

THE TONGAAT FIELD DIARY — A USEFUL MANAGEMENT TOOL

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Abstract

This paper describes a system for recording labour, material and machine usage on all operations concerned with sugar cane husbandry at Tongaat. It involves the use of a daily diary from which the information from one copy of each day's recorded activities is forwarded to a computer bureau, the other copy remaining in the field office. After processing, monthly cost reports are received from the computer which aid in budget control and in centralised field management. Some of the results of this system are briefly reported.

Introduction

Prior to April 1966, the company's system for recording and distributing labour and machine costs was based on the labour unit ticket and tractor return form. A ticket for each unit of labour employed was sent in daily to the compound office and had written on it the cost centre (job number), indicating the work done by the unit the previous day. Similarly, fuel usage returns equating to tractor hours worked were delivered to the clerical staff and the work done by each machine was costed. These labour-unit tickets were used for pay purposes and for costing records, both exercises being calculated and written up manually. The so-called monthly cost report was presented some six to eight weeks after the end of the month and therefore lost a lot of its impact. Furthermore, with growing size of the agricultural division at Tongaat and the desire to have more accurate and meaningful records, it became necessary to investigate the whole system and to improve both the details supplied and the time lag in the presentation of the reports.

The writer and his colleagues at Tongaat therefore designed a system, based on a daily diary, which achieved both objectives. This system is described below:-

The Daily Diary

A copy of the daily diary is presented in Figure 1. It is simply a preprinted form showing operations and cost centres (in rows) and materials, men and machines (in columns).

Thus, if a section, area or estate is involved on a particular day with harvesting, infield transport, land preparation, planting, cultivation, road maintenance and general work around headquarters, the numbers of labour units, fertiliser bags, tractors or mules used are entered in the appropriate spaces. One copy remains on the section as a diary, and the other is sent to a central office handling cost records, wages and paybook matters. The month's total copies from all departments are firstly summarised into a form

suitable for punch card entry and, secondly, paybook details (book number, rate of pay, etc.) are entered on to them before they are forwarded to the computer bureau. The computer then sorts these returns into (a) cost centre (operation number) order for cost control purposes, and (b) into paybook order for wage purposes. On return from the bureau, the accounts department summarises (a) into a monthly cost report which includes the corresponding budget values for each operation and department.

In assigning job numbers (cost centres) to particular operations it is necessary to define operations quite clearly in terms of movements involved, time of operation and relationship to the methods used. The definitions used are presented below :-

Preparation

This includes all operations concerned with the preparation of the soil to a state suitable for replanting sugar cane, including labour used to singe trash from the previous crop and until the final tilth has been achieved. These include at Tongaat :-

- (i) Singeing trash,
- (ii) Subsoiling or ripping,
- (iii) Ploughing,
- (iv) Harrowing or rotavating,
- (v) Drainage or conservation,
- (vi) Bush clearing (breaking in new ground),
- (vii) Filtercake handling and spreading.

Planting

All operations concerned with replanting a field to sugar cane. These include :-

- (i) Drawing and preparing furrows, including any marking involved and fertilising,
- (ii) Cutting, transporting, trashing, chopping and dipping the cane setts,
- (iii) Actual planting, i.e. placement of setts in the furrows and covering with soil.

Cultivation

All operations concerned with the husbandry of the crop between the time of planting (or harvesting in the case of a ratoon crop) and the time of harvesting the following crop. These include :-

- (i) Hand weeding,
- (ii) Herbicides,
- (iii) Cultivating, either by tractor or mule scarifiers,
- (iv) Trash management, including the cleaning of drains and installation of additional drains in ratoon fields,
- (v) Fertiliser application.

Harvesting

- (i) Cane cutting - all units of labour concerned with this operation including actual cutters, non-cutters and indunas,
- (ii) Infield transport - all units of labour and machine hours involved in getting the cane 'mobile' from field to siding (cane loading zone). These involve chain boys, drivers, mechanical loader drivers, iron-standard boys and field and road gleaners.

Maintenance

- (i) Implements - the units of labour and machine hours used on implement repairs (blacksmith, handyman, etc.)
- (ii) Roads - all units of labour and machine hours used on infield road repairs and bridges.

General

All units concerned with :-

- (i) Office work (clerks),
- (ii) Labour - compound (cooks, sweepers, police boys),
- (iii) Stables (sirdars, horse or mule boys),
- (iv) Parks and Gardens and mowing - general headquarters tidiness, etc.
- (v) Labour on annual leave, or injured on duty and not at work but receiving pay.

Other Job Numbers

Any labour units or machine hours being charged out to other departments.

TABLE I
Some standards and the normal range of both labour and machine utilisation on various operations at Tongaat

Operation	Labour (units/acre)		Machines (acres/hr.*)	
	Standard	Normal Range	Standard	Normal Range
Subsoiling	0.4	0.1 - 0.6	1.0	±0.2
Ploughing	0.8	0.3 - 1.4	0.3	±0.1
Harrow/Rotavate	0.3	0.1 - 0.6	0.4	±0.1
Draining	4.0	0 - 5.0	2.0	—
Filterpress Cake	3.0	0 - 4.0	0.4	—
Bush clearing	4.0	0.5 - 8.0	—	—
Furrows	4.0	0.2 - 10.5	} 0.3	—
Setts	3.0	1.0 - 5.0		
Planting	7.0	3.0 - 12.0		
Hand weeding	3.0	2.0 - 5.0	—	—
Herbicides	0.5	0 - 1.0	—	—
Trash management	3.0	2.0 - 4.0	—	—
Cultivating	0.7 (Using Mules)	—	1.0	—
Fertiliser	1.0	0.5 - 1.2	5.0	4.0 - 8.0
Harvesting	3.0	2.7 - 5.0	—	—
Infield Transport	25 tons/unit	20 - 30	10 tons/hour	—
Section general and maintenance	35 units per day for 365 days for sections averaging 3,400 acres.			

*At Tongaat, tractor hours are measured in fuel gallons for wheel tractors and on hour meters for crawlers.

Some results achieved, and discussion

From time to time summary analyses have been conducted on the accumulated data from this field diary system. In so doing several weaknesses in the system have been exposed and corrected. However, after several years of operation, the analysed data is sufficiently reliable to enable useful standards to be set for all operations. Some of these standards and the normal limits or range in variability which can occur are shown in Table 1.

The analysis of the data from year to year has also revealed some interesting facts :-

Cultivation

- (i) Over the life of the crop, ratoon cane required 13.67 units of labour/acre for hand weeding, whilst plant cane needed 25.92 units/acre.
- (ii) Over a selection of burnt and trashed ratoon fields, the hand weeding labour utilisation was :-
Burnt ratoons (313 acres) 19.19 units/acre
13.65 (lowest)
Trashed ratoons (177 acres) 6.49 units/acre
13.06 (highest)
- (iii) Weeding of March plant or Spring planted fields were :-
March plant 25.26 units/acre
Spring plant 26.59 units/acre
- (iv) Labour utilised on trash management was :-
Fields harvested during Winter 3.16 units/acre
Fields harvested during Summer 2.10 units/acre
Burnt Ratoons 3.91 units/acre
- (v) Total labour used on cultivating by mule scarifier for the life of the crop = 4.99 units/acre

Harvesting

- (i) Average performance in harvesting by various methods (i.e. windrowing or bundling) :-

	Tons/unit	% Crop handled
Windrowing Trashed	4.37	26.6
Windrowing Burnt	6.59	5.4
Bundles Trashed	3.34	57.6
Bundles Burnt	3.98	10.4
Weighted average	3.85	100.0%

- (ii) Average output per total units charged to harvesting = 3.1 tons per unit. The above difference represents the 20% of non-cutters employed (including spare gangs, firebreaks, indunas, etc.)

Section General

The mean of 35 non-productive units per day found charged to Section General has been analysed as follows :-

	Units/day	%
(i) Office and Compound	13	38.5%
(ii) Stables	7	20.9%
(iii) Parks, Gardens, Mowing	5	13.2%
(iv) Maintenance of Implements	2	6.1%
(v) Maintenance of Roads	3	7.5%
(vi) I.O.D.	1	3.0%
(vii) On annual leave	4	10.8%

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FIELDS DIARY & DAILY LABOUR DISTRIBUTION

SECTION

OPERATION	Op. No.	FIELD No. Name	Acres/Tons (Bags)	LABOUR UNITS			Horses & Mules	TRACTOR		REMARKS
				Perm.	Mig.	Totl		No.	Hours	
PREPARATION										
Subsoiling	01									
Ploughing	02									
Harrow, Rotavale	03									
Draining	04									
Filter Cakes	05									
Bush Clearing etc.	06									
PLANTING										
Furrows	11									
Sets	12									
Planting	13									
CULTIVATION										
Hand Weeding	21									
Herbicides	22									
Cultivating	23									
Trash Management	24									
Fertiliser	26									
HARVESTING										
Cutting	31									
Infield Transport	41									
MAINTENANCE										
Implements	51									
Roads	52									
GENERAL										
Office, Compound	61									
Stables	62									
Pks. Gdvs. Mowing	63									
I.O.D.	64									
Leave	65									
OTHER JOB NUMBERS										
SUB TOTAL - UNITS PAID										
Sick										
Absent										
TOTAL LABOUR STRENGTH (Agree with Check List)										

TF.2.

SECTION MANAGER

FIGURE I

The figures presented above do not necessarily apply to other farms or estates where management or conditions are different. They are presented merely to illustrate the usefulness of the diary in supplying information about both labour performance on certain operations and labour and/or machine utilisation over the season.

Records which supply the above information can play a vital role in farm management. Not only are yield records and, say, fertiliser, rainfall, irrigation and other crop data important, but facts about labour and machine effort put into various fields to result in the measured yield, help enormously in planning future budgets and making management decisions. It is also, in fact, believed that only when such records as these are available, can sound decisions and judgement be made on when and where to mechanise.

This system has operated for almost five years and is at present being reviewed. More detailed information and reports are being considered. A field history on file in the computer is being developed and a system of exception reporting to field management (using the data presented in Table 1) on labour, machine and material utilisation, and costs, is currently being devised.

The ultimate objective is to have available on request analyses of crop yield factors, field profitability, operation method analysis and also computerised routine reports on harvesting, crop estimates, etc. It is believed that with this information readily available, decisions such as "when to replant", "how to prepare the soil", "what to do in restriction", will be more easily made, whilst accurate budgeting, crop and expenditure forecasts and action needed to improve performances will be soundly guided. In short, a field diary can be developed into an extremely useful management tool.

Discussion

Mr. de Robillard: The cost of irrigation is not mentioned in the paper.

Will the field diary give allocation of labour per hectare for budget purposes?

Dr. Hill: Irrigation is taken into account, but not in the field diary as it would make it too complicated.

We have a similar sheet for other departments, including irrigation.

Irrigation is controlled from a centralised department at Tongaat and they keep their own diaries. Information kept about irrigation of various blocks will be incorporated in the new diary I have mentioned previously. The information will be stored in the computer so that we can analyse yield factors pertaining to a particular field when required.

We are now able to set a budget for labour because we have established standards to work on. The standards will, of course, be modified for difficult areas.

Mr. Andries: Costing machines in hours is always difficult.

How does Tongaat relate the hours recorded against each machine?

Dr. Hill: We use a fuel hour system on all wheel tractors.

If, for example, a Massey Ferguson 35 is used on cultivation, at the end of the day it is filled with fuel

and the amount is recorded against the tractor number and the field number in which it was used.

The hour meters fitted to wheel-type tractors were found to be most unreliable.

We have found that most wheel tractors use about one gallon of dieseline per hour.

We do use hour meters on our fewer crawler tractors.

Mr. Bartlett: The figures are most valuable and it would be interesting to have comparisons from other estates.

On one of our estates, for windrowing burnt cane the average to date is 10.90 compared to Tongaat's 6.59, but we may, of course, be using a different basis of comparison.

These figures should help us to determine accurately the cost of various tasks.

We tend to regard weeding labour as cheap. At 19 units per acre, each at 50c, the cost of weeding is R9.50 per acre. At a yield 40 tons per acre the cost is approximately 25c per ton.

It is possible we may be underestimating the value of certain tasks.

As cane cutters can earn a bonus, why should not weeders?

I would like to record that Illovo has had a cutter who has cut 33 metric tons of cane in a day, following up the next day with 30 tons and that a team of six cutters in a section averaged 20 metric tons a day each.

Mr. Browne: You are using a computer for recording information, but are you also using it for management decisions?

Dr. Hill: At the moment we are only using it for that purpose in the engineering field, but we will be using it for management decisions when the new sophisticated input form is ready. We will then get full value from the computer.

Mr. Stewart: We feel a tractor should be booked out with the hours it is away from its base, even though during the period it might have been standing idle for a time. This gives an idea of total utilisation of the tractors on the estate.

On our daily report only prime data is entered so that minimum calculations are made by the estate. The diary goes to the computer and the information is accumulated in memory until the field is harvested.

Information on the exact labour used in particular operations in a field is then available and is useful to the estate manager.

Dr. Hill: I do not completely agree with you on these two points.

If you have one tractor on mowing and one on ploughing, both may be out for twelve hours and with your system would give the impression of having done the same amount of work, whereas the one ploughing would have done much harder work and used more fuel. The best method of ensuring maximum utilisation is by personal control, and inspection, which is why we have managers.

We use our diary also for cost control purposes and it is kept as a permanent record in the field office and is often referred to.

If information is withheld by having it stored in the computer the diary cannot be used for budget allocation of particular operations.