INFORMATION SOURCES PREFERRED BY LIMITED RESOURCE FARMERS IN USING AGRICULTURAL RISK TOOLS

Ingrid Nya Ngathou
Research Assistant, Department of Agribusiness
Alabama A&M University, Normal
Email: ingathou@aamu.edu

James O. Bukenya
Assistant Professor of Agricultural Economics
Alabama A&M University, Normal
Email: james.bukenya@email.aamu.edu

Duncan M. Chembezi
Associate Director, Small Farms Research Center
Alabama A&M University, Normal
Email: duncan.chembezi@email.aamu.edu

Selected Paper prepared for presentation at the
Southern Agricultural Economics Association's Annual Meetings
Little Rock, Arkansas, February 5-9, 2005.

Address: Department of Agribusiness, P.O. Box 1042 Normal AL, 35762.
This Research was funded by the Risk Management Agency/Civil Rights and Community Outreach Program.

INFORMATION SOURCES PREFERRED BY LIMITED RESOURCE FARMERS IN USING AGRICULTURAL RISK TOOLS

Abstract

The study collected survey data among small and limited resource farmers in north Alabama to examine limited resource farmers' perceptions of the usefulness of selected sources of risk management information. The rationale is to understand the information needs of this group of farmers and to customize outreach programs to address their needs. One of the key finding was that farmers' characteristics influence their perceptions of the sources of information available to them. Another key finding was that sources such as computerized systems and marketing clubs are the less preferred information sources.

KEYWORDS: Risk, management, information, ordered probit

Introduction

Risk and uncertainty are very evident in farming (Hardaker, Hurine and Anderson 1977; Nelson 1997; Harwood et al. 1999). Many factors, such as weather, crop and livestock diseases, insects, adoption of new technologies, fluctuating prices, government programs and policies all create risky situations for farmers. To manage agricultural risk, the U.S. Department of Agriculture and other organizations like the national crop insurance service offer a wide range of different risk management tools such as crop insurance, futures, options, basis pool and forward contracts to farmers. However, the adoption of agricultural risk management tools by farmers in general, and limited resource farmers in particular, has been slow. Previous research (Coble, Knight, Patrick and Baquet, 1999; FSC, 2000; Tiller, 2000; Roe, 1998) suggests that the slow adoption of agricultural risk management tools is related to lack of knowledge and understanding about them. For limited resource farmers, however, the reasons go beyond the lack of knowledge. This group of farmers grows products (fruits and vegetables or raise livestock) that are generally not covered by insurance products.

For instance, a survey by the Federation of Southern Cooperatives of black farmers in Alabama, Georgia, Mississippi and Texas, found that less than 44 percent of the producers had received risk management training (FSC 2000). The main reason given for low participation in such training programs was that many agencies, including land grant universities do not give adequate technical assistance to farmers on such tools like crop insurance (FSC 2000). Similarly, a survey of producers growing major field crops in Indiana, Mississippi, Nebraska and Texas, Coble, Knight, Patrick and Baquet (1999) found that less than 34 percent of the producers had attended any risk management education or other training programs. However, none of these studies boked closely at the issue of information sources preferred by farmers in using agricultural risk management tools.

It is important that farmers know about the various risk management tools available to them so that risk acceptance is a result of choice rather than the lack of awareness of the availability of the alternative risk management tools/sources. In an effort to assist small and limited resource farmers achieve the expected agricultural risk management tools adoption, this study looks at the factors that influence farmers' rating of the usefulness of risk management information tools/sources. It is argued here that understanding limited resource farmers' information needs and usage will assist extension and agricultural educators develop targeted outreach activities which will insure that farmers receive adequate information in a format they can appreciate and understand.

Theoretical Approach

The traditional approach of modeling behavior under risk is through the use of the expected utility approach. Utility theory provides a means of monitoring how people perceive risk and of measuring subjective values by taking advantage of an individual's perception of risk (von Neuman and Morgenstern 1944; Luce and Raiffa 1957; Myerson

1979). The application of utility-theory methods does not require that decision makers have any explicit idea of probability or make explicit mathematical calculations (Rapoport 1966:30). They need only make decisions based on their subjective perception of probabilities. It is assumed by this method that a decision maker's preferences are complete, transitive, and continuous (von Neuman and Morgenstern 1944; Luce and Raiffa 1957; Myerson 1979). Completeness means that a decision maker can compare any alternatives under consideration. Transitivity means that a decision maker who prefers A to B and B to C will also prefer A to C. Continuity means that a decision maker's utility increases continuously such that if A is preferred to C, any option B that is ranked between A and C can be represented by a randomized combination of A and C. Provided that a decision maker's preferences meet these requirements, researchers can use utility-theory methods to monitor preferences and to model decision making.

Economists, taking an explicitly deductive approach, tend to rely for its validity more on the theory's axiomatic foundations than on empirical demonstrations (Perry 1998; Paris and Caputo 1993). When economists do test utility theory, it is often in experiments (Kahneman, Knetsch, and Thaler 1990; Cubitt and Starmer 1998; Bosch-Domenech and Silvestre 1999; Butler 2000). Some experimental economists have focused on violations of utility-theory assumptions. Many of these limitations were detailed in a seminal article by Daniel Kahneman and Amos Tversky (1979) in which they noted common violations of utility theory such as unequal weighting of losses versus gains, overweighting of certain outcomes over probabilistic ones, and failure to consider common features of prospects relevant to the calculation of their value. Other researchers have built upon this foundation (Karmarkar 1979; Tversky and Kahneman 1992; Cubitt and Starmer 1998; Butler 2000; Morrison 2000). Despite various limitations, utility theory appears valid when its assumptions can be met, and violations of assumptions can often be overcome with modifications to utility functions (Kahneman and Tversky 1979; Tversky and Kahneman 1992; Butler 2000). As Morrison (2000:194) notes, despite the limitations of utility theory, "a clearly superior model has not yet been identified."

In contrast to critical experimental studies, non-experimental studies by agricultural economists (Bar-Shira 1992; Smith and Mandac 1995; Elamin and Rogers 1992; Zuhair, Taylor, and Kramer 1992) tend to support the fit between utility theory and people's actual behavior. For instance, Bar-Shira (1992) found that, when a feasible solution to a land allocation problem for farmers exists, risk aversion coefficients can be assessed and people behave in accordance with utility-theory predictions.

Data

The first part of the study involved identifying how many different information sources about agricultural risk management tools/sources are available for farmers in general, and limited resource farmers in particular, and the criteria used to evaluate information sources. This was achieved by contacting extension agents using snowball sampling (Malhotra, Shaw and Crisp 1996) where each agent was asked to recommend others who could help further. An extensive search of the Internet and libraries also led to the discovery of different products and sources of information available to farmers. A brief

summary was written about each information source and then categorized using evaluation criteria into:

- Risk management experts
- Printed materials
- Computer-based
- Marketing associations
- Radio/TV, and
- Advice/face to face contacts.

The evaluation criteria were,

- Cost
- Readability
- Relevance
- Balance view
- Depth of content
- Range of content
- Presentation
- Ease of access
- Ease of use
- Timeliness
- Accuracy, and
- Feedback.

Survey

The second part was a survey questionnaire to determine limited resource farmers' evaluation and ratings of the selected information sources. The survey was administered in two phases. First, the questionnaire was mailed to 288 farmers throughout north Alabama. A total of 34 questionnaires were returned (12 percent return rate). The second phase was administered during the risk management conference organized by the Alabama A&M University's Small Farms Research Center and during a seminar organized by the Alabama Cooperative Extension System. Twenty-four questionnaires were completed during the Small Farms Research Center's risk management conference, while 59 questionnaires were completed during the Alabama Cooperative Extension seminar. In total 117 questionnaires were collected and analyzed.

Information Source Evaluation

The survey asked farmers to select the most useful source of information and rank these sources using a Likert type scale (ranging from 1 for *not useful* to 5 for *very useful*). The responses from this question are used to construct the dependent variable (USFLNS), which measures limited resource farmers' ranking of the sources of information consulted. Overall the most useful information sources (Table 2) were printed materials (magazines, newsletters and fact sheets) followed by face-to-face advice by other

farmers, and risk management experts (training courses/seminars, brokers/advisers) by order of preference. Others were computer (internet-based education modules, e-mail), books, risk management associations (marketing clubs) and radio/television programs. The findings in Table 1 are consistent with previous findings (Suvedi, Campo and Lapinski 1999, Roe 1998) that media, consultants, Agfacts and to a lesser extent field days are the main information sources used by farmers.

Table 1. Number and percent of "most useful" information sources

Information Source	**Count**	**Percentage**
Printed Materials [magazines, newsletters, fact sheets]	41	35%
Face-to-face advise by other farmers	37	32%
Risk management experts [training course/seminar, broker/adviser]	31	26%
Computer [internet-based education modules, e-mails]	28	24%
Books [detailed reading on own]	23	20%
Risk management associations/marketing clubs	18	15%
Radio/television programs	16	14%

- It appears from the results in Table 1 that one of the better ways to help limited resource farmers manage agricultural risk is their access to printed materials like periodic newsletters, fact sheets and other practical material.

- A snow ball effect will also ensure that the more farmers are reached through initial efforts, the more other farmers will get the information since communication with their peers seems to be one of the best sources of information at their disposal.

Econometric Approach

The empirical model examines how the ranking of the usefulness of risk management information sources are affected by limited resource farmers' characteristics. The questionnaire asked farmers to "indicate how useful the sources of information are in helping [them] to make decisions" (The reliability coefficient, Cronbach' alpha, is estimated at .89). Information source rankings are regressed on farmers' characteristics and control variables. In addition, the questionnaire captured personal data including age, educational level and ethnicity as well as data about the farm: farm tenure, ownership structure, farm sales, and type of production (Table 2). Because the information source rankings are qualitative and discrete in nature, an ordered probit model was estimated. The ordered probit regression produces the maximum likelihood estimates of coefficients that predict a farmer's ranking of the information sources. The underlying variable, the actual rank expressed by the farmer, is continuous and unobservable; only the values chosen as most closely representing farmers' actual ranking is observed.

Table 2. Variable Definitions

Variable Name	Variable Description
Dependent Variable	Ranking of the level of usefulness of risk management information
USEFULNESS	= 0 if the information is not useful at all = 1 if the information is somewhat useful = 2 if not sure whether the information is useful = 3 if the information is useful = 4 if the information is very useful
Independent Variables	
OWN	=1 if farmer owns the farm; 0 otherwise
FULL-TIME	=1 if full-time farmer; 0 otherwise
MARKETING PLAN	=1 if farmer has a marketing plan; 0 otherwise
INSURANCE	=1 if farmer has crop insurance; 0 otherwise
PRODUCTION	=1 if farmer produces row crops =2 if farm produces livestock =3 if farmer produces fruits and vegetables =4 if farmer produces products other than the above
AGE	=1 if age is 39 years or below =2 if age is between 40-49 years =3 if age is between 50-59 years =4 if age is 60 years or above
ETHNICITY	=1 if white =2 if black =3 if Hispanic =4 if American Indian =5 if Other
SALES	=1 if farm sales are less than $5,000 =2 if farm sales are between $5,000 and $9,999 =3 if farm sales are between $10,000 and $19,999 =4 if farm sales are above $20,000
EDUCATION	=1 if farmer completed high school or less =2 if farmer attended college =3 if farmer attended graduate school

The estimated model is specified as:

USEFULNESS = *Constant* + *Own* + *Full-time* + *Ethnicity* + *School* + *Insurance* + *Marketing plan* + *age* + *Sales* + *Production.* (See Table 2 for variable definitions)

Similar studies have found that the selected factors usually have an influence on how farmers perceive or rate information sources that they receive and also on whether farmers adopt new techniques or technologies (Jones, Battle and Schnitkey 1990; Isengildina and Hudson 2001; Amponsah 1995). The equation is estimated using the ordered probit procedure in LIMDEP (Greene 2000).

Results

The dependent variable (USEFULNESS) is constructed to take into consideration the indicated sources of information for which each farmers has provided an evaluation. The different ratings for each source are combined into one value that gives a general idea of what farmers in general think about the sources of information that they consult. The variables that are significant at 5 percent level are OWN, AGE and MARKETING; implying that these variables are the strongest predictor of how farmers rate the usefulness of the risk management information they receive (Table 3). To the contrary, variables related to ethnicity, production, full-time and sales are not instrumental in influencing the way farmers rate/perceive the different sources of information.

Specifically, AGE exerts downward pressure (negative influence) on USEFULNESS, which means that as people age, they are not as satisfied about the information they receive as are younger people. If age is related to years in farming, older farmers may not think that they have as much to learn about risk management as young farmers and therefore they do not think that the information that they receive is useful. The different sources of information about risk management may not have as much to offer to them as they do to younger individuals. AGE is also the only variable that has a negative relationship to USEFULNESS. Every other category seems to think that there are some sources of information that meet their needs.

The OWN variable has the strongest explanatory power in usefulness perception among farmers who responded to the survey. Farmers who own land/farm strongly feel that the various sources of information that they consult are useful. It can be argued that because of their commitment to farming, owners know how to extract information from each source. Another explanation is that they may know better how to make the most of the information they receive and also they have more time to implement the suggested practices.

Table 3. USEFULNESS model: Summary of Results

Variable	Coefficient	Std Error	t-stat	P-value
ONE	0.829	0.619	1.338	0.181
OWN	0.886*	0.304	2.914	0.004
FULL-TIME	0.228	0.228	0.997	0.319
INSURANCE	0.348	0.264	1.319	0.187
MARKETING PLAN	0.573*	0.227	2.522	0.012
PRODUCTION	-0.084	0.151	-0.555	0.579
AGE	-0.256*	0.103	-2.477	0.013
ETHNICITY	0.073	0.136	0.534	0.593
SALES	0.036	0.113	0.316	0.752
SCHOOL	0.206	0.152	1.350	0.177
Mu (1)	0.571**	0.179	3.186	0.001
Mu (2)	1.657**	0.243	6.829	0.000
Mu (3)	2.906**	0.303	9.595	0.000
Log likelihood function	-150.6477			
Restricted log likelihood	-168.4097			
Chi-squared	35.5240			
Degrees of freedom	9			
Significance level	0.000			

*, ** Denote significant at the 5 and 1 percent levels

The second highest explanatory power comes from the MARKETING PLAN variable which is also significant at 5 percent. Perhaps writing a marketing plan is a result of the information that farmers are provided with in that regard. If writing a marketing plan has been useful to them, they may have a good perception of the sources of information that they consult in general.

A variable that could be expected to be negatively related to USEFULNESS is SCHOOL (because more education could mean higher expectations), but the estimated results show the opposite. Again, this may relate to the variety of sources presented where farmers who are more educated can find their needs met (such as Internet, Computer-based training, and training by risk management experts which is the real favorite across categories). It may also relate to the number of years in farming, where people who are

more educated may have less farming experience and thus, rely more on outside sources than on their own experience. Something else that education may do is enabling farmers find information; as such when a college graduate for example reads a magazine, he or she may get more from the reading than other farmers. Also, they may know what to consult or who to call depending on the information that they are requesting. In that case, they are more in tune with the different sources that they consult and get the most of their information gathering.

Predicted Outcomes

Based on frequencies of actual and predicted outcomes, the results suggest that the model performs relatively well, correctly predicting 34.13 percent of the total 117 responses analyzed (Table 4). Specifically, the model predicts that 4 (observed: 9) of the total sample rate the risk management information they receive as not useful; 0 (observed: 11) of the total sample rate the risk management information they receive as not very useful; 46 (observed: 37) of the total sample rate the risk management information they receive as somehow useful; 60 (observed: 42) of the total sample rate the risk management information they receive as useful; 7 (observed: 18) of the total sample rate the risk management information they receive as very useful. Overall, the model predicts that 96.58 percent of the total sample will rate the risk management information they receive as useful to some degree. The *log likelihood* statistics is also used to test the significance of the model. We observe a *log likelihood* value of -150.65 and a significance level of (.0000) suggesting that the model is significant.

Table 4. USEFULNESS: Predicted Versus Actual Outcomes

	Predicted					
Actual	0	1	2	3	4	Total
0	2	0	6	1	0	9
1	0	0	7	4	0	11
2	2	0	15	19	1	37
3	0	0	17	21	4	42
4	0	0	1	15	2	18
Total	4	0	46	60	7	117

Marginal Effect

The marginal effects help to further understand how the dependent variable (level of usefulness) is related to the independent variables. These effects are evaluated by assuming that a given respondent has the mean score for every independent variable; in other words, the respondent is average in every way. This technique enables to isolate the

effect of a change in one variable given that all the others remain constant. The estimated effects are presented in Table 5.

For instance, a producer who owns the farm is coded 1 in the data, and the one who rents is coded 0. The estimated effect for the OWN variable in Table 5 shows that a producer who owns is 16.92 percent more likely than someone who rents to rate the risk information he/she receives as *very* useful, while a full-time producer 4.34 percent more likely than a part-time producer to rate the risk management information he/she receives as very useful. One can argue that because of the effort that they put in to farming, landowners and full-time farmers seek and get more relevant information than other farmers. Also, they may in general have more time to get more information and therefore as a whole they feel that they get very useful information, regardless of source.

One interesting finding is that a producer in the 40-49 age category is a little less likely to rate the risk information as very useful than younger (below 40 years) and older farmers (above 49 years of age). Another equally important result is that a producer who has a marketing plan is 10.94 percent more likely to rate the risk management information he/she receives as very useful than someone without a marketing plan, while a producer with insurance is 6.65 percent more likely to rate the risk management information he/she receives as very useful than someone who is not insured. Overall, the marginal effects, though small in magnitude, show that an average producer in every aspect except maybe in age, would rate the risk management information he/she receives as very useful.

Table 5. USEFULNESS: Marginal Effects

Variable	USEFUL-NESS=0	USEFUL-NESS=1	USEFUL-NESS=2	USEFUL-NESS3	USEFUL-NESS =4
ONE	-0.079	-0.0974	-0.154	0.1721	0.1583
OWN	-0.0845	-0.1041	-0.1646	0.184	0.1692
FULL-TIME	-0.0217	-0.0267	-0.0423	0.0473	0.0434
INSURANCE	-0.0332	-0.0409	-0.0647	0.0723	0.0665
MARKETING PLAN	-0.0546	-0.0673	-0.1065	0.119	0.1094
PRODUCTION	0.008	0.0098	0.0156	-0.0174	-0.016
AGE	0.0244	0.0301	0.0476	-0.0532	-0.0489
ETHNICITY	-0.0069	-0.0086	-0.0135	0.0151	0.0139
SALES	-0.0034	-0.0042	-0.0066	0.0074	0.0068
SCHOOL	-0.0196	-0.0242	-0.0382	0.0427	0.0393

Conclusion

The study employed survey data collected among small and limited resource farmers in north Alabama to determine the factors that influence farmers' perception of usefulness of sources information in managing agricultural risk. To examine the effect of farmer characteristics on information source rating, the paper used a probit model. The results suggested that farmers' characteristics influence their perceptions of the sources of information they consider valuable. The following are the key findings:

- It appears from these results that the good ways to reach farmers would be to have agricultural educators conduct training sessions and leave farmers with enough material that they can study on their own.

- Periodic newsletters with practical material would also be helpful to the farmers. A snow ball effect will ensure that the more farmers are reached through initial efforts, the more other farmers will get the information since communication with peers seems to be among farmers' best source of information.

- Sources such as computerized systems and marketing clubs are the bottom choices as far as gathering information.

- The information should also be presented to farmers based on their age and education level. In a consistent way, older farmers have lower ratings than younger farmers. On the other hand, the education variable is positively related to rating information as useful. These two variables were the most consistent explanatory variables for agricultural risks and usefulness perception.

- Based on the calculated marginal effects, the ownership status was found to be the most distinctive factor in assessing usefulness, ceteris paribus, followed by having a marketing plan.

- Of the producers who believe they receive useful sources of information it would be interesting to find out which ones actually implement the risk management strategies proposed and what factors determine usage of the information received.

- Other topic worth exploring for risk management educators would be to determine which information sources is most effective (in term of usefulness and usage) with different age groups and education levels.

- Finally, the fundamental limitations of this study pertain to survey data. These include, but are not limited to coverage errors, non response and distortions of measurement errors.

References

Amponsah, W.A. 1995. "Computer Adoption and Use of Information Services by North Carolina Commercial Farmers." *Journal of Agricultural and Applied Economics*.37.2: 565-576.

Bar-Shira, Ziv. 1992. Nonparametric test of the expected utility hypothesis. *American Journal of Agricultural Economics* 74:523-34.

Bosch-Domenech, Antoni, and Joaquim Silvestre. 1999. Does risk aversion or attraction depend on income? An experiment. *Economics Letters* 65:265-73.

Butler, D. J. 2000. Do non-expected utility choice patterns spring from hazy preferences? An experimental study of choice "errors." *Journal of Economic Behavior and Organization* 41: 277-97. Coble, K., Knight, O. Patrick, G.F., Baquet, A.E. 1999. "Crop Producer Risk Management Survey: A Preliminary Summary of Selected Data; A Report from the Understanding Farmer Risk Management Decision Making and Educational Needs Research Project." Information Report 99-001. Mississippi State University.

Coble, K., Knight, O. Patrick, G.F., Baquet, A.E. 1999. "Crop Producer Risk Management Survey: A Preliminary Summary of Selected Data; A Report from the Understanding Farmer Risk Management Decision Making and Educational Needs Research Project." Information Report 99-001. Mississippi State University.

Cubitt, Robin P., and Chris Starmer. 1998. Dynamic choice and the common ratio effect: An experimental investigation. *Economic Journal* 108:1362-81.

Dismukes, R. Harwood and J.L., Bentley, S.E. 1997. "Characteristics and Risk Management Needs of Limited Resources and Socially Disadvantaged Farmers." *Agricultural Information Bulleting* no 733:104 +.

Elamin, Eltighani M., and Leroy F. Rogers. 1992. Estimation and use of risk aversion coefficient for traditional dry land agriculture in western Sudan. *Agricultural Economics* 7:155-66.

Federation of Southern Cooperative (FSC). 2000**. "**Risk Management Survey of African-American Farmers: Preliminary Findings." Federation of Southern Cooperatives/Land Assistance Fund (FSC/LAF). A Survey Funded by the Risk Management Agency of the United States Department of Agriculture**.**

Greene, W. 2000. *LIMDEP*, Version 7.0, Econometric Software, New York: Plainview.

Goodman, S.K. 1993. "Information needs for management decision-making." *Records Management Quarterly*. 27.4: 12-22.

Hardaker, B.J., Hurine, B.M., and Anderson, J.R. 1977. *Coping with Risk in Agriculture*. CAB International Publishing Company.

Harwood, J., et al. 1999. "Managing Risk in Farming: Concepts, Research and Analysis." Market and Trade Economics Division, ERS, USDA. *Agricultural Economics Report* no 774.

Isengildina, O., and Hudson, D.M. 2001. "Factors Affecting Hedging Decisions Using Evidence from the Cotton Industry." Paper Presented at the NCR-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management, April 23-24, in St-Louis, Missouri.

Jones, E., Battle, M.T., Schnitkey, G.D. 1990. "A Socioeconomic Analysis of Marketing Information Usage among Ohio Fruit Producers." *Southern Journal of Agricultural Economics*.

Kahneman, Daniel, Jack L. Knetsch, and Richard H. Thaler. 1990. Experimental tests of the endowment effect and the Coase theorem. *Journal of Political Economy* 98: 1325-47.

Luce, R. Duncan, and Howard Raiffa. 1957. Games and decisions: Introduction and critical survey. New York: John Wiley.

Malhotra, N. K., Hall, H., Shaw, M. & Crisp, M. 1996. *Marketing Research: An Applied Orientation*, Prentice Hall, Sydney, Australia.

Myerson, Roger B. 1979. An axiomatic derivation of subjective probability, utility, and evaluation functions. *Theory and Decision* 11:339-52.

Nelson, G.A. 1997. "Teaching Agricultural Producers to Consider Risk in Decision-making." Faculty Paper 97-17. College Station, Texas: Texas A&M University

Paris, Quirino, and Michael R. Caputo. 1993. Keeping the dream of rigorous hypothesis testing alive. *American Journal of Agricultural Economics* 75:25-41.

Perry, Gregory. 1998. On training Ph.D.s in economics: What can economics programs learn from those in agricultural economics? *American Journal of Agricultural Economics* 80: 608-15.

Rapoport, Anatol. 1966. Two-person game theory: The essential ideas. Ann Arbor: University of Michigan Press.

Roe, S., 1998. *Wool producers use and knowledge of price risk management instruments*, Honors dissertation, Curtin University of Technology, Muresk Institute of Agriculture, Pert.

Smith, Joyotee, and Abraham Mandac. 1995. Subjective Versus Objective Yield Distributions as Measures of Production Risk. *American Journal of Agricultural Economics*, 77: 152-62.

Suvedi, Murari, Shelly Campo and Maria Lapinski. 1999. Trends in Michigan Farmers' Information-Seeking Behaviors and Perspective on the Delivery of Information. *Journal of Applied Communications*, 83, 3.

Tiller, B.M., 2000. *Price Risk Management Tools and the Western Australian Grain Producer*, Honors dissertation, Curtin University of Technology, Muresk Institute of Agriculture, Perth.

Tversry, Amos, and Daniel Kahneman. 1992. Advances In prospect theory: Cumulative representation of uncertainty, *Journal of* Risk *and Uncertainty* 5:297-323.

Von Neumann, John, and Oskar Morgenstern. 1944. Theory of games and economic behavior. New York: John Wiley.

Zuhair, Sugu M. M., Daniel B. Taylor, and Randall A. Kramer. 1992. Choice of utility function form: Its effect on classification of risk preferences and the prediction of farmer decisions. Agricultural Economics 6:333-44.