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Marketing specialty corn contracts under uncertainty in Iowa

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CHAPTER 1. INTRODUCTION

Changing Forces in Specialty Grain Marketing

Traditionally corn has been a commodity crop, and has been treated, handled, and marketed on the assumption that all corn is the same. Most agree that the corn industry of the near future will be more end-user and demand oriented. Corn users and processors have become more interested in both the physical and intrinsic chemical characteristics of corn and how these quality differences affect their business. The biotechnology advancements now being made will allow producer to meet very specific customer needs by engineering hybrids with customized chemical traits. While this allows growers to add value to a traditionally lower-value, commodity crop, capturing that value is probably among the most important issues facing the future of specialty corn production.

Currently, marketing knowledge has become one of the most important factors that a producer needs to tap the benefit from these technology breakthroughs. A producer must obtain the extra knowledge or at least know where to find it. As corn producers seek big gains offered by the genetic revolution, cost control will be even more critical. Specialty corn is usually priced at a premium above the commodity price of the yellow dent corn because it carries the special trait, but it also carries additional production costs in most cases. Knowing when the premium justifies the added costs requires analysis by the producer prior to making the planting decision.

To make matters more difficult, farmers must make decisions in a risky, ever-changing environment. Changing markets and the rapidly developing technology add a new dimension to the traditional production decision-making process. Five years ago, a farmer budgeting for the next corn crop might plan to spend $20 per acre for seed, $35 for crop protection, $35 for fertilizer and feel on target under the assumption that price will not change dramatically. Today, the equation has changed and budgeting crop production is not that simple anymore. For example, prices for corn vaulted to historic high levels in the spring and summer of 1996. By late summer of 1998, corn prices had declined to the lowest level in over 10 years. For corn, the longest period of very low prices was from mid 1986 to early 1988. This was a period of consecutive large (1986, 1987) and weak export demand. In the recent years, the demand and supply of corn overseas, the fertilizer and the livestock markets have been playing an increasingly important role in corn production and corn price determination. These factors bring to the corn producers higher risk and uncertainty in their operations and the increasing market volatility fosters new thoughts of producing and marketing of corn in Iowa. (Figure 1).

Figure 1: Monthly average corn prices ($/bu) received by Iowa farmers, 1980-1998

U.S. Corn Production and Usage

Corn is America's largest single crop. Both the planted area and the total value of corn produced exceed those for any other commodity. Each year, American farmers devote one in every four arable acres to corn production. Corn production in the United States is concentrated in the upper Midwest. The "Corn Belt" stretches from Ohio to Nebraska. The top-three corn producing states of Iowa, Illinois and Nebraska account for approximately 46% of the total corn produced in the United States.

In the State of Iowa, corn sales makes up to 29% of the State total farm receipts. According to Iowa Agricultural Statistics Services, there were about 98,000 farms in Iowa and the average size of these farms was 339 acres. Iowa farmers harvested about 1.6 billion bushels of corn in 1997 with an average yield of 138 bushels per acre. For acreage and value, specialty corn is also increasing. Estimated specialty corn acreage in 1996 was about 2.5 million acres (total corn acreage was 12.4 million acres in 1996). In 1999, it is expected to increase to about 3.7 million acres – an increase of about 48%.

Table 1: State of Iowa top agriculture commodities, 1997

Commodity	% of State Total Farm Receipts	% of US Total Value
Corn	29.4	18.4
Soybean	25.6	17.9
Hogs	23.0	22.4
Cattle and calves	12.8	4.5
Dairy products	4.1	2.5

Source: Economic Research Service, United State Department of Agriculture (USDA)

Both the United States and the rest of the world use corn principally as livestock feed. Crum and Stilbon (1997) reported that approximately 80% of the corn grown in the U.S. is utilized in livestock and poultry feed either domestically or abroad. Corn can supply all the energy and much of the protein required in an animal's diet. In the United States, where wheat, oats, barley, and sorghum compete as feed grains, corn dominates. It represents up to 86% of the total grain used as a feed ingredient.

Feed costs represent 60-70% of the total cost in livestock and poultry production with corn representing the major component and primary energy source in most animal diets. Feeding corn grain with higher energy density and consistency is of great economic interest to livestock and poultry producers. In corn, the majority of the available energy is found in the starch and oil. One way to increase the value and utility of corn is to increase its energy density (more energy per pound). Since oil contains 2.25 times more energy than starch, increasing the oil content of corn grain generates more energy per unit volume. The larger germ of high oil corn (HOC), one of the most important of the specialty corns, results in increased oil content and higher energy per bushel. HOC, which had virtually no production acres in 1992, was produced on an estimated 1 million acres in 1997 (Kalaitzandonakes and Maltsbarger 1998). It averages 6-8 percent oil content compared to a 3 percent average for conventional corn varieties. For the farmers, the most important benefit is the opportunity to add value "on-farm". When farmers feed HOC they can earn more net dollars per acre by producing higher value grain than standard corn. By eliminating the need for intermediate handling and the associated IP logistics cost, farmers capture all of the extra benefit through feed cost savings. For example, Renkoski (1997) suggested an "approximately $10/ton savings from the substitution of higher priced ingredients with lower priced [specialty] corn to achieve the same diet (page 126)."

Although used primarily to feed livestock, corn is being used in various types of industrial processing each year. Industrial products include edible oil, starch, high fructose corn syrup (HFCS), and alcohol (ethanol). Starch products include films, coatings, adhesives, paper products, binders, road de-icers, absorbents, dyes, sizing, and other textile industry materials. Examples of market specialized corn hybrids include waxy corn, which is used by the food industry as a stabilizer/thickener and the white and yellow food corns, which are sold to dry-mill processors and used in breakfast cereals and snack chips. New research on development of biodegradable plastics derived from corn starch shows promise in the near future.

Specialty Corns in the U.S.

Specialty corns are genetic modifications of yellow dent corn designed to better fit the needs of special end-users. Corn grain users and processors have become more interested in the quality characteristics of corn grain. Corn that meets specific user needs are also called value-added or identity preserved corn. There is a diverse group of specialty corns produced in the US. Some examples include the waxy corns, HOC, high-lysine corns, white corn and yellow food corns, silage corn, sweet corn and popcorn and etc. Contracts for growing specialty corns usually offer a premium over the yellow dent corn price to compensate for the high costs and provide incentive for production.

On the other hand, various kinds of risk are involved in specialty corn production and marketing. Other than yield uncertainly, there may be extra costs and management needed to meet the quality standards stated in a contract. Ownership risks may also arise when title to the grain is not well defined in the contract. Unreliable financial status of the contractor may pass certain payment risks to the contractual arrangement (Ginder, 1997). Although there are considerable amount of research done on contracting issues in fruit and vegetables, crops, poultry and livestock, there is relatively little published data available concerning net returns under different specialty corn contracts.

Objectives

This study analyzes alternative contractual scenarios to determine the costs and benefits of marketing specialty corn under uncertainty using different contract arrangements. Three kinds of contracts were evaluated and compared using recently published data from Iowa State University Extension. These contracts include a contract based on the commodity corn price plus a premium, a flat price per bushel contract, and a flat payment per acre contract. The specific objectives of this research are: (1) to develop a spreadsheet model to evaluate the net returns for specialty corn production under the three alternative contractual arrangements under uncertainty. (2) to analyze the linkage between yield risk, price risk, and net returns per acre under the different land potentials. (3) to develop a computer software program titled "CornContract Explorer" which will permit farmers and others to analyze costs and net returns for specialty corn contracts using their own data.

CHAPTER 2. CONTRACTING SPECIALTY CORNS

Additional Risk and Cost Considerations for Specialty Corns

Specialty crops require special attention and bring different risks to the producer (Ginder, 1997). Some of these concerns include the need of better insect management to protect the crop from corn insects such as cutworms, wireworms or rootworms. Moreover, in order to compensate for the non-yielding pollinator plants, growers of certain HOC hybrids, have to plant higher populations. Field isolation may also be needed for certain specialty corns such as waxy corn, seed corn and HOC. Furthermore, farmers have to segregate the grain in order to preserve the characteristics from harvest to use and fields scouting is essential to observe growth and development of pollinators. Some of the above-mentioned additional risk and cost considerations for growing specialty corns are investigated in further detail in the following sections.

Rotation and Optimum Seeding Rates

It is common to plant specialty corn hybrids after soybean. Studies suggest that grain yield for corn following soybean rotation will typically be about 10% higher than corn following corn. Other advantages of rotated corn are reduced pest pressure and minimization of volunteer corn. Volunteer corn can cause contamination problems during pollination in waxy, high-oil, high-lysine and high amylose corn. Generally, corn following soybean rotation will incur less fertilizer and insecticide cost.

Furthermore, specialty hybrids have different optimum seeding rates. For example, HOC requires an increase in the planted population of 8%-10% more plants per acre over the population for the typical yellow dent corn. The added population is needed to compensate for the presence of the high oil pollinator plants (which themselves do not contribute significantly to yield). Extra seed needed means extra money to be spent on specialty corn production. Because specialty corn seed is more expensive, producers usually select lower risk fields with higher yield potential to maximize yield and reduce stress.

Isolation Costs

An additional consideration when selecting production sites for certain specialty corn, like waxy corn, high-lysine corn, high amylose corn, white corn, and HOC, is isolation. Proper isolation allows growers to capture the maximum value from their production fields by minimizing cross-pollination. Research conducted by Pioneer suggests that the minimum isolation distance needed for highest oil content should be 60 feet (24 30-inch rows) from single cross hybrids. Isolation costs are different from field to field and it is highly correlated to the layout of the field. Farmers may plant a different crop such as soybean and generate income to compensate for all or part of the extra cost associated to isolation practices. However, any reduction in profits from what could have been generated by planting corn represents an added cost.

Identity Preservation

Specialty corn typically has characteristics that are of value to certain end users and may not be of any value or may be of negative value to other users. In order to prevent the introduction of normal corn pollen into the field, farmer may carefully clean the planter to remove all normal corn seeds prior to planting specialty corn. Cleaning the planter and also the combine incur extra labor costs in specialty corn production. Further steps include storing the special hybrids in separate bins to prevent mixing with normal corn. Such segregated storage adds extra costs to normal storage, drying, and handling costs. Specialty corn production may generate other costs because facility may be filled to below full capacity and extra time may be needed for slower low temperature drying processes. The basic need is to protect the crop's purity, and kernel integrity and identity.

Integrated Crop Management

Some contractors require the use of integrated crop management (ICM) in order to maintain specific quality requirements stated in the contracts. ICM is a concept developed at Iowa State University Extension for the Iowa Model Farm Demonstration Project. It is an intensive crop management program, which includes planning, field scouting, pest management and nutrient management in a crop production operation. It allows the producer to optimize economic yields while reducing excess chemical application and increasing efficiency in certain planting operations such as tillage, seed population selection, and timing. A study done by the Leopold Center for Sustainable Agriculture (Duffy, 1997) found that ICM services, which cost about $6 per acre total, created average extra net returns of at least $13 per acre. Other studies suggested that by employing ICM strategies, yields are 10-15% higher than average and that for every dollar a participant spent on the project a $5 average benefit was received. (Frieberg, 1993). The use of ICM service is considered in the CornContract Explorer computer software as an option. However, we did not incorporate it in the uncertainty analysis because of the complication it adds to the simulation.

Using Marketing Contract

Contracts are an important part of the production and marketing for selected livestock commodities (such as broilers, eggs, and hogs) and crops (such as vegetables and fruit). There are generally two kinds of contracts commonly used in the US for agricultural commodities. Traditionally, marketing contracts are more commonly used for field crops, while production contracts are more prevalent in the livestock industry. However, this relationship has been changing for the past few years as more and more vegetables are being grown under production contracts and hogs are being sold under marketing contracts. Contracts have been increasingly used on the production side of agriculture especially in producing specialty crops. Although producers may not be able to define the type of contract offered, it is nevertheless helpful to be able to understand some important features that a typical contract carries.

> A *contract* is a legally binding agreement between two or more parties. The contract may be written (preferable) or oral.
>
> A valid contract has four essential components:
>
> 1. The parties involved in the contract must be legally competent.
> 2. The subject matter of the contract must be legal and proper.
> 3. All the parties to a contract must willingly consent to the agreement, as evidenced by an offer and an acceptance.
> 4. The transaction embodied in the contract must involve consideration; that is, the parties must receive and/or give up something of value. (Barry et al., 1995)

Benefits of using contracts

Agricultural production using contracts has many advantages for both producer/grower and contractors. According to USDA's Agricultural Resources Management Study (ARMS), almost a third of all crops and livestocks produced by American farmers was grown or sold under contract in 1997. Several studies have showed the importance and application of using contracts as a tool to manage various yield and price risk (Barkema, Drabenstott, and Welch, 1991; Coaldrake and Sonka, 1993; Hueth and Lewin, 1999). In addition to specifying quality requirements, contracts can also specify price, quantities and other terms like premium schedule. Evidence suggests that farmers' decisions to entering into a contract is dependant on their attitude toward risk, their financial position and the relative trade-offs among different crop contracts (Sporleder, 1992; Hueth and Lewin, 1999).

Contracting offers farm operators the advantages of reducing the risks of price swings, sharing production costs, and stabilizing income. Between 1991 and 1997, the share of commodities produced under marketing contracts increased from 16 percent to 22 percent of total U.S. value of production (another 10 percent under production contracts). Topping the list of crops produced under marketing contracts were fruits and vegetables, with $11 billion sold through contract. Other crops with large shares of production value under marketing contracts were cotton ($1.9 billion); corn ($1.7 billion); and soybean ($1.7 billion). The 1993 Farm Costs and Returns Survey done by the UDSA indicated that about one forth of the corn producing farms used contracts, which generated a total of 1,090 million dollars (Table 2).

Table 2: Distribution of farms and value of production by selected farm type in the US

Item	Corn	Hogs	Poultry	Fruit and vegetables
		Number		
Number of farms	80,094	82,132	27,589	108,027
Farms with contracts	20,720	9,232	24,500	39,252
Farms with marketing contracts	19,627	4,749	1,050	37,957
		Million dollars		
Total value of production	8,519	8,436	11,237	16,308
Value of production under contract	1,141	1,155	9,642	8,627
Value under marketing contracts	1,090	197	796	7,738

Source: Farm Costs and Returns Survey, 1993. Economic Research Service, USDA

CHAPTER 3. MODEL SPECIFICATIONS

Input-Output Assumptions

For purposes of this study, analysis is carried out with a Microsoft Excel spreadsheet model. A budgeting method was used to evaluate three alternative types of specialty corn contracts. These contracts were evaluated from the standpoint of the corn grower and comparisons of contract proposals are stated in terms of net returns to growers. Data were restricted to cost and returns estimates for the State of Iowa. Three sets of budget data were computed for corn for each planting rotation, under the assumption that the crop was produced on low yield potential (LYP) land, average yield potential (AYP) land, and high yield potential (HYP) land as classified in Table 3. The expected yield potentials were selected according to the budget data published in the 'Estimated Costs of Crop Production in Iowa – 1999,' an Iowa State University Extension publication. The expected price ($2.41 per bushel) for corn used to calculated benefits from different contracts is the average corn price received by Iowa farmers for the past 18 years.

Table 3: Default yield potentials under different rotation practices

Rotation	Yield Potentials		
	Low	Average	High
Corn following Corn	100 bu/acre	120 bu/acre	145 bu/acre
Corn following Soybean	115 bu/acre	135 bu/acre	160 bu/acre

Yield Potentials

The ninety-nine counties of the State of Iowa were divided according to the Corn Suitability Rating (CSR) index and their average yield for the past 18 years. The CSR index is a relative measure of a soil's potential corn and soybean yield production. The CSR was used to group the counties into 3 groups in order to obtain yield potential distribution for the analysis. Counties with a CSR index below 75 and above 80 were grouped as LYP and HYP counties respectively. Other counties with a CSR index between 75 to 80 were group as AYP land (Table 4). Certain counties with relatively higher average corn yield were classified in higher yield potential group. The CSR index used in this study was published in the 'Cash Rental Rates for Iowa 1999 Survey,' an Iowa State University Extension publication. There

Table 4: County Yield Potential Classifications

Yield Potential	Number of Counties	Counties
LYP	30	Adair, Adams, Appanoose, Cass, Cherokee, Clarke, Clayon, Crawford, Davis, Decatur, Dickinson, Emmet, Harrison, Henry, Iowa, Keokuk, Lee, Lucas, Lyon, Monona, Mooroe, Montgomery, Plymouth, Pottawattamie, Ringgold, Taylor, Union, Van Buren, Wayne, Woodbury
AYP	39	Allamakee, Audubon, Black Hawk, Boone, Bremer, Buchanan, Buena Vista, Butler, Calhoun, Carroll, Cerro Gordo, Chickasaw, Clay, Clinton, Dallas, Delaware, Dubuque, Fayette, Fremont, Guthrie, Hancock, Howard, Ida, Jefferson, Jones, Marshall, Mills, Osceola, Page, Palo Alto, Pocahontas, Polk, Sac, Shelby, Story, Wapello, Winnebago, Winneashiek, Worth
HYP	30	Benton, Cedar, Des Moines, Floyd, Franklin, Greene, Grundy, Hamilton, Hardin, Humboldt, Jackson, Jasper, Johnson, Kossuth, Linn, Louisa, Madison, Mahaska, Marion, Mitchell, Muscatine, O'Brien, Poweshiek, Scott, Sioux, Tama, Warren, Washington, Webster, Wright

are about 60% of the counties belong to the LYP and HYP groups and about 40% of the counties belong to the AYP group.

Production Cost Estimates

The estimates for production costs were obtained from 'Estimated Costs of Crop Production in Iowa – 1999,' an Iowa State University – University Extension publication. Different planting rotations require different types and levels of inputs. Also, when growing certain specialty corn, extra seeds are needed. Because the grain produced carries additional value and substantial amounts of research and development costs were incurred developing it, there is additional cost for the seed. For example, a typical TC Blend® bag of seeds may cost $30 (per unit) more than a similar bag for a regular hybrid. Extra cost for cleaning the combine and planter, storage and handling, transportation and field isolation are also considered. In this study, we assumed there is a $2 per acre charge for extra labor cost for cleaning the combine and planter and a $0.03 per bushel for extra storage and handling incurred in specialty corn production. This equals to $0.17 more over the commodity on a per bushel basis. Corn following soybeans incur less cost than the corn following corn in producing both commodity corn (about $20 per acre) and specialty corn (about $18 per acre). Data used are provided in Table 5 and Table 6.

Statistical Distributions

Price and yield data were used to compute their respective statistical distribution. Monthly average prices received by Iowa farmers (1980-1998) were obtained from Iowa Department of Agriculture and Land Stewardship Agricultural Marketing Division, Des Moines, Iowa. The prices for corn are given in dollars per bushel. The yield data, Iowa corn

Table 5: Data for the corn following corn rotation

Expected Yield	100 bu/acre		120 bu/acre		145 bu/acre	
Price Premium ($/bu)	0.30					
Flat Price per bu ($/bu)	2.65					
Flat Premium per acre ($/acre)	35.00					
Commodity Corn						
Seeds per bag	80,000					
Seeds per acre	22,000		26,000		30,000	
Seed Cost ($/1000)	1.00					
Specialty Corn						
Bag Premium ($/bag)	30.00					
Seeds needed (% greater/acre)	8%					
Storage and Handling ($/bu)	0.03					
Cleaning combine and planter ($/acre)	2.00					
Field Isolation ($/acre)	0.00					
Transportation ($/bu)	0.00					
Other Costs ($/acre)	0.00					
	Fixed	Variable	Fixed	Variable	Fixed	Variable
Preharvest Machinery ($/acre)	16.31	6.95	16.31	6.95	16.31	6.95
Machinary ($/acre)						
Combine	12.04	7.84	12.04	7.84	12.04	7.84
Haul	2.00	1.00	2.40	1.20	2.90	1.45
Dry	4.00	10.83	4.80	13.00	5.80	15.71
Handle	1.20	0.50	1.55	0.65	1.85	0.80
Labor (3.4 hours @ $7.00)	23.80		23.80		23.80	
Land cash rent ($/acre)	105.00		125.00		150.00	
Chemicals ($/acre)						
Nitrogen		19.20		22.40		27.20
Phosphate		11.60		13.05		15.95
Potash		4.20		4.90		6.30
Lime		6.00		6.00		6.00
Herbicide		30.00		30.00		30.00
Insecticide		14.00		14.00		14.00
Other Costs ($/acre)						
Crop Insurance		5.50		5.50		5.50
Miscellaneous		6.00		7.00		8.00
ICM Services		0.00		0.00		0.00
Total Cost ($/acre)						
Commodity Corn	**317.50**		**352.54**		**397.39**	
Specialty Corn	**334.11**		**371.84**		**419.55**	

Table 6: Data for the corn following soybean rotation

Expected Yield	115 bu/acre		135 bu/acre		160 bu/acre	
Price Premium ($/bu)	0.30					
Flat Price per bu ($/bu)	2.65					
Flat Premium per acre ($/acre)	35.00					
Commodity Corn						
Seeds per bag	80,000					
Seeds per acre	22,000		26,000		30,000	
Seed Cost ($/1000)	1.00					
Specialty Corn						
Bag Premium ($/bag)	30.00					
Seeds needed (% greater/acre)	8%					
Storage and Handling ($/bu)	0.03					
Cleaning combine and planter ($/acre)	2.00					
Field Isolation ($/acre)	0.00					
Transportation ($/bu)	0.00					
Other Costs ($/acre)	0.00					
	Fixed	Variable	Fixed	Variable	Fixed	Variable
Preharvest Machinery ($/acre)	14.30	5.55	14.30	5.55	14.30	5.55
Machinary ($/acre)						
Combine	12.04	7.84	12.04	7.84	12.04	7.84
Haul	2.30	1.15	2.70	1.35	3.20	1.60
Dry	4.60	12.46	5.40	14.63	6.40	17.33
Handle	1.25	0.55	1.70	0.75	1.95	0.85
Labor (3.0 hours @ $7.00)	21.00		21.00		21.00	
Land cash rent ($/acre)	105.00		125.00		150.00	
Chemicals ($/acre)						
Nitrogen		16.00		19.20		22.40
Phosphate		13.05		14.50		17.40
Potash		4.90		5.60		7.00
Lime		6.00		6.00		6.00
Herbicide		30.00		30.00		30.00
Insecticide		0.00		0.00		0.00
Other Costs ($/acre)						
Crop Insurance		5.50		5.50		5.50
Miscellaneous		6.00		7.00		8.00
ICM Services		0.00		0.00		0.00
Total Cost ($/acre)						
Commodity Corn	**298.03**		**333.22**		**376.27**	
Specialty Corn	**315.12**		**353.00**		**398.90**	

yield by county (1980-1998) and detrended county corn yield data (1980-1998), used in this paper are from Dr. Robert N. Wisner, Iowa State University Extension and Dr. Bruce Babcock, Center of Agricultural and Rural Development, Iowa State University, respectively.

Price and yield distributions were estimated from historical data to obtain realistic probability distributions. Once price and yield distributions were estimated, random draws from those distributions were used as inputs to simulate prices and yields that might occur. Simulated prices and yields were then used in the spreadsheet model to project cost and net returns. The distributions of the price and yield data are provided in Appendix A.

Yield Distribution

Studies have shown that crop yields are skewed and do not follow normality (Day, 1965; Gallagher, 1986; Kaufmann and Snell, 1997; Moss and Shonkwiler, 1993; Ramirez 1997). However, current literature has also shown inconsistent results on the degree of skewness in the distribution. Nelson and Preckel (1989) fit corn yields to a beta distribution, which was conditional on fertilizer application over time using a two-stage maximum likelihood estimation procedure. Their results showed that corn yield distributions conditional on fertilizer were negatively skewed. Gallagher (1986), on the other hand, suggested that the distribution of yield variation attributable to weather may be skewed and bounded by the plants' potential with given technology and input. We assumed that county-level corn yield to be beta distributed since it has the advantage of flexible skewness which the normal, lognormal, exponential and gamma distributions do not. The county-level corn yield data we used was detrended using linear splines. The method is used in crop insurance determination to better identify the systematic risk and capture the effect of technology trends (Skees, Black, and Barnett, 1997).

Price Distribution

Commodity price has been commonly assumed to be lognormally distributed (O'Brien, Hayenga, and Babcock, 1996). O'Brien (1993) applied natural logarithm to model the harvest time average corn price suggested that corn price distribution functions are strictly positive. Extreme high values during the period were observed in the summer of 1996. While there was this brief period when corn reached record prices, the volume sold were extremely limited. It is suggested that there were not much grain flowing in the market at the extremely high prices during the 90's. We assumed the average monthly corn prices to be lognormally distributed and applied truncated lognormal distribution, which put an upper limit on the simulated corn price to \$3.40 per bushel. The upper limit was set because there was virtually no grain flowing through the market at extremely high prices and using a distribution with price in this range could distort results.

Premium Distribution

We also investigated the impact of oil content variation on the net returns performance of the market plus contract. Oil content data were obtained from Iowa Grain Quality Initiative's Iowa Corn Quality Database. Oil content of the corn converted from 15% moisture level to a dry weight basis. Observations above a 6.0% oil content were extracted and a premium using a sliding scale schedule based on oil content was applied. We used truncated normal distribution, which put lower and upper limits on the simulated premium in a range from \$0.10 and \$0.30 per bushel, respectively. Based on an OPTIMUM® HOC premium schedule, oil content less than 6% received no premium and oil content above 8% received a flat \$0.30 premium per bushel. A sample premium schedule is listed below for HOC (Table 7).

Table 7: Sample premium schedule for HOC

Oil Content	Premium	Oil Content	Premium
< 6.00%	\$0.00	7.00%	\$0.20
6.00%	\$0.10	7.10%	\$0.21
6.10%	\$0.11	7.20%	\$0.22
6.20%	\$0.12	7.30%	\$0.23
6.30%	\$0.13	7.40%	\$0.24
6.40%	\$0.14	7.50%	\$0.25
6.50%	\$0.15	7.60%	\$0.26
6.60%	\$0.16	7.70%	\$0.27
6.70%	\$0.17	7.80%	\$0.28
6.80%	\$0.18	7.90%	\$0.29
6.90%	\$0.19	8.00%	\$0.30
		> 8.00%	\$0.30

Source: OPTIMUM® OSCAR™ Contracting System

Description of Specialty Corn Contracts

Alternative marketing contracts investigated included: (1) a commodity corn price plus a premium contract, (2) flat price per bushel contract, (3) flat payment per acre contract. These three contracts were compared together against the standard commodity corn production. A description of the general provisions for each of the contracts is discussed in the following section.

Commodity plus a premium contract

In this contract, the price paid to the farmer includes a specified premium over the local cash commodity corn price for each bushel produced. Different specialty corns have different premium schedules and the premium can be determined based on the demand for the trait and or the trait content. For example, growing waxy corn will receive an average premium ranging from $0.15 to $0.20 and premium paid to farmers for yellow food grade corn ranges from $0.05 to $0.15 per bushel. On the other hand, premium for growing HOC is calculated by following a sliding scale from $0.10 per bushel for 6.0% oil content to $0.30 per bushel for 8.0% oil content and above.

Flat price per bushel contract

A flat price was fixed prior to planting in this contractual arrangement and is applied to all bushels. For the purposes of the analysis, $2.65 per bushel was the assumed as the flat price. The $0.24 per bushel premium above the average price for commodity corn provides an incentive to farmers to lock themselves in this contract. The flat price may be either higher or lower in actual practice. This type of contract transfers all price risk and opportunity from the seller to the buyer on the date of the trade. A producer who wants to be insulated from any adverse price movement but is willing to accept yield risk might use this contract.

Flat payment per acre contract

This contract states that the premium paid to the farmer is added to the per acre return under an expected price and yield for commodity corn. For this analysis, the premium was added to the returns generated by an expected price for commodity corn of $2.41 per bushel and an expected yield of 135 bushels per acre for commodity corn. Thus a flat premium was set at $35.00 per acre above the base return a producer would receive at $2.41 per bushel on a yield of 135 bushels per acre. The farmer will face zero price and yield risks in the production of specialty corn under this contract. So long as the farmer knows the production costs, a profit can be assumed or the producer does not enter the contract. In actual practice, the premium may be higher or lower and depending on the specific requirements of the contract and the added costs above commodity.

Three prices were used in the CornContract Explorer spreadsheet model, viz., high price ($2.91), expected price ($2.41), and low price ($1.91). The $0.50 per bushel interval was selected so that the high/low prices constitute ±1 standard deviation around the mean (average) price. The net return per acre vs. yield graphs (Figures 2-4) give us preliminary results of the performance of the three contracts at the three different price levels on AYP land. With the high price scenario, the market plus contract out-performed the others on this particular type of land. However, if a farmer faces low market price, the flat price per bushel contract and the flat payment per acre contract reduce his/her risk exposure and guarantee a more stable income for the farm. It is noteworthy that both the market plus contract and flat price per bushel contract generate higher net returns to the farmer than the flat payment per acre contract does if the actual yield is above the expected yield for AYP land at the expected price. This suggests that farmers who expect an average price level but higher than normal yields should consider either the market plus contract or the flat price per bushel contract over the flat payment per acre contract. However, if the expected price is lower than the average price, flat payment per acre contract will create higher net return per acre over the market plus contract if the yield is lower than average. This illustrates that different contracts perform differently in different price and yield situations. For a producer it is useful to know what the most likely outcomes for the three contract arrangements are (given the uncertainty about price and yield) and how they compare to commodity corn. To address these questions, a Monte Carlo simulation was conducted to investigate the performance of the three contractual arrangements under the price, yield, and quality (oil content) uncertainty.

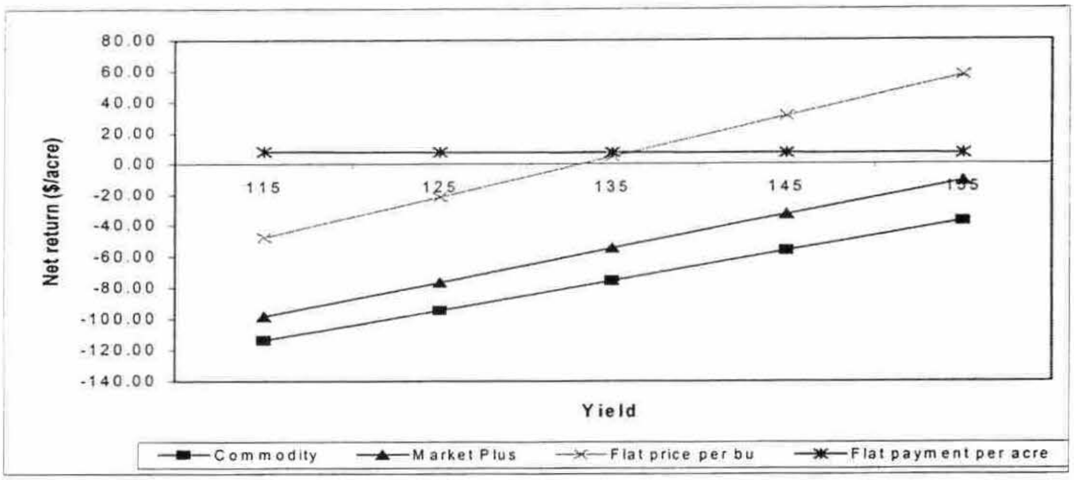


Figure 2: Net return ($/acre) vs. yield at low price on AYP land

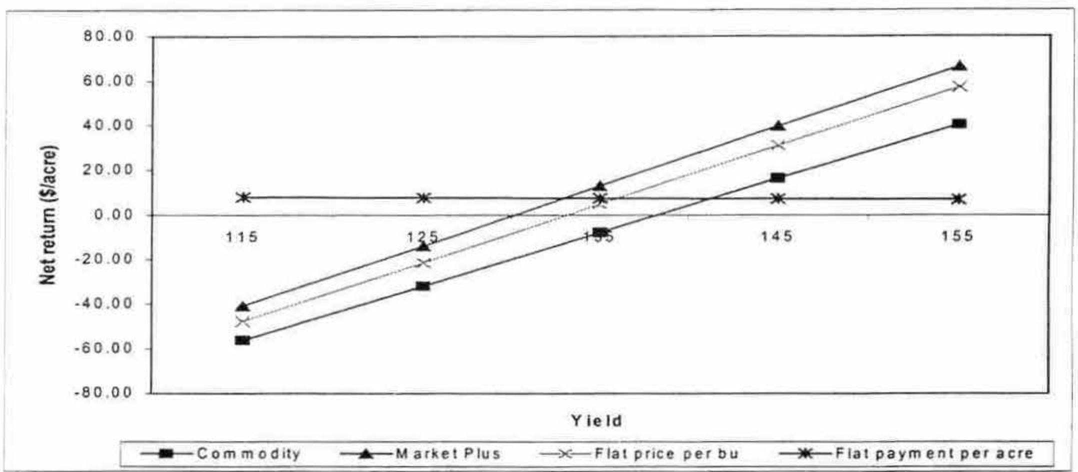


Figure 3: Net return ($/acre) vs. yield at average price on AYP land

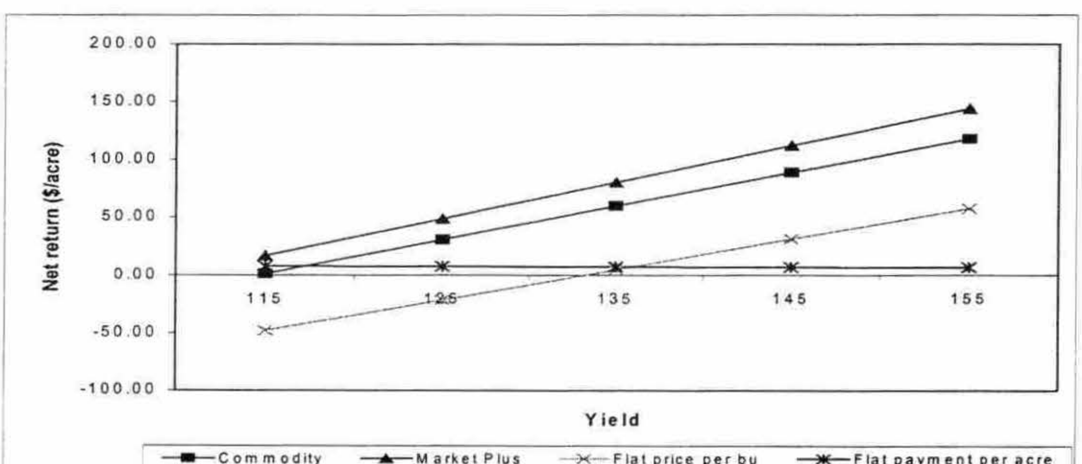


Figure 4: Net return ($/acre) vs. yield at high price on AYP land

CHAPTER 4. SIMULATION AND RESULTS

Probability and risk analysis were done on the corn following soybean rotation only because of it wide use in current Iowa farm operations although similar analysis could be also conducted on corn following corn rotation. With the assumption of a beta distribution for the yield data and a lognormal distribution for the price data, BESTFIT® was used to estimate the parameters of the specified distributions. After the parameters for the uncertain factors were identified, @RISK® was used to perform Monte Carlo simulation. Five hundred iterations were taken in the simulation for each of the three yield potential lands (115 bu/acre, 135 bu/acre, and 160 bu/acre). This ensured that each contractual arrangement faced identical uncertainties in both production and market outcomes. Descriptions of the distribution fitting and simulation processes by BESTFIT® and @RISK® are provided in Appendix B.

Descriptive Statistics of the Simulations

The descriptive statistics provided in Table 8 shows some basic information about the simulation results. The highest net return for any of the scenarios was for the market plus contract on HYP land and the lowest net return was for the commodity on LYP land. The range of the net returns become smallest with the flat price per bushel contract on LYP land, but largest with market plus contract on HYP land. The contract with the highest average net return for LYP and AYP lands is flat payment per acre contract. However, for the HYP land, the highest average net return comes from flat price per bushel contract. Farmers should pay more attention when growing corn on LYP and HYP lands because of the higher risk level (higher standard deviation) associated in the production.

Table 8: Net return per acre results for the simulations

	Mean	Minimum	Maximum	Std. Dev.
		Dollars		
Low Yield Potential Land				
Commodity	-30.46	-233.01	238.81	92.51
Market Plus	-13.37	-238.34	269.27	99.68
Flat Price per Bushel	-13.52	-232.38	127.43	84.48
Flat Payment per Acre	-4.12	-	-	-
Average Yield Potential Land				
Commodity	-17.24	-209.27	201.91	78.28
Market Plus	3.06	-210.04	229.46	82.58
Flat Price per Bushel	0.61	-204.99	124.98	63.02
Flat Payment per Acre	6.00	-	-	-
High Yield Potential Land				
Commodity	2.04	-201.20	273.41	88.00
Market Plus	22.15	-199.42	304.00	93.25
Flat Price per Bushel	23.82	-155.10	155.36	73.46
Flat Payment per Acre	20.10	-	-	-

Comparing Contracts

Risk must be quantified in order to evaluate whether various risk management tools and strategies are effective. The measurement of uncertainty involves estimating the probability of future outcomes. Two of the major sources of risk in agriculture are price fluctuations and yield variability. The flat price per bushel contract eliminated the price risk associated with the production, storage and marketing. The market plus contract creates incentive and provides compensation to farmers for producing specialty corn, but it does not help shelter the production from either production risk or price risk. The flat payment per acre contract transfers all the yield and price risks from the farmer to the contractor. Making risky decisions requires careful consideration of the various strategies available and the possible outcomes of each. Risk management involves choosing among alternatives that have uncertain outcomes and farmers vary greatly in their willingness to undertake risks and in their abilities to survive any unfavorable outcomes arising risky actions.

Comparing the Net Return per Acre among Contracts

Values for the net returns per acre from the respective contracts were collected and investigated in the Monte Carlo simulation. Contracts, which generate a higher net income per acre with equal or less risk, are considered to be better for a farmer. Net return per acre was used as the critical decision factor rather than net return per bushel or cost of production or premium received because net income per acre simultaneously factors in yields, costs, and the quality of product. It also provides information on the marginal benefit of producing additional acreage of contracted specialty corn. Farmers can use this information in formulating their decision about whether or not to contract specialty grains.

Yield Sensitivity

Figures 5-7 are scatterplots of the performance of different contracts with respect to yield variation on the three different types of land. Intuitively, higher yield generates higher net return on a per acre basis. However, other patterns can be observed in the scatterplots. Both price and yield risk are present and a trend of increasing variability in the net returns with respect to the increase in yield between the commodity and market plus contract. This illustrates the increasing importance of the per bushel premium to net return as more bushels are produced. Flat price per bushel contract exhibits a linear relationship with the yield and breakeven at around 135 bushel per acre on the AYP land.

Higher income variability is associated with LYP land, which means higher risks and

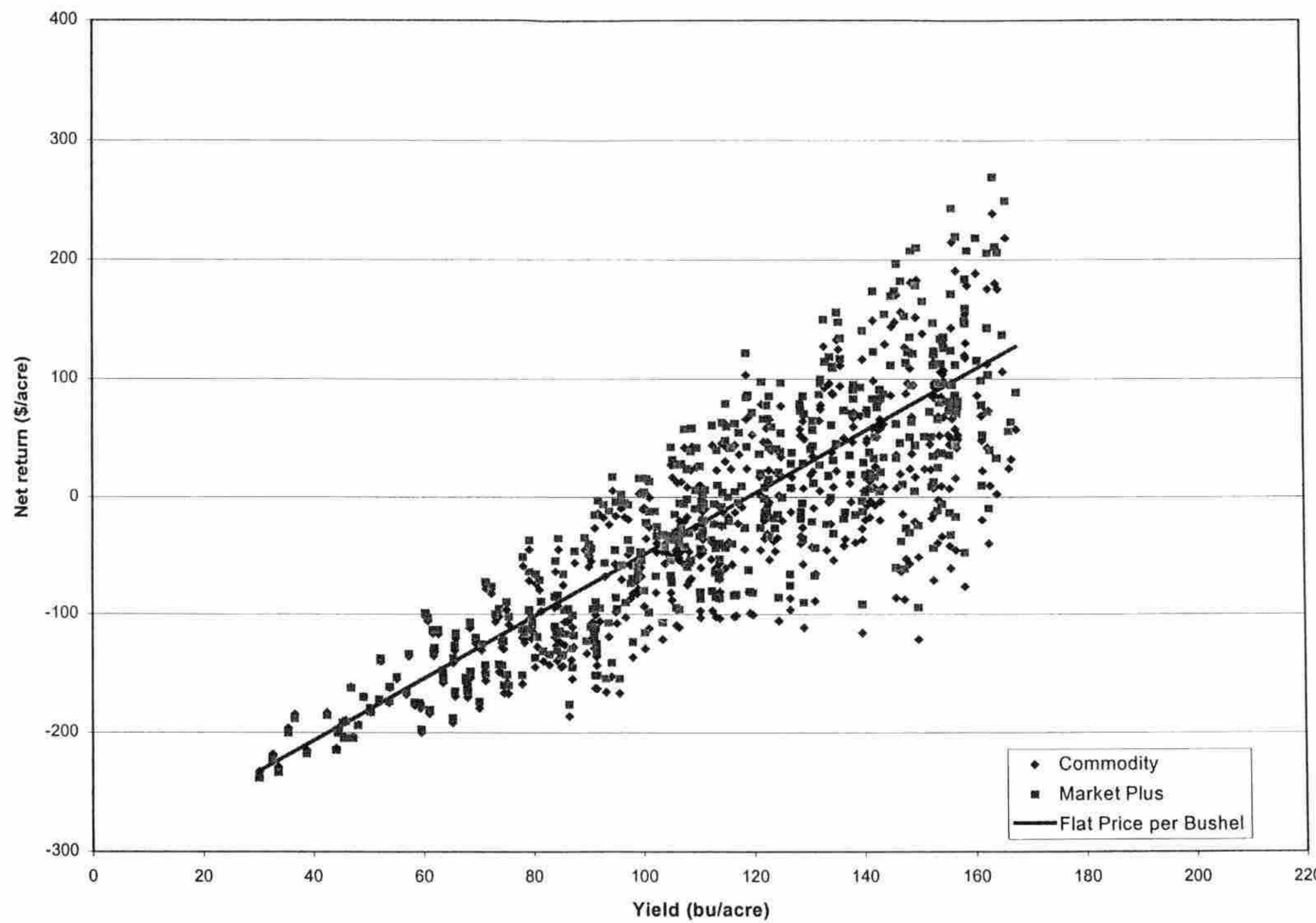


Figure 5: Yield sensitivity of different contracts on the LYP land

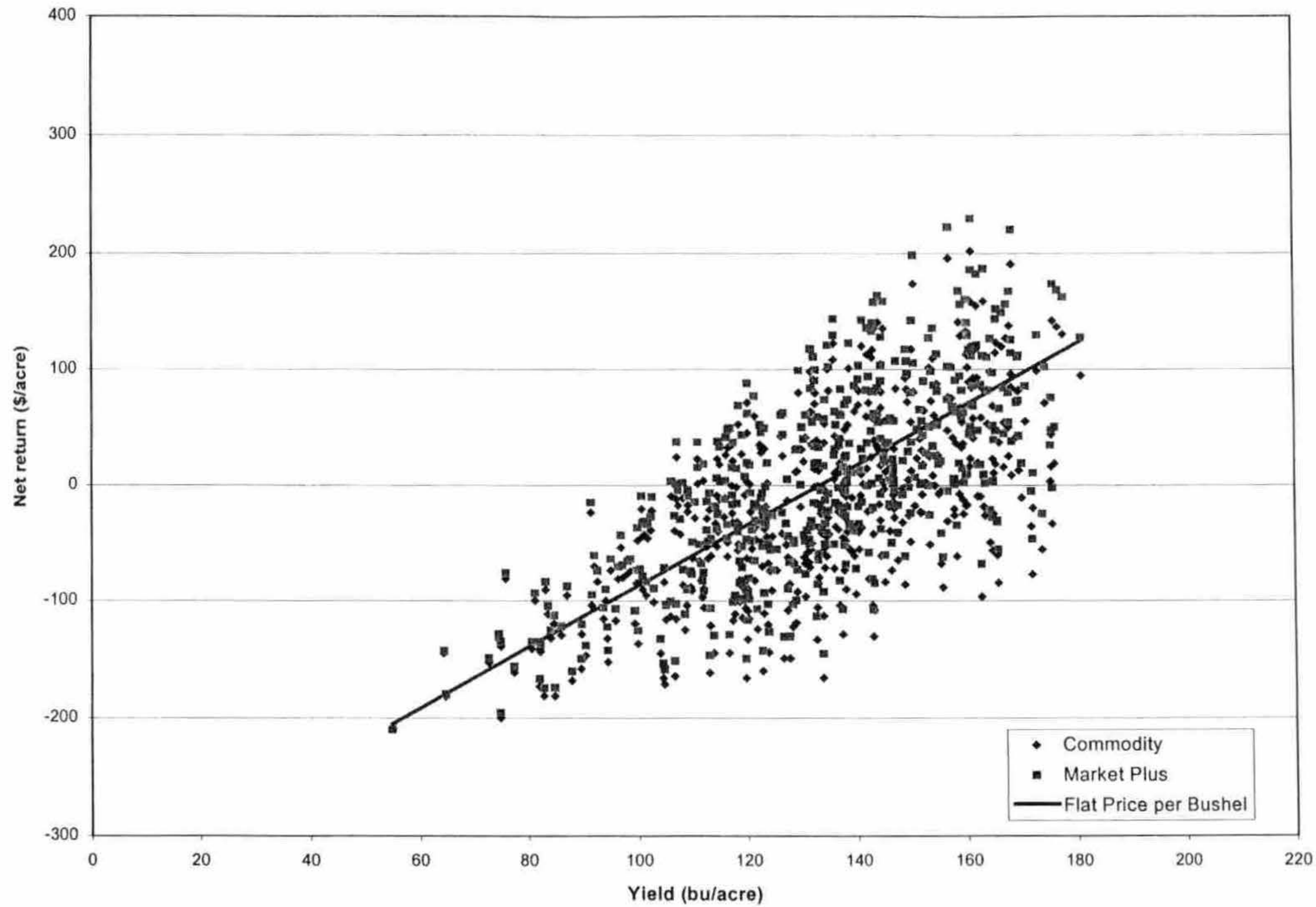


Figure 6: Yield sensitivity of different contracts on the AYP land

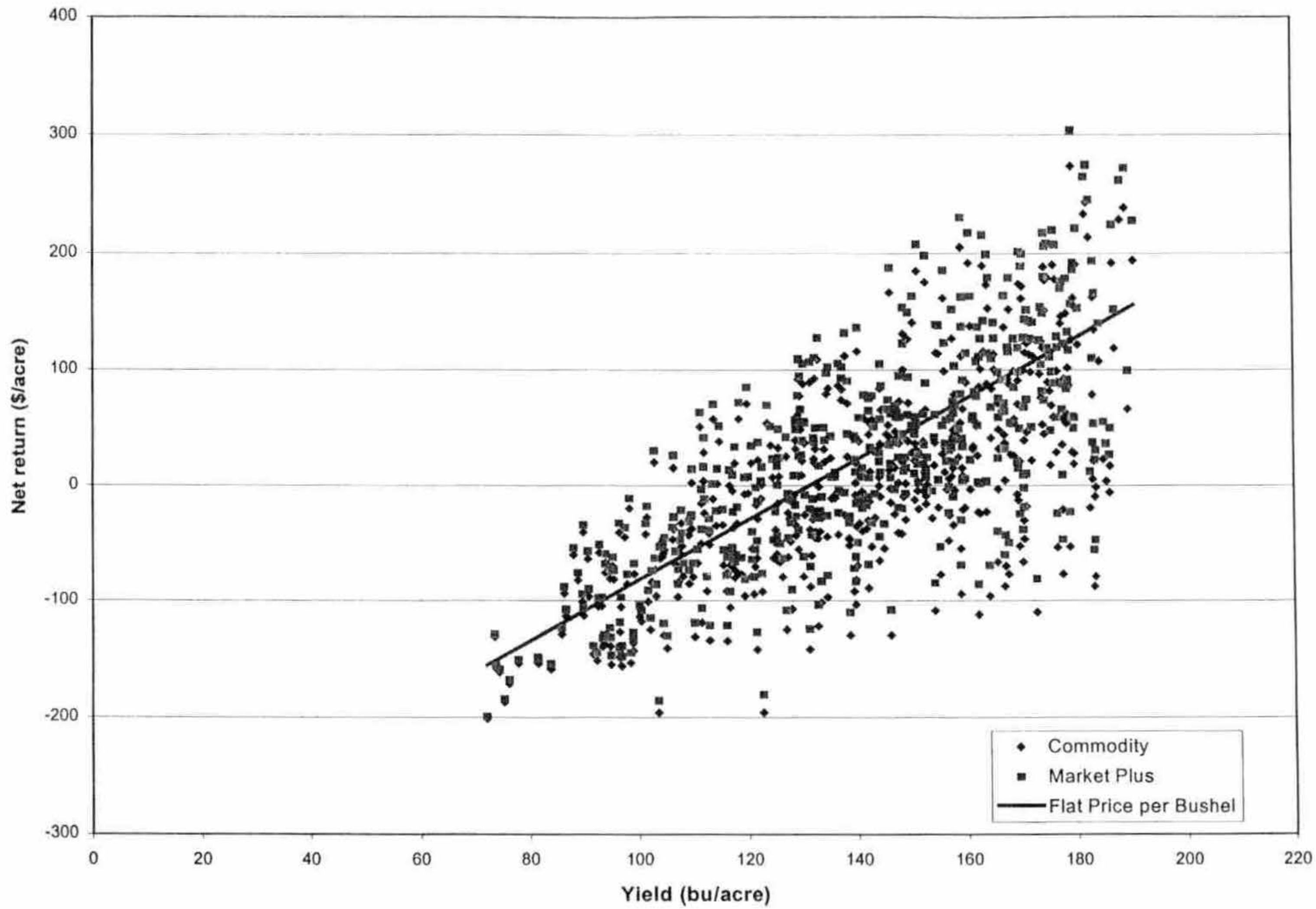


Figure 7: Yield sensitivity of different contracts on the HYP land

higher probability of getting negative net return per acre in corn production. Farmers should be able to realize from here that as yield increases, the variability of the net return per acre increases since higher production will incur more costs and the price factor will play a larger role in the determination of the final net income received from the operation.

Likelihood of Positive Net Income

@RISK® allows users to enter target values and find the likelihood of achieving them. By entering zero as the target value, we can investigate the probability of positive net income. In Table 9, simulation statistics showed that generally higher probability of getting negative net income was associated with lower yield potential production. The flat price per bushel contract provides the highest benefit over the commodity on all three types of lands. There is also a roughly constant increase (about 7%) in the probability of generating positive net income with market plus contract and flat price per bushel contract while moving from lower yield potential land to higher yield potential land.

Table 9: Probability of positive net income from contracts vs. commodity

	Commodity	Market Plus	Benefit	Flat Price per Bushel	Benefit
LYP land	38.16%	44.87%	+6.71%	45.71%	+7.55%
AYP land	42.77%	52.79%	+10.02%	53.34%	+10.57%
HYP land	51.18%	60.46%	+9.28%	62.89%	+11.71%

Distribution of the Net Returns

In Figures 8-16, the distribution of the net return per acre for different contracts are graphed. The net return per acre for the commodity and market plus contract is generally normally distributed, but there are visible differences in the average net return per acre among the contracts. However, for the flat price per bushel, it cut off at $127.43, $124.98,

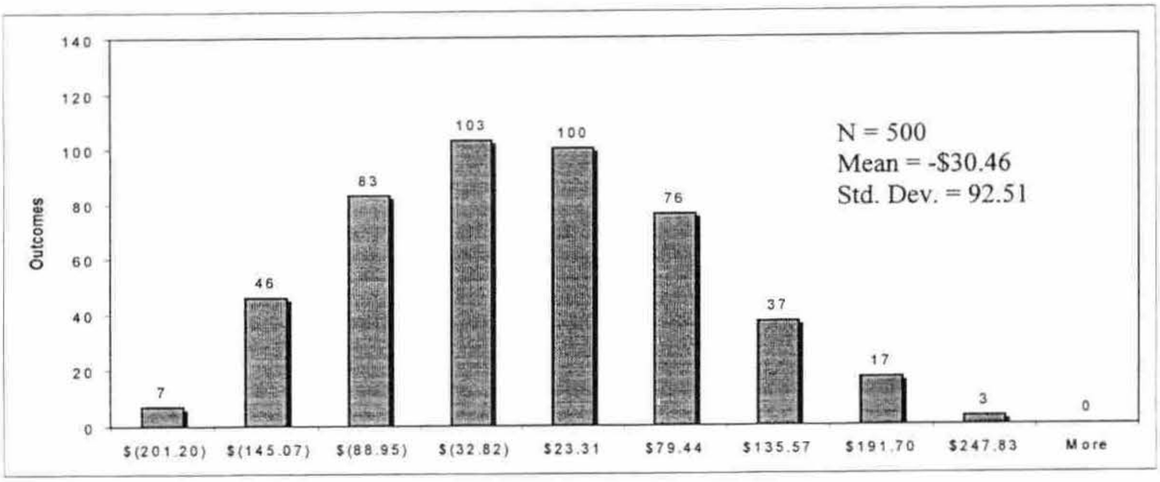


Figure 8: Net return ($/acre) for commodity on LYP land

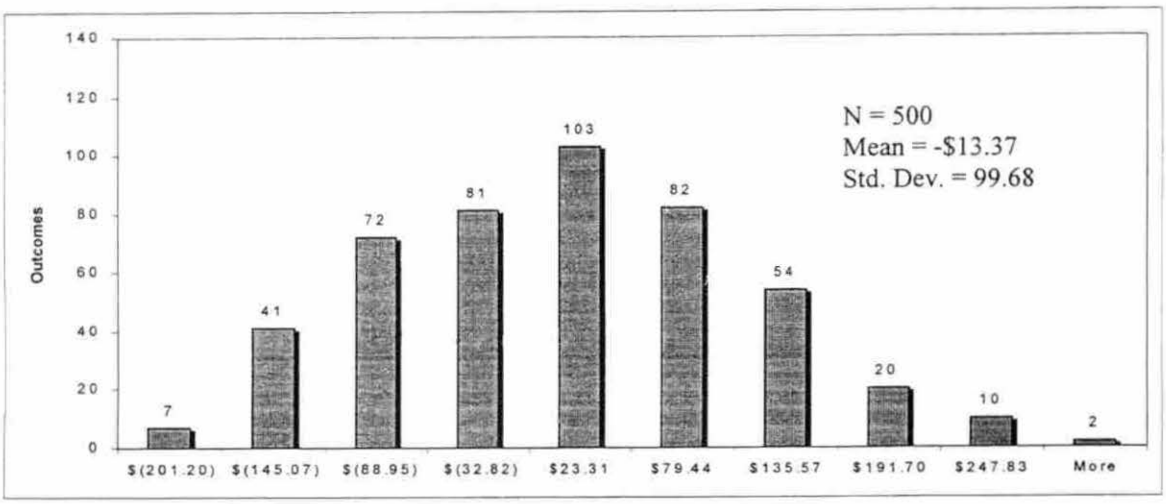


Figure 9: Net return ($/acre) for market plus contract on LYP land

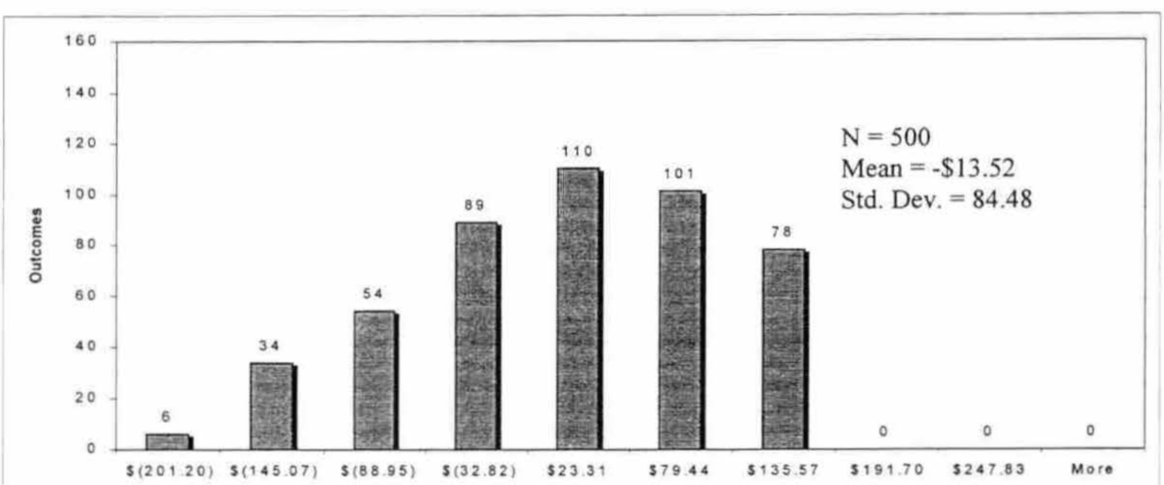


Figure 10: Net return ($/acre) for flat price per bushel contract on LYP land

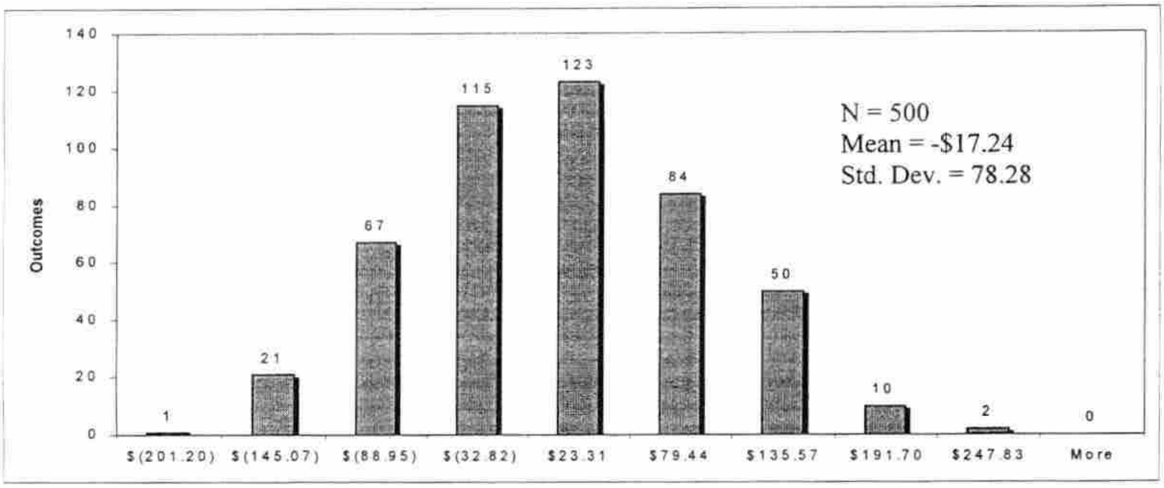


Figure 11: Net return ($/acre) for commodity on AYP land

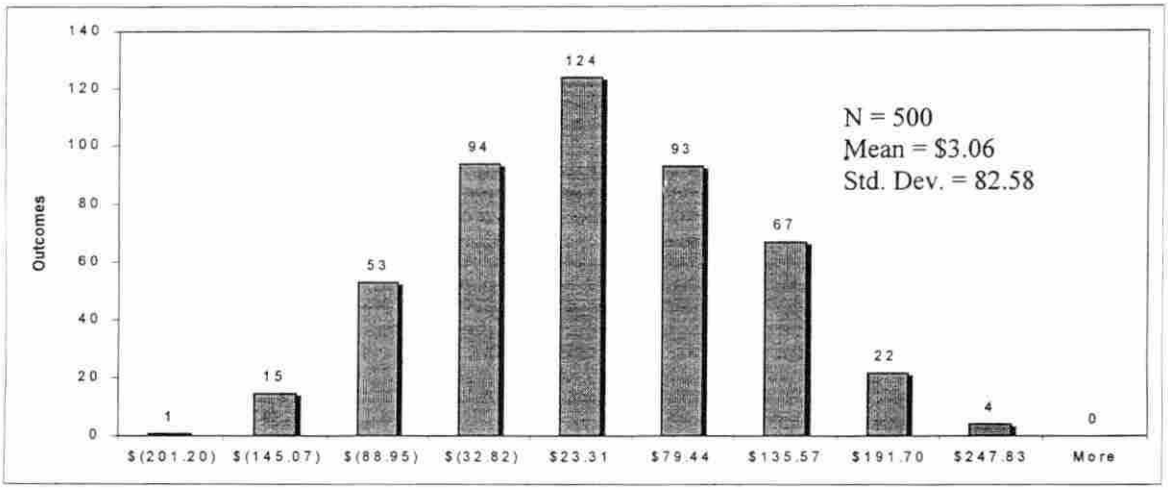


Figure 12: Net return ($/acre) for market plus contract on AYP land

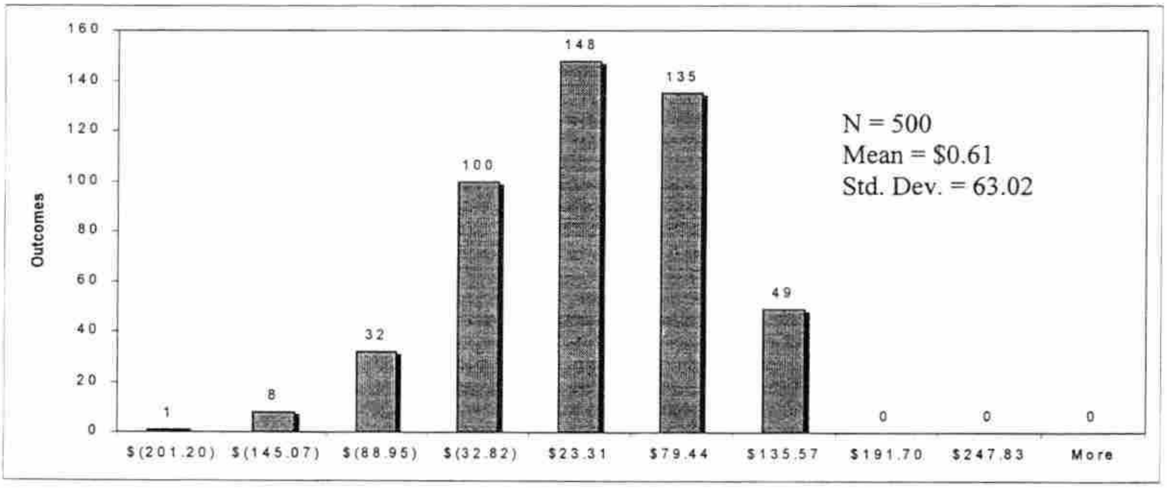


Figure 13: Net return ($/acre) for flat price per bushel contract on AYP land

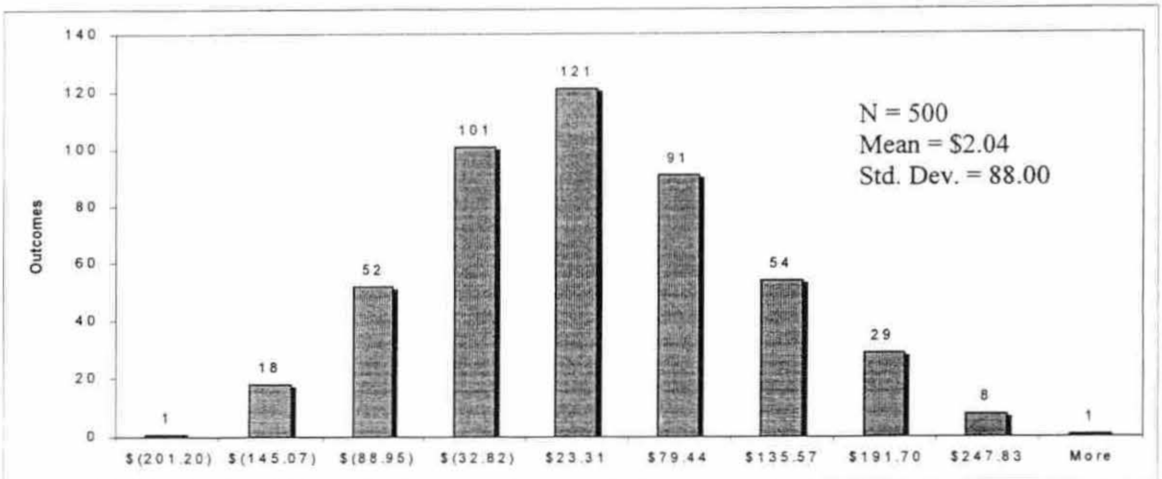


Figure 14: Net return ($/acre) for commodity on HYP land

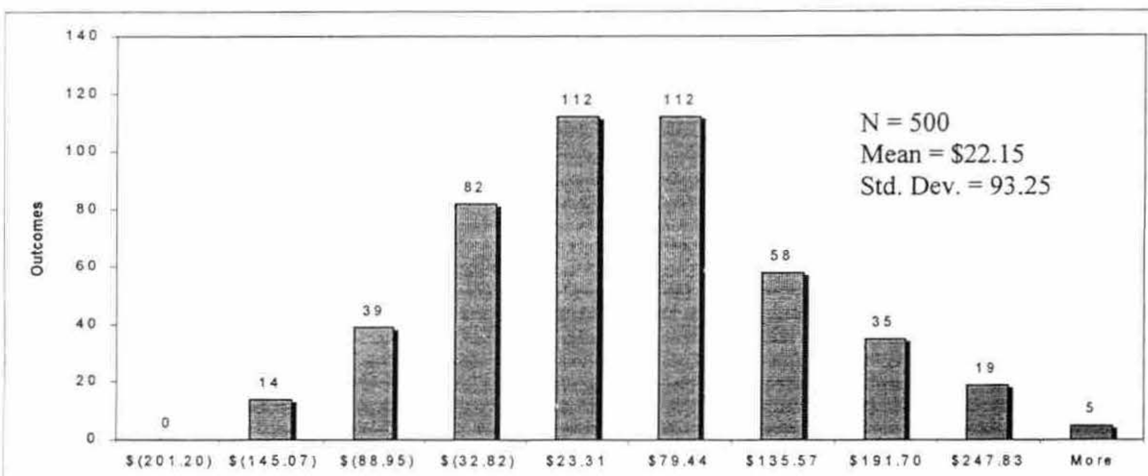


Figure 15: Net return ($/acre) for market plus contract on HYP land

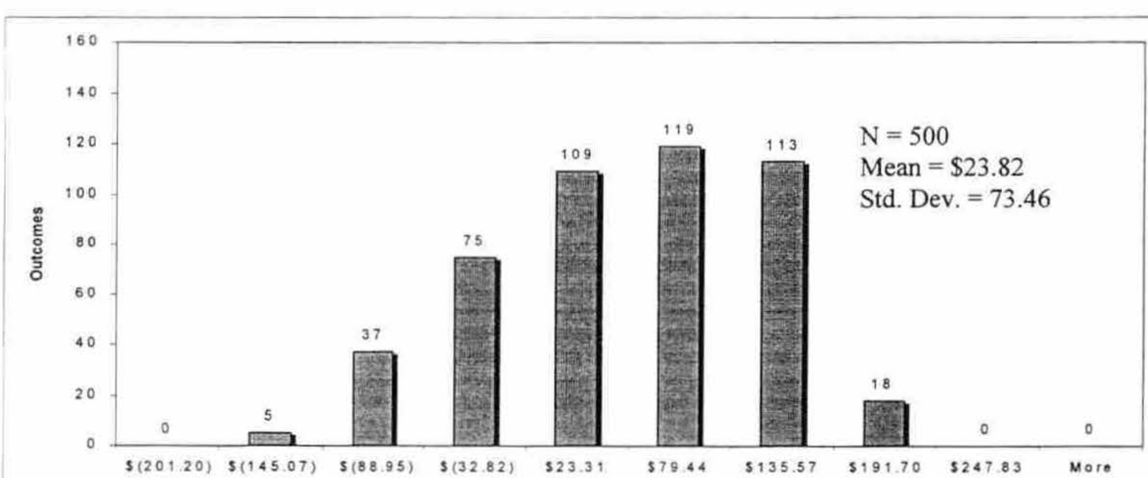


Figure 16: Net return ($/acre) for flat price per bushel contract on HYP land

and $155.36 per acre on the LYP land, AYP land, and HYP land, respectively. The flat payment per acre contract, market plus contract ranks second in terms of average net return. When comparing the performance of the contracts, operations on a higher yield potential land are able to generate higher net returns to the farmer. The market plus contract performs better than the flat price per bushel contract in terms of average net return on the LYP and AYP lands. Also, the market plus contract has a higher average net return (about $15 - $20 per acre) than the commodity on all types of land. The flat price per bushel contract is by definition, better risk management tool compare to the market plus contract, which does not protect farmers from any price or yield risk in corn production.

The standard deviations are lowest with the flat price per bushel contract. This supports the idea of lower risk exposure with this type of contract. Farmers with a higher yield and receiving a higher price will obviously generate a higher net income per acre. The yield variability is the only risk factor that is affecting the variability of the net income in the flat price per bushel contract. Without the price risk factored into the simulation, flat price per bushel contract is not able to capture higher net income when prices go up. This represents to a loss of opportunity of about $100 per acre if we compare the maximum net income received from growing commodity corn rather than growing specialty corn with the flat price per bushel contract.

Modified Safety-First Approach

A modified safety-first approach to risk management is used to evaluate the commodity production against the three contractual productions and a table of summary of the comparison is provided in Table 10. In this case, we assume that the decision-maker (or the farmer) maximizes expected return, E(Y), subject to the constraint that the probability of

Table 10: Comparison of contract performances with the safety-first approach

Contract	Expected income E(Y)	Minimum return[1] (Y-min)	Probability of falling below minimum return (P)
	Dollars		*Percent*
Low Yield Potential Land			
Commodity	-30.46	0	61.84
Market Plus	-13.37	0	55.13
Flat Price per Bushel	-13.52	0	54.29
Flat Payment per Acre	-4.12	0	-
Average Yield Potential Land			
Commodity	-17.24	0	57.23
Market Plus	-3.06	0	47.21
Flat Price per Bushel	0.61	0	46.66
Flat Payment per Acre	6.00	0	-
High Yield Potential Land			
Commodity	2.04	0	48.82
Market Plus	22.15	0	39.54
Flat Price per Bushel	23.82	0	37.11
Flat Payment per Acre	20.10	0	-

[1] A zero minimum net return selected here suggests the farm will cease operation if the business is not break-even under the particular contractual arrangement.

return less than or equal to a specified minimum level (Y-min) does not exceed a given probability (P). The approach can be expressed mathematically as:

$$max\ E(Y) \quad subject\ to\ Prob\ (Y < Y\text{-}min) \leq P \qquad (3.1)$$

The method is very straightforward and easily understood. We assume the critical probability is fifty percent and the minimum level is zero dollars per acre in net return (breakeven point). Farmers would choose flat price per bushel contract over the commodity and market plus contract on AYP and HYP land. For the LYP land, there is an about 1.5% increase in the probability of getting positive net return, but also an about 1.5% decrease in average net income received from the market plus contract. A risk-averse farmer may still choose flat price per bushel contract since it has a lower standard deviation, which means less exposure to risk. Table 11 compares the probability of net returns falling below different subjective minimum returns. With this kind of analysis, we can compare and contrast the

Table 11: Comparison of contract performances with the safety-first approach at different subjective minimum returns

Contract	Probability of falling below minimum return[1] (*Y-min (P)*)			
	Dollars (Percent)			
Low Yield Potential Land				
Commodity	20 (68.40)	10 (65.90)	-10 (58.49)	-20 (53.97)
Market Plus	20 (62.09)	10 (58.65)	-10 (50.81)	-20 (46.29)
Flat Price per Bushel	20 (61.80)	10 (58.32)	-10 (50.53)	-20 (45.84)
Flat Payment per Acre	-	-	-	-
Average Yield Potential Land				
Commodity	20 (65.05)	10 (60.47)	-10 (52.93)	-20 (48.20)
Market Plus	20 (57.28)	10 (52.53)	-10 (42.40)	-20 (37.73)
Flat Price per Bushel	20 (59.59)	10 (53.17)	-10 (40.14)	-20 (36.11)
Flat Payment per Acre	-	-	-	-
High Yield Potential Land				
Commodity	20 (56.69)	10 (53.45)	-10 (43.94)	-20 (39.87)
Market Plus	20 (48.47)	10 (44.11)	-10 (36.48)	-20 (33.13)
Flat Price per Bushel	20 (45.68)	10 (42.33)	-10 (32.11)	-20 (28.64)
Flat Payment per Acre	-	-	-	-

[1] Four subjective minimum returns were selected here to illustrate the changes in net return probability based on the farmer's income expectation.

change of probabilities of the simulated outcomes that fall below the target values set according to personal goals and expectations. In this case, there is a 3-4% change in probability for every $10 (per acre) change in target value.

A Case on Growing HOC

Contracting HOC is common in the United States. The previous study operated on the general assumption that all specialty corn received same amount of premium, and that is $0.30 per bushel. However, the extra value of HOC is measured by its oil content. The premium variability will only affect the market plus contract and we found that the mean and standard deviation of the net returns are lower when the oil content variation is considered. These data are shown in Figures 17-19. This means the quality variation brings down the average net return in specialty corn production. Also, when the oil content variation is taken into account, there is approximately a 5% increase in the probability of getting a negative net return (59.67%, 54.05%, and 48.82% on LYP land, AYP land, and HYP land respectively).

An increased standard deviation on the LYP and HYP land also suggests that with the quality (oil content) variability factored into the decision-marking process, it is riskier to grow specialty corn with the premium tied to the trait content. The average net return per acre is about $10 per acre lower with the oil content variation than without the oil content variation while producing specialty corn on AYP and HYP lands and this effect is minimal on the LYP land, just $6 per acre lower.

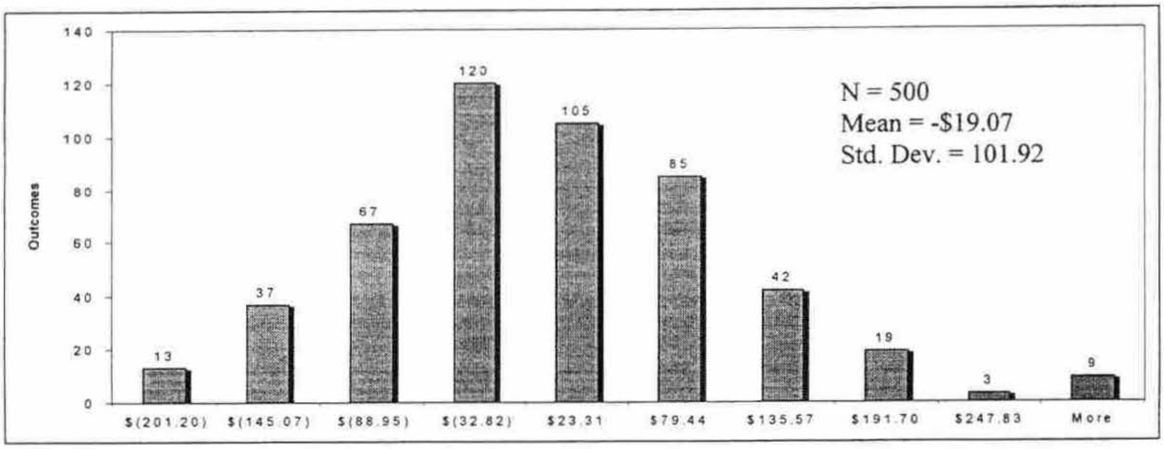


Figure 17: Net return ($/acre) for market plus contract on LYP land with oil content variation

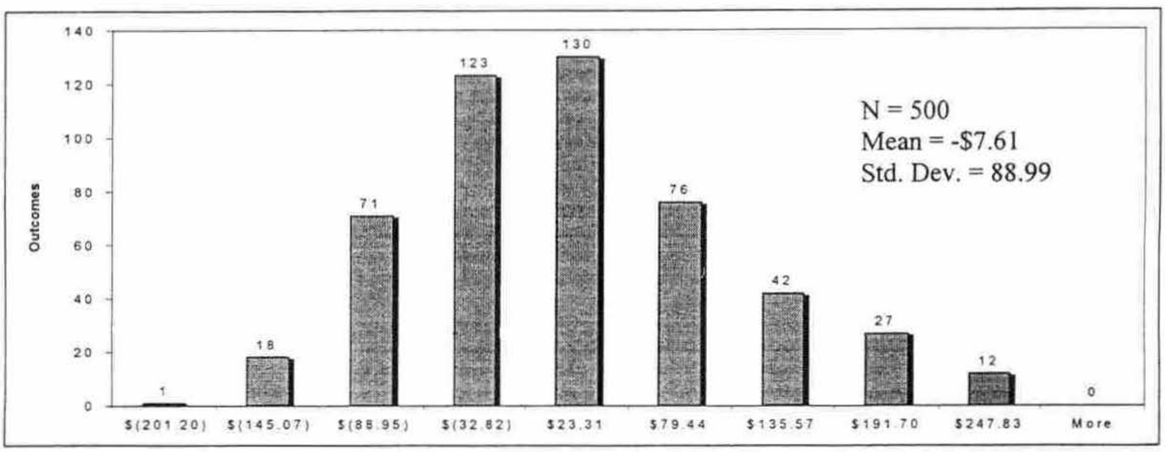


Figure 18: Net return ($/acre) for market plus contract on AYP land with oil content variation

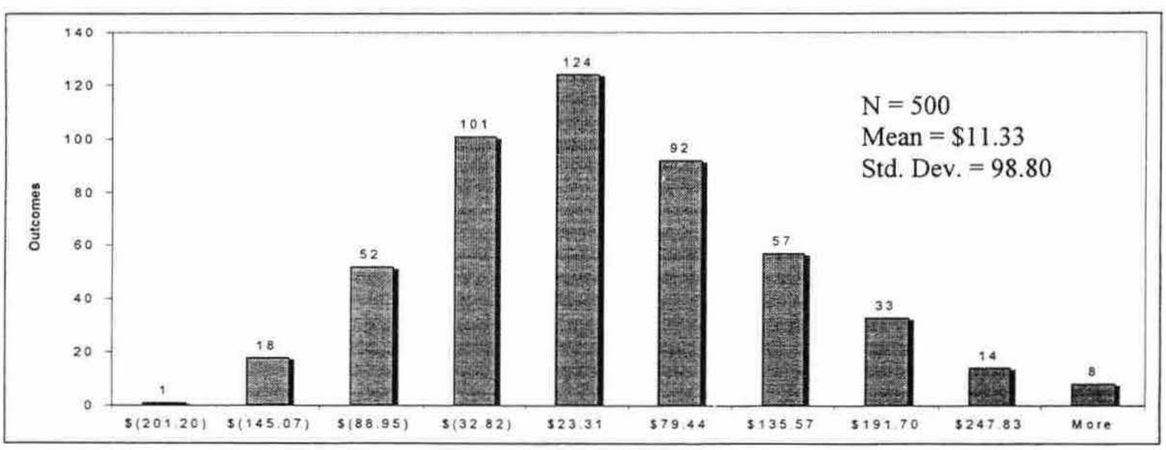


Figure 19: Net return ($/acre) for market plus contract on HYP land with oil content variation

Summary and Conclusions

The disengagement between price/income protection and production after the 1996 farm bill, together with an increasing interest in value added traits, motivated the use of marketing contracts in specialty crop production. However, recent concentration in the seed industry may result in "smaller share of the revenue from production going to the producer [and] resulting in less compensation to the producer" (Harl, 1998, page 4). Farmers and contractors now demand new information to compare the costs and returns of different contractual arrangements. In fact, it is suggested that contracts are simply not for every farm and the decision on whether or not to engage in contract farming relies on very careful analysis. No matter what the benefits a contract can bring to the operation, several points should be stressed when a farmer is about to engage in a contractual arrangement.

1. Understand the terms, conditions and the contractual obligations.
2. Understand the costs of production of the specialty corn and the costs to preserve the identity of that value added crop.
3. Understand the benefits that are associated with the particular contract and compare the figures with other possible alternatives.

This study used simulated data to evaluate the net returns of the commodity production and the other three contractual productions. The evaluation of the contracts is solely based from a producer's prospective. It is obvious that those contracts that are preferable to the producer may not be preferable to the contractor. For example, the yield and price risks (that are eliminated under the flat payment per acre contract from a producer's standpoint) are passed to the contractor. The contractor may need some other kinds of risk management tools to minimize the risk exposure of his/her business. To better understand the management and marketing considerations from a contractor's prospective requires extra analysis that are out of the scope of this study.

Furthermore, this study did not consider some other factors such as government payments or crop insurance, which will provide "income cushions" to the farmers when price dives. The analysis of the three contractual arrangements indicated that there is no single contract that can fit all farm operations under the assumptions set forth earlier in this paper. Several conclusions can be drawn from this study.

1. Not all farms should engage in producing specialty corn. This study used cost estimates that may not apply to every single farm in the state of Iowa. Farmers need to have a good understanding of the cost and capital structure of their own business before they can evaluate the benefit of different contractual arrangements. Contracting without that may lock in a loss.
2. Risk-averse farmers should find the flat payment per acre contract preferable only if net return is higher than or equal to the market plus contract and the flat price per bushel contract at a breakeven operation. These conditions are most likely to occur for specialty corn hybrids with a high yield penalty. Although it passes all the yield and price risks to the contractor and guarantees stable income, it still generates negative income to operations on LYP land under the assumption that the extra flat payment is $35 per acre. It loses the ability to capture the higher income when prices go up and the operation has a yield from the field higher than the expected yield.
3. The average net returns from different contracts generally increase with the increases in yield and price. However, there were higher costs and greater

variability associated with both the LYP and HYP land. All contractual arrangements performed better on the HYP land simply because of the higher yield potential on this land.

4. There is an increasing variability in the net returns with respect to the increase in yield for the commodity and market plus contract. Higher yield will incur more cost in storage and handling on the cost side and the marginal effect of the market price on the net return will be higher on the returns side.
5. Other than the flat payment per acre contract, the operations that used flat price per bushel contract were able to reduce the standard deviation (i.e. the risk) associated with the price variability.
6. Farmers should be aware of the added risk associated with growing specialty corn when the premium depends on the trait content. Quality variation is another source of uncertainty that can in some cases bring down the average net return per acre to an operation.
7. The premium paid in this analysis made the specialty production superior to the commodity in all cases. It is, however, possible for premium to be so low that this result does not occur. Producers on all land types need to know their actual costs for both commodity and specialty corn before deciding to contract at any given level of premium.

APPENDIX A

CORN PRICE DISTRIBUTION

AND

COUNTY-LEVEL CORN YIELD DISTRIBUTIONS

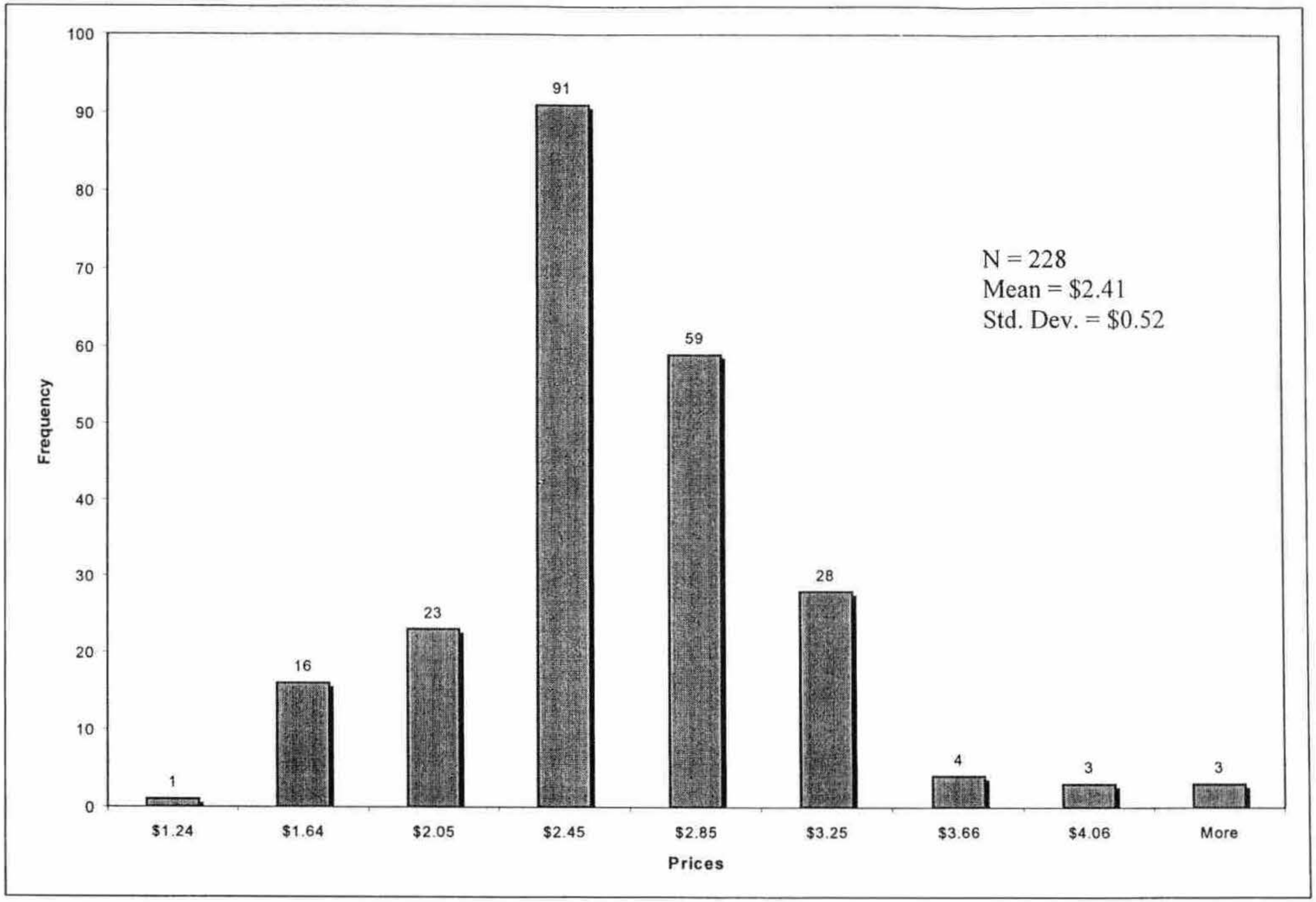


Figure 20: Monthly Average Corn Price Received by Iowa Farmer (1980-1998)

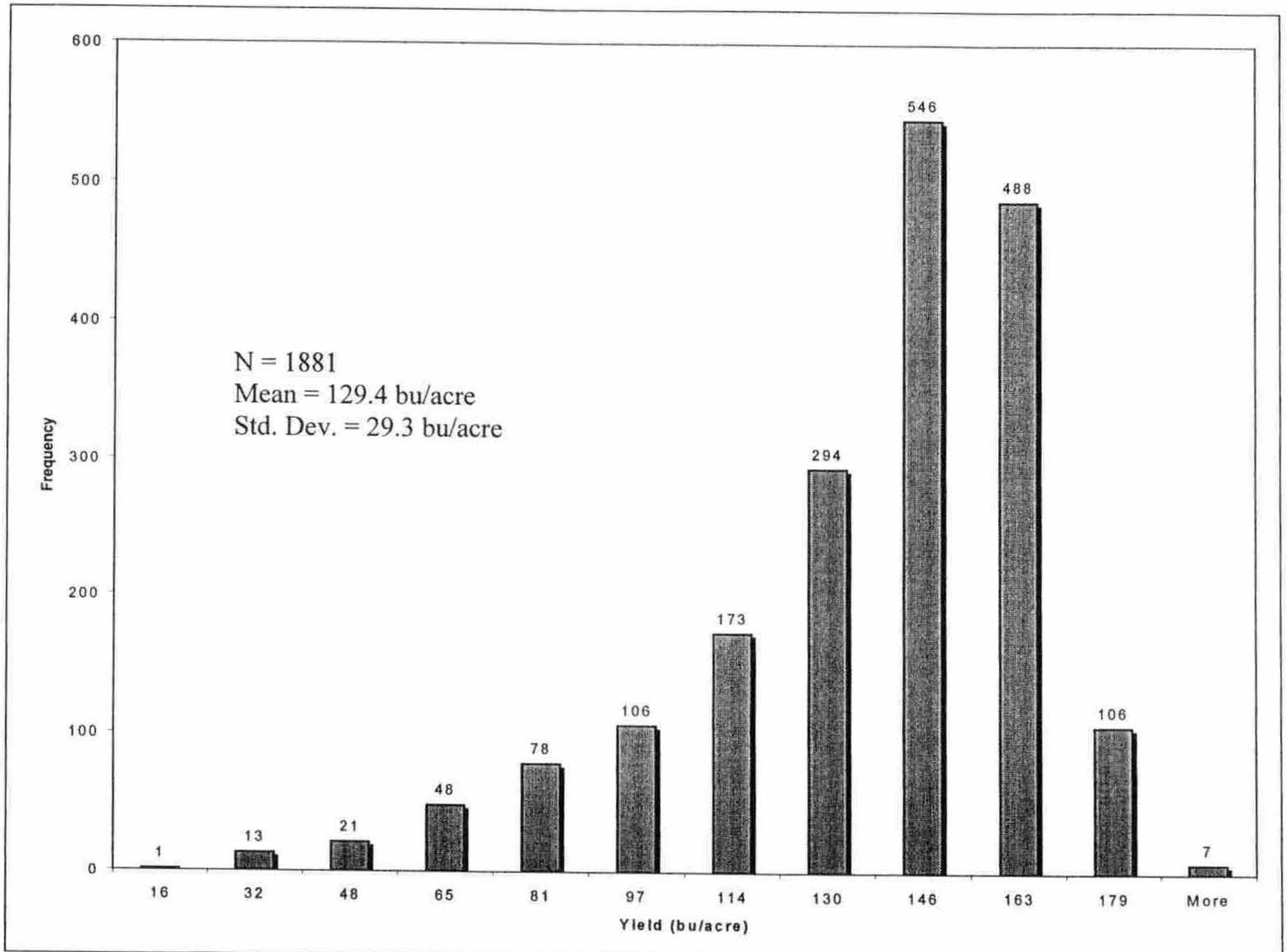


Figure 21: Detrended Iowa County-Level Corn Yield Distribution (1980-1998)

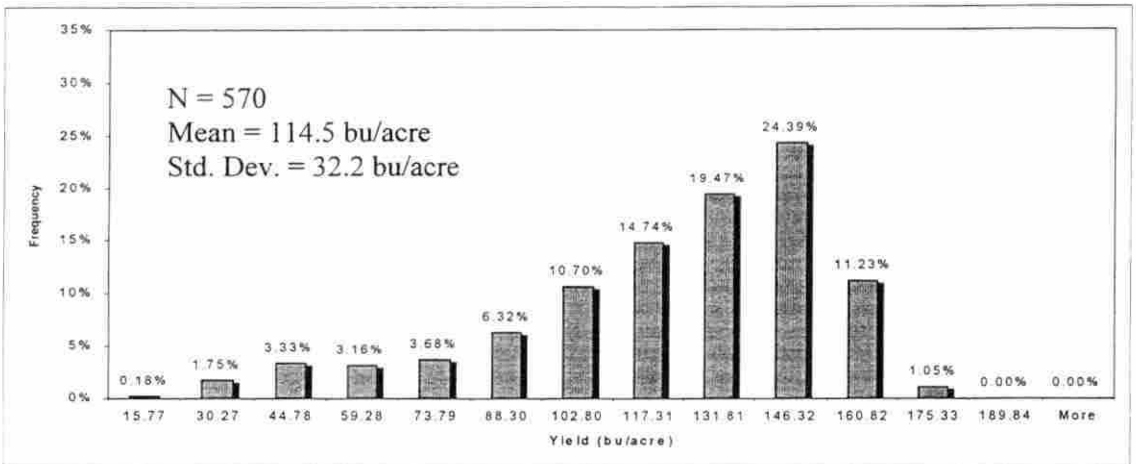


Figure 22: Corn Yield Distribution of the LYP Counties

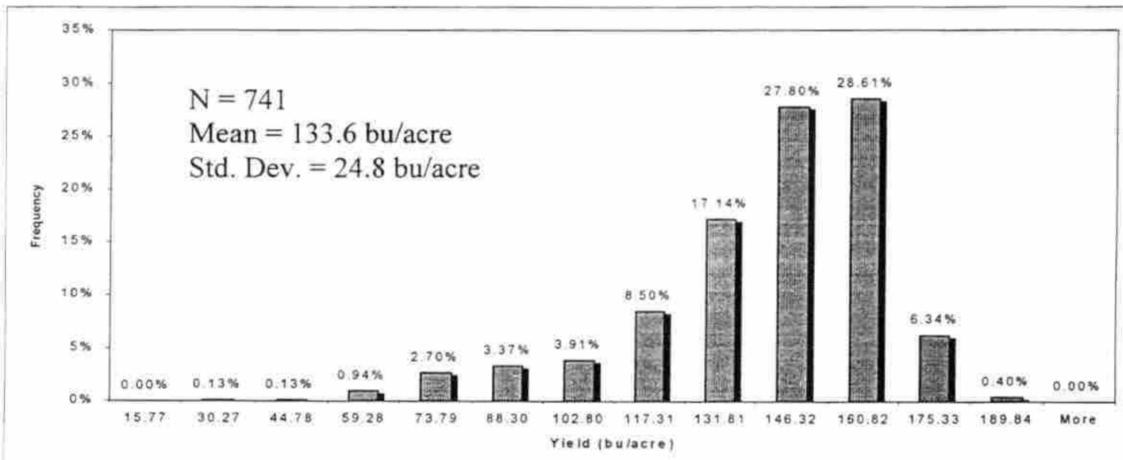


Figure 23: Corn Yield Distribution of the AYP Counties

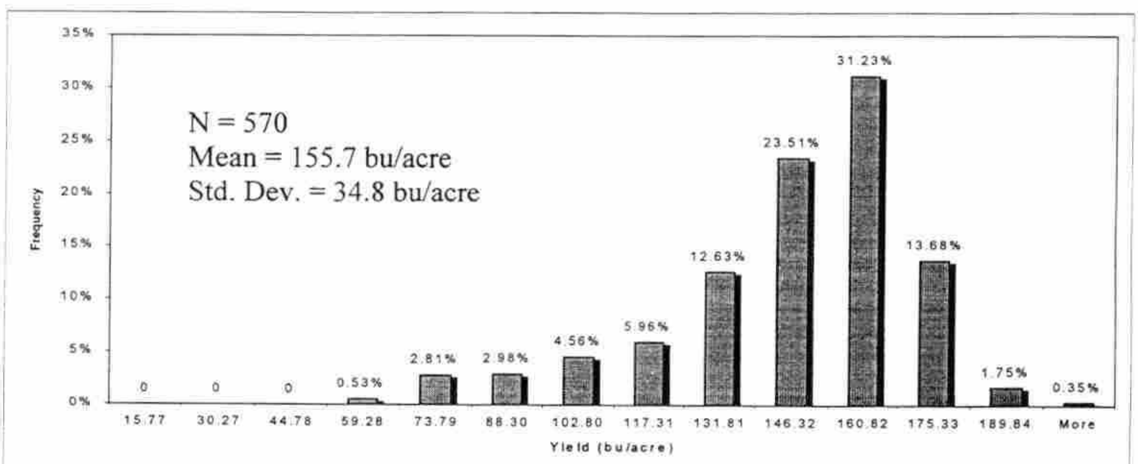


Figure 24: Corn Yield Distribution of the HYP Counties

APPENDIX B

BESTFIT® AND @RISK®

COMPUTATION DISCRIPTION

BESTFIT® is a Windows program, which finds the distribution that best fits a sample of data. BESTFIT® tests up to 25 different distribution types to find the best fit. What it does is to look for the parameters of the function that optimize the goodness-of-fit, a measurement of the probability that the input data was produced by the given distribution. BESTFIT® goes through the following steps when finding the best fit for your input data:

- For each distribution type, a first guess of parameters is made using maximum-likelihood estimators
- The fit is optimized using the Levenberg-Marquardt method (if selected)
- The goodness-of-fit is measured for the optimized function
- All functions are compared and the one with the lowest goodness-of-fit value is considered the best fit

@RISK® is the Risk Analysis and Simulation add-in for Microsoft Excel®. It allows user to replace uncertain values in a spreadsheet model with one of 37 @RISK® probability distribution functions. Using Monte Carlo simulation (if selected), @RISK® will recalculate the spreadsheet hundreds or thousands of times, each time selecting random numbers from the @RISK® functions the user entered. The program provides a Simulation Statistics window that contains statistics for all outputs displayed in a spreadsheet-like format. Users can also enter Target values and find the likelihood of achieving them. @RISK® also performs Sensitivity Analysis and Scenario Analysis. Sensitivity Analysis determines which input distributions have the biggest impact on the outputs. Scenario Analysis identifies combinations of inputs, which lead to output target values.

APPENDIX C

CONTRACTS COMPARISON ON DIFFERENT LAND TYPES

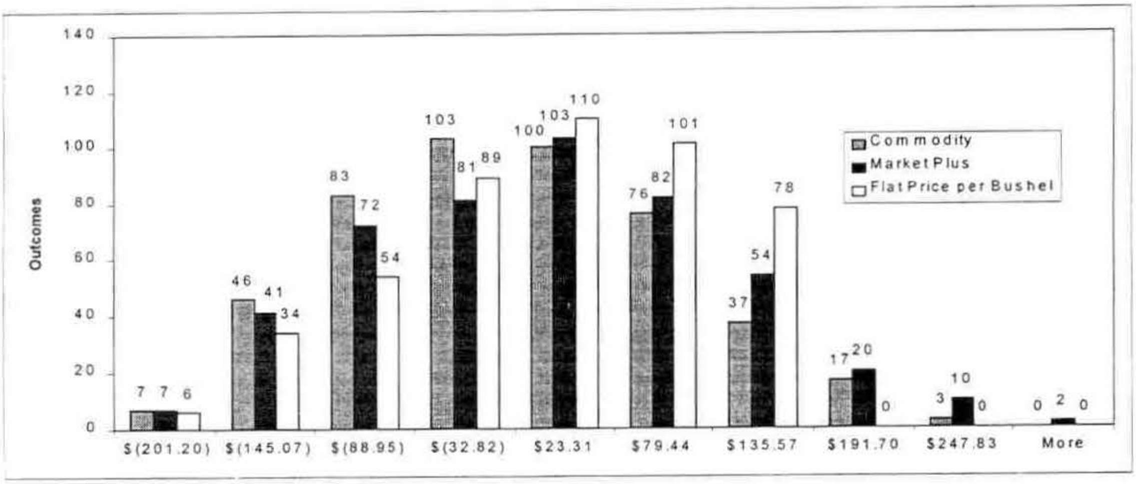


Figure 25: Contracts Comparison on LYP land

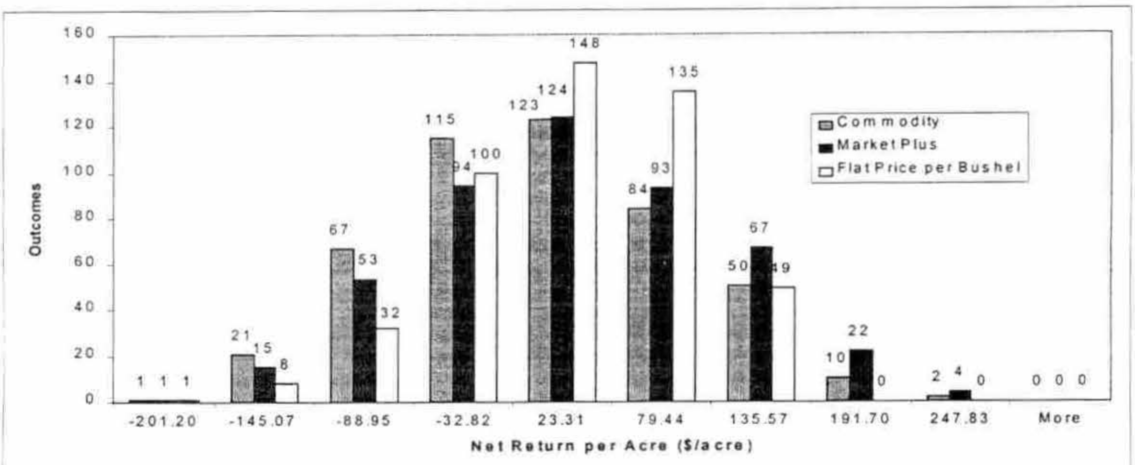


Figure 26: Contracts Comparison on AYP land

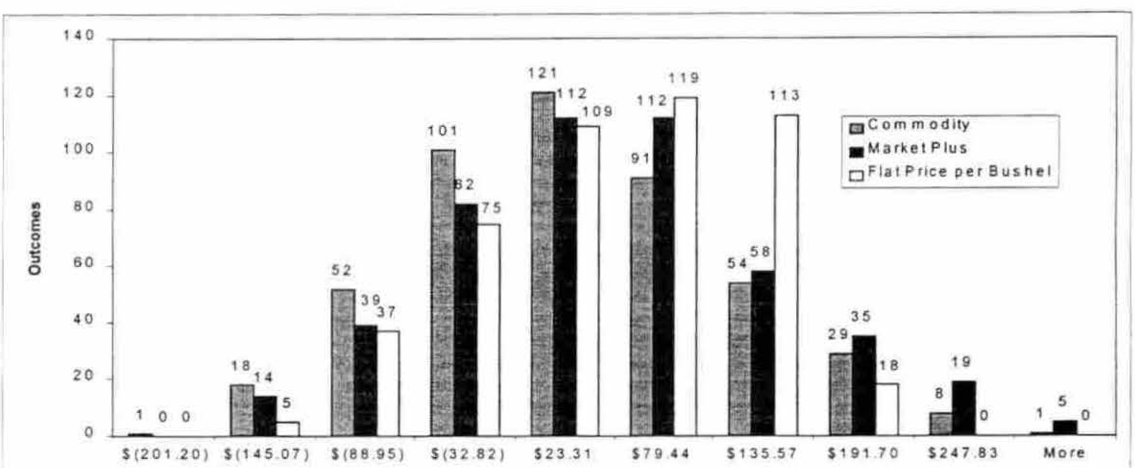


Figure 27: Contracts Comparison on HYP land

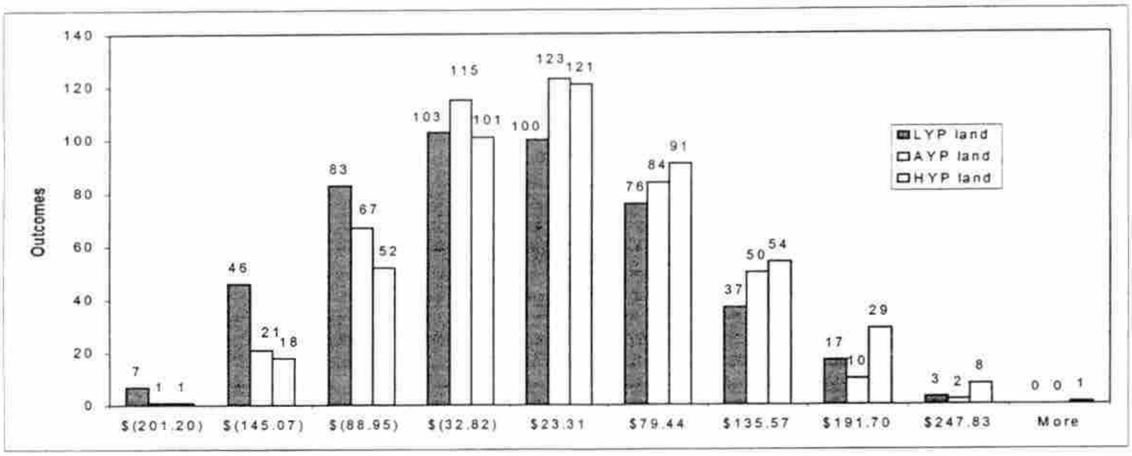


Figure 28: Commodity Production on Different Land Types

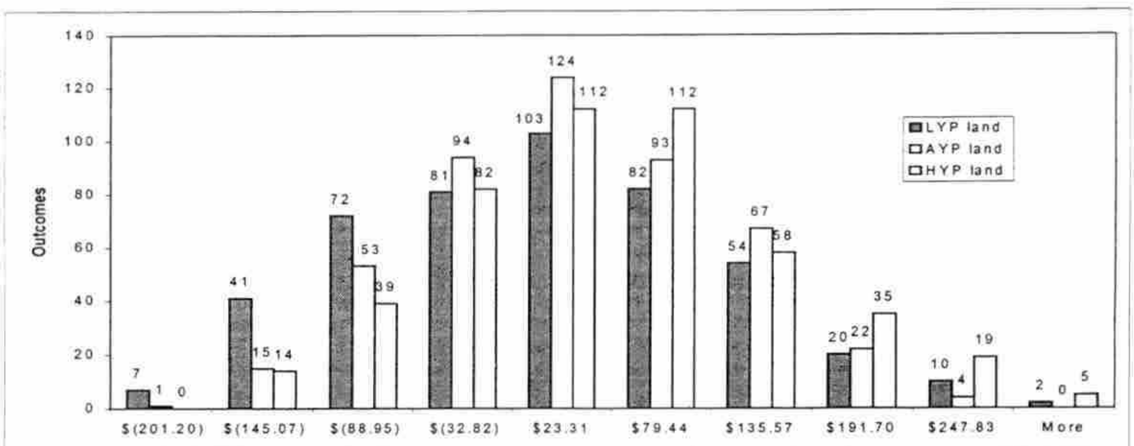


Figure 29: Market Plus Contract on Different Land Types

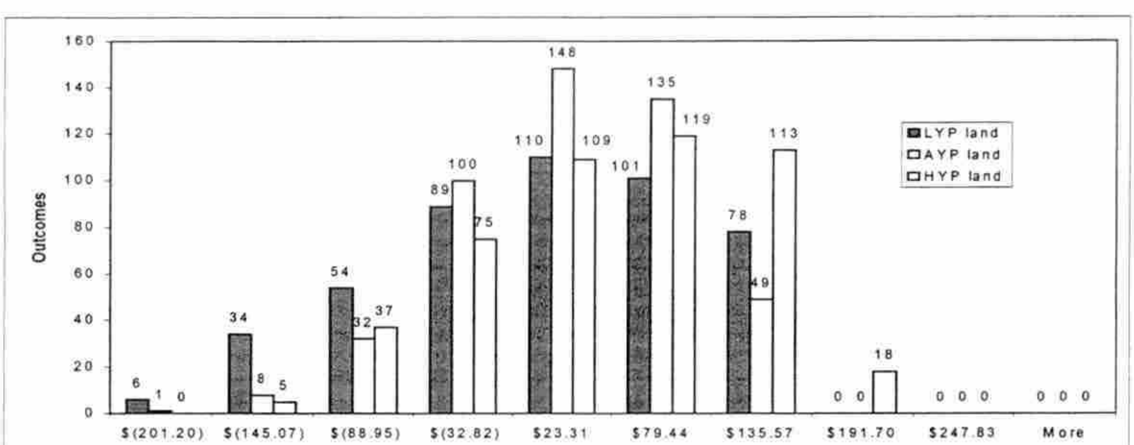


Figure 30: Flat Price per Bushel Contract on Different Land Types

APPENDIX D

CORNCONTRACT EXPLORER

THE SPREADSHEET MODEL

DATA ENTRY SHEETS

AND

SAMPLE OUTPUTS

DATA ENTRY

with 1999 budget figures

Rotation	Corn Following Corn
Yield with Commodity (bu per acre)	100

Local Cash Commodity Price

High Price ($ per bu)	2.90
Expected Price ($ per bu)	2.40
Low Price ($ per bu)	1.90

Seeds - Commodity

Seeds per bag	80000
Seeds (Commodity) per acre	22000
Commodity Seed Cost ($ per 1000)	1.00

Yield Expectation

Expected Yield (bu per acre)	100
Very Low Yield (bu per acre)	80
Low Yield (bu per acre)	90
High Yield (bu per acre)	110
Very High Yield (bu per acre)	120

Seeds - Specialty

Bag Premium ($ per bag)	30.00
Seeds needed (% greater per acre)	8%
Seeds (Specialty) per acre	23760
Specialty Seed Cost ($ per 1000)	1.38

Machinery

	Passes	Fixed Cost	Variable Cost	Custom
Preharvest Machinery ($ per acre)		16.31	6.95	
Chisel plow	1	2.01	1.40	0.00
NH3 applicator	1	2.28	1.25	0.00
Tandem disk	1	2.36	1.00	0.00
Field Cultivator	1	2.54	0.66	0.00
Planter	1	4.27	1.25	0.00
Cultivator	1	2.01	0.94	0.00
Sprayer	1	0.84	0.45	0.00
Others	1	0.00	0.00	0.00
Harvest Machinery ($ per acre)		19.24	20.17	
Combine		12.04	7.84	0.00
Haul		2.00	1.00	0.00
Dryer		4.00	10.83	0.00
Handle		1.20	0.50	0.00

Labor

Labor Rate ($ per hour)	7.00
No. of Hours of Labor per acre	3.40
Land Cash Rent ($ per acre)	105.00

Chemicals

	Price ($ per lb)	Usage (lbs per acre)
Nitrogen	0.16	120.00
Phosphate	0.29	40.00
Potash	0.14	30.00

Lime (yearly cost in $)	6.00
Herbicide ($ per acre)	30.00
Insecticide ($ per acre)	14.00

Other Costs

Crop Insurance ($ per acre)	5.50
Miscellaneous ($ per acre)	6.00
ICM Services ($ per acre)	0.00
Interest on Preharvest Variable Costs	9%

Extra Costs for Specialty

Storage and Handling ($ per bu)	0.03
Cleaning combine and planter ($/acre)	2.00
Field Isolation ($ per acre)	0.00
Transportation ($ per bu)	0.00
Other Costs ($/acre)	0.00

Contract Alternatives

Flat Price per bu ($ per bu)	2.65
Flat Premium per acre ($ per acre)	35.00
Price Premium ($ per bu)	0.30

DATA ENTRY

with 1999 budget figures

Rotation	Corn Following Corn
Yield with Commodity (bu per acre)	120

Local Cash Commodity Price

High Price ($ per bu)	2.90
Expected Price ($ per bu)	2.40
Low Price ($ per bu)	1.90

Seeds - Commodity

Seeds per bag	80000
Seeds (Commodity) per acre	26000
Commodity Seed Cost ($ per 1000)	1.00

Yield Expectation

Expected Yield (bu per acre)	120
Very Low Yield (bu per acre)	100
Low Yield (bu per acre)	110
High Yield (bu per acre)	130
Very High Yield (bu per acre)	140

Seeds - Specialty

Bag Premium ($ per bag)	30.00
Seeds needed (% greater per acre)	8%
Seeds (Specialty) per acre	28080
Specialty Seed Cost ($ per 1000)	1.38

Machinery

	Passes	Fixed Cost	Variable Cost	Custom
Preharvest Machinery ($ per acre)		16.31	6.95	
Chisel plow	1	2.01	1.40	0.00
NH3 applicator	1	2.28	1.25	0.00
Tandem disk	1	2.36	1.00	0.00
Field Cultivator	1	2.54	0.66	0.00
Planter	1	4.27	1.25	0.00
Cultivator	1	2.01	0.94	0.00
Sprayer	1	0.84	0.45	0.00
Others	1	0.00	0.00	0.00
Harvest Machinery ($ per acre)		20.79	22.69	
Combine		12.04	7.84	0.00
Haul		2.40	1.20	0.00
Dryer		4.80	13.00	0.00
Handle		1.55	0.65	0.00

Labor

Labor Rate ($ per hour)	7.00
No. of Hours of Labor per acre	3.40
Land Cash Rent ($ per acre)	125.00

Chemicals

	Price ($ per lb)	Usage (lbs per acre)
Nitrogen	0.16	140.00
Phosphate	0.29	45.00
Potash	0.14	35.00
Lime (yearly cost in $)		6.00
Herbicide ($ per acre)		30.00
Insecticide ($ per acre)		14.00

Other Costs

Crop Insurance ($ per acre)	5.50
Miscellaneous ($ per acre)	7.00
ICM Services ($ per acre)	0.00
Interest on Preharvest Variable Costs	9%

Extra Costs for Specialty

Storage and Handling ($ per bu)	0.03
Cleaning combine and planter ($/acre)	2.00
Field Isolation ($ per acre)	0.00
Transportation ($ per bu)	0.00
Other Costs ($/acre)	0.00

Contract Alternatives

Flat Price per bu ($ per bu)	2.65
Flat Premium per acre ($ per acre)	35.00
Price Premium ($ per bu)	0.30

DATA ENTRY

with 1999 budget figures

Rotation	Corn Following Corn
Yield with Commodity (bu per acre)	145

Local Cash Commodity Price

High Price ($ per bu)	2.90
Expected Price ($ per bu)	2.40
Low Price ($ per bu)	1.90

Seeds - Commodity

Seeds per bag	80000
Seeds (Commodity) per acre	30000
Commodity Seed Cost ($ per 1000)	1.00

Yield Expectation

Expected Yield (bu per acre)	145
Very Low Yield (bu per acre)	125
Low Yield (bu per acre)	135
High Yield (bu per acre)	155
Very High Yield (bu per acre)	165

Seeds - Specialty

Bag Premium ($ per bag)	30.00
Seeds needed (% greater per acre)	8%
Seeds (Specialty) per acre	32400
Specialty Seed Cost ($ per 1000)	1.38

Machinery

	Passes	Fixed Cost	Variable Cost	Custom
Preharvest Machinery ($ per acre)		16.31	6.95	
Chisel plow	1	2.01	1.40	0.00
NH3 applicator	1	2.28	1.25	0.00
Tandem disk	1	2.36	1.00	0.00
Field Cultivator	1	2.54	0.66	0.00
Planter	1	4.27	1.25	0.00
Cultivator	1	2.01	0.94	0.00
Sprayer	1	0.84	0.45	0.00
Others	1	0.00	0.00	0.00
Harvest Machinery ($ per acre)		22.59	25.80	
Combine		12.04	7.84	0.00
Haul		2.90	1.45	0.00
Dryer		5.80	15.71	0.00
Handle		1.85	0.80	0.00

Labor

Labor Rate ($ per hour)	7.00
No. of Hours of Labor per acre	3.40
Land Cash Rent ($ per acre)	150.00

Chemicals

	Price ($ per lb)	Usage (lbs per acre)
Nitrogen	0.16	170.00
Phosphate	0.29	55.00
Potash	0.14	45.00
Lime (yearly cost in $)		6.00
Herbicide ($ per acre)		30.00
Insecticide ($ per acre)		14.00

Other Costs

Crop Insurance ($ per acre)	5.50
Miscellaneous ($ per acre)	8.00
ICM Services ($ per acre)	0.00
Interest on Preharvest Variable Costs	9%

Extra Costs for Specialty

Storage and Handling ($ per bu)	0.03
Cleaning combine and planter ($/acre)	2.00
Field Isolation ($ per acre)	0.00
Transportation ($ per bu)	0.00
Other Costs ($/acre)	0.00

Contract Alternatives

Flat Price per bu ($ per bu)	2.65
Flat Premium per acre ($ per acre)	35.00
Price Premium ($ per bu)	0.30

DATA ENTRY

with 1999 budget figures

Rotation	Corn Following Soybeans
Yield with Commodity (bu per acre)	115

Local Cash Commodity Price

High Price ($ per bu)	2.90
Expected Price ($ per bu)	2.40
Low Price ($ per bu)	1.90

Seeds - Commodity

Seeds per bag	80000
Seeds (Commodity) per acre	22000
Commodity Seed Cost ($ per 1000)	1.00

Yield Expectation

Expected Yield (bu per acre)	115
Very Low Yield (bu per acre)	95
Low Yield (bu per acre)	105
High Yield (bu per acre)	125
Very High Yield (bu per acre)	135

Seeds - Specialty

Bag Premium ($ per bag)	30.00
Seeds needed (% greater per acre)	8%
Seeds (Specialty) per acre	23760
Specialty Seed Cost ($ per 1000)	1.38

Machinery

	Passes	Fixed Cost	Variable Cost	Custom
Preharvest Machinery ($ per acre)		14.30	5.55	
Chisel plow	1	0.00	0.00	0.00
NH3 applicator	1	2.28	1.25	0.00
Tandem disk	1	2.36	1.00	0.00
Field Cultivator	1	2.54	0.66	0.00
Planter	1	4.27	1.25	0.00
Cultivator	1	2.01	0.94	0.00
Sprayer	1	0.84	0.45	0.00
Others	1	0.00	0.00	0.00
Harvest Machinery ($ per acre)		20.19	22.00	
Combine		12.04	7.84	0.00
Haul		2.30	1.15	0.00
Dryer		4.60	12.46	0.00
Handle		1.25	0.55	0.00

Labor

Labor Rate ($ per hour)	7.00
No. of Hours of Labor per acre	3.00
Land Cash Rent ($ per acre)	105.00

Chemicals

	Price ($ per lb)	Usage (lbs per acre)
Nitrogen	0.16	100.00
Phosphate	0.29	45.00
Potash	0.14	35.00

Lime (yearly cost in $)	6.00
Herbicide ($ per acre)	30.00
Insecticide ($ per acre)	0.00

Other Costs

Crop Insurance ($ per acre)	5.50
Miscellaneous ($ per acre)	6.00
ICM Services ($ per acre)	0.00
Interest on Preharvest Variable Costs	9%

Extra Costs for Specialty

Storage and Handling ($ per bu)	0.03
Cleaning combine and planter ($/acre)	2.00
Field Isolation ($ per acre)	0.00
Transportation ($ per bu)	0.00
Other Costs ($/acre)	0.00

Contract Alternatives

Flat Price per bu ($ per bu)	2.65
Flat Premium per acre ($ per acre)	35.00
Price Premium ($ per bu)	0.30

DATA ENTRY

with 1999 budget figures

Rotation	Corn Following Soybeans
Yield with Commodity (bu per acre)	135

Local Cash Commodity Price

High Price ($ per bu)	2.90
Expected Price ($ per bu)	2.40
Low Price ($ per bu)	1.90

Seeds - Commodity

Seeds per bag	80000
Seeds (Commodity) per acre	26000
Commodity Seed Cost ($ per 1000)	1.00

Yield Expectation

Expected Yield (bu per acre)	135
Very Low Yield (bu per acre)	115
Low Yield (bu per acre)	125
High Yield (bu per acre)	145
Very High Yield (bu per acre)	155

Seeds - Specialty

Bag Premium ($ per bag)	30.00
Seeds needed (% greater per acre)	8%
Seeds (Specialty) per acre	28080
Specialty Seed Cost ($ per 1000)	1.38

Machinery

	Passes	Fixed Cost	Variable Cost	Custom
Preharvest Machinery ($ per acre)		14.30	5.55	
Chisel plow	1	0.00	0.00	0.00
NH3 applicator	1	2.28	1.25	0.00
Tandem disk	1	2.36	1.00	0.00
Field Cultivator	1	2.54	0.66	0.00
Planter	1	4.27	1.25	0.00
Cultivator	1	2.01	0.94	0.00
Sprayer	1	0.84	0.45	0.00
Others	1	0.00	0.00	0.00
Harvest Machinery ($ per acre)		21.84	24.57	
Combine		12.04	7.84	0.00
Haul		2.70	1.35	0.00
Dryer		5.40	14.63	0.00
Handle		1.70	0.75	0.00

Labor

Labor Rate ($ per hour)	7.00
No. of Hours of Labor per acre	3.00
Land Cash Rent ($ per acre)	125.00

Chemicals

	Price ($ per lb)	Usage (lbs per acre)
Nitrogen	0.16	120.00
Phosphate	0.29	50.00
Potash	0.14	40.00

Lime (yearly cost in $)	6.00
Herbicide ($ per acre)	30.00
Insecticide ($ per acre)	0.00

Other Costs

Crop Insurance ($ per acre)	5.50
Miscellaneous ($ per acre)	7.00
ICM Services ($ per acre)	0.00
Interest on Preharvest Variable Costs	9%

Extra Costs for Specialty

Storage and Handling ($ per bu)	0.03
Cleaning combine and planter ($/acre)	2.00
Field Isolation ($ per acre)	0.00
Transportation ($ per bu)	0.00
Other Costs ($/acre)	0.00

Contract Alternatives

Flat Price per bu ($ per bu)	2.65
Flat Premium per acre ($ per acre)	35.00
Price Premium ($ per bu)	0.30

DATA ENTRY

with 1999 budget figures

Rotation	Corn Following Soybeans
Yield with Commodity (bu per acre)	160

Local Cash Commodity Price

High Price ($ per bu)	2.90
Expected Price ($ per bu)	2.40
Low Price ($ per bu)	1.90

Seeds - Commodity

Seeds per bag	80000
Seeds (Commodity) per acre	30000
Commodity Seed Cost ($ per 1000)	1.00

Yield Expectation

Expected Yield (bu per acre)	160
Very Low Yield (bu per acre)	140
Low Yield (bu per acre)	150
High Yield (bu per acre)	170
Very High Yield (bu per acre)	180

Seeds - Specialty

Bag Premium ($ per bag)	30.00
Seeds needed (% greater per acre)	8%
Seeds (Specialty) per acre	32400
Specialty Seed Cost ($ per 1000)	1.38

Machinery

	Passes	Fixed Cost	Variable Cost	Custom
Preharvest Machinery ($ per acre)		14.30	5.55	
Chisel plow	1	0.00	0.00	0.00
NH3 applicator	1	2.28	1.25	0.00
Tandem disk	1	2.36	1.00	0.00
Field Cultivator	1	2.54	0.66	0.00
Planter	1	4.27	1.25	0.00
Cultivator	1	2.01	0.94	0.00
Sprayer	1	0.84	0.45	0.00
Others	1	0.00	0.00	0.00
Harvest Machinery ($ per acre)		23.59	27.62	
Combine		12.04	7.84	0.00
Haul		3.20	1.60	0.00
Dryer		6.40	17.33	0.00
Handle		1.95	0.85	0.00

Labor

Labor Rate ($ per hour)	7.00
No. of Hours of Labor per acre	3.00
Land Cash Rent ($ per acre)	150.00

Chemicals

	Price ($ per lb)	Usage (lbs per acre)
Nitrogen	0.16	140.00
Phosphate	0.29	60.00
Potash	0.14	50.00
Lime (yearly cost in $)		6.00
Herbicide ($ per acre)		30.00
Insecticide ($ per acre)		0.00

Other Costs

Crop Insurance ($ per acre)	5.50
Miscellaneous ($ per acre)	8.00
ICM Services ($ per acre)	0.00
Interest on Preharvest Variable Costs	9%

Extra Costs for Specialty

Storage and Handling ($ per bu)	0.03
Cleaning combine and planter ($/acre)	2.00
Field Isolation ($ per acre)	0.00
Transportation ($ per bu)	0.00
Other Costs ($/acre)	0.00

Contract Alternatives

Flat Price per bu ($ per bu)	2.65
Flat Premium per acre ($ per acre)	35.00
Price Premium ($ per bu)	0.30

Budgets for Commodity Corn

Corn Following Soybeans	Yield	115 bu/acre	
	Unit	Fixed	Variable
Preharvest Machinery		$14.30	$5.55
Seed and Chemicals			
Seed Cost			22.00
Nitrogen @ $0.16 per lb	100.00		16.00
Phosphate @ $0.29 per lb	45.00		13.05
Potash @ $0.14 per lb	35.00		4.90
Lime (yearly cost)			6.00
Herbicide			30.00
Insecticide			0.00
Crop Insurance			5.50
Mischellaneous			6.00
ICM Services			0.00
Interest on Preharvest Variable Cost (8 months)	9%		6.54
Total			**115.54**
Harvest Machinery			
Combine		12.04	7.84
Haul		2.30	1.15
Dry		4.60	12.46
Handle		1.25	0.55
Total		**20.19**	**22.00**
Labor @$7 per hour	3 hours	21.00	
Land Cash Rent Equivalent		105.00	
	Expected Yield	115	
	Cost per acre	$160.49	$137.54
	Total cost per acre		298.03
	Cost per bushel	1.40	1.20
	Total cost per bushel		2.59
	Very Low Yield	95	
	Cost per bushel	1.69	1.45
	Total cost per bushel		3.14
	Low Yield	105	
	Cost per bushel	1.53	1.31
	Total cost per bushel		2.84
	High Yield	125	
	Cost per bushel	1.28	1.10
	Total cost per bushel		2.38
	Very High Yield	135	
	Cost per bushel	1.19	1.02
	Total cost per bushel		2.21

Budgets for Specialty Corn

Corn Following Soybeans	Yield Unit	115 bu/acre Fixed	Variable
Preharvest Machinery		$14.30	$5.55
Seed and Chemicals			
Seed Cost			32.67
Nitrogen @ $0.16 per lb	100.00		16.00
Phosphate @ $0.29 per lb	45.00		13.05
Potash @ $0.14 per lb	35.00		4.90
Lime (yearly cost)			6.00
Herbicide			30.00
Insecticide			0.00
Crop Insurance			5.50
Mischellaneous			6.00
ICM Services			0.00
Interest on Preharvest Variable Cost (8 months)	9%		7.51
Total			**127.18**
Harvest Machinery			
Combine		12.04	7.84
Haul		2.30	1.15
Dry		4.60	12.46
Handle		1.25	0.55
Total		**20.19**	**22.00**
Labor @$7 per hour	3 hours	21.00	
Land Cash Rent Equivalent		105.00	
Additional Costs for Specialty			
Cleaning combine and planter			2.00
Storage and Handling			3.45
Transportation			0.00
Field Isolation			0.00
Other Costs			0.00
	Expected Yield	115	
	Cost per acre	$160.49	$154.63
	Total cost per acre		315.12
	Cost per bushel	1.40	1.34
	Total cost per bushel		2.74
	Very Low Yield	95	
	Cost per acre	160.49	154.03
	Total cost per acre		314.52
	Cost per bushel	1.69	1.62
	Total cost per bushel		3.31
	Low Yield	105	
	Cost per acre	160.49	154.33
	Total cost per acre		314.82
	Cost per bushel	1.53	1.47
	Total cost per bushel		3.00
	High Yield	125	
	Cost per acre	160.49	154.93
	Total cost per acre		315.42
	Cost per bushel	1.28	1.24
	Total cost per bushel		2.52
	Very High Yield	135	
	Cost per acre	160.49	155.23
	Total cost per acre		315.72
	Cost per bushel	1.19	1.15
	Total cost per bushel		2.33

Returns from Different Contracts at Low Yield

	Low Yield = 105		
	Contract 1 Commodity Market Plus Premium	Contract 2 Flat Price / bu	Contract 3 Flat Payment / acre
Cost of Production ($/acre)	$314.82	$314.82	$314.82
Yield (bu/acre)	105	105	105
Cost of Production ($/bu)	$3.00	$3.00	$3.00
Premium ($/bu)	$0.30	-	-
Premium ($/acre)	-	-	$35.00
Expected Price ($/bu)	$2.71	$2.65	$2.71
Net return ($/bu)	$0.19	$0.13	$0.19
Net return ($/acre)	$23.33	$15.83	-$3.27
High Price ($/bu)	$3.21	$2.65	$2.71
Net return ($/bu)	$0.69	$0.13	$0.19
Net return ($/acre)	$85.83	$15.83	-$3.27
Low Price ($/bu)	$2.21	$2.65	$2.71
Net return ($/bu)	-$0.31	$0.13	$0.19
Net return ($/acre)	-$39.17	$15.83	-$3.27

Returns from Different Contracts at High Yield

	High Yield = 125		
	Contract 1 Commodity Market Plus Premium	Contract 2 Flat Price / bu	Contract 3 Flat Payment / acre
Cost of Production ($/acre)	$315.42	$315.42	$315.42
Yield (bu/acre)	$125.00	$125.00	$125.00
Cost of Production ($/bu)	$2.52	$2.52	$2.52
Premium ($/bu)	$0.30	-	-
Premium ($/acre)	-	-	$35.00
Expected Price ($/bu)	$2.71	$2.65	$2.71
Net return ($/bu)	-$0.29	-$0.35	-$0.28
Net return ($/acre)	-$30.27	-$36.57	-$2.67
High Price ($/bu)	$3.21	$2.65	$2.71
Net return ($/bu)	$0.21	-$0.35	-$0.28
Net return ($/acre)	$22.23	-$36.57	-$2.67
Low Price ($/bu)	$2.21	$2.65	$2.71
Net return ($/bu)	-$0.79	-$0.35	-$0.28
Net return ($/acre)	-$82.77	-$36.57	-$2.67

Returns from Different Contracts at Expected Yield

Expected Yield = 115

	Contract 1 Commodity Market Plus Premium	Contract 2 Flat Price / bu	Contract 3 Flat Payment / acre
Cost of Production ($/acre)	$315.12	$315.12	$315.12
Yield (bu/acre)	115	115	115
Cost of Production ($/bu)	$2.74	$2.74	$2.74
Premium ($/bu)	$0.30	-	-
Premium ($/acre)	-	-	$35.00
Expected Price ($/bu)	$2.71	$2.65	$2.71
Net return ($/bu)	-$0.03	-$0.09	-$0.03
Net return ($/acre)	-$3.47	-$10.37	-$2.97
High Price ($/bu)	$3.21	$2.65	$2.71
Net return ($/bu)	$0.47	-$0.09	-$0.03
Net return ($/acre)	$54.03	-$10.37	-$2.97
Low Price ($/bu)	$2.21	$2.65	$2.71
Net return ($/bu)	-$0.53	-$0.09	-$0.03
Net return ($/acre)	-$60.97	-$10.37	-$2.97

Returns from Different Contracts at Very Low Yield

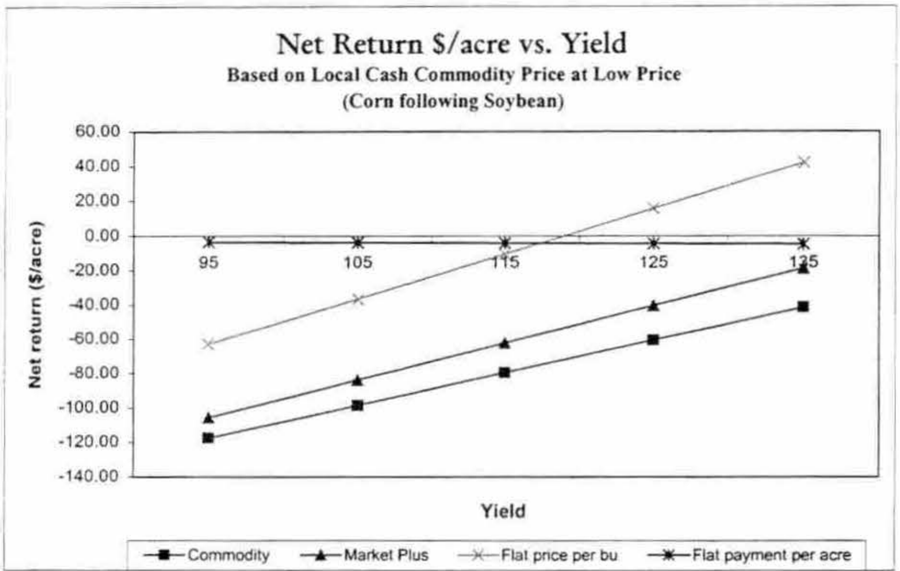
Very Low Yield = 95

	Contract 1 Commodity Market Plus Premium	Contract 2 Flat Price / bu	Contract 3 Flat Payment / acre
Cost of Production ($/acre)	$314.52	$314.52	$314.52
Yield (bu/acre)	95	95	95
Cost of Production ($/bu)	$3.31	$3.31	$3.31
Premium ($/bu)	$0.30	-	-
Premium ($/acre)	-	-	$35.00
Expected Price ($/bu)	$2.71	$2.65	$2.71
Net return ($/bu)	$0.38	$0.32	$0.38
Net return ($/acre)	$50.13	$42.03	-$3.57
High Price ($/bu)	$3.21	$2.65	$2.71
Net return ($/bu)	$0.88	$0.32	$0.38
Net return ($/acre)	$117.63	$42.03	-$3.57
Low Price ($/bu)	$2.21	$2.65	$2.71
Net return ($/bu)	-$0.12	$0.32	$0.38
Net return ($/acre)	-$17.37	$42.03	-$3.57

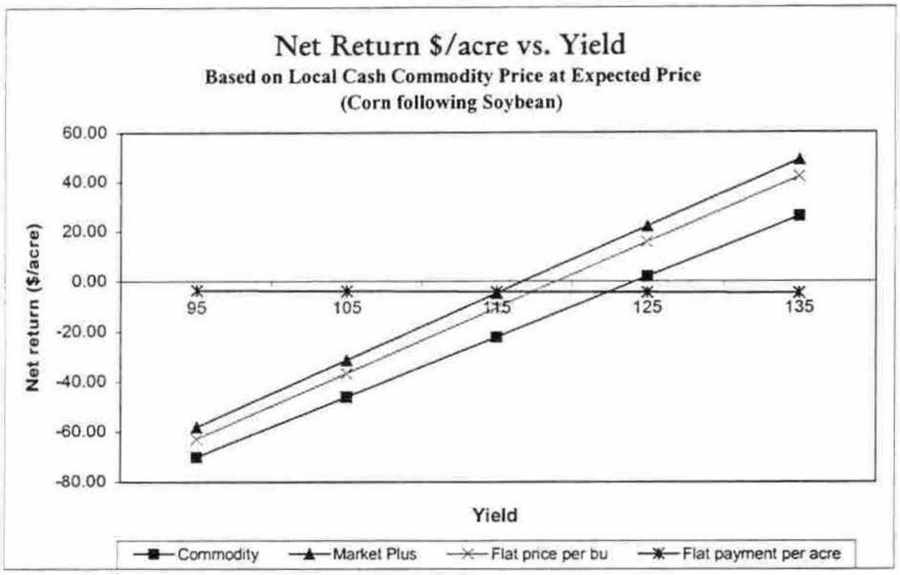
Returns from Different Contracts at Very High Yield

Very High Yield = 135

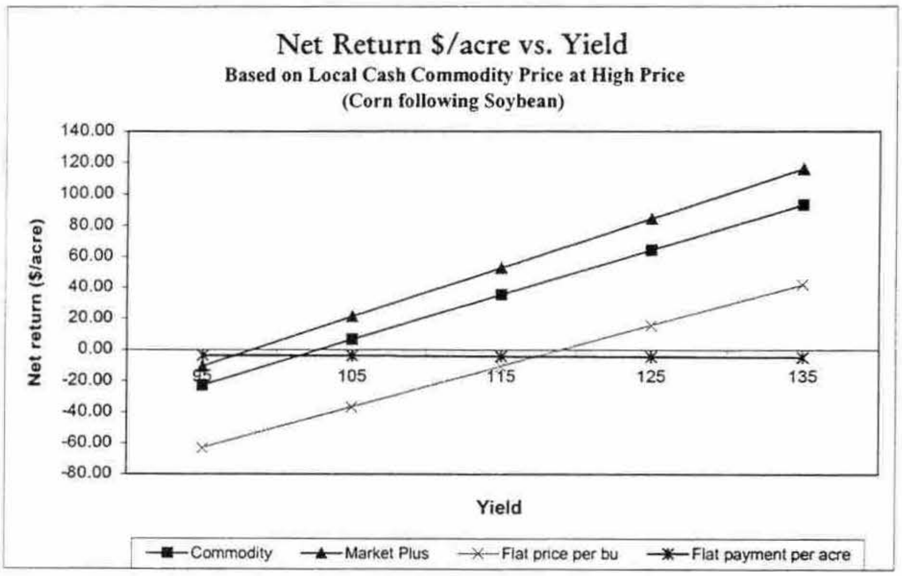
	Contract 1 Commodity Market Plus Premium	Contract 2 Flat Price / bu	Contract 3 Flat Payment / acre
Cost of Production ($/acre)	$315.72	$315.72	$315.72
Yield (bu/acre)	135	135	135
Cost of Production ($/bu)	$2.33	$2.33	$2.33
Premium ($/bu)	$0.30	-	-
Premium ($/acre)	-	-	$35.00
Expected Price ($/bu)	$2.71	$2.65	$2.71
Net return ($/bu)	-$0.60	-$0.66	-$0.60
Net return ($/acre)	-$57.07	-$62.77	-$2.37
High Price ($/bu)	$3.21	$2.65	$2.71
Net return ($/bu)	-$0.10	-$0.66	-$0.60
Net return ($/acre)	-$9.57	-$62.77	-$2.37
Low Price ($/bu)	$2.21	$2.65	$2.71
Net return ($/bu)	-$1.10	-$0.66	-$0.60
Net return ($/acre)	-$104.57	-$62.77	-$2.37



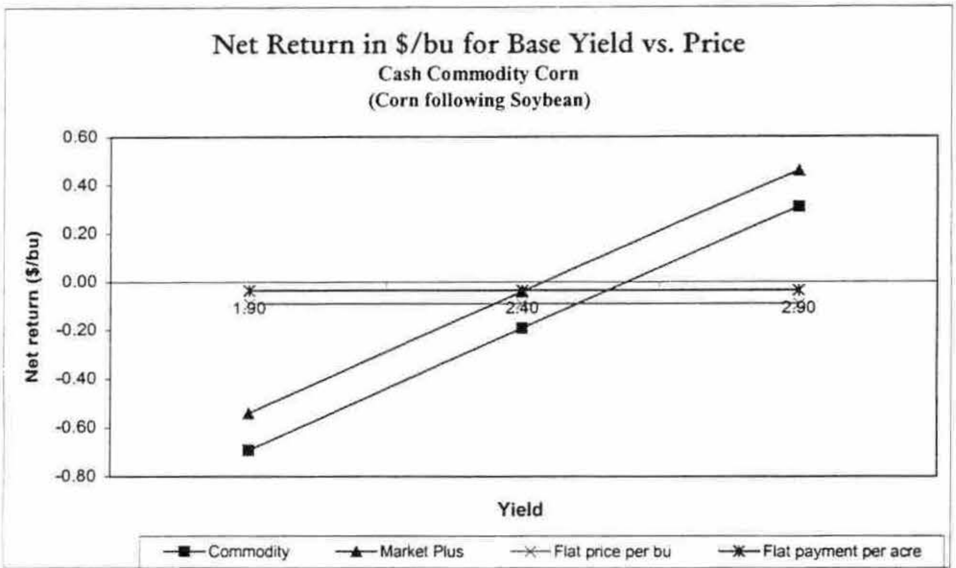
Yield	Very Low	Low	Base	High	Very High
Yield (bu/acre)	95	105	115	125	135
Commodity	-117.53	-98.53	-79.53	-60.53	-41.53
Market Plus	-105.52	-83.82	-62.12	-40.42	-18.72
Flat price per bu	-62.77	-36.57	-10.37	15.83	42.03
Flat payment per acre	-3.52	-3.82	-4.12	-4.42	-4.72



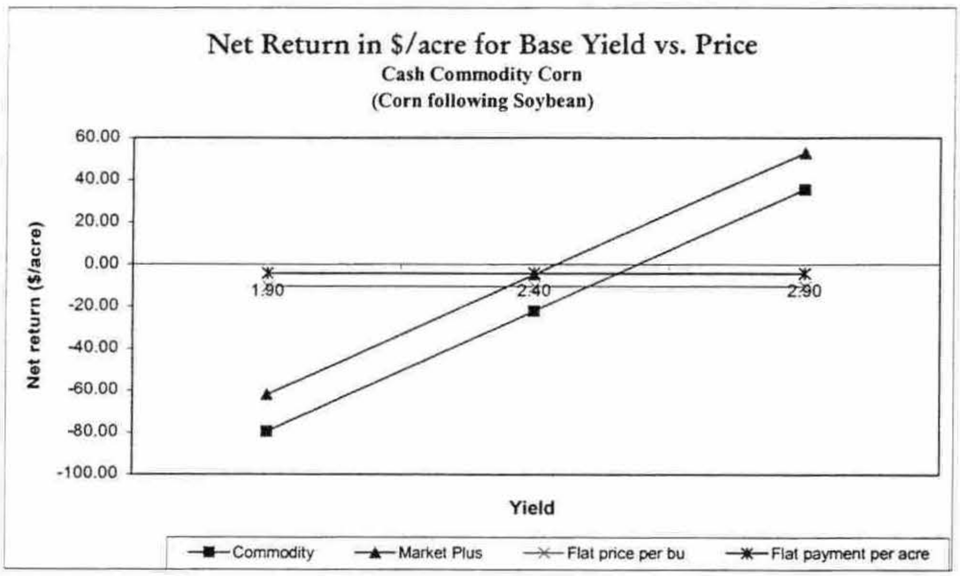
Yield	Very Low	Low	Base	High	Very High
Yield (bu/acre)	95	105	115	125	135
Commodity	-70.03	-46.03	-22.03	1.97	25.97
Market Plus	-58.02	-31.32	-4.62	22.08	48.78
Flat price per bu	-62.77	-36.57	-10.37	15.83	42.03
Flat payment per acre	-3.52	-3.82	-4.12	-4.42	-4.72



Yield	Very Low	Low	Base	High	Very High
Yield (bu/acre)	95	105	115	125	135
Commodity	-22.53	6.47	35.47	64.47	93.47
Market Plus	-10.52	21.18	52.88	84.58	116.28
Flat price per bu	-62.77	-36.57	-10.37	15.83	42.03
Flat payment per acre	-3.52	-3.82	-4.12	-4.42	-4.72



Price	Low Price	Expected Price	High Price
Price (dollars)	1.90	2.40	2.90
Commodity	-0.69	-0.19	0.31
Market Plus	-0.54	-0.04	0.46
Flat price per bu	-0.09	-0.09	-0.09
Flat payment per acre	-0.04	-0.04	-0.04



Price	Low Price	Expected Price	High Price
Price (dollars)	1.90	2.40	2.90
Commodity	-79.53	-22.03	35.47
Market Plus	-62.12	-4.62	52.88
Flat price per bu	-10.37	-10.37	-10.37
Flat payment per acre	-4.12	-4.12	-4.12

Commodity at Different Price/Yield Combinations

			Corn Following Soybeans		
Yield	Very Low	Low	Base	High	Very High
Yield (bu/acre)	95	105	115	125	135
Total cost per acre	$298.03	$298.03	$298.03	$298.03	$298.03
Total cost per bushel	$3.14	$2.84	$2.59	$2.38	$2.21
Expected price ($/bu)	$2.41	$2.41	$2.41	$2.41	$2.41
Net return ($/bu)	-$0.73	-$0.43	-$0.18	$0.03	$0.20
Net return ($/acre)	-$69.08	-$44.98	-$20.88	$3.22	$27.32
High price ($/bu)	$2.91	$2.91	$2.91	$2.91	$2.91
Net return ($/bu)	-$0.23	$0.07	$0.32	$0.53	$0.70
Net return ($/acre)	-$21.58	$7.52	$36.62	$65.72	$94.82
Low price ($/bu)	$1.91	$1.91	$1.91	$1.91	$1.91
Net return ($/bu)	-$1.23	-$0.93	-$0.68	-$0.47	-$0.30
Net return ($/acre)	-$116.58	-$97.48	-$78.38	-$59.28	-$40.18

Market Plus at Different Price/Yield Combinations

			Corn Following Soybeans		
Yield	Very Low	Low	Base	High	Very High
Yield (bu/acre)	95	105	115	125	135
Total cost per acre	$314.52	$314.82	$315.12	$315.42	$315.72
Total cost per bushel	$3.31	$3.00	$2.74	$2.52	$2.33
Premium per bushel	$0.30	$0.30	$0.30	$0.30	$0.30
Premium per acre	-	-	-	-	-
Expected price ($/bu)	$2.71	$2.71	$2.71	$2.71	$2.71
Net return ($/bu)	-$0.60	-$0.29	-$0.03	$0.19	$0.38
Net return ($/acre)	-$57.07	-$30.27	-$3.47	$23.33	$50.13
High price ($/bu)	$3.21	$3.21	$3.21	$3.21	$3.21
Net return ($/bu)	-$0.10	$0.21	$0.47	$0.69	$0.88
Net return ($/acre)	-$9.57	$22.23	$54.03	$85.83	$117.63
Low price ($/bu)	$2.21	$2.21	$2.21	$2.21	$2.21
Net return ($/bu)	-$1.10	-$0.79	-$0.53	-$0.31	-$0.12
Net return ($/acre)	-$104.57	-$82.77	-$60.97	-$39.17	-$17.37

Flat Price per Bushel at Different Price/Yield Combinations

	Corn Following Soybeans				
Yield	Very Low	Low	Base	High	Very High
Yield (bu/acre)	95	105	115	125	135
Total cost per acre	$314.52	$314.82	$315.12	$315.42	$315.72
Total cost per bushel	$3.31	$3.00	$2.74	$2.52	$2.33
Premium per bushel	-	-	-	-	-
Premium per acre	-	-	-	-	-
Expected price ($/bu)	$2.65	$2.65	$2.65	$2.65	$2.65
Net return ($/bu)	-$0.66	-$0.35	-$0.09	$0.13	$0.32
Net return ($/acre)	-$62.77	-$36.57	-$10.37	$15.83	$42.03
High price ($/bu)	$2.65	$2.65	$2.65	$2.65	$2.65
Net return ($/bu)	-$0.66	-$0.35	-$0.09	$0.13	$0.32
Net return ($/acre)	-$62.77	-$36.57	-$10.37	$15.83	$42.03
Low price ($/bu)	$2.65	$2.65	$2.65	$2.65	$2.65
Net return ($/bu)	-$0.66	-$0.35	-$0.09	$0.13	$0.32
Net return ($/acre)	-$62.77	-$36.57	-$10.37	$15.83	$42.03

Flat Payment per Acre Price/Yield Combinations

	Corn Following Soybeans				
Yield	Very Low	Low	Base	High	Very High
Yield (bu/acre)	95	105	115	125	135
Total cost per acre	$314.52	$314.82	$315.12	$315.42	$315.72
Total cost per bushel	$3.31	$3.00	$2.74	$2.52	$2.33
Premium per bushel	$0.00	$0.00	$0.00	$0.00	$0.00
Premium per acre	$35.00	$35.00	$35.00	$35.00	$35.00
Expected price ($/bu)	$2.71	$2.71	$2.71	$2.71	$2.71
Net return ($/bu)	-$0.60	-$0.28	-$0.03	$0.19	$0.38
Net return ($/acre)	-$2.37	-$2.67	-$2.97	-$3.27	-$3.57
High price ($/bu)	$2.71	$2.71	$2.71	$2.71	$2.71
Net return ($/bu)	-$0.60	-$0.28	-$0.03	$0.19	$0.38
Net return ($/acre)	-$2.37	-$2.67	-$2.97	-$3.27	-$3.57
Low price ($/bu)	$2.71	$2.71	$2.71	$2.71	$2.71
Net return ($/bu)	-$0.60	-$0.28	-$0.03	$0.19	$0.38
Net return ($/acre)	-$2.37	-$2.67	-$2.97	-$3.27	-$3.57

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