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Computers for the farm

By M. Meaton*

The day when every farm will need its own computer is a long way off, but already, computers are making valuable contributions to farming.

The electronics industry is threatening to revolutionise society in the way the industrial revolution did using machinery. The new revolution is based on mass-produced silicon chips, which have been the basis for smaller and cheaper electronic devices.

Examples of the influence of these chips are now common. A calculator which would have cost hundreds of dollars in the early 1970s is now available in an equivalent pocket-sized model for less than $10. Electronic watches have shattered the Swiss watch-making industry, being cheaper and much more accurate than mechanical watches.

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The silicon chip — the basis of the electronics revolution. The actual size is shown next to a one cent coin, and the "workings" (arrowed) are enlarged below. Photography — E. Laidlaw
Farmers are therefore asking themselves what this means for them. Will computers change the farm as dramatically as they have changed other industries?

Computer services
For many years, Western Australian farmers have been using computers through services such as the Farm Management Service Laboratory, and computers have helped research and commerce to provide better services to farmers. As computers become cheaper, they will be more widely used and such services should become even more efficient.

Services such as the Farm Management Service Laboratory are likely to become more widely used as farmers become more familiar with their capabilities and limitations. Originally the Farm Management Service Laboratory offered only a tally of income and expenditure compared with figures previously budgeted for. However, it has been developed and expanded and now includes more complex financial accounting systems and livestock breeding programmes.

Another computer-based service was begun by the Department of Agriculture in 1975 to provide more accurate advice on rates of superphosphate. Using the computer, it was possible to combine the results of hundreds of trials. The sometimes-complex calculations to determine the optimum rate are easily handled by the computer.

Since 1975, the Department has also introduced computer-based systems for advice on costs of farm machinery finance, pig rations and rations for dairy cattle.

However, these services rely on an “interpreter” between the farmer and the computer; it is likely to be many years before the farmer will have to feed information into the computer itself.

Farming by computer
Computers have the potential to do calculations and the more sophisticated computers are designed to store information.

The pocket calculators already in use on farms are the simplest form of computer. The basic functions — adding, subtracting, dividing or multiplying, are all that is needed for most farm calculations.

If a sequence of calculations is to be repeated many times, the next step is to use a “programmable” calculator. These cost from around $100, and can be told (programmed) to do things such as add or multiply in a regular sequence.

Telling the programmable calculator what to do — programming it, can be quite complex. As an alternative to programming the calculator yourself, programmes can be purchased, but the agricultural packages of programmes are based on farming overseas and are of limited use for Western Australian farming.

More elaborate still are microcomputers — full computers, with the ability to store information as well as do calculations. Microcomputers cost less than $1000 in their basic form, although a useful model for a farm could cost several thousand dollars. Similar machines would have cost nearly $100,000 around 1960.

A microcomputer comprises a keyboard, screen, electronic circuitry based on silicon chips, and a power supply — all equivalent to a pocket calculator, but on a larger scale. The important difference is that information can be stored either on a normal recording cassette tape or on a “floppy disc”.

The ability to store information and carry out calculations means microcomputers have the potential for record keeping, as decision making aids, and for controlling other mechanical operations.

Record keeping
The storage ability of a microcomputer could be invaluable for farmers interested in maintaining detailed records of their property. Such information could include paddock histories, weather records, livestock and machinery schedules, in addition to financial details.

Computers are ideal for livestock recording schemes and for some years have been used for this purpose by the Farm Management Service Laboratory, National Beef Recording scheme and the Department of Agriculture Mastitis Information Service.

In the financial field, computers are suitable for accounting purposes including cash flow budgeting, monthly budget comparisons, cumulative recording and taxation accounting. They are being used in this way by an estimated 70 per cent of Western Australian accounting firms as well as the Farm Management Service Laboratory. Computer packages are available which include the programmes necessary for these calculations, but at present they are fairly expensive.

Decision making aids
Farming is a complex business and requires many decisions to be made. Some of these decisions require calculations such as whether there will be a profit in buying livestock for fattening and re-sale. These calculations which may help a farmer are:

- Calculation of optimal fertiliser rates.
- Gross margin or profitability calculations on alternative farm enterprises.
- Estimation of costs of different sources of farm finance.
- Monitoring livestock performance for breeding and culling.
- Comparing costs of different feed rations.
- Estimation of optimum dam and catchment sizes.
- Whole farm planning using...
advanced mathematical models like linear programming.

Computer programmes (the "software"; the computer itself is called the "hardware") have been developed for these problems by research workers in the United States and Australia. However, at this stage they are mostly complex and require an 'expert' to collect the information and enter it into the machine.

Examples of such programmes which are managed by the Department of Agriculture are "Decide" which calculates optimal fertiliser rates, "Reckon" which evaluates the cost of alternative sources of farm machinery finance, "Damcat" which calculates desirable dam and catchment areas, and minimum livestock feed cost programmes. A whole farm planning service is provided by the Farm Management Service Laboratory.

These programmes perform satisfactorily, but for the farmer interested in using the programmes himself, most have not been adapted to run on the types of microcomputers being marketed. Few farmers would be interested in learning the skills necessary to do the programming themselves.

Control of other operations

The technology now exists for central computer control of farm machinery and for remote monitoring of variables such as soil moisture levels, climatic information and livestock performance. Visions of totally remote-controlled agriculture are therefore no longer futuristic, but it will be many years before this level of operation is practical.

Choosing a computer

The quantity and sophistication of "hardware" required will depend on the computing ability wanted.

A programmable calculator available for around $300 includes small magnetic cards which can hold up to 1000 programme steps. These hand-held calculators can perform many of the simpler calculations such as boom spray calibration, analysing feed rations, gross margins and comparing rates of interest. However, they are limited in the amount of information they can store.

With these programmable calculators therefore, the data for the programme may need to be entered by hand each time the calculation is performed.

The alternative is to use a microcomputer. Information for a microcomputer can be stored either in the computer itself where storage is limited, on audio cassette tapes or on "floppy discs" which resemble a flexible 45 rpm record. Cassette tape storage is cheap but limited in capacity and speed of operation, whereas floppy disc hardware, whilst fast and efficient, is still relatively expensive.

A farmer wishing to set up a system with the ability to store farm records, carry out basic accounting functions and perform some of the calculations mentioned, will require a computer storage of about 32k and preferably two floppy disc drives. Two suitable systems are available for less than $3000.

However farmers purchasing microcomputers will either have to wait for the programme packages to be developed or write their own programmes.

The development cost of programme packages is high and therefore it will be some time before the demand is enough to encourage sale of packages at reasonable cost.

Until this stage it is hard to justify the purchase of a microcomputer. Accountants, farm management consultants, the Department of Agriculture and the Farm Management Service Laboratory can offer the same services fairly cheaply.

Perhaps what could be considered is that microcomputers are an excellent way to become familiar with computers. The expense could also be justified on the basis of the educational value for children. A wide range of computer games are available which are entertaining for adults as well as children.

The future

Once the computer industry starts to offer farmers a good selection of agricultural programmes to go with the hardware there will be a boom in microcomputers for the farm.

If this happens quickly, the next five years may see far more widespread adoption of these machines. In the meantime however, the computer services available to farmers already are an excellent alternative.

In the long term, access to more sophisticated computer services will be possible. The ideal would be a computer on the farm for preparing records and simpler calculations, combined with access through a telephone link to a larger computer. Ultimately, such a link could allow a wide range of information transfer. It may even become possible to check prices, then buy or sell farm products through the computer.