# CONTRACT PRODUCTION AND MARKET COORDINATION FOR SPECIALTY CROPS: THE CASE OF INDIANA

Joan Fulton
Associate Professor, Purdue University

James Pritchett
Assistant Professor, Colorado State University

and

Ryan Pederson
Former Graduate Student, Purdue University

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# CONTRACT PRODUCTION AND MARKET COORDINATION FOR SPECIALTY CROPS: THE CASE OF INDIANA

Joan Fulton, James Pritchett, and Ryan Pederson

Although specialty grains and oilseeds have long been part of the crop mix in Indiana recent advances in biotechnology and low prices for commodity corn and soybeans has sparked interest in a new wave of specialty crops. Interesting questions related to specialty crop production include: why do producers produce/not produce specialty crops? What additional premiums do producers receive from specialty crops? What additional costs do producers incur from growing specialty crops? What additional revenue do producers earn from growing specialty crops?

With the production of specialty crops many producers have entered production contracts. Important questions related to contract use and the production of specialty crops include: Why do producers enter a production contract? What provisions are typically found in a specialty crop contract? What aspects of contract do producers not like?

In this paper we explore the above questions utilizing data from a survey of corn and soybean producers in Indiana. A description of the survey is found in the following section. The third section of this paper contains descriptive statistics using the survey data. The fourth section of the paper reports the results of binary logit analysis. In that section we examine which factors affect, in a statistically significant manner, whether a producer will produce a specialty grain and for those producers that are producing a specialty grain which factors affect whether they will produce under contract. In the fifth section we use stochastic dominance analysis to evaluate alternatives that producers might consider when growing specialty crops.

## SURVEY

A specialty grain questionnaire was mailed to 8000 Indiana corn and soybean producers in March 2000. A ten-county region in southwestern Indiana was more heavily sampled as it was believed that producers in that region of the state were more actively involved in the production of specialty grains. Ex-post analysis of the data suggests that premium levels, additional costs, and production levels were homogenous throughout the state so the oversampling did not affect the results presented here. Questionnaires were returned by 2304 producers for a response rate of almost 29%. The questionnaire was four pages long and included questions about type of farming operation, adoption of specialty grains, additional costs and premiums from producing specialty grains, identity preservation practices implemented with specialty grains, use of production contracts for growing specialty grains, activities required as part of production contracts, reasons for using production contracts, and least desirable aspects of production contracts.

Specialty grain producers grow a variety of crops and typically devote nearly one third of their acreage to the specialty crops. Producers who grow specialty grains tend to be larger than those who don't grow specialty grains. In 1999 specialty grain producers harvested an average of 874 acres while those producers who did not grow specialty grains harvested an average of 284 acres. One could conclude that producers of larger acres are better suited for growing specialty grains than smaller producers.

Only 15% of the survey responds did producer a specialty grain. Over half of the respondents cited "no opportunities to sell the specialty crop" as a reason for not growing specialty crops (Table 1). About 40% of the respondents cited "additional investment required" and "requires too much managerial time" as reasons for not growing specialty crops. One-quarter of the respondents cited high variable production costs as the reason for not growing specialty crops.

Table 1: Reasons for Not Producing a Specialty Grain

| Reasons | Number of Respondents | % of Total Respondents (N=1114) |
|---|---|---|
| No opportunities to sell the specialty crop | 641 | 56% |
| Additional investment required | 463 | 40% |
| Requires too much managerial time | 418 | 36% |
| Variable production costs too high | 284 | 25% |

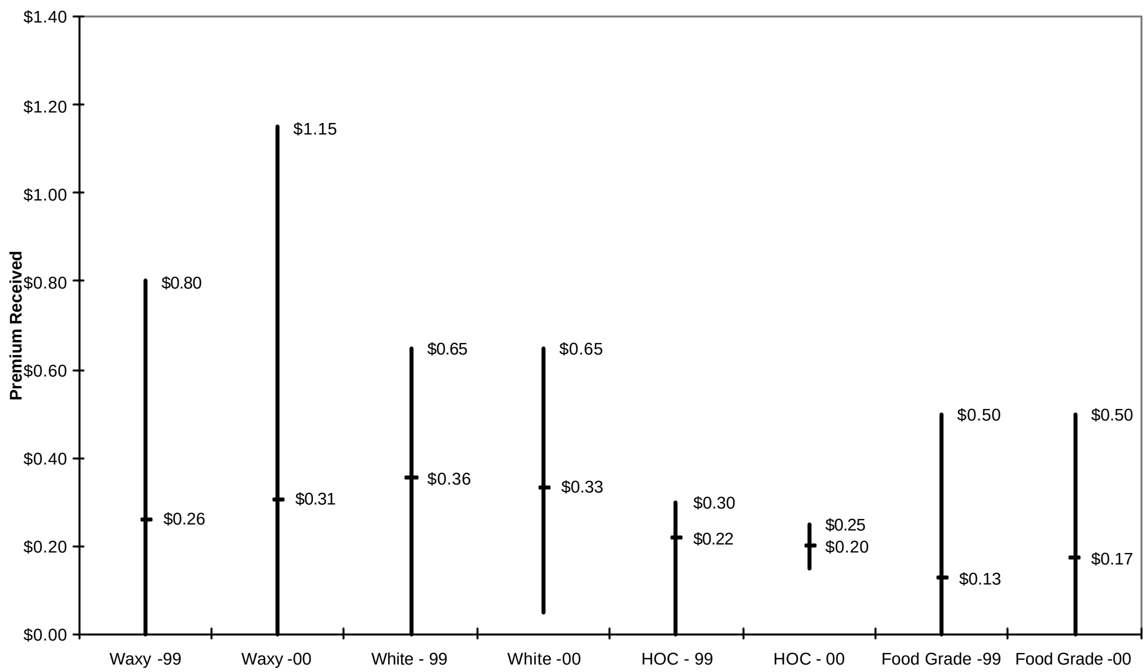
## SPECIALTY CROP PRODUCTION IN INDIANA

Producers plant specialty crops believing that higher profits will result compared to No. 2 yellow and commodity soybeans. One of the objectives of this research was to evaluate whether the producers actually experience the higher profits. Data from the survey on yields, premiums, and additional costs were used to calculate additional net revenue from producing specialty crops. The results are reported in the following two sub-sections, first for corn and then for soybeans.

### *Specialty Corn*

Respondents were asked to report the average premium received in 1999 and the premium they expect to receive in 2000 for each of the specialty corn crops they reported growing. The results for waxy corn, white corn, high oil corn and food grade corn, are shown in Figure 1 with the high, low and average premiums reported with the vertical lines.

Figure 1:  Range of Premiums for Specialty Corn




There is a substantial range in reported premiums.  For 1999 Waxy corn growers reported an average premium of $0.26 per bushel, with a maximum premium reported of $0.80 per bushel and a minimum of $0.00 per bushel.  Producers expectations for 2000 suggest that the range of premiums will be even larger with a maximum expected premium of $1.15 per bushel, a minimum of $0.00 and an average of $0.31 per bushel.  Also of interest are high oil corn premiums, which ranged from $0.00 per bushel to $0.30 per bushel in 1999 and were expected to range from $0.15 to $0.20 per bushel in 2000.  The wide variation in premiums be due to a significant difference in the quality of specialty corn or that premiums are largely dependent on individual negotiation.

Respondents were asked to estimate the additional costs that they incurred from producing specialty corn.  The questionnaire was structured with costs under specific headings to facilitate accurate information collection.  Additional cost categories included additional seed cost (including both higher plant population as well as technology fees associated with specialty corn seed), transportation, handling and drying, storage and segregation, fertilizer, herbicide, pesticide, other more intensive management and production requirements and quality testing.  The results are presented in Table 2.

High oil corn producers reported the highest per bushel cost for seed (Seed-RC) and for the technology fee (Seed-TF).  The greatest additional costs per bushel for waxy corn, food grade corn, and white corn were found in the categories of transportation, handling and drying (H&D), and storage and segregation (S&S).  Respondents reported very little additional cost for fertilizer, herbicide, and other production and management requirements, or quality testing. It is important to note that additional production costs may be generated in areas that are not at first expected, transportation, handling and storage of the grains.

Table 2: Additional Costs per Bushel of Producing Specialty Corn in Indiana

| | **High Oil** | **Food Grade** | **Waxy** | **White** |
|---|---|---|---|---|
| **Seed – RC** | $0.031 | $0.005 | $0.026 | $0.008 |
| **Seed – TF** | $0.044 | $0.003 | $0.001 | $0.003 |
| **Transportation** | $0.016 | $0.056 | $0.060 | $0.036 |
| **H&D** | $0.006 | $0.026 | $0.032 | $0.030 |
| **S&S** | $0.008 | $0.043 | $0.014 | $0.018 |
| **Fertilizer** | $0.000 | $0.007 | $0.008 | $0.006 |
| **Herbicide** | $0.000 | $0.006 | $0.000 | $0.003 |
| **Pesticide** | $0.005 | $0.003 | $0.002 | $0.002 |
| **Management** | $0.001 | $0.001 | $0.034 | $0.008 |
| **Quality** | $0.000 | $0.000 | $0.002 | $0.001 |
| **Total Add'l Cost** | $0.111 | $0.150 | $0.179 | $0.115 |

Yield, premium and additional cost information that respondents provided were used to determine what additional profit was experienced from growing specialty corn. In this paper the difference is called additional net revenue from producing specialty corn and is determined by subtracting the additional costs per acre from the premium received per acre. There is a relatively wide difference in additional net revenue per acre for waxy, white, high oil and food grade corn (Figure 2).

The additional net revenue per acre for waxy corn ranged from a low of -$14.60 per acre to a high of $84.70 per acre. For white corn the range is from a low of -$26.75 per acre to a high of $97.00 per acre. It is important to note that the per acre additional net revenue is compared to No. 2 yellow corn. Thus a negative value for additional net revenue does not represent negative profits as such, but rather net revenue per acres less than if the producer had grown No. 2 yellow corn.

*Specialty Soybeans*

As with specialty corn, respondents were asked to report the premiums received from specialty soybeans grown (Figure 3). The greatest premium received by producers was for tofu soybeans with reported premiums ranging from a high of $1.50 per bushel to a low of $0.50 per bushel and an average premium of $0.98 per bushel. Some producers who responded to the survey received no premium for STS® Soybeans and Seed Soybeans.

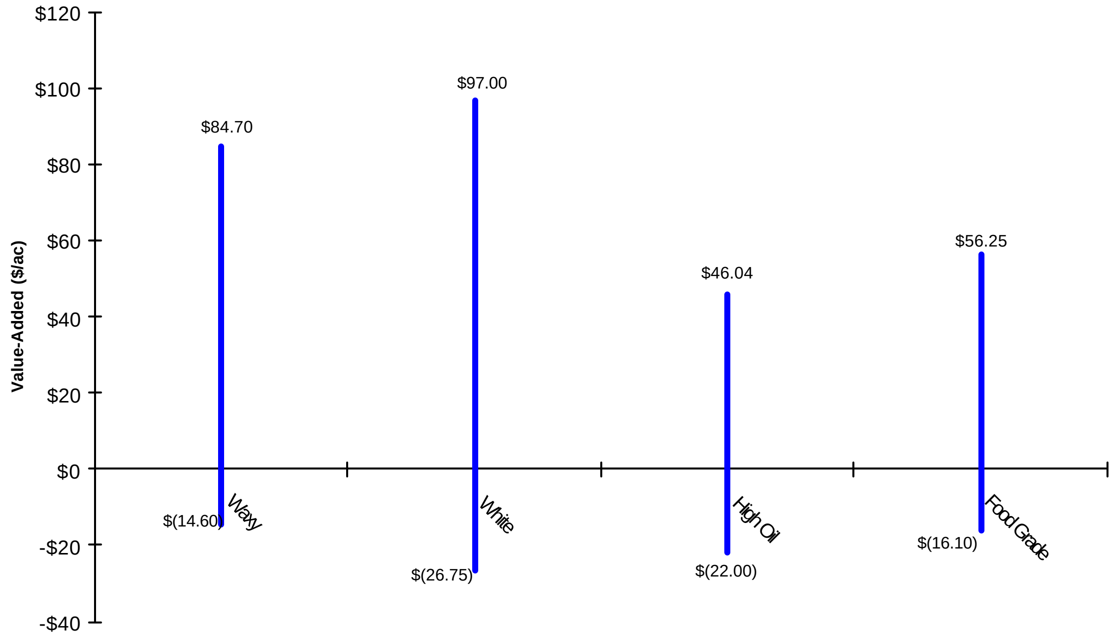


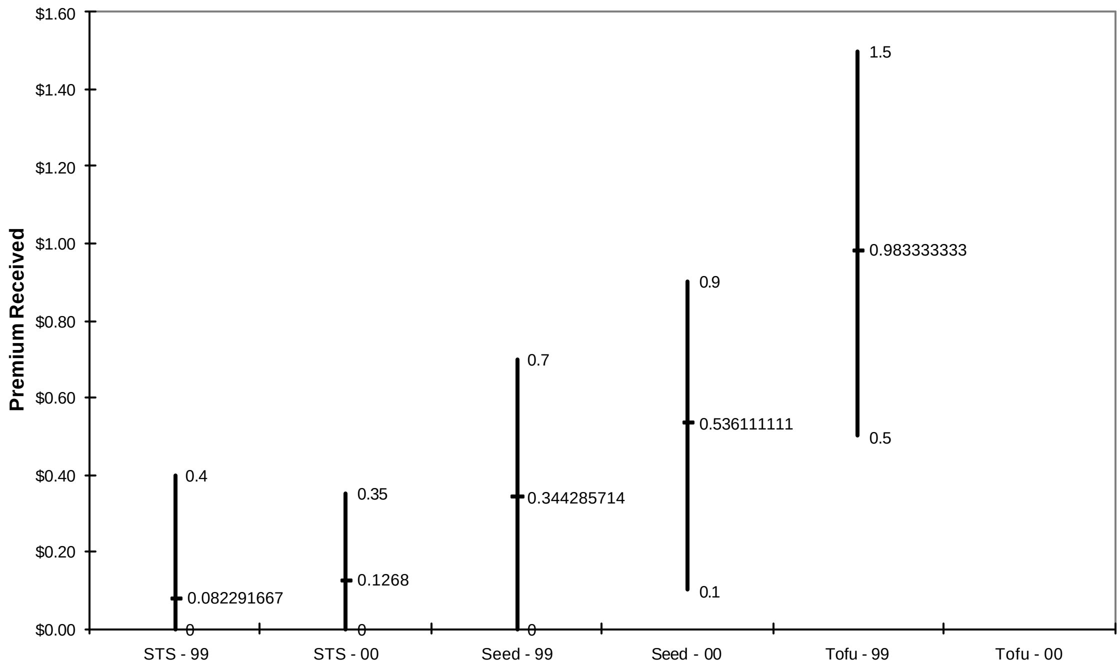

Figure 2: Range of Additional Net Revenue from Specialty Corn

It is important to consider the additional costs associated with specialty soybean production, just as was considered with specialty corn production (Table 3). Tofu and seed soybeans appear to have greater additional costs when compared to STS® soybeans. The greatest additional costs for tofu are related to its seed cost (Seed-RC), its technology fee (Seed-TC) and its transportation costs. Conversely, seed soybeans have the greatest additional costs when it comes to more intensive production/management requirements and herbicide costs, although the seed technology fee and additional transportation costs remain important factors. Clearly, the high premiums for tofu soybeans are justified given the additional costs expected with tofu soybean production.

Table 3: Additional Costs per Bushel for Producing Specialty Soybeans in Indiana

| | **Tofu** | **Seed** | **STS®** |
|---|---|---|---|
| **Seed – RC** | $0.116 | $0.009 | $0.022 |
| **Seed – TF** | $0.047 | $0.035 | $0.004 |
| **Transportation** | $0.060 | $0.003 | $0.027 |
| **H&D** | $0.000 | $0.005 | $0.005 |
| **S&S** | $0.035 | $0.028 | $0.014 |
| **Fertilizer** | $0.000 | $0.022 | $0.014 |
| **Herbicide** | $0.042 | $0.053 | $0.003 |
| **Pesticide** | $0.000 | $0.000 | $0.001 |
| **Management** | $0.012 | $0.059 | $0.004 |
| **Quality** | $0.000 | $0.000 | $0.000 |
| **Total Add'l Cost** | $0.312 | $0.214 | $0.094 |

Figure 3: Range of Premiums for Specialty Soybeans




Using the same method adopted for specialty corn, the additional net revenue per acre of specialty soybeans was computed (Figure 4). The additional net revenue per acre ranged from -$11.13 to $18.55 per acre for STS® soybeans and from -$27.80 to $25.00 per acre for seed soybeans. Once again, it is important to note that a negative additional net revenue per acre does not mean negative returns as such; rather that the producer could have earned more if commodity soybeans were produced rather than the specialty variety.

*Use of Contracts when Growing Specialty Crops*

Since producers often use contracts when growing specialty grains, a series of questions about contracts were included in the questionnaire. Although producers enter into contracts for many reasons, additional revenue was the reason that was most widely noted with 92% of respondents identifying that reason (Table 4). Just over one-third of the respondents indicated that access to market was a reason for entering a contract. Access to seed and reducing price risk were cited as reasons for contracting by 28% and 21% of respondents respectively.

Figure 4: Range of Additional Net Revenue for Specialty Soybeans

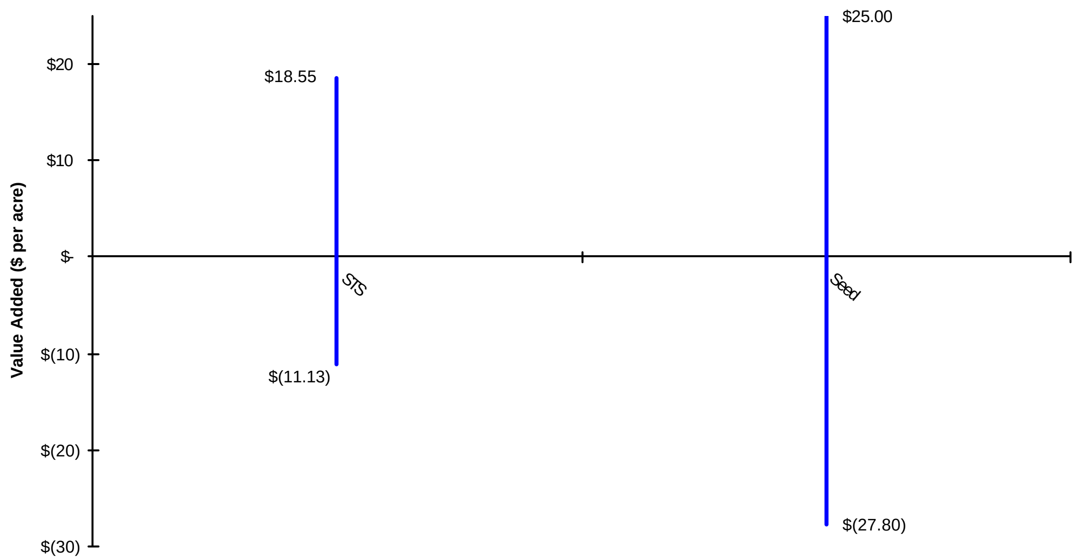



Table 4: Reasons for Entering a Specialty Production Contract

| Reasons | Number (N=170) | % of Respondents |
|---|---|---|
| Additional Revenue | 156 | 92% |
| Access to Market | 64 | 37% |
| Access to Seed | 48 | 28% |
| Reduce Price Risk | 36 | 21% |
| Access to Technology | 23 | 14% |
| Reduced Input Costs *(e.g. cheaper herbicide)* | 20 | 12% |
| Other | 8 | 5% |

Respondents observe different provisions in their contracts. In particular, a majority of producers reported that their contract stipulated the planning of a variety from an approved list, storage of the crop on the farm, a specific delivery time, and a specific delivery location. (Table 5). Contract frequently contained provisions for managing delivery logistics (e.g. deliver to a specific location is noted in 89% of contracts reported, delivery on specific dates is found in 74% of contracts, store crop on-farm is required by 71% of contracts). Managing quality is accomplished when designating varieties (71% of contacts) or by sampling for quality testing (42% of contracts). More stringent quality control provisions were observed less frequently with only 31% of contracts requiring a specific pesticide or herbicide program, 29% requiring specific equipment and 27%

requiring specific harvest practices. Finally, pricing mechanisms were found in a minority of contracts.

Table 5: Provisions Found in Specialty Grain Contracts

| **Activities Required by Contract** | **Number (N=170)** | **% of Respondents** |
|---|---|---|
| Deliver to Specific Location | 152 | 89% |
| Deliver on Specific Dates | 125 | 74% |
| Plan a Variety from a Designated List | 121 | 71% |
| Store the Crop on Farm | 121 | 71% |
| Provide Samples for Quality Testing | 72 | 42% |
| Specific Pricing Method *(e.g. only forward contracts)* | 68 | 40% |
| Specific Pricing Window *(e.g. Sept.-Jan. only)* | 63 | 37% |
| More Intensive Production Management such as Pesticide or Herbicide Programs | 52 | 31% |
| Specific Handling Equipment and Instructions | 50 | 29% |
| Use Specific Harvesting Equipment or Follow Specific Harvesting. | 46 | 27% |

When asked for the three least desirable aspects of their contracts, respondents identified uncertainty around the delivery date to be the most problematic, followed by the distance to the delivery location. Table 6 lists the least desirable aspects of contracts by survey respondents as well as the number of respondents that selected each aspect.

Table 6: Least Desirable Aspects of a Specialty Grain Contract

| **Least Desirable Aspects of Contract** | **Number (N-170)** | **% of Respondents** |
|---|---|---|
| Delivery Date Unknown | 83 | 49% |
| Delivery Location | 56 | 33% |
| Additional Costs | 51 | 30% |
| Yield Penalty | 47 | 28% |
| Quality Standard | 45 | 27% |
| Identity Preservation | 42 | 25% |
| Loss of Control | 37 | 22% |
| Timing of Payment | 26 | 15% |
| Additional Investment | 16 | 9% |
| Input Requirements | 15 | 9% |
| Other | 11 | 7% |

**LOGIT ANALYSIS**

Producers were asked to provide background information concerning their farming operation. In addition to the type of operation (e.g. whether their operation was primarily grain, grain and livestock or primarily livestock), they were asked to identify the total number of acres planted to corn and soybeans, and how many of these acres were planted to genetically modified crops.

The background information on the respondents was used in a binary logit analysis to identify the factors that have the greatest influence on first whether a producer grows specialty grains and second whether a producer grows specialty grains under contract. Table 7 presents the results of the logit analysis of the factors affecting whether a producer grows specialty grains. The dependent variable is equal to one if the producer raised specialty grains and zero otherwise. The explanatory variables include the total number of acres planted by the producer (ACRES), dummy variables for the type of operation (Cash Grain, Grain and Livestock, Livestock, and Other). In addition a dummy variable that was equal to one of the producer planted genetically modified crops (GMO) and zero otherwise was included. The operation type Cash Grain was left out of the estimation to avoid the dummy variable trap and consequently the coefficients for operation types are analyzed relative to Cash Grain producers. Two models are presented in Table 7 for comparison purposes.

The Chi Squared values of 263.85 and 257.85 indicate that the set of variables as a whole are statistically significant, at the 99% confidence level, in explaining the variation in the dependent variable. In addition, the models correctly predicted nearly 86% of the time. Both GMO and ACRES were statistically significant at the 99% level and both variables have positive coefficients. Larger producers and those that grow GMO crops are more likely to grow specialty crops. The variables for type of operation were not statistically significant. These results are consistent with those of Swanson et al. They evaluated how producer characteristics affect the likelihood of raising specialty grains by using a stepwise multiple regression model. Results of their regression indicated that the farm size variable had a positive coefficient.

Table 7: Binary Logit Results for Factors Affecting Whether Producer Grows Specialty Grains

| Variable | Model 1 | Model 2 |
|---|---|---|
| Constant | -2.8052* | -2.8402* |
| GMO | 0.7981* | 0.8212* |
| ACRES | 0.0013* | 0.0014* |
| Grain & Livestock | -0.7931 | |
| Livestock | -0.4362 | |
| Other | 0.4856 | |
| Chi Squared | 263.85* | 257.85* |
| % Correctly Predicted | 85.8% | 85.5% |

* Statistically significant at 99%

In a similar manner, a binomial logit analysis was performed to determine the factors associated with whether specialty grain producers choose to raise specialty grains under contract. The sample for the model only includes those producers who indicated producing specialty grains so is a smaller sample size at 283 observations.

In this model the dependent variable equals one if the crop was produced using a production contract and zero otherwise. Explanatory variables included dummy variables based on whether the producer planted genetically modified crop varieties (GMO), if the producer raised more than one variety of specialty grain and the intended end-use of the specialty grain. End-use was divided into three categories: Food, Feed and Seed. Seed was the variable excluded from the regression to avoid the dummy variable trap. Thus the coefficients for Food and Feed are analyzed relative to Seed. Two models are presented for comparison purposes.

The set of variables as a whole are statistically significant at the 99$ confidence level, as indicated by the Chi Squared values of 84.96 and 82.39. The models were able to correctly predict over 70% of the time. The coefficients for GMO and multiple specialty grains are not statistically significant in Model 1, and thus were left out of Model 2. The coefficient for ACRES is positive and statistically significant at the 99% confidence level, indicating that as operation size increases it is more likely that the producer will producer specialty grains under contract. The coefficients for Food and Feed are both negative, indicating that specialty grains for seed use are more likely to be grown under contract than specialty grains used for food or feed. The feed coefficient is statistically significant at the 99% confidence level and Food is statistically significant at the 90% confidence level.

Table 8: Binary Logit Results for factors affecting Contract use by Producers growing Specialty Grains

| Variable | Model 1 | Model 2 |
|---|---|---|
| Constant | 0.1147 | 0.2784 |
| GMO | 0.1080 | |
| ACRES | 0.0012* | 0.0012* |
| Multiple Specialty Grains | 0.398 | |
| Food | -0.9319** | -0.9362* |
| Feed | -1.2397* | -1.2532* |
| Chi Squared | 84.96* | 82.39* |
| % Correctly Predicted | 71.8% | 73.3% |

* Statistically significant at 99%
**Statistically significant at 90%

**RISK ANALYSIS BASED UPON EFFICIENCY CRITERIA**

It is possible to compare the risks associated with different varieties of specialty grains using additional analysis. In this section three areas are analyzed including: differences in premiums received for the selected varieties of specialty grains, differences in the level of additional net revenue created by selected varieties of specialty grains and differences in premiums received for raising specialty grains with and without a contract. In analyzing the data, four efficiency criteria are used including: Expected value-Variance (EV), First Degree Stochastic Dominance (FSD), Second Degree Stochastic Dominance (SSD) and Stochastic Dominance with Respect to a Function (SDRF). Three ranges of risk aversion will be considered with the SDRF analysis. The lower and upper levels of absolute risk aversion coefficient for slightly risk averse are 0.00000 and 0.00001 respectively. For moderately risk averse the lower and upper levels of absolute risk aversion coefficient are 0.00001 and 0.0001 respectively. For highly risk averse the lower and upper levels of absolute risk aversion coefficient are 0.0001 and 0.001 respectively.

Data obtained from the survey on premiums received in 1999 and expected premiums for 2000 as well as additional net revenue levels achieved for 1999 will be used in this analysis. For the EV and FSD efficiency criteria it was possible to use the data directly to determine the alternative in the efficient and inefficient sets. For the EV criteria, the mean and standard deviation values were used. For FSD the alternatives in the efficient and inefficient set were determined by graphing and visually inspecting the empirical cumulative distributions. In order to evaluate the survey data under SSD and SDRF an equal number of observations was needed for each of the alternatives being considered. In order to generate these observations @RISK®, an Excel® add-in was used. A process similar to the one followed by Richardson et. al. to simulate an empirical probability distribution was used to generate the needed observations for this analysis. First a CDF was developed for the data set. Next, pseudo-minimum and pseudo-maximum values were assigned for each distribution. These values lie close to the outside of the observed minimum and maximum values, and allow for the simulated data to generate the same extreme values that were reported by the survey respondents. After the CDFs and the associated pseudo-minimum and pseudo-maximum values were identified, the risk cumulative function in @RISK® was used to generate 1000 observations for each of the desired data sets. Summary statistics and CDFs generated from the simulated observations were compared against the summary statistics and CDFs for the survey data to ensure that the simulated data was an appropriate representation of the survey data. Then tests for SSD and SDRF were performed using a DOS based program by Cochran and Raskin.

Table 9 reports the alternatives remaining in the efficient set by premiums received in 1999 and expected in 2000 for different varieties of specialty soybeans and specialty corn. Although the mean premium received for seed soybeans was considerably higher than the mean premium for STS® soybeans n both years, neither variety is moved into the inefficient set based on EV criteria because STS® soybeans also had a higher variance. The distribution of premiums received for seed soybeans dominated the distribution of premiums received for STS® soybeans in both 1999 and 2000 based on FSD, SSD and SDRF. This difference in ranking is not unexpected, as the distributions of premiums are not normal and as suggested by King and Robison (p. 73) "the resulting efficient set (found under EV) may differ from the SSD efficient set" when non-normal distributions are evaluated.

In both 1999 and 2000 survey respondents indicated that white corn had the highest mean premium and food grade corn had the lowest mean premium. Bases on the EV. FSD and SSD criteria, food grade corn was moved to the inefficient set in both years, but the remaining three corn varieties remained in the efficient set. When the distributions of specialty corn premiums are ranked using SDRF additional varieties are moved into the inefficient set. Under all three ranges of risk aversion white corn was the only variety remaining in the efficient set. More risk averse producers will prefer the premiums associated with white corn over the other varieties of specialty corn.

Table 9: Alternatives Remaining in Efficient set by Premiums Received by Indiana Producers in 1999 and 2000 Growing Specialty Grains

| | **EV** | **FSD** | **SSD** | **SDRF Slightly Risk Averse** | **SDRF Moderately Risk Averse** | **SDRF Highly Risk Averse** |
|---|---|---|---|---|---|---|
| **Specialty Soybeans (1999)** | STS<br>Seed | Seed | Seed | Seed | Seed | Seed |
| **Specialty Soybeans (2000)** | STS<br>Seed | Seed | Seed | Seed | Seed | Seed |
| **Specialty Corn (1999)** | High Oil<br>Waxy<br>White | High Oil<br>Waxy<br>White | High Oil<br>Waxy<br>White | White | White | White |
| **Specialty Corn (2000)** | High Oil<br>Waxy<br>White | Waxy<br>Waxy<br>White | High Oil<br>Waxy<br>White | White | White | White |

When evaluating the selected varieties of specialty grains with respect to the level of additional net revenue received per acre, the EV criteria was not able to eliminate any alternatives from the efficient set (Table 10). Under FSD and SSD both varieties of soybeans remain in the efficient set, while food grade corn and high oil corn drop to the inefficient set. When SDRF was used to compare the alternatives STS® soybeans were moved to the inefficient set. In the case of corn, only white corn remains in the efficient set under SDRF. It is interesting to note that these were the same rankings produced when only the premium levels were analyzed.

Finally, efficiency criteria were used to evaluate the risk return trade-off of producing under a contract versus no contract. In this analysis the level of premiums received for 1999 and expected for 2000 were combined for each specialty grain variety in order to create a more complete distribution. Each of the six varieties of specialty grains that have been previously discussed were analyzed. Rankings under EV, FSD, SSD and SDRF are reported in Table 11.

Table 10: Alternatives Remaining in Efficient set by Added Value Achieved by Indiana Producers in 1999 and 2000 Growing Specialty Grains

| | **EV** | **FSD** | **SSD** | **SDRF Slightly Risk Averse** | **SDRF Moderately Risk Averse** | **SDRF Highly Risk Averse** |
|---|---|---|---|---|---|---|
| **Specialty Soybeans** | STS<br>Seed | STS<br>Seed | STS<br>Seed | Seed | Seed | Seed |
| **Specialty Corn** | Food Grade<br>High Oil<br>Waxy<br>White | Waxy<br>White | Waxy<br>White | White | White | White |

In the case of seed soybeans, the EV criteria suggested that producing under contract was in the efficient set, and not using a contract in the inefficient set. When analyzed under FSD, SSD both alternatives remained in the efficient set. Producing without a contract moved back into the inefficient set under SDRF for all levels of risk aversion. This occurred because the CDFs crossed at the outlying probabilities, but the CDF for contract production was significantly to the right of the no contract at several probability levels.

Under the EV criteria contract alternatives for STS® soybeans could not be ranked. However, when compared by both FSD, SSD and SDRF producing under contract dominated producing without a contract.

Rankings for the four varieties of specialty corn were nearly identical under all efficiency criteria with the exception of high oil corn. Under EV and FSD both contract and no contract remain in the efficient set. Under SSD and SDRF producing with no contract remains in the efficient set while producing under contract moves to the inefficient set.

Table 11: Alternatives Remaining in Efficient set by Premiums Received by Indiana Producers in 1999 and 2000 With and Without Production Contracts

| | **EV** | **FSD** | **SSD** | **SDRF Slightly Risk Averse** | **SDRF Moderately Risk Averse** | **SDRF Highly Risk Averse** |
|---|---|---|---|---|---|---|
| **Seed Soybeans** | Contract | No Contract<br>Contract | No Contract<br>Contract | Contract | Contract | Contract |
| **STS Soybeans** | No Contract<br>Contract | Contract | Contract | Contract | Contract | Contract |
| **Food Grade Corn** | No Contract<br>Contract | Contract | Contract | Contract | Contract | Contract |
| **High Oil Corn** | No Contract<br>Contract | No Contract<br>Contract | No Contract | No Contract | No Contract | No Contract |
| **Waxy Corn** | No Contract<br>Contract | Contract | Contract | Contract | Contract | Contract |
| **White Corn** | No Contract<br>Contract | Contract | Contract | Contract | Contract | Contract |

**REFRENCES**

Cochran, Mark J. and Rob Raskin. A Generalized Stochastic Dominance Program for the IBM PC. Stochastic Dominance Program. Version 5.1, Copyright 1986-93.

King, Robert P. and Lindon J. Robison. Risk Management in Agriculture. "Risk Efficiency Models." Peter J. Barry (Ed.). Iowa State University Press, Ames Iowa, 1984.

Richardson James W, Steven L. Klose, and Allan W. Gray. "An Applied Procedure for Estimating and Simulating Multivariate Empirical (MVE) Probability Distributions In Farm-Level Risk Assessment and Policy Analysis." Journal of Agricultural and Applied Economics, pp. 299-315, Vol. 32, Num. 2, August 2000.

Swanson, Burton E. Hohamed M. Samy, Andrew J. Sofranko, Joe G. Harper, and Rita L Frerichs. "Assessing Farmer's Interests and Needs for Specialty Corn and Soybean Information in the Lower Illinois River Basin." http://web.aces.uiuc.edu/value/research/assessing.html , January 23, 2003.