

DESIRABLE ATTRIBUTES OF  
COMPUTERISED FINANCIAL SYSTEMS  
FOR PROPERTY MANAGERS

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# AGRIBUSINESS & ECONOMICS RESEARCH UNIT

LINCOLN COLLEGE, CANTERBURY, NEW ZEALAND.



The Agribusiness and Economics Research Unit (AERU) operates from Lincoln College providing research expertise for a wide range of organisations concerned with production, processing, distribution, finance and marketing.

The AERU operates as a semi-commercial research agency. Research contracts are carried out for clients on a commercial basis and University research is supported by the AERU through sponsorship of postgraduate research programmes. Research clients include Government Departments, both within New Zealand and from other countries, international agencies, New Zealand companies and organisations, individuals and farmers. Research results are presented through private client reports, where this is required; and through the publication system operated by the AERU. Two publication series are supported: Research Reports and Discussion Papers.

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Founded as the Agricultural Economics Research Unit in 1962 from an annual grant provided by the Department of Scientific and Industrial Research (DSIR), the AERU has grown to become an independent, major source of business and economic research expertise. DSIR funding was discontinued in 1986 and from April 1987, in recognition of the development of a wider research activity in the agribusiness sector, the name of the organisation was changed to the Agribusiness and Economics Research Unit. General policy direction is provided by an AERU Review Committee which meets annually. An AERU Management Committee comprised of the Principal, the Professors of the two associated departments, and the AERU Director and Assistant Director administers the general Unit policy.

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## Preface

The introduction of improved management systems on farms is a key element of improved farm profitability. The use of conventional business management techniques involving management accounting and financial reporting and analysis is a requirement for future operation of New Zealand farms and businesses. The use of such techniques is enhanced by the effective incorporation of a computer based system into the day to day farming operation. Increasing numbers of New Zealand farmers are coming to the conclusion that such systems are necessary and that they can be handled efficiently by farmers.

This Discussion Paper describes the aspects of farm computing systems that should be explored by farmers in making a decision about the type of system which would best suit their needs and the type of operations they should consider exploring. The Discussion Paper concentrates mainly on the financial packages and the financial recording attributes which should be considered. These types of packages are the most frequently used by farmers and appear to yield the best value to farmers.

Dr Peter Nuthall and Mr Peter Oliver are the Head and Senior Research Officer, respectively, of the Kellogg Farm Management Unit at Lincoln College. This Unit has an ongoing development programme concentrating on the production of farmer business computer programmes. This Discussion Paper is drawn from a paper prepared by the authors for the Second Australian National Conference on Computers in Agriculture.

A C Zwart  
DIRECTOR



## SECTION 1

### INTRODUCTION

Most producers face a wide range of financial decision making problems and consequently can potentially make effective use of the many different computer based financial analysis packages available. Examples include transaction recording and analysis packages (e.g. Shanon and Robertson's Saltbush General Accounting System, the Kellogg Farm Management Unit's Financial Recording System), budgeting systems (e.g. Etherington, 1981; Nuthall, 1984; Mill and Longworth, 1975), whole property linear programming based decision models (e.g. Kletke et al, 1975), fertilizer application models (e.g. Ross, 1978), machinery decisions (e.g. Brown and Schoney, 1985) and payroll packages (of which there are a range available). Despite this wide range, however, most producers are primarily interested in financial recording and budgeting systems. This has been borne out by the many surveys of computer owning producers. For example, a recent survey of the Kellogg Farm Management Unit's newsletter readers showed the percentage of people with a computer using a package a 'great deal' or 'often' was:

Financial recording	98%
Financial budgeting	97%
Wordprocessing	78%
Production records	75%
Livestock records	72%
Feed budgeting	52%
Payroll	40%
Customer billing	17%

When asked the major reasons for using a computer, Oliver (1985) found computer users responded with "financial management" at the top of their list. These responses would be anticipated as ongoing decisions must be made in the financial management and cash flow forecasting areas whereas decisions on, for example, enterprise selection, machinery replacement, fertilizer levels and land purchase, all occur infrequently and are often more cost effectively handled using pencil and paper methods rather than through expensive on-farm computer packages. For these reasons, this paper concentrates on reviewing financial budgeting and recording.

Financial recording practices have always been of major interest. One of the first computerised systems was the mail-in accounting system operated by Michigan State University (see Eisgruber, 1975). These financial packages have flourished now that micro-computers are available despite the scepticism of the early critics (e.g. Hardaker and Anderson, 1981; Nuthall, 1982). The Michigan system actually commenced around 1975 using pencil and paper methods and was eventually computerised. The next major move was into linear programming systems around 1968 (see Candler, 1970; also Baker, 1970) but these systems have never proved to be popular. No doubt this has been partly due to attempting to use sophisticated systems before producers are familiar with basic recording packages. As micro-computers become more extensively used and managers that have had an early exposure to these management aid machines at school and tertiary levels move through the community, this situation may change, particularly as the software becomes easier to use. Indeed, the opportunities to provide significant assistance to managers through advanced software provides an exciting and challenging future for farm manage-



ment - computer professional teams. The era in which office management has a machine akin to equipment like tractors, milking and shearing machines is rapidly approaching.

With this in mind this paper contains a discussion on financial budgeting and recording systems with a view to providing the means to evaluate packages currently available. The comments made are based on many years experience of working with farmers and computers, and more latterly, the experience gained by members of the Kellogg Farm Management Unit based at Lincoln College. (The Unit's objective is to develop and support computer based management aids (supplied throughout Australasia).) Topics covered include the place of budgeting and recording in management, the requirements of good budgeting and financial recording packages, the need for integration between systems, the importance of proper support and education as well as the benefits attainable from using integrated packages. Comments are also offered on the development and maintenance of successful packages as well as the need for a consumer service. Finally some thoughts about the future form of financial packages are provided.

## SECTION 2

### MANAGEMENT AND FINANCIAL PACKAGES

In the non-certain environment in which primary production exists management must cope with a constantly changing set of resources resulting from variable and unpredictable weather, input requirements, variable physical production levels, variable prices and costs not to mention variations in the government laws and regulations which set the rules under which production must operate. Within modern society there are few parallels which are as complex or variable as agriculture. Traditionally management has operated using rules of thumb stemming from tried and tested production methods evolved by conservative managers that have managed to remain viable. With the ever increasing squeeze on profits together with the inherent variability it is becoming increasingly important to make the most effective use possible of the resources available. This means constant planning and re-planning. The much stressed cycle of

Planning ---> execution ---> control



must be the key to effective management. This procedure implies constant attention to the office side of property management.

Before the advent of affordable small business computers only lip service was paid to this dynamic cycle. The rules of thumb sufficed as it was simply not practicable on the one or two man property to keep all the records and carry out the constant re-budgeting necessary using pencil and paper methods. This has now changed.

In the most practical sense planning involves budgeting the alternative courses of action to choose the best (greatest attainment of the objective - which may in fact be survival rather than profit maximisation per se). This procedure not only must measure the value of the objective function but must also test the feasibility of the plan. Feasibility involves ensuring the supply of resources do not fall short of the demand at every point in time. Of particular concern is the liquid cash resource and consequently the monthly cash flow.

Once a plan is selected the execution phase of putting into effect the production and financial plans takes over. The printed 'financial budget' becomes the blueprint for all activity and indicates the tasks that must be performed each week. It also clearly indicates the overdraft accommodation required or, if cash surpluses exist, what short term investments must be taken out. Taxation plans might also need to be implemented as the budget forecasts indicate likely taxation commitments and the benefits possible from the various tax avoidance strategies.

As soon as a plan is implemented recording must start. This involves noting, in a suitable form for analysis, actual input, production and sales. Given the budget predictions it is possible to assess the effectiveness of the execution through comparisons of planned and actual outcomes. This starts the cycle off once again as questions must be asked about how both the technical and financial management can be improved and whether the plan's direction should be altered.

Furthermore, the constant variability means this planning-execution-control cycle must be repeatedly kept in motion. Computer packages facilitate this procedure through enabling updates of base budgets and cashflows with the minimum of effort thus assisting the execution phase through, for example, providing suitable reports for bankers. The control component must equally be simple and linked to the budgets for comparisons. Records should be collected in a suitable data base for a range of analyses and comparisons.

This description of the management process makes it clear the totality of the financial packages required for efficient and constantly updated management. While many specialist packages (e.g. for machinery replacement, fertilizer level assessment) can potentially be of use, the constantly varying conditions means the managers of primary production most frequently require financial budgeting (planning and execution) and financial recording systems (execution and control). These packages must be designed to aid the dynamic planning requirements but at the same time be as simple as possible with all extraneous and confusing statistical analysis removed. Computers can lead to masses of misleading information so the danger of clouding the real objectives must be constantly guarded against. This is only possible where a clear framework of the management process necessary is firmly held.

## SECTION 3

### DESIRABLE ATTRIBUTES IN FINANCIAL PACKAGES

#### 3.1 Introduction

The dynamic management cycle dictates the desirable features of financial management software. The packages must enable managers to efficiently perform this process with the minimum of hand operations and intellectual input. This section reviews the requirements of both financial budgeting and recording. Few comments are offered on the general requirements of packages - these have been reviewed many times in other papers (e.g. Nuthall, 1979; 1983; McGrann & Griffin, 1981; Rehman & Esslemont, 1981).

#### 3.2 Financial Budgeting

A complete package must enable comparisons of alternatives and the creation of cash flows. The degree of detail included must depend on the types of users. Professional 'budgeters' can often take many shortcuts thus relying on their experience to amalgamate detail into conglomerate categories. On the other hand, the infrequent budgeter requires much greater detail and direction to ensure the budget is realistic and complete. As most farmers fall into the latter category the packages developed by the Kellogg Farm Management Unit contain this detail.

Specific requirements can be divided into the six categories, of the form of data input, the coverage of this input, enterprise comparisons, required reports, cashflows and methods of update and use. Each of these categories is addressed in turn below:

- (i) Primary Information Input - the data requirement must be in the form available to the user, and grouped logically. This is sometimes difficult to achieve as every user will have a slightly different primary input. It may be necessary to change work flow patterns to accommodate a package as complete flexibility is not always possible. However, the user should be able to dictate at least the ordering of the input and also exclude items irrelevant to his particular situation. Furthermore, pre-calculations should not be required as this defeats one of the purposes of using a computer. Physical quantities and associated prices must be acceptable but at the same time totals must be capable of direct use as source documents may not show details. Flexibility is clearly the key.
- (ii) Items included - All possible income and expense items must be catered for. In that an almost infinite number of possibilities exist it is not possible to have a named category for each. Thus, packages must include room for user named categories. Furthermore, the number of different crops, paddocks, flocks, herds, employees, mortgages and so on must not be restrictive. In the KFMU package, for example, some 100 crops can be included, four different named flocks as well as four separate herds.

Non-farm items must be capable of inclusion as many properties are owner operated units in which the totality of the operation is the decision making unit. Equally as important is the inclusion of all capital and development items for the same reasons.

Because of the variation between properties the user must be able to bypass with ease all items of no relevance.

- (iii) Enterprise Comparisons - Besides the need to make whole farm system comparisons it is essential the package be capable of isolating the gross margin from embedded enterprises. Also of relevance is the ability to perform sensitivity analyses both for enterprise budgets and the complete property forecasts.
- (iv) Reports - Adequate printed and screen reports must be the key to a successful budgeting package. Most requirements will include:
  - (a) a one page financial statement summary.
  - (b) a one page physical report on, for example, crop production, animal numbers and their production.
  - (c) detailed multi-page reports of all input and output, both physical and financial, according to the user's requirements. These reports must include enterprise gross margin reports where required.
  - (d) appropriate cash flow forecasts (see next sub-section).
  - (e) key performance statistics and characteristics.

The one page summaries and the enterprise reports enable comparisons between alternatives whereas the detailed reports provide the basis for the execution phase of management (the blue prints). The one page reports, and possibly also the detailed reports, as well as the cash flow provide the documentation necessary for satisfying bankers. The taxation estimates also affect planning and financing matters.

The performance statistics must clearly include profit and cash surplus figures enabling a comparison of alternatives. Some producers will also be interested in various measures such as gross income per \$1000 labour costs, gross income per dry stock equivalent and so on. From a management point of view, however, many of these statistics are irrelevant as the primary criterion is the sustainable cash surplus for a given set of resources.

All reports should be obtainable both on the screen and printer though their form will be different due to the different size of the reporting medium.

- (v) Cashflow - A crucial component of any package must be the cashflow module. This enables an assessment of the cash feasibility of a plan and is the report by which funds are raised. The cashflow should be created from the annual forecast figures using the most appropriate means possible. This means the ability to take

each annual figure and obtain a monthly distribution through either

- (a) entering dollar values for each month,
- (b) entering a % of total for each month,
- (c) entering the requirement for an equal monthly division with the package doing the sums,
- (d) entering the requirement for a bi-monthly; tri-monthly, every 4 months, or every 6 months equal distribution as well as the starting month for the sequence so the package can automatically calculate the figures.

The distribution pattern should be stored for frequent use in the dynamic management process so when an annual figure is updated the cashflow can similarly be updated without the need for operator intervention.

Furthermore, the cashflow module should calculate overdraft interest, as well as interest earned on any surpluses where necessary, so providing a bottom line cumulative cash flow given the beginning of year balance and interest payments. The financial year chosen should, of course, be user selectable.

Note also that the cashflow created should be integrated with financial recording packages thus facilitating constantly updated comparisons between forecasts and actuality. This is the control phase of management.

In that many producers find very detailed budgeting impractical (due to the inherent uncertainties), it should be possible to relate consolidated financial records with budget estimates rather than be forced to use a simple one-to-one correspondence.

- (vi) Ease of Update and Use - for effective management the budget and cashflow must be simple to update and use. The major rationale for using a computer is the need for constant reviews and if these are not simple and convenient the exercise loses some of its value.

Any single item in the budget must be directly accessible and capable of alteration at any time. Such a change must automatically flow through to the cashflow estimate without operator interference. This probably means the package should be menu driven as well as providing the ability to bring up on the screen any single item through an item coding system. This facilitates moving from one unrelated item to another which is often the requirement when updating a budget.

Any number of budgets must be capable of storage on named files. This assists in the comparisons of alternative systems and the exploration of new possibilities. A base file must be capable of duplication enabling experimental changes and their evaluation. This whole procedure must be simple and error protected as much as possible. The ability to move backwards and forwards on any data entry screen, to exit at any point, to access help messages thus removing the need for constant reference to a manual, to prevent disk full errors, and make backup copies are all examples of facilities important for ease of use.

### 3.3 Financial Recording

#### 3.3.1 Introduction

Financial Recording Systems are undoubtedly the most important packages in the eyes of producers - they provide the key to using computers for management purposes as most producers start with a financial recording package and frequently use it for at least a year before attempting to integrate another package into their management. In a significant number of cases it is likely the move into additional packages will never in fact occur.

Financial recording involves entering details of all financial transactions and using the accumulated data to produce reports such as a running total of income and expenditure in a range of categories, comparisons of these totals with budgeted figures, enterprise profits and so on. A range of these packages are commercially available for most computers. Which package is most appropriate for each producer must clearly depend on a range of factors including features of the particular property, the producers objectives and abilities, the requirements of any associated accountants and consultants as well as the type of equipment available and the costs and support available. It is unlikely any one package is the best choice for all situations though some commentators would no doubt disagree with this statement. It is fair to note, however, that wherever possible the most comprehensive package available should be acquired as while all components might not be used initially computer users tend to obey a kind of Parkinsonian law which states that their demands will grow exponentially with increasing experience to the point where they require more than the package can provide.

Any package purchased must satisfy a number of general criteria such as consistency of procedures throughout, uncluttered and simple screen displays, opportunity to exit or backtrack at all points, ability to move directly from any one function to any other without the delay of hierarchical menus, and so on. Various other support type factors must also be examined. Examples are the quality of the manuals, the extent of guarantees offered and whether the package can be moved to another computer should this be necessary. It is also important to know how long a package has been in use and whether there are any other local users for support reasons. Nuthall (1983) discusses all these as well as other factors.

### 3.3.2 Requirements in a Financial Recording Package

In recent years a number of lists of the requirements have been published. Examples include Ross, (1983) and Anon (1985). The following list is an amalgam of these together with the features embodied in the KFMU's Financial Recording System and a consolidation of the many suggestions made by producers.

- (i) Cash control - the package must be capable of maintaining an updated forecast of the monthly cumulative cash position. This involves taking the 'actual cash to date' and combining this with updated budget figures for the remainder of the year together with the starting balance. Where several bank accounts are operated these must all be consolidated automatically into the one report. This constantly updated cash forecast enables re-assessments of borrowing as well as lending programmes, thus ensuring the interest bill is minimised, or maximised depending on the case. A knowledge that \$20,000 will be available for, say two months should be capitalised on. Oliver (1985) shows that one of the important benefits of a financial information system is the ability to carefully manage the cash situation.
- (ii) Planning Control - Comparisons between the actual income or expenditure compared with budget are essential to assess how the plan is progressing. This must be performed for each category of income and expenditure in each month, for cumulative year to date totals as well as for the whole year. The latter two allow for fluctuations as monthly budgets cannot be expected to be completely accurate. All these comparisons must be possible at any stage and for any category of income and/or expenditure.

The comparisons are the heart of the re-planning process. Discrepancies, both above and below targets, must be assessed and decisions made on any corrective action required. This then necessitates a budget and cashflow update. Note, however, that it may be optimal to accept a discrepancy and, equally, where no discrepancy exists, it may be prudent to alter the plan. The latter situation can occur where anticipated prices and/or costs and opportunities have changed since the initial budget was created.

- (iii) Taxation Control - careful assessments of potential income tax commitments can provide significant tax savings through utilisation of tax minimisation strategies. Minimisation of any pre-payments is of crucial importance. Where these opportunities exist the package must provide a continuously updated estimate of taxable income. This requires a distinction between taxable and non-taxable items, both in the record of actual transactions as well as the budget, and thus provide updated tax commitment estimates through using the 'actual-to-date' figures combined with the 'remainder-of-the-year' budget figures (which will have been constantly updated).

To assess alternative tax strategies the package should also provide forecasts of the actual tax commitment through holding details of the tax rates and any personal circumstances relevant to tax calculations. However, as tax laws are often complex, consultations with trained tax consultants are usually desirable.



Where tax laws require special records and reports to be produced the package should accommodate these requirements. An example is sales tax (in New Zealand and Britain, Goods and Services Tax). For income tax form filing, and working with accountants, it is usually essential for the package to produce ledger accounts containing full details of every transaction (to enable proper checking and verifications), and trial balances. Profit and loss statements, and balance sheets, can also be useful but not essential as the ledger accounts provide the base data.

If the package is used as the basic source of accounting information it should undoubtedly be based on a double entry system. This ensures accuracy through providing constant checks against bank statements and other asset and liability accounts. Indeed, the extra work associated with a double entry system is so minimal in correctly designed packages that it is doubtful whether single entry systems have a significant place.

- (iv) Enterprise Analysis - the past is the only source of information for future decision making. To improve efficiency the package must be capable of searching through the data base of past transactions to provide factual information on the total return and/or cost associated with a particular profit or cost centre. This is exemplified in the enterprise profit reports showing which enterprises contributed most to the whole property profit. Equally as important is the ability to isolate all costs associated with an activity (e.g. cultivation costs). While future prices and costs are unlikely to exactly repeat themselves, the historic enterprise reports can be modified to provide an estimate of future returns. The cost centre reports enable an assessment of technical efficiency - for example cultivation costs per hectare can be compared with costs on similar properties as well as against alternative methods such as the use of contractors or chemical based systems.

As each property will have different enterprise and cost centres the package must be configurable for any situation, with income and/or expenditure categories either automatically allocated, allocable under some circumstances, or never allocated. Furthermore as expenditure frequently occurs before the acquired resource is actually allocated to an enterprise (e.g. a bulk supply of items like fertilizer, insecticides and weedicides) the system must allow suspense account arrangements which record the cash flow when it occurs and then enable a re-allocation at a later date.

- (v) Physical Quantity Reports - As the physical quantity associated with many transactions (e.g. tonnes of fertilizer, number of lambs, kgs. of clover seed, tonnes of wheat, kgs. of wool...) provides useful management information in many situations the package should be capable of recording this information.

The quantity data enables estimating such items as the average price per unit sold or purchased over a defined period, the current stock on hand of a commodity (e.g. number of ewes at the start of the year less sales plus purchases), the total wheat production sold from a grouping of paddocks and so on.

For future cash flow budgeting and general planning purposes it is also important to know the pattern of physical flows each month. A knowledge of how many lambs were sold each month over the last few years forms a basis for predicting likely future flows. These reports on stock and production numbers are also useful for filling out statistics forms.

Physical quantity reports should also include stock control. Where animals are involved automatic ageing from one class to another is an important requirement.

- (vi) Debtors and Creditors - While many users will be content to rely on a simple cash basis system there are also many with a requirement for accrual systems together with records of what is owed, to whom it is owed, as well as the reverse for debtors. Some will also require the production of invoices for debtors records together with information on payment histories for both debtors and creditors. For full debtors - creditors systems files of names and addresses of the second parties will be necessary.

Where non-cash transactions are recorded it is important that reports with and without accrued transactions are obtainable to allow cash assessments compared with the committed situations. When the cash actually flows for a debtor or creditor the system should allow an automatic transfer of the transaction from the non-cash to the cash category. Furthermore, part payments must be allowable as these often occur. Effectively, direct journal entries must be possible.

- (vii) Asset and Liability Registers - to enable a constant assessment of net worth as well as a record of assets and liabilities the package must allow for asset and liability accounts as well as the revenue and expense categories. Preferably, both market value valuations as well as tax law valuations should be recordable thus allowing both management and tax reports to be prepared. Stock value assessments is an example of the need for both market value and tax value reports.

As assets are purchased and sold these should automatically update the registers. Similarly for liabilities. Depreciation should also be calculated where a full accounting system is required. However, there is nothing to prevent depreciation being calculated outside the bounds of the package and then entered as a non-cash journal entry. Also, a package which allows the automatic assessment of loan commitments can be of benefit.

- (viii) Office Management - Frequently many frustrating hours are spent maintaining the paper side of the financial affairs of any business. A financial package should assist in this regard in as many areas as possible.

Searching records to check whether in fact an account was paid, calculating the total wages paid to a casual employee between two dates are examples. This means the package must search on a range and combination of items such as cheque numbers, invoice numbers, transaction description, date and so on. If the package can accept standard descriptions this both reduces data entry time as well as facilitating searches.

The ability to keep track of several bank accounts and consequently obtain bank reconciliations is also important for checking purposes. Other checking requirements include lists of creditors and debtors as well as automatic stock control systems to enable keeping track of current stock levels (e.g. fertilizer, fruit in a cool store, nursery stock).

There is also the cheque writing facility. While many producers will find hand writing of cheques convenient others will obtain benefit from the computer system performing this task. Where this occurs extra files of suppliers and creditors must be kept enabling the cheque contents to be quickly defined. When the cheque is printed the data should automatically flow through to the central data base. Cheques for invoices and statements containing several different items must also be possible.

- (ix) Payroll - while most primary producers are not faced with payroll calculation problems there are cases, particularly on horticultural properties, where a payroll package would be useful. This package should enable keeping all the relevant records about each employee together with current tax rates and allowances. The end result must be the calculations of the weekly wages after all relevant deductions have been made together with the printing out of all the necessary pay slips and tax reconciliations. Of crucial importance is that the data is transferred to the financial data base without having to be re-entered as a separate transaction. As individual employee records do not need recording both in the payroll module as well as the main financial package the data transferred will need to be consolidated, but without losing any enterprise detail required.
- (x) Ease of Use and Flexibility - Man is inherently lazy with an aversion to reading manuals. If the full benefits of the package are to be realised it must be relatively simple to use and totally flexible. Every property situation is slightly different so the package must be user configurable to become taylor made for each property. This is important as there is nothing more frustrating than only achieving eighty percent of the requirements.

There are many factors associated with ease of use and flexibility. Some of the more important are included in the following list:

- (a) menu as well as function code driven,
- (b) the number of accounts should be variable, the form of account codes should be selected by the user, and the names of accounts user chosen,
- (c) budget items (as against cash transaction accounts mentioned in (a)) should be definable by the user with the number of accounts not being restricted to the number of transaction accounts (usually require less with several transaction accounts totaling into one budget account for comparisons)
- (d) the ability to add, delete and change accounts at any stage. Also, the ability to change the values stored.

- (e) the data input procedure must comply with the form the data is available. As the data entry routines are the key to ensuring accuracy and completeness they should contain features such as the ability to immediately change any entry, confirmation of entries (e.g. if entering an account code the name is immediately displayed), ability to repeat entries except for one or two changes (e.g. for several 'transactions' on one cheque), automatic checks on whether a code exists, prevent exiting if a balance is incorrect, display sub-totals and bank balances as data entry proceeds.
- (f) single transactions must be allocable to several accounts for amalgamated bills,
- (g) reports must be obtainable at any time and be simple to comprehend. This means graphs and pie-charts can be useful.
- (h) the user can control when the month and year ends (and back-tracking is possible) and end of year procedures of clearing out accounts and transferring asset and liability totals should be automatic. This also involves updating the cashflow from one year to the next with suitable percentage increases.
- (i) any number of banks can be allowed for and these given user entered names,
- (j) units of measure for physical quantities under user control.
- (k) automatic data file backups on closedown after new data has been entered.

No doubt each user can think of other considerations as well. One will undoubtedly be the quality of the manual.

- (xi) Comparative Analysis and Trend Statements - many producers enjoy comparing their performance statistics with those of other similar properties. In these cases the package should clearly produce the required figures. As the requirements will vary a desirable feature is a report writer allowing the user to define the types of non-standard reports required. Basic measures that should always be included where asset and liability records are included are the percentage return on equity and capital invested as well as net worth statements. Also of value are debt servicing ratios such as the debt per hectare or dry stock equivalent (i.e. per productive unit). There is in fact no end to the number of statistics that can be calculated but care must be taken to ensure the real objectives are kept in mind.

Once several years records have been collected trend statements become important to clearly highlight changes that are occurring. Questions about whether the trends are desirable must then be asked. To obtain these statements the package must obviously allow past data records to be kept through archiving files and disks rather than relying on using the same data disk all the time.



## SECTION 4

### INTEGRATION

For simplicity and ease of use packages must be integrated wherever possible. A transaction entered into the data base must be available to all reporting modules. This is particularly important when linking budgeting to recording. The budgeting package creates the cashflow and this must be transferable to the financial recording package to enable the all important budget - actual comparisons. Many packages do in fact include a budget cash flow entry facility but usually this must be pre-calculated (item by item, month by month) using pencil and paper. If a computer facility is available it would seem logical to use it for entering the basic physical and price information and leaving the machine to calculate the cash flow which can then be transferred to the financial recording system.

In linking a budgeting routine to a financial package it is obviously necessary to have flexibility - the budgeted categories may be quite different from those to be recorded so a 'correspondence' needs to be definable which maps one to the other.

To indicate what is meant by integration within a financial package a good example is the sale of stock - one entry should update the sale of stock account, update the relevant bank balance, update the stock enterprise account, update the actual cash flow, and finally update the inventory of stock numbers. Integration also refers to the ability to move values from one account to another. An example occurs when a suspense account is used to hold an expense before the associated resource is allocated to enterprises - reversals are used as the resource is used and allocated accordingly. The total cash situation is not affected but the enterprise reports are.

Integration can, of course, be carried too far for the sake of a single entry. When, for example, production activities are recorded these may in fact occur before any associated cash flow and, furthermore, the unit of activity (e.g. cultivating a paddock) might be quite different from the unit of cash flow. In this latter case it may be easier to record the activities or actions quite separately and accept that some overlapping of data entry occurs. The complexities of integration may defeat the purpose of saving time.

Wherever possible financial packages that produce files accessible by wordprocessing, spreadsheet and general data base packages are preferable. This facility enables integration of the data into reports and additional analysis. Also of relevance is whether the structure of the files is available to accountants so their account formatting packages can access the data without the need for re-entry.



## SECTION 5

### SUPPORT REQUIRED

The most sophisticated and capable package is of little use if the operator does not understand its use and, crucially, how to make effective use of the information provided. Training in property management principles, in simple accounting ideas and in the use of packages and computers are all equally essential. These ideas are widely accepted and have been stressed for many years (e.g. Nuthall, 1979) but seldom get sufficient attention.

The actual support required will, of course, depend on the complexity, and consequently, the capability of each package. Producers without the background to understand simple accounting systems, the development of a chart of accounts and associated budgets should not contemplate using complex packages. Such people may need to consider whether a computer can in fact be used with value in their circumstances.

General education on management principles and simple accounting must come from community education programmes with support from local extension groups. However, package manuals should also contain the rudiments of these areas as should any associated training packages, tapes and or disks. New users of systems frequently move too quickly into a package and expect immediate results. In reality this is not always possible and time spent on learning a package and, most importantly, carefully working out the best way to set it up will have a longer term pay off. Support procedures must assist in all these aspects.

Where a choice exists between two similar packages the selection should clearly be based on the package with local support. This counts for many saved hours and probably also increased efficiency of use. Local support can often consist of other users as a co-operative approach can lead to immediate solutions. Special workshops of experienced users led by a management expert are crucial to the ongoing growth in the efficient use of packages - their existence should be checked out when choosing a package.

Group exercises lead to many new ideas and ways of using management software.





## SECTION 6

### DEVELOPMENT AND MAINTENANCE

The important questions in the development and maintenance of management software have been covered by many authors (e.g. McGrann et al 1981, Nuthall 1983). Rather than repeat these messages at length a few summary points will be made.

It must be stressed that the development of sophisticated, competent and relatively fool proof software requires an extremely professional approach and considerable resources. Furthermore, development is never finished in that as soon as the basic system is complete maintenance starts and must always continue. The more producers that start using a package the more demands for slight variations, improvements and bug corrections occur. If a package is to survive all the common demands must eventually be met.

To stress the complex and totally time consuming nature of software development and maintenance consider the large number of programs that have been developed around the world in universities, colleges and farm kitchens that live for a year or so and then quietly disappear (e.g. Moncrieff (1980) reviews lack of use of mainframe systems). Their failure to develop is often due to the lack of maintenance though the all important support and marketing are also factors.

Efficient maintenance requires a regular procedure for contacting software users to determine their problems and suggestions. Of course, these ideas must be assessed against good management practice as often what seems a good idea to a farmer when first asked to make suggestions suddenly loses its use when it is actually implemented. Thus, careful planning of new modules and alterations is required.

Use of data base packages and spreadsheets (see Moncrieff (1983) for a review of the use of spreadsheet software in farm management) enables the rapid and more reliable development of 'packages' but where tailor made, sophisticated and relatively foolproof systems are required it is almost essential to use less constraining high level languages. Of course, the most efficient and less constraining, though not necessarily faster, code is produced through use of assembler but the time cost involved is prohibitive for primary production packages where the market is restricted compared with general business systems.

As packages become more sophisticated and flexible, testing the code becomes a crucial element of the development and maintenance procedure. The perfect answer to this difficulty is yet to be found as even the giants of the software industry occasionally release packages with bugs. Clearly, however, as much effort as possible must be devoted to a testing routine which involves careful structuring of the test procedure as well as a tiered operation involving, initially, the analyst who created the code, secondly, specially trained testers and, finally, co-operating field users. If it is remembered that competent budgeting and financial packages can have as many as 20-30 integrated programs each, the enormity of the testing task becomes apparent.

The ongoing problem of keeping manuals up-to-date must also be recognised. This task must be performed by specialists in written communication - not by the package developers. Finally, the fact that hardware is always changing and improving must also influence maintenance - the systems must grow with the available hardware and provisions for transferring accumulated data made.

## SECTION 7

### BENEFITS FROM USING FINANCIAL PACKAGES

There is a marked lack of conclusive evidence on the marginal benefits of using a computer and financial packages. The difficult nature of evaluating the value of non-specific data means this situation will continue for some time. Surveys of producers (e.g. Oliver, 1985; Kirby and Rehman, 1983) indicate they, the users, believe the benefits result from a greater awareness of potential opportunities and problems as well as a sharper approach to management generally. General observation would confirm these comments in that the process of budgeting, recording and analysis stimulates the operator to question all activities with a much more critical approach than previously.

In a general sense Oliver (1985) found farmers in Australia and New Zealand ranked the reasons for using a computer as:

- financial management
- faster more reliable information system
- easier record keeping
- more enjoyment of management
- management of physical resources
- family benefits
- time savings
- increased income
- hobby interest
- reduced expenses.

As expected, financial management is at the top of the list but also worthy of note are the mentioning of family benefits and hobby interests. The real question is whether these non-profit uses are a way of justifying the expense involved or whether they are bonuses over and above a profitable investment. Oliver found 70% of the computer users surveyed believed the returns probably covered the costs involved (and 13% said it was too early to tell). When asked to put a value on the benefits some 18% of the 183 respondents were prepared to answer - this averaged at \$4858. Other questions indicated they believed the return consisted of \$2691 (23% answered) tax savings and \$1040 (26% answered) additional interest earned. (Also note that 65% believed the computer was of 'considerable use', or better, for credit control, 55% made the same comment for forecasting taxable income and 68% said the same for comparing actual outcomes with the budget). These figures are, of course, opinions rather than facts. The next step in getting more substantial data must be before and after surveys of comparable properties. It will also be important to conduct detailed case studies to obtain an in-depth understanding of why producers believe they are obtaining benefits. Equally as important will be studies of producers that have acquired a computer but have never really made effective use of it. Are these cases mainly due to lack of training or support? Or are they operators without the inherent ability to use sophisticated equipment? Can tests be devised to prevent this situation occurring?

Despite the existence of some failures the success stories are in the majority by far. The Kellogg Unit maintains contact with all users of its software and statements such as 'for my purposes the program is brilliant' are quite common and provide the positive feed back necessary to continue developing increasingly more competent systems.

The other approach to assessing the benefits of packages is to use simulation studies. Two examples are Debertin et al (1975) and Oliver (1985). Debertin et al simulated the management process using a computer model of a property. Two groups of decision makers, one with feedback and research information, and the other without, used the model to simulate the decision process to see which group received the greatest return. The group with information earned an extra \$7000/year over a five year simulation period. Oliver, on the other hand, used two linear programming models, one with feedback information similar to the kind of financial data a financial package would provide, the other without, to simulate the management process and found the gains to information were in the order of \$1500 per annum. The difference in the results from these two models will be partly due to the simplifying assumptions in the linear programming model and the differences in the size of the property used.

Clearly the benefits will depend very much on the attributes of each individual case and factors such as the manager's objectives and abilities as well as the size of the unit must all be important. The data that has been obtained so far, however, indicates there is every prospect that the number of financial packages on farm computers will continue to grow as positive benefits are being obtained. Despite this, potential investors should be aware that the benefits often take a year or so to eventuate. Moving into computerised systems should be carefully planned with due allowance given to the time it takes to evolve and learn new systems. Regular data entry and analysis sessions should be structured into the property management plans rather than the traditional 'book work when nothing else is pressing' kind of attitude.

## SECTION 8

### A CONSUMER SERVICE

One of the major problems faced by potential users of financial software is the choice between the packages offered (having selected a package the type of computer should, of course, follow). The only real way to assess the alternatives is by spending several months using each in a real situation. However this is clearly impractical in most situations. Consequently choice usually depends on finding what appears to be an acceptable, rather than a best, system; what other people in the area are using; and which system is being promoted by the local computer agent. None of these reasons will necessarily lead to the best choice. Indeed, it is likely the best known systems will be the packages that have had the most promotion rather than necessarily the ones most likely to serve the producer's needs.

To overcome this problem there is a real need for an independent evaluation group with a brief to produce detailed assessments and tests of the software available. This operation would be akin to the product consumer services available in many parts of the world which thoroughly test and report on consumer items. The nearest approach to this idea in existence currently are the Computer Institutes in the U.S.A. (see Schmidt, 1981).

Any evaluation service should recognise the different requirements of a range of typical property situations and consequently set up lists of desirable features for each case. Packages submitted by developers could then be assessed against the requirements and reports produced summarising the results. The many other features of a package (ease of use, backup systems, manual completeness, training support and so on) should also be addressed thus providing a comprehensive report. Clearly, the personnel involved would need to be well versed in applied and theoretical farm management as well as computer use. They would also need to maintain a continuing contact with samples of the users of all packages to assess factors such as on-farm problems, support received, update and maintenance procedures and the like.

A basic consumer facility for the whole of Australasia would require three to four people though more could be used to advantage. As software requirements are very similar throughout the region a single group is all that is necessary, giving some economies of size.

While the benefits would be received by producers, the innovative nature of computers in primary production means the service would initially need to be funded from state funds from throughout the region. Once the numbers of computer users has increased some of the cost should then be borne by the people directly benefiting from the service. A consumer service joining fee plus a cost for the reports received would be one possibility. Corporate bodies and libraries should also be eligible to join.

As with most testing authorities, standard procedures would need setting up. Evaluation criteria proposed should be submitted to software suppliers to ensure all the categories they believe are important are in fact included. Equally as important, after the report has been prepared the suppliers should again be requested to make comments. Any suggestions thought to be relevant should be incorporated into the report and the remainder printed in a section for "software suppliers' additional comments".

To ensure producers' views and requirements are constantly kept to the fore the criteria and reports should also be submitted to a panel of leading producers for similar vetting. This procedure approaches as closely as possible objectivity and guards against a tendency to look for systems with academic merit in contrast to an emphasis on practical systems designed for the producer.

At the same time as testing for practicability the consumer service should be involved in limited research activities to foster the personnels' awareness of likely advances. This background facilitates a farsighted review of package updates and encourages reports with a view to the future. These reports can also stimulate software producers to make useful changes.

For positive action to occur in this consumer service area it will be necessary for two or three individuals to put together a concrete proposal and seek support. For success this group should probably come from a State Department of Agriculture in that they have traditionally operated as extension agencies with objectivity as their goal. There is clearly a real challenge here for an enthusiastic and enterprising person.

## SECTION 9

### THE FUTURE

The future must be seen in terms of both a longer run worsening terms of trade for primary producers and a rapidly changing electronic technology and associated software. The worsening economic situation means an increasing need for a professional approach to management and the concomitant use of micro-computers and financial packages to facilitate improved planning, execution and control. The improving technology must mean easier to use computer systems that can achieve increasingly effective business management.

How far and how quickly computer based financial management will penetrate will depend on the extent of the economic necessity to use improved systems together with the attitudes that evolve. There is evidence that bankers are increasingly demanding well prepared financial statements and that accountants are supporting this trend (e.g. see Anon, 1984), particularly as inadequate and poorly presented financial records can lead to worsening economic situations being recognised too late (Bagnall & Aukes, 1985) for corrective action.

As it will take some time for computer education to penetrate the community and, furthermore, as many farmers do not, and will not, have the background necessary to enter data and effectively operate packages, professionals will have an increased input to the office management tasks in these cases. This is a team approach view which relies on the expertise of the specialist. In the past the accountant, lawyer and consultant have been in this category but a shift will occur with travelling secretaries, consultants and the banks and financiers becoming increasingly involved. Accountants, however, will also offer support to farmers who are capable of doing their own computer work through training courses and direct assistance. They will see the necessity to shift some of their work away from straight book-keeping in order to maintain their position as an important component of the farmers' support team.

As technology improves there will be a move to networked systems with automatic banking procedures becoming increasingly important. Rather than re-enter transaction detail, point of sale data capture is likely to enter a central data base system giving rise to all the necessary funds flow and documentation and eventually down loading to the producer's micro-computer for use in on-farm management. These procedures will require some standardisation enabling the automatic transfer of data. Improved technology will also facilitate on-farm data capture through improved software and voice recognition systems.

Those farmers with micros will probably not use other than basic management packages. These packages will be increasingly integrated but even so the time and expertise required to operate the various simulation packages available for assisting with the infrequently made decisions will mean farmers will seek help from specialists through networked systems. These integrated networks will also provide data for budgeting purposes and be used for marketing and goods purchase uses.



To aid all these developments research on farmers' decision making processes will be important, as will studies of the best methods of introducing farmers to financial management on computers. An example of the kind of case study work required is provided by Lenne et al (1983). Of more long term significance, however, is the need to work on financial management 'expert systems'. Successful farmers, and consultants, need to be carefully studied to determine whether their procedures and methods can be mimicked on a computer and therefore made available to many more producers. Whether the success achieved with expert systems in the medical diagnostic area can be repeated needs to be carefully examined.

## SECTION 10

### CONCLUDING COMMENTS

From a producers' point of view probably the most significant conclusion is the need for the development of a software evaluation unit. This unit would overcome many of the untenable selection problems and act as a major stimulus to improved systems.

This unit should pay particular attention to financial packages as these will undoubtedly be the most important from both a demand point of view as well as for efficiency reasons. Special attention should also be placed on sophisticated and capable budgeting packages which are linked to the recording systems. The linkages must be automatic, but flexible, and enable fully integrated planning, execution and control within the dynamic environment faced by managers of primary production.

It should be noted that not only will linked budgeting and recording packages be the most popular but they will also be the major systems used by most producers. The time input required to fully learn and utilise the benefits available from such comprehensive packages will preclude the wide use of other packages. The exceptions will be producers with very special interests in other areas, an example being detailed stud stock production data recording.

As users will find keeping abreast with one integrated system is quite demanding this package should perform all their general planning and financial requirements.

While some producers will use spreadsheets and data base systems to develop their own financial systems, increasingly farmers will resort to using specialist packages as the benefits of programs designed to perform a specific task will be significant.

These packages will be produced by professional groups that have the large resource backing necessary to develop capable and comprehensive software. With the limited market size, the number of successful groups in the longer run will be limited.

The specialist packages provided may never appear as professional from presentation and convenience points of view compared to general purpose programs. Being designed for the Australasian market the potential volume is insufficient to support very large design and programming teams which are possible where the businessmen of the entire English speaking world are potential users. Despite this, the packages available will increasingly provide a framework for a marked improvement in the efficiency with which farmer's scarce resources are used, and they will certainly do this in a sound and robust manner.



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