

# SRDC Grower Group Innovation Project

## Final Report

**SRDC project number:** HGP009

**Project title:** Harvest Record Keeping Electronic Logbook

**Group name:** Murray Harvesting PTY LTD

**Contact person:** Brian Dore

**Due date for report:** 01/08/2007

**Funding Statement:** This project was conducted by Murray Harvesting in association with the Sugar Research and Development Corporation (SRDC). SRDC invests funds for sugar R&D derived from the sugar industry and the Australian Government.

The Murray Harvesting is not a partner, joint venturer, employee or agent of SRDC and has no authority to legally bind SRDC, in any publication of substantive details or results of this Project.

## **Body of Report**

### **Executive Summary:**

(An overview of the aim, conduct, key results and learnings from the project. Maximum 500 words)

The main project aims were to develop an electronic harvester logging system that would be user friendly and reduce the requirements for manual entry of data. The information collected was then collated and reported to the grower so that his/her farm could be bench marked against the rest of the group. The project also aimed to provide an alternative to the current fleet logging systems developed for transport or mining industries and adapted to the sugar industry. Other project aims included the initial steps in the development of parameters for the adoption of differential pricing for harvesting and/or pricing that was linked to harvest performance.

The essence of the project was to take a manual system of recording data via log books and converting to an electronic form. This involved the utilising personal digital appliances (PDA-small hand-held computers), developing software for the PDA and base computer to collect and store logged information. The information was then collated and presented to each grower in the group.

Overall the project was a success. The use of personal PDA and/or mini computers as a substitute for paper based logbooks is feasible. However the technology does have constraints. Primarily there is still a reliance on human input of data. This task, while less onerous when utilising electronic means for recording data, still requires valuable operator time to complete and is prone to error. The system developed also relied on a physical connection between the PDA and the base computer for data transfer. Improvements in technology now permit the use of PDA/mobile phone hybrids to download this information automatically. Other aims of the project that were not realised were linking to Tully Sugar Limited (TSL) systems to obtain grower data on the tonnes cut and quality measurements for the cane supplied. Whilst technically possible the current data structures at TSL don't provided for easy external access by third parties. There is also privacy issues involved in accessing this data. These constraints did not allow harvest performance per block to be reported to growers.

Data was collected on the field conditions at the time of harvest. This information was then matched to corresponding NIR measured quality parameters for the cane supplied. There appears to be a link between the quality of the cane supply and field conditions at the time of harvest. This result must be qualified with fact that the field condition observations were subjective and the data set was relatively small. However the effect of the field conditions on cane quality should be explored to try to determine these effects as this will become critical in the development and application of performance based payment for harvesting linked to cane quality outcomes.

Despite these shortfalls the project achieved most of the aims of the outlined above by providing growers with information on harvest performance and cost on a farm basis.

### **Background:**

(Why did you need to do this project?)

The original need was born out of necessity. Murray harvesting had been logging data via manual means for a number of years previous to this project and the time needed for data entry both in the initial recording and then further entry into a database was too great. The idea of recording the data on harvest performance in an electronic log book would at least reduce some of the manual input of data.

### **Aims:**

(Include the Aim and the expected benefits that were listed in Section 2 of your original Application)

The project aimed to achieve

- Automation of current manual logbook system.
- Adapt minicomputers for use as electronic harvester logbook.
- Generate reports for growers on harvest performance.
- Explore the opportunities to match harvester data and NIR data on cane quality.
- Record field conditions and harvester performance to gauge the effect on cane quality.
- Provided a benchmark for alternative and more expensive harvest recording systems such as “Big mate” and MT data products.
- Provided the base information for the development key performance indicators for harvesting (KPIs) for harvesting and new payment systems. This is expected to be the next phase and another project in its self.
- Improved understanding of harvest costs.
- Improved understanding of the effects of farm layout on harvest cost.
- Improved understanding of the effects of field conditions and harvest operation on cane quality.
- Measurement of harvest performance and cane quality will provide the base for the development of key performance indicators for harvesting (KPIs) and alternative payment systems.
- Development of computer and reporting skills of Jamie and Brian Dore.
- Potential to enhance the understanding of harvest economics and the relationship between stake holders in the Murray Harvesting group.

### **Methodology:**

(How was the project conducted?)

The key activities of the project were:

- Develop and customise PDAs and software for a data / logbook system for harvesting.
- Develop an evaluation and scoring system for field conditions at harvest.
- Implement system over a harvesting season.
- Report collated harvest data to the growers from the group.

### **Results and Outputs:**

(What results were produced by the Project? The results should include data collected, articles or reports written, events held and anything else you see as relevant to the industry. Relevant files including photographs should be provided on a CD. If there is any protected Project Technology, eg information that has been kept confidential, such as equipment specifications, patentable knowledge please outline and discuss this with SRDC)

- PDA hardware was adapted for use, software utilising “xml” files for data transfer, and a customised Microsoft access database was developed and harvest data collected
  - Figure 1: PDA in cab, shows the PDA installed in the cab of Murray Harvesting’s Harvester.
  - Figure 2: PDA Screenshot, depicts the screenshots of the data entry pages on the PDA
  - Figure 3 outlines a schematic of the data collection system.

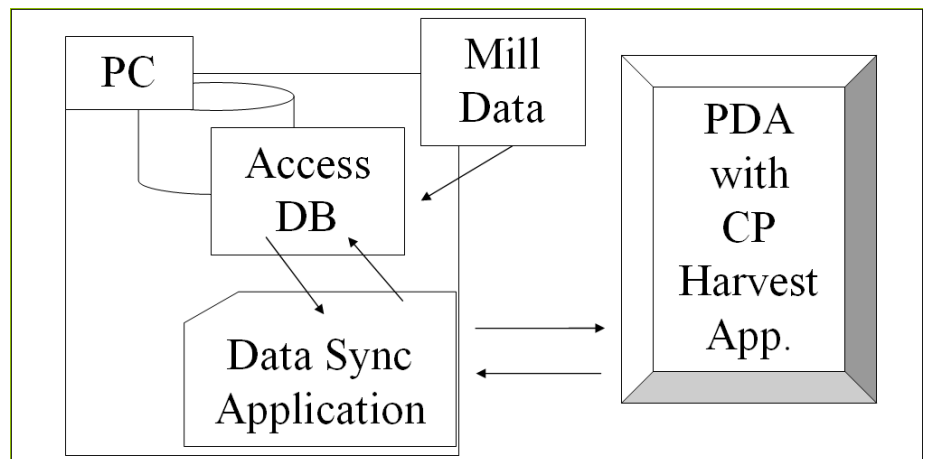
Figure 1: PDA in cab



Figure 2: PDA Screenshot

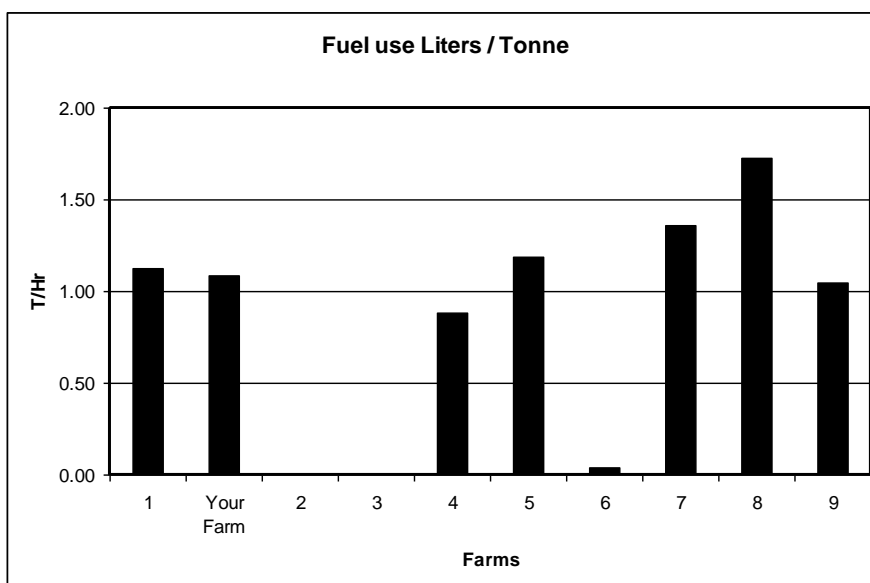
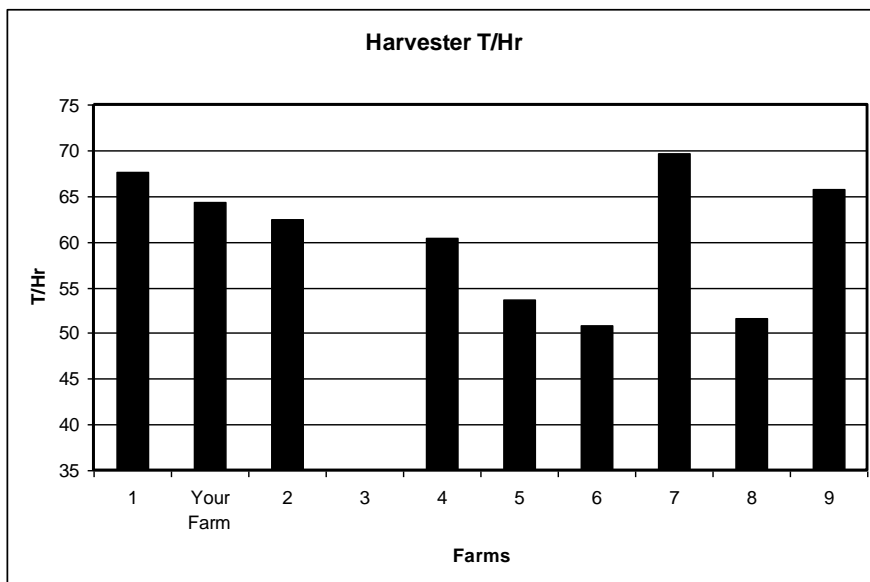
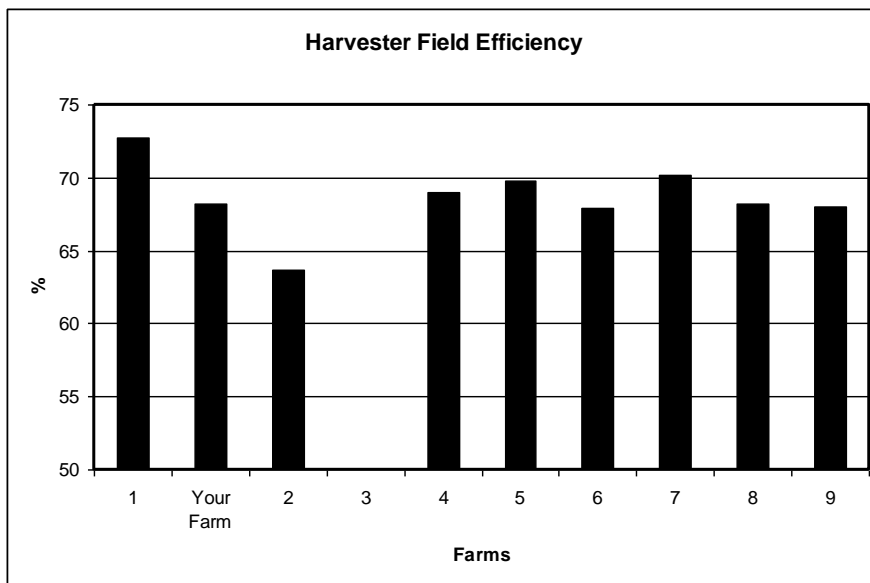


Figure 3: Data collection system:



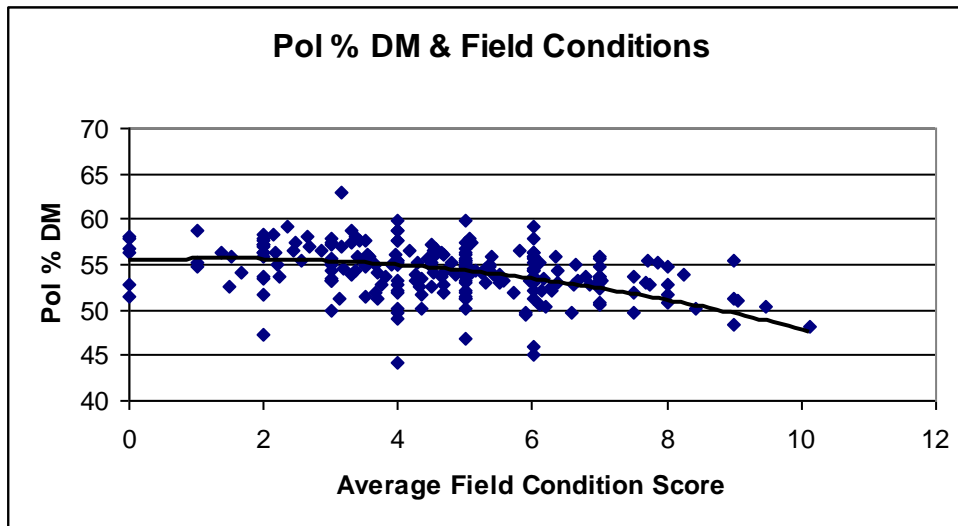
- The growers in the Murray Harvesting group were provided with reports documenting the key performance indicators of harvest efficiency, harvester tonnes per hour, and fuel use. Initially these reports were rudimentary but sufficient in the context that the growers received the report in a one on one meeting with a representative of Murray harvesting.
  - Figure 4: Harvesting report extracts, outlines an example of the harvest report.

Figure 4: Harvesting report extracts.



- Potential key performance indicators for harvesting have been identified as:
  - Elevator pour rate or tonnes per elevator hour
  - Tonnes per harvester engine hour
  - Field conditions vs various measures of cane quality such as soil in cane supply, fibre, and Pol.
  - Figure 5: Pol % DM & Field Conditions, outlines the effect of worsening field conditions (increasing rating from 0 to 12) on quality parameter such as Pol as a % of dry matter in the cane supplied.

Figure 5: Pol % DM & Field Conditions.



### Capacity Building:

(How has the Group's capacity to conduct R&D and implement better farming systems been enhance?)

The capacity of the group has being improved in a number of areas:

- Jamie, Greg, and Brian Dore have improved their skill set in use of computers, report generation, and communication skills. They also improved their skill set in developing an idea and taking it from a concept through to functional system.
- The understanding and knowledge of harvesting costs and the effect of factors such as row length and farm layout on harvesting efficiency has improved in the grower group.
- The improved measurement of harvest performance data has allowed Murray Harvesting Pty Ltd to better negotiate on harvest price and performance with growers. This was realised in the development and implementation of alternative payment systems such as base price + fuel

### Outcomes:

(What benefits have been achieved or are expected from the project, and what more has to happen to get the full benefit from the project? How do the expected benefits compare with those predicted at the start of the project, as outlined in the Application?)

The main outcomes realised form the project are:

- Paper based logbook systems can be replaced by electronic data recording systems providing some improvements in the efficiency of the data collection and report generation. Real time logging of the harvest by sophisticated and dedicated logging systems is the only realistic, timely, and cost effective way to provided harvest performance measurement at a farm block level.
- The growers in the Murray harvesting group responded the pricing signals sent via the alternate harvest price plus fuel payment system by altering their harvest management and farm layouts to improve efficiency.

The project also highlighted some key requirements for harvest performance measurement in the Tully area namely:

- Using a central system for harvest performance measurement will provide efficiencies in the collection, storage, and retrieval of data.
- The effects of field conditions on the quality of cane supply need to be quantified for inclusion in the development of payment systems for harvesting that are related to harvest performance and cane quality.
- Harvest performance data is sensitive information for both harvester owner and growers. The introduction of measurement and use of the data will have to be closely managed by all the stakeholders to obtain the best possible outcomes. There maybe some requirement for external analysis of the collected data to assist in the development of well grounded alternative payment systems for harvesting. Using a central system for harvest performance measurement will provided efficiencies in the collection, storage, and retrieval of data by industry stakeholders of the data via mill website and portals.

### **Environmental Impact:**

(Outline any adverse or beneficial environmental impacts of conducting the Project and/or implementing its findings)

- There are no direct environmental impacts other than improvements in the efficiency of harvesting and the resultant improvement in fuel use per tonne of cane harvested.

### **Communication and Adoption of Outputs:**

(Outline any communication activities that have been conducted and any that are planned. How has SRDC been acknowledged or involved? Have any lessons from the project been applied by members of the Group, or others?)

- Presentation at the 2006 GIVE day
- Communication on the project results and outcomes with the Harvesting Best Practice Committee established in 2006 to oversee a trial of harvest performance measurement equipment supplied by Techagro Pacific and AgGuide in the Tully area. Of particular interest to the committee was:
  - the recommendation on harvest parameters for measurement to obtain data that could be used in developing in key performance indicators for harvesting,
  - issues relating to data collection, storage, and report generation.
  - Harvest performance report formats
  - recommendations on seeking assistance with the development key performance indicators for harvesting and the development of alternative payment systems based of quality outcomes.
  - The use of PDAs and or mobile phone – minicomputer hybrids as an interface for harvester performance measuring systems.

### **Recommendations:**

(What recommendations would you make as a result of the project, including suggestions for further research and development?)

Research needs to be carried out to quantify the effects of field conditions on the quality of cane supply. This information will be critical in the the development of payment systems for harvesting that are related to harvest performance and cane quality.

Harvest performance data is sensitive information for both harvester owner and growers. The introduction of measurement and use of the data will have to be closely managed by all the stakeholders to obtain the best possible outcomes. There maybe some requirement for external analysis of the collected data to assist in the development of well grounded alternative payment systems for harvesting.

Using a central system for harvest performance measurement will provided efficiencies in the collection, storage, and retrieval of data by industry stakeholders.

**Publications:**

(List and attach copies (electronically if possible) of all articles, newsletters and other publications from the project.)