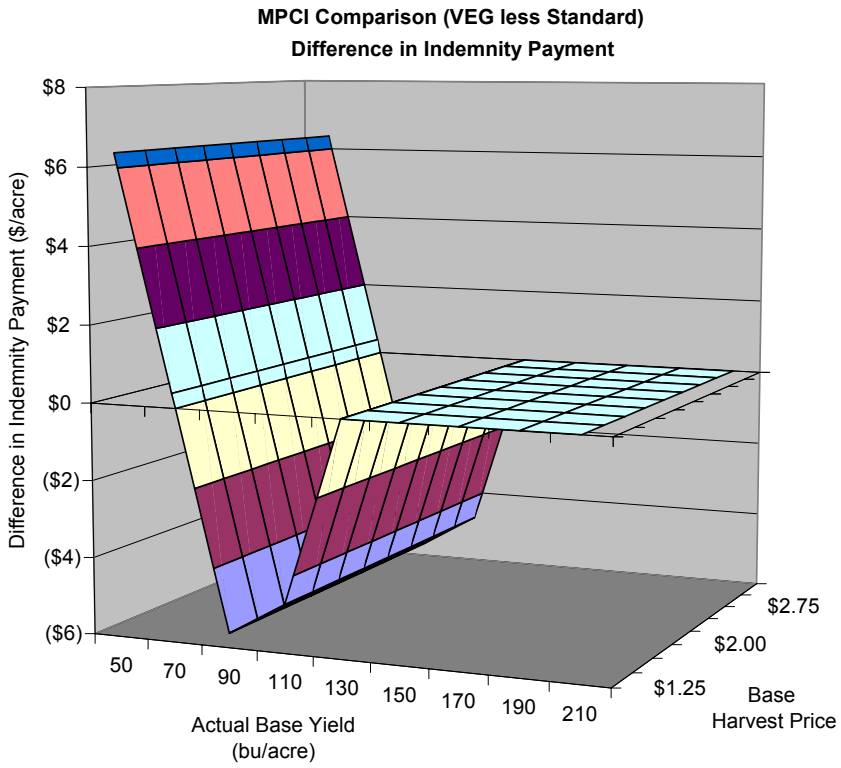



**Source: Ag Education & Consulting**

**Figure 31. MPCI Indemnity Payments for VEG and Standard Coverage for Waxy Corn Example**

Figure 32 shows the difference in indemnity payments between standard and VEG coverage by actual yield and harvest price. The figure shows that the VEG coverage results in lower indemnity payments until actual yields fall to roughly 70 bushels per acre. Below 70 bushels per acre the VEG coverage results in higher payments. The shape of the graph is a result of the two components of the indemnity payment differences discussed above. Between approximately 70 and 130 bushels per acre, the value of the lower yield guarantee is greater than the added value of the market price premium on the bushels paid. At lower yields, the price premium more than compensates for the

difference in yield guarantee and, therefore, the VEG coverage results in a higher indemnity payment. At yields above 130 bushels per acre, indemnity payments are not made under either option.




Source: Ag Education & Consulting

**Figure 32. Difference in Indemnity Payments for MPCI for Coverage of Waxy Corn**

Which insurance coverage option the producer in this example would select (standard or VEG) depends on the relative cost of the insurance products. Insurance cost was not considered in this example. Also note that the results would change if the market price premium was changed.

### *Example No. 2—Revenue Based Crop Insurance Comparison for Waxy Corn*

In this example, the crop insurance payments under standard and VEG crop revenue coverage are compared. As in the previous example, waxy corn is insured with standard and VEG insurance. As shown in Table 30, the same basic APH and market price premium assumptions as in the previous example are used. The revenue coverage level under both insurance types is the same at 85% and the base price on both insurance options is $2.25 per bushel. Given these assumptions the revenue guarantee on the standard insurance is $287 per acre while the guarantee on the VEG insurance is $309.

**Table 30. CRC Example Assumptions for Waxy Corn Example**

| | Standard Insurance | VEG Insurance |
|---|---|---|
| APH, Bushels/Acre | 150 | 150 |
| Yield Adjustment | 0% | 5% |
| Adjusted APH | 150 | 143 |
| Coverage Level | 85% | 85% |
| Base Price, $/Bushel | 2.25 | 2.55 |
| VEG Price Premium, $/Bushel | | 0.30 |
| Revenue Guarantee, $/Acre | $287 | $309 |

Source: Ag Education & Consulting

At first glance, the VEG insurance option appears preferable to the standard insurance if they were priced the same. The producer's adjusted APH is lower under the VEG insurance but he is receiving a market price premium. The revenue guarantee is substantially higher under the VEG option, which appears to be in the producer's favor.

Table 31 shows the crop insurance payments under both types of insurance with an actual yield of 90 bushels per acre and a harvest price of $2.00 per bushel. Table 31 shows that the VEG insurance coverage results in a lower insurance payment per acre than the standard coverage. The revenue guarantee is higher under the VEG coverage but so is the actual gross revenue used for the insurance calculation. The addition of the $0.30 premium on the harvest price results in a higher gross revenue with the VEG insurance. The insurance payment is determined under both options by subtracting the actual gross revenue from the guarantee. The standard insurance pays $107 per acre and the VEG coverage pays $102 per acre under this scenario.

**Table 31. CRC Payments with an Actual Yield of 90 Bushels per Acre**

| | Standard Insurance | VEG Insurance | Difference |
|---|---|---|---|
| Actual Yield | 90 | 90 | 0 |
| Harvest Price | $2.00 | $2.30 | $0.30 |
| Gross Revenue for Insurance Calculations | $180 | $207 | $27 |
| APH Yield | 150 | 143 | -8 |
| Maximum of Spring and Harvest Price | $2.25 | $2.55 | $0.30 |
| Coverage Level | 85% | 85% | 0% |
| Revenue Guarantee | $287 | $309 | $22 |
| Indemnity Payment | $107 | $102 | -$5 |

**Source: Ag Education & Consulting**

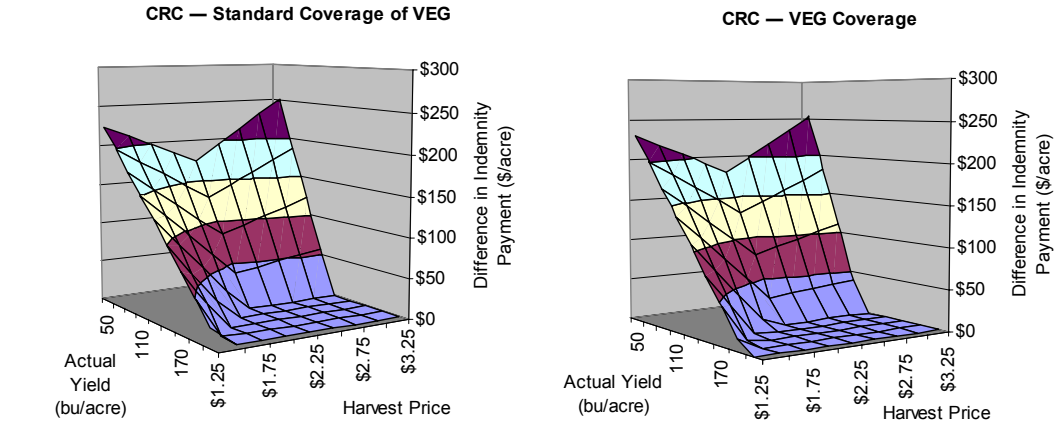
As with the MPCI, the insurance payment has three components. Table 32 shows the components of the CRC insurance payment under the scenario for both the standard and VEG insurance. Even though the CRC insurance payments are based on revenue versus yield alone, the payments can be broken down into yield, base price, and premium components. The table shows that when there is a lower APH with the VEG insurance, the yield and base price components will be lower with the VEG insurance than with the standard insurance. The VEG insurance does have the benefit of the premium component but the VEG insurance payment will be lower than the standard coverage payment as long as the premium component is less than the yield and base price components combined.

**Table 32. Components of CRC Payments with an Actual Yield of 90 Bushels per Acre**

| | Standard Insurance | VEG Insurance | Difference |
|---|---|---|---|
| **APH Impact on Yield Guarantee** | | | |
| Bushels Paid | 38 | 31 | -6 |
| Standard Price (Fall Price) | $2.00 | $2.00 | $0.00 |
| Bushel-Based Insurance Payment | $75 | $62 | -$13 |
| **APH Impact as a Result of Base Price Changes** | | | |
| Change in Base Price (If Harvest Price is Lower) | $0.25 | $0.25 | $0.00 |
| APH | 128 | 121 | -6 |
| Price-Based Insurance Payment | $32 | $30 | -$2 |
| **VEG Price Premium Impact on Bushels Paid** | | | |
| Bushels Paid under VEG Insurance | | 31 | |
| VEG Price Premium | | $0.30 | |
| Result of VEG Price Premium Paid on Bushels | | $9 | $9 |
| Total Insurance Payment | $107 | $102 | -$5 |

**Source: Ag Education & Consulting**

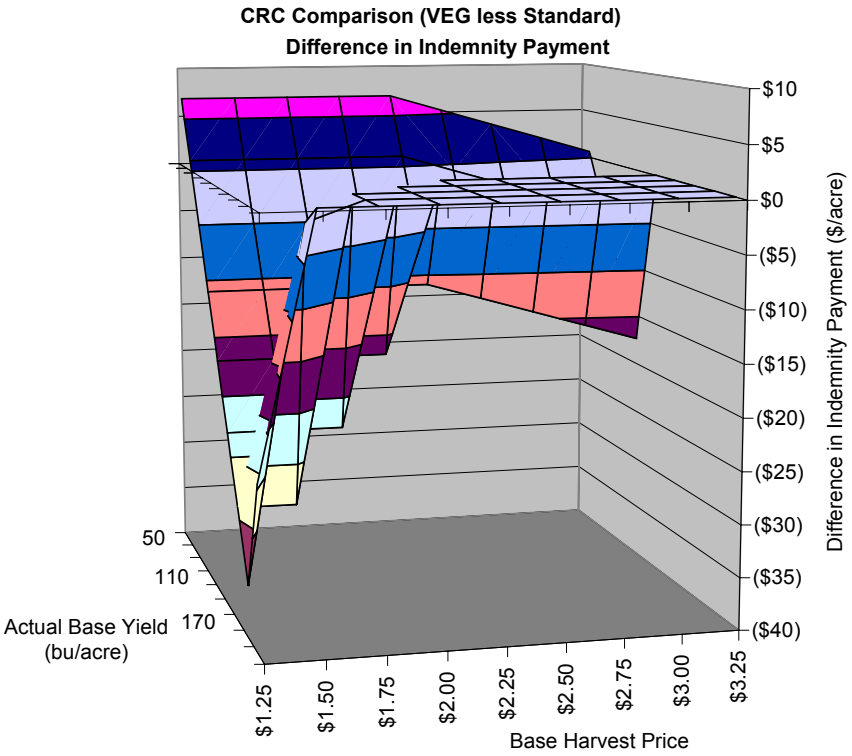
It is useful to compare the CRC insurance payments under standard and VEG policies over a range of yields and prices. Figure 33 shows the indemnity payments under the VEG and standard coverage by actual yield and harvest price. Notice that unlike the MPCI, the payments are dependent on both price and yield. The shapes of the two charts are similar. However, the payments start at lower price and yield combinations with the standard coverage than with the VEG insurance.




**Source: Ag Education & Consulting**

**Figure 33. CRC Indemnity Payments for VEG and Standard Coverage for the Waxy Corn Example**

The differences in payments between the standard and VEG policies are more clearly illustrated in Figure 34, which shows the difference in payments for the two policy types at different yield and price points. The figure shows that the payments on VEG insurance only exceed the standard insurance at very low yields. Certain price and yield combinations can result in insurance payments as much as $35 per acre less with the VEG insurance than with the standard insurance.




**Source: Ag Education & Consulting**

**Figure 34. Difference in Indemnity Payments for CRC for Coverage of Waxy Corn**

As in the MPCI example, the cost of the crop insurance was not included in the scenario. Differences in cost for the VEG and standard policies would impact the results.

## Conclusions of VEG Crop Insurance Analysis

These examples show that providers of the insurance products and producers need to be aware of the tradeoffs associated with modifying both the APH and market settlement prices used in insurance products. Unexpected results can occur, and it is important to look at the insurance payment results under a wide range of assumptions.

The results show that VEG growers would most likely keep using the standard policies if the cost of standard crop insurance was the same or less than VEG insurance. In many cases, the VEG coverage resulted in lower indemnity payments than standard insurance. VEG insurance may have to be priced lower than standard insurance to encourage usage. Provisions in current crop insurance could be changed to disallow producers from using standard coverage on some types of VEG.

Currently, commodity grain growers may be subsidizing the insurance costs of VEG growers. The analysis shows that VEG growers may be benefiting from being able to insure their VEG that has a moderate yield drag with standard insurance. The VEG often has a greater probability of generating a claim given the expected yield drag. The cost of covering claims on these types of VEG that can be insured now with standard insurance may be reflected in the premiums paid by all growers including the commodity grain growers.

## Value Chain Level Risk Management

Another alternative to traditional crop insurance for managing the risks associated with value-enhanced grains is to develop insurance tools that insure risks at the value chain level. Many of the types of risks involved with the production and marketing of VEG may be better managed at the value chain level versus the individual farm level. The actual development of value chain level risk management tools is beyond the scope of this project. However, the following sections provide some thoughts on the types of tools that may be useful.

## Potential Value Chain Level Risk Management Tools

We have considered two potential types of value chain risk management tools. There likely are additional types that could be developed but our discussion will focus on the following types.

- Group Insurance Plans for Producers
- Supply Insurance for Merchandisers and Processors

### *Group Insurance Plans for Producers*

Group crop insurance plans for producers could be developed for producers raising VEG for specific markets. The crop insurance would be customized for the unique crop type and risks faced by the producers in the group. For example, a unique crop insurance plan could be developed and offered to producers growing high protein soybeans for a given processor. The plan would only be available to the producers raising the high protein soybeans for that processor. Market prices, yields, and quality factors used in the insurance plan could be based on the specific characteristics of the local market and production requirements.

Since the insurance plans would be unique for specific markets and producer groups, they could offer risk protection on factors that are not feasible to cover with traditional crop insurance. Quality trait risk and the impact of quality trait levels on crop value could be covered with the group plans. Unlike other crop insurance options, the group plans could use the specific premium and discount schedules associated with the unique market to set up the insurance coverage. Each of the critical quality traits for the unique crop type could be included in the coverage.

Grain elevators, merchandisers, or processors that typically buy grain directly from producers would likely manage the group insurance plans. They would offer the crop insurance when contracting with producers for grain production. The insurance may be bundled with the production contract in order to provide the producers with minimum revenue guarantees.

There are several reasons why grain companies or processors may want to offer crop insurance or otherwise manage risks for producers. Firms that buy VEG from producers often struggle to maintain a grower base that is willing to raise the types of VEG they need and is trained on the production and handling procedures for producing the VEG. Data from the U.S. Grains Council VEG Quality Report show that the turnover rate in VEG producers was nearly 30% in 2002. VEG buyers may incur added costs in recruiting and training new growers. Buyers often have a significant investment in their grower base and they may be looking for additional ways to maintain it. By offering crop insurance as part of their production contracts, buyers may be able to maintain their grower base and secure their supplies more efficiently. Growers would be able to access the risk management tools as a part of the production system with the buyer, and the risk management tools would be designed for the specific VEG market.

Providing crop insurance may also be a way for grain buyers to enhance their profitability. They may be able to offer insurance services more competitively than traditional insurance providers since they already have direct contact with the growers and the ability to verify claims. By pooling the risks of all their growers, the buyers may be able to offer insurance rates and insurance products that traditional providers cannot.

Many grain buyers offer services to producers such as grain marketing programs to help producers manage price risk. These services provide returns to the grain buyers and help them secure their relationships with the producers. Grain buyers would likely be interested in offering additional services to help producers manage other risks such as yield and quality risks.

### *Supply Insurance for Merchandisers and Processors*

Most of the risk management discussion in this report has focused on producer risk management. However, there may also be a need for tools to help other firms in the VEG value chain manage their risks. As discussed in the "Risks Across the Value Chain" chapter, grain originators, merchandisers, and processors also face new types of risks when they handle or use VEG. These firms may benefit from access to risk management tools for VEG.

Crop insurance can be used to manage yield risk for a producer of most types of VEG. It provides coverage against low yields. However, the crop insurance does not cover the risks of the grain merchandiser or user that was counting on the supply of VEG that was cut short by low yields. A lower than expected supply of VEG may affect the throughput of the grain dealer. A buyer of VEG may be dependent on a single source of grain and, therefore, face a significant added cost to find another source or switch to another product. For example, a snack food manufacturer that uses white corn from a specific growing region will be adversely affected by low white corn yields. They may incur added costs associated with shipping in white corn from other areas or be forced to reduce their production. In addition, the underlying market price of the white corn will likely increase due to the lower production. Unlike commodity corn, the processor may not be able to hedge against the risk of increases in white corn prices. They may be able to hedge the base/commodity corn price but not the premium for white corn that can vary significantly. These risks may be covered currently by wider margins and lower premiums than would be required if these risks were reduced.

Quality problems with VEG can also affect VEG buyers. The VEG buyers may be able to offset part of the costs associated with lower than expected quality by discounting the price paid for the VEG. However, at some point the quality may start to affect the quality of processed products and/or animal feeding performance. Grain price discounts may not cover the losses associated with all quality risks for VEG buyers.

Supply insurance for VEG handlers and buyers could offer coverage for both quality and quantity risks. Supply insurance would be beneficial for VEG users and it would likely help to foster the development of the VEG market. End users may be more willing to use VEG if they had access to risk management tools to offset some of the risks associated with using VEG.

## Issues to Consider

There are two major issues to consider before moving ahead with the development of risk management tools at the value chain level. First, the development of risk management tools at the value chain level may not be consistent with RMA's statutory mission. RMA's mission is to "provide and support cost-effective means of managing risk for agricultural producers in order to improve the economic stability of agriculture." Some of the types of risks management tools for the value chain may go beyond managing producer risks to managing the risk of merchandisers, elevators, and processors. However, by helping to manage value chain level risks, the risk management products may enable the development of the VEG market or lower margins, thus benefiting producers. Without the development of the value chain risk management tools, some VEG markets and marketing systems may not develop.

Second, more work is needed to determine if demand exists for these types of tools and to determine which types of organizations would be users of these tools. Analysis of the VEG market indicates that some segments of the market are struggling to find ways to better manage risks. VEG producers are finding that risk management tools that manage price and yield risks alone may not be sufficient to cover the types of risks they face. The move toward coordinated systems is creating new types of risks for both producers and other firms in the value chain.

# Further Research Work Needed

This project has uncovered several research topics that need additional work. These research topics are summarized below.

**Additional analysis of the risks associated with raising value-enhanced grains.** This work focused on risks associated with growing value-enhanced corn and soybeans in Illinois. Additional work may be needed to see how these risks vary in other growing regions and for other value-enhanced crops.

**Further development of crop insurance products for value-enhanced corn and soybeans.** General recommendations were developed as a part of this project for changes to traditional crop insurance for value-enhanced grain coverage. However, more work is needed to evaluate product alternatives, analyze underwriting methodologies, and develop parameters for establishing coverage levels.

**Development of value chain level risks management tools.** The need for risk management tools at the value chain level was noted as a part of this project. Additional work is necessary to determine what types of products are needed, how the products would be designed, what types of coverage would be offered, what the products would cost, and the level of involvement of the Risk Management Agency in these types of products.

**Development of risk analysis tools for producers.** Work done as a part of this project showed that there could be a need for software tools that allow producers to analyze the tradeoffs associated with different crop insurance options. If specialized insurance products become available for VEG, it will be useful for producers to have access to a tool that allows them to compare coverage options. Additional tools that help producers quantify and visualize the risks associated with VEG and how those risks can be managed with crop insurance may also be useful.

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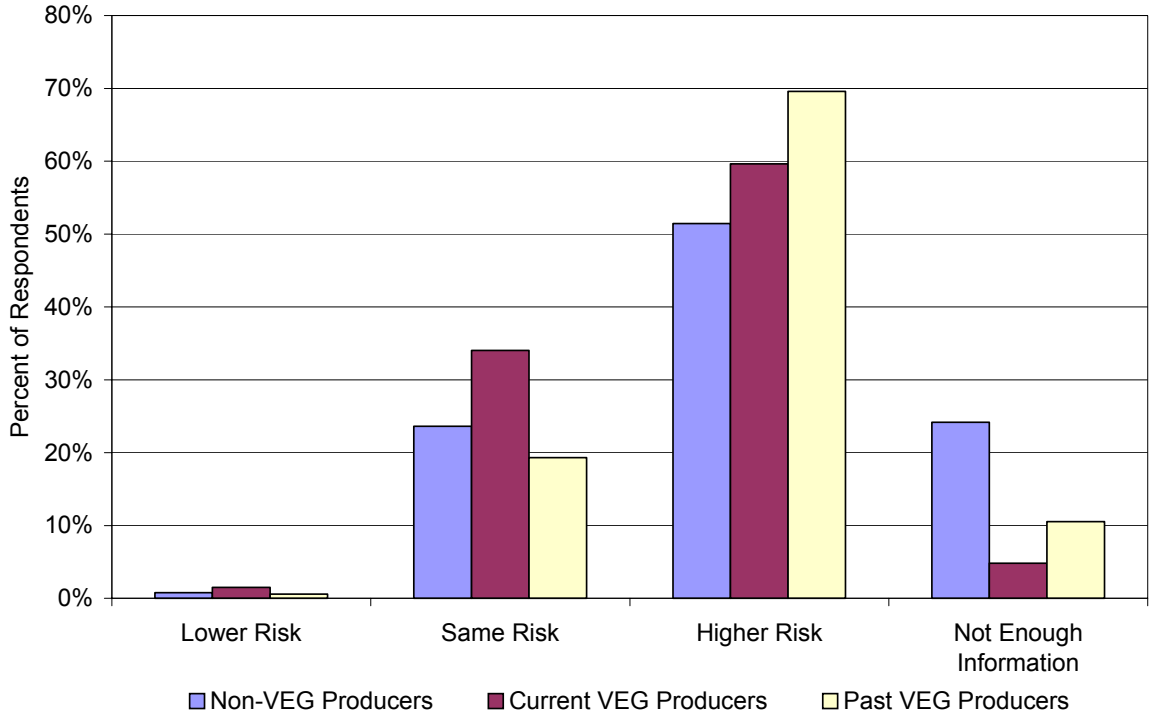
# Appendix A
# Producer Risk Perceptions of Value-Enhanced Grain

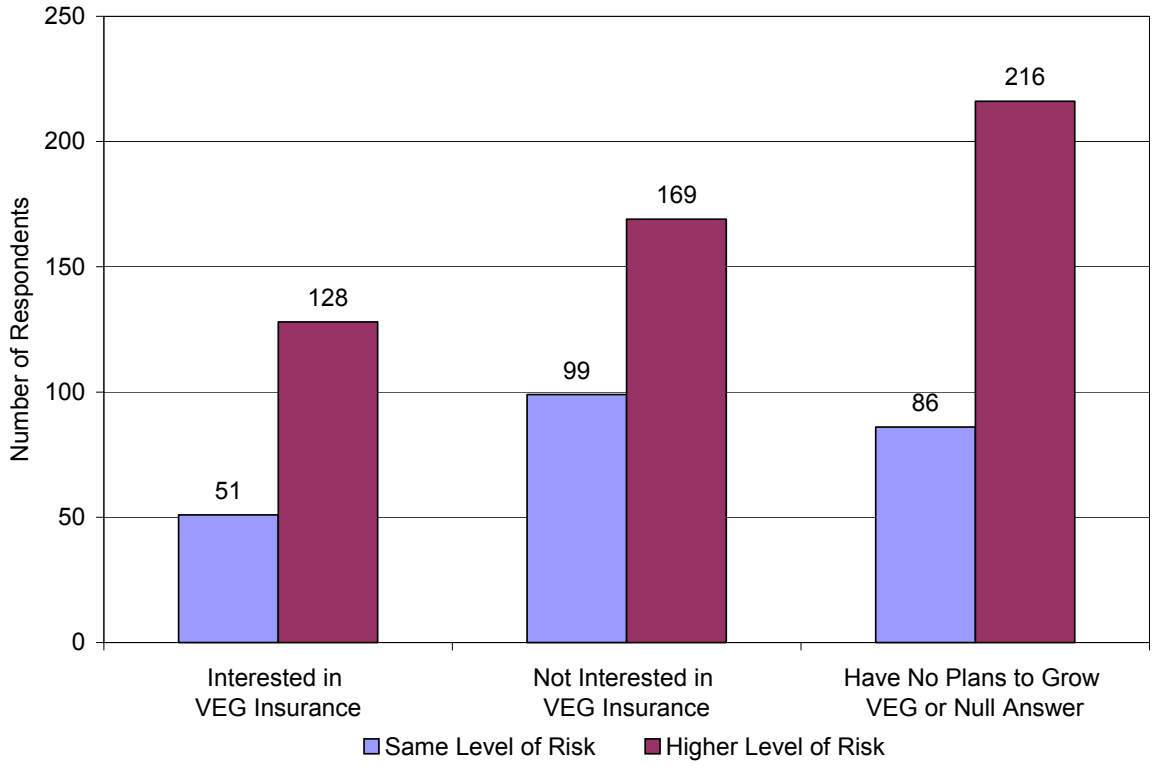
Producers' perceptions of the risk involved in producing and marketing crops influences the adoption and implementation of risk management tools. One objective of the AEC Producer Survey was to assess producers' perceptions of the risks involved in growing value-enhanced corn and soybeans. Figure A.1 shows that the majority of the producers in all three producer groups perceived VEG production to have higher risk than commodity grain production (a total of 513 respondents). Past experience with VEG production influences the perceptions of past VEG producers since almost 70% of the past VEG producers indicated that VEG production has higher risk than commodity production. Of the producers who perceive VEG and commodity production to have the same level of risk, current VEG producers have the highest proportion. Very few respondents (1% of all the respondents) thought VEG production has lower risk than commodity grain production.




**Source: AEC Producer Survey**

**Figure A.1. Perception of VEG Risk Compared to Commodity Grain Risk**

The respondents were asked in the survey whether they were interested in crop insurance specifically designed for value-enhanced crops, not interested in VEG crop insurance, or had no plans to grow VEG. A higher proportion of the respondents who perceived VEG production to be riskier than commodity production are interested in crop insurance than the producers who perceived VEG and commodity production risk to be about the same (Figure A.2).




**Source: AEC Producer Survey**

**Figure A.2. VEG Risk Perception and Interest in VEG Crop Insurance**

Another way to view the results is by evaluating the producers by their interest in crop insurance. Almost 72% of the respondents interested in VEG insurance perceived the risk associated with VEG production to be higher than commodity production risk (Table A.1). About 68% of the respondents who are either not interested in VEG insurance or have no plans to grow VEG perceived VEG production to be riskier.

**Table A.1. VEG Risk Perception and Interest in VEG Crop Insurance**

| | Risk Perception of VEG Production Compared to Commodity Production | | | |
|---|---|---|---|---|
| | Same Level of Risk | | Higher Level of Risk | |
| Insurance Interest | Number | Percent | Number | Percent |
| Interested in VEG Insurance | 51 | 28.5% | 128 | 71.5% |
| Not Interested in VEG Insurance | 99 | 36.9% | 169 | 63.1% |
| Have No Plans to Grow VEG or Null Answer | 86 | 28.5% | 216 | 71.5% |
| Total | 236 | | 513 | |

**Source: AEC Producer Survey**

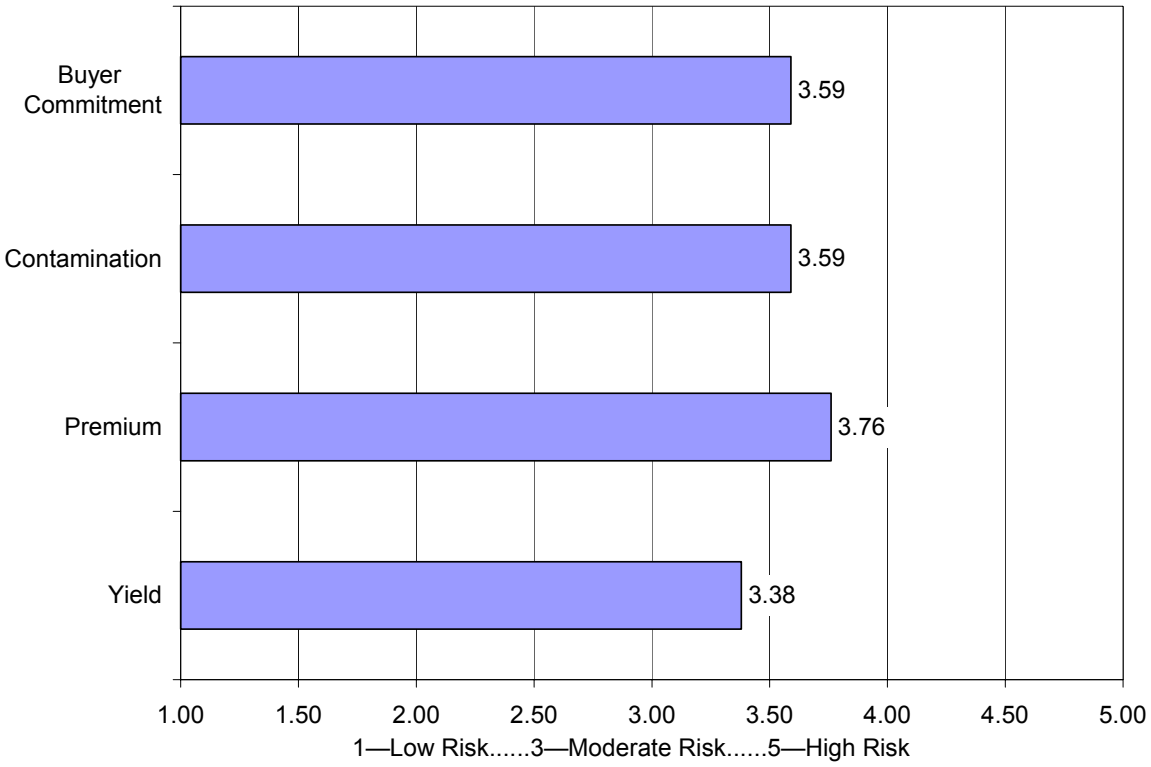
The AEC Producer Survey asked the respondents about the reasons behind their perceptions of the risks associated with VEG production. Those who felt VEG risk was lower than the risk associated with commodity grain production indicated that the benefits outweighed the costs. The producers who indicated that risk affiliated with VEG production was the same as those associated with commodity grain production replied that the benefits were about the same as the costs associated with VEG production. Other reasons for rating VEG and commodity grain production risks to be the same include the following:

- Non-GMO production has not created additional risks.
- No problems with VEG production have been experienced.
- There are always risks involved in production agriculture.
- The similarity in risks between VEG and commodity grain production are due to similar production practices.

The majority of the respondents indicated that VEG production is riskier than commodity grain production. Their reasons for rating VEG production higher include the following:

- Limited market access for VEG products
- Premium decay
- Pest problems or limited agronomic practices
- Special handling and storage requirements
- Yield problems
- Higher costs translating into costs being greater than the benefits of VEG production
- Quality problems
- Extra labor required
- Delivery problems
- Buyer default on contract
- Contamination

The survey also asked the producers about their perceptions of specific sources of risk pertaining to VEG production. Figure A.3 presents the average score for the four risk sources for all the survey respondents. The risk of loss of premium was given the highest score across all risk categories, while yield risk appears to be the lowest rated factor of the four. Table A.2 summarizes the average scores for the four risk sources by grower type. Current VEG growers consistently rate the factors lower than the non-growers and past VEG growers do. This perception of lower risk may influence their decisions to grow VEG.




**Source: AEC Producer Survey**

**Figure A.3. Source of Risk or Uncertainty with VEG Production for All Respondents**

**Table A.2. Sources of Risk or Uncertainty with VEG Production**

| | Average Score | | |
|---|---|---|---|
| **Risk Factor** | **Non-VEG Producers** | **Current VEG Producers** | **Past VEG Producers** |
| Yield | 3.38 | 3.25 | 3.61 |
| Premium | 3.86 | 3.61 | 3.99 |
| Contamination | 3.73 | 3.37 | 3.73 |
| Buyer Commitment | 3.73 | 3.37 | 3.73 |

**Source: AEC Producer Survey**

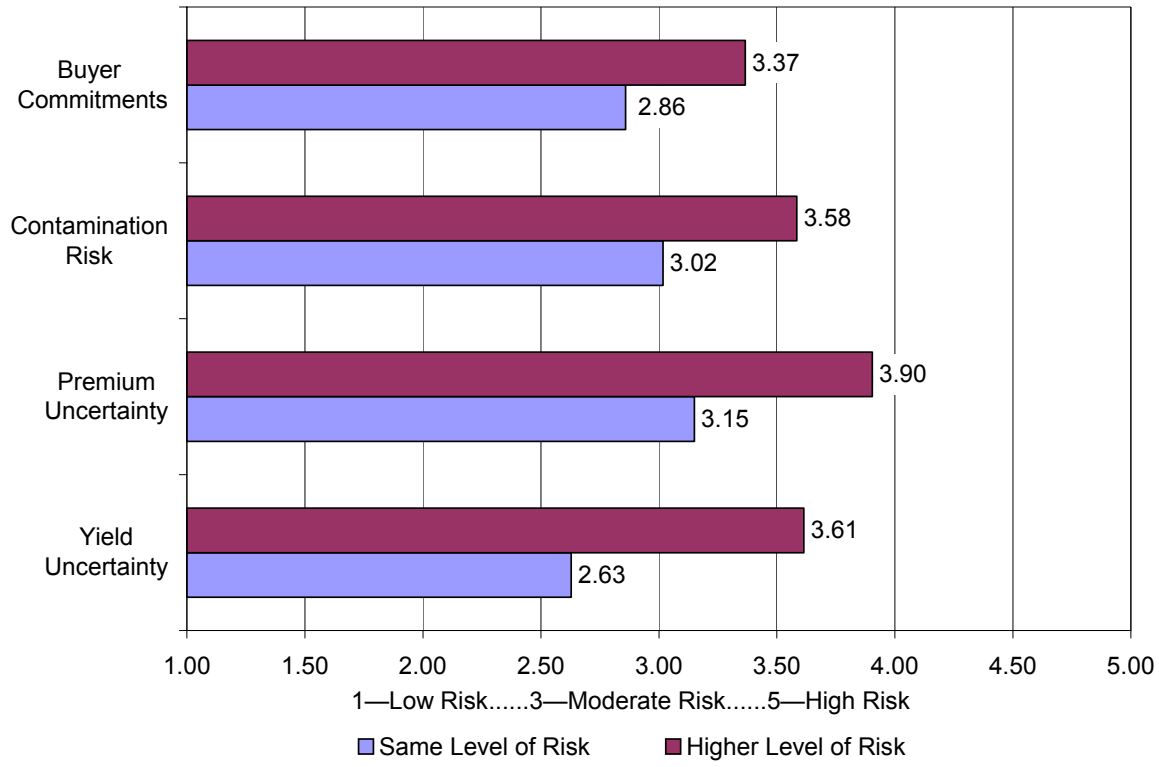
Those respondents interested in VEG crop insurance rated premium risk to be the highest source of risk, and buyer commitment to be the lowest source of risk for VEG production (Table A.3). In addition, the producers interested in VEG crop insurance consistently rated the risk factors lower than those producers with no plans to grow VEG but higher than those growers who are not interested in VEG insurance.

**Table A.3. Sources of Risk with VEG Production by Insurance Interest Group**

| | Average Score | | |
|---|---|---|---|
| **Risk Factor** | **Interested in VEG Insurance** | **Not Interested in VEG Insurance** | **No Plans to Grow VEG or Null** |
| Yield | 3.42 | 3.23 | 3.46 |
| Premium | 3.71 | 3.71 | 3.89 |
| Contamination | 3.54 | 3.46 | 3.73 |
| Buyer Commitment | 3.29 | 3.26 | 3.61 |

**Source: AEC Producer Survey**

Another insight to producers' perceptions of the risk involved in growing VEG is understanding how risk factors are related to overall risk perceptions. A sub-sample of the study is the current VEG producers. Figure A.4 presents results for current VEG producers who rated VEG production risk the same or higher than commodity production risk. The average score for the four risk factors are higher for the growers who perceive VEG production risk to be higher than for the producers who perceive VEG production risk to be the same. These higher ratings of individual risk factors support the greater overall risk rating. Both groups of producers, on average, rated premium uncertainty as a result of not meeting quality standards the most important source of risk. However, while the producers with a higher overall risk rating scored yield uncertainty with the second highest score, the producers with a same overall risk rating scored yield uncertainty with the lowest average rating. It is possible that yield variation has been a greater problem for those rating VEG risk higher than commodity risk than for those rating VEG risk the same as commodity production risk.




**Source: AEC Producer Survey**

**Figure A.4. VEG Risk Perception of Current VEG Producers**

Growers of value-enhanced corn and soybeans were asked about their perceptions of risk associated with the particular type(s) of VEG they grew in 2001. Perceptions of risk could differ by VEG type. For example, producers may perceive production of high oil corn to be riskier than white corn production. For each type of value-enhanced grain, current VEG producers were asked to rate their perception of VEG production risk compared to commodity production risk on a scale of 1 (lower) to 3 (higher), and to rate four risk factors on a scale of 1 (low risk) to 5 (high risk). Table A.4 summarizes the scores of the respondents. For VEG types with more than five observations, white corn received the highest average overall risk score of the value-enhanced corn types, and tofu soybeans were rated, on average, as the riskiest specialty soybeans. The respondents rated the non-GMO corn and food grade soybeans as the least risky specialty corn and soybeans, respectively.

**Table A.4. Average Risk Rating of VEG Production Compared to Commodity Grain Production**

| VEG Type | Number of Obs. | Overall Risk Score (Scale of 1 to 3) | Risk Factor Average Score on Scale of 1 to 5 | | | |
|---|---|---|---|---|---|---|
| | | | Yield Uncertainty | Premium Uncertainty | Contamination Risk | Buyer Strength |
| White Corn | 27 | 2.67 | 3.32 | 3.07 | 3.18 | 2.22 |
| Hard Endosperm/Food Grade Corn | 57 | 2.26 | 2.26 | 2.95 | 3.07 | 2.63 |
| High Oil Corn | 55 | 2.64 | 2.89 | 3.30 | 2.48 | 2.65 |
| Non-GMO Corn | 57 | 2.12 | 1.68 | 3.18 | 3.21 | 2.82 |
| Seed Corn | 19 | 2.47 | 3.68 | 2.68 | 3.05 | 2.16 |
| Waxy Corn | 6 | 2.50 | 2.83 | 1.83 | 2.67 | 2.17 |
| High Starch Corn | 12 | 2.36 | 1.83 | 3.08 | 3.25 | 3.08 |
| High Amylose Corn | 1 | 3.00 | 2.00 | 3.00 | 4.00 | 4.00 |
| Low-Temperature Dried Corn | 4 | 2.50 | 2.00 | 3.00 | 3.00 | 3.00 |
| Low-Stress Crack Corn | 1 | 3.00 | 3.00 | 1.00 | 1.00 | 2.00 |
| Organic Corn | 3 | 2.67 | 3.00 | 3.33 | 3.67 | 3.00 |
| Nutritionally Enhanced Corn | 6 | 2.50 | 2.83 | 2.00 | 2.67 | 2.17 |
| Seed Soybeans | 89 | 2.28 | 2.36 | 3.38 | 2.78 | 2.68 |
| STS Soybeans | 35 | 2.40 | 2.08 | 3.00 | 2.72 | 2.59 |
| Non-GMO Soybeans | 101 | 2.21 | 1.81 | 3.02 | 3.17 | 2.87 |
| Organic Soybeans | 2 | 3.00 | 3.00 | 4.00 | 4.00 | 3.50 |
| Tofu Soybeans | 12 | 2.67 | 3.42 | 3.17 | 2.92 | 2.50 |
| Food Grade Soybeans | 16 | 2.20 | 2.19 | 2.88 | 2.69 | 2.07 |
| High Protein Soybeans | 4 | 2.00 | 2.00 | 2.00 | 2.25 | 2.50 |
| All Types | | 2.34 | 2.32 | 3.08 | 2.95 | 2.66 |

**Source: AEC Producer Survey**

The value-enhanced types receiving the highest average scores for each of the risk factors are the following (for types with more than five observations):

- Yield uncertainty—seed corn and tofu soybeans
- Premium uncertainty—high oil corn and seed soybeans
- Contamination risk—high starch corn and non-GMO soybeans
- Buyer strength—high starch corn and non-GMO soybeans

Premium uncertainty across all VEG types received the highest score, and contamination risk was rated the second most risky factor. These results are consistent with the average ratings for all respondents rating VEG risk factors, regardless of the VEG type. It appears that perceptions of the risk factors involved in VEG production at the aggregate level are fairly consistent across all sets of experiences with VEG production.

Risk perceptions were also analyzed based on whether or not VEG was produced under contract. Table A.5 shows the results of VEG producers growing and not growing VEG under contract. A higher proportion of producers growing under contract rated VEG production risk to be higher than commodity production risk. The greater risk perception of production under contract may be due to production and quality provisions in the contract. The lower risk perception for VEG producers not growing under contract may explain why they are willing to grow VEG without contracts.

**Table A.5. Risk Perception of VEG Production Compared to Commodity Production**

| | No Contract | | Produced under Contract | |
|---|---|---|---|---|
| **Perceived Level of Risk** | **Number** | **Percent** | **Number** | **Percent** |
| Lower | 5 | 2.4% | 7 | 2.4% |
| Same | 143 | 67.5% | 165 | 56.3% |
| Higher | 64 | 30.2% | 121 | 41.3% |
| Average Score | 2.28 | | 2.39 | |

**Source: AEC Producer Survey**

Another consideration is whether or not actual problems associated with VEG production affect risk perceptions. The VEG growers were asked whether or not they have experienced problems with specific aspects of VEG production. The survey results indicate that producer experience with VEG production problems does transfer into perceptions of risk. For example, 61% of the growers who have experienced problems with a crop(s) being rejected due to not meeting quality standards rated the risk factor related to premium uncertainty a 4 or 5 on the scale of 1 to 5. Producers who have not experienced problems with a specific risk factor tend to rate the risk factor as being a low to moderate risk.

Another issue is how risk perceptions affect the management of the risk. Returning to the sub-sample of current VEG producers, Table A.6 shows the similarity in the distribution of ways in which yield risk is managed between the producers rating VEG risk higher and those rating VEG risk as the same. Both groups most frequently use seed variety selection to manage yield risk.

**Table A.6. Use of Yield Management Tools by Current VEG Producers**

| | Risk Perception of VEG Production Compared to Commodity Production | | | |
|---|---|---|---|---|
| | Same | | Higher | |
| **Yield Management Tools** | **Number of Responses** | **Percent** | **Number of Responses** | **Percent** |
| Geographic Diversification | 21 | 7.4% | 52 | 9.8% |
| Seed Variety Selection | 95 | 33.3% | 176 | 33.1% |
| Crop Insurance | 76 | 26.7% | 131 | 24.7% |
| Crop Rotation | 93 | 32.6% | 172 | 32.4% |

**Source: AEC Producer Survey**

The manner in which the VEG producers market their crop may also be a way to help manage the perceived VEG risk. For the current VEG growers, there is little difference in the proportion of producers pricing more than 50% of their crop prior to harvest based on their risk perceptions (Table A.7). There are differences in the proportions of producers in the other two pricing method categories, but those dissimilarities could be due to reasons other than risk perceptions.

**Table A.7. Pricing Methods Employed by Current VEG Producers**

| | Marketing of Value-Enhanced Corn | | | | Marketing of Value-Enhanced Soybeans | | | |
|---|---|---|---|---|---|---|---|---|
| | Risk Perception of VEG Production Compared to Commodity Production | | | | Risk Perception of VEG Production Compared to Commodity Production | | | |
| | Same | | Higher | | Same | | Higher | |
| Pricing Method | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| Feed 100% of crop to livestock or sell for cash when delivered | 14 | 25.9% | 20 | 18.5% | 9 | 14.8% | 29 | 23.0% |
| Price portion of crop using marketing tools such as cash forward contracts, futures; price 50% or less prior to harvest | 29 | 53.7% | 65 | 60.2% | 48 | 78.7% | 88 | 69.8% |
| Price portion of crop using marketing tools such as cash forward contracts, futures; price more than 50% prior to harvest | 11 | 20.4% | 23 | 21.3% | 4 | 6.6% | 9 | 7.1% |

**Source: AEC Producer Survey**

Crop insurance has been widely promoted as a way to manage risk. The AEC Producer Survey asked the respondents about the types of crop insurance policies they had purchased in the past. As with tools for managing yield risk, there appears to be no large differences in utilization of policies based on risk perceptions (Table A.8). Current VEG producers with a perception of VEG production having higher risk than commodity production use about the same type of policies as growers perceiving VEG risk to be about the same as commodity risk. The most frequently purchased policies for both groups of producers are hail insurance, multiple peril and crop revenue coverage.

**Table A.8. Use of Crop Insurance by Current VEG Producers**

| | Risk Perception of VEG Production Compared to Commodity Production | | | |
|---|---|---|---|---|
| | Same | | Higher | |
| Crop Insurance Policy | Number | Percent | Number | Percent |
| Never Have Purchased Crop Insurance | 8 | 3.0% | 13 | 2.7% |
| Hail Insurance | 79 | 29.2% | 141 | 28.9% |
| Catastrophic Coverage | 33 | 12.2% | 77 | 15.8% |
| Multiple Peril Insurance | 60 | 22.1% | 95 | 19.5% |
| Group Risk Plan | 6 | 2.2% | 6 | 1.2% |
| Crop Revenue Coverage | 58 | 21.4% | 94 | 19.3% |
| Income Protection | 13 | 4.8% | 32 | 6.6% |
| Revenue Assurance | 14 | 5.2% | 30 | 6.1% |

**Source: AEC Producer Survey**

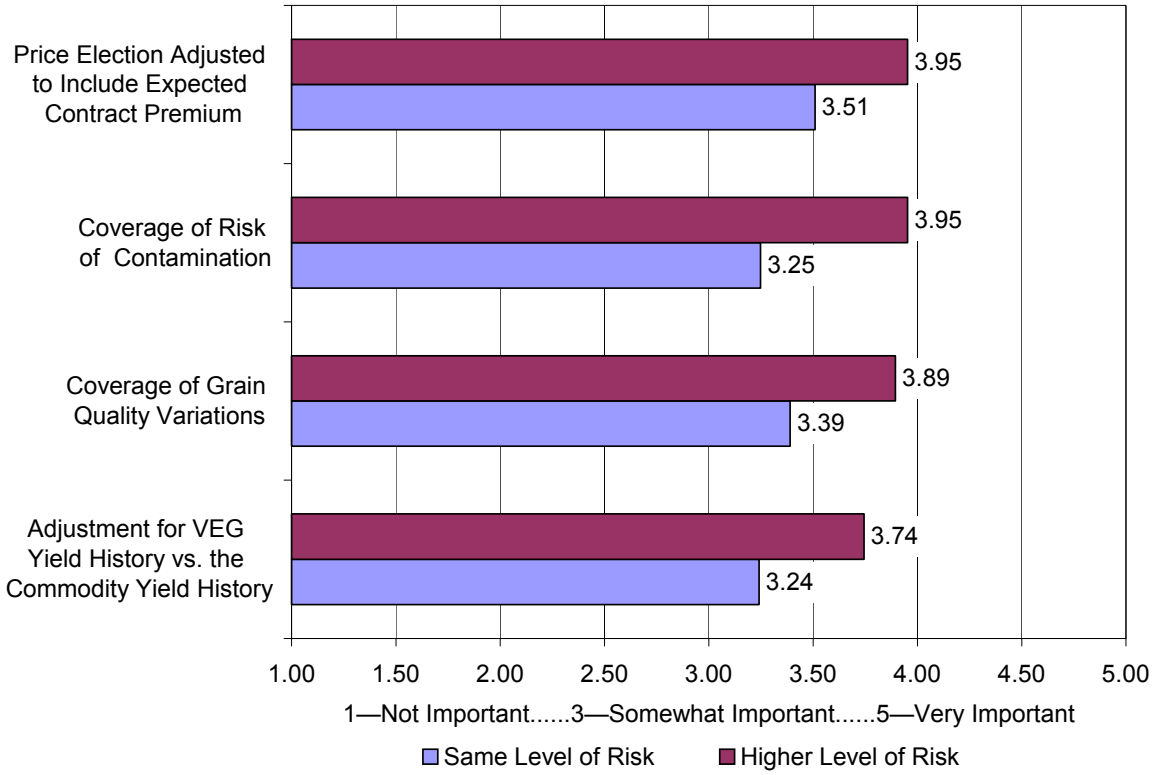
Perceptions of risk may affect the reasons for purchasing crop insurance. According to the respondents in the AEC Producer Survey, a larger percentage of current VEG growers with a higher risk perception indicated that crop insurance is part of an overall risk management plan than did the growers perceiving equivalent risk between commodity and VEG production (Table A.9). In addition, a higher percentage of the same risk perception producers indicated their reasons for purchasing crop insurance was due to a requirement by either a lender or a government program.

**Table A.9. Reasons for Using Crop Insurance by Current VEG Producers**

| | Risk Perception of VEG Production Compared to Commodity Production | | | |
|---|---|---|---|---|
| | Same | | Higher | |
| Reason | Number | Percent | Number | Percent |
| Risk Management | 66 | 37.7% | 131 | 42.0% |
| Part of Overall Grain Marketing Program | 29 | 16.6% | 49 | 15.7% |
| Low-Cost Premiums Justify Purchase | 13 | 7.4% | 38 | 12.2% |
| Requirement of Government Program | 47 | 26.9% | 77 | 24.7% |
| Requirement of Lender | 20 | 11.4% | 17 | 5.4% |

**Source: AEC Producer Survey**

When considering provisions for VEG crop insurance, there is a difference in average scores for the importance of the provisions based on risk perceptions (Figure A.5). Those with higher risk perceptions, on average, rated the four provisions higher than the growers rating VEG production risk to be the same as commodity production risk. Both groups felt that a price election adjusted to include expected contract premium was the most important provision. However, the higher risk group believed that coverage of risk of contamination is equally important, while the same risk group felt a provision to cover grain quality variations was the second highest rated provision. Adjustment for VEG yield history was rated the least important provision by both groups.




**Source: AEC Producer Survey**

**Figure A.5. Average Rating of VEG Crop Insurance Provisions by Current VEG Producers**

# Appendix B
# Focus Group Report
# Executive Summary

## Focus Group Highlights

Focus groups are a qualitative approach to obtaining insight to specific issues. A focus group typically consists of a two-hour meeting with two facilitators and six to eight participants. The head facilitator leads the participants through a series of questions to which the participants respond with their perspectives or opinions. The responses are recorded for future analysis and clarification. A focus group format allows the researchers to clarify answers and to obtain a deeper understanding of the research questions than could be obtained from a mail survey.

## VEG Production

Two focus groups with agricultural producers were convened in east-central and north-central Illinois on December 5 and 7, 2001, respectively. These groups of producers have a wide range of experiences with value-enhanced grain production and have grown VEG ranging from three to thirty-one years. Their VEG crops include tofu, seed, high grade, high protein, non-GMO, and STS® soybeans, and yellow and white food grade corn, high oil, waxy, high oleic, high lysine, seed and high amylose corn. Farm sizes range from 500 to 5,200 acres and the producers' average age is 48. While 100% of the east-central Illinois producers' VEG production was under contract, not all the north-central Illinois group's VEG was produced under contract.

## VEG Production Decisions

The focus group participants grow VEG for several reasons. The most significant reason is the opportunity for increased profitability. However, they also produce VEG to meet the needs of under-capitalization of machinery and storage, to gain exposure to new technology, to obtain cheaper seed and other inputs, to gain the marketing advantage of selling ahead, and for production diversity.

The reasons the producers have decided not to grow particular varieties of VEG include marketing constraints (problems with buyer's call, narrow marketing windows), insufficient compensation for yield loss and/or inconvenience, contractors not honoring the contract, and premium decay.

## VEG Production Practices/Issues

Production practices for VEG differ from those used in commodity grain production. The altered production practices include more advanced planning, different planting and harvesting practices, a more disciplined management approach including more crop scouting and cleaning of equipment, segregated storage, and greater quality control of the grains. In recent years, the producers have also had to gather information about varieties grown in neighboring fields. This information is required because of the GMO concerns.

Advantages to producing VEG were cited by the participants. They feel they are more disciplined in their production. In addition, they receive a higher return for their crop and have competitive advantage relative to other producers.

There are challenges and problems with growing VEG according to the producers. Planting, harvesting, and delivery logistics can be complicated at times, and often there is a limited seed variety selection for planting. Yield drag and/or variability, plant standability, hidden problems with varieties are other problems mentioned by the participants. Some producers feel that the increased value isn't realized at the producer level due to the multiple marketing channels the grain goes through before reaching the end user. Other challenges cited were contamination problems from GMO fields, and storage segregation requirements.

The producers also talked about issues with quality determination. They have experienced inconsistent graders and grading results, and inconsistency between standards stated in contracts and acceptance standards at time of delivery.

## VEG Marketing Practices/Issues

Marketing of VEG by these producers involves marketing windows in which crops can be priced, specified delivery times, and buyer's call. These marketing/delivery practices have forced the growers to be more disciplined or systematic in marketing by requiring the crop to be marketed during a certain time period, instead of holding on to it. In addition, the "Act of God" provision has given the producers additional confidence in marketing their crops. However, these practices have also caused problems. The marketing window is often too narrow or inflexible. Buyer's call often is not consistent with the provisions stated in the contract, and the producers may have to delay delivery of their crop beyond the time specified in the contract.

## VEG Premiums

The consensus is that premiums follow a pattern of decay over the life of the contract. The producers suggest that premiums should cover the integrity of farmers' work, the additional risk involved in VEG production such as yield drag and variability, lost marketing opportunities, the additional labor and expenses required for VEG production and storage, and increased seed cost.

## Crop Insurance

All but one of the participants use either federal crop or hail insurance. Federal crop insurance products include CRC, IP and Group. None of the producers insured their VEG crops differently from their commodity grains. Their reasons for using crop insurance include the idea that insurance is a marketing tool, and the fact that the government subsidy makes the insurance worthwhile to use. Reasons cited for not using crop insurance include the lack of variability in production (good farm ground), the fact that the premiums are too expensive to justify using it, and the low probability of collecting indemnities.

Some of the growers do not feel the need to be compensated for the premium through insurance because it is an extra payoff and does not need to be insured. One producer stated that the growers cannot be protected from every source of risk in agriculture and that producers by nature are risk-takers. He concluded that VEG is just a different source of risk.

The producers did mention a few suggestions for crop insurance products for VEG. They suggested that the policies should consider different yield history for VEG than for commodity production; that insurance should address quality, price and yield issues; that the indemnities should be tied to overall revenue; and that the premiums should be lower.

## Other Suggestions

The producers offered suggestions for improving VEG production from their perspective. It was mentioned that producers should organize to share information. The growers would also like more information on the yield history of the seed varieties that are approved for VEG production. It was suggested to improve the buyer's call provision and to compensate the grower for storage of the grain once it's sold. The producers also want increased markets and buyers for their VEG crops and ways to cut out the middlemen in the marketing channels.

# Champaign Focus Group

## Overview

### Location, When and Attendance

Eight east-central Illinois farmers attended a focus group at Hawthorn Suites, Champaign, Illinois, on Wednesday, December 5, 2001, from 1:00 to 3:00 pm. Their average age was 49, and their age range extended from 33 to 61 years of age. The average farm size of the group was 2,403 acres, but the farm sizes ranged from 500 to 5,200 acres. All the producers grow corn and soybeans, but two of the participants also grow wheat and raise beef cattle. Their farms are within a 150-mile radius of Champaign.

### VEG Production

The participants of the focus group have grown a wide variety of value-enhanced grains including seed corn and soybeans for at least five different seed companies, yellow and white food grade corn, high oil, waxy, and high oleic corn, non-GMO soybeans, and identity-preserved corn. The producers all intend to grow some type of VEG in 2002. However, three of the previous producers of waxy will not be growing waxy corn, one producer will not be growing food grade corn, and another producer will not be growing high oil corn in 2002. The length of time this group of producers has grown VEG ranges from 3 to 31 years.

## Key Findings

### VEG Production Decisions

**Reasons for growing VEG**

The producers cited several reasons in the marketing, production and financial areas for growing VEG (besides an opportunity for increased profitability). A participant mentioned that VEG production allowed him to enhance his operation without the capital investment. His farm did not have the capacity to harvest and store additional volume, and the seed company for which he grew planted, harvested and stored the corn. Production benefits include access to new technology, scouting assistance, alleviation of required storage due to direct delivery of crop, and forcing the producer to be more disciplined in his production practices. VEG production, as experienced by this group of producers, permits them to sell their crop in advance, and provides them with a favorable pricing mechanism. The "Act of God" clause in some contracts provides producers forgiveness if they are not able to deliver on their contract. In other words, a grower may be able to price ahead a certain number of bushels with a contractor, but if he produces less than the contracted amount, he is not obligated to deliver the difference. Other benefits of growing VEG include delayed payment for seed, education provided by the contractors, and increased production information.

**Uncertainties and/or problems with VEG production and marketing**

While there are advantages with VEG marketing, there are also disadvantages. Several problems or disadvantages with VEG production and marketing were mentioned by the participants. In terms of production, the following have been problems for the growers.

- Restrictions on planting time;
- Limited selection of seed varieties available to plant;
- Standability of the corn (problems with the corn standing);
- Hidden or unknown problems with seed varieties;
- Yield drag on VEG varieties;
- Germination problems;
- GMO contamination;
- Cleaning requirements for machinery, equipment and bins;
- Segregation requirements for VEG varieties; and
- Little yield data available on VEG varieties.

Quality standards are an issue with VEG production. While producers receive a premium for a consistent, high quality VEG crop, the producers have experienced disadvantages with the quality standards. Some producers were frustrated with variation in quality grading for the same field of corn or soybeans. In addition, the increased concern about GMO products has increased the importance of no contamination of non-GMO grains by GMO varieties. If a VEG crop has any trace of GMO in it, the contractor rejects the grain, and the grower is not reimbursed for his additional expenses in producing the VEG.

The producers described several other downsides of marketing VEG crops. Some producers must deliver their VEG crop during a certain period, and often this delivery is a time-consuming process, especially due to the long lines at the grain facility taking delivery. The waiting time has recently increased due to additional testing required before the contractor accepts the grain. Some companies use the Chicago Board of Trade as the basis for establishing premiums while other companies define their own basis for establishing premiums. A focus group participant mentioned that the company's use of its own basis is a disadvantage for him. Other growers revealed marketing disadvantages such as narrow marketing windows as stipulated by the contracts, uncertainty with the premiums, limited markets for the VEG varieties, and the storage time required due to contract terms.

Other problems or uncertainties related to VEG production were discussed by the participants. The growers mentioned the premium decline they have seen the past few years. They attribute the premium decay to two reasons.

1. An increased number of producers willing to grow the VEG varieties and the contractors not needing to pay as high a premium as in the past, and

2. The improved yields of the VEG varieties. As yields have improved, premiums have declined.

The contract terms have changed over time, and the producers consider this issue to be a source of uncertainty. The growers stated that contract language is often difficult to understand, causing additional uncertainty for the growers. The participants also cited that contract acreage is increasingly more difficult to obtain due to the greater number of producers growing VEG. Another problem discussed during the focus group is how demand for non-GMO grains has placed additional pressure on agribusinesses to verify their inputs to be non-GMO. Thus, there are increasing requirements for producers to verify that their grains have not been contaminated with GMO varieties.

## VEG Production and Marketing

### Production practices for VEG

Two producers stated that their production practices are no different for VEG than for commodity grains, while the remaining participants explained they use different production practices for their VEG crops. The different VEG production practices experienced by the growers are outlined below.

- The biggest difference in VEG production according to this group of producers is with harvesting and storage. The machinery, equipment, and storage facilities must be cleaned prior to harvest and storage to minimize contamination. In addition, the VEG must remain in segregated storage facilities until their delivery.

- Contractors sometimes dictate planting time and patterns.

- Seed varieties often have to be selected from a pre-approved list.

- One participant mentioned that he has altered some tillage practices for his VEG crops.

- The producers have had to verify what varieties of crops were grown next to their fields to help reduce the chance of contamination of GMO pollen.

- One participant also commented that his VEG production forces him to be a more disciplined marketer.

### Marketing practices for VEG

The focus group participants indicated that contracted VEG production forced them to be more disciplined in their marketing of the contracted crops. VEG contracts stipulate marketing windows, thus providing a timetable by which the grain must be sold. VEG contracts also affect the length of time the crops are stored. One producer stated that he is forced to hold his VEG longer than he would if it was commodity grain. Some contracts have a "forgiveness clause" or "Act of God" clause. One producer believes that VEG production provides more flexibility in his marketing and less production risk.

## Crop Insurance

All but one of the focus group participants carried some type of federal crop insurance in 2001. The one producer that did not carry crop insurance stated that he has not needed insurance in the 20 years he has farmed. This person does not feel the insurance is worth the money because he has experienced little crop loss. Of the remaining producers, four carried a form of Crop Revenue Coverage (CRC), and three took out Income Protection (IP) policies in 2001. Of those seven growers, one does not plan to carry crop insurance again. He stated that he has never received an indemnity and does not feel it is worthwhile to carry the insurance. Another respondent testified that he had a big claim in 2000 and will continue using crop insurance. One person declared that he would possibly use CRC Plus if he was more disciplined and had a better understanding of the policy.

None of the producers insured their VEG crops differently than their commodity crops. Their reasons were that the insurance products do not differentiate between the two categories of crops. Some producers stated that the premium they receive for their VEG is a bonus and that they see no need to insure the potential extra income.

## Contracts and Premiums

### Contracted production

All VEG production of the eight focus group participants has been under contract.

### Contract characteristics

The producers mentioned several benefits of their contracted production. Two growers stated that their trucking expenses were lower than for commodity grain or non-existent because the company delivers the seed (in the case of seed production) and picks up the grain. Other benefits include greater discipline on the grower's part, known premium, exposure to new technology, and education. One participant indicated that having VEG contracts gives him a competitive advantage over other potential tenants with his landlords, and another person stated that VEG production pays well if he meets the time requirements.

According to this group of producers, drawbacks of contract production include the narrow marketing windows, the contract language, and the high spoilage rate after the grain is in the bin. Three growers also mentioned that meeting the delivery schedule is a problem with the contracts.

This group of producers has seen changes over time in its contracts. Some of the contract changes include the following:

- The participants are obtaining more information on neighbors' chemicals, herbicides and seed varieties used due to GMO issues.

- One grower testified that a seed company for whom he grows has changed its contract structure from a two-contract system to a quality system. The two contract types used to be a preferred grower contract and an open contract. They no longer exist.

- The contracting companies pay as little as possible for premiums, and the premium structure has changed over the years. One grower mentioned that a food company put a cap on its premiums for one or two years. However, they lost growers due to the caps, and therefore, the caps were eliminated.

- The producers are also now witnessing a bundling of products. Seed companies are offering to finance seed purchases, chemical and seed products are bundled, and some companies are requiring their chemicals to be used if their seed is purchased.

- A grower commented that a seed company has changed its premium scale over time.

The effects of the changed contract terms on profitability are mixed. Some of the producers indicated that decreased premiums have cut into their profits, while others have experienced increased premiums. One participant pointed out that the higher premium has been accompanied by greater requirements on the grower's behalf.

**Costs covered by price premiums**

The focus group participants were asked which cost-related factors should be compensated by VEG premiums. They suggested the following direct or indirect costs should be covered by the premiums:

- The integrity of the grower's work;

- The grower's involvement in producing and marketing VEG;

- Corn yield drag;

- Delivery inconvenience; and

- Lost marketing opportunities.

## Additional VEG Management Tools

### General suggestions

Suggestions for improving VEG production were elicited from the participants. In terms of general improvements, two growers proposed expanded or different markets for VEG. Another person recommended the organization of producer groups to enable growers to share information with one another. He also stated that the farm bill is supposed to address a guaranteed floor for farm income and that federal crop insurance should provide that floor. One participant mentioned that he would like assistance in interpreting the markets. Another recommendation was for simpler government programs.

### Crop insurance

The participants were also asked for recommendations for improving federal crop insurance. The following suggestions were made:

- The crop insurance policies should be simple and realistic.
- Crop insurance policies should differentiate between value-enhanced and commodity yield history.
- Insurance premiums should be cheaper.
- A floor should be in place for income insurance.
- Crop insurance and the government program are volume-driven. A grower suggested focusing on failure to meet quality, not yield, differences.
- Insurance indemnities should cover at least production costs.
- The language for crop insurance policies should be simple.

### New contract terms

When the producers were asked about suggestions for different contract terms, a producer proposed a standardization of quality determination throughout the delivery chain. Another grower requested simpler contract language.

## Summary

The Champaign focus group participants were diversified and experienced in producing value-enhanced corn and soybeans. With this experience, they brought to the session a wide range of perspectives and opinions about VEG production and marketing. Their reasons for growing VEG included the fact that VEG production created a more efficient use of their capital, provided production advantages (including scouting assistance and exposure to new technology), and presented marketing benefits (e.g., forces the producer to be more disciplined in his marketing and reduces some of the marketing risk).

The participants described production and marketing practices stipulated by their VEG contracts. Production practices include dictated planting times, limited selection of approved varieties of seed to be planted, verification of adjacent field varieties for GMO tracking, and cleaned machinery, equipment and bins for VEG harvesting and storage. Some of these production procedures have caused problems or disadvantages for the growers. Restricted planting and delivery times are often inconvenient for the producers. The approved seed varieties frequently produce lower-than-average yields and have limited data available on their performance. It is sometimes difficult for the farmers to have the necessary segregated storage for the VEG.

The VEG contracts often stipulate a marketing window for the crop, and this has created problems for the growers. Other problems with VEG production include, inconsistent grading for the same crop, declining premiums, and premiums that change from year to year. These are all sources of risk for the producer.

All but one of the producers carried either CRC or IP insurance in 2001. However, they did not insure their VEG in a different manner than their commodity crops. This is because the policies do not differentiate between value-enhanced and commodity grains. The producers also believe the premium does not need to be insured because it is a bonus above and beyond their "non-VEG" profit.

According to this group of producers, premiums should compensate the grower for his labor, integrity of his work, yield drag, delivery inconvenience, and lost marketing opportunities.

Suggestions for improving VEG production include expanding markets for VEG, designing crop insurance policies that differentiate between VEG and commodity production, have lower premiums and simpler to understand than the existing policies, and developing consistent quality grading practices throughout the delivery system.

# Peru Focus Group

## Overview

### Location, When and Attendance

Seven north-central Illinois farmers attended a focus group at the Ramada Inn, Peru, Illinois, on Friday, December 7, 2001, from 1:00 to 3:00 p.m. These producers ranged in age from 42 to 53 and their average age was 46. The participants all grow corn and soybeans. In addition, one farmer raises livestock, one producer grows wheat and oats, and another participant grows lima beans and sweet corn. The average farm size is 1,153 acres, and the farms range in size from 850 to 1,800 acres. Their farms are within a 60-mile radius of Peru.

### VEG Production

This group of Illinois producers has grown several different types of value-enhanced crops ranging from tofu, seed, food grade, high protein, non-GMO and STS® soybeans to food grade, high oil, high lysine, high amylose and seed corn. The producers have marketed their VEG to a variety of buyers ranging from large grain buying companies to Japanese firms. Some of the VEG has also been grown for farm use (livestock feed). These growers plan to grow VEG in 2002 but not necessarily the same varieties. At least one producer who has grown high oil corn in the past will not be growing that variety in 2002. The participants have grown VEG a minimum of three years and a maximum of fifteen years.

Three of the producers' value-enhanced crops were all produced under contract. One producer mentioned that 50% of his 2001 VEG production was under contract. Another grower indicated that all his high oil production was under contract, but his non-GMO crops were not contracted until after the crop emerged. The sixth producer stated that 80 to 90% of his tofu beans are produced under contract (depends on the year). Seventy-five to eighty percent of the same grower's seed grains are produced under contract, but all his other specialty crops are produced under contract. The last participant revealed that about 80% of his VEG production is under contract. He usually does not contract his non-GMO beans and sometimes enters into a contract with grain handlers for high starch corn during the summer months.

## Key Findings

### VEG Production Decisions

**Reasons for growing VEG**

The participants discussed motivating factors for producing VEG. Their reasons include the following:

- Cheaper seed and inputs, particularly for non-GMO crops.
- Some varieties, such as high starch corn and non-GMO soybeans, have been high yielding.
- Greater diversity of production with VEG production.

- The premiums offered for the crops.

- The opportunity to meet the needs of a dynamic market. One producer mentioned that he works with foreign firms that have shopping lists of what they want, and he produces what he can to meet their needs.

**Reasons for not growing VEG**

The growers discussed the reasons why they are not producing VEG varieties they have previously grown. Three participants mentioned either that the premium has become lower or that the premium has not been enough to cover the yield loss incurred with the VEG. One producer stated that he had a buyer that did not honor his contract by changing delivery time and location. Another participant indicated that ownership change with a contractor has changed the manner in which the VEG business is conducted, and he is not happy with the new management.

Other reasons for not growing VEG include the inconvenience of delivery times and buyer's calls, and the unpredictability of the amount the contractor will actually purchase. This group had several examples of buyer's call as stated in the contract to be a week, but when the call came, the delivery time was actually one to two days in length. The producers also cited situations where they had to "race" against other growers to deliver their crop. Often, the contractor could not take any additional grain, and the producers had to wait for several weeks to deliver the balance of their crop.

## VEG Contract Terms

**Production/agronomic practices**

The producers were asked about the production or agronomic practices they implement as a result of producing VEG. Their comments follow.

- A participant mentioned that purity and identity preservation (IP) are important issues with his contracts, and he has adapted his production to meet those requirements.

- The growers mentioned that clean equipment and storage facilities and segregated storage bins are needed for their specialty production.

- One person does not use an auger on his seed soybeans.

- It was stated that weed control is more difficult for non-GMO crops than for GMO varieties.

- More crop scouting is performed.

- The producers can use only approved varieties of seed.

- A grower mentioned that he must be careful with location of his VEG crops due to threat of cross-pollination with other varieties.

- Grain quality must be maintained once it is harvested. During storage, the grain must remain at a specific moisture level, and certain varieties can only be low-temperature dried.

- More advanced planning of production is required with VEG production.

The growers do believe that there are benefits from implementing the specific VEG production practices. The cited benefits include pride in producing a high quality crop, paying more attention to the crop production phase (such as more intense management and crop scouting), increased yield, comparative advantage due to ability to store the crop, and increased return.

Drawbacks or problems were mentioned by the focus group participants. One pointed out that the value is not realized at the farmer level, and the middlemen receive most of the added value. He would like to realize more of the value added to the product. Another producer commented that timing of delivery is not always convenient. A different grower feels he is taking all the risk in the VEG production and not being paid for that risk. One person stated that VEG growers should "put your seatbelt on" due to the greater variability of VEG production. The producers also testified that sometimes they are not compensated for their labor and expenses when events beyond their control prevent delivery of their crop. Examples include weather-related occurrences such high winds eliminating the crop or GMO contamination from a neighboring field preventing crop delivery.

Changes over time in production practices have also been noted. Due to GMO issues, the producers now need to know what is planted in neighboring fields. However, several of the producers revealed problems with neighbors either not being honest or not knowing what they have planted. In those cases, they stated that they have gone to a second source either to verify or determine what has been planted. It was also stated that profitability could be negatively affected if neighbors are not verified. The GMO situation has also increased the time required to clean their VEG crops. The StarLink experience was mentioned, and a participant testified that one neighbor lost 75% of his high oil corn crop because StarLink was detected in the corn. One grower has concluded that VEG production currently pays enough to grow only one variety of VEG.

The participants were asked about how VEG production has affected their crop yields. Members of this producer group have experienced yield drag with high oil, high starch and high amylose corn. Three producers have had different experiences with non-GMO crops – one had a higher yield, one had no difference, and one had lower yields than his commodity grain. These growers have noted that yields have improved over time due to improved genetics. One participant pointed out that high oil yield has improved but the oil content has been sacrificed with the yield improvement.

**Quality**

Aspects of value-enhanced grain quality were discussed with these producers. One grower stated that no stain was allowed on the seed coat, and stain can be a big problem in tofu beans. The quality requirements have motivated the producers to set their machinery better, and to be, in one person's words, "a lot keener" producer. They suggested they have a greater awareness of quality due to their VEG production.

There are drawbacks or problems with quality issues as they related to VEG production. According to this focus group, they include the following:

- Growers have had problems with seed coat that in turn affects quality.
- They feel some contractors set unrealistic standards.
- Some quality standards have been inconsistent or unpredictable.
- One participant noted that a particular company has higher contamination standards when accepting non-GMO seed than when selling it.
- Another person declared that when the barge is full, rejection rates for quality are higher.
- The testing procedures are very time consuming.
- It was stated that while the contracts have remained the same over time, the quality evaluation technology has changed.

These growers made suggestions for improving the quality component of VEG production. They would like to see the human factor of grading made more consistent. It was suggested to have an independent party grade the grain, and the contractor would not be involved in the grading process. Another recommendation is that the companies compensate the grower if his grain is above the contracted standard. The rationale for this suggestion is that producers are docked if their grain quality is lower than the acceptable contract standards.

**Marketing and pricing**

Marketing is also altered with VEG production. One requirement for VEG marketing is a narrow marketing window. An example mentioned during the focus groups is a four to six month window whereas commodity grain is sometimes marketed over a one and half year period. Another example is that contracts offer programs to lock in different prices at different times of the year.

Problems associated with marketing VEG mentioned by the participants include the following.

- Producers are not compensated for VEG storage once the crop has been sold but before the contractor has taken delivery.
- Demand for export grain is sometimes vulnerable to politics in importing countries. One producer cited Mexico and its elections as an example. Prior to the election, Mexico limited its imports of high oil corn, but following the election, it resumed importing the corn.
- There are inconsistent marketing options for the value-enhanced grain varieties. For some VEG, there is more than one market alternative (e.g., high oil), whereas there may be only one option for other varieties.

- Producer location is another factor that can either limit or expand market opportunities. Growers located near the river have the river and local elevators as marketing options.

- Buyer's call has been a problem for growers. Some contracts have a buyer's call provision, and the grower cannot market the grain before the call. If the buyer's call comes at a date later than specified in the contract, it can pose a problem for the grower if he was planning to sell his grain at the contracted time.

- One producer stated that buyer's call has changed over time and that he would like to be compensated for the uncertainty of the buyer's call. It was also suggested that they desire longer marketing windows and larger VEG markets with more companies. In addition, they would like to be compensated for storage of the grain after its sale but before its delivery.

**Premiums**

Premiums are an important component of VEG production. A grower noted that when a value-enhanced variety is new, the premiums paid to producers are high. However, the premiums then deteriorate as more producers begin growing for the company. It appears to him that there is a three to four year cycle on premiums.

This group of producers believes the following should be covered by the premiums they receive.

- Production unpredictability or yield drag risk;

- Increased seed costs;

- The additional management and labor required, particularly during harvest and for cleaning of equipment and machinery; and

- Segregation and storage of the VEG crop.

**Other comments**

The producers made other comments with respect to their experiences with VEG production. Two growers concurred that they do not want the contractors to manage the "whole deal" by taking away costs. The producers want to capture some of the value and are willing to perform some of the management. This would allow them to keep their independence by retaining some management control of the value-enhanced delivery process.

The participants have experienced products being bundled together. For example, chemicals and seed have been bundled together, and a contractor stipulated that the producer was to purchase its chemicals. However, the seed dealers indicated that the specified chemicals would ruin the crop. Seed companies have also offered low interest rates if producers want to finance their seed purchases through them. Another seed company has offered a higher premium for grain grown from the seed varieties it sells.

One grower pointed out that foreign buyers have specific requirements that often are unrealistic, and the supplier (grower) may not be able to produce the grain requested by the buyer. Consistency is an important issue for grain exports, and the exporters are doing what they can to maintain consistency with their growers.

## Crop Insurance

### Policies carried

Six of the participants carried some form of federal crop insurance in 2001 while the seventh producer purchased hail insurance only. The federal crop insurance users purchased a mixture of federal products and hail insurance; four people have carried hail, three have used CRC, and two have used group insurance. The length of time these producers have used crop insurance ranges from 2 to 13 years. These growers have not insured their VEG crops differently than their commodity grains.

### Reasons

The producers' reasons for using crop insurance vary. Three growers said CPC gives them more confidence when marketing their grain by providing confidence to sell grain ahead of time. One of the three growers mentioned that along with the insurance, his farm's geographic diversification gives him greater confidence to be an aggressive seller ahead of time. Another participant pointed out that the government subsidy makes the insurance worthwhile for him to purchase.

The participant that carried only hail insurance stated that the probability of collecting on federal crop insurance was low so he did not see the need to purchase the insurance. An additional reason for not carrying federal crop insurance, according to this grower, is that there has been an upward trend of average yields, and actual production history does not reflect that change. Another producer stated that his farm faces little risk because it is good ground. Another person stated that CRC insurance on soybeans does not pay because they are more drought resistant than corn.

### Bundled insurance products

One producer had heard about a vegetable company bundling crop insurance with its production contracts. A grower reported that a grain company would guarantee a minimum bushel yield for their seed. He felt there was a cost associated with it, but that it is hidden. He also stated that this is a form of insurance.

### VEG crop insurance provisions

The participants suggested that crop insurance should be tied to revenue, not just bushels. Another option is to tie the insurance to grain quality or establish a price structure to compensate for the potential increased revenue or premium. The producers concurred that a VEG crop insurance product should address quality, yield and price, but its implementation would be difficult due to its complexity. The participants also expressed the desire to have lower insurance premiums.

### Other Suggestions

Other suggestions were made by the producers. A grower mentioned that the contractors should compensate the growers if they do not take delivery according to the contract. They would like to have longer term contracts or guarantees than they currently have. One person would like to grow something that nobody else grows or new varieties or types of VEG. Another person mentioned that in the past producers have been compensated for their loyalty to a company.

## Summary

The group of northern Illinois producers has grown a wide variety of value-enhanced soybeans and corn. In addition, they have sold to an assortment of contractors, both domestically and for export purposes. Their reasons for growing VEG include availability of cheaper inputs, higher yields, greater production diversity, and the opportunity to meet the needs of a dynamic market. Disadvantages of VEG production include declining premiums, contractors not honoring the contract, the inconvenience of delivery times, and the problems associated with buyer's call.

VEG production has required altered production and marketing practices. Some of the production practices employed by this group of producers include identity preservation, the cleaning of machinery, equipment and storage facilities, more intensive crop scouting than with commodity grains, monitoring of varieties planting in neighboring fields, and greater advanced planning of production.

Benefits of VEG production cited by the participants include pride, better management, comparative advantage and increased return. Disadvantages were also mentioned. They consist of delivery inconvenience, greater yield variability than with commodity crops, insufficient compensation for their time and labor, and inconsistent quality grading.

The GMO issue has created change in VEG production through monitoring of neighboring crops and increased testing requirements of the crop.

Marketing of VEG differs from commodity grain, and these differences have caused some challenges for these growers. Many contracts stipulate a marketing window, and whether the grain can be priced ahead of delivery or at time of delivery. Delivery time is not always the time stated in the contract, and the producers have sometimes had to wait weeks past the specified contract time to market their VEG.

Premiums decline after a few years of a contract existing. Nonetheless, the growers feel that the premiums should compensate them for the production variability, increased seed costs, their additional labor and management, and segregation, storage and delivery of the VEG crop.

All but one of the participants carried some federal crop insurance in 2001. Reasons for purchasing crop insurance include increased confidence in marketing the crop and the fact that it is a sound management practice. None of the producers carried different policies for their value-enhanced crops than they did for their commodity grains.

Suggestions for VEG crop insurance products were made, and they include tying the insurance to revenue, not just to bushels. The growers also mentioned that the contractors should compensate the growers for storage, and provide wider marketing windows.

# Appendix C

# Review and Evaluation of Contracts for Specialty Grains and Oilseeds as They Influence Grower Risks

## Risk in Specialty Crop Production–Under Contract

Contract terms vary within and among the different types of specialty grains and oilseeds. The differences among contract terms are listed below.

### Determination of Base Price

1. Price may be set by the cash price quoted at the delivery elevator. That price varies with national market prices but also by local supply and demand, availability of transportation (e.g. the barges are full or late arriving) and local competition. The flat price is subject to variability in price level and in the local basis.

2. The price may be tied to another cash market, such as a sub terminal or the export bid on the river. This reduces the variability of the local basis.

3. The buyer may offer the grower all the pricing tools available for commodity corn and soybeans, including price later and forward price contracts.

4. The price may be tied to the Chicago Board of Trade. If the price is tied to the Chicago Board of Trade, the buyer often must be able to hedge.

5. The time period for setting the base price may be specified over a limited period or left open.

6. There may be an escape clause if the buyer loses on the Futures Market transaction.

7. The grower may be required to work out a base price with the receiving elevator, leaving the base uncertain at the time the contract is signed.

### Establishing the Premium

Alternatives for establishing the premium included the following.

1. A fixed amount above the base is specified in the contract, thus eliminating the risk of premium changes.

2. A sliding scale based on quality adds another dimension of uncertainty.

3. The presence of a default price on rejected loads reduces risk.

## Quantity

All the contracts reviewed contained a quantity provision in one of the following forms.

1. Specified number of bushels.

2. Specified number of acres.

3. Some contracts contained a clause accepting all production from the contracted acreage or relieving the grower of indemnity if production falls short.

## Delivery Terms

The following items relate to delivery terms in the contracts.

1. Responsibility for delivery may reside with the grower or the buyer.

2. Contracts often specify when the grower is to deliver the crop, and if delivery is dependent upon the buyer calling to specify the delivery time, it is called "buyer's call." Contract provisions for buyer's may:

    a. Allow the grower to specify a preference of delivery date.

    b. Provide flexibility within a given time period, such as a month.

    c. Specify quantities by time period.

    d. Allow a grace period around the delivery date.

    e. Provide compensation if the elevator is unable to accept delivery at the time specified in the contract.

3. Location where crop must be delivered. Contracts may:

    a. Specify only one delivery point.

    b. Specify multiple delivery points, with grower choice.

    c. Specify multiple delivery points, with the buyer's right to dictate.

## Quality

The following contract terms address quality issues.

1. The grade may be appealed in cases of dispute.

2. An appeal is permitted on the measurement of the attributes determining the premium.

3. The grower may request a second sample as well as a second evaluation to provide greater assurance that the values are representative of the lot.

4. Competence and reliability of the individual doing the grading were not included in any of the contracts reviewed.

5. Submission of samples may be required from the bin prior to delivery.

6. Quality losses during normal storage periods and extended storage periods may have escape clauses.

### Contamination

The contracts may contain provisions pertaining to contamination:

1. Crops with less than maximum quality may result in rejection, loss of premium, or reduction in premium.

2. To verify a contamination-free crop, producers agree to field inspections, certification, and location relative to other crops.

### Legal

The contracts may contain several provisions related to legal obligations. Some of the contract provisions include:

1. Variations of default clauses.

2. Waiver of damage responsibility of the buyer in cases of damage caused by the crop.

3. Grower specified as being responsible for inherent hazards.

4. Act of God clauses.

5. Specification that NGFA arbitration rules apply in case of dispute (may limit grower's options).

6. Delivery to other buyers specifically prohibited.

7. A clause that allows the buyer to default if the export market for the specialty crop closes (puts an additional risk responsibility on the grower).

### Financial or Investment

The contract may require the grower to incur costs that would be amortized over several years (such as storage and drying equipment).

### Insurance

Some contracts cover a portion of crop insurance.

### Landlord

The contract may include no information on the landlord, leaving those arrangements to the grower, or they may identify different levels of landlord participation in the contract such as the following.

1. Identification of landlord name and address.
2. Landlord must sign the contract along with the tenant.
3. The landlord's share of costs and premiums are specified in the contract.

## Required Practices and Technology

Most contracts place some restrictions on growers with respect to allowable or required practices for production, harvest, and storage of the crop. These conditions vary among crops and contracts. In some cases, the requirements reduce grower risks. In other cases, they result in additional costs. These costs do not affect the risk directly, but they can affect the size of the loss associated with the risk. Contract specifications in this category include the following.

### Seed

1. Contractor furnishes the seed.
2. Contractor specifies the variety, but does not furnish the seed.
3. Grower must purchase seed from the contractor.
4. Grower may choose from a list of approved varieties.
5. Dealer receipts may be required as proof of variety.
6. Grower must show proof of variety and quantity by field.
7. Contractor may specify variety but will not guarantee the availability of seed.

### Production and Harvesting

1. General requirement such as "follow approved practices" or "maximize yield".
2. Specify chemicals required or prohibited.
3. Contractor must have access to fields, equipment, storage bins, etc.
4. Contractor supervises procedures from planter to combine.
5. Contractor requires identification of crops to be planted on adjacent fields. Location must be identified. Fields must be marked.
6. Contractor requires crop history for the fields or adjacent fields.
7. A detailed program of chemical application, planting procedures, tillage, etc. may be required.

8. Contractor specifies harvesting equipment, practices, beginning moisture levels.
9. Samples from every load during harvest.

## Storage

1. General requirements such as access to bins, security, cleanliness.
2. Quality control practices including aeration.
3. Assurance of segregation.
4. Prohibition of chemicals used for insect control.
5. Storage time may be specified or left to the buyer's option.

# Appendix D
# AEC Producer Survey Summary

## Crop Production

### All Respondents

Total useable responses—889

Average crop acres—929

### By Producer Group

Current VEG producers, on average, crop 441 more acres than non-VEG growers and 250 more acres than past VEG growers.

**Table D.1. 2001 Crop Production by Producer Group**

| | Non-VEG Producers | Current VEG Producers | Past VEG Producers | All Respondents |
|---|---|---|---|---|
| Total Crop Acres (average) | 727 | 1,168 | 918 | 929 |
| Corn Acres (average) | 355 | 591 | 464 | 465 |
| Soybean Acres (average) | 344 | 545 | 447 | 440 |
| Number Respondents | 385 | 333 | 171 | 889 |

### By Insurance Interest Group

About 22% of the survey respondents indicated they would be interested in crop insurance specifically designed for value-enhanced crops.

Growers interested in VEG insurance, on average, crop more total acres than those not interested in VEG insurance or those who have no plans to grow VEG.

**Table D.2. 2001 Crop Production by Insurance Interest Group**

| | Interested in VEG Insurance | Not Interested in VEG Ins. | No Plans to Grow VEG |
|---|---|---|---|
| Total Crop Acres (average) | 1,061 | 962 | 793 |
| Corn Acres (average) | 539 | 480 | 393 |
| Soybean Acres (average) | 496 | 454 | 381 |
| Number Respondents | 195 | 299 | 335 |

### Perception of VEG Risk

58% of all respondents perceive VEG production to have higher risk than commodity corn and soybean production while 26.5% believe commodity and VEG production present the same levels of risk.

Of the three producer groups, past VEG growers believe VEG production has the highest level of risk compared to commodity production. Current VEG producers have the lowest level of perception of risk for VEG production.

**Table D.3. Risk of VEG Production Compared to Commodity Production by Producer Group**

| | Non-VEG Producers | | Current VEG Producers | | Past VEG Producers | | All Producers | |
|---|---|---|---|---|---|---|---|---|
| **Risk Categories** | **Number** | **Percent** | **Number** | **Percent** | **Number** | **Percent** | **Number** | **Percent** |
| Lower Risk | 3 | 0.8% | 5 | 1.5% | 1 | 0.6% | 9 | 1.0% |
| Same Risk | 90 | 23.4% | 113 | 33.9% | 33 | 19.3% | 236 | 26.5% |
| Higher Risk | 196 | 50.9% | 198 | 59.5% | 119 | 69.6% | 513 | 57.7% |
| Not Enough Information | 92 | 23.9% | 16 | 4.8% | 18 | 10.5% | 126 | 14.2% |
| Null | 4 | 1.0% | 1 | 0.3% | | 0.0% | 5 | 0.6% |
| Total Responses | 385 | | 333 | | 171 | | 889 | |
| Average Within Classification | 2.67 | | 2.61 | | 2.77 | | 2.66 | |

66% of the producers interested in crop insurance perceive VEG production to have higher risk than commodity production.

**Table D.4. Risk of VEG Production Compared to Commodity Production by Insurance Interest Group**

| | Interested in VEG Insurance | | Not Interested in VEG Insurance | | No Plans to Grow VEG or Null | |
|---|---|---|---|---|---|---|
| **Risk Categories** | **Number** | **Percent** | **Number** | **Percent** | **Number** | **Percent** |
| Lower Risk | 2 | 1.0% | 3 | 1.0% | 4 | 0.9% |
| Same Risk | 51 | 26.2% | 99 | 33.1% | 86 | 20.2% |
| Higher Risk | 128 | 65.6% | 169 | 56.5% | 216 | 50.8% |
| Not Enough Information | 14 | 7.2% | 28 | 9.4% | 84 | 19.8% |
| Null | | 0.0% | | 0.0% | 35 | 8.2% |
| Total Responses | 195 | | 299 | | 425 | |
| Average Within Classification | 2.70 | | 2.61 | | 2.69 | |

Premium uncertainty as a result of not meeting quality standards is viewed as the largest source of risk in VEG production.

Yield uncertainty is perceived as the lowest source of risk in VEG production.

**Table D.5. Sources of Risk with VEG Production by Producer Group**

| | Average Score (Scale: 1=low risk, 5=high risk) | | | |
|---|---|---|---|---|
| **Risk Factor** | **Non-VEG Producers** | **Current VEG Producers** | **Past VEG Producers** | **All Respondents** |
| Yield | 3.38 | 3.25 | 3.61 | 3.38 |
| Premium | 3.86 | 3.61 | 3.99 | 3.76 |
| Contamination | 3.73 | 3.37 | 3.73 | 3.59 |
| Buyer Commitment | 3.73 | 3.37 | 3.73 | 3.59 |

**Table D.6. Sources of Risk with VEG Production by Insurance Interest Group**

| | Average Score (Scale: 1=low risk, 5=high risk) | | |
|---|---|---|---|
| **Risk Factor** | **Interested in VEG Insurance** | **Not Interested in VEG Insurance** | **No Plans to Grow VEG or Null** |
| Yield | 3.42 | 3.23 | 3.46 |
| Premium | 3.71 | 3.71 | 3.89 |
| Contamination | 3.54 | 3.46 | 3.73 |
| Buyer Commitment | 3.29 | 3.26 | 3.61 |

While all the respondents, on average, believe the most beneficial aspect of growing VEG is for greater ability to diversify production, the current VEG producers indicated that greater opportunity to increase farm income is the most important benefit of growing VEG.

Greater access to grain markets is the least important benefit for growing VEG.

**Table D.7. Average Score for Level of Agreement with Benefits of Growing VEG**

| | Average Score (Scale: 1=low risk, 5=high risk) | | | |
|---|---|---|---|---|
| Benefit | Non-VEG Producers | Current VEG Producers | Past VEG Producers | All Respondents |
| Greater access to grain markets | 2.56 | 2.68 | 2.49 | 2.59 |
| Greater opportunity to increase farm income | 3.32 | 3.64 | 3.42 | 3.46 |
| Greater access to new technology | 3.33 | 3.26 | 3.19 | 3.28 |
| Greater ability to diversify production | 3.46 | 3.60 | 3.53 | 3.53 |
| Greater ability to integrate vertically up/down the value chain | 3.28 | 3.28 | 3.21 | 3.26 |

Producers interested in VEG insurance believe that greater opportunity to increase farm income and greater ability to diversity production are equally beneficial reasons for growing VEG.

**Table D.8. Average Score for Level of Agreement with Benefits of Growing VEG by Insurance Interest Group**

| | Average Score (Scale: 1=low risk, 5=high risk) | | |
|---|---|---|---|
| Benefit | Interested in VEG Insurance | Not Interested in VEG Insurance | No Plans to Grow VEG or Null |
| Greater access to grain markets | 2.72 | 2.58 | 2.53 |
| Greater opportunity to increase farm income | 3.69 | 3.44 | 3.37 |
| Greater access to new technology | 3.36 | 3.18 | 3.31 |
| Greater ability to diversify production | 3.69 | 3.44 | 3.52 |
| Greater ability to integrate vertically up/down the value chain | 3.32 | 3.21 | 3.28 |

## VEG Production

56.7% of the respondents have grown VEG at one time in their past.

**Table D.9. VEG Growers Ever**

| | Number | Percent |
|---|---|---|
| Yes | 504 | 56.7% |
| No | 381 | 42.9% |
| No Response | 4 | 0.4% |
| Total | 889 | 100.0% |

37.5% of the respondents grew VEG in 2001.

**Table D.10. VEG Growers in 2001**

| | Number | Percent |
|---|---|---|
| Yes | 333 | 37.5% |
| No | 193 | 21.7% |
| No Response | 363 | 40.8% |
| Total | 889 | 100.0% |

Non-GMO corn was the most frequently reported value-enhanced corn type grown in 2001, followed closely by hard endosperm/food grade corn (65 respondents).

Growers of nutritionally enhanced corn reported the lowest yield as percent of commodity yield for VEG corn types in 2001 (81.7%).

The highest portion of producers grow seed corn under contract (84.2%) while the highest average proportion of value-enhanced corn production grown under contract was for white corn production (87.5%).

**Table D.11. Value-Enhanced Corn**

| | Number Acres | | Average VEG Yield as % of Commodity Yield | | Grown Under Contract | | | | Growers with No Contract or Null Answer | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variety | Average | Number | Average | Number | Average Percent of Production | Number Growers | Percent of Total Growers | Total Growers | Number Growers | Percent of Total Growers |
| White | 210.6 | 32 | 87.8% | 30 | 87.5% | 23 | 82.1% | 28 | 5 | 17.9% |
| Waxy | 104.9 | 8 | 87.6% | 7 | 56.5% | 4 | 66.7% | 6 | 2 | 33.3% |
| Hard Endosperm/Food Grade | 359.2 | 62 | 95.4% | 58 | 71.1% | 34 | 57.6% | 59 | 25 | 42.4% |
| High Oil | 233.5 | 53 | 93.2% | 53 | 82.9% | 38 | 64.4% | 59 | 21 | 35.6% |
| High Starch | 143.8 | 16 | 98.1% | 14 | 81.6% | 5 | 41.7% | 12 | 7 | 58.3% |
| High Amylose | 550.0 | 2 | 100.0% | 2 | 0.0% | 0 | 0.0% | 1 | 1 | 100.0% |
| Non-GMO | 282.8 | 65 | 99.9% | 52 | 57.5% | 17 | 29.3% | 58 | 41 | 70.7% |
| Nutritionally Enhanced | 108.0 | 5 | 81.7% | 3 | 75.5% | 4 | 66.7% | 6 | 2 | 33.3% |
| Organic | 90.0 | 2 | 83.3% | 3 | 0.0% | 0 | 0.0% | 3 | 3 | 100.0% |
| Low Stress Crack | 675.0 | 2 | 96.3% | 2 | 0.0% | 0 | 0.0% | 1 | 1 | 100.0% |
| Low Temperature Dried | 121.6 | 9 | 99.1% | 99 | 0.0% | 0 | 0.0% | 4 | 4 | 100.0% |
| Post-Harvest Pesticide-Free | 20.0 | 1 | N/A | 0 | N/A | N/A | | N/A | | |
| Seed | 223.9 | 19 | 101.4% | 14 | 79.6% | 16 | 84.2% | 19 | 3 | 15.8% |

Of the value-enhanced corn types, white, high oil, organic and seed corn were perceived as having the highest levels of risk.

The highest average rating for the following factors by value-enhanced corn type are:

- Yield uncertainty—seed corn
- Premium uncertainty—organic corn
- Contamination risk—organic corn
- Buyer strength—high starch

**Table D.12. Value-Enhanced Corn**

| | Level of Riskiness, Percent of Responses | | | | Average Rating for Risk Factors | | | |
|---|---|---|---|---|---|---|---|---|
| Variety | Lower | Same | Higher | Insufficient Information | Yield Uncertainty | Premium Uncertainty | Contamination Risk | Buyer Strength |
| White | 0.0% | 32.1% | 64.3% | 3.6% | 3.32 | 3.07 | 3.18 | 2.22 |
| Waxy | 0.0% | 50.0% | 50.0% | 0.0% | 2.83 | 1.83 | 2.67 | 2.17 |
| Hard Endosperm/Food Grade | 1.7% | 69.0% | 27.6% | 1.7% | 2.26 | 2.95 | 3.07 | 2.63 |
| High Oil | 0.0% | 35.1% | 61.4% | 3.5% | 2.89 | 3.30 | 2.48 | 2.65 |
| High Starch | 0.0% | 63.6% | 36.4% | 0.0% | 1.83 | 3.08 | 3.25 | 3.08 |
| High Amylose* | 0.0% | 0.0% | 100.0% | 0.0% | 2.00 | 3.00 | 4.00 | 4.00 |
| Non-GMO | 3.4% | 79.3% | 15.5% | 1.7% | 1.68 | 3.18 | 3.21 | 2.82 |
| Nutritionally Enhanced | 0.0% | 50.0% | 50.0% | 0.0% | 2.83 | 2.00 | 2.67 | 2.17 |
| Organic | 0.0% | 33.3% | 66.7% | 0.0% | 3.00 | 3.33 | 3.67 | 3.00 |
| Low Stress Crack* | 0.0% | 0.0% | 100.0% | 0.0% | 3.00 | 1.00 | 1.00 | 2.00 |
| Low Temperature Dried | 0.0% | 50.0% | 50.0% | 0.0% | 2.00 | 3.00 | 3.00 | 3.00 |
| Post-Harvest Pesticide-Free | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Seed | 21.1% | 10.5% | 68.4% | 0.0% | 3.68 | 2.68 | 3.05 | 2.16 |

* There was only one respondent each for high-amylose and low stress crack corn, and thus interpretation of the results for these types must be put in the perspective of only one grower.

Lower than expected premiums is the most frequent problem with value-enhanced corn production as reported by the respondents; delivery schedule problems are a close second, followed by too narrow of a marketing window.

Buyer contract default is the least frequent reported problem.

**Table D.13. Value-Enhanced Corn**

| | Number of Respondents Indicating Problem Has Occurred | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Variety | Lower Than Expected Premiums | Crop Rejected Due To Not Meeting Quality Standards | Buyer Contract Default | Too Narrow Marketing Window | Lower Than Expected Yields | GMO Contamin-ation | Delivery Schedule Problem | Storage Problems | Harvesting Problems |
| White | 8 | 8 | 1 | 9 | 14 | 3 | 8 | 2 | 11 |
| Waxy | – | – | – | 1 | 1 | – | 2 | – | 1 |
| Hard Endosperm/ Food Grade | 25 | 14 | 6 | 22 | 17 | 2 | 26 | 11 | 14 |
| High Oil | 28 | 7 | 3 | 12 | 22 | 2 | 25 | 9 | 4 |
| High Starch | 2 | 3 | 2 | 4 | 2 | 1 | 6 | 1 | 1 |
| High Amylose | 1 | – | – | - | 1 | – | – | – | – |
| Non-GMO | 32 | 14 | 5 | 28 | 5 | 10 | 28 | 6 | 3 |
| Nutritionally Enhanced | – | 1 | – | 2 | 3 | – | 4 | 1 | 2 |
| Organic | 1 | – | – | – | 1 | – | 1 | – | – |
| Low Stress Crack | 1 | – | – | – | 1 | – | – | – | - |
| Low Temperature Dried | 2 | – | – | 1 | 1 | – | – | – | – |
| Post-Harvest Pesticide-Free | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Seed | 5 | 4 | 1 | 4 | 7 | 1 | 1 | 1 | 3 |
| Total Problems | 105 | 51 | 18 | 83 | 75 | 19 | 101 | 31 | 39 |

The top three value-enhanced soybean types grown by the respondents in 2001 were non-GMO, seed and STS® soybeans (115, 95, 49 respondents, respectively).

Growers of tofu soybeans realized the lowest yield as percent of commodity yield (87.6%) while non-GMO soybean producers suffered little yield drag.

The highest proportion of producers growing under contract was for seed soybeans (84.8%) while the highest average proportion of value-enhanced soybean production was for food grade soybean production (181.1%).

**Table D.14. Value-Enhanced Soybeans**

| | Number Acres | | Average VEG Yield As % of Commodity Yield | | Grown Under Contract | | | | Growers With No Contract or Null Answer | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variety | Average | Number | Average | Number | Average Percent | Number Growers | Percent of Total Growers | Total Growers | Number Growers | Percent of Total Growers |
| Seed | 355.3 | 95 | 97.7% | 80 | 79.7% | 78 | 84.8% | 92 | 14 | 15.2% |
| Tofu | 286.1 | 10 | 87.6% | 10 | 70.6% | 10 | 83.3% | 12 | 2 | 16.7% |
| STS | 221.0 | 49 | 98.1% | 40 | 45.0% | 20 | 50.0% | 40 | 20 | 50.0% |
| High Protein | 133.0 | 3 | 91.7% | 3 | 36.9% | 3 | 75.0% | 4 | 1 | 25.0% |
| Food Grade | 192.2 | 11 | 98.7% | 8 | 81.1% | 11 | 68.8% | 16 | 5 | 31.3% |
| Organic | 181.7 | 3 | 90.0% | 4 | 0.0% | – | 0.0% | 2 | 2 | 100.0% |
| Non-GMO | 266.5 | 115 | 99.7% | 101 | 34.7% | 40 | 37.7% | 106 | 66 | 62.3% |

Of the value-enhanced soybean types, tofu soybeans are perceived as having the highest level of risk (excluding organic soybeans).

The highest average rating for the following factors by value-enhanced corn type are:

- Yield uncertainty—tofu soybeans
- Premium uncertainty (excluding organic soybeans)—seed soybeans
- Contamination risk (excluding organic soybeans)—non-GMO soybeans
- Buyer strength (excluding organic soybeans)—non-GMO soybeans

**Table D.15. Value-Enhanced Soybeans**

| | Level of Riskiness, Percent of Responses | | | | Average Rating for Risk Factors | | | |
|---|---|---|---|---|---|---|---|---|
| Variety | Lower | Same | Higher | Insufficient Information | Yield Uncertainty | Premium Uncertainty | Contamination Risk | Buyer Strength |
| Seed | 2.2% | 67.4% | 30.3% | 0.0% | 2.36 | 3.38 | 2.78 | 2.68 |
| Tofu | 0.0% | 33.3% | 66.7% | 0.0% | 3.42 | 3.17 | 2.92 | 2.50 |
| STS | 2.9% | 54.3% | 42.9% | 0.0% | 2.08 | 3.00 | 2.72 | 2.59 |
| High Protein | 0.0% | 100.0% | 0.0% | 0.0% | 2.00 | 2.00 | 2.25 | 2.50 |
| Food Grade | 0.0% | 80.0% | 20.0% | 0.0% | 2.19 | 2.88 | 2.69 | 2.07 |
| Organic* | 0.0% | 0.0% | 100.0% | 0.0% | 3.00 | 4.00 | 4.00 | 3.50 |
| Non-GMO | 1.9% | 73.8% | 22.3% | 1.9% | 3.00 | 3.00 | 3.00 | 3.00 |

*There were only two observations for organic soybeans.

Lower than expected premiums is the most frequent problem with value-enhanced soybean production as reported by the respondents; delivery schedule problems are the next most frequent problem.

GMO contamination is the least frequent problem.

**Table D.16. Value-Enhanced Soybeans**

| | Number of Respondents Indicating Problem Has Occurred | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Variety | Lower Than Expected Premiums | Crop Rejected Due To Not Meeting Quality Standards | Buyer Contract Default | Too Narrow Marketing Window | Lower Than Expected Yields | GMO Contamination | Delivery Schedule Problem | Storage Problems | Harvesting Problems |
| Seed | 48 | 36 | 9 | 19 | 37 | 1 | 33 | 13 | 17 |
| Tofu | 2 | 1 | 1 | 3 | 6 | – | 2 | 1 | 3 |
| STS | 13 | 4 | 1 | 12 | 2 | 5 | 16 | 4 | 1 |
| High Protein | 2 | 1 | 1 | 1 | 1 | – | 1 | – | – |
| Food Grade | 4 | 4 | 1 | 1 | 2 | 1 | 11 | – | – |
| Organic | 1 | 1 | – | – | 1 | – | – | – | 1 |
| Non-GMO | – | – | – | – | – | – | – | – | – |
| Total Problems | 70 | 47 | 13 | 36 | 49 | 7 | 63 | 18 | 22 |

VEG growers received full premiums on the majority of their production acreage.

Producers received no premiums on only 4.3% of their production.

**Table D.17. VEG Acres by Premium Category***

| Variety | Number of Acres | | | | | Average VEG Yield as Percent of Commodity Yield |
|---|---|---|---|---|---|---|
| | Received No Premium | Received Reduced Premium | Received Full Premium | Not Yet Marketed | All Acres | |
| White Corn | 26 | 18 | 5,032 | 815 | 5,891 | 90.04 |
| Hard Endosperm/Food Grade Corn | 400 | 48 | 14,278 | 1,575 | 16,302 | 96.53 |
| High Oil Corn | 113 | 1,403 | 6,013 | 3,542 | 11,071 | 93.31 |
| Non-GMO Corn | 752 | 130 | 7,074 | 2,296 | 10,252 | 99.95 |
| Seed Corn | 22 | 105 | 3,507 | — | 3,634 | 105.83 |
| Seed Soybeans | 1,804 | 4,098 | 20,495 | 3,493 | 29,890 | 98.24 |
| STS Soybeans | 38 | — | 6,019 | 523 | 6,579 | 98.33 |
| Non-GMO Soybeans | 1,385 | 223 | 17,784 | 3,739 | 23,130 | 99.65 |
| Waxy Corn | — | — | 520 | 40 | 559 | 93.92 |
| High Starch Corn | 320 | — | 940 | 180 | 1,440 | 98.58 |
| Low-Temperature Dried Corn | — | — | — | — | — | 97.50 |
| Low-Stress Crack Corn | — | — | — | — | — | 97.50 |
| Organic Corn | — | — | — | — | — | 75.00 |
| Nutritionally Enhanced Corn | — | — | 525 | 15 | 540 | 81.67 |
| Organic Soybeans | — | — | — | — | — | 80.00 |
| Tofu Soybeans | 23 | 74 | 2,805 | 25 | 2,926 | 86.05 |
| Food Grade Soybeans | 88 | 8 | 1,941 | 50 | 2,086 | 99.15 |
| High Protein Soybeans | 2 | — | 397 | — | 399 | 91.67 |
| All VEG Acres | 4,971 | 6,106 | 87,331 | 16,292 | 114,700 | 96.96 |
| Percent of All VEG Acres | 4.3% | 5.3% | 76.1% | 14.2% | | |

*This table summarizes data from only the respondents who answered both questions—(1) number of VEG acres and (2) % of crop for which they had received the associated premium (none, reduced, full or not yet marketed).

The majority of the VEG growers felt that annual input costs for VEG are about equal to costs of commodity grains.

When evaluating production costs by VEG type, high oil corn had the highest proportion of respondents that believe their production costs are higher than that for commodity corn.

**Table D.18. Comparison of Annual Input Costs of Commodity versus VEG Production**

| VEG Type | Number of Respondents | | | | |
|---|---|---|---|---|---|
| | Lower | Same | Higher | Null | Total |
| White Corn | 1 | 20 | 4 | 3 | 28 |
| Hard Endosperm/Food Grade Corn | 3 | 43 | 9 | 4 | 59 |
| High Oil Corn | 1 | 23 | 31 | 3 | 58 |
| Non-GMO Corn | — | 44 | 4 | 10 | 58 |
| Seed Corn | 8 | 5 | 6 | — | 19 |
| Seed Soybeans | 12 | 55 | 20 | 5 | 92 |
| STS Soybeans | 4 | 23 | 8 | 5 | 40 |
| Non-GMO Soybeans | 11 | 66 | 19 | 10 | 106 |
| Waxy Corn | — | 5 | — | 1 | 6 |
| High Starch Corn | 1 | 9 | — | 2 | 12 |
| High Amylose Corn | — | 1 | — | — | 1 |
| Low-Temperature Dried Corn | 1 | 2 | — | 1 | 4 |
| Low-Stress Crack Corn | — | — | — | 1 | 1 |
| Organic Corn | — | 2 | — | 1 | 3 |
| Nutritionally Enhanced Corn | — | 6 | — | — | 6 |
| Organic Soybeans | — | — | 1 | 1 | 2 |
| Tofu Soybeans | — | 5 | 6 | 1 | 12 |
| Food Grade Soybeans | — | 12 | 4 | — | 16 |
| High Protein Soybeans | — | 4 | — | — | 4 |
| All Respondents | 42 | 325 | 112 | 48 | 527 |

Producer experience with problems associated with VEG production does transfer into perceptions of risk associated with a specific factor. For example, 61% of the growers who have experienced problems with a crop(s) being rejected due to not meeting quality standards rated the risk factor related to premium uncertainty a 4 or 5 on a scale of 1 to 5 (5 represents high risk).

Producers who have not experienced problems with a specific risk factor tend to rate the risk factor as being a low to moderate risk.

**Table D.19. Risk Rating for Specific Factors versus Problems Producers Have Experienced with VEG Type**

| | | | | | | |
|---|---|---|---|---|---|---|
| Risk Factor: | Premium uncertainty as a result of not meeting quality standards | | | | | |
| Problem: | Lower than expected premiums | | | | | |
| | Risk Rating of Factor | | | | | |
| Problem | Low Risk | | Moderate | | High Risk | Total |
| Yes | 11 | 26 | 60 | 64 | 44 | 205 |
| | 5.4% | 12.7% | 29.3% | 31.2% | 21.5% | |
| No | 48 | 74 | 102 | 70 | 19 | 313 |
| | 15.3% | 23.6% | 32.6% | 22.4% | 6.1% | |
| Risk Factor: | Premium uncertainty as a result of not meeting quality standards | | | | | |
| Problem: | Crop rejected due to not meeting quality standards | | | | | |
| | Risk Rating of Factor | | | | | |
| Problem | Low Risk | | Moderate | | High Risk | Total |
| Yes | 3 | 16 | 27 | 38 | 34 | 118 |
| | 2.5% | 13.6% | 22.9% | 32.2% | 28.8% | |
| No | 56 | 84 | 135 | 96 | 29 | 400 |
| | 14.0% | 21.0% | 33.8% | 24.0% | 7.3% | |
| Risk Factor: | Yield uncertainty | | | | | |
| Problem: | Lower than expected yields | | | | | |
| | Risk Rating of Factor | | | | | |
| Problem | Low Risk | | Moderate | | High Risk | Total |
| Yes | 17 | 20 | 44 | 31 | 20 | 132 |
| | 12.9% | 15.2% | 33.3% | 23.5% | 15.2% | |
| No | 162 | 103 | 73 | 39 | 10 | 387 |
| | 41.9% | 26.6% | 18.9% | 10.1% | 2.6% | |
| Risk Factor: | Risk of contamination from other crops | | | | | |
| Problem: | GMO contamination | | | | | |
| | Risk Rating of Factor | | | | | |
| Problem | Low Risk | | Moderate | | High Risk | Total |
| Yes | 2 | 5 | 11 | 11 | 14 | 43 |
| | 4.7% | 11.6% | 25.6% | 25.6% | 32.6% | |
| No | 85 | 98 | 130 | 116 | 47 | 476 |
| | 17.9% | 20.6% | 27.3% | 24.4% | 9.9% | |
| Risk Factor: | Strength and commitment of the buyer or contractor | | | | | |
| Problem: | Contract default by buyer | | | | | |
| | Risk Rating of Factor | | | | | |
| Problem | Low Risk | | Moderate | | High Risk | Total |
| Yes | 1 | 5 | 11 | 9 | 12 | 38 |
| | 2.6% | 13.2% | 28.9% | 23.7% | 31.6% | |
| No | 105 | 132 | 123 | 78 | 32 | 470 |
| | 22.3% | 28.1% | 26.2% | 16.6% | 6.8% | |

## Decisions, Land Use and Investments (Capital Utilization)

The majority of past and current VEG producers indicated that their landlord(s) have had no influence on their decisions to produce VEG.

**Table D.20. Landlords' Influence on VEG Production Decision**

| | Number |
|---|---|
| Total Respondents | 524 |
| Respondents with 1 response | 504 |
| Respondents with 2 responses | 20 |
| No rented land | 107 |
| Landlord encouraged producer not to grow | 34 |
| Landlord encouraged producer to grow | 49 |
| Landlord has had no influence | 354 |

About 55% of the past and current VEG growers who share-rent land indicated that the land tenure position (own, cash rent or crop-share lease) is not a factor in the decision to grow VEG.

**Table D.21. Likelihood of Raising VEG on Share-Rented Land Than on Owned or Cash-Rented Land**

| | Number |
|---|---|
| Total Respondents | 511 |
| No share-rented land | 105 |
| Less likely to raise VEG | 121 |
| More likely to raise VEG | 14 |
| No difference between share-rented land and owned or cash-rented land | 231 |
| It varies from landlord to landlord | 52 |

VEG producers do not always select the highest quality land in which to grow VEG; often quality is not a factor in deciding on which field(s) to grow VEG.

**Table D.22. Manner in Which VEG Fields are Selected**

| | Number |
|---|---|
| Total Respondents | 521 |
| Respondents with 1 response | 517 |
| Respondents with 2 responses | 4 |
| Lower than average quality land | 2 |
| Average quality land | 162 |
| Higher than average quality land | 136 |
| Quality of land varies with VEG type | 72 |
| Do not consider the quality of land when selecting fields | 153 |

A small percentage (11.8%) of past and current growers have invested in specialized equipment or facilities for VEG production.

**Table D.23. Investment in Specialized Equipment or Facilities for VEG Production**

| | Number | Percent |
|---|---|---|
| Yes | 62 | 11.8% |
| No | 463 | 88.2% |
| Investment Amount | | |
| Average | $32,682 | |
| Minimum | $100 | |
| Maximum | $250,000 | |

## Table D.24. Capital Investment by VEG Type

| | White Corn | Hard Endosperm/ Food Grade Corn | High Oil Corn | Non-GMO Corn | Seed Corn | Seed Soybeans | STS Soybeans | Non-GMO Soybeans |
|---|---|---|---|---|---|---|---|---|
| Additional equipment purchased | 5 | 11 | 5 | 7 | 11 | 30 | 2 | 7 |
| No additional equipment purchased | 23 | 48 | 52 | 51 | 8 | 61 | 38 | 99 |
| Average cost of additional equipment purchased | $41,200 | $50,782 | $48,000 | $21,780 | $48,464 | $37,036 | $20,000 | $22,800 |

## Table D.25. Producers That Grow Only One Type of VEG

| | White Corn | Hard Endosperm/ Food Grade Corn | High Oil Corn | Non-GMO Corn | Seed Corn | Seed Soybeans | STS Soybeans | Non-GMO Soybeans | Total Observations | Total Producers |
|---|---|---|---|---|---|---|---|---|---|---|
| Additional equipment purchased | 1 | 4 | 1 | 2 | 3 | 12 | | 1 | 24 | 24 |
| No additional equipment purchased | 8 | 16 | 24 | 12 | 1 | 29 | 21 | 36 | 147 | 147 |
| Number of producers indicating cost of additional equipment | 1 | 4 | 1 | 2 | 3 | 9 | | | 20 | 20 |
| Average cost of additional equipment purchased | $35,000 | $27,205 | $20,000 | $7,450 | $36,667 | $15,511 | | | $428,320 | $21,416 |

## Table D.26. Producers That Grow Two Types of VEG

| | White Corn | Hard Endosperm/ Food Grade Corn | High Oil Corn | Non-GMO Corn | Seed Corn | Seed Soybeans | STS Soybeans | Non-GMO Soybeans | Total Observations | Total Producers |
|---|---|---|---|---|---|---|---|---|---|---|
| Additional equipment purchased | 3 | 1 | 1 | 1 | 6 | 12 | | 2 | 26 | 13 |
| No additional equipment purchased | 4 | 20 | 16 | 29 | 6 | 22 | 13 | 46 | 156 | 78 |
| Number of producers indicating cost of additional equipment | 3 | 1 | 1 | | 6 | 11 | | 2 | 24 | 12 |
| Average cost of additional equipment purchased | $7,000 | $5,000 | $10,000 | | $60,517 | $36,936 | | $8,600 | $822,600 | $34,275 |

## Table D.27. Producers That Grow Three Types of VEG

| | White Corn | Hard Endosperm/ Food Grade Corn | High Oil Corn | Non-GMO Corn | Seed Corn | Seed Soybeans | STS Soybeans | Non-GMO Soybeans | Total Observations | Total Producers |
|---|---|---|---|---|---|---|---|---|---|---|
| Additional equipment purchased | 1 | 5 | 3 | 3 | 2 | 5 | 1 | 4 | 24 | 8 |
| No additional equipment purchased | 8 | 8 | 8 | 7 | | 7 | 4 | 15 | 57 | 19 |
| Number of producers indicating cost of additional equipment | 1 | 4 | 3 | 2 | 2 | 4 | | 2 | 18 | 6 |
| Average cost of additional equipment purchased | $150,000 | $93,500 | $70,000 | $37,000 | $30,000 | $90,000 | | $37,000 | $1,302,000 | $72,333 |

## Table D.28. Producers That Grow Four Types of VEG

| | White Corn | Hard Endosperm/ Food Grade Corn | High Oil Corn | Non-GMO Corn | Seed Corn | Seed Soybeans | STS Soybeans | Non-GMO Soybeans | Total Observations | Total Producers |
|---|---|---|---|---|---|---|---|---|---|---|
| Additional equipment purchased | | 1 | | 1 | | 1 | 1 | | 4 | 1 |
| No additional equipment purchased | 3 | 4 | 4 | 3 | 1 | 3 | | 2 | 20 | 5 |
| Number of producers indicating cost of additional equipment | | 1 | | 1 | | 1 | 1 | | 4 | 1 |
| Average cost of additional equipment purchased | | $20,000 | | $20,000 | | $20,000 | $20,000 | | $80,000 | $20,000 |

Management practices such as harvesting and handling are rated the most important risk factor affecting quality specifications.

Weather and growing conditions is rated the least important risk factor affecting quality specifications.

**Table D.29. Risk Factors Affecting Meeting Quality Specifications by VEG Producer Group**

| | Average Rating of Factor* | | |
|---|---|---|---|
| **Risk Factors** | **Current** | **Past** | **Current and Past** |
| Weather and growing conditions | 3.69 | 3.84 | 3.73 |
| Management practices such as harvesting and handling | 4.32 | 4.50 | 4.37 |
| Sampling methods used at the delivery point | 3.91 | 4.20 | 4.02 |
| Testing methods used at the delivery point | 4.03 | 4.29 | 4.11 |

*Rated on a scale of 1 (Not important) to 5 (Very important)

## Risk Management

### Yield Risk Management

Selection of seed varieties and crop rotation and diversification are the most important ways in which yield risk is reduced according to all the respondents.

**Table D.30. Manner in Which Yield Risk is Reduced**

| | Number of Respondents | | | |
|---|---|---|---|---|
| **Management Option** | **Non-VEG Producers** | **Current VEG Producers** | **Past VEG Producers** | **Total** |
| Geographic diversification | 64 | 75 | 30 | 169 |
| Crop insurance | 270 | 218 | 110 | 598 |
| Selection of seed varieties | 339 | 290 | 148 | 777 |
| Crop rotation and diversification | 334 | 282 | 151 | 767 |

Crop insurance is the most important manner in which to manage yield risk for those growers interested in VEG insurance.

**Table D.31. Manner in Which Yield Risk is Reduced**

| | Number of Respondents | |
|---|---|---|
| **Management Option** | **Interested in VEG Insurance** | **Not Interested in VEG Insurance** |
| Geographic diversification | 49 | 60 |
| Crop insurance | 171 | 255 |
| Selection of seed varieties | 155 | 176 |
| Crop rotation and diversification | 167 | 254 |

## Marketing

The largest volumes of crops are marketed by pricing after harvest with marketing tools.

**Table D.32. Pricing Method for Commodity and Value-Enhanced Corn and Soybeans**

| | Corn | | Soybeans | |
|---|---|---|---|---|
| Pricing Method | Average Percent of Commodity Crop | Average Percent of Value-Enhanced Crop | Average Percent of Commodity Crop | Average Percent of Value-Enhanced Crop |
| Feed to livestock | | | | |
| Average percent | 32.2% | 53.3% | 20.6% | 56.5% |
| Number producers | 203 | 37 | 12 | |
| Sell for cash price when delivered | | | | |
| Average percent | 47.2% | 54.8% | 57.9% | 64.4% |
| Number producers | 484 | 114 | 425 | 123 |
| Priced prior to harvest with marketing tools such as cash forward contracts, futures, and/or options | | | | |
| Average percent | 35.3% | 51.4% | 36.5% | 46.3% |
| Number producers | 486 | 160 | 394 | 134 |
| Priced after harvest with marketing tools such as cash forward contracts, futures, and/or options | | | | |
| Average percent | 52.0% | 58.4% | 59.2% | 67.6% |
| Number producers | 521 | 167 | 468 | 186 |

The majority of the producers price a portion of their crop using marketing tools such as cash forward contracts, futures and/or options. They price 50% or less of the crop prior to harvest.

VEG is more likely to be priced a portion of their crop prior to harvest than commodity grain.

**Table D.33. Pricing Method for Commodity and Value-Enhanced Corn and Soybeans**

| Respondents | Commodity Corn | VE Corn | Commodity Soybeans | VE Soybeans |
|---|---|---|---|---|
| Feed 100% of crop to livestock or sell for cash when delivered | | | | |
| Number | 141 | 5 | 143 | 59 |
| Percent | 19.3% | 2.6% | 21.2% | 21.9% |
| Price portion of crop using marketing tools such as cash forward contracts, futures; price 50% or less prior to harvest | | | | |
| Number | 527 | 134 | 476 | 183 |
| Percent | 72.2% | 70.9% | 70.7% | 68.0% |
| Price portion of crop using marketing tools such as cash forward contracts, futures; price more than 50% prior to harvest | | | | |
| Number | 62 | 50 | 54 | 27 |
| Percent | 8.5% | 26.5% | 8.0% | 10.0% |
| Total | 730 | 189 | 673 | 269 |

More producers are likely to use different marketing methods for their value-enhanced corn than for their commodity corn in contrast to VE soybeans where the largest number of producers use similar marketing methods for both their commodity and value-enhanced soybeans.

**Table D.34. Pricing Method for Commodity and Value-Enhanced Corn and Soybeans**

| | No Difference in Marketing Methods | | Different Methods Employed | | |
|---|---|---|---|---|---|
| Comparison of Marketing Methods | Number | Percent | Number | Percent | Total |
| Marketing of commodity versus VE corn | 172 | 82.3% | 37 | 17.7% | 209 |
| Marketing of commodity versus VE soybeans | 201 | 90.1% | 22 | 9.9% | 223 |
| Marketing of commodity corn versus soybeans | 554 | 88.8% | 70 | 11.2% | 624 |
| Marketing of VE corn versus VE soybeans | 143 | 86.1% | 23 | 13.9% | 166 |

## Crop Insurance

Hail and multiple peril crop insurance are the most frequently purchased insurance policies purchased by the respondents.

Crop revenue coverage is the most frequently purchased revenue insurance policy.

**Table D.35. Types of Crop Insurance Policies Used by Producer Group**

| | Number of Respondents | | | |
|---|---|---|---|---|
| Policy Type | Non-VEG Producers | Current VEG Producers | Past VEG Producers | Total |
| Never purchased crop insurance | 37 | 22 | 12 | 71 |
| Hail | 264 | 232 | 127 | 623 |
| Catastrophic coverage | 145 | 116 | 74 | 335 |
| Multiple peril | 201 | 164 | 89 | 454 |
| Group risk plan | 10 | 12 | 4 | 26 |
| Crop revenue coverage | 128 | 162 | 69 | 359 |
| Income protection | 37 | 48 | 22 | 107 |
| Revenue assurance | 27 | 46 | 22 | 95 |

**Table D.36. Types of Crop Insurance Policies Used by Insurance Interest Group**

| | Number of Respondents | | |
|---|---|---|---|
| Policy Type | Interested in VEG Insurance | Not Interested in VEG Insurance | No Plans to Grow VEG or Null |
| Never purchased crop insurance | 7 | 30 | 35 |
| Hail | 148 | 202 | 273 |
| Catastrophic coverage | 74 | 109 | 152 |
| Multiple peril | 114 | 137 | 203 |
| Group risk plan | 7 | 11 | 8 |
| Crop revenue coverage | 117 | 106 | 137 |
| Income protection | 36 | 34 | 37 |
| Revenue assurance | 39 | 25 | 32 |

Risk management is the most frequently stated reason for purchasing crop insurance.

Lender requirement is the least frequently stated reason for purchasing crop insurance (besides "Other").

**Table D.37. Reasons for Purchasing Crop Insurance by Producer Group**

| | Number of Respondents | | | |
|---|---|---|---|---|
| Reason | Non-VEG Producers | Current VEG Producers | Past VEG Producers | Total |
| Risk management | 199 | 209 | 88 | 496 |
| Part of overall grain marketing program | 201 | 164 | 89 | 454 |
| Low-cost premiums justify purchase | 67 | 56 | 32 | 155 |
| Requirement of government program | 174 | 132 | 82 | 388 |
| Requirement of lender | 47 | 39 | 21 | 107 |
| Other | 12 | 6 | 7 | 25 |

**Table D.38. Reasons for Purchasing Crop Insurance by Insurance Interest Group**

| Reason | Number of Respondents | | | |
|---|---|---|---|---|
| | Interested in VEG Insurance | Not Interested in VEG Insurance | No Plans to Grow VEG or Null | Total |
| Risk management | 153 | 151 | 192 | 496 |
| Part of overall grain marketing program | 65 | 51 | 54 | 170 |
| Low-cost premiums justify purchase | 31 | 60 | 64 | 155 |
| Requirement of government program | 88 | 136 | 164 | 388 |
| Requirement of lender | 32 | 30 | 45 | 107 |
| Other | 8 | 3 | 14 | 25 |

Expense is the most frequently indicated reason for not purchasing crop insurance.

**Table D.39. Reasons for Not Purchasing Federal Crop Insurance by Producer Group**

| Reason | Number of Respondents | | | |
|---|---|---|---|---|
| | Non-VEG Producers | Current VEG Producers | Past VEG Producers | Total |
| Too expensive | 123 | 110 | 64 | 297 |
| Do not know enough about the policies to purchase | 36 | 13 | 8 | 57 |
| Not enough variation in production to justify its purchase | 122 | 88 | 55 | 265 |

**Table D.40. Reasons for Not Purchasing Federal Crop Insurance by Insurance Interest Group**

| Reason | Number of Respondents | | | |
|---|---|---|---|---|
| | Interested in VEG Insurance | Not Interested in VEG Insurance | No Plans to Grow VEG or Null | Total |
| Too expensive | 65 | 107 | 125 | 297 |
| Do not know enough about the policies to purchase | 7 | 17 | 33 | 57 |
| Not enough variation in production to justify its purchase | 46 | 84 | 135 | 265 |

Less than 5% of the respondents have purchased different crop insurance policies for their VEG production.

**Table D.41. Whether or Not Different Insurance Policies are Carried for VEG Crops by Producer Group**

| | Current VEG Producers | | Past VEG Producers | | Total Respondents | |
|---|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | Number | Percent |
| Respondents | 314 | | 161 | | 475 | |
| Yes | 17 | 5.4% | 5 | 3.1% | 22 | 4.6% |
| No | 295 | 93.9% | 147 | 91.3% | 442 | 93.1% |
| Have not grown VEG | 2 | 0.6% | 9 | 5.6% | 11 | 2.3% |

**Table D.42. Whether or Not Different Insurance Policies are Carried for VEG Crops by Insurance Interest Group**

| | Interested in VEG Insurance | | Not Interested in VEG Insurance | | No Plans to Grow VEG or Null | | Total Respondents | |
|---|---|---|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| Respondents | 189 | | 287 | | 333 | | 809 | |
| Yes | 18 | 9.5% | | 0.0% | 6 | 1.8% | 24 | 3.0% |
| No | 144 | 76.2% | 260 | 90.6% | 87 | 26.1% | 491 | 60.7% |
| Have not grown VEG | 27 | 14.3% | 27 | 9.4% | 240 | 72.1% | 294 | 36.3% |

Six percent of past and current VEG producers have had crop insurance as part of their VEG contract.

**Table D.43. Whether or Not Crop Insurance is Part of VEG Contract by Producer Group**

| | Current VEG Producers | | Past VEG Producers | | Total Respondents | |
|---|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | Number | Percent |
| Respondents | 317 | | 166 | | 483 | |
| Yes | 23 | 7.3% | 6 | 3.6% | 29 | 6.0% |
| No | 294 | 92.7% | 153 | 92.2% | 447 | 92.5% |
| Have not grown VEG | | 0.0% | 7 | 4.2% | 7 | 1.4% |

**Table D.44. Whether or Not Crop Insurance is Part of VEG Contract by Insurance Interest Group**

| | Interested in VEG Insurance | | Not Interested in VEG Insurance | | No Plans to Grow VEG or Null | | Total Respondents | |
|---|---|---|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| Respondents | 191 | | 295 | | 345 | | 831 | |
| Yes | 18 | 9.4% | 10 | 3.4% | 1 | 0.3% | 29 | 3.5% |
| No | 148 | 77.5% | 267 | 90.5% | 112 | 32.5% | 527 | 63.4% |
| Have not grown VEG | 25 | 13.1% | 18 | 6.1% | 232 | 67.2% | 275 | 33.1% |

Less than 3% of past and current producers have had problems with crop insurance policies carried specifically for their VEG crops.

**Table D.45. Whether or Not Crop Insurance for VEG Has Been a Problem by Producer Group**

| | Current VEG Producers | | Past VEG Producers | | Total Respondents | |
|---|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | Number | Percent |
| Respondents | 293 | | 148 | | 441 | |
| Yes | 7 | 2.4% | 3 | 2.0% | 10 | 2.3% |
| No | 241 | 82.3% | 106 | 71.6% | 347 | 78.7% |
| Have not used crop insurance for VEG | 45 | 15.4% | 39 | 26.4% | 84 | 19.0% |

**Table D.46. Whether or Not Crop Insurance for VEG Has Been a Problem by Insurance Interest Group**

| | Interested in VEG Insurance | | Not Interested in VEG Insurance | | No Plans to Grow VEG or Null | | Total Respondents | |
|---|---|---|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| Respondents | 177 | | 268 | | 309 | | 754 | |
| Yes | 6 | 3.4% | 2 | 0.7% | 2 | 0.6% | 10 | 1.3% |
| No | 134 | 75.7% | 199 | 74.3% | 67 | 21.7% | 400 | 53.1% |
| Have not used crop insurance for VEG | 37 | 20.9% | 67 | 25.0% | 240 | 77.7% | 344 | 45.6% |

Price election adjusted to include expected contract premium is rated the most important provision for VEG crop insurance.

**Table D.47. Importance of Provisions for VEG Crop Insurance by Producer Group**

| | Average Importance Rating (Scale: 1=not important, 5=very important) | | | |
|---|---|---|---|---|
| Provision | Non-VEG Producers | Current VEG Producers | Past VEG Producers | Total |
| Adjustment for VEG yield history vs. the commodity yield history | 3.75 | 3.53 | 3.89 | 3.69 |
| Coverage of grain quality variations | 3.81 | 3.68 | 3.99 | 3.79 |
| Coverage of risk of contamination | 3.84 | 3.65 | 3.91 | 3.78 |
| Price election adjusted to include expected contract premium | 3.90 | 3.78 | 4.05 | 3.88 |

**Table D.48. Importance of Provisions for VEG Crop Insurance by Insurance Interest Group**

| Policy Provisions | Average Importance Rating (Scale: 1=not important, 5=very important) | | |
|---|---|---|---|
| | Interested in VEG Insurance | Not Interested in VEG Insurance | No Plans to Grow VEG or Null |
| Adjustment for VEG yield history vs. the commodity yield history | 4.0 | 3.3 | 3.9 |
| Coverage of grain quality variations | 4.0 | 3.5 | 3.9 |
| Coverage of risk of contamination | 4.0 | 3.4 | 4.0 |
| Price election adjusted to include expected contract premium | 4.1 | 3.5 | 4.0 |

The majority of those interested in crop insurance specifically designed for value-enhanced crop is the current VEG producers.

**Table D.49. VEG Production History versus Interest in VEG Insurance (Excludes Null Observations)**

| | Number of Respondents | | | |
|---|---|---|---|---|
| | Interested in VEG Insurance | Not Interested in VEG Insurance | No Plans to Grow VEG | Total |
| Non-VEG Producers | 38 | 60 | 268 | 366 |
| Current VEG Producers | 117 | 173 | 9 | 299 |
| Past VEG Producers | 40 | 66 | 58 | 164 |
| Total | 195 | 299 | 335 | 829 |


Centrec Business Center
3 College Park Court
Savoy, IL 61874
Phone: 217.352.1190
Fax: 217.352.1425
Website: www.centrec.com
Email: centrec@centrec.com