THE DEVELOPMENT OF SOFTWARE TO SUPPORT PLANNING CONVERSION TO ORGANIC AGRICULTURE

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ABSTRACT

Planning is essential to the successful conversion of conventional to organic farming. Currently, advisors base planning on personal experience and expertise, historical and market data. The process can be time consuming and expensive. A new software package designed to support this process has been developed. The software enables the user to construct conversion scenarios for a farm over a period of up to fifteen years. The software calculates profit and loss and cash flow reports and nutrient and forage budgets for each year, thus helping to identify any potential economic, nutrient or forage problems in the plan. A beta version of the software will become available during 2001 as part of the EMA 2001 software system.

Keywords: Computer software, Organic conversion, Gross margins, Nutrients, Forage

INTRODUCTION

The increased demand for organic produce in the UK has lead to an equal demand for support to convert from conventional to organic production. Planning helps to reduce risks associated with the conversion process by identifying potential problems relating to resource constraints such as land, capital and labour requirements, financial returns and cash flow. Currently, advisors base planning on personal experience and expertise, historical and market data. The process can be time consuming and expensive. A new software package has been developed to support this process.

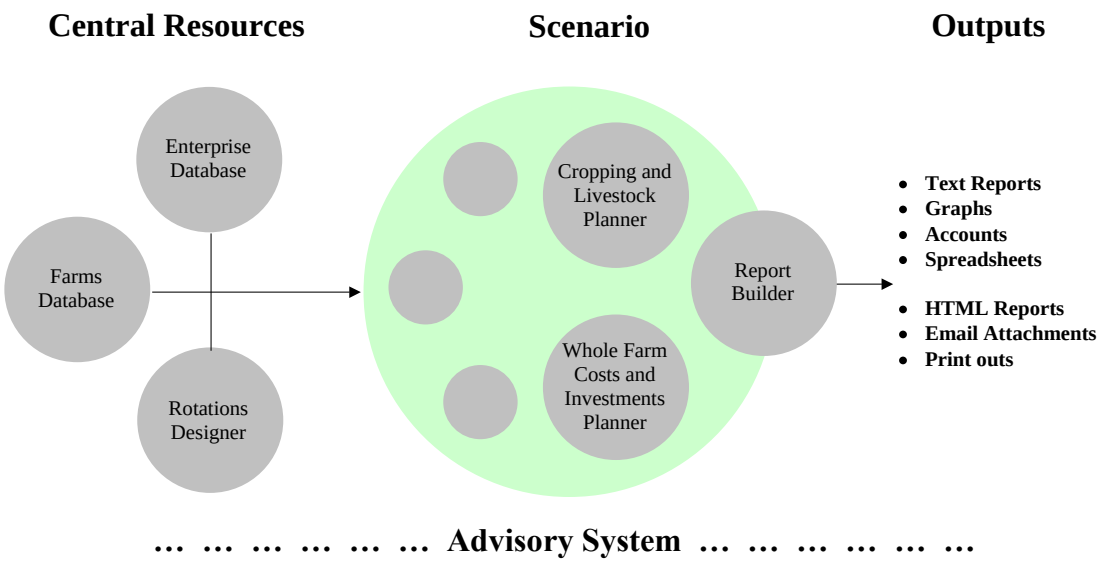
SOFTWARE STRUCTURE

At the outset of the project the aim was to develop software that was flexible, practical and labour saving. There was no defined structure, but there were a number of drivers that ultimately determined the structure of the software. These included:

- Replicating and enhancing existing planning procedures already undertaken by advisers.
- Encapsulating organic expertise in an environment that would allow users to explore different conversion scenarios.
- Access to common resources that can be utilised to create these scenarios, thus speeding up the process of scenario creation.
- The software should provide useful outputs for analysing conversion plans and provide information in a format to support the organic certification process.
- Other requirements requested by potential end users.

Consequently the structure is one that evolved during the software development based on these drivers and feedback from potential end users. Figure 1 is a conceptual illustration of the structure.

FIGURE 1. Software Structure



The central resources are separate entities that can be developed over time by the user. They become the building blocks for creating scenarios. When a scenario is created the details selected from the central resources become part of the scenario entity. Once part of the scenario they can be amended and adapted and this will not change the original details in the central resources. Once the scenario is created the user has access to tools that allow them to plan out the farm enterprises, costs and investments over a period of up to fifteen years. The user can then use the report builder to generate a number of different outputs from the scenario that can be used to analyse the conversion plan.

Underlying the software is an Advisory System of useful documents that can be accessed from any part of the software. The documents include the UKROFS, IFOAM and Soil Association organic standards and the text of the Organic Farm Management Handbook (Lampkin & Measures, 2001). These documents have been created as compiled HTML files (CHM) and have hyperlinks for cross-referencing and links to appropriate web sites.

CENTRAL RESOURCES

Farms Database

The Farms Database holds information about each farm that the user wishes to create conversion plans for. These details are referred to as the 'farm profile' and include the name and size of each field, the last two years of cropping/livestock and a current inventory of farm machinery and buildings. To create and analyse a scenario a specific farm profile must be selected by the user from the database.

Enterprise Database

The Enterprise Database holds information about crop and livestock enterprises. These details include the amounts and costs of typical inputs and outputs associated with the enterprise and thus the gross margin. There are also typical nutrient contents of those inputs and outputs and in the case of livestock other properties that can be used to calculate the annual ME requirement per animal (used for forage budgeting in the scenario). New enterprises may be created and existing ones deleted or amended as required allowing a user to tailor the database to their own circumstances and priorities such as increased yields of crops. They can also save different versions of the database, e.g. a version where costs or product prices are higher. When the user creates the scenario this database becomes part of the scenario and can be changed within the scenario without altering the original.

Rotation Designer

This allows the user to develop standard rotations that they can apply in the scenario. As the user creates sequences of crops they are analysed according to a set of rules. These include interval between crop types, proportion of crop types in the rotation and which crop follows which. The rules generate advice for constructing the rotation that helps avoid pest, disease and fertility problems. It also advises on the likely nutrient balance of the rotation. The rotations that are developed are transferred into the scenario when it is created.

CONVERSION SCENARIOS

To create a conversion scenario, the user selects a farm profile, an enterprise database and sets the duration of the scenario (up to 15 years). The software then automatically creates the scenario database and provides the user with access to the Cropping and Livestock Planner and the Whole Farm Costs and Investments Planner.

Cropping and Livestock Planner

This tool allows the user to allocate a crop to each field and livestock numbers for each year of the scenario. This is done using a table of fields and scenario years (in the case of cropping). Each cell in this table can be colour coded to indicate the conversion status. Crops can be applied to fields either on an individual basis or a rotation can be applied which will transpose a rotation (developed in the Rotation Designer) on to the field for the duration of the scenario. As the user develops the plan statistics for areas of crops, numbers of animals and gross margins for each year of the scenario are displayed below the plan in either tabular or graphical format. This aids the process of creating the plan, for example ensuring that gross margins do not fall below acceptable levels in any one year of the scenario.

Whole Farm Costs and Investments Planner

This facility enables the user to calculate fixed and variable costs for the whole farm over the duration of the scenario. It also allows them to plan investments that may be necessary during the conversion scenario. The software automatically calculates all the costs that have been incurred from the defined enterprises in the Cropping and Livestock plan. The user may add additional costs such as fuel and electricity or add in any additional income that may arise from other non-agricultural enterprises.

If the user plans to invest in new machinery or buildings during the conversion scenario then they can use the investment planner. On provision of relevant financial data the software automatically calculates depreciation, opportunity costs, capital repayments and interest and adds this to the whole farm costs for the relevant years of the scenario. This facility can also take account of income generated by the sale of capital equipment from within the farm inventory during the scenario.

Report Builder

Once a conversion scenario has been generated the Report Builder may be used to create a number of reports to further analyse the plan and/or support the application to convert. For each year of the scenario a profit and loss account, a cash flow account and an investment plan report are produced. This helps identify any years in the plan where economic difficulties could occur, e.g. large losses or cash flow problems. A monthly cash flow report can also be created. This requires each cash item to be allocated to a specific month, which although can be time consuming, can also be valuable for a business plan. These reports can be exported as CSV files that can then be opened in a spreadsheet package such as MS Excel or they can be exported as HTML then either printed out or automatically attached to an email.

CONCLUSION

Software Performance

The software is still being finalised and will be released for piloting and evaluation in May/June 2001. Therefore as yet there is no feedback on its performance and use within the industry. However, limited demonstrations to advisers have taken place during its development and feedback at these sessions has been positive.

Potential Benefits

It is important to remember that the software is not expected to replace human expertise but rather support and enhance it. Thus a key criterion for assessing the performance and potential benefits of the software is that it should be 'labour saving', i.e. it should speed up the process of creating conversion plans. It is hoped that this has been achieved in several ways:

- The user can create enterprises and rotations (in the central resources) that they can use for any scenario, thus avoiding data entry repetition. The ability to customise the software is further increased in the Options section of the software where the users can set other standard/default figures as well as manage enterprise databases and other components.
- Financial, nutrient and other data for each enterprise are embedded within the conversion scenario thus the user can get instant financial, nutrient and forage calculations when constructing the conversion scenario. This is extremely valuable when trying to construct cropping and livestock plans as it allows the user to balance the plan in terms of economics, nutrients and forage requirements.
- The user can rapidly create conversion scenarios to get a quick assessment of the financial feasibility of the proposed system. During this early phase the user can switch off the auto-calculate function of the software to prevent the software re-calculating outputs each time a change is made to the plan, thus speeding up the process. If the feasibility assessment is satisfactory the user can then add further detail to refine the plan. For

example by adding more detail to the whole farm costs and investment planner or creating more detailed enterprises.

- The software will automatically calculate depreciation, opportunity costs, and capital and interest payments for items entered in the investment planner.
- The software can automatically create profit and loss and cash flow reports for each year of the scenario using variable/fixed costs, income and other financial data. These reports can be saved, printed or automatically attached to email.
- Once a conversion scenario has been created it is simple to revise it and the software will then recalculate the consequences for the farm finances, nutrient and forage balances.
- Each revision of a conversion scenario can be saved as a different scenario (a separate file) and thus the outputs of each scenario can be printed out and compared.
- There are a number of options where the user can export data from the conversion scenario, which can then be imported into a spreadsheet package such as MS Excel. Thus giving the user further opportunities to analyse the data and/or incorporate the data into a business plan or grant/conversion application.

Software Release

A beta version of the software will be released in May 2001 (packaged as EMA-Plan) as part of the Environmental Management for Agriculture (EMA 2001) software package (Lewis & Bardon, 1998), which is also managed by AERU at the University of Hertfordshire (see http://www.herts.ac.uk/aeru/emahome.htm). This gives the software access to all the other facilities that are in EMA 2001 including the Advisory system that contains over 2500 pages of information. This beta version of EMA-Plan does not contain any enterprise data so it is the responsibility of the user to input this data. However, it is likely that enterprise data sets will be made available in the future. For example, an organic enterprise database may be sold as part of the Organic Farm Management Handbook (Lampkin & Measures, 2001). Thus users would receive a generic planning tool as part of EMA 2001 and would then purchase a data 'plug-in' with the handbook that would provide the data in the handbook in a form that can be used within the software.

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BIOGRAPHICAL NOTES

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For further information about the AERU see: http://www.herts.ac.uk/aeru/