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NOTES FOR SYMPOSIUM ON  
TEACHING DECISION MAKING UNDER RISK  
1979 AAEA ANNUAL MEETING <sup>1</sup> - ODELL WALKER

As a prelude to the wheat risk project, in 1975 Gene Nelson and I conducted a survey of undergraduate farm management and extension programs concerning teaching decision making under uncertainty. We found that most classes that included the topic only contained one or two periods on definitions of knowledge situations, sources of uncertainty and illustrations, and discussion of strategies, such as diversification, insurance and flexibility. This was the case for many of the beginning farm management classes. A few farm management classes covered payoff matrices and trees and probalistic decision rules, and used some good applied problems. On the extension side, there was an active program in a few states, involving mostly marketing strategies and widely scattered topics such as insurance and sensitivity analysis under variable prices and yields. Our guess at that time was that additional coverage was included in marketing classes and in marketing extension programs. Also, quantitative undergraduate courses such as operations research included some modern decision theory. We received course materials and other indications that our supposition was true. We knew

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<sup>1</sup>The intent of the Symposium format is to have no speeches and much group interaction. Thus, there were no papers. These are the notes for my introductory comments.

1979 AAEA annual meeting

that most graduate production courses had some coverage of decision making under uncertainty but, except in advanced classes, it was short.

The results of the survey suggested that agricultural workers in the field such as county extension directors, area agents, and even state specialists had little preparation on which to base a strong program in decision making under uncertainty. They had scant preparation and were provided little support in educational programs. In addition, they were already very busy. We know that a busy person is not likely to volunteer to teach classes on subjects for which he has no support and less training, and no encouragement for education on decision making under uncertainty.

A question today is, "What has happened as a result of the project?" Has it had an impact and what materials and teaching strategies are being employed that we need to learn about? The wheat risk project suggested use of (modern) decision theory--the payoff matrix and/or the decision tree, alternative decision criteria, probability, ability and willingness of the decision maker to bear risk, and the use of strategies in devising alternative actions within the decision theory framework. Packaged teaching materials and computer aids were emphasized and some new tools were developed.

The slide sets on decision theory were an important part of the product and I will briefly review the contents. The first set is a twelve minute introduction, including sources of uncertainty, introduction to the payoff matrix and probabilities, an example of risk attitudes and a little coverage of strategies. The second set is a twenty-two minute slide-tape presentation on the payoff matrix. Building and using

a matrix is discussed. The third set is on probability. It runs ninety minutes, excluding time for use of an accompanying workbook. Topics include sources of probabilities, tables and histograms, eliciting probabilities, and using probabilities. It is suited to serious instruction on probability. The fourth slide-tape set has eighteen minutes on attitudes and risk ability. The fifth tape is forty-nine minutes on controlling risk in two parts. The first is a little drama which illustrates strategies in a realistic setting and the second part is more nearly a text book discussion of strategies. These two parts can be separated. Each of the sets is accompanied by a book that shows the contents and discusses the use of the material. A guide book with a short summary of decision theory is also available.

Naturally we wonder how much these and other materials and ideas are being used. With that in mind, I made a few phone calls and other inquiries to individuals who were at the Denver Workshop at which the materials were presented. I asked whether they are using the materials and about activities in their locations related to teaching decision making under uncertainty. It is a limited survey and we expect to do more. I managed to get reasonably direct information from colleagues at eleven land grant schools. Five had been fairly active participants in some or all phases of the project.

Seven of the locations indicated they had been using the slides in both extension and teaching. The predominant use seemed to be in teaching. In addition to farm management, the slides have been in resource economics and an integrated pest management course. In fact, one respondent said that people not trained in ag. economics were very receptive to the

materials. The slides are being used in several farm management classes, both the first farm management class and the advanced. One respondent used the full set intensively with an international class and felt it was very useful.

The probabilities tape requires a considerable amount of time if it is going to be covered completely. Some respondents indicated that they had some trouble teaching probabilities. On the other hand, others are using the probability tape particularly because it is put together to do the complete teaching job.

My impression from the survey is that we have stimulated some teaching activity with the materials and evoked new attention to problems of decision making under uncertainty. That is encouraging, but I believe we still don't have enough people trained to make a significant impact.

I am using the slide sets in my advanced farm management class. Students have had the first farm management course, in which about a day or so is spent on decision making under uncertainty, and a class in ag. finance. My goal is that the students leave knowing a way of organizing and thinking about decision problems under uncertainty, using the payoff matrix or the decision tree. I would also like for them to begin to think in terms of probabilities rather than single values and understand how people with different attitudes about risk and abilities to bear risk would use different decision rules. I emphasize safety first as a decision rule, partly, because it forces the student to use probabilities and partly because I think it makes sense.

I use the slides selectively. I have found that it is very easy to roll the slides and tape recorder in and use the parts that are

desired. Sometimes I use the tape and sometimes I don't. Students seem to enjoy hearing another voice and having a visual presentation in contrast to the more typical discussion-overhead presentation.

We have a problem in providing students with interesting applications. Our students have limited current experience with problems and risk bearing. The professor is under quite a lot of pressure to demonstrate the usefulness of the concepts. I have a number of homework exercises—all the way from eliciting probability distributions to applications of Bayesian analysis.

We are challenged to integrate training in decision making under uncertainty with micro static theory. I think it is a problem that students have just "mastered" one system of analysis and then we add the complications of imperfect knowledge. We also need to integrate the training that they have in marketing (including hedging and contracting) and the training they are getting in statistics (confidence intervals and probability ideas in general).

Finally, it seems that we have at least two models for training and teaching in class room and extension that need some evaluation. I call the models the layer cake and the assorted cookie approaches. The layer cake (or verticle learning) idea is that we build a base of micro theory and technical agriculture with early courses and build on that training with tools and by relaxing the static assumptions of time and perfect knowledge. We successively add layers of difficulty and broader considerations leading to the real world case.

The assorted cookie model recognizes many important subjects in agricultural economics or management, such as marketing, livestock

management, production, input acquisition, insurance, taxes, estate planning, machinery, theory, risk and uncertainty, etc. The cookies are presented in separate courses or workshops, somewhat on demand of clientele. The cookie model is a neater, less complicated way to deliver information. We deliver cookies that have been successful and we know how to bake. The model obscures the fact that uncertainty must be reckoned with in estate planning, input acquisition, marketing and production planning. The concepts and tools need to be a part of the manager's problem solving kit. Given all the problems, the uncertainty topic doesn't get in the cookie bag when it must compete with estate planning, tax problems, records and partial budgeting. A logical progression in teaching someone how to do budgeting includes handling the problem of uncertainty about prices, yields and input requirements and demonstrating how some procedures for decision making under uncertainty can be integrated into the management process. When we do that we will have less difficulty in making sure that our clientele get at least some training in risk management.