13

The Computer and Farm Management

OBJECTIVES

- **To eliminate a few misconceptions about the computer.**
- **To give reasons why the use of a computer at farm level has become necessary.**
- **To give an overall explanation of the operation and components of a computer system.**
- **To explain the uses (application) of a computer in farm management.**
- **To discuss four methods of using the computer at farm level and to compare the pros and cons of a computer bureau service as apposed to the ownership of one's own computer system.**
- **To explain and elucidate with practical examples application programs for farm management purposes.**
- **To analyse the six steps in buying a computer.**

As became apparent in earlier chapters, the gathering and analysis of information are an important key to a successful farming enterprise. With the information explosion of the past decade the farmer has also had to double his efforts to gather the *correct* information *rationally* and analyse it *logically*. As a result of the difficult economic times faced by farmers, more rather than less information is necessary to survive financially. It is in this information context that the computer has a role to play.

Initially computer development was in the field of large and expensive mainframe computers which only the big, moneyed institutions could afford. Use of the computer in agriculture was therefore limited to agricultural state departments, control boards, cooperatives and similar institutions. Technological development and the introduction of the powerful, simple and relatively cheaper microcomputer changed the situation, bringing this aid within reach of the individual farmer.

An obstacle in this development process was that few, if any, farming programs were available for use as an aid at farm level. Moreover, farmers were reluctant to accept the computer and it was mainly individuals or smaller companies who entered the field of developing and marketing farming programs, resulting in a relatively slow development. Today, however, suitable farming software is available in South Africa and much has been achieved in the process of development. The question the farmer now has to answer is no longer whether the computer can be used on the farm, but rather whether he should buy one himself. He must also decide between different programs and between different types of computers.

Little published information is available in South Africa about these matters. The next three sections will therefore pay special attention to these *three* questions. It must, however, be borne in mind that computer science is developing very rapidly, which means that information on programs, types of computers, application methods and techniques will soon become obsolete. In addition to this, computers have only been used on the farm for a relatively short period (at most three to four years), making it difficult to assess the actual benefits of a computer on the farm. Despite these two shortcomings, the full potential of computer use in farm management will only be realised if the currently available knowledge and experience are shared.

MISCONCEPTIONS ABOUT THE COMPUTER

Before discussing the computer and its functions, it is important to clarify some erroneous ideas or misconceptions about the use of computers in the farming context. The first of these is that the computer is a substitute for a farm information system. A second is that the computer as such is important, and a third concerns the fact that only some people can use a computer. A fourth wrong idea is that the purchasing process starts with the choice of the type of computer.

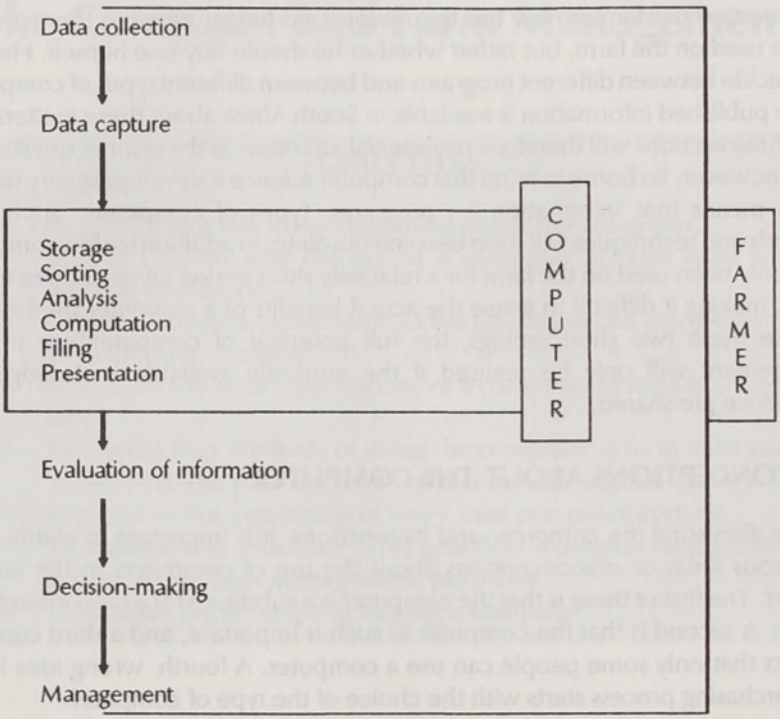
The computer as substitute for a farm information system

If a farmer who has no information system thinks that a computer will solve his problems or simplify matters, he is wrong. The contrary rather holds true: the use of the computer as management information aid must be supported by a sound and systematic administrative system. In fact, most farmers find that the introduction of a computer system means that initially they have to spend more time on record-keeping and have to do more paperwork than before.

Every enterprise should have an information system. In simple terms this means the gathering of unprocessed data (figures and facts), its capture and processing into useful information and in a format that will be of use to the farmer in the management of his enterprise. In this system or process the role of the computer

is mainly restricted to the processing and presentation of the information as shown in figure 13.1

Figure 13.1 The role of the computer in data processing, decision-making and management



It is evident from figure 13.1 that the collection, capturing and evaluation of information remains the responsibility of the farmer and that without these no true information system can exist. It is also clear that the computer cannot do anything unless it is supplied with data. This is one of the reasons why the information or record systems of many farmers fail, namely the lack of *updating the essential day-to-day data*. This naturally does not imply that the daily data must be entered on a day-to-day basis, but that the data must be collected and eventually be included in the record system.

The question may well be asked: what is its use if the computer cannot replace a farmer's record system? The advantage of using a computer in record-keeping is that it compels the farmer to work systematically and that the data stored in the

computer can be used for a variety of purposes. It facilitates calculations and can produce reports as required. Timely decisions are possible, thereby improving management.

The magical powers of the computer

Many people still regard the computer as some or other mysterious invention with extraordinary powers. The computer as such is nothing but a piece of equipment like a typewriter. The computer cannot think, argue, make decisions or solve problems. At best it can only make more reliable information available sooner, thereby making it possible to make better decisions.

The computer therefore does not take over the creative or analytical thought processes of the farmer, but offers him more facts to consider and more time to pay attention to these facts. It is therefore obvious that the importance of the computer lies in its use, not in the computer itself.

Only certain people can use a computer

One often hears it said that "I am too old for a computer" or "only some people were born to work with computers". This would imply that only some — especially younger — people are capable of being trained as computer users. This is far from the truth. Any person who is willing and has the perseverance can be trained to use the computer in a relatively short time. It requires no special temperament, expertise with figures, intelligence or precision, as is evident from the fact that clerks, typists, professors, pupils, housewives, businessmen, architects, researchers and children are equally competent in the use of computers. This does not, however, mean that they are all systems analysts or programmers, but it does prove that computer operators need not design systems or write programs themselves. All that is required is the will to master new techniques, the time to do so, and the discipline related thereto. Regarding the latter aspect, it is necessary to be aware of the fact that the computer demands a certain method and discipline because a user cannot vary the set procedure at will. There are good reasons for this, just as there are good reasons why traffic regulations apply to the motorist.

Deciding on the type of computer

When considering the purchase of a computer, one of the first questions is: What type of computer? This should, in fact, not be the first, but the last in a series of questions to be answered. What a farmer must ask himself are the following:

- What is wrong with my present information system?

- Can I supply the necessary data for the computer program and do I have the time to do so?
- Can I use more, and more comprehensive, information meaningfully in my enterprise?
- What are my specific information needs?
- Which program (software) will best serve my information needs?
- What computer (hardware) is necessary to operate the chosen program?

These aspects will be dealt with more fully in the section on the buying of a computer.

Let us now deal with a few reasons for the use of computers in farm management and give an explanation of computer software.

A FEW REASONS FOR THE USE OF COMPUTERS IN FARM MANAGEMENT

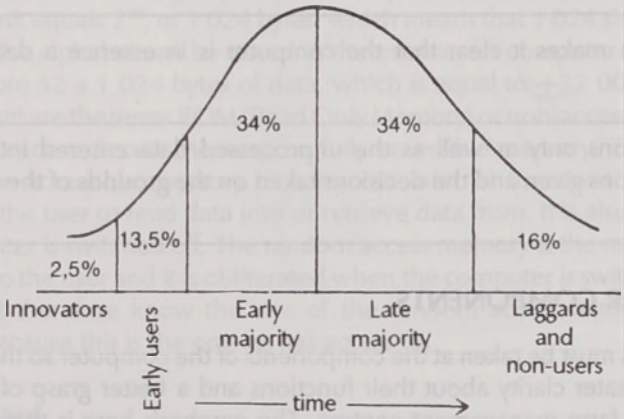
The management of a modern farming enterprise has become more complicated over the past few years, rather than easier. This is due to increasing production costs, high inflation and interest rates, dwindling markets, natural disasters, lower productivity of natural resources and an increase in knowledge, information and options. The modern farmer must therefore, while considering lower profit margins, make technical, physical and financial decisions that hold far-reaching implications for his enterprise. In this respect the farmer is both assisted and confused by the wealth of secondary information available to him on the one hand, while on the other he is hampered by a lack of primary information concerning his own enterprise. In the process of data collection and decision-making, the computer is a powerful farm management aid and the reasons for using it in the farming context can be summarised as follows:

- *Increase of information and complexity of calculations:* The amount of data required by a farmer for rational decisions, increases daily. This data (primary and secondary) must be transformed into meaningful, useful information for decision-making and the techniques for doing this are becoming increasingly complicated and refined.
- *Rate of change and innovations:* There are literally daily changes in markets, prices, interest rates and technology in the farming situation. Such changes and innovations demand rapid calculations and even faster decision-making.
- *Dwindling number of farmers and bigger farming units:* The number of farmers in the RSA continues to decline. The result is that farming units are becoming bigger, which results in more complex management problems and more data to process. More demands are also made on management time,

while the administrative load increases more than proportionately. This situation together with the fact that bigger enterprises can make full use of the computer, justify the capital invested in a computer system.

- *Growing expertise and easy acceptance:* As farmers, particularly the younger generation, innovators and opinion-makers become more conversant with and skilled in computer use, the rate of acceptance of computers among farmers will increase. The rate does, however, depend on several factors, but should basically assume the same pattern as Rogers' acceptance curve (figure 13.2). Observations indicate that technological development takes at least 20 years to filter through to the different groups of the farming population (as illustrated), but there are signs that this period is becoming shorter.

Figure 13.2 Acceptance curve for new developments*



* Everett Rogers, as illustrated in Kurtz,D.L. & Boone, L.E., *Marketing*, New York:Dryden Press, 1982, p.235.

HOW A COMPUTER WORKS

As already mentioned in a previous section, the computer has no magic powers, but it is a time-saver and a convenience. In this respect the computer, seen functionally, is an aid like a combine harvester, a washing machine and a car. It can compile a cow's feed ration, file a library's volume names, design a car or play a game of chess. However, to do all these things, different computer programs are used. Such a program is nothing but a recipe according to which the computer handles the data and is very similar to the cooking recipes used by housewives. The same ingredients (data) are converted into different forms in the same stove

(the computer), depending on the specific recipe used — the program therefore determines the result. Schematically the function of a computer can be depicted as follows:

Figures 13.3 Functioning of a computer

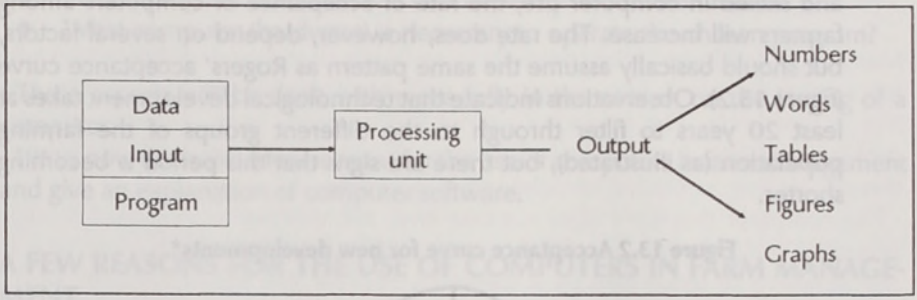


Figure 13.3 makes it clear that the computer is in essence a data processing machine.

> It functions only as well as the unprocessed data entered into it, the instructions given and the decisions taken on the grounds of the information.

COMPUTER COMPONENTS

A closer look must be taken at the components of the computer so that the farmer can have greater clarity about their functions and a better grasp of its potential value in the farm management context. The emphasis here is therefore on the so-called hardware which is represented by the visible, tangible components. Examples of these components are shown in figure 13.4 and consist of the following:

- The *computer* itself, also called the central processing unit (CPU).
- The *keyboard* which is used to feed unprocessed data and instructions into the computer.
- The *monitor* or screen (visual display unit (VDU)) on which numbers, words, symbols and graphs are presented.
- The *printer* which can print on paper that which appears on the monitor.
- The *disks* or external memory sources on which information and instructions are stored.
- The *disk drive* which rotates the disks.

The central processing unit

The central processing unit is in reality the brain of the computer. Here the calculations are made and the logical activities are carried out. It consists of microprocessors which in turn consist of small silicon chips with a very large number of connections that are linked together for the processing of data. The main memory is usually also housed in the central processing unit and programs and data from the external memory sources (disks) are fed into this.

The internal function of a computer is not important here — suffice it to say that computer sizes are measured in memory capacities, for example 32K, 64K, etc., and a 16-bit computer can potentially process faster than an 8-bit computer.

A bit is the smallest unit of data that a computer can handle and a combination of eight bits forms one byte. A byte is used to represent a single character (a number or a letter), while the memory capacity of a computer is expressed in K bytes. Every K memory unit equals 2^{10}, or 1 024 bytes, which means that 1 024 single numbers or letters of the alphabet can be stored in the memory. A computer with 32K can therefore store 32 x 1 024 bytes of data, which is equal to $\pm$32 000 characters. Also important are the terms ROM (Read Only Memory) or non-accessible memory and RAM (Random Access Memory) or fully accessible memory. The computer uses the non-accessible memory to carry out internal functions and it is not available to the user to read data into or retrieve data from. It is also not blanked if the computer is switched off. The random access memory is the memory which is available to the user and it is obliterated when the computer is switched off. The farmer must therefore know the size of the random access K-memory of the computer because this is the one he has access to.

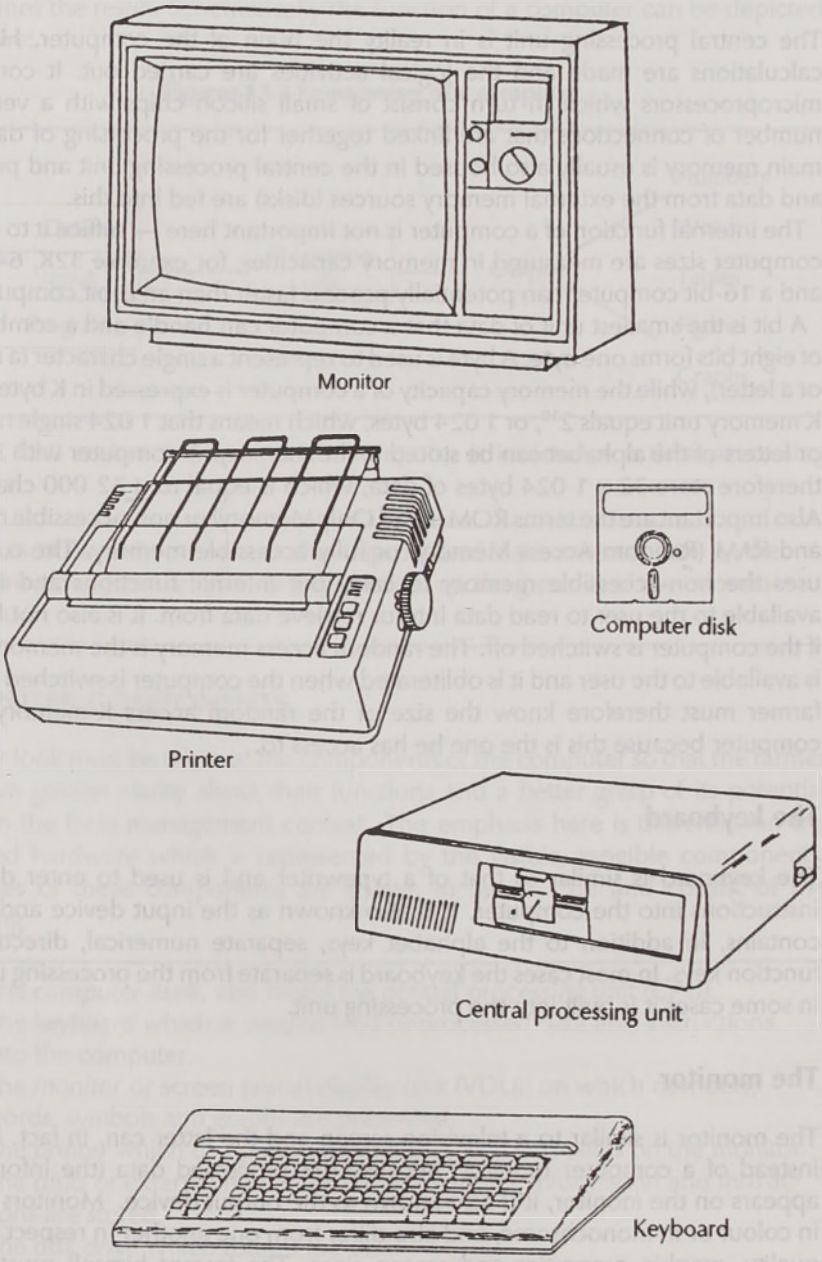
The keyboard

The keyboard is similar to that of a typewriter and is used to enter data and instructions into the computer. It is also known as the input device and usually contains, in addition to the alphabet keys, separate numerical, direction and function keys. In most cases the keyboard is separate from the processing unit, but in some cases it is built into the processing unit.

The monitor

The monitor is similar to a television screen and the latter can, in fact, be used instead of a computer monitor. Because the processed data (the information) appears on the monitor, it is also known as the output device. Monitors may be in colour or in monochrome, and also differ from one another in respect of letter quality, graphic properties and screen sizes. The farmer himself must decide

Figure 13.4 Computer components



whether graphic representations are essential and what his preferences are in terms of colour and other properties.

The printer

The market now offers a wide variety of printers that differ in respect of letter quality, forms, printing speed and paper widths. Here the farmer must be guided by his own taste and preferences. The printer must, however, be able to print graphs if graphic representations are required and paper widths must be adaptable to program requirements.

Disk drives and disks

The disk drive is the apparatus that drives or rotates the computer disk. The disk may be made of a hard, rigid substance or a flexible one. Data and information are stored on disks on basically the same principle as sound is stored on a sound cassette. By putting the disk in the disk drive, the number, words and instructions that are stored on the disk can be retrieved and read into the processing unit. A hard disk rotates faster than a floppy disk and although more data can be stored on a hard disk, such a hard disk can usually not be removed. Floppy disks store less information, but because it can be removed and floppy disks are relatively cheap, more floppy disks can be used. Disk capacity is expressed in bytes and a 360K disk can store 360 000 single letters or numbers.

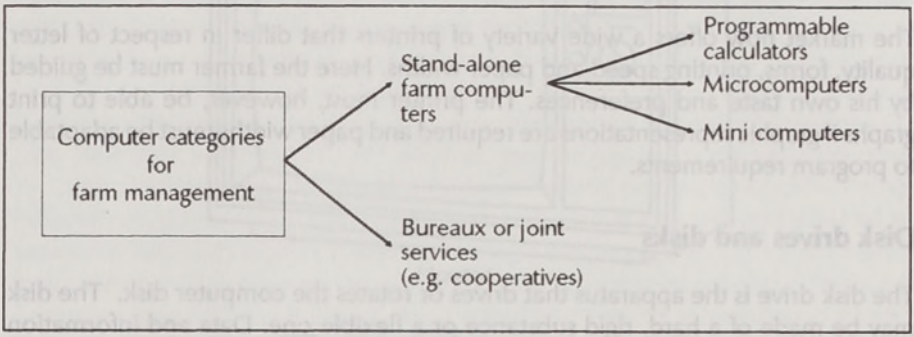
For farming purposes a double-disk drive is usually preferred. With such a drive the program instructions and data are read into the computer on one disk, while the farmer's own information is stored on the second disk. If large amounts of data have to be stored, as in the case of livestock programs, the big farmer might find it a nuisance to constantly change disks and a hard disk should be considered. The advantages of floppy disks are that they are relatively cheaper, are easy to transport and can be used on a similar computer away from the farm. It is also simple and cheap to make duplicates. A drawback is that floppy disks are easily damaged and that they become technically obsolete after prolonged use.

COMPUTER CATEGORIES FOR USE IN FARM MANAGEMENT

It is not always desirable or meaningful to divide computers into different groups because smaller computers, with the expansion of memory capacity, can be upgraded to large and powerful computers. In addition to this, different computers can be linked together and it is possible to create an extensive computer network by linking different computers together. The various possibilities mentioned above will not be taken into consideration for the purpose of this discussion. A simple

schematic explanation of computer categories for farm management purposes will suffice.

Figure 13.5 Computer categories for farm management purposes



Computer development today is most spectacular in the field of the microcomputer, and it seems as if the 'home computer revolution' is an established fact. Reasons for this are that hardware is becoming relatively cheaper and that a wide range of software is freely available at low prices. A shortcoming of the microcomputer system is that up to now programs have not been interchangeable between the different machines. Developments in this regard have, however, progressed far and programs that are interchangeable between different machines (with or without further adjustments) already exist and are becoming more readily available.

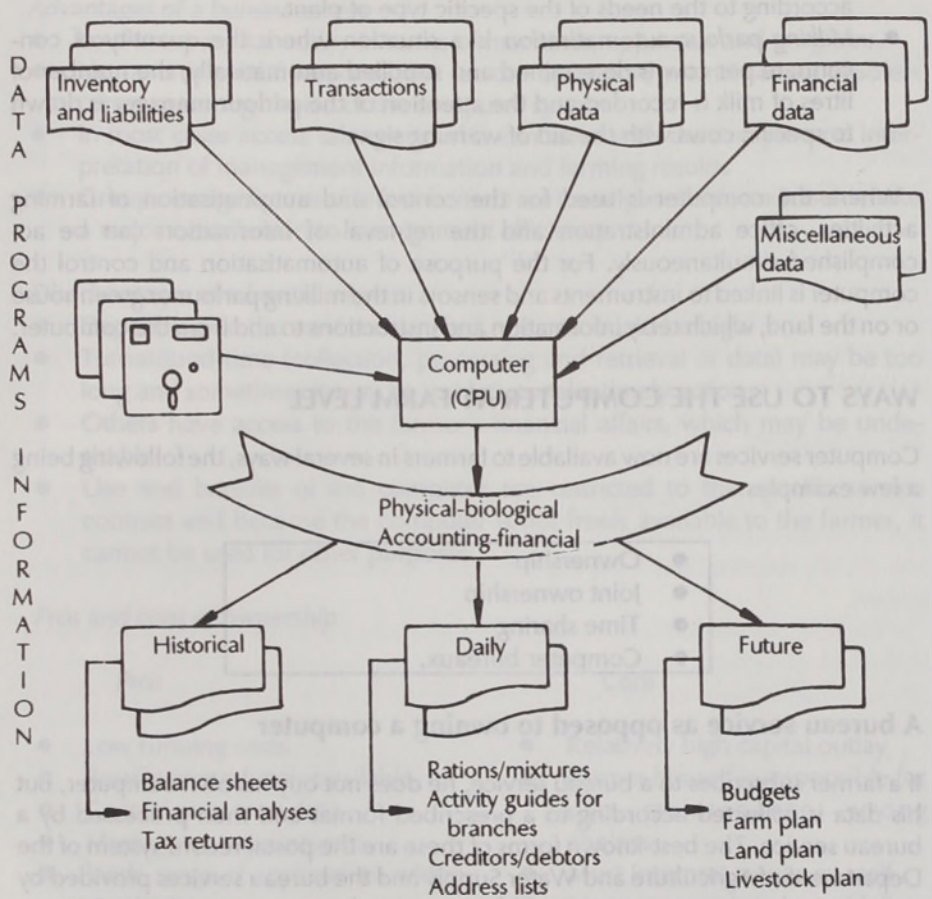
The microcomputer can also be adapted to function with both standard and tailor-made programs. It can also be linked up with central computer networks provided that communication between the two is possible. A further advantage of the microcomputer is that it is relatively simple to use, something that was made possible by easily-understandible manuals, menus and short training courses.

COMPUTER USES IN FARM MANAGEMENT

The most important uses of computers in farm management are to collect data, store data/information, retrieve, analyse and process data and to display the results. The decision-maker is therefore able to make better decisions by using this information. Computer information can be used as *historic data, daily activity guides and future-planning models*. Moreover, the collected data can be processed into *physical-biological* or *financial accounting* reports.

Schematically, the use of the computer for purposes of *farm management information* can be presented according to a system flow chart like that in figure 13.6.

Figure 13.6 Computer uses for farm management information



Besides the above applications, the computer can also be used for *office administration* and *farm automatisation*. In the case of *office administration*, the computer could be used as a typewriter, filing system and a word processor for preparing and processing letters, documents, cheques, envelopes, etc. In the case

of *farm automatisation,* the computer can be used for irrigation control, greenhouse control and milking parlour activities.

- Computerised *irrigation control* entails the monitoring and regulation of irrigation times, quantity of water, fertiliser applications and spraying activities.
- *Greenhouse control* means that the computer is used to adjust and control the humidity,light intensity, temperature, wind speed or other variables according to the needs of the specific type of plant.
- *Milking parlour automatisation* is a situation where the quantity of concentrate per cow is determined and supplied automatically, the number of litres of milk is recorded and the attention of the parlour manager is drawn to specific cows with the aid of warning signals.

Where the computer is used for the control and automatisation of farming activities, office administration and the retrieval of information can be accomplished simultaneously. For the purpose of automatisation and control the computer is linked to instruments and sensors in the milking parlour or greenhouse or on the land, which relay information and instructions to and from the computer.

WAYS TO USE THE COMPUTER AT FARM LEVEL

Computer services are now available to farmers in several ways, the following being a few examples:

- Ownership
- Joint ownership
- Time sharing
- Computer bureaux.

A bureau service as opposed to owning a computer

If a farmer subscribes to a bureau service, he does not buy his own computer, but his data is collected according to a prescribed format and then processed by a bureau service. The best-known forms of these are the postal record system of the Department of Agriculture and Water Supply and the bureau services provided by some agricultural cooperatives. In addition to this, bureau services in the RSA are provided by accountants, private agricultural consultants, veterinarians, groups of farmers and specialised organisations such as the Sugar-cane Growers' Association.

Most farmers in the Republic are faced with the choice of buying a computer or joining a bureau service. As in most agricultural situations, this choice depends on

the farmer's individual circumstances, preferences, skills and personality. For example, a farmer who has neither the time nor the temperament to operate his own computer system will probably derive more benefit from a bureau service than one who likes to do things himself and can find the time to do it. With these individual differences in mind, the following pros and cons of a bureau service as opposed to an own computer system can be summarised as follows:

Advantages of a bureau service

- Low or no capital outlay in terms of machines, apparatus and programs.
- No or only partial responsibility for the operation, maintenance, obsolescence or wrong choice of the computer system.
- In most cases access to experts who can assist with the analysis and interpretation of management information and farming results.
- Group average figures of fellow farmers are usually available and could make a major contribution to management efficiency.

Disadvantages of a bureau service

- Depending on the services required, the cost could be high.
- Turnaround time (collection, processing and retrieval of data) may be too long and sometimes it may be too late to take timely action.
- Others have access to the farmer's financial affairs, which may be undesirable.
- Use and benefits of the computer are restricted to the specific service contract and because the computer is not freely available to the farmer, it cannot be used for other purposes.

Pros and cons of ownership

Pros	*Cons*
• Low running costs	• Relatively high capital outlay
• Results immediately available	• Farmer himself is responsible for use, maintenance, wrong choices
• Control over own data	• Must interpret results oneself
• Meets own requirements	• No comparative figures of fellow farmers.
• Wide range of applications within enterprise	
• Multipurpose, e.g. for use in home, educational programs and for typing facilities.	

A farmer who wants to enjoy the benefits of both methods may naturally join a bureau service and also buy his own computer. The logical step would then be to have the bureau deal with the accounting and financial side of the farming enterprise while a smaller computer is used for the day-to-day farming activities. Examples of the latter uses are: *physical/biological reports* (labour records, land, crop, livestock and vehicle reports), *office administration* (word processing, typing facilities and address lists), *planning decisions* (partial budgets ['what if'], cost analyses and branch comparisons) and domestic and educational uses.

Joint ownership

Joint ownership of a computer in the farming context means that two or more farmers (usually a study group) jointly own a computer. The computer can be housed at the home of one of the members, or in a central office. The computer is then operated by one of the group members, each member separately or by a paid employee on behalf of the group. Experience has shown the latter to be the most successful in the long term. Joint operation by members individually is usually only an interim solution until each has acquired his own computer. It does, however, offer a valuable opportunity to gain experience and helps to reduce wrong choices.

Time sharing

Time sharing is closely related to joint ownership, but differs in that the user is not a joint owner of the computer system. He only buys computer time and is therefore not directly responsible for the maintenance, modification or improvement of the system.

In the RSA organised time sharing is still relatively inaccessible to farmers owing to the lack of network systems with which the farmer can link up. In the USA there are national or regional networks such as those of universities and a few private institutions with which farmers can link up.

A network can function in two ways. According to the first the farmer can retrieve only information such as weather and market reports and disease identification from the system, while in the second he can use the network for the calculation and processing of his own information. The latter is, however, expensive and at present not economically feasible, except in special instances where the farmer's system can be linked inexpensively to the mainframe system.

SOFTWARE

The computer as such, with a memory and input and output mechanisms, is of no use to the farmer without the necessary software. Because it is physically visible,

the hardware is relatively easy to understand, but software is not physically visible and therefore more difficult to grasp.

This is further complicated by the fact that there are basically two main types of software which can in some instances be subdivided further. The two types of software are:

- The operating system; and
- The applications software.

The operating system

The operating system activates and controls the internal functioning of the computer. It arranges the retrieval of data and instructions from the disks and displays the information on the monitor or on paper. The operating system is usually bought with the computer and therefore already forms part of the system. Unfortunately different brands of computers use different operating systems with the result that a program developed for a specific operating system cannot be used on all makes of computer. Examples of operating systems are MS-DOS for IBM-type computers, CPM for computers with Z80-processors and Apple-DOS for Apple processors.

It is important for the farmer to know that different operating systems exist. He must therefore make sure that the specific computer's operating system can handle the specific program.

Applications software

More important to the farmer than the operating system, is the choice of applications software. *Applications software or programs, are the orders and instructions given to the computer which allow it to carry out certain tasks and functions with the assistance of its operating system.* Just as figures are keyed into a manual calculator and the plus symbol(+) is used to add the figures, the computer must also be given instructions about the tasks to be carried out. These instructions are usually laid out on a disk and can be read into the memory of the computer by means of a disk drive. The farmer can then supply the data, upon which the necessary processing and tasks will be carried out according to the program instructions. A wide range of programs is now available and can be bought. There are basically two main types of software, namely multipurpose and single-purpose software.

Multipurpose program

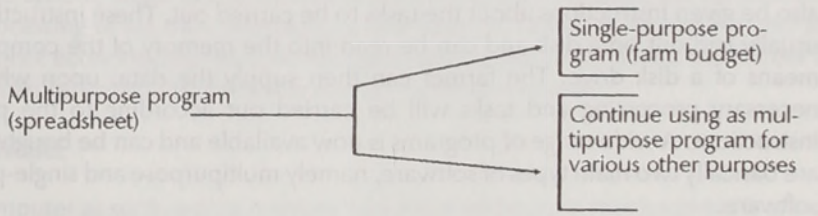
As the name indicates, multipurpose software is a group of programs that can be used for more than one purpose within or outside the farming enterprise. These programs find wide application with owners of microcomputers because they offer scope for making own applications within the framework of the program. Multipurpose programs usually have good users' manuals and if these instructions are followed, it is easy to use the program as such, or to develop "tailor-made" (single-purpose) programs.

Examples of some multipurpose programs are summarised in table 13.1.

Table 13.1 Examples, descriptions and some trade names of popular multipurpose programs

Type	Description	Trade names
Spreadsheet	Consists of rows and columns with formulae and can be used for a variety of calculations and projections	Multiplan Visi Calc Super Calc Lotus 1,2,3
Data base	An extensive filing system that is used for record-keeping, reports, sorting and grouping information	D-base PC File
Word processing program	An extensive typewriter by means of which written material can be edited, amended and stored	Easy Writer Write-One Word-Star
Accounting program	Used for book-keeping, processing of income and balance sheets,etc.	Home-Accountant

Because a multipurpose program can be used to develop an own single-purpose program, it enables the farmer to use a spreadsheet for example, to design his own farm budget which he can copy and use repeatedly. He therefore creates an individual single-purpose program (utility program) from a multipurpose program. Schematically the process can be illustrated as follows:



Single-purpose program

Single-purpose programs were developed for a specific use or purpose. Examples of these are dairy, pig and stockfeed programs. Single-purpose programs can be further subdivided into standard and individual single-purpose programs.

A standard single-purpose program — briefly called a standard program — can be bought. It has a complete users' manual to make it accessible to a variety of farmers, for example all pig or all dairy farmers. In most cases standard programs can, at extra cost, be adjusted to the circumstances of an individual farmer(s). If such adjustments result in drastic changes in the program, the end result could be regarded as an individual program. Examples of standard single-purpose programs are given in table 13.2.

Table 13.2 Examples of standard single-purpose programs

Type	Description and uses
Accounting-financial program	Is used for daily commercial transactions (ledger accounts) by means of which branch analyses, lists of creditors, farm income and balance sheets can be created.
Dairy farming	Data on cows, calves, bulls, milkings, etc., are read in and the program supplies information on cows, milk production per lactation, progeny performance.
Land/cultivating budgets	Land sizes, soil compositions, fertilisation recommendations, etc., are read in and the expected potential profit or loss per land or crop is projected.

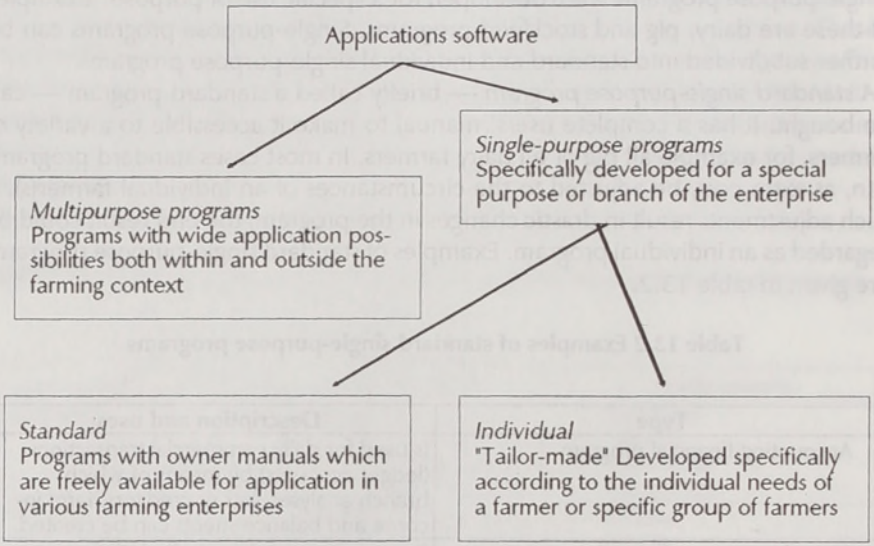
As the name indicates, an *individual single-purpose program* is one developed for use by a farmer(s) for a specific need. Such programs are known as being "tailor-made".

The above explanation of applications software for the farming enterprise can also be illustrated by means of a schematic presentation as in figure 13.7.

STEPS IN PURCHASING A COMPUTER (SHOULD THE FARMER BUY A COMPUTER?)

One of the first questions asked when buying a computer, is: what type of computer should I buy? This is not the first, but rather the last question in a series of six questions that should be considered. The six questions, which can also be regarded as six logical steps in the process of buying a computer, are on p 326:

Figure 13.7 Simplified explanation of applications software for farm management purposes



Steps in purchasing a computer

1. What is wrong with the farmer's present information system?
2. Is the farmer able and willing to supply the data necessary for a computer system?
3. Can the farmer interpret and meaningfully implement the vast amount of detailled information offered by a computer in his enterprise?
4. What are the farmer's specific needs in respect of a computer system?
5. Which programs will supply in the farmer's needs?
6. What is the most suitable type of computer that will meet these requirements?

What is wrong with the farmer's present system?

Before buying a computer system, the farmer must first examine his present information system to determine its shortcomings and whether a computer will eliminate these shortcomings. In many cases the shortcomings are due to a farmer's tardiness to supply data, in which case a computer system will certainly not offer a solution to his problems.

Is the farmer able and willing to supply the necessary data?

A second question a farmer must ask himself is whether he has the ability to supply more detailed data. To make the best use of a computer system, especially for record-keeping, the farmer must supply as much detail data as possible. Experience indicates that farmers who do not follow sound administrative procedures prior to computerisation experience problems with computerisation.

Regarding the supply of data, there are, in fact, two aspects to be borne in mind. The *first* concerns the procedure and system required to supply the data, while the *second* concerns the farmer's willingness, sacrifice and dedication to collect the necessary data on an ongoing basis and make them available timeously.

For example, a computer system that makes provision for fuel costs for different types of vehicles cannot be utilised fully if —

- the procedure and system of monitoring fuel consumption per type of vehicle is inadequate; or
- the data on litres of fuel, hours worked, etc., is not regularly recorded and entered into the computer.

Similarly, it would be futile to buy a minimum-cost feeding program if the farmer cannot supply information about the composition and cost of different fodder crops.

Can the large amount of information offered by the computer system be interpreted and used meaningfully in the enterprise?

A third matter that must be considered when buying a computer system is the utilisation of the more comprehensive information that is made available to the farmer. Again there are two considerations, namely:

- Does the farmer have the expertise to analyse the information properly and to draw logical conclusions?
- Does the size and nature of the farming operation justify more information?

Regarding the former aspect, the farmer must bear in mind that computer programs for use in farming were compiled and developed by a variety of persons. These programs therefore differ from one another as regards terminology, cost compositions, calculation procedures and reporting. In many instances the programs differ to such an extent that the farming profit or loss figures of two programs are not directly comparable. The farmer must therefore ensure that he buys a program which is reconcilable with established accounting, farm management and agricultural economic analyses.

Moreover, the farmer should be able to interpret the computer printouts correctly. Farmers who do not have the expertise should consult someone who does, and attend courses in this regard. Institutions and individuals who could be of assistance

here are agricultural economists, farm management consultants, agricultural cooperatives, universities, etc.

The second aspect involved in the availability of information, is the value and usefulness of more information. Some enterprises are too small, too extensive or too simple to justify investment in an expensive computer system. A computer system is only justified if it will facilitate operations and ultimately lead to increased profitability. The farmer must therefore ask himself whether the more detailed information provided by the computer will make any meaningful contribution to the efficiency and profitability of his enterprise. However, most South African enterprises are already so big and diversified that the computer can be economically justified, and, as the numbers of farmers continue to decline, computerisation will be increasingly justified.

What are the farmer's information needs and what other uses does he have for the computer?

If the farmer is satisfied that more information could make a meaningful contribution to his enterprise, he should define his information needs as exactly as possible. Although this is no simple task and there is also no fixed formula that can be used, there is no sense in buying a computer simply "to keep records". The farmer should ask himself which physical and financial records he wants and what other uses he has for the computer — such as address lists and budgets. In short, the farmer must identify what he wants to achieve with his computer as precisely as possible. To do this, he will have to do some research and gather information from fellow farmers, computer firms, agricultural cooperatives and others. Once the farmer knows what the computer is capable of doing, he must identify his information needs according to table 13.3 (p 329), analyse them and arrange them in order of priority.

In table 13.3 the information needs of the enterprise are identified while other possible uses for the computer are explained in table 13.4 (p 330). While completing both tables the farmer must not concentrate on *present needs* only, but *future farming needs* must also be taken into account.

Which program will best supply in the farmer's needs?

In the previous section the farmer examined the application possibilities of the computer in his own farming enterprise and in this way determined his information and use needs. Now he must evaluate and acquire software that will fulfill his specific needs.

Three approaches can be followed. The *first* is to use multipurpose programs such as a spreadsheet or data base program to develop his own individual

Table 13.3 Determining the information requirements of a farming enterprise

1	2			3			4			5
Reports	How important are the following reports for the farming enterprise?			How often is such a report required?			Will the report have a major effect on the profitability			Order of priority on the basis of column 2 to 4
	Very important	Imporant	Useful	Monthly	Quarterly	Annually	Definitely	Probably	No	
Financial reports										
Transaction statement										
List of creditors										
List of debtors										
Cash-flow projection										
Income statement										
Balance sheet										
Tax statement										
Branch analyses										
Machinery cost analyses										
Asset register/depreciation schedule										
Crop/land budget										
Livestock budget										
Wage sheet										
Physical reports										
Fodder rations										
Land records										
Livestock records										
Irrigation schedules										
Inventory										
Market report										

Table 13.4 Additional applications of a farm computer system

Uses	I			II
	Relative order of importance: 1 (very important) to 5 (unimportant)			Overall order of priority
	Present application	Immediate future 2 - 3 years	Further future 4 - 5 years	1 (very important) 5 (unimportant)
Word processing				
Recording of data				
Address lists				
Educational				
Recreation				
Milking parlour automation				
Greenhouse control				
Irrigation schedules and control				
Mapping				
Graphs				
Activity lists				
Cheque processing				
Wage packets with coin analyses				
Linkage with network, eg. Beltel				

programs. Although this method has much merit, it is not recommended where a comprehensive computer system is the ultimate objective or where the farmer is not that familiar with the possible uses and operation of the multipurpose program. Moreover, the farmer must have some knowledge of accounting and farming analysis to create a meaningful and logical program; he must also have enough time to devote to this activity.

The greatest advantage of a self-developed program is that it is adapted to the farmer's specific situation and he knows exactly what the program entails. Such knowledge gives him confidence in the program and offers him the scope to amend and extend it as the need arises.

The *second* approach that can be followed is closely related to the first, but differs in that the farmer enters into a contract with a computer firm to do the development work. This method has advantages, but is relatively expensive and could take a long time to complete.

A *third* approach is to use standard single-purpose programs. Although these programs are not tailor-made to the farmer's own needs, most offer the scope to adapt them at a price. This type of program was developed to meet the requirements of a variety of enterprises and the farmer must ask himself if the extent to which the program satisfies his own needs is adequate. In most cases this will be the case and the farmer, as he becomes more conversant with the computer, can develop his own auxiliary individual utility programs.

Whether the farmer decides to develop his own programs or buy standard programs, the question of program evaluation remains a moot point for the following reasons:

- A wide range of single-purpose applications software already exists in the RSA, and new ones are added regularly;
- It usually takes time to evaluate a program thoroughly; in most cases this can only be done after a one-year cycle;
- Adjustments and changes may be added either before or after buying the program to obviate obvious shortcomings;
- Programs that appear to be relatively simple might well have been developed for a specific market segment of farmers (enterprises); and
- What is a "good" program for one farmer or a specific enterprise, may well be a "poor" program for another, depending on the farmer's needs, knowledge and scope of application.

The above gives an indication of the problems experienced with program evaluation and for this reason the following general procedures are suggested for the farmer when he sets out to make his own evaluation:

- Obtain as much information as possible about readily available programs. (Contact cooperatives, the Department of Agriculture, universities, colleges, marketers and fellow farmers who own computers.)
- Determine whether the program can accomplish that for which there is a specific need. If the farmer needs monthly branch analyses and he can supply the data, the program must be able to do the analyses or it does not meet the primary requirement.
- Evaluate the users' manuals. Without a good users' manual, a computer program has little value.
- Determine the degree of complexity of the program. Here it is important to consult experts and current users. Try to borrow time from a current user to become familiar with the way the program works.
- Compile a list of the minimum requirements with which the program must comply, for example:

Requirements	*Available*	
Monthly transaction statement	Yes	No
Monthly list of creditors	Yes	No
Annual income statement for		
— management	Yes	No
— tax	Yes	No
Double entry system, etc.	Yes	No

- Is program training provided and, if yes, according to what method and at what cost?
- On what basis and at what cost are program maintenance and improvements effected?
- How reliable is the supplier?
  - — Where is the supplier's nearest office?
  - — How long has the supplier been actively involved in program development and marketing?
  - — What is the depth of the supplier in terms of knowledge, experience and continuity?
- What is the price of the program and how does quality compare with price?

By following the above procedures the farmer can compile a list according to which both the program and the supplier can be assessed and compared with other suppliers.

This process takes time and in some cases the program can only be evaluated after a full cycle of use. *However, choosing the right program remains a decisive factor when buying a computer system* which is why a lot of time and trouble should be spent on it. Once a certain program has been chosen and the enterprise organised accordingly, it is difficult to replace it with a completely new program.

Which computer is the most suitable?

The sixth and final step in the computer-buying process is the choice of the computer itself. If the preceding steps were duly considered and assessed, the farmer should by this time have certainty about the size of the computer, the operating system required and other technical details such as the printer, monitor and disk drive required. If the farmer knows which software he is going to use, he also basically knows which computer facilities are needed to operate the program. The choice of the specific make or size of computer does, however, remain difficult, and to assist the farmer in making this decision, the following factors are offered for consideration:

- If a farmer wants to wait until the best or cheapest computer has been developed, he will probably never buy one. The same applies to his tractor, car or combine: improved types and models do not cause the old ones to fall into disuse.
- Buy a computer with enough capacity or good potential for extension. A general rule is that use of the computer doubles from the expected uses for which it was initially bought, within two years.
- Buy a reliable and well-known trade mark that can handle the general operating systems and programs. Consult experts in the field on this.
- Look at what fellow farmers in the immediate vicinity are using and also consider the recommendations and information given by the local agricultural cooperative.
- Buy from a dealer who will provide good service and maintenance.

Final remarks on buying a computer

From the above it is evident that the logical order when buying a computer does not start with the type of computer, but with the needs of the specific farmer. Then the farmer determines which programs will fulfil his needs and what type of computer is needed to operate the programs. However, a question that remains unanswered is how and from what source a farmer can gather more information about computers. Brief reference was made to this in previous sections, but more details are justified:

- *Computer courses:* Universities, technikons, agricultural cooperatives and computer firms present short courses on computers and software from time to time.
- *Seminars/farmers' days':* Because computerisation at farm level is a comparatively new development, seminars and farmers' days dealing with computerisation are held from time to time.
- *Agricultural shows:* If the farmer already knows what he is looking for, computer firms exhibiting at agricultural shows could supply valuable information.
- *User groups:* One of the quickest and best ways to obtain information about computers is to join user groups or to initiate such a group.
- *Publications:* Publications on computer uses in the farming enterprise are available from various libraries and bookshops and could also be a source of information.

SUMMARY

Computerisation at farm level is still in its infancy and much remains to be learnt. There is, however, already proof that the computer as a management aid has

numerous uses on the farm. Farmers mainly use standard single-purpose programs, but some have already developed successful individual programs. This process is, however, time consuming and if the farmer does not have the time to do it himself, it would be better for him to determine his needs for computerisation and to buy a computer with programs that will provide in his specific needs.

Annexure: Interest Tables

Table 1.1 The future value of R1 invested at compound interest*

$(1 + i)^n$

Rate/Period (i)

(n)	1%	2%	3%	4%	5%
1	1.0100	1.0200	1.0300	1.0400	1.0500
2	1.0201	1.0404	1.0609	1.0816	1.1025
3	1.0303	1.0612	1.0927	1.1249	1.1576
4	1.0406	1.0824	1.1255	1.1699	1.2155
5	1.0510	1.1041	1.1593	1.2167	1.2763
6	1.0615	1.1262	1.1941	1.2653	1.3401
7	1.0721	1.1487	1.2299	1.3159	1.4071
8	1.0829	1.1717	1.2668	1.3686	1.4775
9	1.0937	1.1951	1.3048	1.4233	1.5513
10	1.1046	1.2190	1.3439	1.4802	1.6289
11	1.1157	1.2434	1.3842	1.5395	1.7103
12	1.1268	1.2682	1.4258	1.6010	1.7959
13	1.1381	1.2936	1.4685	1.6651	1.8856
14	1.1495	1.3195	1.5126	1.7317	1.9799
15	1.1610	1.3459	1.5580	1.8009	2.0789
16	1.1726	1.3728	1.6047	1.8730	2.1829
17	1.1843	1.4002	1.6528	1.9479	2.2920
18	1.1961	1.4282	1.7024	2.0258	2.4066
19	1.2081	1.4568	1.7535	2.1068	2.5270
20	1.2202	1.4859	1.8061	2.1911	2.6533
21	1.2324	1.5157	1.8603	2.2788	2.7860
22	1.2447	1.5460	1.9161	2.3699	2.9253
23	1.2572	1.5769	1.9736	2.4647	3.0715
24	1.2697	1.6084	2.0328	2.5633	3.2251
25	1.2824	1.6406	2.0938	2.6658	3.3864

* How R1 will grow with compound interest

Table 1.2 The future value of R1 invested at compound interest*

$(1 + i)^n$

Rate/Period (i)

(n)	6%	7%	8%	9%	10%
1	1.0600	1.0700	1.0800	1.0900	1.1000
2	1.1236	1.1449	1.1664	1.1881	1.2100
3	1.1910	1.2250	1.2597	1.2950	1.3310
4	1.2625	1.3108	1.3605	1.4116	1.4641
5	1.3382	1.4026	1.4693	1.5386	1.6105
6	1.4185	1.5007	1.5869	1.6771	1.7716
7	1.5036	1.6058	1.7138	1.8280	1.9487
8	1.5938	1.7182	1.8509	1.9926	2.1436
9	1.6895	1.8385	1.9990	2.1719	2.3579
10	1.7908	1.9672	2.1589	2.3674	2.5937
11	1.8983	2.1049	2.3316	2.5804	2.8531
12	2.0122	2.2522	2.5182	2.8127	3.1384
13	2.1329	2.4098	2.7196	3.0658	3.4523
14	2.2609	2.5785	2.9372	3.3417	3.7975
15	2.3966	2.7590	3.1722	3.6425	4.1772
16	2.5404	2.9522	3.4259	3.9703	4.5950
17	2.6928	3.1588	3.7000	4.3276	5.0545
18	2.8543	3.3799	3.9960	4.7171	5.5599
19	3.0256	3.6165	4.3157	5.1417	6.1159
20	3.2071	3.8697	4.6610	5.6044	6.7275
21	3.3996	4.1406	5.0338	6.1088	7.4002
22	3.6035	4.4304	5.4365	6.6586	8.1403
23	3.8197	4.7405	5.8715	7.2579	8.9543
24	4.0489	5.0724	6.3412	7.9111	9.8497
25	4.2919	5.4274	6.8485	8.6231	10.8347

* How R1 will grow with compound interest

Table 1.3 The future value of R1 invested at compound interest*

$(1 + i)^n$
Rate/Period (i)

(n)	11%	12%	13%	14%	15%
1	1.1100	1.1200	1.1300	1.1400	1.1500
2	1.2321	1.2544	1.2769	1.2996	1.3225
3	1.3676	1.4049	1.4429	1.4815	1.5209
4	1.5181	1.5735	1.6305	1.6890	1.7490
5	1.6851	1.7623	1.8424	1.9254	2.0114
6	1.8704	1.9738	2.0820	2.1950	2.3131
7	2.0762	2.2107	2.3526	2.5023	2.6600
8	2.3045	2.4760	2.6584	2.8526	3.0590
9	2.5580	2.7731	3.0040	3.2519	3.5179
10	2.8394	3.1058	3.3946	3.7072	4.0456
11	3.1518	3.4785	3.8359	4.2262	4.6524
12	3.4985	3.8960	4.3345	4.8179	5.3503
13	3.8833	4.3635	4.8980	5.4924	6.1528
14	4.3104	4.8871	5.5348	6.2613	7.0757
15	4.7846	5.4736	6.2543	7.1379	8.1371
16	5.3109	6.1304	7.0673	8.1372	9.3576
17	5.8951	6.8660	7.9861	9.2765	10.7613
18	6.5436	7.6900	9.0243	10.5752	12.3755
19	7.2633	8.6128	10.1974	12.0557	14.2318
20	8.0623	9.6463	11.5231	13.7435	16.3665
21	8.9492	10.8038	13.0211	15.6676	18.8215
22	9.9336	12.1003	14.7138	17.8610	21.6447
23	11.0263	13.5523	16.6266	20.3616	24.8915
24	12.2392	15.1786	18.7881	23.2122	28.6252
25	13.5855	17.0001	21.2305	26.4619	32.9190

* How R1 will grow with compound interest

Table 1.4 The future value of R1 invested at compound interest*

$(1 + i)^n$
Rate/Period (i)

(n)	16%	17%	18%	19%	20%
1	1.1600	1.1700	1.1800	1.1900	1.2000
2	1.3456	1.3689	1.3924	1.4161	1.4400
3	1.5609	1.6016	1.6430	1.6852	1.7280
4	1.8106	1.8739	1.9388	2.0053	2.0736
5	2.1003	2.1924	2.2878	2.3864	2.4883
6	2.4364	2.5652	2.6996	2.8398	2.9860
7	2.8262	3.0012	3.1855	3.3793	3.5832
8	3.2784	3.5115	3.7589	4.0214	4.2998
9	3.8030	4.1084	4.4355	4.7854	5.1598
10	4.4114	4.8068	5.2338	5.6947	6.1917
11	5.1173	5.6240	6.1759	6.7767	7.4301
12	5.9360	6.5801	7.2876	8.0642	8.9161
13	6.8858	7.6987	8.5994	9.5964	10.6993
14	7.9875	9.0075	10.1472	11.4198	12.8392
15	9.2655	10.5387	11.9737	13.5895	15.4070
16	10.7480	12.3303	14.1290	16.1715	18.4884
17	12.4677	14.4265	16.6722	19.2441	22.1861
18	14.4625	16.8790	19.6733	22.9005	26.6233
19	16.7765	19.7484	23.2144	27.2516	31.9480
20	19.4608	23.1056	27.3930	32.4294	38.3376
21	22.5745	27.0336	32.3238	38.5910	46.0051
22	26.1864	31.6293	38.1421	45.9233	55.2061
23	30.3762	37.0062	45.0076	54.6487	66.2474
24	35.2364	43.2973	53.1090	65.0320	79.4968
25	40.8742	50.6578	62.6686	77.3881	95.3962

* How R1 will grow with compound interest

Table 1.5 The future value of R1 invested at compound interest*

$(1 + i)^n$
Rate/Period (i)

(n)	21%	22%	23%	24%	25%
1	1.2100	1.2200	1.2300	1.2400	1.2500
2	1.4641	1.4884	1.5129	1.5376	1.5625
3	1.7716	1.8158	1.8609	1.9066	1.9531
4	2.1436	2.2153	2.2889	2.3642	2.4414
5	2.5937	2.7027	2.8153	2.9316	3.0518
6	3.1384	3.2973	3.4628	3.6352	3.8147
7	3.7975	4.0227	4.2593	4.5077	4.7684
8	4.5950	4.9077	5.2389	5.5895	5.9605
9	5.5599	5.9874	6.4439	6.9310	7.4506
10	6.7275	7.3046	7.9259	8.5944	9.3132
11	8.1403	8.9117	9.7489	10.6571	11.6415
12	9.8497	10.8722	11.9912	13.2148	14.5519
13	11.9182	13.2641	14.7491	16.3863	18.1899
14	14.4210	16.1822	18.1414	20.3191	22.7374
15	17.4494	19.7423	22.3140	25.1956	28.4217
16	21.1138	24.0856	27.4462	31.2426	35.5271
17	25.5477	29.3844	33.7588	38.7408	44.4089
18	30.9127	35.8490	41.5233	48.0386	55.5112
19	37.4043	43.7358	51.0737	59.5679	69.3889
20	45.2593	53.3576	62.8206	73.8641	86.7362
21	54.7637	65.0963	77.2694	91.5915	108.4202
22	66.2641	79.4175	95.0413	113.5735	135.5253
23	80.1795	96.8894	116.9008	140.8312	169.4066
24	97.0172	118.2050	143.7880	174.6306	211.7582
25	117.3909	144.2101	176.8593	216.5420	264.6978

* How R1 will grow with compound interest

Table 1.6 The future value of R1 invested at compound interest*

$(1 + i)^n$
Rate/Period (i)

(n)	26%	27%	28%	29%	30%
1	1.2600	1.2700	1.2800	1.2900	1.3000
2	1.5876	1.6129	1.6384	1.6641	1.6900
3	2.0004	2.0484	2.0972	2.1467	2.1970
4	2.5205	2.6014	2.6844	2.7692	2.8561
5	3.1758	3.3038	3.4360	3.5723	3.7129
6	4.0015	4.1959	4.3980	4.6083	4.8268
7	5.0419	5.3288	5.6295	5.9447	6.2749
8	6.3528	6.7675	7.2058	7.6686	8.1573
9	8.0045	8.5948	9.2234	9.8925	10.6045
10	10.0857	10.9153	11.8059	12.7614	13.7858
11	12.7080	13.8625	15.1116	16.4622	17.9216
12	16.0120	17.6053	19.3428	21.2362	23.2981
13	20.1752	22.3588	24.7588	27.3947	30.2875
14	25.4207	28.3957	31.6913	35.3391	39.3738
15	32.0301	36.0625	40.5648	45.5875	51.1859
16	40.3579	45.7994	51.9230	58.8079	66.5417
17	50.8510	58.1652	66.4614	75.8621	86.5042
18	64.0722	73.8698	85.0706	97.8622	112.4554
19	80.7310	93.8147	108.8904	126.2422	146.1920
20	101.7211	119.1446	139.3797	162.8524	190.0496
21	128.1685	151.3137	178.4060	210.0796	247.0645
22	161.4924	192.1683	228.3596	271.0027	321.1839
23	203.4804	244.0538	292.3003	349.5935	417.5391
24	256.3853	309.9483	374.1444	450.9756	542.8008
25	323.0454	393.6344	478.9049	581.7585	705.6410

*How R1 will grow with compound interest

Table 2.1 The present value of R1 at the end of a specific period*

$1/(1 + i)^n$
Rate/Period (i)

(n)	1%	2%	3%	4%	5%
1	0.9901	0.9804	0.9709	0.9615	0.9524
2	0.9803	0.9612	0.9426	0.9246	0.9070
3	0.9706	0.9423	0.9151	0.8890	0.8638
4	0.9610	0.9238	0.8885	0.8548	0.8227
5	0.9515	0.9057	0.8626	0.8219	0.7835
6	0.9420	0.8880	0.8375	0.7903	0.7462
7	0.9327	0.8706	0.8131	0.7599	0.7107
8	0.9235	0.8535	0.7894	0.7307	0.6768
9	0.9143	0.8368	0.7664	0.7026	0.6446
10	0.9053	0.8203	0.7441	0.6756	0.6139
11	0.8963	0.8043	0.7224	0.6496	0.5847
12	0.8874	0.7885	0.7014	0.6246	0.5568
13	0.8787	0.7730	0.6810	0.6006	0.5303
14	0.8700	0.7579	0.6611	0.5775	0.5051
15	0.8613	0.7430	0.6419	0.5553	0.4810
16	0.8528	0.7284	0.6232	0.5339	0.4581
17	0.8444	0.7142	0.6050	0.5134	0.4363
18	0.8360	0.7002	0.5874	0.4936	0.4155
19	0.8277	0.6864	0.5703	0.4746	0.3957
20	0.8195	0.6730	0.5537	0.4564	0.3769
21	0.8114	0.6598	0.5375	0.4388	0.3589
22	0.8034	0.6468	0.5219	0.4220	0.3418
23	0.7954	0.6342	0.5067	0.4057	0.3256
24	0.7876	0.6217	0.4919	0.3901	0.3101
25	0.7798	0.6095	0.4776	0.3751	0.2953

*The present value of R1 in the future

Table 2.2 The present value of R1 at the end of a specific period*

$1/(1 + i)^n$
Rate/Period (i)

(n)	6%	7%	8%	9%	10%
1	0.9434	0.9346	0.9259	0.9174	0.9091
2	0.8900	0.8734	0.8573	0.8417	0.8264
3	0.8396	0.8163	0.7938	0.7722	0.7513
4	0.7921	0.7629	0.7350	0.7084	0.6830
5	0.7473	0.7130	0.6806	0.6499	0.6209
6	0.7050	0.6663	0.6302	0.5963	0.5645
7	0.6651	0.6227	0.5835	0.5470	0.5132
8	0.6274	0.5820	0.5403	0.5019	0.4665
9	0.5919	0.5439	0.5002	0.4604	0.4241
10	0.5584	0.5083	0.4632	0.4224	0.3855
11	0.5268	0.4751	0.4289	0.3875	0.3505
12	0.4970	0.4440	0.3971	0.3555	0.3186
13	0.4688	0.4150	0.3677	0.3262	0.2897
14	0.4423	0.3878	0.3405	0.2992	0.2633
15	0.4173	0.3624	0.3152	0.2745	0.2394
16	0.3936	0.3387	0.2919	0.2519	0.2176
17	0.3714	0.3166	0.2703	0.2311	0.1978
18	0.3503	0.2959	0.2502	0.2120	0.1799
19	0.3305	0.2765	0.2317	0.1945	0.1635
20	0.3118	0.2584	0.2145	0.1784	0.1486
21	0.2942	0.2415	0.1987	0.1637	0.1351
22	0.2775	0.2257	0.1839	0.1502	0.1228
23	0.2618	0.2109	0.1703	0.1378	0.1117
24	0.2470	0.1971	0.1577	0.1264	0.1015
25	0.2330	0.1842	0.1460	0.1160	0.0923

*The present value of R1 in the future

Table 2.3 The present value of R1 at the end of a specific period*

$1/(1 + i)^n$
Rate/Period (i)

(n)	11%	12%	13%	14%	15%
1	0.9009	0.8929	0.8850	0.8772	0.8696
2	0.8116	0.7972	0.7831	0.7695	0.7561
3	0.7312	0.7118	0.6931	0.6750	0.6575
4	0.6587	0.6355	0.6133	0.5921	0.5718
5	0.5935	0.5674	0.5428	0.5194	0.4972
6	0.5346	0.5066	0.4803	0.4556	0.4323
7	0.4817	0.4523	0.4251	0.3996	0.3759
8	0.4339	0.4039	0.3762	0.3506	0.3269
9	0.3909	0.3606	0.3329	0.3075	0.2843
10	0.3522	0.3220	0.2946	0.2697	0.2472
11	0.3173	0.2875	0.2607	0.2366	0.2149
12	0.2858	0.2567	0.2307	0.2076	0.1869
13	0.2575	0.2292	0.2042	0.1821	0.1625
14	0.2320	0.2046	0.1807	0.1597	0.1413
15	0.2090	0.1827	0.1599	0.1401	0.1229
16	0.1883	0.1631	0.1415	0.1229	0.1069
17	0.1696	0.1456	0.1252	0.1078	0.0929
18	0.1528	0.1300	0.1108	0.0946	0.0808
19	0.1377	0.1161	0.0981	0.0829	0.0703
20	0.1240	0.1037	0.0868	0.0728	0.0611
21	0.1117	0.0926	0.0768	0.0638	0.0531
22	0.1007	0.0826	0.0680	0.0560	0.0462
23	0.0907	0.0738	0.0601	0.0491	0.0402
24	0.0817	0.0659	0.0532	0.0431	0.0349
25	0.0736	0.0588	0.0471	0.0378	0.0304

* The present value of R1 in the future

Table 2.4 The present value of R1 at the end of a specific period*

$1/(1 + i)^n$
Rate/Period (i)

(n)	16%	17%	18%	19%	20%
1	0.8621	0.8547	0.8475	0.8403	0.8333
2	0.7432	0.7305	0.7182	0.7062	0.6944
3	0.6407	0.6244	0.6086	0.5934	0.5787
4	0.5523	0.5337	0.5158	0.4987	0.4823
5	0.4761	0.4561	0.4371	0.4190	0.4019
6	0.4104	0.3898	0.3704	0.3521	0.3349
7	0.3538	0.3332	0.3139	0.2959	0.2791
8	0.3050	0.2848	0.2660	0.2487	0.2326
9	0.2630	0.2434	0.2255	0.2090	0.1938
10	0.2267	0.2080	0.1911	0.1756	0.1615
11	0.1954	0.1778	0.1619	0.1476	0.1346
12	0.1685	0.1520	0.1372	0.1240	0.1122
13	0.1452	0.1299	0.1163	0.1042	0.0935
14	0.1252	0.1110	0.0985	0.0876	0.0779
15	0.1079	0.0949	0.0835	0.0736	0.0649
16	0.0930	0.0811	0.0708	0.0618	0.0541
17	0.0802	0.0693	0.0600	0.0520	0.0451
18	0.0691	0.0592	0.0508	0.0437	0.0376
19	0.0596	0.0506	0.0431	0.0367	0.0313
20	0.0514	0.0433	0.0365	0.0308	0.0261
21	0.0443	0.0370	0.0309	0.0259	0.0217
22	0.0382	0.0316	0.0262	0.0218	0.0181
23	0.0329	0.0270	0.0222	0.0183	0.0151
24	0.0284	0.0231	0.0188	0.0154	0.0126
25	0.0245	0.0197	0.0160	0.0129	0.0105

* The present value of R1 in the future

Table 2.5 The present value of R1 at the end of a specific period*

$1/(1 + i)^n$
Rate/Period (i)

(n)	21%	22%	23%	24%	25%
1	0.8264	0.8197	0.8130	0.8065	0.8000
2	0.6830	0.6719	0.6610	0.6504	0.6400
3	0.5645	0.5507	0.5374	0.5245	0.5120
4	0.4665	0.4514	0.4369	0.4230	0.4096
5	0.3855	0.3700	0.3552	0.3411	0.3277
6	0.3186	0.3033	0.2888	0.2751	0.2621
7	0.2633	0.2486	0.2348	0.2218	0.2097
8	0.2176	0.2038	0.1909	0.1789	0.1678
9	0.1799	0.1670	0.1552	0.1443	0.1342
10	0.1486	0.1369	0.1262	0.1164	0.1074
11	0.1228	0.1122	0.1026	0.0938	0.0859
12	0.1015	0.0920	0.0834	0.0757	0.0687
13	0.0839	0.0754	0.0678	0.0610	0.0550
14	0.0693	0.0618	0.0551	0.0492	0.0440
15	0.0573	0.0507	0.0448	0.0397	0.0352
16	0.0474	0.0415	0.0364	0.0320	0.0281
17	0.0391	0.0340	0.0296	0.0258	0.0225
18	0.0323	0.0279	0.0241	0.0208	0.0180
19	0.0267	0.0229	0.0196	0.0168	0.0144
20	0.0221	0.0187	0.0159	0.0135	0.0115
21	0.0183	0.0154	0.0129	0.0109	0.0092
22	0.0151	0.0126	0.0105	0.0088	0.0074
23	0.0125	0.0103	0.0086	0.0071	0.0059
24	0.0103	0.0085	0.0070	0.0057	0.0047
25	0.0085	0.0069	0.0057	0.0046	0.0038

* The present value of R1 in the future

Table 2.6 The present value of R1 at the end of a specific period*

$1/(1 + i)^n$
Rate/Period (i)

(n)	26%	27%	28%	29%	30%
1	0.7937	0.7874	0.7813	0.7752	0.7692
2	0.6299	0.6200	0.6104	0.6009	0.5917
3	0.4999	0.4882	0.4768	0.4658	0.4552
4	0.3968	0.3844	0.3725	0.3611	0.3501
5	0.3149	0.3027	0.2910	0.2799	0.2693
6	0.2499	0.2383	0.2274	0.2170	0.2072
7	0.1983	0.1877	0.1776	0.1682	0.1594
8	0.1574	0.1478	0.1388	0.1304	0.1226
9	0.1249	0.1164	0.1084	0.1011	0.0943
10	0.0992	0.0916	0.0847	0.0784	0.0725
11	0.0787	0.0721	0.0662	0.0607	0.0558
12	0.0625	0.0568	0.0517	0.0471	0.0429
13	0.0496	0.0447	0.0404	0.0365	0.0330
14	0.0393	0.0352	0.0316	0.0283	0.0254
15	0.0312	0.0277	0.0247	0.0219	0.0195
16	0.0248	0.0218	0.0193	0.0170	0.0150
17	0.0197	0.0172	0.0150	0.0132	0.0116
18	0.0156	0.0135	0.0118	0.0102	0.0089
19	0.0124	0.0107	0.0092	0.0079	0.0068
20	0.0098	0.0084	0.0072	0.0061	0.0053
21	0.0078	0.0066	0.0056	0.0048	0.0040
22	0.0062	0.0052	0.0044	0.0037	0.0031
23	0.0049	0.0041	0.0034	0.0029	0.0024
24	0.0039	0.0032	0.0027	0.0022	0.0018
25	0.0031	0.0025	0.0021	0.0017	0.0014

* Present value of R1 in the future

Table 3.1 Annuity with a present value of R1*

$i/(1 - (1 + i)^{-n})$
Rate/Period (i)

(n)	1%	2%	3%	4%	5%
1	1.0100	1.0200	1.0300	1.0400	1.0500
2	0.5075	0.5150	0.5226	0.5302	0.5378
3	0.3400	0.3468	0.3535	0.3603	0.3672
4	0.2563	0.2626	0.2690	0.2755	0.2820
5	0.2060	0.2122	0.2184	0.2246	0.2310
6	0.1725	0.1785	0.1846	0.1908	0.1970
7	0.1486	0.1545	0.1605	0.1666	0.1728
8	0.1307	0.1365	0.1425	0.1485	0.1547
9	0.1167	0.1225	0.1284	0.1345	0.1407
10	0.1056	0.1113	0.1172	0.1233	0.1295
11	0.0965	0.1022	0.1081	0.1141	0.1204
12	0.0888	0.0946	0.1005	0.1066	0.1128
13	0.0824	0.0881	0.0940	0.1001	0.1065
14	0.0769	0.0826	0.0885	0.0947	0.1010
15	0.0721	0.0778	0.0838	0.0899	0.0963
16	0.0679	0.0737	0.0796	0.0858	0.0923
17	0.0643	0.0700	0.0760	0.0822	0.0887
18	0.0610	0.0667	0.0727	0.0790	0.0855
19	0.0581	0.0638	0.0698	0.0761	0.0827
20	0.0554	0.0612	0.0672	0.0736	0.0802
21	0.0530	0.0588	0.0649	0.0713	0.0780
22	0.0509	0.0566	0.0627	0.0692	0.0760
23	0.0489	0.0547	0.0608	0.0673	0.0741
24	0.0471	0.0529	0.0590	0.0656	0.0725
25	0.0454	0.0512	0.0574	0.0640	0.0710

* The size of an instalment to repay R1

Table 3.2 Annuity with a present value of R1*

$i/(1 - (1 + i)^{-n})$
Rate/Period (i)

(n)	6%	7%	8%	9%	10%
1	1.0600	1.0700	1.0800	1.0900	1.1000
2	0.5454	0.5531	0.5608	0.5685	0.5762
3	0.3741	0.3811	0.3880	0.3951	0.4021
4	0.2886	0.2952	0.3019	0.3087	0.3155
5	0.2374	0.2439	0.2505	0.2571	0.2638
6	0.2034	0.2098	0.2163	0.2229	0.2296
7	0.1791	0.1856	0.1921	0.1987	0.2054
8	0.1610	0.1675	0.1740	0.1807	0.1874
9	0.1470	0.1535	0.1601	0.1668	0.1736
10	0.1359	0.1424	0.1490	0.1558	0.1627
11	0.1268	0.1334	0.1401	0.1469	0.1540
12	0.1193	0.1259	0.1327	0.1397	0.1468
13	0.1130	0.1197	0.1265	0.1336	0.1408
14	0.1076	0.1143	0.1213	0.1284	0.1357
15	0.1030	0.1098	0.1168	0.1241	0.1315
16	0.0990	0.1059	0.1130	0.1203	0.1278
17	0.0954	0.1024	0.1096	0.1170	0.1247
18	0.0924	0.0994	0.1067	0.1142	0.1219
19	0.0896	0.0968	0.1041	0.1117	0.1195
20	0.0872	0.0944	0.1019	0.1095	0.1175
21	0.0850	0.0923	0.0998	0.1076	0.1156
22	0.0830	0.0904	0.0980	0.1059	0.1140
23	0.0813	0.0887	0.0964	0.1044	0.1126
24	0.0797	0.0872	0.0950	0.1030	0.1113
25	0.0782	0.0858	0.0937	0.1018	0.1102

* The size of an instalment to repay R1

Table 3.3 Annuity with a present value of R1*

$i/(1 - (1 + i)^{-n})$
Rate/Period (i)

(n)	11%	12%	13%	14%	15%
1	1.1100	1.1200	1.1300	1.1400	1.1500
2	0.5839	0.5917	0.5995	0.6073	0.6151
3	0.4092	0.4163	0.4235	0.4307	0.4380
4	0.3223	0.3292	0.3362	0.3432	0.3503
5	0.2706	0.2774	0.2843	0.2913	0.2983
6	0.2364	0.2432	0.2502	0.2572	0.2642
7	0.2122	0.2191	0.2261	0.2332	0.2404
8	0.1943	0.2013	0.2084	0.2156	0.2229
9	0.1806	0.1877	0.1949	0.2022	0.2096
10	0.1698	0.1770	0.1843	0.1917	0.1993
11	0.1611	0.1684	0.1758	0.1834	0.1911
12	0.1540	0.1614	0.1690	0.1767	0.1845
13	0.1482	0.1557	0.1634	0.1712	0.1791
14	0.1432	0.1509	0.1587	0.1666	0.1747
15	0.1391	0.1468	0.1547	0.1628	0.1710
16	0.1355	0.1434	0.1514	0.1596	0.1679
17	0.1325	0.1405	0.1486	0.1569	0.1654
18	0.1298	0.1379	0.1462	0.1546	0.1632
19	0.1276	0.1358	0.1441	0.1527	0.1613
20	0.1256	0.1339	0.1424	0.1510	0.1598
21	0.1238	0.1322	0.1408	0.1495	0.1584
22	0.1223	0.1308	0.1395	0.1483	0.1573
23	0.1210	0.1296	0.1383	0.1472	0.1563
24	0.1198	0.1285	0.1373	0.1463	0.1554
25	0.1187	0.1275	0.1364	0.1455	0.1547

* The size of an instalment to repay R1

Table 3.4 Annuity with a present value of R1*

$i/(1 - (1 + i)^{-n})$
Rate/Period (i)

(n)	16%	17%	18%	19%	20%
1	1.1600	1.1700	1.1800	1.1900	1.2000
2	0.6230	0.6308	0.6387	0.6466	0.6545
3	0.4453	0.4526	0.4599	0.4673	0.4747
4	0.3574	0.3645	0.3717	0.3790	0.3863
5	0.3054	0.3126	0.3198	0.3271	0.3344
6	0.2714	0.2786	0.2859	0.2933	0.3007
7	0.2476	0.2549	0.2624	0.2699	0.2774
8	0.2302	0.2377	0.2452	0.2529	0.2606
9	0.2171	0.2247	0.2324	0.2402	0.2481
10	0.2069	0.2147	0.2225	0.2305	0.2385
11	0.1989	0.2068	0.2148	0.2229	0.2311
12	0.1924	0.2005	0.2086	0.2169	0.2253
13	0.1872	0.1954	0.2037	0.2121	0.2206
14	0.1829	0.1912	0.1997	0.2082	0.2169
15	0.1794	0.1878	0.1964	0.2051	0.2139
16	0.1764	0.1850	0.1937	0.2025	0.2114
17	0.1740	0.1827	0.1915	0.2004	0.2094
18	0.1719	0.1807	0.1896	0.1987	0.2078
19	0.1701	0.1791	0.1881	0.1972	0.2065
20	0.1687	0.1777	0.1868	0.1960	0.2054
21	0.1674	0.1765	0.1857	0.1951	0.2044
22	0.1664	0.1756	0.1848	0.1942	0.2037
23	0.1654	0.1747	0.1841	0.1935	0.2031
24	0.1647	0.1740	0.1835	0.1930	0.2025
25	0.1640	0.1734	0.1829	0.1925	0.2021

* The size of an instalment to repay R1

Table 3.5 Annuity with a present value of R1*

$i/(1 - (1 + i)^{-n})$
Rate/Period (i)

(n)	21%	22%	23%	24%	25%
1	1.2100	1.2200	1.2300	1.2400	1.2500
2	0.6625	0.6705	0.6784	0.6864	0.6944
3	0.4822	0.4897	0.4972	0.5047	0.5123
4	0.3936	0.4010	0.4085	0.4159	0.4234
5	0.3418	0.3492	0.3567	0.3642	0.3718
6	0.3082	0.3158	0.3234	0.3311	0.3388
7	0.2851	0.2928	0.3006	0.3084	0.3163
8	0.2684	0.2763	0.2843	0.2923	0.3004
9	0.2561	0.2641	0.2722	0.2805	0.2888
10	0.2467	0.2549	0.2632	0.2716	0.2801
11	0.2394	0.2478	0.2563	0.2649	0.2735
12	0.2337	0.2423	0.2509	0.2596	0.2684
13	0.2292	0.2379	0.2467	0.2556	0.2645
14	0.2256	0.2345	0.2434	0.2524	0.2615
15	0.2228	0.2317	0.2408	0.2499	0.2591
16	0.2204	0.2295	0.2387	0.2479	0.2572
17	0.2186	0.2278	0.2370	0.2464	0.2558
18	0.2170	0.2263	0.2357	0.2451	0.2546
19	0.2158	0.2251	0.2346	0.2441	0.2537
20	0.2147	0.2242	0.2337	0.2433	0.2529
21	0.2139	0.2234	0.2330	0.2426	0.2523
22	0.2132	0.2228	0.2324	0.2421	0.2519
23	0.2127	0.2223	0.2320	0.2417	0.2515
24	0.2122	0.2219	0.2316	0.2414	0.2512
25	0.2118	0.2215	0.2313	0.2411	0.2509

* The size of an instalment to repay R1

Table 3.6 Annuity with a present value of R1*

$i/(1 - (1 + i)^{-n})$
Rate/Period (i)

(n)	26%	27%	28%	29%	30%
1	1.2600	1.2700	1.2800	1.2900	1.3000
2	0.7025	0.7105	0.7186	0.7267	0.7348
3	0.5199	0.5275	0.5352	0.5429	0.5506
4	0.4310	0.4386	0.4462	0.4539	0.4616
5	0.3795	0.3872	0.3949	0.4027	0.4106
6	0.3466	0.3545	0.3624	0.3704	0.3784
7	0.3243	0.3324	0.3405	0.3486	0.3569
8	0.3086	0.3168	0.3251	0.3335	0.3419
9	0.2971	0.3056	0.3140	0.3226	0.3312
10	0.2886	0.2972	0.3059	0.3147	0.3235
11	0.2822	0.2910	0.2998	0.3088	0.3177
12	0.2773	0.2863	0.2953	0.3043	0.3135
13	0.2736	0.2826	0.2918	0.3010	0.3102
14	0.2706	0.2799	0.2891	0.2984	0.3078
15	0.2684	0.2777	0.2871	0.2965	0.3060
16	0.2666	0.2760	0.2855	0.2950	0.3046
17	0.2652	0.2747	0.2843	0.2939	0.3035
18	0.2641	0.2737	0.2833	0.2930	0.3027
19	0.2633	0.2729	0.2826	0.2923	0.3021
20	0.2626	0.2723	0.2820	0.2918	0.3016
21	0.2620	0.2718	0.2816	0.2914	0.3012
22	0.2616	0.2714	0.2812	0.2911	0.3009
23	0.2613	0.2711	0.2810	0.2908	0.3007
24	0.2610	0.2709	0.2808	0.2906	0.3006
25	0.2608	0.2707	0.2806	0.2905	0.3004

* The size of an instalment to repay R1

Index

Modern farming has developed from an easy lifestyle to a highly specialised business enterprise which makes high demands on the management capabilities of farmers.

Only those who meet these demands can hope to survive economically in the long term and make a financial success of their enterprise.

Effective business management requires insight and specialised knowledge. Many farmers in the Republic do not have adequate knowledge about this aspect of farming, mainly owing to the fact that there were no sources available from which the practising farmer could acquire this knowledge. This book attempts to provide such a source.

Both Prof. Van Reenen and Prof. Davel are attached to the Department of Business Economics at Unisa and present regular courses in practical farm management. Farmers have long recognised both authors as experts in this field.

This book will be invaluable to both the farm management student as well as the farmer himself.

ISBN 0 86981 580 6