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PLANETOR: Review and Application

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Preface

The Planetor software package is presently under development by the Center for Farm Financial Management, University of Minnesota. Planetor can be used to examine both the environmental and economic consequences of integrated crop management practices or Best farm Management Practices (BMPs)for alternative farming systems.

Planetor was used in the analysis for the Big Sioux Aquifer Demonstration Project. Much was learned of Planetor through the Big Sioux Demonstration Project and is presented in this report to aid potential future users considering using Planetor for their individual projects.

A number of people provided valuable assistance in the development of the crop budgets used in the development of the Planetor software package for the Big Sioux Aquifer Demonstration Project. Don Peterson deserves recognition for valuable assistance and advice in the development of this report. David Buland, State Economist, State Soil Conservation Service, Huron provided the livestock budgets as well as much dialogue throughout the development of this report. Area and District U.S. Soil Conservation Service personnel Mark Washechek, Karen Cameron-Howell, and Dennis J. Larson were extremely helpful in identifying crops and cultural practices pertaining to the Big Sioux Aquifer Project. Mel Kloster, Brookings County Agent also provided advice as the budgets were developed. Brad Farber, Research Associate, SDSU Plant Science also provided valuable advice on crops and cultural practices. These individuals are hereafter referred to in this report as key informants.

We would also like to thank the farmers that participated in the on-farm interview process. Their time and effort is much appreciated and without whose cooperation most of this report could not have been completed.

Verna Clark deserves special recognition and thanks for her patience and care in typing the manuscript. Any remaining errors in this report are the responsibility of the authors.

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Introduction

Farmers are becoming increasingly aware of the environmental consequences of farming practices that have become "conventional" over the last 30 to 40 years. As agricultural producers, they are expressing concern about erosion, ground water contamination, and personal health considerations from chemical use. At the same time, farmers are concerned about the economic viability of their operations. Farmers can not afford to sacrifice net farm incomes in order to meet stricter environmental regulations. A new software package named Planetor has been developed that can be used to examine the interrelationship between economic sustainability and environmental safety. Researchers working on the Big Sioux Aquifer (BSA) Demonstration Project at South Dakota State University are among the first to have used this new software package.

The BSA is a shallow glacial outwash aquifer underlying approximately 1000 square miles of prime agricultural land in eastern South Dakota. This aquifer is extremely important to the region as it supplies water for domestic as well as agricultural use. The importance and varied use of the water from this aquifer has increased the demand to ensure that this source of water is of high quality. The BSA demonstration project was initiated to address non-point sources of contamination within the Brookings, Moody, and Minnehaha county areas. The goal of the demonstration project is to implement Best Management Practices (BMPs) on agricultural land and develop other measures at the local level to protect private and public water supplies and shallow ground water aquifers from contamination (Big Sioux Demonstration - Project Summary, 1991).

Best Management Practices for agricultural land became a focus issue when farmers, policy makers, and the general public began to be aware of the environmental impacts of farming practices. Today, the BMPs of farmers are judged by both economic and environmental criteria. Concern is being expressed about erosion, groundwater contamination, and personal health considerations from chemical use and other farming practices. Additionally, concern is being raised about the economic viability of the farming operations. Farmers are continually examining ways to meet environmental standards without sacrificing net farm considerations.

In the past, it has been quite difficult to evaluate both the environmental and economic effects of alternative farming systems at the same time. Recently, a software package called Planetor has been developed for such a task. Planetor is the centerpiece of the SMART-Sustaining and Managing Agricultural Resources for Tomorrow micro-computer package being developed by the University of Minnesota. Planetor is specifically designed to help farmers and ranchers evaluate both the environmental and economic aspects of their present farming operation as well as any proposed changes they may be planning in the future.

Because Planetor is one of the few packages that integrates environmental and economic data, it was chosen for use on the BSA project. Planetor is a new software package which is still under development. Much was learned by this initial use of Planetor. Future potential users can benefit by the experience and knowledge gained of Planetor by it having been used on the BSA-Demo project. This report will describe Planetor, describe some of

Planetor's virtues, short comings, and answer some of the questions potential users may have about Planetor.

PART A

Introduction To and Description of Planetor

This section of the report will include a description of the Planetor computer package. Discussion will center primarily around introducing the reader to the Planetor computer package in a general sense followed by a more detailed discussion of the environmental and economic portions of Planetor.[1]

Introduction to Planetor.

Planetor is the centerpiece of the SMART-Sustaining and Managing Agricultural Resources for Tomorrow micro-computer package being developed by the University of Minnesota. Planetor is designed to help farmers and ranchers evaluate both environmental and economic aspects of their present farming operation as well as any proposed changes they may be planning in the future.

Planetor uses both soil and budget data to report environmental and economic results of a particular farming system. Planetor presents environmental results in three areas: 1) erosion, 2) water quality, and 3) pesticide toxicity. Results can be shown on both whole farm and/or per field basis. Green, yellow, and red indicator lights are used to show the impact of a particular farm plan on the environment.

Using Planetor requires that a soils data base and a variety crop enterprise budgets be developed. The soils database is prepared from county-level soils surveys. This information is available from the Soil Conservation

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[1] Much of the following discussion can be referenced to two publications: 1) Planetor Overview and 2) Planetor Demonstration Program User's Manual published by the Center For Farm Financial Management, University of Minnesota.

Service (SCS). Planetor can not be used if the soils information is not available for the area Planetor is to be used to examine.

Crop and livestock enterprise budgets are also necessary for the use of Planetor. The enterprise budgets are typically assembled by an agricultural specialist using Budgetor.

Budgetor is a tool used by Planetor to summarize crop and livestock budgets and other data for Planetor. The budgets are "average" or "typical" budgets corresponding to the same area represented by the soils database. These budgets are very similar to other conventional budgets, but with some addition information so that economic and environmental consequences of a particular farming system can be analyzed.

A partial listing of this additional information requirement includes: 1) budgeting be on rotational basis (up to 12 years if desired), 2) budgets developed for various cropping systems employing different fertility and pesticide rates, and tillage systems, 3) pesticides be specifically identified by trade name to determine the effects on water quality and human toxicity, 4) nitrogen requirements as well as application rates are identified, and 5) risk factors for each enterprise and those relating to diversification are specified.

Much of the budget data necessary for the development of Budgetor for Planetor for the BSA was obtained through the budget generator called CROPBUDGET. Livestock budget data was obtained primarily from budgets previously developed by the extension service and modified by David Buland, State SCS Economist, to fit the Budgetor format. Soils data for the BSA was provided by the Soil Conservation Service.

After Budgetor and the soils data are completed for an area, both are sent to the Center for Farm Financial Management at the University of Minnesota where both are "combined" to form a Planetor package specific to a given area. Turn around time for development of a South Dakota specific version of Planetor for use with the BSA-Demo project was approximately one week. The center for Farm Financial Management was very accessible and helpful when questions arose about Budgetor or Planetor.

Planetor uses red, yellow and green lights to indicate the impact of a cultural practices on the environment. Red indicates potential that a cultural practice(s) may have severe negative environmental effects. Green indicates the that practice(s) is within the established tolerable limits. Yellow indicates caution needs to be exercised and possible alternative practices considered. The indicator lights and their meaning are discussed in greater detail below.

Environmental

Erosion indicator lights displayed by Planetor are for water erosion only. The potential for wind erosion is not considered in the output but is shown in the farm data input section of Planetor. The color of the water erosion light is determined by applying the Universal Soil Loss Equation (USLE) to the soil type, slope, slope length, and cultural practice values. Most or all of this information is contained in the soils data base as part of Planetor. A C-factor, part of the USLE, is not contained in the soils database.

C-factors depend on the crops grown, and the tillage practices for the particular field. More specifically C-factors are a number representing the ratio of soil loss from a field with a specified cropping and management system or plant cover to that from the fallow condition on which the K factor is evaluated (SCS South Dakota Technical Guide, 1977).

The color of the lights for erosion are determined by comparing the value calculated by the USLE for erosion to the SCS "T" value. "T" is defined as the tolerable soil loss limit. If the soil loss is less than nine-tenths of "T" for that soil type, the low or green light is turned on. If soil loss is greater than nine-tenths but less than twice "T" the yellow or medium light is turned on. If soil loss is twice "T" or greater the red or high light is turned on.

Water quality indicator lights of Planetor combine nitrogen use, pesticide leaching and pesticide runoff effects into one common indicator light. Each also have separate underlying indicator lights. However, only the highest light of the three is shown when the three underlying lights are combined. Therefore, with Planetor it is possible to improve the environmental impact of a farm plan based on the water quality, without changing the color of the overall water quality light, by improving one or two of the underlying water quality lights.

Excess nitrogen is determined by the following criteria. If excess nitrogen is less than or equal to 25 pounds the low or green light is turned on. The medium or yellow light is turned on if the excess nitrogen is less than 50 but more than 25. The red light is turned on if excess nitrogen is calculated to be more than 50 pounds per acre.

Pesticide leaching is part of the water quality indicator light. The color of the pesticide leaching light is determined by combining the leaching rating for the field's soil type and the leaching rating for a particular chemical. The leaching ratings are contained in files in the Planetor program.

Pesticide runoff is also part of the water quality indicator. The color of the pesticide runoff light is determined by combining the runoff rating for the field's soil type and the runoff rating for a particular chemical. The runoff ratings are contained in files in the Planetor program.

Pesticide toxicity indicates the toxicity of pesticides used in terms of human exposure. Pesticide toxicity ratings are taken from the individual chemicals label and are classified as high, medium, or low corresponding to red, yellow, or green indicator lights. Pesticide toxicity data is contained in the chemical data base in Planetor.

Economic

Economic data calculated by Planetor consist of two types: the tradition financial income measures, <u>and</u> measures of balance between farm resources and their use. Economic data is available from Planetor on a whole farm basis as well as a crop and livestock enterprise basis.

Traditional financial income measures shown by Planetor include direct costs, net farm income, net worth change, and an average year figure. The average year figure is the simple average of the numbers for each year of the plan. A diversification effect is also calculated by Planetor. The diversification effect is a measure of how much income variability is reduced by having multiple enterprises on the farm.

Economic resources results show how five major farm resources (feed, labor, energy, water, and manure) are balanced against farm requirements.

A production summary is also provided by Planetor. Items included in this summary include acres by crop, total production by crop, corn equivalents (bushels), hay equivalents (tons), silage equivalents (tons), pasture (AUMS), and livestock. These are shown on a per year basis.

Planetor Version 1.21 was used for this research effort. Version 2 should be available in the future. Version 2 is the modified version of Planetor 1.21 to incorporate many needed improvements.

PART B

Using the Planetor Package

This portion of the report will describe the general procedure necessary to begin using Planetor. Data requirements and a description of the general procedure used for the BSA will be discussed.

Initial Step

Planetor is the centerpiece of the SMART-Sustaining and Managing Agricultural Resources for Tomorrow micro-computer package being developed by the University of Minnesota. Planetor can be obtained by contacting Center for Farm Financial Management in St. Paul. A Planetor Demo Version is available for those wishing to preview the program. There is a nominal charge for the demo. Those wishing to obtain a working copy of Planetor need to contact the Center for Farm Financial Management. A working copy of Planetor will not be received. Instead a budgeting program called Budgetor will be received.

Before discussing Budgetor, a description of the required computer hardware for Budgetor is in order. Budgetor requires an IBM-PC AT, PS/2 or compatible. A hard disk is desirable but a 2 floppy drive system with a minimum of 720K on the program disk will suffice. At least 512K of RAM is needed. A colored monitor is recommended but not required (Hawkins, et al., 1990).

Planetor is an area specific program and therefore requires data customized to the area that it will be used to analyze. Budgetor is the tool for summarizing the crop and livestock budgets and other data used to drive Planetor. Budgetor is not a budget generator. Budgetor is reasonably user friendly in terms of the user being able to learn the commands and move within the program. Budgetor is also very similar to Planetor in terms of format. The transition from Budgetor to Planetor should be made with relative ease. However, ease of operation does not imply accuracy of the coefficients. Much of the information required and used by Budgetor is available from other budgeting tools such as FINPACK or CROPBUDGET. That which is not available may require applied research. In any case, creating the budgets necessary for Budgetor (Planetor) is not a quick and easy process. Required data is of sufficient detail that a team of agricultural specialists and a large time commitment may be required.

Budgetor

Input Requirements for Budgetor. Planetor budgets, and therefore Budgetor crop budgets used to create the Planetor crop budgets, are rotational generic budgets that are to be modified later by Planetor users to fit specific farm cases. Generic budgets imply that the coefficients used are average or typical for the area being studied. This implies that a "typical" or "benchmark" farm may be needed for the area Planetor is to be used in order to create the coefficients.

The methodology to identify a "typical" baseline or benchmark farm, crop rotations and cultural practices over the BSA included use of primary and secondary data sources. (Much more detail of this process is available in Economic Staff Paper 91-9.) The development of a benchmark farm includes defining what are "typical" cultural practices, crop rotations, acreage distributions, machine inventories, and overall farm size for a baseline or benchmark farm as well as estimating the associated costs of each. The baseline farm is also necessary as cultural practices may vary from area to area. This information is essential to the development of Budgetor. Once the above parameters and data has been determined, then the associated per acre costs of each practice need to be determined so they can be entered into Budgetor and subsequently Planetor.

The cost coefficients entered into Budgetor are entered on a summary basis. Meaning fuel costs for a crop are entered as a total per acre per crop and not on a per operation per acre per crop basis. An example to illustrated this, all fuel costs (excluding drying) for producing corn are entered as one per acre lump sum in Budgetor as compared to entering fuel costs per acre for each cultural practice.

CROPBUDGET was used to estimate the costs for the BSA project. CROPBUDGET is a stand alone program or budget generator designed to estimate future costs of crop production. CROPBUDGET analyzes the operational costs of machinery and any custom operations included in producing a crop. Output includes a listing of the additional purchased inputs and an itemized analysis of cash costs and returns per acre (Peterson 1991). See Econ Staff Paper 91-9 for further details.

CROPBUDGET proved to be quite useful in generating the coefficients necessary to develop the Budgetor crop budgets required by the SMART (Planetor) software package. Other software packages such as FINPACK or CARE (SCS) may work equally as well.

In addition to the above, other data is also necessary to complete the crop budgets. C-factors are an example. C-factors are defined on page 6. C-factors are area specific and depend on the crops grown and the tillage practices on the field. C-Factors need to be calculated for each individual budget as well as for each rotational crop budget in Budgetor.

Livestock budgets are also part of Budgetor and use much same format as the crop budget part of budgetor. The livestock budgets are, as are the crop budgets, an average or typical budget for the area Planetor is to be used for. Livestock budgets are an average long run budget.

Livestock data is entered on five separate entry screens in a single column format for each enterprise. Screen one requires enterprise description information. Screen two asks for expected income and screen three asks for the associated costs of the enterprise. Screen four requires total labor per unit other than labor associated with custom hire operations. Screen five asks for the feed required per head for the operation.

As are the crop budgets, the required livestock budgets are of sufficient detail to essentially require a agricultural specialist to complete the budgets. A team approach may be necessary. A multitude of sources of information will likely be needed in order to complete the budgets.

Once Budgetor and the soils data is complete, both are sent to the Center for Farm Financial Management in St. Paul where both are "combined" to form a Planetor package specific to the area being studied. Turn around time for this will be at least two days after the information reaches St. Paul.

PART C

Initially Using Planetor

Part C of the paper will be an introduction to Planetor. Budgetor was discussed in the previous section. A description of computer hardware required and a very general approach to operating Planetor follows. This section on using Planetor is supplemented by Part F that describes the use of Planetor on a actual case farm.

Planetor

Once Planetor is received from the University of Minnesota it should be ready to install and use for the particular area it was developed for. Computer hardware requirements include at least a XT-class microcomputer running MS/PC-DOS 2.1 or higher and a hard disk with at least 2 megabytes free and 640 RAM minimum with at least 540K free. An AT class microcomputer or higher with a color monitor is strongly recommended but not strictly required (Hawkins, et al., 1990). A word of warning, Planetor is a RAM memory "hog". As rotations and number of fields increase and the livestock budgets are included for whole farm analysis, users may find themselves short of RAM.

The "switch" from Budgetor to Planetor should not pose an obstacle for those familiar with Budgetor. The menus and format are very similar if not almost identical many instances. To build a farm for analysis with Planetor six areas of farm data are asked for: 1) Farm/farmer's name, 2) Field information, 3) Crops, 4) Livestock information, 5) Overhead, and 6) Risk.

The farm/farmer's name is straight forward and for identification purposes.

Field information is a more involved data entry area. Field name is asked for first, followed by predominant soil type and soil characteristics, type of tillage, number of acres, and if share rented and type of sharing arrangement.

If an actual farm is being modeled it is very helpful to have ASCS aerial photograph of the farm. The farmer can point to a field on the photograph, label it by name and number of acres. The Planetor user can use the aerial photograph at a later time to determine the predominant soil type for the field by comparing the field on photograph to the county soil survey maps available from the SCS. It also helps make the fields less abstract to the interviewer.

Crop information is asked for next. The first task is to identify the crop raised in the present year along with the typical rotation for the field. Planetor has in its database the generic crop budgets developed on a rotational bases. The generic data is designed to be modified to fit the specific farm more closely. The process of modifying the generic budgets is as thorough as the farmer or user wishes.

Livestock data can be entered next. The procedure is similar to that of crops where the generic data can be modified as much as desired to fit the specific farm being analyzed. The process of modifying the generic budgets is as thorough as the farmer or user wishes.

Overhead information is asked for next. Most of the overhead information is straight forward and may be known offhand by the farmer. Farmers may be reluctant to reveal some of the overhead information as it is of a rather personal nature. The most troublesome overhead data for farmers to supply during the BSA interviews was total labors hours available to the operation for each month of the year.

Risk is the final section of the farm data section. The risk section of Planetor must be completed for each farm. Risk is the user's subjective opinion of the degree to which net returns from one enterprise are correlated with each of the other enterprises. Five choices are presented to pick from ranging from strong positive of strong negative. This data requirement may go slightly beyond the level of understanding of the casual user.

Planetor uses the above information to analyze the farm on a whole farm bases and on a enterprise basis. Further discussion of the use of Planetor and partial discussion of the output is included in the report in Part D and Part F. First however, is a discussion of the potential needs and deficiencies of Planetor as seen by the authors of this report.

PART D

Potential Needs and Deficiencies of Planetor

Planetor is one of the first software packages being developed that will have the capabilities to integrate both environmental and economic data into a whole farm analysis. The following discussion will focus primarily on a limited number of needs and deficiencies of the package as seen by the authors. Some of these were alluded to previously or may be mentioned below for the first time. Certainly, Planetor is a good program that possess many qualities much needed by farmers, researchers, and policy makers now and in the future. However, and not justly, these virtues will not be greatly expounded upon in this report.

To be able to have the capabilities to do both environmental and economic data, Planetor requires a tremendous amount of up front work to amass the necessary database. This database includes soils information, and crop and livestock budgets. All the data must be specific to the area that Planetor is to be used.

One of the potential downfalls of Planetor therefore is the tremendous up front investment in terms of time, effort, and expertise required in order to have a product that is usable for a given area. Planetor is not a ready to use, out of the box software package.

Because Planetor is not ready to use, one important first steps for those planning to implement Planetor is to establish a multi-disciplinary team of experts to supply technical support for the individual(s) developing the software for a specific geographical area. This may require inter-departmental or inter-agency cooperation, which in some instances may not be feasible or possible.

The soils data, as stated elsewhere in this report, was available for the BSA Demonstration project from the South Dakota Soil Conservation Service. Inter-agency cooperation was required in order to access the soils information. Time and effort was needed to insure that required data is indeed available, of sufficient quality, and in a usable format. Again, this process may require a large investment of up front time.

Crop and livestock budgets are also required up front for the area to be analyzed before Planetor can be used. These budgets are area specific and of sufficient detail that an agricultural specialist (with the team support) is almost essential in their development. Crop budgets are on a rotational basis, which is discussed elsewhere in this paper.

One of the touted primary strengths of Planetor is the ability to test alternative cultural practices for a given field to determine if: (1) those practices are as environmentally damaging as other alternative practices that may be available and, (2) to provided an economic feasibility report of those practices. However, changing cultural practices on a given field is not an easy task. For example, if a certain pesticide is indicated by lights to be potentially harmful to the environment, alternative pesticides can be chosen from the data base contained in Planetor. However, costs do not change when the alternative pesticide is chosen. Planetor users presently need to do external hand calculations and enter the change in costs as well. This can be quite time consuming if a large number of pesticides are substitutable and need to be considered as part of an alternative system.

Presently, Planetor only analyzes environmental damage of excess nitrogen. Excess phosphate and potassium are not considered. In some areas, excess phosphate may be a much greater problem than excess nitrogen. This deficiency will most likely be corrected in future versions of Planetor.

Fertilizer credits from manure may also be suspect. Presently, in Version 1.21, only nitrogen credit is given for manure when it is applied to a field. Nutrient loss from storage, timing and method of application are ignored as are P and K credits that may be received from the manure.

Erosion is also area of weakness. Presently, Planetor only considers water erosion. Soil **wind** erosion is a serious problem in many areas. This problem may be corrected in future versions.

A weakness encountered by the authors is Planetor's seemingly inability to handle multiple cultural practices. A specific example would be a terraced field farmed on the contour. Both of these practices may be considered environmentally sensitive or conserving, however the benefits of both in terms of preventing harm to the environment can not be accounted for by Planetor.

C-factors are a number used by Planetor to calculate soil erosion. C-factors, as explained earlier in this report, are area specific and depend on the crops grown and the tillage practices on the field. Presently, C-factors need to be calculated by hand outside of Planetor for each individual crop budget as well as for each rotational crop budget. It would simplify the use of Planetor if this could be handled internally by the program.

Rotational budgets may also be an area of weakness. There are a seemingly infinite number of crop rotations being used by farmers. Single year budgets that could be used as a "pick list" by the Planetor user to develop a specific rotation probably would be easier to develop and use later.

Planetor, at the present, is not rate sensitive to pesticide use in the crop budgets in terms of economics as mentioned above or in terms of the environmental harm. As Planetor presently operates, application of a pint of atrazine per acre has the same environmental impact as a gallon per acre applied to the same acre would have. A less absurd example would be perhaps cutting the use of a corn herbicide in half while increasing the mechanical row cultivating by one pass. In this example, the environmental sensitivity to the herbicide would be the same even though the rate applied was cut in half.

Planetor sets a parameter of only one predominant soil type per field. This may be an area of potential weakness, though the authors have reserved judgement on this aspect. Fields are many times determined first by surveyed boundaries (section lines) and then by topography boundaries. Therefore, two or more predominant soil types may be present in large fields. Potential for environmental harm for certain fertilizers and pesticides may vary depending on soil type. A solution to this potential problem is to divide the field into two or more parts. However, this can easily double or triple the number of fields on the farm and greatly increase the complexity of operating Planetor for a given farm operation, not to mention "farming" to meet the Planetor results.

A cosmetic need of Planetor would be to print the soil type on the output or printout sheets. Presently, soil type is shown in the printouts at the end of this report because the authors made an effort to type in the field name followed by the abbreviation for soil type in the data entry section. Many of the results of Planetor are based on soil type. It would beneficial to print soil types for each field so readers of the output data could identify cultural practices with specific soil types. It would also be easier to identify when the incorrect soil type was entered for the field.

Not all the weaknesses and deficiencies of Planetor have been discussed. Planetor is a tool being developed, that in the future, with refinements should prove to be even more useful for environmental and economic analysis of farming systems.

Possible Future Use of Planetor in South Dakota.

Agriculture's impact on the environment has became a focal point in the recent years for farmers, researchers, extension personnel, and the general public. Many conventional farming practices are being blamed for the contamination of our water supply and deterioration of our environment. Alternative farming systems such as Ridge-Till, No-Till, Minimum-Till and Sustainable Agricultural have been promoted by their advocates as being the best alternative to the present farming systems predominantly used. It has been in the past and is presently difficult to compare alternative farming systems on both an environmental and economic bases. Planetor is certainly a valuable first step and could prove useful in the future as a method of comparing farming system alternatives from both the environmental and economic standpoint. This type of information could prove useful at the farm level as well as for research and extension.

Future research needs to include information pertaining to the willingness of farmers to change their farming practices and to their economic ability to change. Planetor could serve a very important role in this process. Farmers may be much more willing to alter their present farming practices slightly if it could be shown through a model such as Planetor, that their economic position will not be adversely affected.

Planetor employed as a seminar tool may be the greatest potential future use of the software package. Planetor could be used in a workshop setting to develop a typical farm for an area. Changes could be made to that typical farm using the Planetor software to model alternative cultural practices and their environmental and economic effect on the farm. A team of agricultural specialists could be present to answer questions farmers had about the output generated by Planetor during the workshop. The agricultural specialists could be the same as were involved in the development of Planetor (Budgetor). Planetor could also prove very useful and valuable if through the seminar program, it simply increased farmers awareness of which of their present cultural practices may be potentially harmful to the environment and how those practices could be easily modified in a cost efficient manner.

Planetor could possibly be used as an aid in determining what incentives would be necessary to persuade farmers to modify their cultural practices to those that are thought to be less harmful to the environment. If the benefits of a certain alternative can be shown to outweigh the costs of the present method, farmers may be more willing to modify present methods to those that are potentially less environmentally harmful.

Version 2 of Planetor is one possible alternative to do the analyses alluded to above. Planetor could also possibly be used to examine other issues pertinent to South Dakota as well. Alternatives to livestock waste management and the future use of tracts coming out of CRP contracts are other such areas. Version 2 of Planetor might also prove useful to analyze existing data that is currently available from the SDSU Southeast farm near Beresford, SD as well as other data collected from on-going sustainable farming and water quality research.

PART E

Case Farm Selection Criteria and Interview

After developing a version of Planetor specific to the BSA, it was decided that three case farms would be necessary for the initial analysis for the BSA and as a test of Planetor. These farms are distributed across the aquifer from north to south.

The three case farms were identified by the District Conservationist for each respective county. The farms were chosen based on a number of criteria. Primary considerations were: 1) location of farm in relationship with the BSA, 2) if the farm operator expressed interest in or is involved in the Integrated Crop Management (ICM) program, 3) best judgement as to if the farm is a representative typical conventional farm for the area, and 4) willingness of the farmer to participate in the project.

Personal interviews were done with each farmer. Two of the farmers were interviewed once while a third farmer was interviewed twice. That third farm is presented in subsequent sections of this report. Of the information gathered during the interview process, the most important and relevant information gathered for the BSA analysis included: 1) expected yields, 2) typical crop rotations for the farm, 3) actual pesticides used, 4) amounts and methods of fertilizer application, 5) how fields are work in spring and fall in relationship to the crops grown, 6) livestock raised on the farm, 7) minimal information as to livestock numbers and rations, 8) how manure is stored and to which fields it was applied, and 9) some basic overhead information necessary to do a whole farm analysis with Planetor software package. All of this information was used to customized general budgets in

Planetor to be farm specific. For this report, pesticides refer exclusively to herbicides.

All crop and livestock data was collected on a field by field or enterprise basis. The interview process took slightly more than 2 hours for each farm. For two of the three case farms only part of the whole farm unit was included in the study. That part of the farm included in the study was decided upon at the outset of farm interview process by the interviewer and the farmer. General considerations considered when choosing the farm unit to model included; 1) if it was typical in terms of rotations and cultural practices of the interviewee's operation and of their neighbors, 2) size and location of the tract in relation to the BSA, and 3) number of fields on the tract.

Major drawbacks to this approach include that the Planetor model presented in this report is not a true representation of the whole farm. Therefore, such things as: 1) shortages of feed may be shown that are actually supplied by other parts of the whole farm, 2) a labor surplus may be shown that is actually used for the rest of the whole farming operation, 3) manure produced is not credited to any of the fields shown as it is spread on other fields of the whole farm.

PART F

Discussion and Description of Case Farm Analysis

One case farm is included in this report to demonstrate the use of Planetor. One "run" was made initially with Planetor for the farm using only the generic information. This was followed by a second and third run. Modifications were made to Run 1 to make the Planetor model more farm specific. A final run (Run 3) was completed for the case farm. It was attempted in Run 3 to make the farm less environmentally harmful. Only Run 2 is shown in this report.

Description of Runs

The first Planetor printout or Run 1 was for the farm with its' reported crop rotations and livestock enterprises. Only the generic information was used for Run 1. No farm specific data was included in Run 1 except for: 1) the specific soils data for each field, 2) the rotation for each field, 3) livestock operation(s) for each farm, 4) overhead, 5) risk, 6) rental arrangement and 6) C-factors. No adjustments were made in Run 1 to the budgets for: 1) fertilizer rates or prices, 2) pesticide rates or prices, 3) crop yields or selling weights of livestock, 4) nitrogen credit on fields where manure was applied, and 5) the rations of livestock.

The second Planetor printout or Run 2 for the farm was more farm specific than Run 1 but less so than Run 3. The same budgets as used in Run 1 were just modified to be even more farm specific. Adjustments were made to the budgets in Run 2 for: 1) fertilizer rates and prices, 2) type of pesticides, pesticide rates and prices, 3) yields and selling weights of livestock, 4) nitrogen credits on fields to which manure was applied, and 5) very limited modifications to the rations of livestock.

The final Planetor run (Run 3) for the case farm was a modification of Run 2. The budgets used in Run 3 were adjusted to reflect the a less environmentally damaging farming system based on output from Run 2. Adjustments were made in Run 3 for factors affecting water quality and pesticide toxicity. Items adjusted include nitrogen fertilizer rates and the type of pesticides applied together with the associated costs of those items.

All runs were for a crop rotation of 4 years. Year 1 represents the 1991 crop year. Years 2 through 4 represents crop years 1992-94. A four year cropping period was chosen because: 1) the longest rotation specified during the farm interviews was four years in length, 2) the weather and government regulations make it difficult for farmers to predict what they will be planting beyond the present year, 3) data handling becomes cumbersome, 4) more than four years exceeded the needs of the BSA - Demo project or this report, and printouts become too difficult to read and understand.

Also, for discussion purposes, Year 1 data will be the focus of the discussion, but discussion will not be strictly limited to Year 1. The underlying reasoning is that cultural practices for any given crop are assumed not to change from year to year. This implies that the tillage practices, fertilizer rates and pesticide types and rates will not change for a given crop during the 4 year rotation.

Description of Case Farm

The case farm is the located on the Moody and Minnehaha county border. It was judged to be typical conventional farm for the area. The part of the whole farm modeled by Planetor consisted of 415.3 acres of cropland and no pasture land (415.3 acres total). The most typical rotation is Corn - Soybeans. Some silage is harvested on poorer yielding fields. Alfalfa is grown on 15.5 acres, approximately one-half which was harvested and one-half which was declared government set-aside. Manure is spread on some of the fields.

The farm uses many cultural practices that are similar to other conventional farm practices in the area. Typical spring tillage operations for the various crops grown primarily includes tandem discing. Fall tillage most typically includes leaving soybean ground as is after harvest. Corn ground is chiseled plowed in the fall. Chisel plowing is often preceded by a tandem discing.

Fertilizers and pesticides are used on this farm at typical or recommended rates.

Livestock raised on the farm includes backgrounding feeder cattle from 500 to 850 pounds. Hogs are also raised on the farm. Feeder pigs are purchased monthly at 40 pounds and fed to approximately 225 pounds. A few ewes are also raised on the farm but are considered a hobby by the farmer and therefore were not included in this analysis.

Run 1. This farm unit is presently farmed as 12 different fields. Soil types and slope vary but include soils that are predominantly silty clay loams with slopes varying from 0 to 6 percent. The environmental summary indicated that soil erosion is not generally a problem on the farm. Only two fields were shown as having a soil loss rating in the medium range. All other fields were shown not to have a soil loss problem. This is water erosion only and not wind erosion. Wind erosion is shown in the data input section of Planetor.

With the use of the generic budgets, potential for damage to water quality was shown on every field. Eradicane and Lasso EC combined with most soil types for the case farm had a potential for leaching and runoff. Nitrogen is shown on many fields to in medium or high excess.

Economic results showed the farm operating with generic budgets at a slight loss in terms of income before non-farm income, family living expense, federal income tax, and social security taxes. That loss was approximately $5,000. When non-farm income, family living expenses, and taxes were included net worth change was negative.

Labor was shown to be in excess. This would be somewhat expected as the farmer reported in the interview being employed off the farm.

The energy summary and water summary were shown. Nothing is irrigated hence the water summary was shown as zero. The manure summary showed approximately 17,000 pounds of nitrogen was produced by livestock manure. The manure was stored where it falls and later spread. All manure was spread on owned land and was credited to the operation in Run 2.

Run 2. The second Planetor printout or Run 2 for the case farm is very similar to Run 1 except with more farm specific modifications than are contained in Run 1. As stated previously, adjustments made to the farm data for Run 2 include: 1) fertilizer rates and prices, 2) pesticide rates and prices, 3) yields and selling weights of livestock, 4) nitrogen credits on fields that manure was applied to, and 5) limited modifications to the rations of livestock. Readers may review the Planetor output for Run 2 in Annex A.

Farm fields and soil information was not changed for Run 2. The environmental summary for Run 2 continues to indicate that soil erosion is generally not a problem on the farm. As was the case in Run 1, two fields have soil loss ratings in the medium range. All other fields are shown not to have a soil loss problem. This is water erosion only and not wind erosion. Wind erosion is shown in the data input section of Planetor.

With the budgets incorporating the fertilizer rates and pesticides reported used by the farmer on each field, potential for damage to water quality is shown on most every field. As indicated on the printout for Run 2, Buctril, Lasso II, Basagran, Lasso EC, Treflan, and Roundup combined with most soil types have a potential for both leaching and runoff. Nitrogen is shown on some fields to be in excess.

Economic results of Run 2 show the farm operating with the generic budgets, modified to be more farm specific, to be more profitable than with the generic budgets. That profitability is shown to be approximately $25,000 more than Run 1. When non-farm income, family living expenses, and income and social security taxes are included net worth change is positive when compared to Run 1, in which a negative change in net worth was shown.

Labor did not change from Run 1 to Run 2 and is still shown to be in excess.

The energy summary and water summary are also shown. Energy usage in terms of diesel equivalents increased with Run 2 when compared to Run 1. The increase in energy usage is related to an increase in fertilizer reported applied by the farmer. Nothing is irrigated, hence the water summary is shown as zero. The manure available to spread depends on how long the animals were assumed to be on the farm. All manure produced was spread in Run 2.

The production summary is shown next. Farm generic production yields were generally adjusted upward by the farmer. Therefore, greater yields and crop surpluses are shown in many cases. Reviewers are reminded that the production summary is only for part of the actual whole farm and that livestock numbers are based on the whole farm. Therefore such things as apparent feed surpluses or shortages are quite lightly to result.

Run 3. The third Planetor printout or Run 3 for case farm was very similar to Run 2 except adjustments were made in an attempt to modify the farming system to be less environmentally damaging. Adjustments were made to the data for Run 3 that included: 1) less nitrogen fertilizer applied to fields where excess nitrogen was indicated by Planetor and 2) less environmentally harmful pesticides (based on **Planetor)** were substituted for those presently used by the farmer. Associated prices were adjusted accordingly.

Farm fields and soil information was not changed for Run 3. The environmental summary for Run 3 continued to indicated that soil erosion was generally not a problem on the farm so no changes in tillage practices were made. The two fields shown having a medium soil erosion rating are presently farmed on the contour by the farmer. Further changes, such as modifying the rotation or cultural practices might decrease the soil loss rating to low. These changes were not made in this analysis.

Water quality and pesticide toxicity were both shown by Planetor as red flags or high in Runs 1 and 2 indicating that perhaps a different choice of pesticides would be less harmful to both the environment and the operator. Therefore, attempts were made to decrease the dangers or change the red flags (high indicators lights) to yellow or green flags (medium and low indicators lights) for both water quality and pesticide toxicity.

Perhaps it needs to restated here that the water quality indicator light combines nitrogen levels, potential for pesticide leaching and pesticide runoff into one combined light. Each area also has its' own separate indicator light. Therefore, with Planetor it is possible to improve the environmental impact of a farm plan for water quality without changing the color of the overall indicator light, by making necessary adjustments to change the underlying nitrogen levels, pesticide leaching and pesticide runoff lights.

The printout for Run 2 indicated that Buctril, Lasso II, Basagran, Lasso EC, Treflan, and Roundup reported used by the farmer combined with the particular soil types for this farm have potential for both pesticide leaching and runoff. Nitrogen was shown to be at the medium level in 5 of the 12 fields.

By substituting alternative pesticides for those used by the farmer, it was possible to change the indicator light indicating the potential for pesticide leaching from high to medium or medium to low for most fields. Pesticide leaching is one of the three water quality factors considered by Planetor.

For this particular farm, it was not possible to change the light for potential pesticide runoff. It remained high in all cases for all fields. The potential for pesticide runoff combines the effects of soil type for a particular field with a particular pesticides potential for run off. For the case farm shown here, soil characteristics are such that almost all pesticides listed in the Planetor database have a high potential for runoff to occur, therefore the light remained red or high in almost all cases. Insecticides were not used by this farmer.

Pesticide substitutions for Run 3 were made with substitutability in mind. Effort was made to substitute pesticides that could be applied in a similar matter, at approximately the same time, and for similar weed infestations as those the farmer is presently using. The substitutions made for the case farm were the following:

For corn: Dual was substituted for Lasso (both granular)

For Soybeans: Dual was substituted for Lasso
Lorox was substituted Treflan
Classic was substituted for Basagran

Excess nitrogen was also indicated by Run 2 on 5 separate fields. A yellow light or medium level is indicated if the excess nitrogen is less than 50 but more than 25 pounds per acre. For the case farm, nitrogen excess was usually caused by lack of adjustment for nitrogen credit from legumes or manure. In three of the five fields showing medium or yellow lights, simply decreasing the amount of nitrogen applied changed the light from yellow to green, or from a medium to low. In the two remaining fields, manure was being spread on soybean ground. These warning lights could also be changed by having the farmer spread the manure on other fields and decreasing the amount of purchased nitrogen applied to those fields.

The amount of reduction necessary to change the indicator lights to green was as follows for each of the three fields:

Field #8 Decrease the Nitrogen applied by 63 pds in year 2
Field #9 Decrease the Nitrogen applied by 63 pds in year 2
Field #11 Decrease the Nitrogen applied by 98 pds in year 1

Economic results of Run 3 showed the farm operating slightly more profitably in terms of income before non-farm income, family living expense, income and social security taxes than with the Run 2 budgets for Year 1. However, that increase in profitability was a difference of less than $500. Profitability then varied between Years 2-4 for Runs 2 and 3. When non-farm income, family living expense, income and social security taxes were included, positive net worth change for Run 3 was larger than for Run 2 for Year 1, but varied in subsequent years.

Labor did not change from Run 2 to Run 3 and is still shown to be in excess.

Energy usage in terms of diesel equivalents decreased with Run 3 when compared to Run 2. The decrease in energy usage was related in part to the decrease in fertilizer use by the farmer by adopting the alternative system of Run 3. Nothing is irrigated, hence the water summary was shown as zero. The manure summary did not change from Run 2 to Run 3. All manure produced was spread on the same fields in both Runs 2 and 3. The production summary was shown next. Yields did not changed for Run 3 from Run 2.

Summary

Farm managers of today are faced with many alternative management strategies to meet their goals. Goals of individual farm managers can vary tremendously. Profit is generally assumed to be the overriding goal of most farm managers. However, factors such as individual and family goals, and environmental considerations may be in direct conflict with profit maximizing options available to a particular farm manager.

Farm managers and others have in the past had a difficult time to analyze and compare alternative management goals and farming systems. Planetor is the centerpiece of the SMART-Sustaining and Managing Agricultural Resources for Tomorrow micro-computer package. Planetor is specifically designed to help farmers and others evaluate both the environmental and economic aspects of their present farming operation as well as any proposed changes they may be planning in the future.

Planetor is an area specific program that requires a seemingly enormous amount of up front time and effort before it can be used for analysis purposes. Using Planetor requires that a soils database as well as crop and livestock enterprise budgets be developed. Planetor is still in development stages and presently has a few "bugs" and other issues that need to be worked out. This should not discourage use of the program however.

Planetor is a good program that possess many qualities much needed by farmers, researchers, and policy makers now and in the future. Planetors main use (as seen by the authors) is that of an educational tool. Planetor is somewhat complex to use and creates a large amount of inter-related output for a given farm. Because of the volume and detail of the output, it may create more questions than it answers. Creating questions or pointing out potentially less profitable enterprises along with environmental and personal hazards of an operation can be justification enough for the program. If Planetor causes farmers to re-evaluate their operations with economic and environmental goals in mind, then progress has been made.

Planetor could also prove to be useful to researchers at SDSU. Planetor could prove useful in the future as a method of comparing alternative farming systems and practices from both the environmental and economic standpoint. This type of information could prove useful at the farm level as well as for research and extension purposes.

Planetor could also possibly be used to examine other issues pertinent to South Dakota as well. Alternatives to livestock waste management and the future use of tracts coming out of CRP contracts are other such areas. Version 2 of Planetor, which is expected to be released soon, may prove more useful to analyze existing data that is currently available from the SDSU Southeast farm near Beresford, SD as well as other data collected from on-going sustainable farming and water quality research projects.

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Annex A

Planetor Budget for Case Farm

This annex contains a Planetor printout of Run 2 for case farm 3. Runs 1 and 3 are not shown in this report.

Case Farm C - Run 2
PLANETOR Version 1.2
Center For Farm Financial Management
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South Dakota State University
User: South Dakota State University, Ag Eng. & Extension. John Cole & Burton Pflueger
File: FARMCR2 Date: 10-08-1991

*** FIELD SUMMARY ***

Field		Acres	Year 1	Year 2	Year 3	Year 4
Field #1	EsA	51.7	Corn	Soybeans	Corn	Soybeans
Field #2	EsA	55.5	Soybeans	Corn	Soybeans	Corn
Field #3W	Ga	51.8	Soybeans	Corn	Soybeans	Corn
Field #4	Wa	21.8	Soybeans	Corn Silage	Soybeans	Corn Silage
Field #5	Ga	59.0	Corn	Soybeans	Corn	Soybeans
Field #6	Ca	50.0	Corn	Soybeans	Corn	Soybeans
Field #7	Ga	20.0	Corn Silage	Soybeans	Corn Silage	Soybeans
Field #8	MoB	7.1	Hay Alfalfa	Corn	Soybeans	Corn
Field #9	Ac	8.4	Hay Alfalfa	Corn	Soybeans	Corn
Field #10	MnB	37.0	Soybeans	Corn	Soybeans	Corn
Field #11	EsA	18.0	Corn	Soybeans	Corn	Soybeans
Field #3E	Ga	35.0	Soybeans	Corn	Soybeans	Corn

*** ENVIRONMENTAL SUMMARY ***

EROSION			Predicted Average Soil Loss / Year (tons)	Tolerable Soil Loss / Year (tons)	Soil Loss Rating
Field #1	EsA	51.7	2.9	5.0	Low
Field #2	EsA	55.5	2.9	5.0	Low
Field #3W	Ga	51.8	3.1	5.0	Low
Field #4	Wa	21.8	2.6	5.0	Low
Field #5	Ga	59.0	3.1	5.0	Low
Field #6	Ca	50.0	1.8	5.0	Low
Field #7	Ga	20.0	3.7	5.0	Low
Field #8	MoB	7.1	6.8	5.0	Medium
Field #9	Ac	8.4	1.5	5.0	Low
Field #10	MnB	37.0	4.9	5.0	Medium
Field #11	EsA	18.0	2.9	5.0	Low
Field #3E	Ga	35.0	3.1	5.0	Low

WATER QUALITY		Year	Crop	Potential Problems
Field #1	EsA	1	Corn	High Buctril runoff, High Lasso II runoff
		2	Soybeans	Medium Basagran leaching, High Basagran runoff, High Lasso EC runoff, High Roundup runoff, High Treflan runoff
		3	Corn	High Buctril runoff, High Lasso II runoff
		4	Soybeans	Medium Basagran leaching, High Basagran runoff, High Lasso EC runoff, High Roundup runoff, High Treflan runoff
Field #2	EsA	1	Soybeans	Medium Basagran leaching, High Basagran runoff, High Lasso EC runoff, High Roundup runoff, High Treflan runoff
		2	Corn	High Buctril runoff, High Lasso II runoff
		3	Soybeans	Medium Basagran leaching, High Basagran runoff, High Lasso EC runoff, High Roundup runoff, High Treflan runoff
		4	Corn	High Buctril runoff, High Lasso II runoff
Field #3W	Ga	1	Soybeans	High Basagran leaching, Medium Lasso EC leaching, High Basagran runoff, High Lasso EC runoff, High Roundup runoff, High Treflan runoff
		2	Corn	Medium Lasso II leaching, High Buctril runoff, High Lasso II runoff
		3	Soybeans	High Basagran leaching, Medium Lasso EC leaching, High Basagran runoff, High Lasso EC runoff, High Roundup runoff, High Treflan runoff
		4	Corn	Medium Lasso II leaching, High Buctril runoff, High Lasso II runoff

WATER QUALITY (cont.)	Year	Crop	Potential Problems
Field #4 Wa	1	Soybeans	High Basagran leaching, Medium Lasso EC leaching, Medium Basagran runoff, Medium Lasso EC runoff, High Roundup runoff, High Treflan runoff
	2	Corn Silage	Medium Lasso II leaching, Medium Buctril runoff, Medium Lasso II runoff
	3	Soybeans	High Basagran leaching, Medium Lasso EC leaching, Medium Basagran runoff, Medium Lasso EC runoff, High Roundup runoff, High Treflan runoff
	4	Corn Silage	Medium Lasso II leaching, Medium Buctril runoff, Medium Lasso II runoff
Field #5 Ga	1	Corn	Medium Lasso II leaching, High Buctril runoff, High Lasso II runoff
	2	Soybeans	High Basagran leaching, Medium Lasso EC leaching, High Basagran runoff, High Lasso EC runoff, High Roundup runoff, High Treflan runoff
	3	Corn	Medium Lasso II leaching, High Buctril runoff, High Lasso II runoff
	4	Soybeans	High Basagran leaching, Medium Lasso EC leaching, High Basagran runoff, High Lasso EC runoff, High Roundup runoff, High Treflan runoff
Field #6 Cm	1	Corn	High Buctril runoff, High Lasso II runoff
	2	Soybeans	Medium Basagran leaching, High Basagran runoff, High Lasso EC runoff, High Roundup runoff, High Treflan runoff
	3	Corn	High Buctril runoff, High Lasso II runoff
	4	Soybeans	Medium Basagran leaching, High Basagran runoff, High Lasso EC runoff, High Roundup runoff, High Treflan runoff
Field #7 Ga	1	Corn Silage	Medium Lasso II leaching, High Buctril runoff, High Lasso II runoff
	2	Soybeans	High Basagran leaching, Medium Lasso EC leaching, High Basagran runoff, High Lasso EC runoff, High Roundup runoff, High Treflan runoff
	3	Corn Silage	Medium Lasso II leaching, High Buctril runoff, High Lasso II runoff
	4	Soybeans	High Basagran leaching, Medium Lasso EC leaching, High Basagran runoff, High Lasso EC runoff, High Roundup runoff, High Treflan runoff
Field #8 MoB	1	Hay Alfalfa	High Roundup runoff
	2	Corn	Medium Lasso II leaching, High Buctril runoff, High Lasso II runoff, High Excess Nitrogen
	3	Soybeans	High Basagran leaching, Medium Lasso EC leaching, High Basagran runoff, High Lasso EC runoff, High Roundup runoff, High Treflan runoff, Medium Excess Nitrogen
	4	Corn	Medium Lasso II leaching, High Buctril runoff, High Lasso II runoff
Field #9 Ac	1	Hay Alfalfa	High Roundup runoff
	2	Corn	Medium Lasso II leaching, Medium Buctril runoff, Medium Lasso II runoff, High Excess Nitrogen
	3	Soybeans	High Basagran leaching, Medium Lasso EC leaching, Medium Basagran runoff, Medium Lasso EC runoff, High Roundup runoff, High Treflan runoff, Medium Excess Nitrogen
	4	Corn	Medium Lasso II leaching, Medium Buctril runoff, Medium Lasso II runoff
Field #10 MnB	1	Soybeans	High Basagran leaching, Medium Lasso EC leaching, High Basagran runoff, High Lasso EC runoff, High Roundup runoff, High Treflan runoff, High Excess Nitrogen
	2	Corn	Medium Lasso II leaching, High Buctril runoff, High Lasso II runoff
	3	Soybeans	High Basagran leaching, Medium Lasso EC leaching, High Basagran runoff, High Lasso EC runoff, High Roundup runoff, High Treflan runoff
	4	Corn	Medium Lasso II leaching, High Buctril runoff, High Lasso II runoff
Field #11 EsA	1	Corn	High Buctril runoff, High Lasso II runoff, High Excess Nitrogen
	2	Soybeans	Medium Basagran leaching, High Basagran runoff, High Lasso EC runoff, High Roundup runoff, High Treflan runoff
	3	Corn	High Buctril runoff, High Lasso II runoff
	4	Soybeans	Medium Basagran leaching, High Basagran runoff, High Lasso EC runoff, High Roundup runoff, High Treflan runoff
Field #3E Ga	1	Soybeans	High Basagran leaching, Medium Lasso EC leaching, High Basagran runoff, High Lasso EC runoff, High Roundup runoff, High Treflan runoff, High Excess Nitrogen
	2	Corn	Medium Lasso II leaching, High Buctril runoff, High Lasso II runoff

WATER QUALITY (cont.)	Year	Crop	Potential Problems
	3	Soybeans	High Basagran leaching, Medium Lasso EC leaching, High Basagran runoff, High Lasso EC runoff, High Roundup runoff, High Treflan runoff
	4	Corn	Medium Lasso II leaching, High Buctril runoff, High Lasso II runoff

PESTICIDE

Chemical	Label Toxicty	Chemical	Label Toxicty
Basagran	Caution	Buctril	Warning
Lasso EC	Danger	Lasso II	Warning
Roundup	Warning	Treflan	Warning

*** ECONOMICS ***

PROFITABILITY	Year 1	Year 2	Year 3	Year 4
Income				
Corn equivalents	25347	27630	25347	27630
Hay equivalents	934	0	0	0
Silage equivalents	2705	2948	2705	2948
Soybeans	23649	23367	25472	23367
Hogs Finishing	54096	54096	54096	54096
Beef Backgrnd Steers	104071	104071	104071	104071
Other Crop Income	4937	5382	4937	5382
Custom Work Income	4000	4000	4000	4000
Other Farm Income	350	350	350	350
Home Grown Feed Fed	-22400	-22643	-22400	-22643
Gross Farm Income	197689	199202	198578	199202
Expense				
Seed	5811	6088	5997	6088
Fertilizer	5069	5940	4818	5940
Crop chemicals	6281	6174	6464	6174
Drying fuel	43	47	43	47
Custom hire	450	455	417	455
Direct crop labor	4341	4444	4368	4444
Supplies	9	0	0	0
Purch. silage equiv.	2874	2630	2874	2630
Feeder lvst purch	91588	91588	91588	91588
Purchased feed	12113	12113	12113	12113
Vet & Medicine	2760	2760	2760	2760
Supplies	1136	1136	1136	1136
Marketing	3450	3450	3450	3450
Misc. lvst expense	1875	1875	1875	1875
Fuel and Oil	5003	5151	5062	5151
Repairs	4858	4996	4917	4996
Taxes	4350	4350	4350	4350
Insurance	675	675	675	675
Lease	2000	2000	2000	2000
Hired labor	500	500	500	500
Utilities	1200	1200	1200	1200
Interest	21329	21329	21329	21329
Total Farm Expense	177715	178902	177936	178902
Profit or Loss	19974	20300	20643	20300
Probability of Loss %	22.8	22.6	22.1	25.5

NET WORTH CHANGE	Year 1	Year 2	Year 3	Year 4
Profit or Loss	19974	20300	20643	20300
Non Farm Income	10000	10000	10000	10000
Family Living Exp	22000	22000	22000	22000
Federal Income Tax	1734	1780	1828	1780
Social Security Tax	3587	3633	3682	3633
Net Worth Change	2652	2887	3133	2987
Prob of NW Decrease %	44.3	43.9	43.4	44.6

*** RESOURCES ***

Labor Balance (Hours)	Year 1	Year 2	Year 3	Year 4
January	114	114	114	114
February	114	114	114	114
March	114	114	114	114
April	228	222	228	222
May	175	173	167	173
June	136	138	138	138
July	362	368	368	368
August	364	368	368	368
September	368	368	368	368
October	173	162	169	162
November	156	152	154	152
December	74	74	74	74
Labor Available	3968	3968	3968	3968
Labor Needed	1589	1601	1592	1601

ENERGY SUMMARY (Gallons of diesel equivalents)

Irrigation Diesel	0	0	0	0
Irrig Electricity	0	0	0	0
Drying LP Gas	86	94	86	94
Drying Electricity	0	0	0	0
Nitrogen Fertilizer	3052	3479	3005	3479
All Other Diesel	4789	4986	4880	4986
Total Diesel Equiv.	7927	8559	7971	8559

WATER SUMMARY

Inches Per Irrg. Acre	0.0	0.0	0.0	0.0
Total Acre Feet Used	0.0	0.0	0.0	0.0

MANURE SUMMARY (Pounds of nitrogen)

Nitrogen Prod	17225	17225	17225	17225
Nitrogen Used	8640	0	0	0
Nitrogen Balance	8585	17225	17225	17225

*** PRODUCTION SUMMARY ***

CROP ACRES	Year 1	Year 2	Year 3	Year 4
Corn	179	195	179	195
Corn Silage	20	22	20	22
Hay Alfalfa	15	0	0	0
Soybeans	201	199	217	199
Total Acreage	415	415	415	415

CROP PRODUCTION					
Corn	Bu.	12866	14026	12866	14026
Corn Silage	Tons	168	183	168	183
Hay Alfalfa	Tons	37	0	0	0
Soybeans	Bu.	4223	4173	4549	4173

CORN EQUIVALENTS (Bushels)				
Produced	12866	14026	12866	14026
Fed	9997	9997	9997	9997
Balance	2869	4028	2869	4028

SILAGE EQUIVALENTS (Tons)				
Produced	168	183	168	183
Fed	347	347	347	347
Balance	-178	-163	-178	-163

LIVESTOCK	Units	Prod. Per Unit	Total Production
Hogs Finishing	500 Head	230.00 Lb.	115000.00 Lb.
Beef Backgrnd Steers	175 Head	875.00 Lb.	153125.00 Lb.

PLANETOR CROP ROTATION BUDGET

Field Name: Field #1 EsA
Description: Corn Soybean Rotation.

Farm: Case Farm C - Run 2
Date: October 4, 1991

**** RESOURCE MANAGEMENT STRATEGIES ****

C-Factor for this rotation	0.425
Irrigation system used	Not Irrigated
Tillage system	Unrestricted
Input level	Unrestricted
Length of the rotation (yrs)	4

**** COMMENTS ****

This budget is Corn followed by Soybeans. The budgets are conventional. The corn is chiseled plowed and soybeans are left as is in the fall.

**** CROP PLAN ****

Year	Primary Crop	Second Crop
1	Corn	
2	Soybeans	
3	Corn	
4	Soybeans	

**** SUMMARY DATA ****

		Year 1	Year 2	Year 3	Year 4
Excess nitrogen	(lbs)				
With expected yield		25	18	25	18
With optimistic yield		4	18	4	18
Highest chemical rating					
Toxicity		Medium	High	Medium	High
Leaching potential		Medium	High	Medium	High
Run-off potential		Medium	High	Medium	High
Diesel equivalents	(gallons)	31.84	8.90	31.84	8.90
BTU equivalents	(millions)	4.46	1.25	4.46	1.25
Value of exp. yield - Crop 1	($)	236	196	236	196
Value of exp. yield - Crop 2	($)	-	-	-	-
Total return/benefit	($)	277.81	196.00	277.81	196.00
Total cash operating costs	($)	122.19	79.47	122.19	79.47
Return over direct costs	($)	155.62	116.53	155.62	116.53
Total return risk factor	(+/-)	70	45	70	45
Labor requirement	(hours)	2	1	2	1
Corn equivalents produced	(bu)	120	-	120	-
Hay equivalents produced	(ton)	-	-	-	-
Silage equiv. produced	(ton)	-	-	-	-
Animal Unit Month prod.	(AUM)	-	-	-	-

**** YIELD AND PRICE ****		Year 1 Corn	Year 2 Soybeans	Year 3 Corn	Year 4 Soybeans
Unit of yield		Bu.	Bu.	Bu.	Bu.
Expected yield		120.0	35.0	120.0	35.0
Optimistic yield		143.0	40.0	143.0	40.0
Pessimistic yield		65.0	24.0	65.0	24.0
Expected price		1.97	5.60	1.97	5.60
Optimistic price		2.38	7.21	2.38	7.21
Pessimistic price		1.37	4.58	1.37	4.58
Price/yield correlation		Moderate	Moderate	Moderate	Moderate
Value other product/acre		41.41	-	41.41	-
*** 2nd CROP YIELD AND PRICE ***					
Unit of yield					
Expected yield					
Optimistic yield					
Pessimistic yield					
Expected price					
Optimistic price					
Pessimistic price					
Price/yield correlation					
Rev. corr. between crop 1 & 2					
Value other product/acre					
**** NITROGEN ****		Corn	Soybeans	Corn	Soybeans
Credit green manure	(lbs)	35	18	35	18
Credit other sources	(lbs)	-	-	-	-
Applied nitrogen	(lbs)	98	-	98	-
**** HERBICIDES ****					
Lasso II	pds.	8.00	-	8.00	-
Buctril	pints	1.00	-	1.00	-
Lasso EC	Qts.	-	3.45	-	3.45
Treflan	pints	-	0.84	-	0.84
Basagran	pints	-	1.00	-	1.00
Roundup	pints	-	1.00	-	1.00

**** PESTICIDES ****

No Pesticides were selected for use in this rotation.

**** WATER, FUEL & ENERGY ****					
Water applied (inchs/year)		-	-	-	-
Irrigation energy:					
Diesel equivalents	(gal)	-	-	-	-
Electricity	(KWH)	-	-	-	-
Drying:					
LP Gas	(gal)	0.7	-	0.7	-
Electricity	(KWH)	-	-	-	-
All Other:					
Diesel equivalents	(gal)	14.9	8.9	14.9	8.9

PLANETOR CROP ROTATION BUDGET
Farm: Case Farm C - Run 2

**** LABOR ****	Year 1 Corn	Year 2 Soybeans	Year 3 Corn	Year 4 Soybeans
Total labor required (hrs/A)	1.6	1.1	1.6	1.1
Labor allocation in:				
January	-	-	-	-
February	-	-	-	-
March	-	-	-	-
April	0.4	-	0.4	-
May	0.2	0.5	0.2	0.5
June	0.1	0.1	0.1	0.1
July	-	-	-	-
August	-	-	-	-
September	-	-	-	-
October	0.6	0.3	0.6	0.3
November	0.3	0.2	0.3	0.2
December	-	-	-	-

**** CASH OPERATING COSTS $ ****

Seed	17.10	12.00	17.10	12.00
Fertilizer	47.56	-	47.56	-
Crop chemicals	11.86	38.86	11.86	38.86
Crop insurance	-	-	-	-
Drying fuel	0.40	-	0.40	-
Irrigation energy	-	-	-	-
Water assessment	-	-	-	-
Custom hire	2.10	-	2.10	-
Direct crop labor	12.28	8.49	12.28	8.49
Fuel	12.64	7.61	12.64	7.61
Repairs	13.58	9.72	13.58	9.72
Packaging	-	-	-	-
Supplies	-	-	-	-
Miscellaneous	-	-	-	-
Operating interest expense	4.67	2.79	4.67	2.79
Total cash operating expense	122.19	79.47	122.19	79.47

PLANETOR CROP ROTATION BUDGET

Field Name: Field #2 EsA
Description: Soybean Corn Rotation.

Farm: Case Farm C - Run 2
Date: October 8, 1991

**** RESOURCE MANAGEMENT STRATEGIES ****

C-Factor for this rotation	0.425
Irrigation system used	Not Irrigated
Tillage system	Unrestricted
Input level	Unrestricted
Length of the rotation (yrs)	4

**** COMMENTS ****

This budget is Soybeans followed by Corn. The budgets are conventional. The corn is chiseled in the fall and the beans are just left as is after harvest.

**** CROP PLAN ****

Year	Primary Crop	Second Crop
1	Soybeans	
2	Corn	
3	Soybeans	
4	Corn	

**** SUMMARY DATA ****

		Year 1	Year 2	Year 3	Year 4
Excess nitrogen	(lbs)				
With expected yield		18	25	18	25
With optimistic yield		18	4	18	4
Highest chemical rating					
Toxicity		High	Medium	High	Medium
Leaching potential		High	Medium	High	Medium
Run-off potential		High	Medium	High	Medium
Diesel equivalents	(gallons)	8.90	31.84	8.90	31.84
BTU equivalents	(millions)	1.25	4.46	1.25	4.46
Value of exp. yield - Crop 1	($)	196	236	196	236
Value of exp. yield - Crop 2	($)	-	-	-	-
Total return/benefit	($)	196.00	277.81	196.00	277.81
Total cash operating costs	($)	79.47	122.19	79.47	122.19
Return over direct costs	($)	116.53	155.62	116.53	155.62
Total return risk factor	(+/-)	45	70	45	70
Labor requirement	(hours)	1	2	1	2
Corn equivalents produced	(bu)	-	120	-	120
Hay equivalents produced	(ton)	-	-	-	-
Silage equiv. produced	(ton)	-	-	-	-
Animal Unit Month prod.	(AUM)	-	-	-	-

**** YIELD AND PRICE ****		Year 1 Soybeans	Year 2 Corn	Year 3 Soybeans	Year 4 Corn
Unit of yield		Bu.	Bu.	Bu.	Bu.
Expected yield		35.0	120.0	35.0	120.0
Optimistic yield		40.0	143.0	40.0	143.0
Pessimistic yield		24.0	65.0	24.0	65.0
Expected price		5.60	1.97	5.60	1.97
Optimistic price		7.21	2.38	7.21	2.38
Pessimistic price		4.58	1.37	4.58	1.37
Price/yield correlation		Moderate	Moderate	Moderate	Moderate
Value other product/acre		-	41.41	-	41.41
**** 2nd CROP YIELD AND PRICE ****					
Unit of yield					
Expected yield					
Optimistic yield					
Pessimistic yield					
Expected price					
Optimistic price					
Pessimistic price					
Price/yield correlation					
Rev. corr. between crop 1 & 2					
Value other product/acre					
**** NITROGEN ****		Soybeans	Corn	Soybeans	Corn
Credit green manure	(lbs)	18	35	18	35
Credit other sources	(lbs)	-	-	-	-
Applied nitrogen	(lbs)	-	98	-	98
**** HERBICIDES ****					
Lasso II	pds.	-	8.00	-	8.00
Buctril	pints	-	1.00	-	1.00
Lasso EC	Qts.	3.45	-	3.45	-
Treflan	pints	0.84	-	0.84	-
Basagran	pints	1.00	-	1.00	-
Roundup	pints	1.00	-	1.00	-

**** PESTICIDES ****

No Pesticides were selected for use in this rotation.

**** WATER, FUEL & ENERGY ****					
Water applied (inchs/year)		-	-	-	-
Irrigation energy:					
Diesel equivalents	(gal)	-	-	-	-
Electricity	(KWH)	-	-	-	-
Drying:					
LP Gas	(gal)	-	0.7	-	0.7
Electricity	(KWH)	-	-	-	-
All Other:					
Diesel equivalents	(gal)	8.9	14.9	8.9	14.9

PLANETOR CROP ROTATION BUDGET
Farm: Case Farm C - Run 2

**** LABOR ****	Year 1 Soybeans	Year 2 Corn	Year 3 Soybeans	Year 4 Corn
Total labor required (hrs/A)	1.1	1.6	1.1	1.6
Labor allocation in:				
January	-	-	-	-
February	-	-	-	-
March	-	-	-	-
April	-	0.4	-	0.4
May	0.5	0.2	0.5	0.2
June	0.1	0.1	0.1	0.1
July	-	-	-	-
August	-	-	-	-
September	-	-	-	-
October	0.3	0.6	0.3	0.6
November	0.2	0.3	0.2	0.3
December	-	-	-	-

**** CASH OPERATING COSTS $ ****

Seed	12.00	17.10	12.00	17.10
Fertilizer	-	47.56	-	47.56
Crop chemicals	38.86	11.86	38.86	11.86
Crop insurance	-	-	-	-
Drying fuel	-	0.40	-	0.40
Irrigation energy	-	-	-	-
Water assessment	-	-	-	-
Custom hire	-	2.10	-	2.10
Direct crop labor	8.49	12.28	8.49	12.28
Fuel	7.61	12.64	7.61	12.64
Repairs	9.72	13.58	9.72	13.58
Packaging	-	-	-	-
Supplies	-	-	-	-
Miscellaneous	-	-	-	-
Operating interest expense	2.79	4.67	2.79	4.67
Total cash operating expense	79.47	122.19	79.47	122.19

PLANETOR CROP ROTATION BUDGET

Field Name: Field #3W 6a
Description: Soybean Corn Rotation.

Farm: Case Farm C - Run 2
Date: October 4, 1991

**** RESOURCE MANAGEMENT STRATEGIES ****

C-Factor for this rotation	0.425
Irrigation system used	Not Irrigated
Tillage system	Unrestricted
Input level	Unrestricted
Length of the rotation (yrs)	4

**** COMMENTS ****

This budget is Soybeans followed by Corn. The budgets are conventional. The corn is chiseled in the fall and the soybeans are left as is.

**** CROP PLAN ****

Year	Primary Crop	Second Crop
1	Soybeans	
2	Corn	
3	Soybeans	
4	Corn	

**** SUMMARY DATA ****

		Year 1	Year 2	Year 3	Year 4
Excess nitrogen	(lbs)				
With expected yield		18	25	18	25
With optimistic yield		18	4	18	4
Highest chemical rating					
Toxicity		High	Medium	High	Medium
Leaching potential		High	Medium	High	Medium
Run-off potential		High	Medium	High	Medium
Diesel equivalents	(gallons)	8.90	31.84	8.90	31.84
BTU equivalents	(millions)	1.25	4.46	1.25	4.46
Value of exp. yield - Crop 1	($)	196	236	196	236
Value of exp. yield - Crop 2	($)	-	-	-	-
Total return/benefit	($)	196.00	277.81	196.00	277.81
Total cash operating costs	($)	79.47	122.19	79.47	122.19
Return over direct costs	($)	116.53	155.62	116.53	155.62
Total return risk factor	(+/-)	45	70	45	70
Labor requirement	(hours)	1	2	1	2
Corn equivalents produced	(bu)	-	120	-	120
Hay equivalents produced	(ton)	-	-	-	-
Silage equiv. produced	(ton)	-	-	-	-
Animal Unit Month prod.	(AUM)	-	-	-	-

**** YIELD AND PRICE ****	Year 1 Soybeans	Year 2 Corn	Year 3 Soybeans	Year 4 Corn
Unit of yield	Bu.	Bu.	Bu.	Bu.
Expected yield	35.0	120.0	35.0	120.0
Optimistic yield	40.0	143.0	40.0	143.0
Pessimistic yield	24.0	65.0	24.0	65.0
Expected price	5.60	1.97	5.60	1.97
Optimistic price	7.21	2.38	7.21	2.38
Pessimistic price	4.58	1.37	4.58	1.37
Price/yield correlation	Moderate	Moderate	Moderate	Moderate
Value other product/acre	-	41.41	-	41.41

*** 2nd CROP YIELD AND PRICE ***

Unit of yield
Expected yield
Optimistic yield
Pessimistic yield
Expected price
Optimistic price
Pessimistic price
Price/yield correlation
Rev. corr. between crop 1 & 2
Value other product/acre

**** NITROGEN ****	Soybeans	Corn	Soybeans	Corn
Credit green manure (lbs)	18	35	18	35
Credit other sources (lbs)	-	-	-	-
Applied nitrogen (lbs)	-	98	-	98

**** HERBICIDES ****

Lasso II	pds.	-	8.00	-	8.00
Buctril	pints	-	1.00	-	1.00
Lasso EC	Qts.	3.45	-	3.45	-
Treflan	pints	0.84	-	0.84	-
Basagran	pints	1.00	-	1.00	-
Roundup	pints	1.00	-	1.00	-

**** PESTICIDES ****

No Pesticides were selected for use in this rotation.

**** WATER, FUEL & ENERGY ****

Water applied (inchs/year)		-	-	-	-
Irrigation energy:					
Diesel equivalents	(gal)	-	-	-	-
Electricity	(KWH)	-	-	-	-
Drying:					
LP Gas	(gal)	-	0.7	-	0.7
Electricity	(KWH)	-	-	-	-
All Other:					
Diesel equivalents	(gal)	8.9	14.9	8.9	14.9

**** LABOR ****	Year 1 Soybeans	Year 2 Corn	Year 3 Soybeans	Year 4 Corn
Total labor required (hrs/A)	1.1	1.6	1.1	1.6
Labor allocation in:				
January	-	-	-	-
February	-	-	-	-
March	-	-	-	-
April	-	0.4	-	0.4
May	0.5	0.2	0.5	0.2
June	0.1	0.1	0.1	0.1
July	-	-	-	-
August	-	-	-	-
September	-	-	-	-
October	0.3	0.6	0.3	0.6
November	0.2	0.3	0.2	0.3
December	-	-	-	-

**** CASH OPERATING COSTS $ ****

Seed	12.00	17.10	12.00	17.10
Fertilizer	-	47.56	-	47.56
Crop chemicals	38.86	11.86	38.86	11.86
Crop insurance	-	-	-	-
Drying fuel	-	0.40	-	0.40
Irrigation energy	-	-	-	-
Water assessment	-	-	-	-
Custom hire	-	2.10	-	2.10
Direct crop labor	8.49	12.28	8.49	12.28
Fuel	7.61	12.64	7.61	12.64
Repairs	9.72	13.58	9.72	13.58
Packaging	-	-	-	-
Supplies	-	-	-	-
Miscellaneous	-	-	-	-
Operating interest expense	2.79	4.67	2.79	4.67
Total cash operating expense	79.47	122.19	79.47	122.19

PLANETOR CROP ROTATION BUDGET

Field Name: Field #4 Wa
Description: Soybean Corn Rotation.

Farm: Case Farm C - Run 2
Date: October 8, 1991

**** RESOURCE MANAGEMENT STRATEGIES ****

C-Factor for this rotation	0.500
Irrigation system used	Not Irrigated
Tillage system	Unrestricted
Input level	Unrestricted
Length of the rotation (yrs)	4

**** COMMENTS ****

This budget is Soybeans followed by Corn. It a conventional corn budget. The Soybean budget is a conventional budget. The corn is chiseled plowed and soy beans are left as is. The corn is chopped for silage. The silage yield is based on 80 bushel corn. The farmer in the interview stated that he cuts for silage his worst field of corn. His reported an average yield of 120 bu. per acre.

**** CROP PLAN ****

Year	Primary Crop	Second Crop
1	Soybeans	
2	Corn Silage	
3	Soybeans	
4	Corn Silage	

**** SUMMARY DATA ****

		Year 1	Year 2	Year 3	Year 4
Excess nitrogen	(lbs)				
With expected yield		18	-1	18	-1
With optimistic yield		18	-23	18	-23
Highest chemical rating					
Toxicity		High	Medium	High	Medium
Leaching potential		High	Medium	High	Medium
Run-off potential		High	Medium	High	Medium
Diesel equivalents	(gallons)	8.90	29.18	8.90	29.18
BTU equivalents	(millions)	1.25	4.08	1.25	4.08
Value of exp. yield - Crop 1 ($)		196	225	196	225
Value of exp. yield - Crop 2 ($)		-	-	-	-
Total return/benefit	($)	196.00	266.81	196.00	266.81
Total cash operating costs	($)	79.47	124.47	79.47	124.47
Return over direct costs	($)	116.53	142.34	116.53	142.34
Total return risk factor	(+/-)	45	28	45	28
Labor requirement	(hours)	1	2	1	2
Corn equivalents produced	(bu)	-	-	-	-
Hay equivalents produced	(ton)	-	-	-	-
Silage equiv. produced	(ton)	-	14	-	14
Animal Unit Month prod.	(AUM)	-	-	-	-

**** YIELD AND PRICE ****	Year 1 Soybeans	Year 2 Corn Silage	Year 3 Soybeans	Year 4 Corn Silage
Unit of yield	Bu.	Tons	Bu.	Tons
Expected yield	35.0	14.0	35.0	14.0
Optimistic yield	40.0	16.4	40.0	16.4
Pessimistic yield	24.0	13.0	24.0	13.0
Expected price	5.60	16.10	5.60	16.10
Optimistic price	7.21	17.74	7.21	17.74
Pessimistic price	4.58	13.70	4.58	13.70
Price/yield correlation	Moderate	Moderate	Moderate	Moderate
Value other product/acre	-	41.41	-	41.41

*** 2nd CROP YIELD AND PRICE ***

Unit of yield
Expected yield
Optimistic yield
Pessimistic yield
Expected price
Optimistic price
Pessimistic price
Price/yield correlation
Rev. corr. between crop 1 & 2
Value other product/acre

**** NITROGEN ****	Soybeans	Corn Silage	Soybeans	Corn Silage
Credit green manure (lbs)	18	35	18	35
Credit other sources (lbs)	-	-	-	-
Applied nitrogen (lbs)	-	90	-	90

**** HERBICIDES ****

Lasso II	pds.	-	8.00	-	8.00
Buctril	pints	-	1.00	-	1.00
Lasso EC	Qts.	3.45	-	3.45	-
Treflan	pints	0.84	-	0.84	-
Basagran	pints	1.00	-	1.00	-
Roundup	pints	1.00	-	1.00	-

**** PESTICIDES ****

No Pesticides were selected for use in this rotation.

**** WATER, FUEL & ENERGY ****

Water applied (inchs/year)		-	-	-	-
Irrigation energy:					
Diesel equivalents	(gal)	-	-	-	-
Electricity	(KWH)	-	-	-	-
Drying:					
LP Gas	(gal)	-	-	-	-
Electricity	(KWH)	-	-	-	-
All Other:					
Diesel equivalents	(gal)	8.9	14.1	8.9	14.1

#### LABOR ####	Year 1 Soybeans	Year 2 Corn Silage	Year 3 Soybeans	Year 4 Corn Silage
Total labor required (hrs/A)	1.1	2.2	1.1	2.2
Labor allocation in:				
January	-	-	-	-
February	-	-	-	-
March	-	-	-	-
April	-	0.4	-	0.4
May	0.5	0.2	0.5	0.2
June	0.1	0.1	0.1	0.1
July	-	-	-	-
August	-	-	-	-
September	-	-	-	-
October	0.3	1.2	0.3	1.2
November	0.2	0.3	0.2	0.3
December	-	-	-	-

CASH OPERATING COSTS $

Seed	12.00	17.10	12.00	17.10
Fertilizer	-	40.50	-	40.50
Crop chemicals	38.86	11.86	38.86	11.86
Crop insurance	-	-	-	-
Drying fuel	-	-	-	-
Irrigation energy	-	-	-	-
Water assessment	-	-	-	-
Custom hire	-	2.10	-	2.10
Direct crop labor	8.49	16.74	8.49	16.74
Fuel	7.61	12.01	7.61	12.01
Repairs	9.72	19.25	9.72	19.25
Packaging	-	-	-	-
Supplies	-	-	-	-
Miscellaneous	-	-	-	-
Operating interest expense	2.79	4.91	2.79	4.91
Total cash operating expense	79.47	124.47	79.47	124.47

PLANETOR CROP ROTATION BUDGET

Field Name: Field #5 Ga
Description: Corn Soybean Rotation.

Farm: Case Farm C - Run 2
Date: October 4, 1991

**** RESOURCE MANAGEMENT STRATEGIES ****

C-Factor for this rotation	0.425
Irrigation system used	Not Irrigated
Tillage system	Unrestricted
Input level	Unrestricted
Length of the rotation (yrs)	4

**** COMMENTS ****

This budget is Corn followed by Soybeans. They are conventional corn budgets. The corn is chiseled plowed and soybeans are left as is after harvest.

**** CROP PLAN ****

Year	Primary Crop	Second Crop
1	Corn	
2	Soybeans	
3	Corn	
4	Soybeans	

**** SUMMARY DATA ****

		Year 1	Year 2	Year 3	Year 4
Excess nitrogen	(lbs)				
With expected yield		17	18	17	18
With optimistic yield		-4	18	-4	18
Highest chemical rating					
Toxicity		Medium	High	Medium	High
Leaching potential		Medium	High	Medium	High
Run-off potential		Medium	High	Medium	High
Diesel equivalents	(gallons)	30.50	8.90	30.50	8.90
BTU equivalents	(millions)	4.27	1.25	4.27	1.25
Value of exp. yield - Crop 1	($)	236	196	236	196
Value of exp. yield - Crop 2	($)	-	-	-	-
Total return/benefit	($)	277.81	196.00	277.81	196.00
Total cash operating costs	($)	115.13	79.47	115.13	79.47
Return over direct costs	($)	162.68	116.53	162.68	116.53
Total return risk factor	(+/-)	70	45	70	45
Labor requirement	(hours)	2	1	2	1
Corn equivalents produced	(bu)	120	-	120	-
Hay equivalents produced	(ton)	-	-	-	-
Silage equiv. produced	(ton)	-	-	-	-
Animal Unit Month prod.	(AUM)	-	-	-	-

**** YIELD AND PRICE ****		Year 1 Corn	Year 2 Soybeans	Year 3 Corn	Year 4 Soybeans
Unit of yield		Bu.	Bu.	Bu.	Bu.
Expected yield		120.0	35.0	120.0	35.0
Optimistic yield		143.0	40.0	143.0	40.0
Pessimistic yield		65.0	24.0	65.0	24.0
Expected price		1.97	5.60	1.97	5.60
Optimistic price		2.38	7.21	2.38	7.21
Pessimistic price		1.37	4.58	1.37	4.58
Price/yield correlation		Moderate	Moderate	Moderate	Moderate
Value other product/acre		41.41	-	41.41	-
*** 2nd CROP YIELD AND PRICE ***					
Unit of yield					
Expected yield					
Optimistic yield					
Pessimistic yield					
Expected price					
Optimistic price					
Pessimistic price					
Price/yield correlation					
Rev. corr. between crop 1 & 2					
Value other product/acre					
**** NITROGEN ****		Corn	Soybeans	Corn	Soybeans
Credit green manure	(lbs)	35	18	35	18
Credit other sources	(lbs)	-	-	-	-
Applied nitrogen	(lbs)	90	-	90	-
**** HERBICIDES ****					
Lasso II	pds.	8.00	-	8.00	-
Buctril	pints	1.00	-	1.00	-
Lasso EC	Qts.	-	3.45	-	3.45
Treflan	pints	-	0.84	-	0.84
Basagran	pints	-	1.00	-	1.00
Roundup	pints	-	1.00	-	1.00

**** PESTICIDES ****

No Pesticides were selected for use in this rotation.

**** WATER, FUEL & ENERGY ****					
Water applied (inchs/year)		-	-	-	-
Irrigation energy:					
Diesel equivalents	(gal)	-	-	-	-
Electricity	(KWH)	-	-	-	-
Drying:					
LP Gas	(gal)	0.7	-	0.7	-
Electricity	(KWH)	-	-	-	-
All Other:					
Diesel equivalents	(gal)	14.9	8.9	14.9	8.9

PLANETOR CROP ROTATION BUDGET
Farm: Case Farm C - Run 2

**** LABOR ****	Year 1 Corn	Year 2 Soybeans	Year 3 Corn	Year 4 Soybeans
Total labor required (hrs/A)	1.6	1.1	1.6	1.1
Labor allocation in:				
January	-	-	-	-
February	-	-	-	-
March	-	-	-	-
April	0.4	-	0.4	-
May	0.2	0.5	0.2	0.5
June	0.1	0.1	0.1	0.1
July	-	-	-	-
August	-	-	-	-
September	-	-	-	-
October	0.6	0.3	0.6	0.3
November	0.3	0.2	0.3	0.2
December	-	-	-	-

**** CASH OPERATING COSTS $ ****

Seed	17.10	12.00	17.10	12.00
Fertilizer	40.50	-	40.50	-
Crop chemicals	11.86	38.86	11.86	38.86
Crop insurance	-	-	-	-
Drying fuel	0.40	-	0.40	-
Irrigation energy	-	-	-	-
Water assessment	-	-	-	-
Custom hire	2.10	-	2.10	-
Direct crop labor	12.28	8.49	12.28	8.49
Fuel	12.64	7.61	12.64	7.61
Repairs	13.58	9.72	13.58	9.72
Packaging	-	-	-	-
Supplies	-	-	-	-
Miscellaneous	-	-	-	-
Operating interest expense	4.67	2.79	4.67	2.79
Total cash operating expense	115.13	79.47	115.13	79.47

PLANETOR CROP ROTATION BUDGET

Field Name: Field #6 Cm
Description: Corn Soybean Rotation.

Farm: Case Farm C - Run 2
Date: October 8, 1991

****** RESOURCE MANAGEMENT STRATEGIES ******

C-Factor for this rotation	0.425
Irrigation system used	Not Irrigated
Tillage system	Unrestricted
Input level	Unrestricted
Length of the rotation (yrs)	4

****** COMMENTS ******

This budget is Corn followed by Soybeans. They are conventional budgets. The corn is chiseled plowed in the fall and soybeans are left as is after harvest.

****** CROP PLAN ******

Year	Primary Crop	Second Crop
1	Corn	
2	Soybeans	
3	Corn	
4	Soybeans	

****** SUMMARY DATA ******

		Year 1	Year 2	Year 3	Year 4
Excess nitrogen	(lbs)				
With expected yield		7	18	7	18
With optimistic yield		-14	18	-14	18
Highest chemical rating					
Toxicity		Medium	High	Medium	High
Leaching potential		Medium	High	Medium	High
Run-off potential		Medium	High	Medium	High
Diesel equivalents	(gallons)	28.82	8.90	28.82	8.90
BTU equivalents	(millions)	4.04	1.25	4.04	1.25
Value of exp. yield - Crop 1 ($)		236	196	236	196
Value of exp. yield - Crop 2 ($)		-	-	-	-
Total return/benefit	($)	277.81	196.00	277.81	196.00
Total cash operating costs	($)	104.93	79.47	104.93	79.47
Return over direct costs	($)	172.88	116.53	172.88	116.53
Total return risk factor	(+/-)	70	45	70	313
Labor requirement	(hours)	2	1	2	1
Corn equivalents produced	(bu)	120	-	120	-
Hay equivalents produced	(ton)	-	-	-	-
Silage equiv. produced	(ton)	-	-	-	-
Animal Unit Month prod.	(AUM)	-	-	-	-

**** YIELD AND PRICE ****		Year 1 Corn	Year 2 Soybeans	Year 3 Corn	Year 4 Soybeans
Unit of yield		Bu.	Bu.	Bu.	Bu.
Expected yield		120.0	35.0	120.0	35.0
Optimistic yield		143.0	40.0	143.0	143.0
Pessimistic yield		65.0	24.0	65.0	24.0
Expected price		1.97	5.60	1.97	5.60
Optimistic price		2.38	7.21	2.38	7.21
Pessimistic price		1.37	4.58	1.37	4.58
Price/yield correlation		Moderate	Moderate	Moderate	Moderate
Value other product/acre		41.41	-	41.41	-
***** 2nd CROP YIELD AND PRICE *****					
Unit of yield					
Expected yield					
Optimistic yield					
Pessimistic yield					
Expected price					
Optimistic price					
Pessimistic price					
Price/yield correlation					
Rev. corr. between crop 1 & 2					
Value other product/acre					
****** NITROGEN ******		Corn	Soybeans	Corn	Soybeans
Credit green manure	(lbs)	35	18	35	18
Credit other sources	(lbs)	-	-	-	-
Applied nitrogen	(lbs)	80	-	80	-
****** HERBICIDES ******					
Lasso II	pds.	8.00	-	8.00	-
Buctril	pints	1.00	-	1.00	-
Lasso EC	Qts.	-	3.45	-	3.45
Treflan	pints	-	0.84	-	0.84
Basagran	pints	-	1.00	-	1.00
Roundup	pints	-	1.00	-	1.00

**** PESTICIDES ****

No Pesticides were selected for use in this rotation.

**** WATER, FUEL & ENERGY ****					
Water applied (inchs/year)		-	-	-	-
Irrigation energy:					
Diesel equivalents	(gal)	-	-	-	-
Electricity	(KWH)	-	-	-	-
Drying:					
LP Gas	(gal)	0.7	-	0.7	-
Electricity	(KWH)	-	-	-	-
All Other:					
Diesel equivalents	(gal)	14.9	8.9	14.9	8.9

**** LABOR ****	Year 1 Corn	Year 2 Soybeans	Year 3 Corn	Year 4 Soybeans
Total labor required (hrs/A)	1.6	1.1	1.6	1.1
Labor allocation in:				
January	-	-	-	-
February	-	-	-	-
March	-	-	-	-
April	0.4	-	0.4	-
May	0.2	0.5	0.2	0.5
June	0.1	0.1	0.1	0.1
July	-	-	-	-
August	-	-	-	-
September	-	-	-	-
October	0.6	0.3	0.6	0.3
November	0.3	0.2	0.3	0.2
December	-	-	-	-

**** CASH OPERATING COSTS $ ****

Seed	17.10	12.00	17.10	12.00
Fertilizer	30.30	-	30.30	-
Crop chemicals	11.86	38.86	11.86	38.86
Crop insurance	-	-	-	-
Drying fuel	0.40	-	0.40	-
Irrigation energy	-	-	-	-
Water assessment	-	-	-	-
Custom hire	2.10	-	2.10	-
Direct crop labor	12.28	8.49	12.28	8.49
Fuel	12.64	7.61	12.64	7.61
Repairs	13.58	9.72	13.58	9.72
Packaging	-	-	-	-
Supplies	-	-	-	-
Miscellaneous	-	-	-	-
Operating interest expense	4.67	2.79	4.67	2.79
Total cash operating expense	104.93	79.47	104.93	79.47

PLANETOR CROP ROTATION BUDGET

Field Name: Field #7 Ga
Description: Corn Soybean Rotation

Farm: Case Farm C - Run 2
Date: October 4, 1991

RESOURCE MANAGEMENT STRATEGIES

C-Factor for this rotation	0.500
Irrigation system used	Not Irrigated
Tillage system	Unrestricted
Input level	Unrestricted
Length of the rotation (yrs)	4

COMMENTS

This budget is Corn followed by Soybeans. The budgets are conventional budgets. The corn is chiseled plowed and soybeans are left as is after harvest. The corn is cut for silage with an yield based on 80 bu. corn for grain. The farmer stated he cuts his worst corn for grain.

CROP PLAN

Year	Primary Crop	Second Crop
1	Corn Silage	
2	Soybeans	
3	Corn Silage	
4	Soybeans	

SUMMARY DATA

		Year 1	Year 2	Year 3	Year 4
Excess nitrogen	(lbs)				
With expected yield		-1	18	-1	18
With optimistic yield		-23	18	-23	18
Highest chemical rating					
Toxicity		Medium	High	Medium	High
Leaching potential		Medium	High	Medium	High
Run-off potential		Medium	High	Medium	High
Diesel equivalents	(gallons)	29.18	8.90	29.18	8.90
BTU equivalents	(millions)	4.08	1.25	4.08	1.25
Value of exp. yield - Crop 1	($)	225	196	225	196
Value of exp. yield - Crop 2	($)	-	-	-	-
Total return/benefit	($)	266.81	196.00	266.81	196.00
Total cash operating costs	($)	124.47	79.47	124.47	79.47
Return over direct costs	($)	142.34	116.53	142.34	116.53
Total return risk factor	(+/-)	28	45	28	45
Labor requirement	(hours)	2	1	2	1
Corn equivalents produced	(bu)	-	-	-	-
Hay equivalents produced	(ton)	-	-	-	-
Silage equiv. produced	(ton)	14	-	14	-
Animal Unit Month prod.	(AUM)	-	-	-	-

**** YIELD AND PRICE ****	Year 1 Corn Silage	Year 2 Soybeans	Year 3 Corn Silage	Year 4 Soybeans
Unit of yield	Tons	Bu.	Tons	Bu.
Expected yield	14.0	35.0	14.0	35.0
Optimistic yield	16.4	40.0	16.4	40.0
Pessimistic yield	13.0	24.0	13.0	24.0
Expected price	16.10	5.60	16.10	5.60
Optimistic price	17.74	7.21	17.74	7.21
Pessimistic price	13.70	4.58	13.70	4.58
Price/yield correlation	Moderate	Moderate	Moderate	Moderate
Value other product/acre	41.41	-	41.41	-

*** 2nd CROP YIELD AND PRICE ***

Unit of yield
Expected yield
Optimistic yield
Pessimistic yield
Expected price
Optimistic price
Pessimistic price
Price/yield correlation
Rev. corr. between crop 1 & 2
Value other product/acre

**** NITROGEN ****	Corn Silage	Soybeans	Corn Silage	Soybeans
Credit green manure (lbs)	35	18	35	18
Credit other sources (lbs)	-	-	-	-
Applied nitrogen (lbs)	90	-	90	-

**** HERBICIDES ****

Lasso II	qts.	8.00	-	8.00	-
Buctril	pints	1.00	-	1.00	-
Lasso EC	Qts.	-	3.45	-	3.45
Treflan	pints	-	0.84	-	0.84
Basagran	pints	-	1.00	-	1.00
Roundup	pints	-	1.00	-	1.00

**** PESTICIDES ****

No Pesticides were selected for use in this rotation.

**** WATER, FUEL & ENERGY ****

Water applied (inchs/year)		-	-	-	-
Irrigation energy:					
Diesel equivalents	(gal)	-	-	-	-
Electricity	(KWH)	-	-	-	-
Drying:					
LP Gas	(gal)	-	-	-	-
Electricity	(KWH)	-	-	-	-
All Other:					
Diesel equivalents	(gal)	14.1	8.9	14.1	8.9

PLANETOR CROP ROTATION BUDGET
Farm: Case Farm C - Run 2

**** LABOR ****	Year 1 Corn Silage	Year 2 Soybeans	Year 3 Corn Silage	Year 4 Soybeans
Total labor required (hrs/A)	2.2	1.1	2.2	1.1
Labor allocation in:				
January	-	-	-	-
February	-	-	-	-
March	-	-	-	-
April	0.4	-	0.4	-
May	0.2	0.5	0.2	0.5
June	0.1	0.1	0.1	0.1
July	-	-	-	-
August	-	-	-	-
September	-	-	-	-
October	1.2	0.3	1.2	0.3
November	0.3	0.2	0.3	0.2
December	-	-	-	-

**** CASH OPERATING COSTS $ ****

	Year 1	Year 2	Year 3	Year 4
Seed	17.10	12.00	17.10	12.00
Fertilizer	40.50	-	40.50	-
Crop chemicals	11.86	38.86	11.86	38.86
Crop insurance	-	-	-	-
Drying fuel	-	-	-	-
Irrigation energy	-	-	-	-
Water assessment	-	-	-	-
Custom hire	2.10	-	2.10	-
Direct crop labor	16.74	8.49	16.74	8.49
Fuel	12.01	7.61	12.01	7.61
Repairs	19.25	9.72	19.25	9.72
Packaging	-	-	-	-
Supplies	-	-	-	-
Miscellaneous	-	-	-	-
Operating interest expense	4.91	2.79	4.91	2.79
Total cash operating expense	124.47	79.47	124.47	79.47

PLANETOR CROP ROTATION BUDGET

Field Name: Field #8 MoB
Description: Alfalfa Corn Soybeans Rotation

Farm: Case Farm C - Run 2
Date: October 8, 1991

**** RESOURCE MANAGEMENT STRATEGIES ****

C-Factor for this rotation	0.292
Irrigation system used	Not Irrigated
Tillage system	Unrestricted
Input level	Unrestricted
Length of the rotation (yrs)	4

**** COMMENTS ****

This budget is Alfalfa followed by Corn followed by Soybeans followed by Corn. All budgets are conventional budgets. Corn is Chiseled plowed. Beans are left alone or not worked in the fall. Alfalfa is sprayed with Roundup and corn planted right in the alfalfa stubble.

**** CROP PLAN ****

Year	Primary Crop	Second Crop
1	Hay Alfalfa	
2	Corn	
3	Soybeans	
4	Corn	

**** SUMMARY DATA ****

		Year 1	Year 2	Year 3	Year 4
Excess nitrogen	(lbs)				
With expected yield		18	90	50	25
With optimistic yield		18	69	50	4
Highest chemical rating					
Toxicity		Medium	Medium	High	Medium
Leaching potential		Low	Medium	High	Medium
Run-off potential		High	Medium	High	Medium
Diesel equivalents	(gallons)	9.62	31.84	8.90	31.84
BTU equivalents	(millions)	1.35	4.46	1.25	4.46
Value of exp. yield - Crop 1	($)	219	236	196	236
Value of exp. yield - Crop 2	($)	-	-	-	-
Total return/benefit	($)	219.20	277.81	196.00	277.81
Total cash operating costs	($)	76.89	122.19	79.47	122.19
Return over direct costs	($)	142.31	155.62	116.53	155.62
Total return risk factor	(+/-)	70	70	45	70
Labor requirement	(hours)	2	2	1	2
Corn equivalents produced	(bu)	-	120	-	120
Hay equivalents produced	(ton)	4	-	-	-
Silage equiv. produced	(ton)	-	-	-	-
Animal Unit Month prod.	(AUM)	-	-	-	-

**** YIELD AND PRICE ****	Year 1 Hay Alfalfa	Year 2 Corn	Year 3 Soybeans	Year 4 Corn
Unit of yield	Tons	Bu.	Bu.	Bu.
Expected yield	4.0	120.0	35.0	120.0
Optimistic yield	4.2	143.0	40.0	143.0
Pessimistic yield	3.4	65.0	24.0	65.0
Expected price	54.80	1.97	5.60	1.97
Optimistic price	74.00	2.38	7.21	2.38
Pessimistic price	32.00	1.37	4.58	1.37
Price/yield correlation	Strong	Moderate	Moderate	Moderate
Value other product/acre	-	41.41	-	41.41

*** 2nd CROP YIELD AND PRICE ***

Unit of yield
Expected yield
Optimistic yield
Pessimistic yield
Expected price
Optimistic price
Pessimistic price
Price/yield correlation
Rev. corr. between crop 1 & 2
Value other product/acre

**** NITROGEN ****	Hay Alfalfa	Corn	Soybeans	Corn
Credit green manure (lbs)	-	100	50	35
Credit other sources (lbs)	-	-	-	-
Applied nitrogen (lbs)	18	98	-	98

**** HERBICIDES ****

Roundup	Qts.	1.00	-	0.50	-
Lasso II	pds.	-	8.00	-	8.00
Buctril	pints	-	1.00	-	1.00
Lasso EC	Qts.	-	-	3.45	-
Treflan	pints	-	-	0.84	-
Basagran	pints	-	-	1.00	-

**** PESTICIDES ****

No Pesticides were selected for use in this rotation.

**** WATER, FUEL & ENERGY ****

Water applied (inchs/year)		-	-	-	-
Irrigation energy:					
Diesel equivalents	(gal)	-	-	-	-
Electricity	(KWH)	-	-	-	-
Drying:					
LP Gas	(gal)	-	0.7	-	0.7
Electricity	(KWH)	-	-	-	-
All Other:					
Diesel equivalents	(gal)	6.6	14.9	8.9	14.9

**** LABOR ****	Year 1 Hay Alfalfa	Year 2 Corn	Year 3 Soybeans	Year 4 Corn
Total labor required (hrs/A)	1.7	1.6	1.1	1.6
Labor allocation in:				
January	-	-	-	-
February	-	-	-	-
March	-	-	-	-
April	-	0.4	-	0.4
May	-	0.2	0.5	0.2
June	0.6	0.1	0.1	0.1
July	0.6	-	-	-
August	0.6	-	-	-
September	-	-	-	-
October	-	0.6	0.3	0.6
November	-	0.3	0.2	0.3
December	-	-	-	-

**** CASH OPERATING COSTS $ ****

Seed	-	17.10	12.00	17.10
Fertilizer	27.06	47.56	-	47.56
Crop chemicals	19.20	11.86	38.86	11.86
Crop insurance	-	-	-	-
Drying fuel	-	0.40	-	0.40
Irrigation energy	-	-	-	-
Water assessment	-	-	-	-
Custom hire	2.10	2.10	-	2.10
Direct crop labor	11.14	12.28	8.49	12.28
Fuel	5.65	12.64	7.61	12.64
Repairs	9.05	13.58	9.72	13.58
Packaging	-	-	-	-
Supplies	1.30	-	-	-
Miscellaneous	-	-	-	-
Operating interest expense	1.39	4.67	2.79	4.67
Total cash operating expense	76.89	122.19	79.47	122.19

PLANETOR CROP ROTATION BUDGET

Field Name: Field #9 Ac
Description: Alfalfa Corn Soybeans Rotation

Farm: Case Farm C - Run 2
Date: October 4, 1991

**** RESOURCE MANAGEMENT STRATEGIES ****

C-Factor for this rotation	0.292
Irrigation system used	Not Irrigated
Tillage system	Unrestricted
Input level	Unrestricted
Length of the rotation (yrs)	4

**** COMMENTS ****

This budget is Alfalfa followed by Corn followed by Soybeans followed by Corn. All budgets are conventional budgets. Corn is Chiseled plowed. Beans are left alone or not worked in the fall. Alfalfa is sprayed with Roundup and corn planted right in the alfalfa stubble. The alfalfa is SET-ASIDE. Assume for this budget that the farmer clips the alfalfa once and does nothing else with it other thatn spray it. Costs were adjusted to reflect this.

**** CROP PLAN ****

Year	Primary Crop	Second Crop
1	Hay Alfalfa	
2	Corn	
3	Soybeans	
4	Corn	

**** SUMMARY DATA ****

		Year 1	Year 2	Year 3	Year 4
Excess nitrogen	(lbs)				
With expected yield		18	90	50	25
With optimistic yield		18	72	50	7
Highest chemical rating					
Toxicity		Medium	Medium	High	Medium
Leaching potential		Low	Medium	High	Medium
Run-off potential		High	Medium	High	Medium
Diesel equivalents	(gallons)	3.11	31.84	8.90	31.84
BTU equivalents	(millions)	0.44	4.46	1.25	4.46
Value of exp. yield - Crop 1	($)	-	236	196	236
Value of exp. yield - Crop 2	($)	-	-	-	-
Total return/benefit	($)	-	277.81	196.00	277.81
Total cash operating costs	($)	57.33	122.19	79.47	122.19
Return over direct costs	($)	-57.33	155.62	116.53	155.62
Total return risk factor	(+/-)	-	68	45	68
Labor requirement	(hours)	0	2	1	2
Corn equivalents produced	(bu)	-	120	-	120
Hay equivalents produced	(ton)	4	-	-	-
Silage equiv. produced	(ton)	-	-	-	-
Animal Unit Month prod.	(AUM)	-	-	-	-

**** YIELD AND PRICE ****	Year 1 Hay Alfalfa	Year 2 Corn	Year 3 Soybeans	Year 4 Corn
Unit of yield	Tons	Bu.	Bu.	Bu.
Expected yield	4.0	120.0	35.0	120.0
Optimistic yield	4.2	140.0	40.0	140.0
Pessimistic yield	3.4	65.0	24.0	65.0
Expected price	-	1.97	5.60	1.97
Optimistic price	-	2.38	7.21	2.38
Pessimistic price	-	1.37	4.58	1.37
Price/yield correlation	Strong	Moderate	Moderate	Moderate
Value other product/acre	-	41.41	-	41.41

*** 2nd CROP YIELD AND PRICE ***

Unit of yield
Expected yield
Optimistic yield
Pessimistic yield
Expected price
Optimistic price
Pessimistic price
Price/yield correlation
Rev. corr. between crop 1 & 2
Value other product/acre

**** NITROGEN ****	Hay Alfalfa	Corn	Soybeans	Corn
Credit green manure (lbs)	-	100	50	35
Credit other sources (lbs)	-	-	-	-
Applied nitrogen (lbs)	18	98	-	98

**** HERBICIDES ****

Roundup	Qts.	1.00	-	0.50	-
Lasso II	pds.	-	8.00	-	8.00
Buctril	pints	-	1.00	-	1.00
Lasso EC	Qts.	-	-	3.45	-
Treflan	pints	-	-	0.84	-
Basagran	pints	-	-	1.00	-

**** PESTICIDES ****

No Pesticides were selected for use in this rotation.

**** WATER, FUEL & ENERGY ****

Water applied (inchs/year)		-	-	-	-
Irrigation energy:					
Diesel equivalents	(gal)	-	-	-	-
Electricity	(KWH)	-	-	-	-
Drying:					
LP Gas	(gal)	-	0.7	-	0.7
Electricity	(KWH)	-	-	-	-
All Other:					
Diesel equivalents	(gal)	0.1	14.9	8.9	14.9

PLANETOR CROP ROTATION BUDGET
Farm: Case Farm C - Run 2

**** LABOR ****	Year 1 Hay Alfalfa	Year 2 Corn	Year 3 Soybeans	Year 4 Corn
Total labor required (hrs/A)	0.2	1.6	1.1	1.6
Labor allocation in:				
January	-	-	-	-
February	-	-	-	-
March	-	-	-	-
April	-	0.4	-	0.4
May	-	0.2	0.5	0.2
June	-	0.1	0.1	0.1
July	0.2	-	-	-
August	-	-	-	-
September	-	-	-	-
October	-	0.6	0.3	0.6
November	-	0.3	0.2	0.3
December	-	-	-	-

**** CASH OPERATING COSTS $ ****				
Seed	-	17.10	12.00	17.10
Fertilizer	27.06	47.56	-	47.56
Crop chemicals	19.20	11.86	38.86	11.86
Crop insurance	-	-	-	-
Drying fuel	-	0.40	-	0.40
Irrigation energy	-	-	-	-
Water assessment	-	-	-	-
Custom hire	2.10	2.10	-	2.10
Direct crop labor	2.99	12.28	8.49	12.28
Fuel	2.26	12.64	7.61	12.64
Repairs	3.27	13.58	9.72	13.58
Packaging	-	-	-	-
Supplies	-	-	-	-
Miscellaneous	-	-	-	-
Operating interest expense	0.45	4.67	2.79	4.67
Total cash operating expense	57.33	122.19	79.47	122.19

PLANETOR CROP ROTATION BUDGET

Field Name: Field #10 MnB
Description: Soybean Corn Rotation.

Farm: Case Farm C - Run 2
Date: October 8, 1991

RESOURCE MANAGEMENT STRATEGIES

C-Factor for this rotation	0.425
Irrigation system used	Not Irrigated
Tillage system	Unrestricted
Input level	Unrestricted
Length of the rotation (yrs)	4

COMMENTS

This budget is Soybeans followed by Corn. The budgets are conventional. The corn is chiseled plowed and soybeans left as is in the fall.

CROP PLAN

Year	Primary Crop	Second Crop
1	Soybeans	
2	Corn	
3	Soybeans	
4	Corn	

SUMMARY DATA

		Year 1	Year 2	Year 3	Year 4
Excess nitrogen	(lbs)				
With expected yield		114	25	18	25
With optimistic yield		114	4	18	4
Highest chemical rating					
Toxicity		High	Medium	High	Medium
Leaching potential		High	Medium	High	Medium
Run-off potential		High	Medium	High	Medium
Diesel equivalents	(gallons)	8.90	31.84	8.90	31.84
BTU equivalents	(millions)	1.25	4.46	1.25	4.46
Value of exp. yield - Crop 1	($)	196	236	196	236
Value of exp. yield - Crop 2	($)	-	-	-	-
Total return/benefit	($)	196.00	277.81	196.00	277.81
Total cash operating costs	($)	79.47	122.19	79.47	122.19
Return over direct costs	($)	116.53	155.62	116.53	155.62
Total return risk factor	(+/-)	45	70	45	70
Labor requirement	(hours)	1	2	1	2
Corn equivalents produced	(bu)	-	120	-	120
Hay equivalents produced	(ton)	-	-	-	-
Silage equiv. produced	(ton)	-	-	-	-
Animal Unit Month prod.	(AUM)	-	-	-	-

**** YIELD AND PRICE ****	Year 1 Soybeans	Year 2 Corn	Year 3 Soybeans	Year 4 Corn
Unit of yield	Bu.	Bu.	Bu.	Bu.
Expected yield	35.0	120.0	35.0	120.0
Optimistic yield	40.0	143.0	40.0	143.0
Pessimistic yield	24.0	65.0	24.0	65.0
Expected price	5.60	1.97	5.60	1.97
Optimistic price	7.21	2.38	7.21	2.38
Pessimistic price	4.58	1.37	4.58	1.37
Price/yield correlation	Moderate	Moderate	Moderate	Moderate
Value other product/acre	-	41.41	-	41.41

*** 2nd CROP YIELD AND PRICE ***

Unit of yield
Expected yield
Optimistic yield
Pessimistic yield
Expected price
Optimistic price
Pessimistic price
Price/yield correlation
Rev. corr. between crop 1 & 2
Value other product/acre

**** NITROGEN ****	Soybeans	Corn	Soybeans	Corn
Credit green manure (lbs)	18	35	18	35
Credit other sources (lbs)	96	-	-	-
Applied nitrogen (lbs)	-	98	-	98

**** HERBICIDES ****

Lasso II	pds.	-	8.00	-	8.00
Buctril	pints	-	1.00	-	1.00
Lasso EC	Qts.	3.45	-	3.45	-
Treflan	pints	0.84	-	0.84	-
Basagran	pints	1.00	-	1.00	-
Roundup	pints	1.00	-	1.00	-

**** PESTICIDES ****

No Pesticides were selected for use in this rotation.

**** WATER, FUEL & ENERGY ****

Water applied (inchs/year)		-	-	-	-
Irrigation energy:					
Diesel equivalents	(gal)	-	-	-	-
Electricity	(KWH)	-	-	-	-
Drying:					
LP Gas	(gal)	-	0.7	-	0.7
Electricity	(KWH)	-	-	-	-
All Other:					
Diesel equivalents	(gal)	8.9	14.9	8.9	14.9

**** LABOR ****	Year 1 Soybeans	Year 2 Corn	Year 3 Soybeans	Year 4 Corn
Total labor required (hrs/A)	1.1	1.6	1.1	1.6
Labor allocation in:				
January	-	-	-	-
February	-	-	-	-
March	-	-	-	-
April	-	0.4	-	0.4
May	0.5	0.2	0.5	0.2
June	0.1	0.1	0.1	0.1
July	-	-	-	-
August	-	-	-	-
September	-	-	-	-
October	0.3	0.6	0.3	0.6
November	0.2	0.3	0.2	0.3
December	-	-	-	-

**** CASH OPERATING COSTS $ ****	Year 1 Soybeans	Year 2 Corn	Year 3 Soybeans	Year 4 Corn
Seed	12.00	17.10	12.00	17.10
Fertilizer	-	47.56	-	47.56
Crop chemicals	38.86	11.86	38.86	11.86
Crop insurance	-	-	-	-
Drying fuel	-	0.40	-	0.40
Irrigation energy	-	-	-	-
Water assessment	-	-	-	-
Custom hire	-	2.10	-	2.10
Direct crop labor	8.49	12.28	8.49	12.28
Fuel	7.61	12.64	7.61	12.64
Repairs	9.72	13.58	9.72	13.58
Packaging	-	-	-	-
Supplies	-	-	-	-
Miscellaneous	-	-	-	-
Operating interest expense	2.79	4.67	2.79	4.67
Total cash operating expense	79.47	122.19	79.47	122.19

PLANETOR CROP ROTATION BUDGET

Field Name: Field #11 EsA
Description: Corn Soybean Rotation.

Farm: Case Farm C - Run 2
Date: October 4, 1991

**** RESOURCE MANAGEMENT STRATEGIES ****

C-Factor for this rotation	0.425
Irrigation system used	Not Irrigated
Tillage system	Unrestricted
Input level	Unrestricted
Length of the rotation (yrs)	4

**** COMMENTS ****

This budget is Corn followed by Soybeans. The budgets are conventional. The corn is chiseled plowed and soybeans are left as is in the fall.

**** CROP PLAN ****

Year	Primary Crop	Second Crop
1	Corn	
2	Soybeans	
3	Corn	
4	Soybeans	

**** SUMMARY DATA ****

		Year 1	Year 2	Year 3	Year 4
Excess nitrogen	(lbs)				
With expected yield		121	18	25	18
With optimistic yield		100	18	4	18
Highest chemical rating					
Toxicity		Medium	High	Medium	High
Leaching potential		Medium	High	Medium	High
Run-off potential		Medium	High	Medium	High
Diesel equivalents	(gallons)	31.84	8.90	31.84	8.90
BTU equivalents	(millions)	4.46	1.25	4.46	1.25
Value of exp. yield - Crop 1	($)	236	196	236	196
Value of exp. yield - Crop 2	($)	-	-	-	-
Total return/benefit	($)	277.81	196.00	277.81	196.00
Total cash operating costs	($)	122.19	79.47	122.19	79.47
Return over direct costs	($)	155.62	116.53	155.62	116.53
Total return risk factor	(+/-)	70	45	70	45
Labor requirement	(hours)	2	1	2	1
Corn equivalents produced	(bu)	120	-	120	-
Hay equivalents produced	(ton)	-	-	-	-
Silage equiv. produced	(ton)	-	-	-	-
Animal Unit Month prod.	(AUM)	-	-	-	-

**** YIELD AND PRICE ****	Year 1 Corn	Year 2 Soybeans	Year 3 Corn	Year 4 Soybeans
Unit of yield	Bu.	Bu.	Bu.	Bu.
Expected yield	120.0	35.0	120.0	35.0
Optimistic yield	143.0	40.0	143.0	40.0
Pessimistic yield	65.0	24.0	65.0	24.0
Expected price	1.97	5.60	1.97	5.60
Optimistic price	2.38	7.21	2.38	7.21
Pessimistic price	1.37	4.58	1.37	4.58
Price/yield correlation	Moderate	Moderate	Moderate	Moderate
Value other product/acre	41.41	-	41.41	-

*** 2nd CROP YIELD AND PRICE ***

Unit of yield
Expected yield
Optimistic yield
Pessimistic yield
Expected price
Optimistic price
Pessimistic price
Price/yield correlation
Rev. corr. between crop 1 & 2
Value other product/acre

**** NITROGEN ****	Corn	Soybeans	Corn	Soybeans
Credit green manure (lbs)	35	18	35	18
Credit other sources (lbs)	96	-	-	-
Applied nitrogen (lbs)	98	-	98	-

**** HERBICIDES ****

Lasso II	pds.	8.00	-	8.00	-
Buctril	pints	1.00	-	1.00	-
Lasso EC	Qts.	-	3.45	-	3.45
Treflan	pints	-	0.84	-	0.84
Basagran	pints	-	1.00	-	1.00
Roundup	pints	-	1.00	-	1.00

**** PESTICIDES ****

No Pesticides were selected for use in this rotation.

**** WATER, FUEL & ENERGY ****

Water applied (inchs/year)		-	-	-	-
Irrigation energy:					
Diesel equivalents	(gal)	-	-	-	-
Electricity	(KWH)	-	-	-	-
Drying:					
LP Gas	(gal)	0.7	-	0.7	-
Electricity	(KWH)	-	-	-	-
All Other:					
Diesel equivalents	(gal)	14.9	8.9	14.9	8.9

PLANETOR CROP ROTATION BUDGET
Farm: Case Farm C - Run 2

**** LABOR ****	Year 1 Corn	Year 2 Soybeans	Year 3 Corn	Year 4 Soybeans
Total labor required (hrs/A)	1.6	1.1	1.6	1.1
Labor allocation in:				
January	-	-	-	-
February	-	-	-	-
March	-	-	-	-
April	0.4	-	0.4	-
May	0.2	0.5	0.2	0.5
June	0.1	0.1	0.1	0.1
July	-	-	-	-
August	-	-	-	-
September	-	-	-	-
October	0.6	0.3	0.6	0.3
November	0.3	0.2	0.3	0.2
December	-	-	-	-

**** CASH OPERATING COSTS $ ****

Seed	17.10	12.00	17.10	12.00
Fertilizer	47.56	-	47.56	-
Crop chemicals	11.86	38.86	11.86	38.86
Crop insurance	-	-	-	-
Drying fuel	0.40	-	0.40	-
Irrigation energy	-	-	-	-
Water assessment	-	-	-	-
Custom hire	2.10	-	2.10	-
Direct crop labor	12.28	8.49	12.28	8.49
Fuel	12.64	7.61	12.64	7.61
Repairs	13.58	9.72	13.58	9.72
Packaging	-	-	-	-
Supplies	-	-	-	-
Miscellaneous	-	-	-	-
Operating interest expense	4.67	2.79	4.67	2.79
Total cash operating expense	122.19	79.47	122.19	79.47

PLANETOR CROP ROTATION BUDGET

Field Name: Field #3E 6a
Description: Soybean Corn Rotation.

Farm: Case Farm C - Run 2
Date: October 8, 1991

**** RESOURCE MANAGEMENT STRATEGIES ****

C-Factor for this rotation	0.425
Irrigation system used	Not Irrigated
Tillage system	Unrestricted
Input level	Unrestricted
Length of the rotation (yrs)	4

**** COMMENTS ****

This budget is Soybeans followed by Corn. The budgets are conventional. The corn is chiseled in the fall and the soybeans are left as is.

**** CROP PLAN ****

Year	Primary Crop	Second Crop
1	Soybeans	
2	Corn	
3	Soybeans	
4	Corn	

**** SUMMARY DATA ****

		Year 1	Year 2	Year 3	Year 4
Excess nitrogen	(lbs)				
With expected yield		114	17	18	17
With optimistic yield		114	-4	18	-4
Highest chemical rating					
Toxicity		High	Medium	High	Medium
Leaching potential		High	Medium	High	Medium
Run-off potential		High	Medium	High	Medium
Diesel equivalents	(gallons)	8.90	30.50	8.90	30.50
BTU equivalents	(millions)	1.25	4.27	1.25	4.27
Value of exp. yield - Crop 1 ($)		196	236	196	236
Value of exp. yield - Crop 2 ($)		-	-	-	-
Total return/benefit	($)	196.00	277.81	196.00	277.81
Total cash operating costs	($)	79.47	115.13	79.47	115.13
Return over direct costs	($)	116.53	162.68	116.53	162.68
Total return risk factor	(+/-)	45	70	45	70
Labor requirement	(hours)	1	2	1	2
Corn equivalents produced	(bu)	-	120	-	120
Hay equivalents produced	(ton)	-	-	-	-
Silage equiv. produced	(ton)	-	-	-	-
Animal Unit Month prod.	(AUM)	-	-	-	-

**** YIELD AND PRICE ****	Year 1 Soybeans	Year 2 Corn	Year 3 Soybeans	Year 4 Corn
Unit of yield	Bu.	Bu.	Bu.	Bu.
Expected yield	35.0	120.0	35.0	120.0
Optimistic yield	40.0	143.0	40.0	143.0
Pessimistic yield	24.0	65.0	24.0	65.0
Expected price	5.60	1.97	5.60	1.97
Optimistic price	7.21	2.38	7.21	2.38
Pessimistic price	4.58	1.37	4.58	1.37
Price/yield correlation	Moderate	Moderate	Moderate	Moderate
Value other product/acre	-	41.41	-	41.41

*** 2nd CROP YIELD AND PRICE ***

Unit of yield
Expected yield
Optimistic yield
Pessimistic yield
Expected price
Optimistic price
Pessimistic price
Price/yield correlation
Rev. corr. between crop 1 & 2
Value other product/acre

**** NITROGEN ****	Soybeans	Corn	Soybeans	Corn
Credit green manure (lbs)	18	35	18	35
Credit other sources (lbs)	96	-	-	-
Applied nitrogen (lbs)	-	90	-	90

**** HERBICIDES ****

Lasso II	pds.	-	8.00	-	8.00
Buctril	pints	-	1.00	-	1.00
Lasso EC	Qts.	3.45	-	3.45	-
Treflan	pints	0.84	-	0.84	-
Basagran	pints	1.00	-	1.00	-
Roundup	pints	1.00	-	1.00	-

**** PESTICIDES ****

No Pesticides were selected for use in this rotation.

**** WATER, FUEL & ENERGY ****

Water applied (inchs/year)		-	-	-	-
Irrigation energy:					
Diesel equivalents	(gal)	-	-	-	-
Electricity	(KWH)	-	-	-	-
Drying:					
LP Gas	(gal)	-	0.7	-	0.7
Electricity	(KWH)	-	-	-	-
All Other:					
Diesel equivalents	(gal)	8.9	14.9	8.9	14.9

PLANETOR CROP ROTATION BUDGET
Farm: Case Farm C - Run 2

**** LABOR ****	Year 1 Soybeans	Year 2 Corn	Year 3 Soybeans	Year 4 Corn
Total labor required (hrs/A)	1.1	1.6	1.1	1.6
Labor allocation in:				
January	-	-	-	-
February	-	-	-	-
March	-	-	-	-
April	-	0.4	-	0.4
May	0.5	0.2	0.5	0.2
June	0.1	0.1	0.1	0.1
July	-	-	-	-
August	-	-	-	-
September	-	-	-	-
October	0.3	0.6	0.3	0.6
November	0.2	0.3	0.2	0.3
December	-	-	-	-

**** CASH OPERATING COSTS $ ****

Seed	12.00	17.10	12.00	17.10
Fertilizer	-	40.50	-	40.50
Crop chemicals	38.86	11.86	38.86	11.86
Crop insurance	-	-	-	-
Drying fuel	-	0.40	-	0.40
Irrigation energy	-	-	-	-
Water assessment	-	-	-	-
Custom hire	-	2.10	-	2.10
Direct crop labor	8.49	12.28	8.49	12.28
Fuel	7.61	12.64	7.61	12.64
Repairs	9.72	13.58	9.72	13.58
Packaging	-	-	-	-
Supplies	-	-	-	-
Miscellaneous	-	-	-	-
Operating interest expense	2.79	4.67	2.79	4.67
Total cash operating expense	79.47	115.13	79.47	115.13

PLANETOR LIVESTOCK BUDGET

Enterprise: Hogs Finishing
Description: Hogs Feeder to Finish, buy at 40-45lb, sell 230lb

Farm: Case Farm C - Run 2
Date: October 4, 1991

**** COMMENTS ****

Buying Feeder hogs at 40-45 lb for $43 per head.
Feeding on corn and supplement to 230 lb.

**** INCOME ****

	Per Head
Expected sale weight (Lb.)	230.00
Optimistic sale weight	235.00
Pessimistic sale weight	215.00
Expected price per Lb.	0.48
Optimistic price	0.54
Pessimistic price	0.42
Other sales	-
Death loss	-2.21
Total return/benefit	108.19

**** CASH OPERATING COSTS ****

Purchase weight or quantity	1.00
Purchase price per unit	43.00
Purchase cost	43.00
Purchased feed	19.50
Health	3.00
Supplies	0.96
Direct livestock labor	-
Fuel	0.08
Repairs	-
Marketing	2.00
Miscellaneous expense	0.95
Interest expense	2.25
Death loss percentage	2.00 %
Total operating expense	71.74
Optimistic total cost	62.00
Pessimistic total cost	82.00
Cost/price correlation	Moderate
Value of feed equivalents	21.67
Return over direct costs	14.78
Total return risk factor (+/-)	15

**** LABOR ****

Labor (hrs./unit)	0.8
Labor allocation in:	
January	0.1
February	0.1
March	0.1
April	0.1
May	0.1
June	0.1
July	0.1
August	0.1
September	0.1
October	0.1
November	0.1
December	0.1

**** FEED REQUIREMENTS ****

		Quantity	Value
Corn equivalents	(bu.)	11.00	21.67
Hay equivalents	(tons)	-	-
Silage equivalents	(tons)	-	-
AUMs required	(AUMs)	-	-
Value of feed equivalents			21.67
Months on the farm		4.00	

**** MANURE ****

Total manure production (lbs)	1500
Nitrogen produced (lbs)	8

PLANETOR LIVESTOCK BUDGET

Enterprise: Beef Backgrnd Steers
Description: Beef Backgrounding Steers, 450 lb. - 875lb.

Farm: Case Farm C - Run 2
Date: October 8, 1991

**** COMMENTS ****

Backgrounding Steers, buy at 450 lb. in November, feed corn + silage in feedlot and sell at 875lb. in June. On farm 8 months.
Feed 1 lb. protein, 6lb. corn, 16.5 lb. corn silage per day for 240 days

**** INCOME ****

	Per Head
Expected sale weight (Lb.)	875.00
Optimistic sale weight	900.00
Pessimistic sale weight	850.00
Expected price per Lb.	0.69
Optimistic price	0.82
Pessimistic price	0.53
Other sales	-
Death loss	-9.06
Total return/benefit	594.69

**** CASH OPERATING COSTS ****

Purchase weight or quantity	450.00
Purchase price per unit	0.89
Purchase cost	400.50
Purchased feed	13.50
Health	7.20
Supplies	3.75
Direct livestock labor	-
Fuel	5.00
Repairs	-
Marketing	14.00
Miscellaneous expense	8.00
Interest expense	30.00
Death loss percentage	1.50 %
Total operating expense	481.95
Optimistic total cost	432.00
Pessimistic total cost	532.00
Cost/price correlation	Moderate
Value of feed equivalents	82.51
Return over direct costs	30.24
Total return risk factor (+/-)	131

**** LABOR ****

Labor (hrs./unit)	3.6
Labor allocation in:	
January	0.3
February	0.3
March	0.3
April	0.4
May	0.3
June	1.0
July	-
August	-
September	-
October	-
November	0.7
December	0.3

**** FEED REQUIREMENTS ****

		Quantity	Value
Corn equivalents	(bu.)	25.70	50.63
Hay equivalents	(tons)	-	-
Silage equivalents	(tons)	1.98	31.88
AUMs required	(AUMs)	-	-
Value of feed equivalents			82.51
Months on the farm		8.00	

**** MANURE ****

Total manure production (lbs)	11000
Nitrogen produced (lbs)	77