BUREAU OF SUGAR EXPERIMENT STATIONS
QUEENSLAND, AUSTRALIA

Final Report
SRDC Project BS128S
Enhanced Productivity Information to improve Extension Programs and Research Data

by J D Cox

SD98002

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SUMMARY

A project was undertaken to extend previously available productivity software tools. Using the end product of a previous project as a prototype, a new application was recreated in a different programming language. The new application enhanced the areas lacking in the previous version of the software, and increased the target user group considerably.

Software titled *PRODIV V2x* was rewritten to manipulate productivity data. The software and manual was distributed to all interested extension and productivity centres.

The new version of the software included previously available report options along with several new options useful for summarising the increased block parameters. These automated reports assist extension in collating and displaying productivity reports in an easy to comprehend format.

All project objectives were achieved and the program is currently available for use in any mill area where the data are available. The project supervisor is continuing research within the productivity area and will utilise existing research in a new project.

1.0 INTRODUCTION

All mills in the sugar industry collect productivity data as cane is processed throughout the season. Generally, these data are stored in databases in rake format, and are commonly available to productivity and extension staff in block format. The mill and district productivity committees use this information to provide growers with seasonal productivity reports.

The productivity data stored by mills have immense potential as an extension tool to identify productivity limits in particular situations and improve overall production. SRDC project BS51S '*Improved utilisation of productivity data through planned extension programs'* resulted in the development of software to assist with the analysis of productivity data and report collation.

One of the main recommendations at the conclusion of BS51S was that further study be undertaken extending previous research on the acquisition of accurate information for use in block recording schemes throughout all mill areas. BS51S was developed using a target mill group consisting of the Mossman, Tully, lsis and Maryborough mills. This new project would encompass as many mill areas as possible and would develop the overall scope of the software currently available.

BS128S *'Enhanced productivity information to improve extension programs and research data'* was the title given to the new project. Research on the new project began in June 1994

and was completed in July 1996. The outcome of the project was a stand alone software program similarly titled *PRODIV*.

2.0 OBJECTIVES

- Extend scope of productivity data to improve extension.
- Develop a process for easy downloading of individual farm data for a grower's own use.
- Produce reports to compare blocks over a full crop cycle.
- Evaluate the effectiveness of various forms of reports.
- Extend use of productivity information to research projects.

3.0 INTRODUCTORY TECHNICAL INFORMATION

After assessing the Excel version of *PRODIV* produced by BS51S, it was decided that the new version should be rewritten using appropriate database software. Microsoft Access was selected because of its relational database and object orientated or graphical user interface (GUI) qualities. Also using Microsoft Access in conjunction with the Access Developers Toolkit (ADT), would allow the software to be operational as a stand alone application.

One of the initial problems encountered developing BS51S and again in BS128S was the difficulty in obtaining mill data in a common format. The success of BS51S involved the use of a specialised intermediate program to convert the data from the format used in the mill computer to a personal computer format. However, currently many mills are updating their systems and progressively the barrier between personal computers (PC) and mainframes is reducing. Most database systems now provide a method of downloading data to a text file, and all common PC software provide options for loading and converting text files.

4.0 METHODS AND MATERIALS

The success of the previous version of *PRODIV* partly involved the use of third-party software to assist with the transfer and conversion of data from a mill computer system to a standardised format for importing into a personal computer. The process worked well for the small target group however, with the increase in target group size, an easy way to import data from an excel file or a text file directly from the mill without third party intervention became essential.

Using a sample data set from the Maryborough Sugar Factory, and basing the report options on those previously available within the earlier version of *PRODIV*, software was created to provide extension and productivity staff with updated facilities for accessing productivity data for presentation to grower groups.

The final stage of the project involved gathering feedback from milling enterprises, productivity staff and extension staff on the effectiveness of reports available and the overall usefulness of the program.

5.0 RESULTS

The project resulted in an executable, object-orientated program which allows easy access to productivity data in a comprehendible format.

The internal structure of the program is depicted in Figure 1 below.

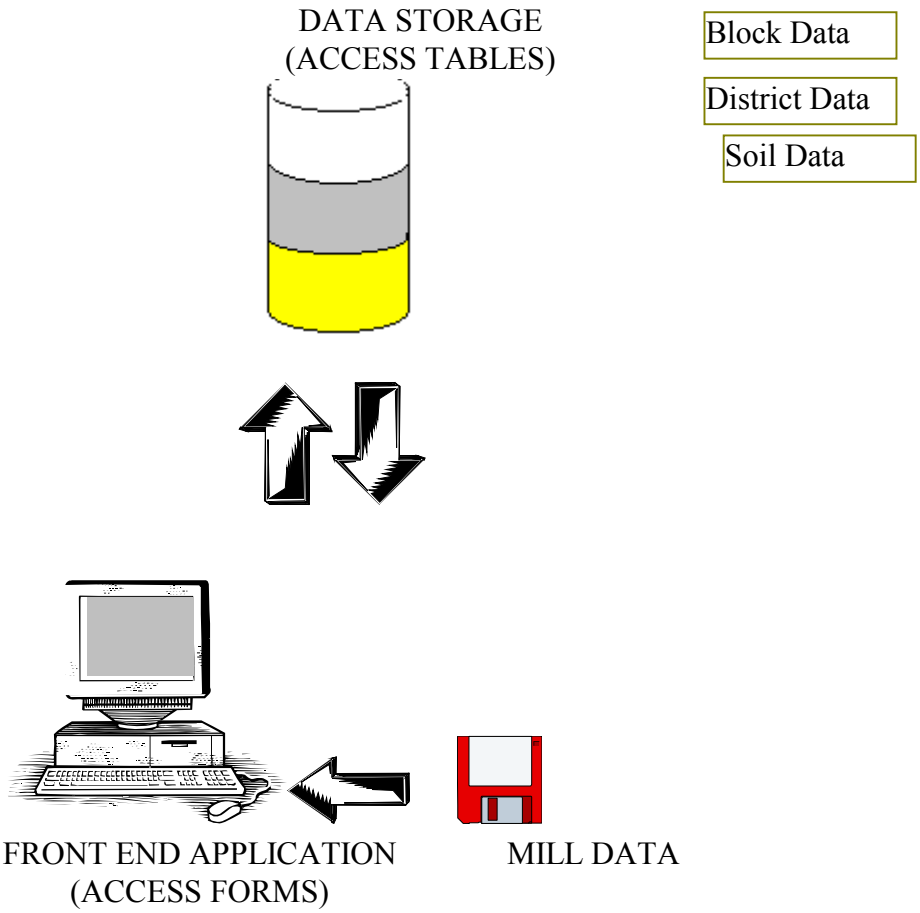

Figure 1.0 Application Structure

Under one simple application interface, tables for block data, soil data and mill districts exist for each mill area. All productivity data are stored as attached tables to ensure any damage to the front end of the application does not corrupt the data. The design also enables upgrades to be distributed without erasing existing loaded data. The front end of the application contains all the forms, queries, macro's and report designs necessary to create the user interface.

PRODIV is a menu driven program which allows users to easily navigate the program selecting the reports they desire. Figure 2 displays the *PRODIV* main screen.

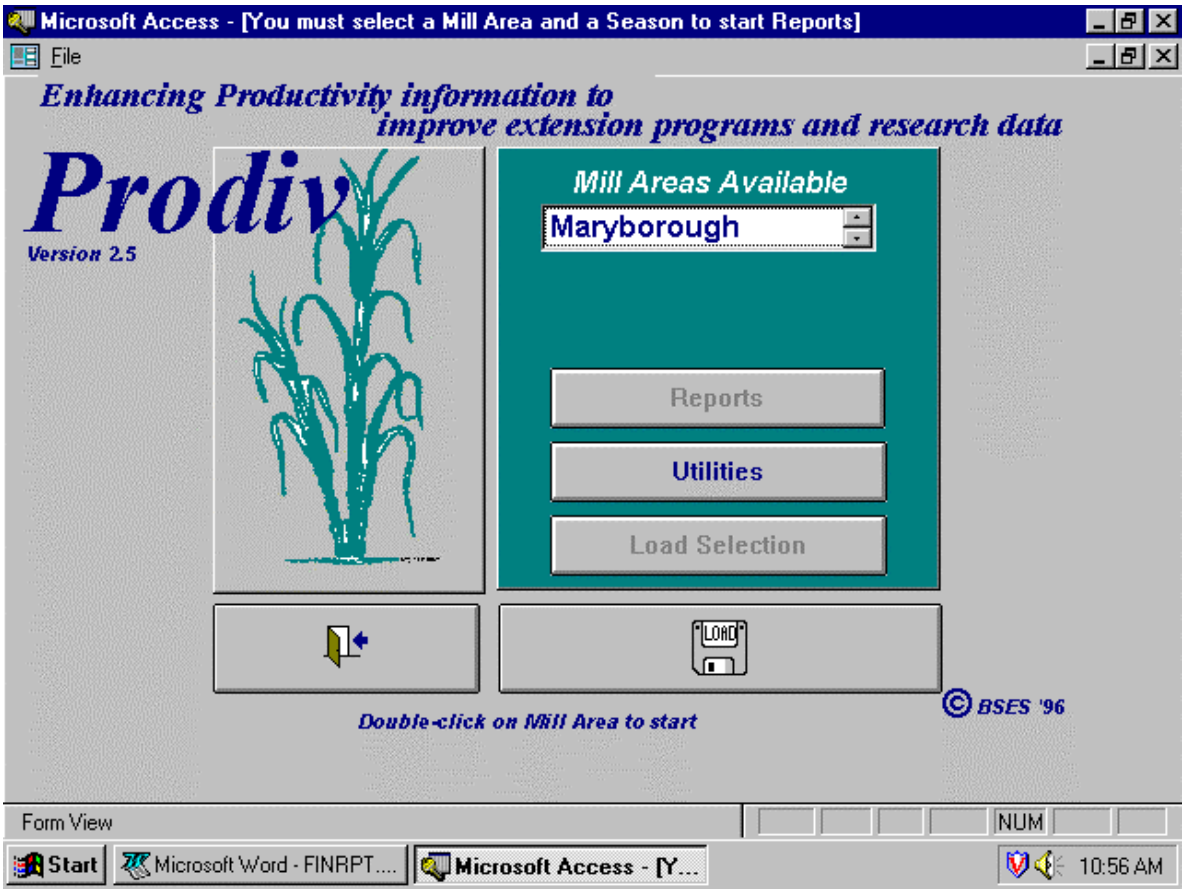

Figure 2. PRODuctivity Information V2.5 - Main Menu

Mill data are loaded each season. Each season of data is appended to the existing relevant mill area data table. At the beginning of each user session, the user can select the range of years for reporting.

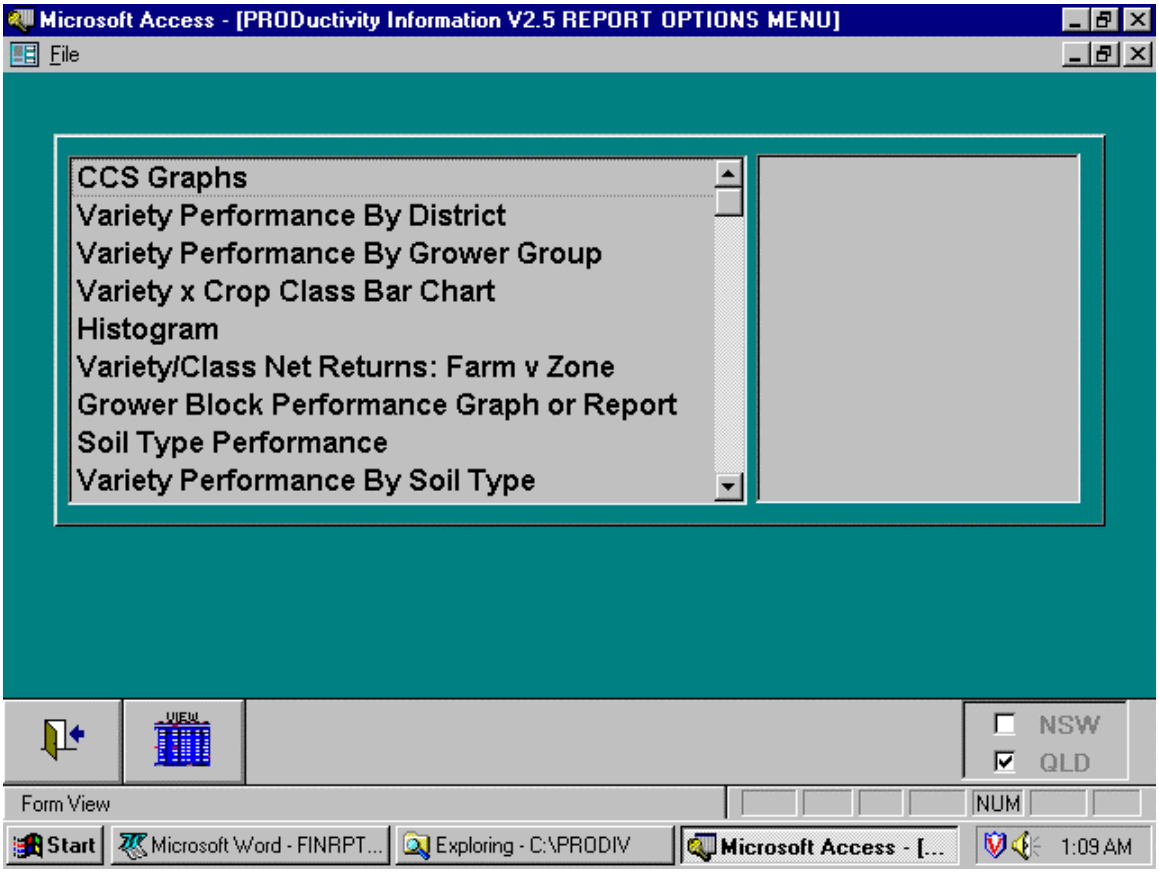

Figure 3 - PRODIV Report Menu

The previous version of *PRODIV* provided a guideline for report development. *PRODIV* V2.x. Report options are:

- CCS Graphs
- Variety Performance By District Table
- Variety Performance By Grower Group Table
- Variety x Crop Class Bar Charts
- Histogram
- Variety/Class Net Returns: Farm Vs Zone Table
- **Grower Block Performance Graph or Report**
- **Soil Type Performance Table**
- **Variety Performance By Soil Type Table**
- **Farm District Ranking Table**

An example of each report can be found in *Appendix A Reports.* All new report options appended to the new version of *PRODIV* V2.x are depicted in bold font above and are defined below.

The Grower Block Performance Graph or Report option was added to the new version to provide a summary to growers on their farm history and net return compared to their zone or district average net return. These two reports combined will be useful in examining an individual growers history should they need to discuss their management practices with their local extension officer.

Soil type data are gradually becoming available, through extension and productivity staff or the mills. *PRODIV* V2.x includes two report options indicating performance based on soil type. The *Soil Type Performance Table* report option provides a summary of average net return for all soil types in a mill area. The *Variety Performance By Soil Type Table* report options provides a summary of all varieties net return with a selected soil type. The soil type reports provide a useful indicator of how soil types affect the net return of a selected area or variety. This allows extension and productivity staff to indicate to growers which varieties perform better on specific soil types.

Finally the *Farm District Ranking Table report option* provides a ranked list of farms and average net returns for a district. A selected growers farm is ranked amongst other farms in the zone providing an indication of their yield in comparison to others in the district. The growers farm number is indicated beside the rank, all other farms remain anonymous.

6.0 DISCUSSION

The project has addressed all the objectives successfully.

The *PRODIV* software package was originally developed to access raw data on individual blocks of sugarcane in mill databases and to load it into a PC in an appropriate format. The revised version produced by this project extends the scope of the available outputs by providing report options for soil type and allowing for the comparison of cane harvesting systems. The application was rewritten in another language to utilise relational database characteristics and to increase the data storage capacity of the application. The application is also easier to load and control for inexperienced computer users and with the addition of the online help system (available by pressing the Fl key at any time) most operational queries can be answered by the application.

PRODIV can now provide accurate and timely information to all mill areas which would like to use the program. *PRODIV* will also be useful for extension and productivity staff in producing individual farm reports when requested by a grower. Several reports available in *PRODIV* provide the user with an export option. This option copies the data behind the reports to a selected location as an excel file where it can be manipulated further or given to the grower for their own use. Later versions

of *PRODIV* will expand the options available for downloading individual farm data for a growers personal use.

Several report options now available allow the user to compare net returns over more than three seasons. This provides a facility for comparing block data over an entire crop cycle. These options will also be expanded in later versions.
PRODIV Version 2.0 was despatched to extension centres in August 1996 after an initial demonstration tour to southern districts in July. Extension and Productivity staff offered feedback on the applications potential. The feedback contributed to some minor changes to the program before it was released. Dispatched with the software were evaluation forms to assist users in conveying feedback and criticisms to the program developer.

At the request of different extension centres, there have been four major updates to *PRODIV*. *PRODIV* Version 2.5 is currently available.

6.1 Difficulties

The program is easy to navigate, however most extension staff had difficulty preparing and loading mill data correctly for the first time. This problem would have been overcome if training had been provided. These training sessions also would have provided instant feedback to the developer on runtime problems.

While using Microsoft Access enhanced the relational data storage qualities of the program it also restricted many areas of the program. Graphed reports could not be edited with the ease that users were accustomed to in earlier versions and object linking and embedding (OLE) errors became a common occurrence when running graphic reports on older machines. This problem only became evident once the application had been distributed.

Some extension staff questioned the validity of the data produced on the reports. Data used for the reports are generated through access queries. Access permits only one query as the source of information for a report, and as a result, averages shown at the conclusion of the report are arithmetic averages calculated on the weighted averages contained within the report. This was a problem which did not arise in the earlier Excel version because there was no restriction on report data.

7.0 IMPLICATIONS

The program has been distributed to all mill areas. Confirmed installations have taken place in Bundaberg, Maryborough, lnnisfail, Tully and Meringa. Most areas did not use the program for their 1996 annual productivity reports however interest has been indicated on using the program in 1997 for collating productivity data.

The software developer is remaining involved with the project at a minimum level to ensure the program has continuing support. A new SRDC funded project will start in July 1997 to extend the software further.

8.0 RECOMMENDATIONS FOR FURTHER RESEARCH

1. Use the relational database structure already available to create an integrated decision support system. This will improve the flexibility of the report options available and maximise efficiency of hardware resources.

2. Enhance report options, providing geographic mapping options. This will assist extension staff with identifying relationships or trends previously overlooked. The scope of the parameters which can be fixed to a geographical location can include soil types, irrigation practices, pest incidence and fertiliser application.

3. Constantly evaluate the effectiveness of reports available and presentation techniques. This will enable extension, productivity and extension staff to access productivity data in a professional and comprehendible format.

4. Provide a facility to assist productivity and extension staff with the collation of seasonal productivity reports, decreasing the amount of time previously set aside for productivity reporting.

9.00 INTELLECTUAL PROPERTY

The software was developed with the intention of making it available to all sugar mills, productivity groups and other organisations within the Australian sugar industry. Consequently, no intellectual property issues arise.

10.0 PUBLICATIONS

'*PRODIV* PRODuctivity Information V 2.0', Janine Cox 1996

11.0 ACKNOWLEDGEMENTS

I would like to thank all extension staff, mill staff and productivity board members for their assistance during the development of the software and the collation of productivity data.

Trademarks

Microsoft ® Access™
Microsoft ® Access Developers Toolkit™
Microsoft ® Excel™

APPENDIX A

REPORTS