



**AUSTRALIAN NUFFIELD FARMING SCHOLARS
ASSOCIATION**

**REPORT OF VISIT TO THE
UNITED KINGDOM
EUROPE
CANADA
AMERICA**

By Trevor Day
(South Australian 1984 Award)

Subjects researched while overseas
12 January 1984 to 10 October 1984

Co-operatives, Grain Legumes and Associated Diseases,
Alternative Crops, Computers for the Farm Office, Farm Finance,
Chemical Application Methods, Long Term Soil Structure and
Fertility, and Grain Handling and Storage.

Royal Agricultural Society of Victoria, Royal Showgrounds,
Epsom Road, Ascot Vale, 3032. Telephone: 376 3733.

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SOIL STRUCTURE AND FERTILITY, AND GRAIN HANDLING AND
STORAGE.

A C K N O W L E D G E M E N T S

It would be physically impossible to thank individually all those who have helped and supported me throughout my Nuffield Farming Scholarship. So much is owed to so many, without whose help not only would the scholarship not be available but virtually unlimited access to information, contacts, agricultural institutions and anything remotely associated with agricultural organizations throughout the United Kingdom, Europe and Canada would not be possible. It seems no door is ever closed to a Nuffield Farming Scholar.

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Chris and Lyn Uppill, my machinery syndicate partners for their help and advice to my managers.

There are many more, too numerous to mention, that should receive acknowledgement in this section.

I hope you will all accept my sincere thanks.

Trevor Day

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A.

I N T R O D U C T I O N

For me the Nuffield Farming Scholarship provided the opportunity to visit Co-operatives in the United Kingdom, Europe, Canada and the United States of America, to gain experience and first hand knowledge of Co-operatives and all aspects of their operations.

It also gave me the opportunity to look at grain legumes, their disease problems and prevention, soil structure and fertility, chemicals, and techniques of application, and computers for on farm use.

I soon realised that Co-operatives on their own were more than enough to study, therefore the others became secondary subjects and did not receive the indepth study that Co-operatives did and therefore will only be referred to briefly in this report.

It was said to me during my scholarship tour that a farmer will not read or absorb anything that extends past one page.

Unfortunately this report will extend past one page, but will be kept as condensed as possible and I hope it will be of use and help to my fellow Co-operative Directors or those contemplating forming a Co-operative.

CO-OPERATIVES VISITED

England	426
Northern Ireland	47
Scotland	102
Wales	80
	<hr/>
Total	655
	<hr/>
Fishery Co-operatives	104
Cottage Industries	9

B.

AIMS AND OBJECTIVES

1. To study Co-operatives with special attention to marketing Co-operatives and all aspects of their operations including structure, constitution, financing, storage, marketing, promotions and marketing intelligence systems.
2. To look at grain legumes with special interest in fungal diseases, treatments and prevention.
3. To look at chemical usage and techniques of application.
4. To look at and discuss the uses of alternate crops to break down disease cycles in the soil.
5. To look at the long term effects of intensive cropping on soil structure and fertility.
6. To assess if there is a place for on farm micro or portable computers.

It should be pointed out that the findings are my own opinions and not those necessarily of the Australian Nuffield Farming Scholarship Trust or my sponsors.

It soon became apparent to me during my visit to the European co-operatives that many of them had developed into what I would call a "commercial company". I started to ask myself, "what is a co-operative"? The Collins English Dictionary said, "owned collectively and managed for joint economic benefit". Another said, "operating jointly to the same end".

REFERENCES in the countries visited:-

Britian: "An Agricultural Co-operative is an association of farmers who have come together to achieve some common commercial objective or objectives more successfully than they could as individuals. These objectives, varying as they must from one co-operative to another, all relate fundamentally to the continuance and the improved profitability of individual members farm businesses".

U.S.A.: "An Agricultural Co-operative is a voluntary association of farm people organized to serve themselves through their own business on a profit sharing basis. The objective of members of co-operatives is to improve their farm income by the orderly marketing of their products and by purchasing their supplies through organizations owned and controlled by themselves".

Canada: "Basically, a co-operative is a business, with a difference! The difference is that a co-operative is owned and operated by local people who have become members".

Another thing that concerned me with the British or European co-operatives was this constant talk about the best way to retain profits. How best could a co-operative retain profits to build up its reserves, capital improvements, and size of its business? When questioned on this, the majority would comment that they were building for the future to give better returns in the future.

This made me wonder if this was not the way a co-operative is meant to be, and brought me back to the meaning of the word "co-operative", which as I understand it, is to benefit the members now, and not just the members sons, or people in the future. When you look at the track record of co-operatives over the years and what I call the wave motion of graph of support (see fig. 1), where the people that originally form the co-operative have loyalty to that co-operative because they understand why it was formed, but by the time the second generation comes along then the loyalty is weakening, and by the time the third generation become members and directors of that co-operative, then the real reason for its formation has been lost through lack of communication and it is for this reason we quite often see co-operatives weaken or fail in that third generation.

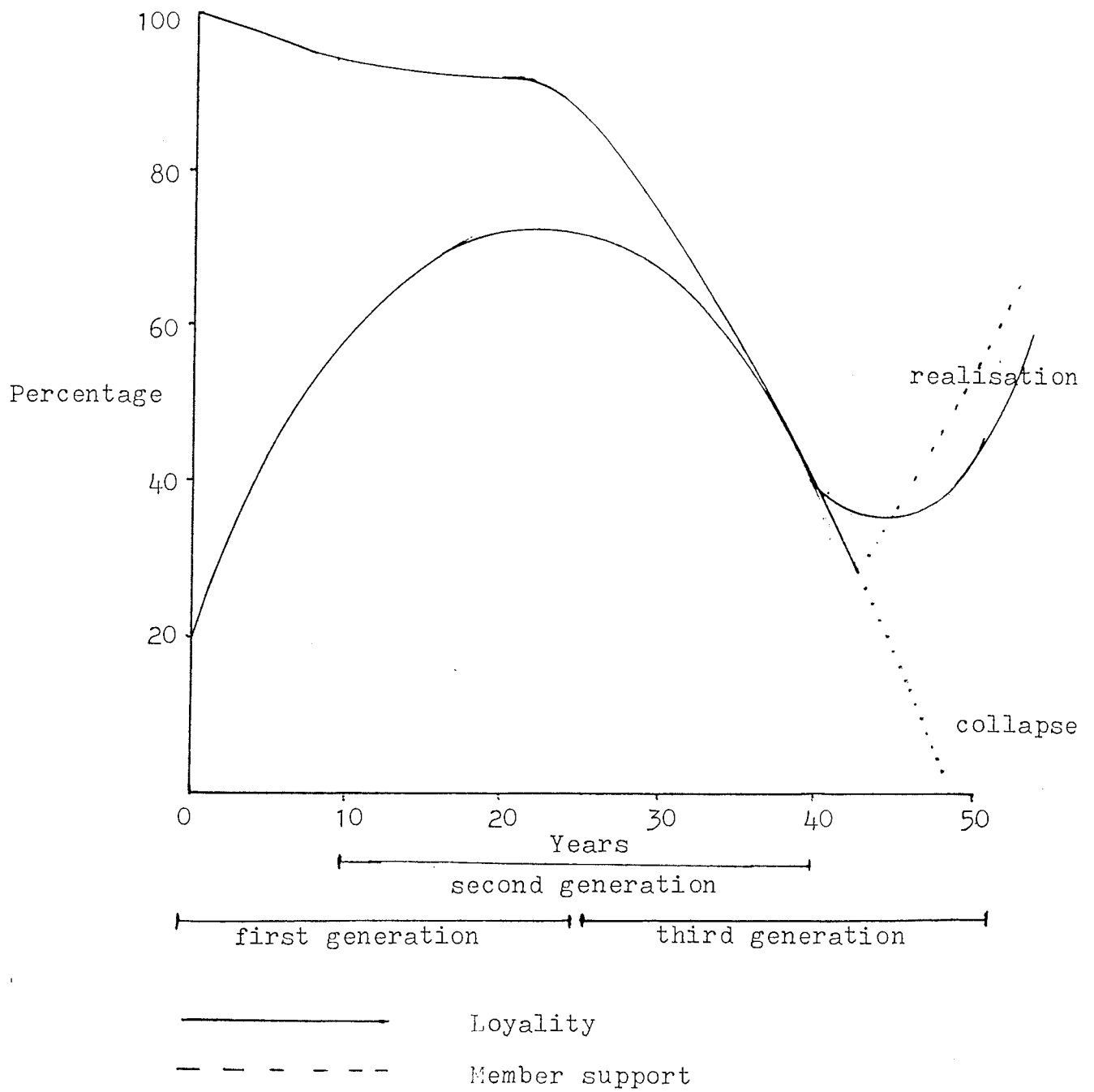
I would question the concept of building up a co-operative, retaining profits and building up capital reserves to benefit future rather than present members. In fact some co-operatives are neglecting their current members in order to supposedly provide benefits for future members!

Surely in building for the future we cannot and should not forget members of today. So you may well ask, "how do we build for the future without neglecting our members of today"? To find an answer to this I think we have to go back and look at the past history of support for co-operatives and try to see why they survived or failed (see fig.1).

When I talk of the wave of support I refer to the fact that as new generations become the members unless they are extremely well educated in co-operatives they have no memory of what it was like without one, and often see the co-operative as just another commercial company and a cost to their marketing or buying.

I think it is fair to say that the majority of co-operatives are formed due to the concern or frustration of growers or people having their incomes reduced for a variety of reasons, some of which may be:- a depression; glut in the market; lack of storage; disadvantage due to size; need for early cash flow.

THE WAVE OF CO-OPERATIVE SUPPORT



If we look at the history of co-operatives we find that many were in fact formed during the depression of the thirties. Obviously the reduced income of farmers in this depression pulled them to act together in co-operatives and increase their viability.

Examples of why co-operatives form :-

Example I: The need of requirement of many growers to receive some money for their products as soon as possible after or during harvest tends to force many of them to panic sell, often on an already glutted market at harvest time. It may well be an inability to store their crop which creates the same problem. Processors then often take advantage of this situation and pay prices well below the actual market value. Out of this we get the formation of a co-operative to either centrally store or market the crop.

Example II: The local hardware store owner finds he is losing trade to the big department store because of lower prices due to greater buying power. He discovers that his fellow shop owners are in the same position, so they get together and form a huge purchasing co-operative to give them greater purchasing power and therefore give them the ability to remain competitive with the big stores.

Example III: Two or three farmers getting together to purchase a machine or machines that individually they cannot afford.

It is easy enough to see how co-operatives form, but it is what happens thereafter that is most interesting.

For example, a marketing co-operative may deduct lets say, \$8.00 per tonne to market grain. Prior to the co-operative being formed the price of the product on the market may have been, say, \$100.00 per tonne, but with the formation of the marketing co-operative it may have lifted the price to, lets say, \$130.00 per tonne. The co-operative members then get \$122.00 per tonne, whereas a non member gets \$130.00 per tonne due to the co-operative putting a floor in the market.

The third generation member who was not around at the beginning of the co-operative cannot necessarily see the benefit that the co-operative is giving him, he only sees the costs. So he rebels and weakens the co-operatives position, either to the stage of collapse or to the stage of realization. If it is the latter, then the co-operative strengthens once again and thereby creating a wave.

So again I ask the question, "is it worth retaining profits from today's loyal members only to get too big and too commercial and end up in a collapse"?

How do we overcome this? I believe it is in an education of future generations. Not by newsletters or media commercials, but at home and in the schools. Canada and the Canadian Co-operative College is a good example. Co-operatives voluntarily pay a percentage of their annual turnover to the college, who then employs a staff of educators. The college in turn trains Co-operative Administrators, Directors etc., and has now introduced a program into public schools to make children aware of the difference between co-operatives and commercial companies, so overcoming to a large extent the impression of a school leaver that a co-operative is just another commercial company.

I must point out at this point that co-operatives are like farms in some ways, that is to say, no two are exactly the same, therefore, what may be right for one may not be right for another. This means that suggestions or conclusions that I may make in this report may not be suitable for every co-operative.

THE MEMBERS:

Commitment, loyalty and support are three words that come to my mind when I first think of the members. Unless members loyally support their co-operative and Co-operative Board and commit themselves or their produce 100% then they cannot expect to gain the full benefits and advantages.

Members need to take an active role in their co-operative by keeping themselves informed, talking to and questioning their directors, and above all attending their co-operative meetings and not just going

along when there is a problem.

It is vitally important that the members attend the Annual General Meetings and elect the best people to the Board and/or make themselves available to serve as Board members.

Members must keep in mind at all times that each and every one of them represents a tooth in a huge gear, should a tooth not give 100%, or break away, then it weakens the whole gear. Should several break away together then the gear could slip, thereby reducing its performance.

THE DIRECTORS:

It is my belief that Directors should be elected by the members and not by the Board. While I understand some of the reasons for a Board being able to elect its own Directors, I feel sure it is just another step away from the members full support. In fact, it should not be necessary for a Board to rule that way. By this I mean that if a Board does its homework correctly then the members will elect the member that the Board would like to have and by doing it this way will get better overall support for the members.

Before a member accepts a position on the Board he should consider the work load carefully and only accept if he is prepared to do his share of the work. Once elected it is vitally important that he does not become merely a "rubber stamp", to either the Chairman nor the Management but remembers his responsibility to the members.

It is also the Director's responsibility to keep himself fully informed of the co-operative's activities and dealings.

To be fair to the Director and asking them to put maximum effort into their appointment we should consider the following:-

1. suitable remuneration and expenses should be paid to offset his own loss of time or production. This obviously must be in line with the amount of time that is required to fulfil his Directorship;

2. there should be a maximum term for Directors to serve on the Board. This could vary from Board to Board but I find it difficult to imagine that any person over a long period of time can continually maintain the workload, enthusiasm, new ideas and performance required of a Board member. It may well be that his own farm will suffer. However, it should also be that a ruling should be included that a person can be re-elected to the Board after, say, an absence of perhaps half the maximum term. This then gives some flexibility in the case of Directors with special capabilities.

THE BOARD:

Each country's Government normally has a minimum number of Directors stipulated in its rules and regulations for the co-operative, however, it is not normal to have a maximum.

Undoubtedly the more Directors the greater cost and the harder it is to make a decision. Once a Board exceeds ten members I believe its cost effective/performance and decision making ability must deteriorate. If more members are required to represent groups within large areas, then there is probably two ways of achieving this:

1. split up into zones with your own Boards with representatives to the central Board; and
2. have a number of Directors "at large" that are there as representation but do not have a voting power.

I believe it is increasingly important that co-operatives should carry out Director training. With the ever increasing complication of running a co-operative, which have some special laws it is vital that all Directors should undergo some training, during, at least the early part of their appointment.

While I feel some advantages can come from Executive Directors on the Board, I firmly believe that the number should not exceed 25% of the Board's numbers. Members should be, and be seen to be, in control of their co-operatives.

The most important thing for the Board to remember, is that it is the members who own the co-operative and it is the member who should benefit from his co-operative, not the Board, the Management, or the co-operative itself, but the members themselves.

THE CHAIRMAN:

The position of Chairman, as I see it, is to control the debating of the Board wisely. He should not run the co-operative himself, but control it on behalf of the Board. It is a vital position which carries a lot of responsibility and therefore to achieve the best performance from the Chairman, three things of importance come to mind:

- 1 providing he is not going outside the Board's instructions it is vital that he is backed completely by his Board and Board members, regardless of their own individual ideas;
2. the position of Chairman should have a maximum of two to five years. As said before, and even more so in this case, a Chairman must put in an enormous amount of effort and time to achieve maximum performance and it should not be expected of him over a long period of time. I believe that if a person enters the Chairmanship for a known period, of say, three years, he will maximize his efforts to achieve his aims in that time, knowing that he will be able to get back and concentrate on his own farm after that time. It then also gives someone else the opportunity to do the same. While some will argue that "he" is the best man for the job, I say, "how do you know unless you try someone else";
3. he must be adequately compensated for his time and efforts as well as his loss of income from his farm.

The Chairman should also endeavour to make sure that each and every one of his Board members carry out their responsibilities as set out by the Board, being sure that they make themselves known to their members and communicate with them and in turn back to the Board.

Some of the bigger co-operatives in Canada, such as Federated Co-operatives and the Saskatchewan Wheat Pool employ their Chairman full-time paying sufficient reward to offset any losses from them having to give up their farm during this time in office. I believe this to be a sound principle in a large co-operative as members can see their Chairman overseeing the operations on their behalf. This neutralizes some of the members' fears of being part of just another "commercial company" with commercial management.

CONCLUSIONS

1. Co-operative business must be carried out for the mutual benefit of all members, the profits being distributed in proportion to the members individual use.
2. Co-operatives need to employ modern and efficient business methods to be competitive in the market place. Top performance will gain patriotism and loyalty of members.
3. Co-operative Boards should form firm guidelines and policies for their co-operative to run on.
4. I feel that many large European Co-operatives are concerning themselves too much with retention of profits and unallocated reserves for the future and neglecting the members who's support they depend on today.
5. New members should be informed of how the co-operative works and what its policies are to avoid misinterpretation.
6. Farmers should be prepared to invest more in their co-operatives to increase its equity capital. This no doubt would increase members loyalty.
7. Members will have greater loyalty and commitment if finance for a specific capital expenditure project is financed through the membership either by a call on shares or debenture system.
8. Democratic member control must be maintained or loyalty will waver.
9. Increased loyalty can be expected from members that are well informed of their co-operative's actions and policies. However, a happy balance must be achieved as too much information could endanger a co-operatives competitiveness. If members know information is available to them, they are less likely to have suspicions.

10. Retaining profits and building unallocated reserves should be examined very carefully as it may well mean poorer returns to members and consequently less loyalty. An even balance must be struck.
11. Co-operative Boards should try where possible to have members of a broad age group and experience.
12. A Co-operative Board should fix a maximum term of office for both Directors and Chairmen that allow re-election after a given period of time off of the Board.
13. With increased sophistication in today's business world, co-operatives should commit themselves to Director Training Schemes.
14. State Governments in Australia should subsidize Directors and Administrators Training. By doing so they would minimize the high cost of supporting collapsed co-operatives.
15. The larger co-operatives grow the more difficult it becomes to maintain communication with the members. Co-operatives must explore every avenue to maintain this communication.
16. On the overall size of co-operatives a recently read quote that I thought fitted my ideas perfectly was, "large enough to count, but small enough to care".

D.

GRAIN LEGUMES

One of the many highlights of my scholarship was being able to attend the Easter School at Sutton Bonnington University, titled "The Pea Crop - A Basis for Improvement". Here contacts were made with breeders, researchers, marketing people and others concerning every facet of the pea crop, from seed through the plant growth to the end user. Many of the contacts I made at this conference were later visited throughout my tour.

I make just a few conclusions from what I have seen.

EUROPE:

In the EEC countries we are seeing tremendous interest and expansion in the area of grain legumes grown, the highest percentage of these being peas, however, faba beans are increasing and there is considerable interest in lupins, mainly because of harvestability and high protein content.

Much of this expansion is due to the massive subsidy offered by the EEC. This subsidy is currently around a A\$100.00 per tonne, guaranteeing the grower a minimum in the region of A\$300.00 per tonne for his crop. The subsidy is set high enough to attract growers to try these crops as an alternative to cereals. By doing this the EEC achieves two things :-

1. reduces the area sown to cereal crops, which are already in massive overproduction; and
2. reduces the amount of protein that has to be imported, which is currently running in excess of eleven million tonnes a year, mostly soya bean from the U.S.A.

Plant Variety Rights are also taking a major part in increasing production with big multi-national companies now encouraging their plant breeders to produce better varieties with better harvestability, better yields and better disease resistance to recoup the massive amount of money they are spending. Plant Variety Rights can give massive cash benefits to those companies that can breed a viable and sought after variety.

U.S.A.:

The major grain legumes are the summer crop types such as soya bean and edible beans such as those used in baked beans. As these crops are not suitable for South Australia I will not comment further on them. In the Northwest, in the area centred around Pullman and bridging the states of Washington and Idaho, we find the main area of production of peas, lentils, faba beans and chick peas. This area is well known for pea and lentil crops and grows more than 80% of the U.S.A's crop.

I was very impressed with the work being done by breeders and their knowledge of what markets were looking for and what the growers were looking for in a variety. I put this down to the fact that the breeders and researchers in the U.S.A. are required to spend some 40% of their time in extension work, both with the growers and the processors and therefore have a much better knowledge of the requirements of each. Obviously available money plays a part in it too, whether it be from the government or the research levy paid by the growers. The very strong growers association also plays a major part especially in developing markets and products to suit these markets. This is financed partly by growers but also receives good government support.

CANADA:

Canada too has some good breeding programs but they tend to be more like our own, smaller in size and surrounded by red tape. In other words they suffer from the delays and internal department jealousies, as do our own. Like our own breeders they do not get the financial support to the degree that we see in the EEC and the U.S.A.

There is no doubt in my mind that during the next decade we will see many vastly improved varieties throughout the world. I believe this will not only increase the area sown to grain legumes, but will also increase the consumption of them.

3.

The things that will bring them greater acceptance will be :-

1. harvestability
2. increased nodulation
3. increased yields
4. better palatability
5. increased protein content
6. better disease controls
7. their ability to improve soil fertility, therefore increasing the viability of the following crops.

E.

ALTERNATIVE CROPS

This last year has left little doubt in my mind about the increased future use of alternate crops. Firstly lets define an alternative crop. To me an alternative crop is any crop other than a main crop for any given area, that is growing in rotation with that main crop and is not a host to fungal or soil born diseases for that crop. The result should be an increase in profitability of the overall enterprise.

These alternate crops may be barely viable in their own right. Their use then depends on how much effect they have on increasing the yield of the following main crop. In other words, gone is the day when you simply look at one year's crop and you choose whether you grow it again or not by its return in that particular year. Increasingly we need to look at a complete rotation of say five years against a different rotation over the same period to get the correct answer to the best rotation.

Types of alternate crops differ considerably from place to place, according to rainfall, soil types etc. In the mid northwest of U.S.A. the main crop may well be corn with soya bean as an alternative or even visa-versa, whereas in Canada we see flax or canola as an alternative to cereal crops. In areas where sugarbeet is prevalent we may see potatoes or cereal as an alternative. Here in Australia, however, I see the majority of alternate crops being grain legumes and oil seeds.

There are farmers continually cropping with the same crop year after year by replacing the needs of the crop with artificial fertilizers. However, the viability of doing this is decreasing with the high cost of fertilizers. To survive the next decade I believe the use of alternate crops with the increased profitability and our long term ability to crop our soils will be the way that we have to go.

F.

COMPUTERS

The age of the silicon chip is most certainly upon us and while the size of it decreases its capacity just keeps increasing.

Not so many years ago the choice of hardware was quite limited and software for farming was virtually non-existent.

Not so today. Choosing the right hardware is almost a nightmare to the uninitiated. Do we buy an "Apple" or an "Apricot" or then again perhaps it should be "IBM Compatible"? Then of course there are the "Apple" lookalikes from Taiwan, and they are cheaper. All this knowing that whatever we choose today will be replaced by something tomorrow that is better and cheaper.

The agricultural software situation too has changed dramatically in the last couple of years. It is now very difficult to choose which program will suit your enterprise best. So the mind haemorrhages at the thought of purchasing a computer and getting it up and running. The salesman's pitch of course is that no farm office is complete without one, and think of how it will increase your efficiency. But do we need one?

There is no doubt that most farming operations would benefit from one but it is difficult to measure at just what stage or level of use it becomes viable.

The first criteria seems to be that you must be an enthusiast to survive the first year of setting it up and getting it running to your satisfaction. There is no doubt that during that first year of learning how to operate it and get the best out of it, many hours will be wasted. Providing you weather that first year the rest becomes a breeze.

For those thinking of computerising their office I would suggest that before purchasing the first good deal they see they should :-

1. look and ask around at others already using them in your area;

2. possibly join a group that have on farm computers and that meet regularly to discuss problems and ideas;
3. don't buy hardware that is not compatible with others in your area as this will deny you access to other programs etc.;
4. do a course in basic programming and/or computer awareness;
5. be aware that you may need to spend more time in the office in the first year than normal, until you have your computer up and running.

In the United Kingdom it would seem a tremendous number of farms are installing computers, many are tying in with Farmplan or Farmfax software, software companies developed by farmers. The simplicity in claiming rebates for Value Added Tax alone can almost justify an on farm computer in the United Kingdom.

In Alberta, Canada, Alberta Agriculture have a number of people evaluating hardware and software for agricultural use. They produce a monthly newsletter reporting on their findings of suitability, best value for money, availability etc. I was impressed with the support that Canadian farmers were getting from Alberta Agriculture.

There certainly is a place for on farm computers. However, it is difficult to assess at what level they are viable.

G.

FARM FINANCE

One of the many things that I looked at while I was in the United Kingdom, Canada and America was the different methods of farm financing.

Although many of the methods were in fact traditional methods as we see here, there were a couple of other things which are worth mentioning. I was both surprised and concerned to find that in the United Kingdom and in some continental countries the banks have been and still are lending on assets rather than the ability to repay.

For instance, in the United Kingdom I spoke to at least two farmers that had overdrafts in the range of three hundred thousand dollars and had no thought of principle repayment, in fact their overdrafts were actually increasing and therefore not only were they not meeting their principle repayments, but were falling behind with the interest repayments as well. This as I see it would only mean disaster in the long run.

Later when I visited Denmark I found in fact that this had happened in the past, that many farmers were propped up by the banks loaning on assets rather than their ability to repay, with the idea that things would improve in the future and farmers would again become viable. However, before this could happen the banks were forced to foreclose and as they foreclosed land prices started to fall and created a domino effect. This led to a crash of land prices within that country and new laws had to be made to arrest the whole collapse of the farming industry. Now we see land prices in Denmark are a third to a half of those just over the border.

In Canada some years ago the government at that time set up a land bank where they would purchase land from a farmer and then lease it back to his son, with the idea that this would overcome the problems of farmers leaving their farms to their sons and then not having enough money to retire, however, this tended to push land prices up as any artificial move usually does and later this idea was dropped.

The one thing that I did find both in the United Kingdom and Canada that I was most impressed with was that several banks are now setting up and using microcomputers to process farm cash flow budgets. Although the idea varied slightly from bank to bank, basically what it allowed the farmer to do was to process his information into a "what if" type program and therefore quickly the farmer could see his cash flow budget change with different inputs, of lets say, grain prices, or cattle prices, adjustments for higher prices or lower prices for the future and/or changes in acreages.

One bank in Canada using this method is actually training agronomists as loans officers and they can go onto the farm with a portable computer with the farmer's budget figures already recorded, sit around the table with the farmer so that he and the farmer have a screen each and then simply key in any adjustments or modification to the budget. Within seconds a new cash flow budget will appear for both to see. Further to that they can also feed in the repayment terms of a loan being considered and immediately see its effect on the cash flow and therefore the farmers ability to repay.

This is the sort of fine tuning to finances that I believe will be required to help farmers overcome lower commodity prices and higher input costs that are currently with us, and no doubt will escalate over the next few years.

There is no doubt that the chemical revolution is here and that countries all over the world are using chemicals as we are. Along with that, the new techniques of application are also quite apparent. I saw the following techniques and sprayers being used - hydraulic sprayers, hydraspin sprayers, flat disc, vertical disc, cone sprayers, micronair sprayers, sprayfoil sprayers and electrodyne (electrically charging water droplets).

The one thing that was very noticeable was that people using hydraulic sprayers were still using very high rates of water application, between 200 and 300 litres per hectare and were adamant that their amounts could not be reduced. Yet talking to people with new techniques or new types of sprayers using low volume, they were adamant that these were very successful. In a lot of cases the low volume sprayers were reducing the amount of chemicals being used and still getting good results.

One of the other things that I found interesting was the amount of self-propelled sprayers that were coming onto the market and in use in the United Kingdom and in Europe. Some of these self-propelled sprayers made use of computer technology, the computer analysing ground speed and then adjusting liquid flow and pressure to compensate for the different ground speeds to give very accurate application rates. The use of low ground pressure vehicles is also becoming fairly common with the compaction problems they have in the United Kingdom, it seems a step in the right direction.

The electrodyne, or the electrical charging of water droplets to reduce drift and also to attract droplets to the plant impressed me very much in the earlier stages of my investigation. The actual demonstrations looked very conclusive, however, looking at university tests of various sprayers, including the electrodyne method, or the electrostatic method there was no apparent advantage to be seen in control of drift or actual increase in efficiency of these sprayers.

At the end of it all it would seem that the hydraulic sprayer set up and used accurately, by a good operator is probably still as good as any sprayer available today. For low application rates it would seem even in this area, that the hydraulic sprayer still stands out if it is properly set up with computer technology controlling pressures in relation to ground speeds and liquid flow.

When we come to the reduction of the amount of chemical used, hydraulic sprayers still maintain their place and I would think it really still comes back to the actual operator and his assessment of the stage of crop growth, the actual weather of the day, soil moisture etc. It is the operators assessment of these values against the amount of chemical used that makes a difference between success and failure.

I. LONG TERM EFFECTS ON SOIL STRUCTURE AND FERTILITY
OF INTENSIVE CROPPING

One could say that the difference between England and Australia, or the Continent and Australia, is that over there they get nine days of rain and one of sunshine, here we get one of rain and nine days of sunshine. Consequently, the amount of run-off in Europe is far less than it is here in Australia and therefore the problem is substantially reduced. Also the deeper soils play a great part in the reduced run-off in Europe, however, the deeper soils also create a problem with compaction and we now see a lot of sub-soiling being carried out. This then reduces run-off and therefore holds water in the soil and allows good root penetration.

In North America run-off is a problem much the same as it is here in Australia. It would seem that in Northern U.S.A. and Canada that people are becoming much more aware of the problem of soil erosion than they are here. To a greater extent sub-soiling, straw incorporation and contouring are being employed to reduce run-off. The development of direct drilling equipment is much more advanced in Canada and the U.S.A., and chemicals are put to greater use to reduce the amount of soil tillage, or soil movement, thereby reducing the damage to the structure of the soil. I was surprised, in fact, by how poor soil structures seemed to be in the United Kingdom, but it is obvious that people are becoming very much more aware of their soil structure, or their lack of soil structure, and reduced tillage, straw incorporation, etc., is increasing dramatically.

We seem to be in between chemical and conventional here in Australia. Much of Canada has, in many cases, thrown away their cultivator share points and are using a knife edge in conjunction with chemicals.

United Kingdom farmers sell through an open market, supported by government export subsidies and government intervention buying.

FARMERS SELL TO -

1. Government intervention
2. End users
3. Co-operatives
4. Grain traders

STORAGES -

1. On farm
2. Syndicate of small co-operatives
3. Co-operative
4. Private company

Government intervention grain is stored in a variety of storages:-

Disused World War II sheds

New stores

Buying space in co-operative or private storage

Increasingly farmers are setting up co-operatives with modern storage, cleaning and grain drying facilities. The co-operatives are set up so that farmers can either sell to the co-operative or store grain until he wants to sell. One of the features that intrigued me about many of these co-operatives was that when a buyer specified a maximum moisture content of, for example, 14% and the grain was stored at say 11½%, then they have facilities to add water to bring it up close to 14%. Selling water at \$150.00 a tonne is a good business.

One other very noticeable trend has been for the United Kingdom to reduce quite dramatically its imports of high quality hard red bread making wheat from Canada. This is due largely to a new baking method developed by the Choreleywood Flour Milling and Baking Research Association. The Choreleywood method allows lower quality wheats to be used in bread making.

An interesting side to the intervention story was discovered while visiting a feed compounding co-operative in Denmark. This co-operative had reduced its grain buying at harvest time and rented its storage to the EEC Government Intervention Scheme. Then later in the year when they anticipated that intervention grain might be shifted they

bought it from the government at a slightly lower price than received by the grower. On top of this they were paid storage for the length of time it was held by intervention in their own store.

Canadian grain is all controlled by the Canadian Wheat Board with co-operatives and private traders acting as agents for it. Grain storage however is largely the responsibility of the farmer. The Wheat Board issues delivery quotas each year prior to harvest and gradually lifts them throughout the year. For example the amount allowed for delivery at harvest time in 1984 was four bushels per acre. The grain is delivered to either the co-operative or private traders grain elevator to load onto trains for the long haul to the seaports. These trains are normally about 1.5 km to 2 km long consisting of around 100 high 90 to 100 tonne bottom emptying hopper cars. Although changing now, the railways grain freight rates were heavily subsidized and railways could shift grain, for example, 1,500 km for about A\$6.50 per tonne (in South Australia we pay A\$8.15 for 90 km).

I was most impressed by the Canadian International Grain Institute and the role it played in training people from overseas countries on how to process Canadian grain into the products that they consume in their own countries. All too often we produce a grain or product and then try to sell it into a country that has no use for it, as it is not their traditional food. So this method of producing a wanted product out of Canadian grain would only lead to increased exports.

One of the reasons Canadian grain was held in high regard by overseas buyers is due to the cleaning of all grain at the Port storage facilities prior to loading onto ships. This is very closely monitored by government officials during loading and is closely adhered to.

Canadian farmers do not get paid for the screenings which are estimated at the time of delivery and docked from their delivery weights. The sale of these screenings then offsets the cost of storage. The Port facilities are set up with dust extraction

equipment. Steam is added to the dust which is then squeezed through a die to form pellets, which are sold for stock food. This they call their profit making equipment.

The U.S.A. handles most of its grain through local co-operative storage. These often belong to a central marketing co-operative with seaport and river front loading facilities. Much of U.S.A's grain is moved on inland waterways thereby reducing transportation costs considerably.

Wheat farmers in the U.S.A. at present have a floor price system within the P.I.K. program. If the price falls below US\$3.75 per bushel then the grower can sell to the government at that price. However should the price rise within nine months of harvest then he can buy back that grain at US\$3.75 and resell it at the new higher price.

The other P.I.K. program carried out during 1983 where farmers were paid to leave land under fallow has backfired to a degree with farmers harvesting higher yields from their 1983 fallow in 1984. To make matters worse, 1983 was a wide spread drought and farmers reacted by sowing roadside to roadside crops in 1984 to try and recover lost incomes. This has created massive over production, but little relief for the farmers liquidity with higher production costs and lower commodity prices.

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