DATA REQUIREMENTS FOR WHOLE-FARM ECONOMIC ANALYSIS OF GRAZING ALTERNATIVES

R.O. Burton, Jr.

Department of Agricultural Economics, Kansas State University, Manhattan, KS 66506, USA

ABSTRACT

The purpose of this paper is to contribute to better communications among the agronomists, animal scientists, and agricultural economists on interdisciplinary teams, that wish to provide useful information to forage producers. This is accomplished by discussing major issues and data requirements for whole-farm economic analysis.

KEYWORDS

Whole-farm, interdisciplinary, data, communications, economic, grazing.

INTRODUCTION

Most scientists are specialists and most forage producers are generalists. Scientists need to specialize to achieve and maintain competence in their individual disciplines. Producers need to generalize to manage all parts of their businesses and to blend various parts into a whole-farm operation to produce outputs for sale. Selecting an optimal combination of production processes that will generate a profit requires information from a range of scientific disciplines. When the sources of information are scientists working independently, the producers are left with the difficult task of combining the information into profitable production processes. A more holistic approach than scientists pursuing and reporting their work independently is for them to work in interdisciplinary teams. A typical interdisciplinary team for meeting the information needs of forage producers would consist of one or more agronomists, animal scientists, and agricultural economists. Inclusion of ecologists and producers would help ensure that environmental, sustainability, and practical management issues are addressed. See Norman et al. (1997) and Ervin and Smith (1996). The purpose of this paper is to contribute to better communications among members of such interdisciplinary teams.

METHODS

Various issues that need to be addressed and data required to evaluate grazing alternatives in the context of whole-farm situations will be discussed. This will be from the point of view of an agricultural economist who specializes in farm and ranch management and most of whose research has been interdisciplinary. Much of this research has involved budgeting of alternatives and specification of models to evaluate alternatives in a whole-farm situation. Examples of such research include Burton and Bryan (1983), Burton et al. (1994), and Reda-Wilson et al. (1987).

RESULTS AND DISCUSSION

Major issues that must be addressed in order to evaluate grazing alternatives in the context of a whole-farm situation include biological inputs and outputs, time frame of the analysis, inputs available to the farm, and risk.

Biological inputs and outputs. Data are needed to describe production processes of the alternatives. Quantities of all economic inputs and outputs must be measured. Two types of problems may arise when attempting to model the alternatives in a farm situation. First, experimental data may have been collected on only a subset of the inputs and outputs. For example, for an experiment involving nitrogen (N) fertilization of pastures, N rates and animal gains likely will be measured. However, in order to model the whole grazing enterprise, amounts of other inputs such as machinery and labor requirements are needed. If amounts of such inputs are not measured as the experiment is in progress, then they will have to be obtained or estimated from other sources, which may not be applicable to the alternatives of the experiment. A second type of problem is that amounts of inputs used in an experiment may not be appropriate for modeling an actual situation. For example, much more labor per animal may be required to handle animals grazing on experimental plots than would be required in a commercial operation.

Time frame of the analysis. Farm modeling requires specification of a planning horizon. Economists often categorize planning horizons into two time periods—short run and long run. The short run is a production period short enough so that some inputs are variable (e.g., feed, seed, and fertilizer) and some are fixed (e.g., land, buildings, and machinery). In the long run, no inputs are fixed. Although other criteria may influence whether grazing alternatives should be analyzed in a short-run or long-run time period, usually the most important criterion is whether adoption would require changes in the fixed inputs. If the farm's fixed inputs would be the same with all alternatives, then the analysis can be simplified greatly by using a short-run planning horizon and not considering fixed costs. Also, if analysis over time is required, there are complicating factors such as changing price levels and time value of money.

Inputs available to the farm. In a market economy variable inputs normally can be purchased, and, therefore, do not constrain the choice and magnitude of alternatives. However, fixed inputs such as land, machinery, and operator labor, often associated with farm size, may be constraining. Data are needed to specify such constraints and the extent to which potential constraints can be relaxed by renting or hiring. This usually will be easiest for a case study of a particular farm. However, models often are constructed to be representative of a type of farm located in a geographical area, requiring careful consideration of an appropriate area over which the resource constraints and the biological data may be representative.

Risk. Producers may be concerned about the income variability associated with grazing alternatives. Risk can be measured as variation in income over time. However, use of such a measure requires a long-term series of biological data. A risk analysis using less than five years likely would not adequately represent a producer's risk. Thus, risk analysis requires that biological scientists make a long-term commitment to a specific experiment, which may not be desirable for them if results based on a shorter data series are publishable.

Conclusions and implications. Biological research provides data that are essential, but not sufficient, for whole-farm economic analysis of grazing alternatives. Effective communications and collaborations among agronomists, animal scientists, and economists likely will increase the range of useful data resulting from experiments and improve the applicability of whole-farm models for forage producers. Therefore, if a whole-farm economic analysis is anticipated, communications are needed before the biological experiment begins to determine data sources and modeling relevant for the clientele.

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