

## SECTION I

### GENERAL INFORMATION

DEC 01 1997

1. **Project Number:** LNE 93-35  
**Grant Number:**  
**Funding Period:** 9/1/93 to 8/31/96
2. **Project Title:** Develop Crop Rotational Budgets for Three Cropping Systems in the Northeast
3. **Project Coordinator:**  
  
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4. **Type of Report:** Final
5. **Date of Report:** November 25, 1997
6. **Reporting Period:** From 9/1/93 to 11/25/97
7. **Major Participants:** No change
8. **Cooperators:** No change
9. **Project Status:**

The project is:

**New:** received SARE/ACE funding for the first time.

**Continuation:** a previously approved project, following revision and competitive review.

#### 10. **Statement of Expenditures**

A financial report will be sent separately by Rutgers Grant and Contract Accounting.

## SECTION II

**Project Title:** DEVELOP CROP ROTATIONAL BUDGETS FOR THREE CROPPING SYSTEMS IN THE NORTHEAST

### OUTLINE

#### 1. Objectives

(A) To develop enterprise budgets for conventional, reduced input, and organic production systems for the Northeast.

(B) To input the enterprise budgets developed into a computerized database so that information on identifying and selecting sustainable practices can be provided.

(C) To provide training to field educators that prepares them to assist farmers in selecting alternative sustainable production systems appropriate to individual farm situations.

(D) To inform farmers about the relative environmental impact and profitability of alternative systems by providing a selection enterprise budgets for various cropping systems .

#### 2. Abstract

The Northeastern United States is the most highly urbanized region in the nation. Public concern for both environmental quality and maintenance of a dependable supply of high quality food presents a challenge for the agriculture of the region. This challenge requires that farming systems be developed and implemented that successfully combine environmentally responsible production methods, and management of resources, in a manner that enables Northeastern farmers to successfully compete in regional, national, and international markets. Long-run profitability is the ultimate determinant of sustainability.

To test the profitability and productivity of alternative systems, enterprise budgets were developed for a set of crop and livestock enterprises under three defined resource management systems. Eighty-one enterprise budgets for "conventional," reduced input," and "organic" production systems were developed by farm management specialists in the Northeast with the assistance of farmers using those practices, as well as production specialists and agents. Initially, the resulting data on inputs and yields were to be entered into Planetor, a national computerized expert system. However, the program has since been discontinued. In lieu of this, a custom Internet web site was developed to host the Northeast enterprise budgets for the three cropping systems. Other items on this web site are an interactive budget form which any farmer can use to input data and calculate net returns, and links to other web sites containing information on sustainable agriculture, organic farming, enterprise budgets, and other relevant topics. This web site is accessible through the Rutgers Cooperative Extension Farm Management Home Page at <http://aesop.rutgers.edu/~farmmgmt/> and will be available February, 1998. Also, the results of this study will be published through the Northeast Regional Agricultural Engineering Service. This will be a refereed publication and will be ready for dissemination by September 1998. Copies will be made available to all of the Northeastern Farm Management Specialists and to other contact people in states which do not have Farm Management Specialists. In addition, three regional hands-on workshops which trained 60 Cooperative Extension and other agricultural agency field staff were conducted to make them aware of the results of the research.

### **3. Specific Project Results**

#### **A. Findings and Accomplishments**

##### **Objective (A)**

The first step was to develop typical budgets of crops and livestock that are of high economic significance in the region. Members of the Northeast Farm Management Extension Committee each accepted responsibility for the development of certain budgets. Budgets for conventional production already existed in most cases, but information was generally lacking for reduced input and organic production methods. The research team met early in the study to standardize the data collection process so that consistency and compatibility could be assured. Existing conventional data sets from the Northeast were collected and reviewed by the research team for potential usefulness. Among the criteria used were consistency in approach, completeness of input information and underlying assumptions, and representativeness of farm conditions. Each budget was constructed within a specific context of assumed farm conditions typical for the crop in the region. These conditions include size of enterprise (acres, number of animals, etc.), slope, soil conditions, fertility, conservation practices, and equipment/technology complement. Much of the information needed for the enterprise budgets was collected from extension agents and specialists, and researchers who work closely with farmers. They have been helpful in defining recommended production practices, production averages, and other production information for each system. Prices paid for production inputs were obtained from suppliers and farmers in the Northeast. Standardized values have been used in the estimation of production costs, assuming average conditions on commercial farms. The budgets are intended to be used as guide to help producers develop costs of production for their particular operation and to make comparisons in producing the crop under conventional, reduced input, or organic systems.

##### **Objective (B)**

Each of the budgets incorporated a representative set of production practices, on-farm and purchased inputs, equipment technologies, and farm-gate marketing requirements. Farm Management Specialists sent completed budgets to Dr. Robin Brumfield. The data was entered into spreadsheets using Excel and an extensive database of production information for the Northeast was developed. In all, eighty-one budgets (thirty-seven conventional, twenty-four integrated crop management, and twenty organic) were developed representing twenty-three crop and seven livestock enterprises (See Attachment for complete list).

Several cooperating farmers as well as Cooperative Extension ICM specialists and organic working groups provided second stage evaluations. Actual farm data were entered along with the typical budgets which were adjusted to reflect actual on-farm costs. This provided a "reality check" of the budgets.

##### **Objective (C)**

Three training workshops for county and regional field staff of the 12 states were held. The Cooperative Extension Service, Soil Conservation Service, Agricultural Stabilization and Conservation Service, Farm Service Agency, and Farm Credits Banks were approached to assess interest in providing training programs for their staff. One workshop was held for the New England states, another for New York, New Jersey, and Pennsylvania, Maryland and West Virginia, and a third for Delaware. A total of 60 field staff attended the sessions.

An illustrative farm with both crop and livestock production was developed that included specific environmental and profitability criteria. This example was used in the training sessions to

familiarize field representatives with the budget data base available, and instruct them in methods for modifying budgets to fit individual situations, and development of new budgets.

### **Objective (D)**

Field educators from each state who attended the training workshops were expected to organize and present similar workshop activities in their home states. At the workshops, farmers learned how each cropping system affected net incomes, productivity, resource use efficiency, costs, and impacts on environmental and human health. Using data from their own farms, participants could then modify the budgets to reflect their own farm situations. In addition, the enterprise budget information has been placed on the Internet. A custom Internet web site was developed to host the Northeast enterprise budgets for the three cropping systems. Other items on this web site are an interactive budget form which any farmer can use to input data and calculate net returns (this information can be emailed to the Rutgers Farm Management Specialist so that current budget can be continuously collected), and links to other web sites containing information on sustainable agriculture, organic farming, enterprise budgets, and other relevant topics. This web site is accessible through the Rutgers Cooperative Extension Farm Management Home Page at <http://aesop.rutgers.edu/~farmmgmt/> and will be available February, 1998. Also, the results of this study will be published through the Northeast Regional Agricultural Engineering Service. This will be a refereed publication and will be ready for dissemination by September 1998. Copies will be made available to all of the Northeastern Farm Management Specialists and to other contact people in states which do not have Farm Management Specialists.

### **B. Dissemination of Findings**

Once the enterprise budgets are made available via the Internet (February 1998) and the published version (September 1998), farm management specialists can use them as a basis for educational programs and to distribute to workshop participants. As stated above, it is expected that field staff from each state organized and presented similar workshop activities in their home states. In these farmer workshops, farmers learned how each system affects net incomes, productivity, resource use efficiency, costs, and impacts on environmental and human health. Using data from their own farms participants could then modify the budgets to reflect their own farm situations.

### **C. Site Information**

To test profitability and productivity of alternative cropping systems, enterprise budgets were developed for a set of crop and livestock enterprises under three defined resource management systems. Enterprise budgets for "conventional," reduced input," and "organic" production systems were developed by farm management specialists in the Northeast with the assistance of farmers using those practices, as well as production specialists and agents. The enterprise budgets contain information on inputs to production such as fertilizer, chemicals, labor, machinery, marketing, and land costs. This information allows the grower to compare his/her operation to an average farm and/or to alternative cropping methods.

## **D. Economic Analysis**

Although there is an increasing body of research on sustainable agricultural practices, much of this work is limited in scope and applicability. Because most laboratory and field plot experimentation has been conducted within the several plant science disciplines, knowledge is fragmentary and non-integrated. A serious deficiency of the existing research base is the lack of applied farm level economic analysis. Limited research is available on the profitability of alternative production practices as affected by individual farm characteristics such as soil types, topography, prior crops, and associated cultural methods. Ideally, farmers should assess alternatives and make production decisions with due consideration for agronomic, environmental, and economic factors.

This project developed crop production budgets specific to the Northeast. Growing conditions, soil and topography, scale of operations, and appropriate technology are often significantly different from other regions. Field crops are typically produced on a different scale and forage crops are integrated into livestock production. Apple production in New Hampshire is unlike apple production in the state of Washington. Cultural practices and economics of on-farm fresh vegetable farms in Massachusetts producing for the fresh market are different from Minnesota where production goes to processing plants.

The Northeast has a large number of economically important crops. Few states in the regional have the professional resources available to develop the range of production budgets represented. For example, only two of the six New England states currently have Farm Management Specialists. However, since the Northeast is fairly small geographically, in many instances budgets developed in one state can be adapted for use in another state. By coordinating and assigning responsibilities, this project developed budgets for most of the economically important crops and livestock in the Northeast.

## **4. Potential Contributions and Practical Applications**

### **A. Potential Impacts of Project Work**

This study developed a data base which provides an analytical framework that allows a "whole farm" assessment of alternative production practices. Production practices included in the analysis include: (1) "Conventional" - primary reliance upon conventional tillage, commercial fertilizers, and agricultural chemicals; (2) "Reduced Input"- use of management practices including minimum tillage, nutrient balancing, and integrated pest management; and (3) "Organic" - use of management practices such as no-till and cover cropping to minimize erosion, reduction of pest populations through rotation and use of manures and natural fertilizers, and biological methods of pest control.

Cost and return information is crucial to policy makers in order to develop benchmarks for agriculture, to make key policy decisions about alternative agricultural enterprises, to assess the viability of various farming enterprises, to understand the effects of policy changes on production structure and farm performance, and in evaluating the distribution of agricultural costs, revenues and profits by commodity, and by region. Researchers also need this information to analyze production structure in agriculture and to determine the impacts of various innovations and interventions on industry structure and performance.

This information demonstrates to growers production practices, inputs, and crop enterprises that reduce costs, increase net farm incomes, lessen adverse impacts upon the environment and human health, and increase competitiveness. Hence, agricultural agents can use this information to make recommendations to farmers about cost containment measures, alternative enterprises, resource use and allocation, and optimal crop mix. By being able to directly relate personal

performance to those of the typical grower of the same commodity or other value added crops, farmers can plan more effectively. Given the rapid international, regional and local changes farming is experiencing now, and the greater emphasis on value added production, information on costs and returns is crucial.

**B. See A above**

**C. New Hypotheses**

N/A

**5. Farmer Adoption and Direct Impact**

**A. Changes in Practice**

The enterprise budgets present the farmer with a whole-farm analysis of the impacts of a particular farming method on profitability and the ecology. Thus profits are maximized, and environmental concerns of water quality, soil erosion, and lower chemical inputs are addressed, resulting in a business that is ecologically sustainable, productive, and profitable.

An economic summary allows year by year analysis of farming systems which could be used to evaluate transition periods with specific attention given to the financial risks associated with alternative transition strategies. Farmers can use these results to make changes in their farming operations so that they are more environmentally and economically sustainable.

**B. Operational Recommendations**

See A above.

**C. Farmers Evaluations**

Several farmers in the Northeast were visited by specialists to test the software by using actual farm data. Evaluations of these visits were given to the University of Minnesota for use in further refining the software.

**6. Producer Involvement**

Number of growers/producers in attendance at:

60 Workshops

\_\_\_\_\_ Conferences

\_\_\_\_\_ Field Days

\_\_\_\_\_ Other events (specify)

Workshops have been conducted for field staff who will work with farmers. Farmers were involved in budget development. They provided many of the inputs and costs for the budgets. On farm testing has been conducted to provide reality checks in the program.

**7. Areas Needing Additional Study**

Due to the fact that Planetor has been discontinued, funding that would support research to develop easy to use computerized whole farm record keeping systems that have an environmental component would be quite valuable. Some are currently available, but do not have an environmental impact component. Also, enterprise production budgets go out-of-date within a few years. This information should be updated at least every five years.

**8. Photographs**  
None available

**ATTACHMENT 1  
LIST OF ENTERPRISE BUDGETS**

**CONVENTIONAL PRODUCTION PRACTICES**

**Field Crops**

1. Costs and Returns of Producing Corn for Grain, Per Acre.
2. Costs and Returns of Producing Corn for Silage, Per Acre.
3. Costs and Returns of Producing Alfalfa Hay - New Seeding, Per Acre.
4. Costs and Returns of Producing Alfalfa Hay - Established Stand, Per Acre.
5. Costs and Returns of Producing Soybeans, Per Acre.
6. Costs and Returns of Producing White Potatoes, Per Acre.

**Fruits**

7. Costs and Returns of Producing Fresh Market Apples, Land Preparation Year, Per Acre.
8. Costs and Returns of Producing Fresh Market Apples, Planting Year, Per Acre.
9. Costs and Returns of Producing Fresh Market Apples, Non Bearing Years 2 and 3, Per Acre.
10. Costs and Returns of Producing Fresh Market Apples, Light Fruit Bearing Years 4-7, Per Acre.
11. Costs and Returns of Producing Fresh Market Apples, Mature Trees Years 8-20, Per Acre.
12. Costs and Returns of Producing Fresh Market Peaches, Land Preparation Year, Per Acre.
13. Costs and Returns of Producing Fresh Market Peaches, Planting Year, Per Acre.
14. Costs and Returns of Producing Fresh Market Peaches, Non Bearing Years 2 and 3, Per Acre.
15. Costs and Returns of Producing Fresh Market Peaches, Light Fruit Bearing Years 4-7, Per Acre.
16. Costs and Returns of Producing Fresh Market Peaches, Mature Trees Years 8-20, Per Acre.
17. Costs and Returns of Producing Blueberries, Land Preparation Year, Per Acre.
18. Costs and Returns of Producing Blueberries, Planting Year, Per Acre.
19. Costs and Returns of Producing Blueberries, Non Bearing Years 2 and 3, Per Acre.

20. Costs and Returns of Producing Blueberries, Light Fruit Bearing Years 4-5, Per Acre.
21. Costs and Returns of Producing Blueberries, Mature Bushes Years 6-20, Per Acre.
22. Costs and Returns of Producing Cranberries, Bog Preparation and Vine Planting Year 1, Per Acre.
23. Costs and Returns of Producing Cranberries, Non-Fruit Bearing Year 2, Per Acre.
24. Costs and Returns of Producing Cranberries, Light Fruit Bearing Years 3-5, Per Acre.
25. Costs and Returns of Producing Cranberries, Mature Fruit Bearing Years 6-20, Per Acre.

### **Vegetables**

26. Costs and Returns of Producing Bell Peppers, Per Acre.
27. Costs and Returns of Producing Green Cabbage, Per Acre.
28. Costs and Returns of Producing Cucumbers, Per Acre.
29. Costs and Returns of Producing Head Lettuce, Per Acre.
30. Costs and Returns of Producing Leaf Lettuce, Per Acre.
31. Costs and Returns of Producing Snap Beans, Per Acre.
32. Costs and Returns of Producing Sweet Corn (Early Season), Per Acre.
33. Costs and Returns of Producing Sweet Corn (Mid-Late Season), Per Acre.
34. Costs and Returns of Producing Tomatoes (Fresh Market), Per Acre.
35. Costs and Returns of Producing Tomatoes (Processing), Per Acre.

### **Livestock**

36. Costs and Returns of Dairy Cow Production, (19,000 Pounds of Milk), Per Cow.
37. Costs and Returns of Independent Poultry Production, (108,864 Table Egg Layers).

## **INTEGRATED CROP MANAGEMENT PRACTICES**

### **Field Crops**

38. Costs and Returns of Producing Corn for Grain, Per Acre.
39. Costs and Returns of Producing Corn for Silage, Per Acre.
40. Costs and Returns of Producing Alfalfa Hay - New Seeding, Per Acre.
41. Costs and Returns of Producing Alfalfa Hay - Established Stand, Per Acre.
42. Costs and Returns of Producing Soybeans, Per Acre.
43. Costs and Returns of Producing White Potatoes, Per Acre.

### **Fruits**

44. Costs and Returns of Producing Fresh Market Apples, Land Preparation Year, Per Acre.
45. Costs and Returns of Producing Fresh Market Apples, Planting Year, Per Acre.
46. Costs and Returns of Producing Fresh Market Apples, Mature Trees Years 8-20, Per Acre.
47. Costs and Returns of Producing Fresh Market Peaches, Land Preparation Year, Per Acre.
48. Costs and Returns of Producing Fresh Market Peaches, Planting Year, Per Acre.
49. Costs and Returns of Producing Fresh Market Peaches, Mature Trees Years 8-20, Per Acre.
50. Costs and Returns of Producing Blueberries, Land Preparation, Establishment, Mature Planting, Per Acre.
51. Costs and Returns of Producing Red Raspberries, Land Preparation, Establishment, Mature Planting, Per Acre.
52. Costs and Returns of Producing Strawberries, Land Preparation, Establishment, Mature Planting, Per Acre.

### **Vegetables**

53. Costs and Returns of Producing Bell Peppers, Per Acre.
54. Costs and Returns of Producing Green Cabbage, Per Acre.
55. Costs and Returns of Producing Snap Beans, Per Acre.
56. Costs and Returns of Producing Sweet Corn (Early Season), Per Acre.

57. Costs and Returns of Producing Sweet Corn (Mid-Late Season), Per Acre.

58. Costs and Returns of Producing Tomatoes (Fresh Market), Per Acre.

**Livestock**

59. Costs and Returns for Dairy Beef Steer Production, Per Cow.

60. Costs and Returns for Dairy Goat, 100 Doe Herd.

61. Costs and Returns for Spring Lamb, Per Ewe.

## **ORGANIC PRODUCTION PRACTICES**

### **Field Crops**

- 62. Costs of Production for Corn for Grain, Per Acre.
- 63. Costs of Production for Corn for Silage, Per Acre.
- 64. Costs of Production for Alfalfa Hay (New Seeding), Per Acre.
- 65. Costs of Production for Alfalfa Hay (Established Stand), Per Acre.
- 66. Costs of Production for Soybeans, Per Acre.

### **Fruit**

- 67. Costs of Production for Fresh Market Apples (Mature Trees), Per Acre.

### **Vegetables**

- 68. Costs of Production for Bell Peppers, Per Acre.
- 69. Costs of Production for Cabbage, Per Acre.
- 70. Costs of Production for Cauliflower, Per Acre.
- 71. Costs of Production for Cucumber, Per Acre.
- 72. Costs of Production for Leaf Lettuce, Per Acre.
- 73. Costs of Production for Yellow Onion, Per Acre.
- 74. Costs of Production for Pumpkins, Per Acre.
- 75. Costs of Production for Sweet Corn, Per Acre.
- 76. Costs of Production for Fresh Market Tomatoes, Per Acre.
- 77. Costs of Production for Processing Tomatoes, Per Acre.

### **Livestock**

- 78. Costs of Production for Dairy Goat, 1500 lbs. Milk/Doe, 100 Doe Herd.
- 79. Costs of Production for Dairy Goat, 1800 lbs. Milk/Doe, 100 Doe Herd.
- 80. Costs of Production for Dairy Goat, 2100 lbs. Milk/Doe, 100 Doe Herd.
- 81. Costs of Production for Spring Lamb, Per Ewe, 100 Ewe Flock.