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# The Economic Impact of Intensive Commodity Price Risk Management Education

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**Abstract:** Research shows that risk management, and in particular price risk management, has been a major concern for agricultural producers, and as such, has been the target area of a substantial amount of Extension education programming. Analysis of survey results indicate that the Master Marketer program, a 64-hour intensive training program that develops master volunteers who extend the education through marketing clubs, is a valuable Extension program helping producers to better-manage price and production risks. On average, graduates of the program have increased their net income by more than $33,000 annually.

# Introduction

A broader view of risk as it relates to management decisions has been embraced due to a multitude of factors, including the introduction of agricultural commodity options in the mid-1980s. In addition, advancements in computer technology have greatly simplified the task of analyzing data and demonstrating in educational programs the concept of risk and strategies to manage risk. Likewise, producer interest in learning more about price risk management strategies has grown.

A survey of crop producers by the Purdue University Cooperative Extension Service found that the most important source of risk facing producers was crop price variability (Patrick & Alexander, 2004). Marketing and price risk management is an area that Extension in many states has placed more emphasis on in the past two decades. In fact, a study by Chizari and Taylor identified innovative marketing strategies, among several other subject matter areas, as one of the reasons for adult educational programs in agriculture (1991).

Considering the ever-changing environment both producers and Extension educators operate in, Trede and Whitaker stated that rapid changes in agricultural technology and in planning and delivery of programs, and the changing structure of the farming industry clearly indicate that agricultural educators will need to reassess their role and responsibility in the planning and delivery of beginning farmer education (2000). Re-evaluating marketing and price risk management educational needs and delivery strategies is precisely what Texas Cooperative Extension (TCE) was doing when the uniquely designed Master Marketer program was created.

# Risk Management Extension Education

The proliferation of risk management educational programs conducted by Extension in the past decade was met by the challenge of discovering effective methods of teaching risk management. Common methods of program delivery were through 1-day and half-day workshops, multi-day workshops and short courses, Internet-based programs, marketing clubs, and short publications. A study by Anderson and Mapp (1996) involved interviewing twelve Extension economists who had developed and delivered educational programs on making decisions in a risky environment. The results of the qualitative study reinforced the notion that producers want to learn about specific strategies they can implement that will result in increased profitability. Producers, in general, are not interested in knowing how numbers were calculated or the underlying theory supporting a particular concept or strategy.

Historically, U.S. farm policy has provided some level of financial risk protection through its price support programs. However, that changed with the enactment of the 1996 Farm Bill (The Federal Agricultural Improvement and Reform Act), which brought about the greatest change in farm policy since the 1930's (Knutson, Flinchbaugh, & Smith, 1998). With the new policy provisions in the Farm Bill, a producer's ability to manage financial risk became increasingly important.

# The Master Marketer Program

In January 1996, the Agricultural Economics Extension Unit of Texas Cooperative Extension launched the Master Marketer program, which is believed to be the most intensive commodity marketing and risk management educational program for agricultural producers ever offered by Extension in the U.S. The program combines three successful educational concepts-master programs, master volunteers, and marketing clubs-into a unique marketing and risk management program. The Master Marketer program consists of 64 hours of intense training spread over four separate 2-day sessions over a 6-week time period. After completion of the program, many graduates start and lead a marketing club in their home area.

The primary focus of the program is on teaching price risk management strategies, how to develop a marketing plan, and how to analyze current and future market conditions. Some other topics include managing production risk through crop insurance, weather risk, varietal seed selection, and enterprise diversification.

The Master Marketer program is taught at the intermediate-to-advanced level, and pre-program "leveling workshops" are held for those participants who are in need of a refresher or introductory-level course on commodity marketing and risk management to ensure that they are ready for the program. Producers having an expressed interest in marketing and leadership abilities are desired due to the expectation that graduates will serve as volunteers in starting a marketing club in their home area. The end results are an expansion in the number of volunteer educators and valuable educational opportunities for producers within a cost effective framework that circumvents personnel and resource constraints currently hindering marketing and production risk management educational efforts (Waller, Amosson, Smith, Bevers, & McCorkle, 2004).

# Methods

A Master Marketer evaluation survey was developed and has been administered 2 1/2 years after the completion of each program. This amount of time allowed graduates two crop years to implement any new risk management techniques learned in the program.

The survey, which focused on knowledge, adoption of practices, and economic impact, contained six sections and followed the post-then-pre design as described by Rockwell and Kohn (1989). The purpose of Section 1 was to gather general information about graduates' marketing practices using close-ended, two-option response format (yes/no) for two time periods-before attending the program and after attending the program. Section 2 dealt with the types of market analysis a producer might use to develop his or her personal market outlook. Section 3 was designed to gather information about graduates' ability to correctly use specific risk management strategies. The purpose of Section 4 was to gather information about graduates' efforts and experiences with starting and leading a marketing club.

Section 5 asked graduates for the estimated price impact as a result of their participation in the Master Marketer program. The price impact questions asked for the difference in the price received using the tools learned in the Master Marketer program versus the price they likely would have received had they marketed their commodities using the methods they employed before attending the Master Marketer program. A list of price impact ranges for corn, wheat, grain sorghum, cotton, soybeans, cattle, sunflowers, and hogs were provided for graduates to choose from. This was a close-ended question with ordered response structure (nine price impact categories). For each commodity, the choices of price impacts included "no change," four ranges of price decreases, and four ranges of price increases. The price ranges were intended to represent the realistic range of possible impacts that could have been experienced by graduates.

The purpose of Section 6, the last section of the questionnaire, was to collect production-related information on crop and livestock enterprises, the typical amount of gross sales, demographic information. Space was made available for graduates to provide any open-ended comments they desired.

# Results

Table 1 provides a description by program location of the 681 Master Marketer graduates. Of the 431 (63%) Master Marketer graduates who provided a valid response to the questionnaire, 283 (66%) of them indicated having dryland crop production, and most respondents produce more than one crop on their farm (Table 2). Excluding pasture acres, the mean total dryland crop acreage was 1,900. There were 204 respondents (47 %)

who reported having irrigated crop production (Table 3), with the mean and median being 1,378 acres and 842 acres respectively.

**Table 1.**
Profile of Master marketer Graduates and Respondents by Program Location (n=768, n=431)

| Program Location/Year | Number of Graduates | Percent of All Graduates | Number of Respondents | Response Rate |
|---|---|---|---|---|
| Amarillo 1996 | 60 | 8.8 | 38 | 63.3% |
| Lubbock 1997 | 64 | 9.4 | 42 | 65.6% |
| Wharton 1997 | 47 | 6.9 | 33 | 70.2% |
| Waco 1998 | 47 | 6.0 | 37 | 90.2% |
| Vernon 1998 | 41 | 6.9 | 31 | 65.9% |
| Amarillo 1999 | 62 | 9.1 | 37 | 59.6% |
| Victoria 1999 | 44 | 6.5 | 22 | 50.0% |
| Lubbock 2000 | 64 | 9.4 | 37 | 57.8% |
| Uvalde 2000 | 27 | 4.0 | 14 | 51.9% |
| Abilene 2001 | 21 | 6.3 | 12 | 57.1% |
| Vernon 2001 | 43 | 3.1 | 24 | 53.5% |
| Weslaco 2001 | 27 | 4.0 | 13 | 48.1% |
| Amarillo 2002 | 52 | 7.6 | 33 | 63.5% |
| Kingsville 2002 | 14 | 2.1 | 10 | 71.4% |
| Lubbock 2003 | 16 | 2.3 | 13 | 81.3% |
| Vernon 2004 | 52 | 7.6 | 35 | 67.3% |
| Total | 681 | 100.0 | 431 | 63.3% |

**Table 2.**
Profile of Master Marketer Participants by Dryland Crops (n=283*)

| Crop | Frequency | Percent | Mean Acres | Median Acres | Minimum | Maximum |
|---|---|---|---|---|---|---|
| Corn | 51 | 18.0 | 707 | 550 | 50 | 3,000 |
| Milo | 126 | 44.5 | 823 | 500 | 10 | 7,000 |
| Wheat | 183 | 67.8 | 1,289 | 700 | 30 | 20,000 |
| Cotton | 125 | 44.2 | 957 | 600 | 15 | 6,500 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Sunflowers** | | | | | | |
| Soybeans | 14 | 4.9 | 437 | 400 | 100 | 800 |
| Hay | 53 | 19.4 | 247 | 150 | 10 | 1,000 |
| Improved Pasture | 64 | 22.6 | 687 | 200 | 20 | 15,000 |
| Native Pasture*** | 103 | 36.4 | 2,383 | 1,000 | 25 | 20,000 |
| Other Crops | 15 | 5.3 | 766 | 500 | 21 | 3,000 |
| Total Dryland Farms* | 283 | | 1,900 | 1,150 | 10 | 20,000 |

*The mean acreage for total dryland farms does not include pasture acres. Percent totals more than 100% because most farms have more than one crop.
**Due to the frequency for sunflowers being less than 5, production information is not reported to protect the confidentiality of the respondent.
***Two responses representing very large native pasture acres are not included in maximum acres to protect the confidentiality of the respondents.

**Table 3.**
Profile of Master Marketer Participants by Irrigated Crop Acres (n=204)

| **Crop** | **Frequency** | **Percent** | **Mean Acres** | **Median Acres** | **Minimum** | **Maximum** |
|---|---|---|---|---|---|---|
| Corn | 102 | 50 | 843 | 500 | 60 | 4,800 |
| Milo | 74 | 36.8 | 297 | 200 | 20 | 1,839 |
| Wheat | 102 | 50.5 | 572 | 250 | 30 | 3,200 |
| Cotton | 101 | 49.5 | 784 | 500 | 30 | 4,100 |
| Sunflowers | | | | | | |
| Soybeans | 14 | 6.9 | 363 | 300 | 100 | 814 |
| Rice** | | | | | | |
| Hay | 35 | 17.2 | 231 | 120 | 8 | 1,500 |
| Improved Pasture | 11 | 5.4 | 256 | 120 | 25 | 800 |
| Native Pasture | 6 | 2.9 | 1,740 | 1,100 | 240 | 4,600 |
| Other Crops | 26 | 12.7 | 725 | 363 | 60 | 4,524 |
| Total Irrig. Farms* | 204 | | 1,378 | 842 | 8 | 9,934 |

*The mean acreage for total irrigated farms does not include pasture acres. Percent totals more than 100% because most farms have more than one crop.
**Because the frequency for rice is less than 5, production information is not reported to protect the confidentiality of the respondent.

In terms of total crop acres (dryland and irrigated), 338 farms had an average of 2,422 crop acres. For comparison purposes, 5.7% of the farms in Texas have 2,000 or more acres of cropland (USDA-NASS, 2004).

There were 216 respondents (50%) who indicated having at least one of three types of cattle enterprises (Table 4). Many of the respondents reported having more than one type of livestock enterprise. Having a cow herd was indicated by 161 respondents, or 48% of those with livestock. The median size cow herd was 100 head. There were 122 respondents (37%) who indicated having a stocker cattle enterprise, and 49 respondents (15%) who reported finishing cattle in a feedlot. The median size for stocker and feedlot enterprises were 463 and 500 head respectively.

**Table 4.**
Profile of Master Marketer Participants by Cattle Production (n=333)

| Crop | Frequency | Percent | Mean Head | Median Yield | Minimum | Maximum** |
|---|---|---|---|---|---|---|
| Cow-Calf | 161 | 48.3 | 338 | 100 | 4 | 13,500 |
| Stocker Cattle | 122 | 36.6 | 1,131 | 463 | 14 | 16,000 |
| Feedlot Cattle | 49 | 15.0 | 1,879 | 450 | 10 | 50,000 |
| Total Farms with Cattle* | 216 | | | | | |

*Total number of farms reporting cattle does not equal the total farms with cattle due to many farms reporting more than one type of cattle enterprise.
**Two responses representing very large cattle enterprises are not included in the maximum number of head to protect the confidentiality of the respondents.

Table 5 contains the distribution of typical annual gross income by crop income, livestock income, and total. Most of the respondents represent medium to large size commercial operations. Only 11 (2.9%) farms had gross income in the $0 to $49,000 range. The median total gross income for all farms was $437,500. Compared to all farms in the state, 3.1% of the farms in Texas had gross income of $250,000 or higher (USDA-NASS, 2004).

**Table 5.**
Profile of Master Marketer Participants by Typical Gross Income Level (n=378)

| Gross Range Income | Frequency | | | Total Gross Percent |
|---|---|---|---|---|
| | Crop | Livestock | Total Gross | |
| $0-49,000 | 29 | 82 | 11 | 2.9 |
| $50,000-249,000 | 115 | 84 | 107 | 28.3 |
| $250,000-499,000 | 87 | 30 | 99 | 26.2 |
| $500,000-1,749,000 | 89 | 34 | 127 | 33.6 |
| $1,750,000-3,749,000 | 16 | 5 | 23 | 6.1 |
| $3,750,000 or higher | 3 | 5 | 11 | 2.9 |
| Total | 339 | 240 | 378 | 100.0 |
| Mean | $546,801 | $398,333 | $744,742 | |
| Median | $312,500 | $137,500 | $437,500 | |

Information pertaining to price impacts can be found in Table 6. Respondents were given a range of price impacts-both negative and positive-and asked to indicate the change of prices received since graduating from the Master Marketer program relative to what they would have received had they employed marketing practices they used before Master Marketer. Price impacts for seven crops and cattle were reported by 372 respondents.

A corn price impact was reported by 167 respondents, with a mean price impact of $0.125 per bushel. The median price impact for corn was $0.155, the standard deviation was $0.107, and the minimum and maximum were -$0.30 and $0.30, respectively. Table 6 includes this information for the other six crops as well. The 169 respondents reporting a cattle price impact had a mean price impact of $4.63 per cwt, a median of $3.00, and a standard deviation of $5.45. While the price impact itself is important for each commodity, the study reported here focused more on the total impact on gross income, which takes into account the level of production for all commodities produced on a farm.

**Table 6.**
Price Impacts of Self-Reported by Master Marketer Respondents

| Commodity | Freq. | Percent | Mean Price* | Median Price | SD | Min. | Max. |
|---|---|---|---|---|---|---|---|
| **Crops** | | | | | | | |
| Corn | 167 | 17.5 | $0.125 | $0.155 | $0.107 | -$0.30 | $0.30 |
| Wheat | 227 | 23.7 | $0.098 | $0.055 | $0.136 | -$0.30 | $0.30 |
| Milo | 180 | 18.8 | $0.155 | $0.080 | $0.166 | -$0.45 | $0.45 |
| Cotton | 169 | 17.7 | $0.022 | $0.013 | $0.028 | -$0.076 | $0.076 |
| Soybeans | 39 | 4.1 | $0.156 | $0.155 | $0.109 | $0.00 | $0.30 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rice*** | 3 | | | | | | |
| Sunflowers*** | 2 | | | | | | |
| **Livestock and Milk** | | | | | | | |
| Cattle | 169 | 17.7 | $4.63 | $3.00 | $5.45 | -$15.00 | $15.00 |
| Total | 372 | | | | | | |

*Price units are: corn, wheat and soybeans are per bushels; cotton is per pound, and milo, rice, cattle, hogs, and milk are per hundred weight (cwt).
**Mean price is statistically significantly different from zero at alpha = .05.
***Since fewer than five respondents reported a price impact for rice and sunflowers, summary statistics are not reported to protect the confidentiality of the respondents.
Percent totals more than 100% because most farms have more than one crop or livestock enterprise.

Responses to the knowledge and adoption questions were analyzed based on the difference in the pre-and-post responses. Preliminary results indicate significant changes in perceived knowledge and practices adopted, with the results being the focus of another paper that is in progress.

The economic impact of the Master Marketer program was measured by participants' change in gross income, which takes into account the price impact, planted acres and yields for crops, and the number of head and pounds produced for livestock enterprises. The impact on gross income for Master Marketer graduates is presented in Table 7, which contains the frequency, percent, mean, median, standard deviation, and significance test information for each commodity and for the total farm impact.

Cotton had the largest mean impact on gross income for crops, with a mean of $17,733 and a standard deviation of $35,553. Cotton was followed by corn, with a mean impact of $15,356. Cattle impacts, which had the highest mean impact per farm of all commodities and were reported by 157 respondents, had a mean of $29,047 per farm and a standard deviation of $62,769. The total farm impact had a mean of $33,640 and a standard deviation of $62,055.

With the primary interest being whether or not Master Marketer graduates benefited economically, a one-tailed t-test was conducted for each of the commodity impacts and the total farm impact (change in total gross income) to test whether the impacts were greater than zero. Each of these tests was statistically significant at the .01 alpha level.

**Table 7.**
Price Impacts on Gross Income for Master Marketer Graduates (n=341)

| Commodity | Frequency | Percent | Mean Change in Gross Income | Standard Deviation | t-value | Sig.* |
|---|---|---|---|---|---|---|
| **Crops** | | | | | | |
| Corn | 140 | 41.1 | $15,536 | $26,904 | 6.73 | <.01 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Wheat | 190 | 55.7 | $6,586 | $17,977 | 5.04 | <.01 |
| Milo | 143 | 41.9 | $4,602 | $7,616 | 7.20 | <.01 |
| Cotton | 147 | 43.1 | $17,733 | $35,553 | 6.03 | <.01 |
| Soybeans | 25 | 7.3 | $2,918 | $3,256 | 4.48 | <.01 |
| Rice*** | 3 | | | | | |
| **Livestock and Milk** | | | | | | |
| Cattle | 157 | 46 | $29,047 | $62,769 | 5.78 | <.01 |
| Hogs | | | | | | |
| Milk | | | | | | |
| Total | 341 | | $33,640 | | | <.01 |

Valid % totals more than 100% because most farms have more than one crop or livestock enterprise.
* One-tailed t-test of mean > 0.
** Since fewer than 5 respondents reported a price impact for rice, summary statistics are not reported to protect the confidentiality of the respondents.

While the economic impact is statistically significant, of equal importance is the extent to which the impact is meaningful or, in this case, is economically meaningful. As noted by Olejnik and Algina (2000), statistical significance testing does not imply meaningfulness. One method of assessing the meaningfulness of the total farm impact is to consider the range of the confidence intervals around the mean. The lower and upper bounds of the confidence interval were $23,800 and $42,000, respectively. In the authors' view, this suggests a meaningful impact given the lower bound of the confidence interval is $23,800.

Another approach to measuring magnitude is to consider the value of the impact relative to the level of gross income, or percentage of gross income. For the respondents, the average impact per farm was 4% of gross income. We consider this to be a meaningful effect on gross income, but a more telling measure would be the value of the impact relative to net farm income.

While net farm income data of farms in the Master Marketer program are not available, farm financial data maintained by TCE's Financial And Risk Management (FARM) Assistance program (Klose et al., 2006) suggests that this type of impact on gross receipts would, on average, translate to an approximate 25% increase in net farm income. Additional evidence to support the magnitude of these impacts came from a follow-up survey administered in 2007 to all Master Marketer graduates. Of 227 respondents, 95% said the Master Marketer training still positively affects their decision making. Respondents also estimated that their net returns have increased 16% over the previous 2 years as a result of the training. All of this evidence suggests that the impacts were economically meaningful.

Through all phases of the data collection process and analysis of the data, all attempts were made to measure program impacts associated with the Master Marketer program. While the analysis suggests a correlation between participation in the Master Marketer program and improved returns, further econometric analysis would be necessary to better explain these relationships.

# Conclusions

The intensive nature of the Master Marketer program represents a significant shift from the traditional half-day or 1-day price risk management workshop. Having participants commit 64 hours (excluding travel time) of their time over a 6-week period requires a significant commitment on their part and on the part of Extension to coordinate the program. Analysis of survey responses from participants indicates a significant economic benefit. The methodology used in the study reported here allows for estimating the economic impact of the program, which is becoming increasingly important considering the growing need for economic accountability information at the state and national levels.

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