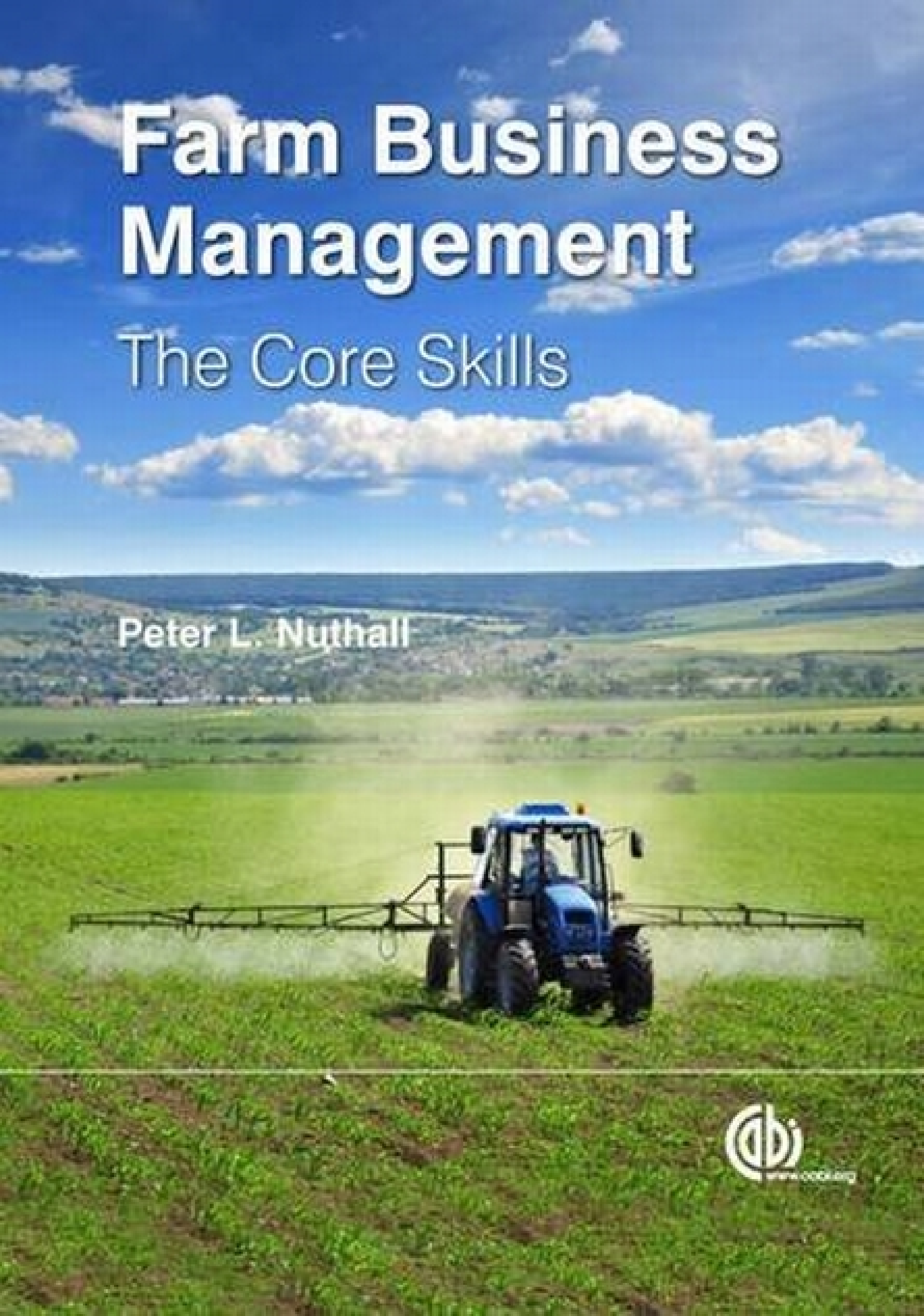

Farm Business Management

The Core Skills

Peter L. Nuthall

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The Author

Peter Nuthall has spent many years teaching and researching aspects of farm management. In addition he has developed and managed a team involved in producing and supporting computer aided management systems used by large numbers of farmers. While most of his time has been at Lincoln University in Canterbury, New Zealand, he has also researched and/or taught at the University of Queensland, Purdue University (Indiana), the University of Kent and the University of Edinburgh. He has also worked for the UK Milk Marketing Board while based at the University of Nottingham (Sutton Bonnington). Many institutions involved in researching and teaching farm management have been visited to gather ideas in both the developed and developing world. He also has experience of agriculture in a diverse range of situations including Russia, India, Fiji, Australia, New Zealand, the USA and the UK. Nuthall has published widely in scientific journals throughout the world, and in monographs as well as having many research items taken up by the popular farming press.

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Pictures displayed have come from a range of sources including the magazines published over the years for the sheep and cattle farmers of New Zealand by what is now called Meat & Wool New Zealand. Images have also come from the United States Department of Agriculture and the Consultative Group on International Agricultural Research (and their research stations in various developing countries). These sources are all gratefully acknowledged.

Specifically, the magazines include *Meat and Wool Innovation*, *Wool Innovation and Wool Grower*, from which both photos and quoted excerpts have been presented. Permission to use this material from Meat & Wool New Zealand is gratefully acknowledged.

A major part of the funding for the initial development of this material was supplied by Meat & Wool New Zealand. This significant contribution is also gratefully acknowledged.

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Introduction

Every farmer wants to be an excellent manager. Getting more out of the land and resources held is most farmers' ambition, particularly if it costs little to be successful. Improvement in managerial ability does, however, involve an investment of time – time studying others' methods, time in reading and watching, time in practising and experimenting and, in this case, time in studying the methods and ideas contained in the pages of this book.

The book has resulted from reviewing many studies of farmers, non-farmers and management research journals and texts. Some of the studies, carried out by the author, relied on interviewing farmers, both successful and less successful. Thus, the book encapsulates what is happening in the very practical world of modern farming and is a summary of what is, hopefully, intelligent observation of the results of the myriads of studies conducted in many countries. It also encapsulates many ideas from management experts in different sectors of the economy that have value in primary production.

While the book is a practical guide to improving management, it is not a book about the practical aspects of the physical side of farm management. Methods of constructing a stock-proof fence, aspects of ensuring good animal health, ways of improving soil fertility, and so on, are hardly ever mentioned. Rather the emphasis is on the core skills and techniques of making decisions, not on their practical implementation.

The book is divided into six parts as well as this introduction. As decisions require information, the first function of good management is in observing all the factors that impinge on, and make up, a farm.

Decision making is about the future. You decide on a course of action and put it into action. The implementation of the decision, and the resulting outcomes, occur in the future, not in the past. In contrast, observation takes place in the present. However, what you observe is the result of what happened in the past, so to make decisions you need to know what state the farm and world is in at the present time. On the other hand, you cannot make a decision unless you know the likely future outcomes from any decision made in the 'here and now'. Thus the second critical area in good management is the ability to successfully anticipate the future. The second part of the book covers this area.

The words 'anticipating the future' suggest it is possible to predict what will happen. If only that was true! In reality every farmer and consultant knows primary production is full of uncertainties. What will the weather do in 2 days' time? What will the price of wheat be on the open market? And what about the price of hay and replacement animals? The list goes on and on, for very little is certain other than some of the bills that come in with monotonous certainty. Thus, a critical part of good management is understanding risk and uncertainty and the methods of dealing with it. Consequently, the third part of the book is about this risk and uncertainty and its many components. This is a difficult area to come to grips with, particularly in primary production, for just about all aspects are uncertain, and so often what a farmer thought was the correct decision and action turns out to be incorrect with hindsight. This does not mean the decision was incorrect, just that bad luck has occurred. Some you win, some you lose. That is the nature of production in an uncertain and risky world. Not for the faint hearted you might think, and you would be correct, for there is good evidence to suggest farmers that find risk difficult will get quite depressed and give in to the stresses. Clearly professional help is required in these situations, but if the farmer fully understands the nature of risk and uncertainty, keeping an even keel is much easier, and certainly more productive in achieving the goals.

In summary, the three main sections cover observation, anticipation and risk management (Parts 1, 2 and 3). To complete these sections an appendix (Part 6) of self testing material provides the reader with 'food for thought' over all the management skills that are likely to be used by a farmer. This comprises a series of 'tests' for each major skill area, together with the answers, enabling self grading. This is where honesty is required if the tests are to be helpful. That is, take the tests without first looking at the answers, some of which you probably will not agree with anyway. That is your prerogative. In addition, each part of the main text also has exercises and mini-tests, largely as appendices to the first three parts, to reinforce the messages provided. It is important to attempt all of them, as good evidence clearly shows participation is critical to learning.

The main sections are rounded off with a concluding section (Part 4), which contains information on what creates high managerial ability. Clearly, success in all the skills covered in the book are part and parcel of high ability, but in addition the human factors portrayed by a manager also influence managerial success. This last part considers these factors and summarizes how they might be changed (for a full discussion on the human aspects of managerial ability see Nuthall, P.L. (2009) *Farm Business Management: the Human Factor*. CAB International, Wallingford, UK).

These important human factors include a farmer's management style, 'locus of control' and managerial aptitude. Assessing these human factors (which might be called a farmer's management profile) involves using various tests. These tests are presented in Part 5 of this book. A farmer's personality, or management style, influences decision making and so must be studied through the test provided. A farmer's attitude to how much control he has over farming outcomes is referred to as the 'locus of control', for which a test is also provided. Then there is the question of just what is the farmer's inherent level of farming intelligence, or what might be better called managerial aptitude. Unfortunately a simple test providing this information is just not available and, besides, it is doubtful if there ever could be one due to the practical nature of farm management. Despite this, a test is provided to act as a guide to aptitude. This test has research data indicating it is related to ability (as do all the other tests mentioned). For each of these tests, data are provided enabling you to compare a farmer's unique approach to those from large samples of other farmers.

Each of the three core parts is made up of many subsections, or chapters as they are referred to. The contents page lists out the chapters and subcomponents provided for each of the observation, anticipation and risk management parts, and similarly the sections containing the assessments (Part 5), quizzes and tests (Part 6). But it should be noted there are test-like tasks in some of the other sections. For example in the ‘observation’ part you are asked to write down information about a farm (perhaps your farm, or perhaps a case study farm)... how much can you accurately recall?

Examples of the chapters in the observation part are reading, listening and visual observation skills. How well do you pick up information when listening to someone? How can you be assured of getting the maximum of information from an expert you are talking to?

While the appendices can be looked at whenever the notion takes you, it should generally be left until the completion of each part. Thus there is a set of tests related to each of ‘observation’, ‘anticipation’ and ‘risk management’. However, the assessments in Part 5 on management style, ‘locus of control’ and management ability can be attempted at any stage. You can use them for assessing farmers’ profiles, and then reuse them after farmers might have attended courses or, for example, after working with colleagues in a farm discussion group, which may well help improve a farmer’s skills over a 2-year period. Perhaps this book might also form the basis of discussion group activities besides the normal practical aspects covered by such groups.

While the major topics of ‘observation’, ‘anticipation’ and ‘risk management’ are the logical areas to consider, they were also the subjects that a large group of farmers said were important. A survey, which was answered by some 700 farmers of all types and ages, asked the farmers to prioritize a very large number of listed skills and farmer attributes that they thought were important to successful farm management. When this list was summarized the clear groupings of what were regarded as the important skills fell into these three categories (observation, anticipation, and risk management) (for details see Nuthall, P.L. (2006) Determining the important management skill competencies. *Agricultural Systems* 88, 429–450).

Finally, some might believe that a farmer is born with management ability and nothing you can do will change this. Fortunately, there is clear evidence that a farmer’s style in particular, and ability in general, can be changed if hard work is put into the process, particularly with the help and mentoring of others. There is also evidence that ability is related to early life experiences, so it is the fortunate farmer who had parents that exposed them to beneficial experiences, particularly on a farm.

With its many short chapters and subsections, this book is designed to support a student or farmer who does not have a lot of time to spend reading at any one sitting. Each module can be completed in less than an hour or so, making it possible to finish off a module in one session. Some readers may well find spending this time in the morning might be advantageous in contrast to attacking a module at night after a full day.

The book should be used in conjunction with one, or more, case study farms, or alternatively the reader’s farm can be used, particularly for practising farmers, or a student who will return to a farm, for clearly the results of study in these cases will provide immediately useful conclusions. Similarly, many of the exercises rely on the reader being familiar with a farm that is then used as a base in providing situations and data for the exercises.

Good luck with your managerial ability improvement both through this book and every other experience. In the end, it is these experiences, if intelligently used, that lead to improvement. This book will help the process. It should also be noted that the use of ‘he’ or ‘him’ in the text does not imply that the text is for males. These terms are used to refer to both female and male readers and farmers. The male form is used because currently most farm managers are indeed male, though in colleges and universities the gender mix is more even, which will eventually lead to a more natural mix in the industry. Where the symbol ‘$’ is used in the text, it refers to New Zealand dollars unless stated otherwise. At the time of writing, NZ$1 = US$0.71 = €0.52 = £0.46.

Part 1 Observation

CHAPTER 1.1 INTRODUCTION TO OBSERVATION SKILLS

To make good decisions you need to know the facts. These come from accurate and all-encompassing observation of the farm, of the markets, of the technological and research environment in which the farm operates, and of the relevant rules and regulations with which the farmer must comply. It is crucial that farmers develop and enhance these observation skills. They must also, of course, develop the skills to make good use of the information observed.

You observe with the help of your senses – sight, hearing, touch and smell. Touch and smell are important in a day to day sense – Is the hay ready to bale? Is there a fire at the back of the farm? – but in a planning and decision-making sense the farmer's eyes and ears become the window to the world in which the farm operates. You visually observe the farm, and other farms, the weather, and you read, and you listen to lectures, talks and the like. All of these activities provide resources, the data, and the intuitive feelings that enable decisions. Comprehensive and accurate observation is crucial to achieving the farm's objectives.

Most farmers have never thought about observation skills in an active sense. They have just acquired what skills they have over the course of normal living. Most farmers, with some formal training, can improve these skills with benefit to efficient decision making and greater success in achieving their objectives. Improvement in observation is, however, seldom dramatic. Working at the skills outlined here produces steady changes and consequent changes in efficiency. Eventually this change does become evident through improved outcomes and satisfaction.

Relevant Facts to Observe

Observation must occur in all areas affecting the farm and its people. In the first instance a manager must observe: (i) the people around him/her – family members, professionals (e.g. accountants, consultants, fertilizer representatives), employees, contractors, etc. The crucial thing is to be able to communicate with all these people, and this involves understanding them and their spoken and non-verbal messages. Then there is: (ii) biological observation – animals, plants, diseases, processes; and (iii) physical factor observations, including the weather, buildings, fences, soil moisture etc. Off-farm observation is equally important, including: (iv) markets and prices/costs, trends, political factor impacts; and (v) institutional factors including local body (council) rules and regulations. Another important area is observing: (vi) the financial situation of the farm and the off-farm financial events. And certainly not least is the area of: (vii) opportunities (e.g. products, methods of production, health management); and (viii) recognizing current on-farm problems.

In a nutshell, a manager must observe, note and interpret a very wide range of information and keep a synopsis in her/his mind ready for action. To confirm a farmer's understanding of the important areas he should attempt the exercise in Appendix A1 (Areas Requiring Observation).

Develop Good Processes – Completeness and Accuracy are Keys

Useful information comes from the successful processing and interpretation of the facts that are noted, and their complete and impartial logging. It is no good calculating the average lambing percentage if you only remember the good years – expectations will be incorrect.

Behind all the observation there must be processes . . . if the farmer observes a listless animal, he immediately starts processing this information to conclude whether there is a problem that needs some action. This requires benchmarks or standards to be stored about what is acceptable, what is not, and triggers that create an action call. All these processes are part of observation and interpretation and need to be trained and developed as components of good management.

For example, one process that is important is soil moisture monitoring. Soil moisture leads to pasture growth (and crop development) and thus eventually animal live-weight profiles, growth and production. You observe rainfall and the weather (deficit days), leading to conclusions on soil moisture. This in turn impacts on forecasts of plant production through observing the current state of pastures (crops), and thus, the expected growth. Eventually all the rain, sunshine and temperatures lead to feed supply and feed budgets (and to crop yields), which give rise to cash-flow budgets.

The observation of these factors, and markets, starts a process of calculating, either on paper or intuitively, the monthly cash inputs and outputs. This leads to profit and tax payments, further calculation processes that end up with an observation of the expected cash surplus, that all important end-point. Thus, managing this surplus all starts with soil moisture and observation and following this through with a logical process.

However, for the estimates of the cash surplus to be correct, *all* the observations must be accurate. This involves not only noting the true facts, but also interpreting them correctly. Any bias must be recognized and corrected. Many farmers quote just their good years when reflecting on the lambing percentage of lambs sold to ewes to the ram. It is human nature to select the positive outcomes. Thus, cross checking observations to guard against bias and inaccuracies is important, and this may involve taking several samples (e.g. weighing several groups of sheep).

Observation Skills Needed

After noticing everything of importance, this must then be committed to memory (or 'paper'). Interpretation is then the key factor, as is an ability to decide whether an apparent fact is indeed true.

Successful observation involves several skills:

- The farmer's faculties must actually notice and register everything and retain what is important – this might be called 'base' observation and involves visual, auditory (listening) and reading skills.
- The relevant information must be put into long-term memory and be able to be recalled on demand. Clearly, you want the information when it is needed. Thus, a good memory is important and while some reckon they do not have much of a memory, memory is a matter of training.
- You must use interpretive and filtering skills – use the observations to note opportunities, problems, and the factors important to resolving decision issues, and discard the irrelevant.
- Healthy observation involves maintaining a somewhat sceptical attitude to check and cross-check information – do not always believe what you observe, are told, or read – double check and end up with a comfortable feeling about the accuracy of the information stored.
- You must recognize that it is not always possible, nor is it legally acceptable, for a farmer to use just his brain to remember absolutely everything. Recording systems are a necessary part of observation. For tax, for example, records are legally required in most countries. But, even for other observations, it makes sense to help the memory with written records. Similarly, to help the base observation in the first place, various aids might be used, so a knowledge of them is useful – e.g. rising plate plant dry matter meters, electronic scales and soil moisture meters. Another example is the use of body condition scoring – not a physical device, but a mental process that helps put meaning into observation.

The Plan Ahead

The chapters that follow explain the components and factors important in each observation attribute. For each section there are a number of exercises, located in an appendix, which you should follow through. There is nothing like practice to develop skills – and constant practice using the techniques suggested as you carry out daily activities is highly recommended.

Recent Observations

Some people automatically notice and register most things of importance. You might well be one of these people. First, check what you remember from the last visit to a case farm, or from the last 48 hours on your own farm. And then, secondly, check whether you have stored away all the relevant information about the farm to understand its current state. Thus, for each of the areas listed below, jot down the issues you observed relating to (skip any that do not have an issue):

On farm
Feed, animal and crop/forage situation
Employee/contractor relationships
Weather situation and physical facilities
Financial situation

Off farm
Market/price/cost issues
New technology/methods
New/changed regulations and rules

How many situations did you note? You might expect to have at least 10–13 items jotted down if you are observing and noting well.

Furthermore, part of good decision making is selecting the things you are going to tackle in the immediate future. After a moments thought, you might like to jot down the top five for a farm, if appropriate, or in your study programme.

Hopefully this exercise was easy in that an active mind will be constantly sorting jobs into priority lists and tackling them accordingly.

Reality Check: Questionnaire on a Case Farm (or Perhaps Your Farm)

To plan and make decisions it is essential to know all about what you are working with. You probably are fairly confident that you know the current state of any property you are working with and, hopefully, its finances. The resources, and their condition, is the base from which the farm must operate today, tomorrow, and every moment into the future. But, just how well do you know the farm's state?

Without looking up records, answer the questions given in Appendix A1 (Farm Reality Check) about the property in terms of its current situation. For any questions you are relatively unsure about enter 'NS'. Any questions that do *not* apply, leave blank. Jot the answers on a piece of paper for checking later. You might like to photocopy the pages and consequently record your answers.

Success of the reality check

How many of the applicable questions could you answer with certainty? _____
How many were you only partially sure about? _____
And how many were what might be called a guess? _____

If you do not know with reasonable accuracy just what situation the farm and the assets/debts are in it is not possible to make the best plans. Good management starts from observation and a good knowledge of the current state of the farm.

The subject of the next chapter is visual observation. To prepare you for this, consider Fig. 1.1 and reflect on the following questions.

Do you agree that the important factors are:

- The soil is dry given all the dust (or has lime/fertilizer just been spread?).
- It is *not* raining!
- However, the growth on the strip being cultivated relative to the rest of the field would suggest that irrigation has been used at some time.
- The 'farm' could be a horticultural property, or one that is growing specialist seed crops, for there do seem to be strips in the field that have had different 'crops' on them.
- The tractor is small, and is an older model with a safety bar. This would go along with the idea of a horticultural unit that does not have large areas to

cultivate, with the tractors lasting well, and not having a need for high kW machines.

- The background has a well established tree area suggesting, perhaps, that the area has been 'farmed' for many years. Possibly the area is not used for widespread intensive production, otherwise the tree area would be reduced to make better use of the valuable land.

Did you notice anything else? Getting it right is critical to good decision making.

Fig. 1.1. Tractor working.

CHAPTER 1.2 VISUAL OBSERVATION

Successful visual observation is a cornerstone to good management and requires sharpness. But 'visual' observation usually means using more than just your eyes. All senses come into play. When you last saw a fire did you have a 'picture' of the fire that included the smell? However, some people 'see' everything, but nothing registers. Others are nearly the opposite. But certainly training and practice helps.

Can you think of anything you missed in the last 6 months? You would be unusual if you had not. You would also be unusual if you cannot improve your visual observation. Improvement here means picking up the important information on offer. Filtering what you see is also important to reduce clutter.

Part of 'seeing' is making sure you use your hearing and smell. How often have you picked up a problem through these faculties? For example, smelling smoke and consequently looking more closely to see if there is a problem, or hearing an animal disturbance and following it up to find a marauding dog, and so on.

What observation method do you use? Abstract or visual? Recording, remembering and considering 'objects' and 'scenes' can be abstract based (e.g. kilograms of live weight, centimetres of pasture height) *or* visual (an image of a ewe, or of a pasture or crop).

If you think of improving pastures through selecting the right grasses, clovers, and fertilizer application as well as grazing routines, do you think about this using words and numbers such as a figure for the extra dry matter produced, the quantity of seed to purchase, the quantity of fertilizer, etc., *or* do you have a picture (photograph) in your mind of what the perfect pasture *looks* like, of the well grown animals grazing it, perhaps an electric fence? Most people think in 'pictures' rather than numbers and words. How boring it would be daydreaming about numbers and words . . . but, of course, eventually numbers are important when, for example, ordering seed and fertilizer.

Consequently, it is important to create an accurate mind *image* of the real situation, and to have in your mind's *eye* details of the critical aspects: what is the grass/clover ratio in this perfect pasture, what is its height, what is the plant density? Having accurate images of what exists, and what you would like, is a starting point to good management. They provide targets. Consider the 'scene' in Fig. 1.2 – what does it tell you? What do you notice?

Shut your eyes – can you still see it? It would be interesting to know if tomorrow morning you still have the picture in your mind. In the meantime, see if you can recall the important components of the scene after covering the picture with a piece of paper.

Did you use a visual approach through keeping the picture in your mind's eye? And did you recall two women discussing corn (maize)/seed samples?

To improve your skills it is important to have a process to follow. This involves scanning, interpretation, re-examination, review and repeat, snapshot storage, conclusion.

Fig. 1.2. Research at work.

Steps in Visual Processing

Correct and useful visual observation is an *active* process – you probably find at the moment you just glance at your surroundings without thinking much about it. You have learned from hard experience that if you do not take in certain things it can be a painful experience – did you notice the block of wood in your way and therefore avoid it? Painful outcomes right from an early age have taught you to make sure you notice certain things. More recently, you learned that a stop sign means *stop*, or risk a hefty fine or an accident. These things have all become automatic.

Equally, improving the visual process initially requires concentration and practice, but eventually it becomes second nature that requires little concentration, but you will, most likely, actually take in more information. Did you ever join the scouts or guides and get your observation badge?

What is the process you would logically follow when ensuring you correctly observe important aspects? Try the following:

1. Quickly scan what is around you, and do another re-scan. What features of the scene have some importance?
2. Careful examination – return your focus on to the features that seem to be important. Examine them carefully, mentally noting the critical aspects.
3. Meaning – consider these critical aspects, and decide what they mean for your situation, particularly with respect to decisions you must make.
4. Review and repeat – go over in your mind the important observations and imprint them in your mind's eye (e.g. can you picture the clouds of the approaching storm?). Relate what you see to the whole farm situation (possibly turn off the irrigation?).
5. Snapshot storage – as part of reviewing and repeating, imagine taking a photograph of the sub-scene/s that are critical, and store them in your mind like a slide show.
6. Review and conclusion – finally re-review the important factors you have observed and the conclusions – perhaps for action.
7. *And* re-scan the whole scene around you, making sure nothing is missed.
8. If relevant, write down in your field notebook any conclusions/action notes (e.g. fix the hole in the fence).
9. Review again – perhaps talk over what you saw today with a helper (spouse, family member...), and what it told you, and also recall the snapshots.

To improve your skills, exercise your mind using the steps listed. A book exercise is given in Appendix A1 (Practice at Using the Correct Visual Observation Process). If you have an 'idle' moment (driving somewhere, having a coffee/tea break, etc.) picture your surroundings and note the important aspects. Recall the captured 'snapshots' last thing at night and mentally review the important observations. The age-old object memory exercise can be useful: ask a friend to put five objects on a table. Then look at the objects for 2 minutes, retire and write down the objects you observed. Were you correct? Then try increasing the number of objects. If you can do this in turns it makes the task into fun. But this must then lead on to some practical practice. Do the same thing in the field, but in this case it is 'nature' that is putting out the objects.

For an exercise in the real world: what did you see/observe today of significance? Can you recall the snapshot of the situation, and the significance of what you observed? Jot down your observations. These might be from a farm, but also from what you read, heard, etc.

Finally, think of the key words that encapsulate visual observation.

You might have come up with some of the following: faculties, eyes, senses, smell, hearing, touch, facts, note, abstract, visual, recording, remembering, scene, missed, filter, clutter, scanning, interpretation, review, repeat, storage, snapshot, conclusion, practice, significant, active, scan, re-scan, recite, benchmark, relevant, active, concentrate, record, critical.

Further visual observation exercises are provided in Appendix A1 (Reinforcement of Visual Observation).

CHAPTER 1.3 READING SKILLS (OBSERVATION)

Introduction

Research has shown a large proportion of the useful information obtained by successful farmers comes from reading. Thus, it makes sense to spend time further developing your skills of obtaining, retaining and understanding the core information contained in anything you read. Of course, the same applies to listening and seeing, and many of the techniques used in getting the most out of reading also apply to listening and seeing, and vice versa.

This section contains a number of suggestions to help you get the most out of reading. To improve your skills you need to constantly practise the techniques. Examples and exercises are provided to assist this process.

'Active reading' is the term used to describe best reading practice. In a nutshell, you need to skim, summarize, question and conclude as you read. There are clearly defined steps to follow. A good starting point is defining your reasons (or objectives) for reading the material.

Active reading

As in listening, the success to getting value out of your reading is to be actively involved. Thus, it's not just a matter of reading through a magazine article, a book on animal health, or whatever, and having finished, thought to yourself – 'that was interesting and useful!' This is called passive reading – you are simply reading line after line, paragraph after paragraph, and, if you are like most of us, finding your mind straying from time to time. *Active* reading is not like reading! You must be constantly thinking about, and reviewing, the material you are reading. Your eyes and mind are not just simply blotting up the information, because it will just as quickly 'blot out'! Your brain must be *active* in constantly questioning, reviewing and summarizing what you read. Robinson (Robinson, F.P. (1946) *Effective Study*, Harper and Bros, New York) and no doubt others too, developed a technique to encourage active reading, called 'PQR3'. The letters stand for:

- P = preview (or sometimes S for survey, thus SQR3);
- Q = question;
- R3 = read, recite and review.

This whole process requires you to have some goals – a purpose for reading. If you are looking at an article in one of the latest farming magazines on drenching for internal parasites, your goal might be to compare what the article says with what you understand is best practice, and subsequently change your knowledge of drenching management if this seems warranted on the evidence. Armed with this goal you read with purpose. You concentrate on just the relevant information, and discard the filling pieces. Of course, sometimes you do not know the goal to start with, so you might have to start again. Notice also that the process involves relating what you read to benchmarks and other information you hold – you have a current set of beliefs and you want to know whether these should be changed, or in some cases you will conclude what you read *adds to*, or extends, your current set of beliefs. It is clear that useful reading is *active* – your mind is constantly working, not just absorbing information.

Thus, to summarize (something your active reading should be doing constantly), you will follow PQR3 and this involves having *goals* on what you want from the material, and relating what you read to what you know, and changing accordingly. It is an *active* process.

The first step is 'skimming' (preview) to obtain a general idea of the whole article. This tells you which parts are relevant, and what your goals might be. This leads on to actually reading the material, and this is followed with the remainder of PQR3. Details of each step are listed below.

Preview (or survey) and question

The first step is *not* to concentrate on the article word for word, but to preview the whole article, to skim through it all, to conduct a quick survey of what it is all about. You can then set your goals on what you want from the article, decide on which parts to read and which to skip. It is a bit like looking for a word in the dictionary – you don't start at A and make your way through the alphabet until you come to the word you want – you skim and concentrate on the bits you want.

This preview/survey allows you to prepare your mind for what to expect and look for – that is, create your goals. Goals might be thought of as questions – you want certain things answered. Thus the second step in PQR3 is to decide 'What are the Questions that need answering?'

Read the excerpt below and then see whether your skimming provides the same goals as were concluded by someone else. Of course, each person might have different goals depending on their situation and current knowledge.

When talking about nitrogen use it was said:

> Nitrogen stress in pastures occurs at different times during the year depending on local climatic conditions. Many pastures, whether used for sheep, beef or dairy farming, have shown responses to N fertilizer applications. The response is not necessarily restricted to particular grass species but will occur from any grass pasture provided there is nitrogen stress, and other factors are not seriously limiting. Good grazing management is needed to ensure the clovers do not get shaded out by the grass being allowed to get too long after application of N fertilizer. Spring N fertilizer applications are likely to be beneficial in many pastures but the soil temperature needs to be above 5°C for a response to occur soon after application. . . . Recent research indicates that there appears to be no advantage in applying frequent light dressings of 10 kg N/ha compared to a

> single application of 50 kg N/ha, although there is greater risk of a larger leaching loss if heavy rain occurs soon after the heavier application rate. Single applications of more than 50 kg N/ha are not recommended.

Having skimmed the statement, the first step in efficient reading is to decide what your goal is in re-reading the material, to decide on what information you can get from the piece. Which of the options below do you think most farmers would take as the goal?

1. Rate of N fertilizer to optimize production.
2. Conditions under which N fertilizer might be used.

Of course, the second choice is what most would regard as correct. The reasoning is that this reading is about much more than N fertilizer rates. It covers several areas where N might be useful (species mix, soil temp, application system, rainfall conditions, etc.) and, consequently, generally gives the rules that should be taken into account when thinking about N. Of course, other factors should also be considered. Examples are the price of N, the value of the product produced (grass which leads to milk, meat and wool), current feed reserves and so on. Did you agree with this conclusion?

Read – the first R

Having previewed and posed the relevant questions, you can now start *reading* – going through the relevant sections in detail. Of course, as a result you might alter the questions originally posed (the goals), but this is to be expected as your understanding improves. You will perhaps have to re-read sections as the *active* process proceeds and you think, relate and critique the information. The result you are looking for is an *understanding* of the material offered. You will finish when you believe you fully comprehend the meaning the author has attempted to portray. Of course, this will not always be possible as you can seldom check your understanding with the author (but perhaps s/he is on e-mail).

As the process proceeds you should be constantly giving yourself *feedback* – for example, you think the author is saying that to get maximum pasture production in the spring you must not graze below 1000 kg/ha (or whatever the case is). When you have finished you should have a summary in your mind, and you can ask:

- How well do I understand the reading?
- Have I constructed a reasonable summary?
- What bits are unclear?
- Where can I go for help to fill in the gaps?
- What are the relationships between the material and other information on the subject?
- Do I believe the main conclusions?
- Which parts need further verification?

Exercise

Consider the excerpt below and then answer the questions (of course you should first skim read before reading further in more detail):

> The Health and Safety in Employment Act 1992, which came into force in 1993 has wide implications for those involved in the farming industry workplace.

> There are now a number of reported Court decisions under the Act which reinforce the need for farm employers to be aware of both the philosophical principles underlying the scheme of the Act and the Statutory provisions which they must perform.
>
> **The Scheme of the Act**
> The Act replaces almost all of the Health and Safety legislation that existed prior to April 1993. The Act signals a move in emphasis from prescriptive standards (such as those found in the Factories and Commercial Premises Act 1987, which set out specific standards of work place safety) to performance standards in which a safety object is described – for example the provision of a safe and healthy work environment – without specifically prescribing how the object should be achieved.
>
> **Key Points**
> The Act requires a change in philosophy on the part of the farmer employers to be proactive; in other words to seek out all hazards and to take steps to prevent injury to workers. A new philosophy is required by the Act; employers are now required to be analytical and critical in providing and maintaining a safe working environment; it is not just a matter of meeting minimum standards and codes laid down by the statute, it requires employers to go further and to set their own standards after due analysis and criticism.

What was the main message/s from the material? Do you think it is:

1. No longer do specific rules apply, so the farmer must work out what is sensible.
2. The Court proceedings must be studied to provide operational rules.

There is not much doubt that you have to be proactive about ensuring adequate health and safety provisions around a farm. These will be farm dependent, rather than fixed by the court, due to the differences between farm situations. Thus the first choice was correct.

What ideas/sections need clarification?

1. What is meant by adequate health and safety?
2. The dates over which the new regulations apply.

The material does not give any clues as to just how a farmer should go about the process. Does the farmer have to give every employee written instructions? Does the farmer have to test everything first? And what is the responsibility of the employees?

How does the material relate to other sections of the farm situation?

1. It has nothing to do with other aspects.
2. It is concerned with the operation of machinery as well as chemicals.

This could be a matter of debate, but certainly the Act covers all aspects of a farm operation from the safety of the buildings to the condition of the tools and how they are used. So, effectively, all aspects are important.

Now consider just what process should be followed when finally fully reading the material.

The reading process

It is usually good practice to highlight or underline the main points if this is possible. If it is someone else's magazine or book you might have to resort to using a notebook for jotting down the main points. In the end it is always useful to commit to paper the conclusions and facts you obtain, perhaps on cards that can be filed in boxes, or in a cabinet that has sections for each major topic, e.g. Plants: cultivars; disease; nutrient requirements; grazing attributes. *Writing* is clearly part of *active* reading.

An active exercise

In the extract that follows, which of the bracketed sections would you highlight as the most important statement? The choices are in brackets with a leading number.

> (1 The health of your animals is an interesting question) often discussed by both farmers, vets, and (2 animal remedies manufacturers). The regulators also discuss this issue as do the (3 industry associations). Each one is interested in (4 gaining benefit for themselves). Much is written on what the farmer should do . . . use this drench often, and spray your pasture with our special mix to provide essential trace elements . . . and so on. It's often (5 hard to decide) as they all say you will gain if you do what is suggested.

To understand the nature of the material you are constantly presented with you need to be fully aware of the motivation behind advertising. Thus, in this instance, option four was chosen, though this is not to say that some of the other statements might not also have been highlighted.

Recite and review – the final two Rs

You need to work hard at storing the information for use as required, but this must also involve critical thinking to sort out what you believe is the current *truth*! Can you remember something you learned by heart at school – a poem, a song, the four times table perhaps? You repeated it over and over until it stuck, and it is still there today. But *reciting* does work in remembering main points – and this is all you require, as you can refer to the detail as and when required. Reciting might be spoken, or written. When 'spoken', you might like to tell someone else your conclusions. This is a form of review session. It is amazing how this helps both parties involved. It is a part of *active* reading.

In the days, weeks and years that follow, it is useful to *review* what you have learned – this can be a mind exercise, or perhaps a discussion exercise where you go over the relevant points with fellow students, family, or possibly neighbours or a discussion group.

Remember that one component of a farm is more than likely related to other components – the fertilizer is related to the soil, to the plants, to the rainfall, to the animal intake and growth, and then to the cash flows – it's an integrated whole. Thus, any review must consider the impact of the information learned on the whole farm. For example, an article on the importance of organic matter in the soil and its impact on the water-holding capacity and fertility clearly has many flow-through components.

Increasing stock numbers can increase the nutrient cycling, which has further impacts on the farm.

Review also involves *critical thinking* about what you have been reading. Do not just accept everything you read – not that most of what is written sets out to mislead – but what does it leave out? Which favourable trial results does it include, which failures does it forget to mention, were the results from just one trial or on a typical soil type, etc.? Critical thinking does not have to be negative, just realistic. Use all your faculties to mentally check out the confidence you can have in the report. Store away your conclusions but do not ignore future material on the subject – you might have to modify your conclusion as further evidence comes to light.

'Recite and review' exercise

Read the excerpt below using your newfound skills (skim, goals, *read*) and then *recite* and *review* so that you can answer the questions from memory.

> The wool handler prepares the fleece by removing shorter or discoloured parts from the fleece as it is being shorn (e.g. crutchings, top knots, sock etc.) and then when it is thrown on the table (e.g. first pieces, necks, seedy backs etc.). They are also responsible for transporting the fleece from the board to the table. During shearing the belly wool is removed first and is collected separately. Shorter, discoloured crutch wools, second cuts and pieces from the legs and head, as well as stains and dags, are separated as they come off the sheep, and swept clear leaving the main fleece clear of inferior wools. The fleece is then thrown on a slatted table where it is skirted to remove faults (clotted portions, vegetable matter, shed stain, etc.) and permanently discoloured or very much shorter wools. During this operation, loose pieces and second cuts still adhering to the fleece are shaken free and fall through the slats to the floor from where they are collected and packed with the shearing board sweepings.

What is the main point you got from this reading?

1. Wool handlers have a simple task.
2. Quality wool is important.
3. Separating wool into like groups is important.

The reading has many sub-topics about the various wool components the handler must watch out for and separate out, so clearly the task is not simple as judgement is required about each type, as is when selecting out the various pieces. And certainly quality wool is important, but that is not what the reading is about. Thus, the central point is number 3, you must create bundles of similar product.

Do you believe *all* you read? Have you ever read anything in a magazine, for example, that you actually know quite a lot about? Where you surprised how thin the article was, perhaps even incorrect and possibly misleading? Some of what is presented might be called 'junk science'.

Junk science: how to recognize it

These days we are all very much aware of the positive role science plays in our lives. However, like every endeavour involving humans, there is potential for abuse. How can you spot doubtful or low quality science? There are no hard and fast rules, but the following observations are of help in this regard. Robert Park, a physicist at the University of Maryland, has developed what he calls the seven warning signs of 'voodoo' science (see Park, R. (2000) *Voodoo Science: the Road from Foolishness to Fraud*. Oxford University Press, Oxford). They are (adapted from the draft of an article by Robert Park for *Think*, the journal of the Royal Institute of Philosophy):

1. A discovery is pitched directly to the media.
2. A powerful establishment is said to be suppressing the discovery.
3. An effect is always at the very limit of detection.
4. Evidence for a discovery is anecdotal.
5. A belief is said to be credible because it has endured for centuries.
6. An important discovery is made in isolation.
7. New laws of nature are proposed to explain an incredible invention.

To which may be added: the research has not been replicated in an independent study (although this is possibly a corollary of point 4). Some examples of these signs are: the effect of GM pollen on monarch butterflies; cold fusion; cars that run on water; a connection between cell phones and cancer; dietary fibre and colon cancer risk; Star Link corn and allergies; multiple chemical sensitivity; alternative medicine; synergistic additivity of endocrine disrupters; and homeopathy.

There is also the situation where a scientist may be brilliant, and have an answer for everything – but another scientist may have a question for everything. Who is the better scientist? It is maintained that the one with the questions is the true genius. Science is more about questions than answers, otherwise we may as well break out the zodiac charts.

Do you agree with the ideas about reading presented above? Practise your reading skills on what is presented, and your critical thinking skills. Make your own judgement.

Summary of Effective Reading

- Be an *active* reader – involve your mind in the process, and other people too, in assessing material.
- Use a well defined process – it is suggested you use the PQR3 process, but perhaps there are modifications that suit your style.
- Luckily, skimming and scanning are always helpful to set the scene and determine how you should approach the material.
- Record the conclusions, and regularly review them – do not be fixed in your conclusions, as the world is an ever changing place, particularly our understanding of it.
- Be constantly critical of what you read in a positive sense – don't just blindly accept.

Remember, the PQR3 process is:

- Preview material – skim and scan to obtain an overview.
- Question – what are the questions on which the article will provide information?

- Read – search for the solutions to the questions (your reading is directed).
- Recite – memorize key ideas, write them down, and discuss.
- Review – review the conclusions and continue to think about them, and relate to the whole.

CHAPTER 1.4 OBJECTIVES AND SKILLS

Setting the Goal Posts: Observing Your Objectives and Goals

In making decisions it is useful to know exactly what the farmer and family/investors want from a farm. These yardsticks enable making choices where there are alternatives that can be followed. Sometimes farmers do not actively think about objectives – it all just happens – but it is usually beneficial to clearly sort out where the goal posts are located.

Sorting Out Objectives

Some farmers just do what they have always done – run their farm as efficiently as they can under the circumstances and, hopefully, a reasonable cash surplus eventuates. As the year progresses various decisions are made on how to use the expected cash surplus, or in some cases the overdraft limit. Others find it useful to spend more time formally observing life, their families, their farm and put active thought into what it is they and their families want out of life. Thus, you might regard one of the important observation skills as working out what the farmer, and any other investors, really want. This, then, becomes the starting point for making plans – it provides a direction. It is probably true that people who know what they want have a greater chance of achieving it, and consequently satisfaction and success. Clearly, if you do not know where the goal posts are, it is impossible to make the right decision to get there – life just sort of happens.

Sorting out objectives takes some thought, even though the person may subconsciously know what they want. The first step for a farmer is to spend some time thinking about his objectives, and also discuss them with his family and all others involved. Of course, the package of objectives that the farmer and his family are happy with may well change with time.

Thinking Carefully About the Objectives

Start thinking about both long- and short-term goals, and write them down – *thinking*, *discussing* and *writing* are the three key words. Similarly, think of the major decisions that have been made in the past. Do they tell you anything about the objectives? For example, what was done with any recent cash surplus? Pay off debt? Invest more in the farm? Learning to observe objectives is a matter of practice and constant discussion, particularly as circumstances change. Discussions with a spouse are, clearly, crucial, and perhaps with other family members depending on their involvement in the farm. The farm's ownership structure will also suggest who else needs to be consulted – a silent partner perhaps.

Depending on our background and upbringing, we all have slightly different views on what is right and wrong, what is a good approach and a suitable philosophy on life. Thus, one way to approach the problem is to write down the farmer's general objectives, and then the specific goals and aspirations that lead from this. This might then be reviewed by other affected stakeholders, and the discussions that follow may lead to an agreed list of specific goals. Similarly, the discussions may occur at the start, and this leads to one member writing down what was concluded for, perhaps, further discussion and conclusion. Of course, what is decided may well be changed later as circumstances dictate and ideas change. Some families will not, perhaps, write the conclusions down, but simply have a mutual understanding.

General objectives

A farmer and his family will have notions about the general outcomes on which to focus (e.g. have a reasonable amount of family time). These basic requirements need developing into concrete plans (e.g. spend the last week of January/August at the beach). For each of the following statements indicate how true it is with respect to your goals and aims by ranking each with a number between 1 and 5, with 1 representing 'True' and 5 'Not true'. Each member of the family might like to give answers for their beliefs. They can then compare notes.

1. It is very important to pass on the property to family members.
2. It is important to earn the respect of farmers/growers in the local community.
3. Making a comfortable living is important.
4. It is necessary to keep debt as low as possible.
5. It is essential to plan for reasonable holidays and plenty of leisure time.
6. Attending field days and farmers'/growers' meetings is vital.
7. It is very important to reduce risk using techniques such as diversification, farming conservatively, keeping cash reserves.
8. Developing facilities and systems that give good working conditions is critical.
9. It is very important to ensure employees enjoy their jobs.
10. Doing jobs that I enjoy is an important part of the operation.
11. Minimizing pollution is very important.
12. I enjoy experimenting with new products and production systems.
13. Proper retirement planning is a major consideration.
14. You must always be striving to increase the total value of assets.
15. Constantly expanding the size of the business is absolutely necessary.
16. Aiming for maximum sustainable net cash returns is very important.
17. Maintaining a presence in the local community is important.
18. It is very important to improve the condition of the property (fertility, facilities, etc.).
19. Giving assets to the children so they can pay for education and/or set up business is very important.

(Note: this set of questions has been used many times to assess the objectives of samples of farmers. For example, see 'Managerial competencies in primary production. The view of a sample of NZ farmers.' FHMG Research Report 04/2002, December 2002, Lincoln University. Available at: http://researcharchive.lincoln.ac.nz/dspace/handle/10182/53 (accessed 10 February 2010)).

This same list can be used by each family member, or owner, and after ranking the results it can form the basis for a discussion between the interested parties with a view to creating an agreement over the objectives to follow. Consider each statement in turn and compare scores for each member. In the end you need to decide on a balance between investment and time input for the farm relative to the family. The answers also influence the form of the farm investment (e.g. business growth) and the use of family time and money.

Specific objectives provide the action plan

A farmer needs to put the general objectives to work by listing out exactly what is intended over the next period (e.g. year). Costing out the implications is clearly important. After adding up the totals a farmer might have to go back to the drawing board. Putting priorities on to the specific objectives is important, as in some years it will not be possible to get very far down the list. To achieve a farmer's objectives requires something more than an understanding of what the farmer and his family are generally seeking – it requires specific goals that are capable of being achieved. In the first instance, these must be for the coming year.

For example, 'keeping debt as low as possible' might be a highly rated objective, but what plan does the farmer have to reduce debt, assuming it is still regarded as being too high? Perhaps a budget is needed to estimate the likely cash surplus, and then list priorities for the cash use, one of which might be to reduce $10,000 of the debt – can this be achieved? Similarly, if, for example, 'it is very important to improve the condition of the property' is rated highly, the farmer needs to make a list of improvements he would like to see, their costs, their place on the priority list, and then together with other demands on the cash surplus, decide which ones are achievable.

Thus, the following procedure needs to be followed:

1. Make a list of the highly scored general objectives.
2. Estimate the time and cash available to put into effect the objectives.
3. For each objective, write down the specific actions that need to be carried out – put them in a priority list.
4. Go through each list and integrate across objectives – end up with a consolidated list in priority order. This will involve initially making a list of all items, then considering and re-considering their order until all stakeholders are happy. How much attention is given to the exact order must depend on how much money and time are available – but first you must estimate the cost of each item and the time involved in implementing the associated tasks. If a good surplus is expected, and there is plenty of work time, thus enabling going reasonably well down the list, you need not worry too much about the ordering of the main items as they will all be funded. Where the ordering matters is where the funds/time will run out.

5. Reflect and review the list, which can then be implemented as time and funds are available. The ordering might well change as the season progresses, as will how far down the list is possible to achieve.

Some people operate this formal procedure in their mind – but perhaps writing it down helps communication between family members and any other group involved that has an interest in the farm.

Example

Consider the following example of Mary and John, and how they came to a resolution. As you read about what they did you should think about your situation.

John and Mary are partners in a rolling hill country sheep farm that supports them and their family adequately – two children aged 5 and 7. The pastures are reasonable but the buildings originated from after the War following soldier settlement. Some of the fences originated in this era, but over the years, especially after amalgamation with the neighbouring property when the settler couldn't manage the farm for a reasonable return, many fences have been replaced.

John and Mary borrowed quite heavily, with family support, when buying into the property some 10 years ago. At first, survival was a major struggle with high interest rates, but their 'heads are now above water'. With the increased value of the property and the good access to local schools where both children, who are doing well and showing excellent promise, attend, John and Mary feel it is time to take stock and consider the future.

Mary helps John on the farm and does all the books, including the tax returns, using a financial package acquired with the second-hand computer. They have taught their ageing parents, who have now moved to a warmer climate, to use e-mail and communication is regular. Over the past years they have worked hard and only ever taken a few days' holiday, though the children have enjoyed camping at the local stream while farm work continued.

John and Mary decided they would each write down their feelings about what was important in life and then swap lists before discussing how they felt.

Mary's list

After some reflection Mary decided she wanted to:

1. Provide for the children – clothes, holidays, experiences and sport, but above all, access to an excellent education through to university if the children wish to study further.
2. Have spare time and cash to enable following other off-farm interests to provide a balanced life, including contact with friends, neighbours and the community.
3. Develop the house and garden to make it a more comfortable place to live, and to reduce the time involved in household chores. Also ensuring it is a place the children can bring their friends was important to Mary.
4. Develop a profession to provide an interesting and challenging life after the children. Being a teacher had always been at the back of her mind.
5. Be free from major financial worry as much as possible in the future.

John's list

John didn't need to think much more – he already had his thoughts sorted. John had previously used the set of statements on general objectives to explore the nature of his beliefs. He rated them as follows:

Gist of meaning	Score (1 (true) to 5 (not true))
1 Passing property to family members	3
2 Community respect	3
3 Comfortable living	1
4 Low debt	2
5 Holidays and leisure time	1
6 Attending farmer meetings	2
7 Low risk systems	2
8 Facilities for good working conditions	3
9 Ensure employee contentment	1
10 Ensure only pleasant jobs	3
11 Minimize pollution	2
12 Trying new things	1
13 Project retirement planning	3
14 Increase net asset value	1
15 Expand net size of business	1
16 Maximizing net cash returns	1
17 Community presence	2
18 Improve property condition	3
19 Transferring assets to children for education and their establishment	1

John found he did not disagree with any of the statements, though he believed some were not a priority at this stage. Retirement planning, for example, he thought could be put aside for another 10 years or so, particularly as improving their net asset situation went hand in hand with retirement.

Transferring assets to the family, however, might need some action now, as asset gifting without gift tax is important. Aspects such as a community involvement and respect and attending farmer meetings are all important to John, and, he believed, were all possible in moderation without sacrificing more important objectives.

And certainly he believed minimizing pollution made common sense and he minimized chemical use as far as possible while ensuring, for example, clean pastures wherever possible. He was also fencing off waterways with inexpensive electric fencing.

In the end he believed the conflict points were putting money into increasing cash returns and net assets, expanding the size of the business (important with the cost-price squeeze) relative to ensuring sufficient family time, leisure and holidays, and lowering risk. John also felt working with both his casual staff and the occasional contractor to ensure they enjoyed their jobs was crucial but something he could do in the normal course of events.

One other conflict point was his enthusiasm to try new technologies (grazing systems, new cultivars, cross breeding, computer packages, etc.) with the need to maintain cash income without excessive risk.

The give and take of reaching a conclusion both could work with
John and Mary compared notes and concluded they were not too far apart. Thus, they sat down to think of the next 12 months. John wanted to pay off some debt with the anticipated cash surplus as well as subdivide three largish paddocks. Paying off debt, he thought, was giving a buffer and moving towards increasing net assets – the question was, how much?

He agreed that increasing their net assets would be helpful to the children's education as potential borrowing would be greater in the future. Mary accepted this. But, what about the kitchen? It really was a difficult place to work. Then, who was going to do the fencing? If John took it on it would mean longer days and weekend work. In the end a *compromise* was struck:

- A new kitchen was to become definite.
- A contractor would be used for half the fencing.
- A family holiday to the relatives in the north would be organized, given the new express class air fares.
- Mary would start a trial correspondence course, meaning they would have to employ 2–3 weeks' extra casual labour. Any surplus would then be used to pay off debt.

John's budgeting suggested $20,000 of debt might just be paid off, but it depended on the seasonal and price outcomes, and this is after the agreed expenditure as well as maintaining the farm assets properly. Mary reckoned she might just fit in a few extra days of casual help to develop a new part of the garden for summer barbeques. Next year, it could just be the tennis court...

All farmers have many ideas on what they would like to do round the farm to improve its productivity, ease of management and appearance. For a case farm with which you are familiar, write out a list in priority order together with a cost estimate.

For example, what house, garden and other developments does the family have in mind? Most farms are a team effort in many respects, with the farm also being the centre of family living. What developments would the team like to see occur in the not too distant future? Put the estimated cost after each one. What about the leisure and holiday plans? Besides enjoying the farm as a place to produce and live, one of the aims of working is to produce a means to provide leisure and holiday activities. What are the family plans and activities in this area – and the costs?

Achieving Goals is Sometimes Different from Reality!

A farmer needs to plan out the time available, and list out what jobs will use the time. Have you ever sat down and worked out where your time actually goes? You might like to do this with a farmer and his family.

On average, each *week* can be divided into the four activities: *farm* work (both physical and mental), *family time*, *personal leisure* and *living*. These activities vary with the time of year, for example peak work (spring?) and off-peak (early winter?). For each of the following, enter the time (hours) spent on each activity in each period. The total for each *week* should be 168.

- How many hours on farm work in the peak period?
- How many hours on family time in the peak period?
- How many hours on leisure in the peak period?
- How many hours on living in the peak period?
- How many hours on farm work in the off-peak period?
- How many hours on family time in the off-peak period?
- How many hours on leisure time in the off-peak period?
- How many hours on living in the off-peak period?

Most farmers will be surprised at some of the figures. Are they content with the division of time, or are changes warranted?

Using Observation Skills, and Getting it Right

The manager has the prime responsibility of observing, interpreting and integrating the requirements of the farm and the household unit, and/or other stakeholders. This takes skill and an ability to clearly observe, and put into workable plans, the feelings and wishes of all those involved. Getting it largely right is *crucial to success*.

Summary

The steps in sorting a plan for the year involves: (i) making sure farmers are perfectly clear on their general objectives; (ii) putting them into some sort of priority weighting list; and (iii) translating the goals into an 'immediate' action list for the near future after costing out the implications. But a farmer should not forget to maintain some flexibility – we live in a changing world. Therefore, a farmer must follow through with the following:

1. Write down general objectives and/or approaches to life. Being clear on what is wanted helps sort out the farmer's and the family's priorities, and the chance of achieving the objectives is greatly improved.
2. Use a scoring system on the 'objective statements' provided in the earlier objective questionnaire if this is found to be helpful – *or* simply note the objectives down in priority order.
3. Create the immediate goals for the family unit as a whole, if appropriate, or some combination of the stakeholders. The goals should be specific statements that give meaning and effect to the objectives.
4. Put the immediate goals into priority order and cost them out (cash and time).
5. Proceed to implement the priority list as appropriate, and as cash and time are available.
6. Maintain flexibility – be prepared to adjust the list as cash and time available vary compared to what was originally anticipated.

Priority lists require farm and non-farm objectives to be integrated. The farm and household unit *compete* for the limited resources of *cash* and *time*. The basic business needs and farm maintenance possibly take first priority, but under some situations maintenance should be deferred.

CHAPTER 1.5 MEMORY AND GOOD MANAGEMENT

Introduction to Your Memory and its Functioning

An ability to remember and recall important facts, ideas and issues is priceless. Your memory is limitless, extremely valuable and can be improved. Memory is made up of two components – short- and long-term segments. Everything goes into short-term memory, is processed, and sent to the long-term memory if considered important. Remembering significant issues, facts, figures and systems is an important component of observation – if you do not remember what you observe you are no further ahead. It is generally agreed that the human mind has limitless capacity to remember things – the problem is to utilize it all. Some people seem to have a great memory without trying, others, the majority, have to work at it.

Have you ever noticed that it is the vivid, the remarkable, the things that fascinate you, the extraordinary, the shocking and so on that stick in your mind, and wondered why is this the case? No one knows exactly, but as noted it is generally agreed that memory is made up of the two components – short and long term memory. A mass of material enters the short-term memory, gets processed and is then largely discarded. On the other hand, if the processing decides the information is worthy of keeping, or is remarkable in some way, it gets shunted into long-term memory. Thus, the key must be to work on this processing system to ensure relevant material gets into long-term store, and that it is retrievable on demand. The latter is also obviously crucial.

Of course, you do not have to store absolutely everything, but you do have to store a knowledge of how to find information when needed. It is pointless storing all telephone numbers – you can get them easily when necessary, though it is handy to have frequently used ones on instant recall. But you do need a framework stored in your mind of each situation, so you know what is relevant and where to get it. Feed management, for example, requires you to understand the principles of nutrition, and to have a knowledge of where to look up the 'specific feeding' value of different forages. Of course, it is convenient to have the facts at your fingertips; for example, perhaps the nutrient value of good quality lucerne hay sticks in your mind if used frequently enough, but it is not essential as you know where to find it.

How good are your current memory skills? Can you remember both important and trivial items? Try answering the following:

1. At what pressure do you keep your car tyres? **(a)** less than 20 lb/in^2; **(b)** 21–40 lb/in^2; **(c)** greater than 40 lb/in^2
2. What dose should a farmer give when orally drenching ewes for internal parasites? **(a)** less than 5 cc; **(b)** 5–7 cc; **(c)** greater than 7 cc
3. At what rate should a farmer sow or top dress clover seed? **(a)** more than 12 kg/ha; **(b)** 12–2 kg/ha; **(c)** less than 2 kg/ha
4. What interest rate is normal for overdrafts? **(a)** less than 6%; **(b)** 6–10%; **(c)** greater than 10%
5. What happened to your country's balance of payments last year? **(a)** a deficit; **(b)** neutral; **(c)** a surplus

6. What was the national rate of inflation last year? **(a)** greater than 4%; **(b)** between 1.5 and 4%; **(c)** less than 1.5%

Compare your answers with your colleagues. While some depend on the year and country, the correct choices might well be: b, c, b, c, a, b.

To store information you need to find the way that best suits you to ensure what you regard as important is firmly logged into long-term memory. 'Tricks of the trade' include jotting on paper, repetition, creating visual images, etc.

How to Lodge Information into Long-term Memory

The old adage 'practice makes perfect' is probably the best principle to follow – practice and concentration. First, of course, comes observation, then deciding on what is relevant, then putting it into long-term memory, followed by a retrieval system. Putting into long-term memory involves systems such as:

- writing down, perhaps in a general notebook or a paddock/field book, and then summarizing into a further notebook (repeated writing);
- repeating things to yourself over and over; and perhaps
- forming visual images of the situation in your mind;
- thinking of 'remarkable' things about a fact or situation that might help imprint it, e.g. last year was noteworthy for the number of triplets in the 125% lambing – so, associate 'triplets/125'...; and
- talking things over with someone and deciding together on the important information to be remembered.

Therefore, keep in mind 'writing', 'repeating', 'visual image', 'remarkable feature' and 'sharing', and practice them all.

Retrieving the information when required is, obviously, equally as important as storing it in the first place. The best way is using a 'notable association' of some kind, but only if you find your automatic system does not normally work.

Retrieval of Information on Demand May Need Help

Repetition helps and develops the association pathways. But the books on memory often talk about dreaming up associations of some kind – perhaps a rhyme using the first letters. These little ditties seem to be easier to remember. For example, you want to remember the sequence of summer production of ryegrass cultivars. Some simple local plot trials suggest for your area the following sequence (unfortunately the trial did not include all available cultivars, nor were there replicates so it is not totally sure that the order is correct):

Bronsyn, Aries, Dobson, Marathon, Vedette, Meridian, Embassy, Ruanui

How can you remember the sequence? What about the sentence:

BAD Marathon runner **Vedette** crossed the **Meridian** near the **Embassy** on **Ruanui** street!

Or maybe you can think up something better? Of course, the process of thinking up the rhyme, sentence, or whatever, helps to imprint the sequence.

Exercise

Think of something to help you remember the nitrogen content of urea (46%), CAN (27%), sulphate of ammonia (21%) and DAP (18%). Write down your solution. How does it compare with this ditty?

> When I was young, DAPper and 18, I 'moaned' at the thought of 21, and positively CANned the idea of 18 plus half as much again, but doubling plus a decade smells of Uriah Heep!

Summary of Memory Improvement

Everyone seems to have different levels of memory abilities, but as memory size is infinite for everyone, practice can usually further develop memory capability. Practice and repetition improves storage into long-term memory and, similarly, retrieval on demand. Numerous little tricks have been tried to improve memory performance, some of which could suit you. In general, memory tricks rely on *elaboration* and *association*. Repetition and writing down are part of elaboration, as is thinking up variations, whereas little easy-to-remember stories to jog your memory are part of association. If you mention 'car', what do you think of – fast, expensive, comfortable, reliable, essential, holiday? These are all associations related to a car. If there is no obvious association between things you wish to remember, you should create one. Thus the use of stories, jokes, rhymes and so on.

In general we remember things that are *recent*, *vivid* and occur *frequently*. Creating an association helps use *vivid*, and this may be a visual image; constant practice and repetition in your mind helps use *recency* and *frequency*.

A better memory means better management.

A Memory Enhancer

Have you ever looked at photographs of past events of your life – a family party, a football match, the newly painted house – then, later on, when discussing past events with a friend or family member, you can explain exactly what the situation was as it is firmly fixed in your mind's eye? Often you do not initially remember where the image came from – it is just there, and it is only on reflection that you recall that the image is so vivid as it comes from a photograph you have seen more than once. But, furthermore, the event/situation is probably important to you in some way – thus you are keen to keep it in memory store.

What other images come to mind? As noted, 'remarkable' things stick firmly and are easily recalled – 'remarkable' might be something good, or something bad, but certainly notable in some way so that it sticks. Can you remember the season the hay barns overflowed, the year the rain was excessive, creating floods, etc.?

Thus, when wanting to remember things, can you create something noteworthy about the item so that it remains to 'the fore' in memory, like the special photographs or events suggested above? Can you create an image in your mind that is recallable on demand? Think about what it is you wish to remember – and what is special about it that can form a key. Keep picturing it in your mind.

Exercise

Appendix A1 (Exercises to Enhance Your Memory) includes exercises both to check your memory and to give it a workout.

CHAPTER 1.6 PROBLEM DEFINITION – ONE OF THE FIRST STEPS

Definition of 'a Problem'

Any problem must be carefully defined otherwise you will (possibly) seek an answer to the wrong situation. But what is a 'problem'?

The word 'problem' means many things. It can mean something has gone wrong – this might be a deviation from the expected or desired. For example, spring grass production might be much lower than expected and animal growth rates minimal. The manager must decide on what action, if any, is appropriate under the circumstances. On the other hand, a situation of deciding what improvements or changes might be profitable is also called a problem, but this time the problem is that of deciding the best action. Similarly, when the season and prices have been great there is likely to be a good surplus. The decision then relates to what should be done with the surplus – hardly a problem in the normal sense of the word, but still a problem in a management sense. For example, should the debt be reduced, should the tractor be replaced, should the house be painted, etc.?

Thus, any situation where changes of some kind are appropriate is referred to as a problem. Problems require resolution and action to rectify the less than desirable situation, or to take advantage of an opportunity.

To recognize problems you need to know what is normal, and observe the reality to compare with this 'normality'. Equally, you need to keenly observe what is happening both within and beyond the farm gate to identify opportunities and other desirable changes. In order to know a problem exists, you must carefully *observe*: (i) what is happening to all aspects of the farm relative to appropriate benchmarks you have in your mind; and (ii) what is happening in the surrounding environment so you know the opportunities that exist.

The 'surrounding environment' includes many aspects and factors. Examples include neighbouring farms (monitor farms), farming magazines, research stations, world markets, perhaps even the World-wide Web if you are connected, radio news and so on. It has often been noticed that successful farmers put a lot of effort into watching what others are doing, and reading almost endlessly.

Having decided there is a problem, and there are *always many*, you must first define the problem, then work out how to analyse the situation.

As an initial exercise, in deciding whether you are achieving your goal you need to have in mind what outcomes are desirable (e.g. a desirable lambing percentage), so jot down the five most important benchmarks that should be used (name and value). This exercise leads on to thinking about the five most important problems on a study farm at the moment – write them down, including both opportunities and difficulties. You should be constantly doing this with regular reviews.

Then add two 'problems' to the list, which involve new developments, new products, or perhaps using new technology.

Define and Specify

Before solving any problem it is important to *define* the problem and the factors that determine/impact on the problem. Be clear what you are dealing with, otherwise you might determine a solution that does not actually solve the problem.

Exercise: define and specify

Consider John's problem (below), and then answer the questions. Think about the problem in terms of: (i) what is other than expected and/or desirable; (ii) the possible causes; (iii) how the causes can be checked/eliminated; and (iv) the options in rectifying the factor that is problematic.

> When the lambs were averaging 4 weeks of age, the ewes seemed to be scouring (passing runny material) and pasture levels were low despite the warm and damp spring. What should John do, as it might not be possible to meet the heavy weight lamb contract? The immediate reaction is to drench (use internal parasite medication) the ewes. But maybe it is not as simple as that. Is the problem lack of grass growth, lack of utilization, diversion of the nutrients into supporting a heavy worm burden, poor lamb growth, trace element deficiency, or something else altogether?

In this case, what is 'other than expected and/or desirable'? For later use in answering the questions, jot down on a piece of paper your thoughts about: what percentage of the ewes are scouring; and does it matter? What is important is: (i) the lamb growth rate; and (ii) the ewe live weight.

First make your judgements on the crucial output factor (perhaps John should do some weighing if this was possible). It is possible that growth is normal and the scouring is simply soft (high moisture level) food.

However, if in fact the animal growth rate is poor, is it due to a low intake or a heavy worm burden? The latter is easy to check with some faecal egg counts – so perhaps John should eliminate this possibility first, then drench if necessary, assuming a regular drenching programme is not under way. If it is, you would have to seriously consider the drench type and parasite resistance.

If the worm burden is not high, then maybe the pasture intake is low despite the apparently good season, but, on the other hand, perhaps it is ill thrift due to reaching a stock level that causes, for example, a selenium deficiency. To determine whether this is a problem will probably need veterinary assistance. If indeed a trace element (or some unlikely disease problem) is not the cause, then pasture production is in all likelihood the problem. What can be done? Probably not much other than apply nitrogen, which may not, however, be economical. Other possibilities include off-farm grazing, buying feed, or even selling stock. If an area is shut up for hay or bailage, perhaps this needs to be used also.

Thus, the key is to carefully examine the 'problem' and, through elimination, work out what are the causing factors and possible solutions. That is, *carefully work out and define the problem, then solve it*. The solution might be to do nothing, depending on the options, costs and returns.

Coming to grips with one of your problems

For at least one of the problems you defined above, think about it and define and specify the details. Jot down your conclusions for each of:

1. The possible reasons for its existence.
2. The pros and cons related to the likelihood of each being the central factor, and thus
3. The most likely cause.
4. Options for improving the situation.
5. Conclude as to the most likely best solution.

The process is a bit long winded, but it is very important that you think carefully about all problems and sort out their details before trying to sort out a solution. In the same way as building a house, unless you have the specifications precise, the end product may well be a mess!

Exercise: concentration and practice

Recognizing and correctly specifying details of a problem is the first step to success. Carefully read the situation presented below, and then answer the questions. Be sure to practise your reading and memory skills when considering the case scenario.

> The other day John had another kind of problem – a group of farmers approached him about joining their group in the supply of superfine high quality wool to a manufacturer in Japan who was seeking long-term contracts to enable committing an investment into a processing plant that supported a boutique clothing chain. Should John commit to the project? Given the far-reaching impact on his farm and systems John knew it was important to methodically assess the proposal. He spent time talking to the group and searching out information on wool prospects.

In the questions presented below, consider the degree of agreement you have with the statements/questions John has prepared when specifying the problem and the factors impacting on it. Then compare your answers with the ones given at the end of the questions.

1. Do you agree that the main requirement would be to work out the yearly impact on the cash flow of entering the contract?
2. Do you agree that working out by how much the existing stock numbers would have to be changed is an important part of the cash flow calculations, and part of this is calculating how many superfine wool producing animals would be necessary to fulfil the contract?
3. How critical is the need to work out whether any special housing would be needed at certain times of the year, whether any special shearing requirements exist, and any special measurements/grading/packaging would be needed? What

about sorting out any special feeding requirements, and determining if there are any health and foot-rot problems that could entail considerable expense?

4. Is it critical to work out whether there are deadlines on the date of supply, and whether variations can be negotiated without great penalty for quantity/date variations to take account of abnormal seasons? In a nutshell, would it be sensible to consult a lawyer to fully check all contract details?

5. Do you agree that it would be absolutely crucial to employ an accountant to work out the profitability of the proposal?

6. How wise would it be to check out the buyer by contacting the Japanese Wool Manufacturers Association, by searching the World-wide Web for information, by checking with an international credit rating organization, by checking with international wool brokers, and doing some more reading on the competition from synthetics?

7. A factor that was uppermost in John's mind was the value of the US dollar relative to the euro if he was to be exporting.

Answers and discussion

1. Yes. There can't be much doubt that the key factor in deciding what to do is to assess what the new cash flow would be, relative to the current situation. However, risk must also be considered, and the effect on the current lifestyle.

2. Yes. A major component of the changes would be the stock numbers necessary.

3. Yes. All these factors impact heavily on the profitability of the venture and therefore must be investigated thoroughly.

4. Yes. All these contract matters are absolutely critical to the feasibility and profitability of the plan and, therefore, must be sorted out by an expert.

5. Unlikely. Many accountants would not have the expertise to assess such technical matters. If you believed you needed help in researching the problem and doing the budgets you would probably be better off employing an experienced farm consultant.

6. Yes. If you do proceed to change your farm significantly to meet the contract you want to make very sure that the buyer is genuine and is likely to be in the market for the long haul (not that anyone can guarantee this).

7. Not relevant. This particular exchange rate relationship probably has little to do with what John receives and thus is not that critical. However, it does depend slightly on whether the Japanese will export to Europe and the USA. The contract itself might also say something about the method of payment.

Further exercise

As a further highly related set of questions, what are the factors important in John's calculations? Jot down your answers to the following propositions and questions. Do you agree with the suggested answers and reasons given at the end of the questions?

1. John needs to investigate wool factors such as the yield per head, and the fineness, bulk, colour, etc. expected by the contract.

2. It is crucial to check out shipping routes, rates and timing – the product must be got to the market and large containers are required.
3. John believed he should spend a lot of time investigating details of such things as the lambing percentage, culling age, death rates, cost of replacements, shearing costs, value of surplus replacements, cost of animal covers, ram costs, health costs, etc.
4. John was also of a mind to develop contacts with the genetic researchers and others interested in genetic engineering related to meat and wool production. Work on pharmaceuticals, particularly in milk, could also be of importance in the developing world of science and economic activity.
5. Finally, there was talk of carefully studying and learning about forward contract rates, forward currency contracts, interest rates, and the US economy and its development.

Answers and discussion
1. Certainly yes. These are all factors impacting on the feasibility and profitability of the system and are necessary to allow budget calculations.
2. Possibly. With wool as valuable as this the shipping and times are not that crucial to the success of the venture (wool is not perishable). Besides, the company will more than likely be looking after the shipping as they will wish to bulk up with other suppliers.
3. Yes. There is not much doubt that all these factors are components of the budgets that must be calculated and consequently are essential to the investigation.
4. A most unlikely need. As far as the contract is concerned, questions of genetic improvement relate very much to the longer term future and, thus, do not impact on the immediate assessment. As for pharmaceuticals, probably a very long shot... but who knows?
5. Sounds like a good idea. Whether these matters are that relevant in the immediate future depends on the details of the proposed contract. How will John be paid? Guaranteed local currency dollar rates? Thus, it is hard to be categorical about these matters, but this would need to be investigated.

Do you agree with the conclusions? Of course you may be right in some cases for some of the conclusions are clearly a matter of opinion. The exercise does, however, reinforce the fact that specifying a problem in many cases takes some thought to sort out *all* the relevant factors.

Defining the Problem (Opportunities)

To move ahead a crucial skill lies in recognizing opportunities and developing them into profit. This is all part of problem recognition and specifying the problem structure.

Exercise: defining the 'problem'

Follow the extract below and then answer the questions.

> Farmers Jack and Jill run a sheep and cattle hill-country unit. On 560 ha they run 2500 mixed age ewes and 200 breeding cows, rearing the replacements and selling some finished lambs (20%), but mainly stores on to other farms

> for finishing. The weaner cattle are sold at the normal weaner sales. The fencing is okay, and the average paddock size is nearly 30 ha. Rainfall is relatively evenly spread and reliably produces 900 mm/year. Hay making is difficult due to the weather and the limited land accessible by machinery. Hay is purchased. Jack and Jill took over the farm 5 years ago after buying from a soldier settlement family whose debt had been reduced to zero and they were quite content to live quietly on a minimum income as they had learned frugal ways in the early years. The pastures had long since reverted and gorse (weed) was starting to return. They are fortunate in that there is a successful monitor farm nearby on similar soils and climate. This farm has been the source of many ideas. Currently it is running 10 stock units per hectare and uses all grass wintering with a 30-day rotation. It finishes 95% of the lambs and buys weaners for finishing as 18 month to 2-year-olds. They use an aircraft for fertilizer application, flown from an air strip situated between the two properties. All replacements are bred on the property.

Consider the degree of truth in each statement in the quiz below. They relate to the nature of the 'problem' and the factors that should be investigated. Take into account the amount of information you have – if the conclusion is not sustainable with the data provided, mark it down. Once you have decided on your answers, compare your conclusions with those provided after the questions.

1. Do you agree that Jack and Jill should immediately change to producing finished lambs?
2. Would it make sense for Jack and Jill to immediately sell their cows and replace them with finishing stock?
3. Do you agree Jack and Jill have a problem with paddock/field size and pasture production so they should half the sizes, perhaps using electric fences if possible, and increase fertilizer levels even at the expense of greater debt. Perhaps they need to refinance?
4. Jack and Jill must consider making hay, silage and any other conserved feed that they might be able to manage.
5. Would it be sensible for Jack and Jill to consider molybdenum, sulphur, and oversowing pelleted clover seed?
6. Should Jack and Jill investigate cost factors such as the cost of mortgages, and thus the repayment schedules; the cost of weaners, the cost of replacement 2-tooth sheep and cows, Olsen P tests, faecal egg counts, the schedule (prices) for bull beef, the availability and cost of casual labour, etc.?
7. Given the state of the weed problem on the farm, should Jack and Jill be investigating bringing in a large herd of goats – perhaps Boer goats for their meat value?
8. Jack and Jill are ambitious. Should they be looking at the cost of hay barns, replacing the wool shed, or at least extending the number of stands (shearing places), changing the cattle yards using some of the new designs, making regular weighing easier?

Answers and discussion

1. Possibly. While Jack and Jill may well like to do this, clearly it is most unlikely to be feasible unless they reduce stock numbers and dramatically improve their pastures overnight. Difficult.

2. Probably not. This is probably unfeasible due to the pasture quality. And, besides, you need to know the relative prices to estimate profitability.
3. Most likely. There is not much doubt that smaller paddocks will give better feed control and, thus, better production. Similarly for increased fertilizer use to levels generally accepted as being profitable in the area; perhaps even higher to start with. As the production increases it will become a cycle of soil improvement, better production and so on until a new equilibrium is reached.
4. Not likely. Maybe initially some bought in feed might cover critical periods, but in the longer run it would make economic sense to use their smaller paddocks, autumn saved feed and sensible rotational grazing to give all-grass wintering.
5. Yes. There is not much doubt that rectifying nutrient deficiencies that support clovers will be a key, as is getting good species growing.
6. Yes. This is rather obvious in that all these factors could well impinge on the best way to develop the farm, and need to be constantly reviewed.
7. Probably not. Goats certainly do a good job on weeds such as gorse and broom, particularly if pushed for feed. But is the fencing up to it, and what is the cost of buying them in, and then how much can the progeny be sold for? You need to evaluate the costs of goats relative to the weed problem. The market value of goats sometimes means the gross margin may not be positive, so this needs to be matched against the handling of the weed problem, and how extensive it is.
8. No. These are grand ideas, and will perhaps be relevant one day in the future. But for the moment, assuming they can get by with what they have, they should postpone such thoughts until the more immediately productive investments have all been exhausted.

Again, you may not entirely agree with the answers given, for they are clearly a matter of opinion. But the exercises given make it clear it is important to open your mind to cover all aspects of a problem when trying to resolve it. Some careful thought will, under most situations, save heartache later.

CHAPTER 1.7 DECIDING RELEVANCE

Everyone is constantly bombarded with material about every product imaginable, together with a plea to purchase it. How do you decide the authenticity of the claims? The good '*observer*' will sort the 'oats from the chaff'.

There is a constant stream of advertising material thrown at farmers, and often it is disguised as factual information. It appears in the letter box in the form of brochures, it appears in the free newspapers, it is in the farming magazines, and certainly appears on TV. Sometimes it is even on the radio. Does the following sound familiar:

> Research shows that if you use additive xyz next time you drench, the lambing percentage will increase by 5% and this means much more profit... Just ring this free number before [date] and a sample will be sent. You'll never get by without this proven product...

Part of observation is picking up the facts that have some real meaning, and interpreting them for the farm's situation. How do you go about this? Skimming all the massive amount of material is essential to sort out what is worth reading further (see Chapter 1.3 on reading skills). Skill at skimming must depend in part on your store of knowledge, as an assessment on whether the claims are likely is the first step in deciding to follow up with an investigation.

What procedures should be followed? Essentially, you should read, listen and watch everything with a critical view of the issues (this does not mean a negative view, but rather a view that quietly questions the authenticity of everything you observe before you come to a conclusion). Use your existing knowledge to judge the likelihood of the statements being true. Remember, the ‘teller’ is more than likely very keen for you to believe their story and, perhaps, embellishes it, and leaves out the unfavourable evidence – that is human nature. You should use a mental checklist to sort out the oats from the chaff. Part of this checklist is to assess the credibility of the ‘person’ or journal delivering the message.

Maintaining a Critical View of All Proposals

Have you seen someone using the proposed product/procedure? Have you heard a radio talk on the subject that suggests some promise? Have you seen some trials by a research organization at a field day that suggests some real benefits? It is unusual for a new claim to be completely new without someone having investigated it – most research organizations and consultants are constantly looking for ideas that can be tested. However, be aware that sometimes some excellent ideas come from farmer trials and experiments, but in these cases it is unlikely that a company is promoting the idea. But even farmer ideas need sorting and investigating whether they might be of use.

Sorting relevance, after having decided more study is necessary, requires you to sort out the details of what the idea/product is:

- What changes to management are necessary?
- What are the inputs required and their cost?
- What additional work is required?
- What are the impacts on output (e.g. increase in wool, lambs, weights, increase in crop quality/yield, etc.).
- What are the impacts on feed output, feeding plans?
- What is the credibility of the proposer of the idea/product?
- What is the evidence of the reliability of the results (has the increase happened in 1 year, on one farm, *or* have the trials been on many farms in the locality of interest)?

This all adds up to doing mini-budgets on the additional costs and returns, and an assessment of the gains happening on the farm. In a nutshell, be super-critical of claims and assess them with a cool and calm head – some will be correct, but some rely on an emotional response to the skill of the advertiser.

You might like to try your hand at assessing the example book advertisement from Lincoln University, presented below. Appendix A1 (Exercises on Critically Assessing Information Offered) contains further exercises on critiquing. They are all based on material taken from well-circulated magazines, but with some minor modifications.

Exercise: critiquing

Read the statement below and then answer the questions.

> Everything you need to know about farming... from 'A'nimal evaluations to 'Z'ero endophyte. Whether it is breeding or dry stock, dairying or cropping, forestry or deer – if you're in the business of farming, you won't find a more comprehensive source of information than Lincoln University's Farm Technical Manual. With over 1000 pages, and seven years in the making... order your copy now... and you will get a special early order discount.

1. Should you treat the statement 'Everything you need to know about farming' with considerable scepticism?
2. Is it true that 'you won't find a more comprehensive source of information'?
3. Will it be out of date, seeing it was 'seven years in the making'?

Answers and discussion
1. This probably goes without saying. Would anyone really believe this statement, as how can the writers judge just what you might want to know, and therefore include absolutely everything? It is a sad commentary on advertising that we have become generally very sceptical.
2. Not sure. For most people this is a hard one to judge as they probably have not conducted a comprehensive search of what is available. But perhaps knowing that the producer has a good reputation, and that there is little profit in putting together such a publication, you might logically think that this publication covers a lot of useful material. Although, of course, if you believe their first statement, how can this one not be true? But, in the end, for most people, 'Not sure' is the answer until completing a comprehensive search.
3. It probably will not be out of date. The reputation of the publisher would suggest they would not offer useless material, and much of the technical information probably does not change that rapidly anyway. But, you might question how they financed 7 years of work with no income, so perhaps all this says is that it is 7 years since the last edition was published.

CHAPTER 1.8 RECORD KEEPING

Record keeping is one of the more important observation skills. As memories are not perfect, farmers always keep some records, if only for the tax department. But, in most situations, farmers should keep rather more. In general, besides tax, records are necessary as a base for good decision making, and to satisfy curiosity about what is happening. These 'curiosity' records may be important to provide enjoyment from farming activities. In summary, the three reasons to put time and effort into record keeping are:

- A farmer is legally bound to keep records (tax records, stock records and, in some situations, environmental factors).
- The farmer, and his family, enjoy seeing the results of their work, and enjoy, for example, keeping records on animal breeding and other factors of interest.

- There is an economic payoff from the effort.

Clearly, the legal requirements need to be met, but some of these data are also economically useful, such as the costs and returns from each enterprise (sheep versus cattle profitability perhaps). And, if you enjoy looking at, for example, the improving quality of the pasture in a paddock, it is interesting to look back over the records of fertilizer use, grazing pattern and pasture mixes used to see why the pasture has turned out as it has. Similarly, some people keep detailed animal records simply because they enjoy documenting the outcomes (although this could also be a legal requirement in some countries). However, overall, most people keep records in order to improve their management and profitability.

As we all have different requirements and abilities, the system that works best will be somewhat unique to each farmer. If working out a good system for a particular farmer, consider the time and cost involved relative to the value (from better decision making) of the records.

Assessing What Records Should Be Kept

Decisions on the records to keep must involve thoughts about:

- The time involvement (and, therefore, cost).
- The decisions that rely on each type of record.
- How much better the decisions might be, given accurate records (both on and off farm, e.g. price trends).
- The value of the better decisions.

It is easy to make these comments, but actually putting figures to the benefits is not straightforward. On the other hand, a reasonable guess at the costs involved is not difficult. In the end it is a very personal decision, because each farmer has different skill and memory capabilities.

Individual Systems

Some farmers write hardly anything down and they still do a fantastic job – they have the knack of noticing, remembering, retrieving, and sorting the 'oats from the chaff'. They can tell you their net current bank balance, and what it is expected to be in a month; they can tell you the feed situation in every paddock or field, the live weight of each mob, the nutrient status of each paddock, the growth stage of each crop, and so on.

On the other hand, most need a few props to achieve this level of current knowledge. For each farmer/manager/helper situation, a system that suits and is convenient must be evolved. Everyone must ask themselves what value is there in keeping, for example, detailed paddock histories, hogget wool weights, hay production and use, daily rainfall and so on.

Consider, for example, rainfall records. What might they be used for? An obvious use is, once several years are available, in estimating the chance of dry periods in different seasons. How valuable is this information? Probably very valuable, as you can work out the feed reserves required to maintain reasonable production, or perhaps the irrigation water needed to maintain crop growth. But possibly the neighbour has records for 50 years – so why do you need them? This must depend on the likelihood of sameness, and whether having two sets is going to be more reliable – what happens when the neighbour is on holiday? Furthermore, if pasture records are kept, relating rainfall to production will probably be very valuable. And should a farmer record the rain at more than one site? This must depend on the terrain. Thought must be given to these, and all similar questions, when deciding on an appropriate system.

Data and Information

The raw data collected must be turned into useful information that provides a basis for decisions. Records, for example, on expenses and sales, need to be added up and related to individual activities (e.g. the cattle enterprise, the feed costs per sheep, the gross margin for wheat) so you can then decide whether some changes will be beneficial to the bottom line.

Collecting large amounts of information and never using it is not a total waste of time, but close to it. The act of writing/entering data on a computer helps to store information away in your memory, and also makes you think about the gathered information, and perhaps come up with some good ideas. There is some research that shows successful farmers tend to keep quite a few records – but what is cause and effect? Probably a mixture.

Therefore, overall, data need processing and turning into *information* on which decisions can be based. Ten years of rainfall records need adding up and comparing – in the end you want to know the chance of a good spring, average spring or poor spring, and whether a poor spring follows a poor winter. This *information* enables *decisions* on stock numbers, feed reserves and so on.

Assessment

Review a farmer of interest's current record keeping practices and ask the following questions:

1. What 'other person provided' paper records are kept and filed, and for what purposes (e.g. invoices; for tax)? Think of all the paper that is kept that has been provided by other people (e.g. bank statements). Write down the general categories (e.g. sales invoices/statements), *and* also state what they are used for (e.g. value added tax (called GST in Australia, VAT in the UK) returns, calculating wool per head, etc.).
2. What farm records are written down, and for what purpose (e.g. fertilizer applications in a paddock(field) diary; for deciding on next year's applications)? Think of all the records that the farmer regularly writes down in a permanent book, or perhaps saves on CDs. Write down the general categories (e.g. daily rainfall), and note what each general category is used for, e.g. for what decisions?
3. What additional records should be kept that are not already kept (both 'other person provided' and things the farmer might write down)? List them and indicate the decisions that the information would help with.

Reflection

Does the farmer keep any records that are never, or seldom, referred to? Should they be used more? How could they be used for decisions, or should they be discarded?

Given the farmer of interest's particular habits, aptitudes, memory skill (use the memory module to enhance memory skills) and farming situation, there will be a record keeping setup that is best. It must be practical, useable and useful. The following example might give you some ideas.

Example: Jack and Jill's records

Jack and Jill run a lamb finishing property in the variable rainfall east coast rolling hill country. The property could be bigger, so they manage very carefully to squeeze out a sustainable living. And they do it adequately, though a series of droughts would put extreme pressure on their finances. What records do they keep?

What Jill does

Jill is an integral part of the team, and runs the computer package that records every transaction and produces sales tax returns. Every transaction is referenced back to a filed invoice, so full traceability is possible for the tax inspector. This reference system also backs up the income tax returns, which are submitted by their accountant, but are based on their computer printouts of all transactions sorted by type (animal health, building repairs, fertilizer expenditure, wool income, etc.). The computer system also sorts out their business as against personal expenditure. It also keeps track of stock numbers, automatically updating the numbers of ewes, 2-tooths, hoggets, rams, etc., as when a sale or purchase is entered the associated number is also entered. However, deaths must be entered as a separate data entry exercise. The system also keeps track of mortgages and the occasional overdraft (bank balances), as well as assets held, as when some plant is sold or purchased this too is entered (it clearly affects the cash flow), as is the acquisition of a new mortgage/asset. Every entry has a reference or invoice number, so searching in the filing cabinet for the original document is easy should this become necessary.

Because *every* transaction gets recorded it is easy, for example, to ask the system to tell you the total money spent on repairs at the local garage (perhaps you can negotiate a quarterly discount), how much a particular tractor has cost in repairs, what the net return is from the cattle (Jill also enters an enterprise code for each transaction, thus allowing the calculation of the profitability of each one). Jill also has a small peony-growing enterprise, which takes a lot of 'spare' time.

What Jack does

Jack also keeps a paddock (field) and daily diary as well as an individual animal recording system for 100 stud ewes – the latter is hardly economic but he enjoys his small stud operation. The individual animal wool weights and fineness are recorded, as are the lamb details and lamb growth rates (weighed fortnightly). The data are submitted to a bureau to calculate breeding values.

Ewe replacements and rams are selected on these values. All progeny is kept and ram lambs are sold. Where possible, dry wets are raddled for culling purposes. The logic and value of this approach is clear (also, in buying rams, Jack uses productivity records).

The daily diary is used to record general and stock activities, stock tallies and productivity data, such as tailing numbers, shearing details and so on. Jack is very careful to spend at least half a day each month going through the diary and updating stock numbers, calculating the effective lambing percentages, fleece wool weight per head, crutchings per head and so on. He can tell you the average ewe productivity for the last 10 years. These data are summarized into an animal book.

The paddock diary is used to record all individual paddock activity – fence repairs, spraying details, fertilizer applications, hay production and making, and so on. You might question why Jack records things such as fence repairs – how can this help future decisions? But Jack likes to look back and see where he spent all his time – there never seems to be enough of it and he is always thinking about how to become more efficient time wise – how much time should he allocate to fence repairs, and when is it worth replacing a fence? Again, Jack is diligent in reviewing the diary every month to tally up rainfall, estimated dry matter production and total fertilizer application per paddock. He also records regular soil test information. In deciding on fertilizer applications each paddock is reviewed. At that time he also does a sum on what extra dry matter he might expect from extra fertilizer and what that might mean in terms of increased wool and meat production.

How Jill and Jack use their system

For a practical system, every component must have its use… so how do Jill and Jack benefit from the information they have collected and recorded?

Jill and Jack reckon they have created an efficient system that relies on a few minutes first thing each morning. Jack, while he is still fresh, writes up his diaries – sometimes he refers to the pocket diary he carries with him at all times to jot down tallies and other things he notices, for example the hole in the fence near the bit of dying gorse, which will have to be attended to before moving his stock. And then there's the monthly review and collation.

These processes also help keep the situation constantly to mind, enabling reflection as they conduct the daily activities. Every month Jill produces printouts of the financial situation, including a comparison between actual cash and budget-predicted cash. At the start of each year they sit down together to plan the activities and make a cash flow budget. This is reviewed each month, or more frequently if it is obvious something major untoward has happened.

Jack would like to do more pasture production recording with small plots, but currently he doesn't have the time. He knows it is important to calibrate his visual assessments. One day he hopes to get involved in formal feed budgeting as feed management is the very essence of their operation and utilizing what is produced more efficiently is all dollars in the bank for not much time expended – he *must* make time, especially if he can jot the figures down for Jill to enter into the computer – he says this is the only gap in his recording/analysis/decision information system.

What do you think? Do farmers you know record more, or less, than Jack and Jill? Why? Maybe they weigh samples of animals – Jack would like to, but he hasn't the time. Currently, he uses his visual assessment, but some benchmarking correlation would be helpful. If only he had a device that could be pointed at a mob and give the average live weight!

What Records to Keep

The list should include personal records, 'other person provided' printed material, material on price and cost expectations, as well as historical figures, farm records, through to cash flow and tax records.

It is useful to sit down and make a full list of what might be recorded, and then go through the list thinking whether a particular farmer would get benefit from the information over and above what memory can produce. Remember, however, that memory can be biased – do you remember only the good outcomes? It is also useful to think of the easiest method of recording each item, and retrieving it. Each farmer should have at least a couple of filing cabinets to store easily retrievable information, or perhaps manila boxes on a shelf. Technical information, e.g. ryegrass cultivar production curves, can be stored in alphabetically sequenced files/boxes, so you can quickly retrieve the information you have (and then, maybe, search the World-wide Web for further information). Another filing cabinet/box could be used for all financial records – bank statements, invoices, loading bills, and so on. Farmers should also keep duplicated backup CDs once the data have been computerized, and more than one set should be kept in different locations in case of fire.

If the farmer has a stud system, or individual animal recording, there will be field sheets for use, and a storage system. The electronically organized may even have a hand-held computer for field recording.

Listed below are items/information that might be recorded/stored. Consider each item and whether it should be in a particular farmer's system.

Personal records/documentation

- Individual family member file – births, school records, certificates, medical, etc.
- Family expenditure records – statements, receipts, quotes (actual transactions may well be in a computer system, or in a cash book).
- Personal and household insurances (building, contents, cars, etc.).
- Family appliance register and guarantees.
- Off-farm investments – references, certificates, etc. (also cash purchases, sales, dividends, if not computer recorded).
- Details of clubs/memberships.

Farm: general records/publications

- Technical information.
- Laws and regulations.
- Markets and prices.
- Costs and supplies.
- Management systems – field days, benchmark data, etc.

Farm: physical records

- Rainfall/weather.
- Paddock (field) activities and results.
- Animal activities and output.
- Pedigree animal records.
- Employee details.
- Contractor details.
- Asset register: stock numbers; buildings; machinery; implements.
- Produce register: hay, crops, grain, etc.

Farm: financial records

- Insurance records.
- Mortgage and loan details.
- Farm accounts.
- Tax returns: income tax; sales tax.
- Income and expenditure: documentation; summaries and totals.
- Cash flow budgets.
- Local body affairs.

Record keeping essentials

Records must be kept in order to satisfy legal requirements, and records should be created/kept where the value of their use exceeds the cost of the time and materials involved. But do not forget that farming can be fun, so also keep records that add to personal satisfaction.

Summary

Records are kept for legal, personal interest or financial reasons. There is little choice over the legal records, but there is choice over the rest. Each farm situation and the people concerned will have a system that best suits them. Over time a farmer can evolve a system with which he is comfortable. Increasingly this will be computer based for ease of analysis. If you cannot analyse the data (i.e. convert data to decision information) there is not much point in keeping the records, except for fun and satisfaction. Consider each potential record and resultant information – what is the work involved in keeping it, and what value will you get out of the information? The choice of action is an economic question like any other decision, such as spending money on fertilizer – what is the additional cost relative to the additional return? The difficulty is that it is not possible to do simple experiments to come up with a clear conclusion – you must use your judgement. Remember that accurate data and the truth of the matter are hard to beat!

Exercise

Finish this section by assessing the *value* of a case farm's records. What is the value if records are kept on:

1. Every activity carried out in each paddock/field. How valuable are these records in adding profit?
2. Stock output and production. How valuable are these records in adding profit?

3. All stock husbandry activities. How much value do these records add to the annual profit?
4. All machinery and building activities and maintenance. Do these records add to profit?
5. Paddock by paddock pasture production and hay yields. Does this information, once analysed, make feed management more efficient so that profit increases?
6. Carefully recorded expenditure and sales information. Does this activity enable better decisions and therefore add value to the bottom line?

CHAPTER 1.9 LISTENING SKILLS

Listening is one of the most important observational skills. Effective listening is critical to successful management as it is our main source of information (40% of communication). Listening is different from hearing – how much that is heard is never retained? You must concentrate, use appropriate filters and store in memory, or write it down.

Introduction to Listening Skills

We spend a lot of time listening to people talking – and this source of information is where we learn most. In fact, for communication time, something like 40% is in listening, 35% talking, 9% writing and 16% reading. Picking up the correct message from others and using it appropriately is, therefore, a very important part of our daily lives and impacts on the success of our management and decision making. Do these figures reflect your situation? Perhaps not exactly, but think about how much time is spent listening to the radio and TV, listening to people at lectures, meetings, field days and, in the case of farmers, listening to family members and employees, and to contractors and others, perhaps on the phone. Getting all these communications right is crucially important.

Listening is different from hearing. Sounds are passing through our ears all the time, but you have to pick up what they mean to your situation – did you hear and absorb the message and its significance?

Take a minute or two to concentrate on all the sounds around you. Concentrate carefully for a few minutes and list the different sounds, both far and near. Is there anything surprising on the list? How much of this do you automatically shut out with filters acquired over the years?

Listening involves energy and concentration – it is an active process. When you are in a conversation it is a particularly active process, or at least it should be if both participants are to receive the message that was intended. You can receive the most information in a conversation if you are supportive, encouraging and non-judgemental. There are two kinds of listening situations: simply receiving information, both verbally and, possibly, through sight (TV, lecture, field day, etc.); and being actively involved in a conversation where, even if it is mainly a one-way flow, your responses can greatly enhance the information received.

Effective listening involves active participation by the receiver. You must ensure the speaker understands that you, the receiver, are interested and supportive – unless the person is only interested in talking *at* you! You must also know what things are generally relevant to you.

Encourage the Speaker, and Concentrate on the Relevant

In conversations, effective listening helps the talker to reduce their emotional reaction level so they can think more objectively; and active supportive encouragement helps them bring out all the useful information they might have to impart. People respond positively if they think you are interested and supportive. This leads to you observing useful facts, figures, ideas and concepts, and good management relies on good information. On the other hand, do you know anyone who is more interested in talking *at* you with her/his ideas, rather than having a conversation? Can you be bothered? Do you quickly turn off?

Effective listening also has another side to it – listening to yourself. Do you really know what you want; do you know what management systems and processes you find most useful on a farm? What is good for someone else is not necessarily good for you – we are all unique. Thus, we also need to listen to ourselves to discover what we, individually, really want and need. Just following what everyone else does is not necessarily right. Have you ever said to yourself 'I should do this, or that, . . .' but never get round to it? Why not? Perhaps it was not right for you anyway. Or if it was, what was the barrier? Sorting these situations out through listening to, and understanding, yourself is a very important aspect of good management.

Furthermore, a common comment is 'I like my boss, he listens to me, I can talk to him'. Clearly, working well with employees/contractors is a crucial part of management. Listening, and thus observation of the real situation, and effective communication is crucial to getting what you want done, and done well. Equally, the same applies to all other conversations you might have.

Active listening involves focusing on the speaker: put your beliefs aside as they may block the message, constantly summarize, and check back with the person (if face to face, e-mail to e-mail, or phone to phone) that you have received the intended message.

Active Communication – Concentrate on the Speaker

It is important to spend time concentrating on listening/observing, not just thinking about your side of the dialogue – focus on the other person – practise and concentrate on this. After, and during, all conversations, *summarize* in your mind what the person said, maybe write it down if considered important (this also helps memorization), and check with the person that you have got it right – do this by summarizing/paraphrasing what they have said back to them. For example, the expert soil scientist you are chatting to after a lecture might say:

> With all the soil testing services around now it is very easy to get exact soil tests, but you do have to be careful with sampling and literally going by what the tests say – just because the Olsen P is well down on what might be said to be a standard, it doesn't mean you should rush to the phone to order the fertilizer truck.

You might respond:

> So, soil tests aren't the complete answer to making economic decisions.

And if this is exactly what the soil scientist meant, he might respond:

> You've got it in a nutshell!

Now you are assured the message taken was correct. This process is referred to as *effective listening* – you are *actively* involved in the conversation – concentrating, summarizing, checking you have the right message, and supporting the speaker.

Think of all the people you have conversations with – which person do you find the easiest and most satisfying to have a discussion with? Think of the features that stick out in their conversational style. Do they:

- Listen without interrupting?
- Support you by making small comments from time to time (e.g. 'I understand', 'Yes, go on', 'That's interesting', etc.)?
- Summarize back to you what they think you mean?
- Never criticize or disagree with what you have said, at least initially? That is, they do not pass judgement on the 'rightness' of you and your views. This is in contrast, however, to having a positive discussion about the efficacy of any conclusion. Being *judgemental* does not lead to a constructive conversation.

They probably *do not*:

- Only half listen, and butt in as soon as possible to force their view on you.
- Listen only in spurts, tuning in and out as they follow their own thoughts.
- Sit there without any kind of response – either verbal or non-verbal (and the non-verbal responses are part of any conversation – what message do you get when the other person keeps looking at their watch, or keeps fidgeting?).

How did all your conversations over the last day rate – which styles did the other person use, which styles did you use?

Exercise: self evaluation

Answer the questions below and get a 'listener' rating. For each question write 1, 2 or 3, depending on the degree of truth. For complete 'truth' enter 3, and 1 for little concurrence.

Do you:

- Concentrate on the person's words despite not agreeing or being disinterested?
- Summarize back what was said to check understanding?
- Check word meanings if you do not understand (ask or look up later)?
- Not daydream when bored or disinterested?
- Plan what you want to say, and the best time to say it?
- Try to get the real meaning despite possible word misinterpretation?
- Not think about a countering argument when still getting an explanation?
- Worry about how the other person might react to what you say?
- Try to understand the background and perspective of the other person?

- Use pencil and paper to be sure you do not forget the main points?
- Take time to form an opinion on their views?

Now, add up your score. If you scored 25 or above you are a great listener.

Making Use of Active Communication in Problem Solving

Have you ever sorted out an answer to a problem while, or shortly after, talking to someone about it? Active communication quite often focuses the mind on to a solution. If someone understands what you are saying, and what you feel, and supports you, you feel more comfortable and stronger. This situation seems to help find a solution to a problem that is yours – and if you think up the solution yourself it is more likely to be suited to your particular situation. This is in contrast to using someone else's solution, perhaps imposed on you.

Perhaps explaining something to another person helps you to order thoughts in your mind – perhaps verbal action leads to a mental summary and action. Certainly, to explain something you need to order your thoughts. Do you feel good when someone listens, understands, and supports what you say? Think of the reverse, too, when dealing with others. When there is empathy, what is the body language – facial expression, tone of voice, gestures and body posture, eye contact?

Exercise

1. Give a call to a person you find empathetic and who listens to you, and ask if they could help on the latest decision problem that is going through your mind – think about the approach the person takes. Does it conform to the ideas listed?
2. Chat to someone you think might be having difficulty sorting out a decision – chat a little, but mainly listen, using the approach suggested, and observe whether they come to a resolution. Talk to them about it afterwards. *However*, be careful and sensitive – perhaps it is better to keep clear of personal problems unless you are sure the discussion will not lead to potential difficulties and concerns.
3. Read the extract below:

> Jim, the neighbour, has always been interested in new ryegrass cultivars. After attending a company field day he was keen to share the ideas.
>
> Jim: I enjoyed seeing the plot trials of the new ryegrasses – boy – I reckon they'll make a big difference to my spring feed bottleneck with huge production increases. I was most impressed with the differences in the cultivar compared with the older grasses. Without a doubt spring growth is up 30% – that's something!
>
> Response: What you saw really impressed you, especially this year when it is so dry.
>
> Jim: You are right – I'm really keen to try the new ryegrass if I can get my hands on some seed.
>
> Response: I wonder if the company representative had some trial plot cutting measurements for you that I could see?

Jim: He didn't seem to have the exact figure for several springs and total year figures, but, boy, the latest cutting data was impressive – it must have been at least 30% better, and it certainly looked great.

Response: Sounds just great. So you did some sums on the data?

Jim: Well, not exactly, as we only had the kg DM for the last cut and only for the new cultivars, not for the old one we have always used. The company rep said they were going to get this data from some other trials.

Response: Well, we'll look forward to seeing the full picture all in good time.

Do you agree that the way the conversation went is appropriate: were the responses correct, or would you have put them another way?

You will note some active supporting comments, which reiterate what was said – supporting, but at the same time checking you have got the message. For example: 'what you saw really impressed you' and 'sounds just great'. But there were also suggestions about positive action in contrast to a direct criticism of the enthusiasm. For example: 'I wonder if the company representative had some trial plot cutting data measurements for you to see?' and 'Well, we'll look forward to seeing the full picture all in good time.'

Listening With Your Eyes

In conversations, be aware that people communicate with more than just their voice. You should be alert to the cues and respond accordingly to enhance receipt of the message. Picking up true meanings sometimes involves doing more than hearing and listening – we are all aware of non-verbal communication, so whether receiving messages, or giving messages, we should observe the real meaning and make sure we respond according to the true message being given. Non-verbal messages are either *positive* (favourable to what is being said) or *negative* (not interested, does not agree). Here is a list of both to contemplate – do you agree with it?

Positive	Negative
Smiling	Raising an eyebrow
Nodding head	Frowning
Sitting forward in chair	Looking away from speaker
Remaining silent	Rolling eyes
Opening and relaxing body posture	Closing and stiffening posture
Touching	Withdrawing
Not moving	Behaving restlessly
Having eye contact	Hanging head down
Sighing	Squinting eyes
Letting head nearly	Scowling
touch shoulder	Rotating head from side to side
Looking delighted	Critical face expression
Slumping in chair	Folding arms across chest
Tilting head down	Putting hands on hips
Arching neck forward	Narrowing eyes

Positive	Negative
Looking straight at speaker	Looking sideways Drumming fingers Shrugging shoulders Puffing cheeks Pulling back corners of mouth Swishing foot backwards and forwards Bouncing leg

Can you think of any other non-verbal signals that you, or anyone you know, use? While the list given covers the common non-verbal signals, you may well be conscious of others either used by you, or by others you listen to often.

Reflection

Last time you had a conversation with someone, can you remember any of the gestures listed above? Did they reinforce the message, or were they contrary? Did you remember what the other person did, or was it what you did? Jot down your conclusions.

Next time you have a conversation, think about the gestures being displayed – are they described in the list? And be conscious of your own gestures.

Passive Listening: Hard Work is Necessary for Success

In some situations, particularly in large groups, you are simply listening. In this case you are unable to check back to see if you have the correct message. You must concentrate hard, and work on having an *open* mind. What filters and biases do you carry with you?

Active listening and communication is often about arrangements on and off the farm and relationships, rather than primarily *observing* and *storing* away useful data and *information*. On the other hand, most farmers pick up a massive amount of *information* from *listening* to what others have to say, whether on the radio, on the TV, at seminars or at field days, etc.

Do you get the true meanings and relevant facts from these listening sessions? You will probably never know, as in many cases it is not possible to get active feedback like you can in a conversation. But there are many things we can concentrate on to make sure we give ourselves every chance to get the correct message.

One of the most important things is to work hard at *keeping an open mind*. Easily said, but not often as easy to do as we all have our own personal biases, or filters, that keep out some of the messages. More often than not we are *blind* to our own filters. Some possible filters to think about include:

- Memories: we have a memory of a similar situation or event from which we decided a conclusion. Thus, we do not actually listen to the current message: 'Oh, not again – we've heard this before!' Or *have* we?

- Values, beliefs, strong feelings: if the person giving the message exhibits different values/ideas to those to which we subscribe, you may not listen with an open mind: for example, ‘This person is fixed against rural development – we don’t need these types!’
- Interests/Assumptions: if the assumptions behind the talk do not comply with your situation, you switch off. For example, perhaps the talk is aimed at intensive fat lamb, and you are on hill country…but maybe there is a valid message/information.
- Prejudices: maybe, and sometimes for good reason, you have built up a prejudice against a possibility and so ‘turn off’ at the suggestion. Perhaps sometime in the past you had trouble controlling cattle with some now replaced fences so you will not consider running them despite the possible profit/management advantages. Maybe, in this example, the new fences mean you need to take a fresh look.
- Expectations: you expect to receive certain information, but the person gives you something else, so you daydream. You may have lost a good opportunity.
- Environmental filters: perhaps where you are sitting makes hearing and concentrating difficult. Make sure you are in the best location to get the full message.

It is well known that people often only want to notice the things that conform to their beliefs and prejudices. You need to think about this factor and work on keeping an *open mind* – observe all the messages, and process them openly and intelligently.

Practise your passive listening skills

1. When you find a quiet period after a discussion or lecture, jot down the main points you took in. Then think back carefully and ask yourself if there were any other points missed in the first assessment. If there were, why did you miss them? If it is possible, go back to the person with your list and check that your summary is how the speaker meant it to be. To be able to make your summary you need to concentrate and take mental notes (or on paper if feasible). When was the last time you listened to someone talking about a farming matter? Was it at an agricultural talk, perhaps in a conference, or on the radio, or at a meeting? What were the main points you picked up from the talk?
2. Think back to recent conversations/lectures – was anything said, or observed, that turned you off so that you became negative to the discussion? If so, what was it that gave this reaction? What factors/messages produce a negative reaction in you? Most of us have some blank spots: we turn off from what is being said when hearing or noticing something the speaker says or does. Being quite honest with yourself, what are your ‘turn off’ factors?
3. Do you ‘daydream’? Think back to your most recent work discussion, meeting, lecture: did your mind wander on to something else besides the words? You would be unusual if you did not wander for at least a few minutes. Many people find their mind wanders on to the things occupying their minds at the present, but other topics are also favourite daydreaming areas. Next time, concentrate on whether your mind wanders, and see if you can prevent it – *concentrate*, *summarize* and *write down*.

The key to effective listening is *attention*, *reception* and *perception*. Concentrate hard to ensure every word is received, and then summarize and conclude. Do not let the messenger distract you.

Concentration: the Key to Message Receipt

Make sure you hear every word, receive the messages and their meanings, and form a perception of their significance. This means you must ignore distractions, annoying mannerisms, annoying accents or words and so on. Equally, if the person giving the message conforms to everything you think a good speaker should be, do and say, do not just take everything they say literally – be perceptive. In a nutshell, do not let the messenger distract you from the *useful information*.

Think about this point next time you listen to someone at, for example, a field day. Also, remember that *concentration* uses a large amount of energy. If you can, tape radio talks, or even live talks, so you can absorb them when you are fresh and ready to receive the message.

More on Message Receipt

The diagram below summarizes the situation:

Original story	Filters	Message
xxxxxxxxxxx	Word meanings	
xxxxxxxxxxx	Biases	ACTUAL
xxxxxxxxxxx	Distractions	MESSAGE
xxxxxxxxxxx	Cultural myths	RECEIVED
xxxxxxxxxxx	Emotional blocks	
xxxxxxxxxxx	Noise/speech speed	
xxxxxxxxxxx	Comfort	
xxxxxxxxxxx	Illness	

The key is to get the 'message received' box almost as big as the 'original story' box. Do not forget the ending box sometimes actually gets bigger than the originating box – a bit of creative imagination has also to be guarded against.

Remember, practice makes perfect, so you need to remember all the points about *effective listening* by using mental notes – keep thinking about them and practising in every listening situation. And remember *anyone can become an accurate listener with practice*. You are not born with good listening habits, they are learned. They are common sense and easily *acquired by everyone*.

Summary of Listening and Communication Skills

- Find areas of common interest.
- Practise *active listening* energetically (giving constant feedback).
- Constantly *concentrate* with all your energy.
- Focus attention on the central ideas being portrayed: what are the central messages, then take notes of these messages.
- Resist external distractions: mannerisms, noise, etc.
- Resist emotional reactions.

- Be aware of your biases and counteract them.
- Maintain an open mind.
- Practise regularly.
- Evaluate speaker's content – not the speaker.
- Constantly process the information, ending up with a summary précis.

Does the following sound familiar to you?

> Jim listened to the Rural Broadcast the other day. It was an interview with a flower exporter who had a growing business. The exporter talked about the high prices being received in the Tokyo and New York markets for peonies and roses. He was exhorting farmers to become involved as there are many farms with small micro-climate areas that could well be suitable. He quoted the yields possible. A sum at the prices quoted indicated the gross income was very high – this started Jim thinking, as he knew some people in a relatively high altitude area near an airport who were growing peonies and seemingly doing well. A visit to them was on the cards. He also felt a call to the nearest flower auction house was warranted.
>
> The investigation revealed the high prices quoted were indeed occurring, but only over a couple of weeks before Christmas. If the average was worked out over the normal harvesting season the price was only a third of the quoted figures. This cut back the gross return per hectare to a marginal figure.

You won't improve without effort – a change process is required. Just reading this will not make much difference. Effort, practice and constant review are necessary.

The change process

Learning good listening skills probably involves change for most people. This needs to be worked at, and involves *hard work* – it will not just happen. The good news is, of course, that eventually the process becomes second nature so you no longer need to concentrate on the best procedure.

The normal process is:

1. Non-awareness: you do not know there is a better process.
2. Awareness: after going through the material you are now aware of, and appreciate, the skills of good listening.
3. Internalizing: you consciously put into effect 'good practice'.
4. Integration: the new behaviour becomes subconscious – it just happens without thinking about it.
5. Improvement: you need to be constantly asking yourself whether you can improve.

Generally speaking, of course, this stepped process applies in all areas of managerial skill.

Concluding Comments on Listening

Be aware that receiving and registering the message intended by the speaker does not always provide the true facts. Thus, be critical, in a positive sense, of the information before coming to a conclusion. Consider the credentials of the speaker. Do not generalize from just one observation. Find another source of information – do they agree with each other? Where did the data come from – are the conditions comparable to mine? Are there advantages from what is being proposed relative to the current situation on the farm?

Work at being a doubtful believer, but once the message is checked out and found to be robust, quickly act accordingly.

CHAPTER 1.10 REVIEW OF OBSERVATION SKILLS

Decisions depend on facts: to make successful decisions you must know all the factors impinging on a farm. They come from observation.

What is observation, and what needs observing? Everyone knows observation is using all your senses to pick up relevant facts. This includes all the technical, price, cost, market, rule, regulation, people, etc. factors that impinge on a farm. A farmer must constantly practise picking up relevant facts and checking that he has not missed anything. Farmers should compare notes with others with similar interests.

Good processes lie behind successful observation. Useful information comes from successful processing and interpretation of the facts noted, and from complete and impartial logging of these facts. It is no good calculating the average lambing percentage if you only remember the good years – expectations will be wrong. You must develop procedures for observation, which become automatic, including writing down, in a systematic way, the important facts. You must then have a system that allows quick retrieval.

Improvement in observation is not always obvious. Seldom is there a major improvement that is startling to the farmer. Rather, a steady improvement occurs that possibly becomes noticeable when the farmer stops to think about how his management and attainments have improved. So often improvements are more obvious to outside observers in contrast to the farmer himself. This situation must be appreciated by farmers when working on improving observation as they may put less time into the approaches highlighted in this book if immediate change is not obvious.

In good observation you first need to notice everything of importance, and this must then be committed to memory (or paper). Interpretation is then the key factor, as is an ability to decide whether an apparent fact is indeed true.

Remember that there are many aspects to observation. They include good visual observation, good reading skills, good listening skills (both active setups where there is a dialogue, and non-active where you are simply listening in an active way). Do not forget things such as observing the farm family objectives, watching out for biases, and working on correcting them. Then there is the matter of having a good record-keeping system, which is also related to improving memory and recall skills. Clearly, there is much to practise.

The Plan Ahead

By now you have been through all the observation chapters. In a farmer's case he should constantly review the chapters, say every 6 months, until he no longer finds them reminding him of anything new. Furthermore, any student of observation should not forget to do the exercises and tests just to check that he answers or reports them correctly.

The chapters in this observation section explain the components and factors important in each form of observation. There is nothing like practice to develop the skills discussed – constant practice using the techniques suggested as the reader carries out their daily activities is highly recommended. Remember, there is good evidence that *considerable improvement in observation skills is to be expected* if you work hard at it. And be very sure to improve your critical ability skills: part of observation is ensuring you get the right information, which is then useful to decision making.

Right at the very beginning, one very important decision many farmers face is whether to purchase a particular farm, or block of land to add to an existing farm. Critical to this decision, and how much to pay, is the productivity of the land. This depends largely on two factors: the quality of the soil (which will vary across the farm) and the nature of the weather impinging on the land relative to any irrigation system that might exist, or is potentially available. Get these observations right and the venture has the foundation for success.

But observation is only the first step in good management. The observed facts obtained must be turned into useful decisions. This involves both anticipating potential outcomes and assessing the risk associated with alternative decisions. Thus the next two parts of the book cover these two broad skill areas.

APPENDIX A1 REINFORCEMENT EXERCISES

Areas Requiring Observation

To check your memory of the important areas to observe, *classify the category of factor observed* in each of the mini-scenarios below. Decide into which category the situation falls. Write down your answer and then check below if you are correct.

1. Tom spent the evening catching up on the reports of recent wool sales in his farming journals.
2. June spent some time talking to the employed married man and his family when calling to give them some biscuits.
3. June was keen to maintain the assets in good condition and made a point of checking out all the buildings very carefully at least once a year.
4. Jim walked the farm and jotted down in his notebook the estimated dry matter cover in each paddock.
5. James talked to his bank manager about his overdraft level, and also called the stock and station agent manager to find out whether his balance was also in overdraft.
6. The rain gauge had not needed a visit for some time. Sunscreen was more the order of the day. Tom was starting to scratch his head over the feed situation now that mating time was only a month away and the sheep were losing weight.
7. Bob and Samantha weren't much good at watching TV as there always seemed to be more jobs that should be attacked. But one night when studying the accounts the TV was turned on… what was showing was very interesting. The current affairs programme was talking about a group of farmers who were setting up a cooperative to work on health products. Maybe there was some scope here?

8. Humidity levels had been high lately. June reckoned crop fungal levels could be building, so she spent some hours checking each field of developing crop for signs of infection.

Answers

The categories are: **1** markets, **2** people, **3** physical, **4** biological, **5** finances, **6** farm problems, **7** opportunities, **8** biological.

Farm Reality Check

To make appropriate choices the decision maker must be fully cognizant of all the factors that make up the farm. Test yourself by answering each relevant question from the lists below. If a question does not apply to the farm, which might be a case study, just mark it NA. You might like to photocopy the questions so you can write your answers.

1. Ewes – divide the flock, including 2-tooths, into THREE live weight groupings and give:

(i) lightest group: less than ________ kg/head number ________
(ii) middle group: between ________ and ________ kg number ________
(iii) heaviest group: greater than ________ kg number ________

TOTAL ________

2. Hoggets – similarly, divide them into TWO groups. If none on hand at the moment, leave blank.

(i) lightest group: less than ________ kg/head number ________
(ii) heaviest group: greater than ________ kg number ________

TOTAL ________

3. Lambs – similarly, divide them into THREE groups. If none on hand, leave blank.

(i) lightest group: less than ________ kg/head number ________
(ii) middle group: between ________ and ________ kg number ________
(iii) heaviest group: greater than ________ kg number ________

TOTAL ________

(iv) average age (weeks): ________

4. Other sheep – similarly, divide them into TWO groups. If none on hand, leave blank.

(i) lightest group: less than ________ kg/head number ________
(ii) heaviest group: greater than ________ kg number ________

TOTAL ________

5. Cows – divide the herd into THREE live weight groupings and give:

(i) lightest group: less than ________ kg/head number ________
(ii) middle group: between ________ and ________ kg number ________
(iii) heaviest group: greater than ________ kg number ________

TOTAL ________

6. Heifers – less than yearlings. Divide the herd into THREE live weight groupings and give:

(i) lightest group: less than ________ kg/head number ________
(ii) middle group: between ________ and ________ kg number ________
(iii) heaviest group: greater than ________ kg number ________

TOTAL ________

7. Heifers – greater than yearlings. Divide the herd into THREE live weight groupings and give:

(i) lightest group: less than ________ kg/head number ________
(ii) middle group: between ________ and ________ kg number ________
(iii) heaviest group: greater than ________ kg number ________

TOTAL ________

8. Calves – similarly, divide them into THREE groups. If none on hand, leave blank.

(i) lightest group: less than ________ kg/head number ________
(ii) middle group: between ________ and ________ kg number ________
(iii) heaviest group: greater than ________ kg number ________

TOTAL ________

(iv) average age (weeks): ________

9. Growing cattle – less than 18 months. Similarly, divide them into THREE groups. If none on hand, leave blank.

(i) lightest group: less than ________ kg/head number ________
(ii) middle group: between ________ and ________ kg number ________
(iii) heaviest group: greater than ________ kg number ________

TOTAL ________

(iv) average age (weeks):________

10. Growing cattle – greater than 18 months. Similarly, divide them into THREE groups. If none on hand, leave blank.

(i) lightest group: less than ________ kg/head number ________
(ii) middle group: between ________and ________ kg number ________
(iii) heaviest group: greater than ________ kg number ________

TOTAL ________

(iv) average age (weeks): ________

11. Other stock.

(i) type: ________ number ________
(ii) type: ________ number ________
(iii) type:________ number ________

12. TOTAL NUMBER OF SHEEP ________ (add up above – is the total correct?)

13. TOTAL NUMBER OF CATTLE ________(add up above – is the total correct?)

14. Pasture. Divide the grazing pasture into four groups* based on their dry matter cover (make your best 'guesstimate').

(i) worst: ______ ha of ______ kg DM/ha
(ii) basic: ______ ha of ______ kg DM/ha
(iii) reasonable: ______ ha of ______ kg DM/ha
(iv) best: ______ ha of ______ kg DM/ha
* include any areas shut up

15. Lucerne (alfalfa) – leave blank if none. Divide the lucerne into four groups* based on their dry matter cover (make your best 'guesstimate').

(i) worst: ______ ha of ______ kg DM/ha
(ii) basic: ______ ha of ______ kg DM/ha
(iii) reasonable: ______ ha of ______ kg DM/ha
(iv) best: ______ ha of ______ kg DM/ha
* include any areas shut up

16. Feed crops – leave blank if none. Divide the feed crops into four groups* based on their dry matter cover (make your best 'guesstimate').

(i) worst: ______ ha of ______ kg DM/ha
(ii) basic: ______ ha of ______ kg DM/ha
(iii) reasonable: ______ ha of ______ kg DM/ha
(iv) best: ______ ha of ______ kg DM/ha
* include any areas shut up

17. Cash crops – leave blank if none. Divide your cash crops into two groups.

(i) looking like average or better yield: ______ ha
(ii) looking like less than average yield: ______ ha

18. TOTAL PRODUCTIVE AREA ______ ha (add up above – is this total correct?)

19. What is your most productive grass variety/cultivar?

20. What is your most productive clover variety/cultivar?

21. Hay reserves. Divide any hay/bailage into three feed quality levels and give:

(i) high quality:
no. of bales (ave ______ kg/bale) ______ Dominant species: ______
(ii) medium quality:
no. of bales (ave ______ kg/bale) ______ Dominant species: ______
(iii) low quality:
no. of bales (ave ______ kg/bale) ______ Dominant species: ______
(iv) how many bales are not adequately covered? ______

22. Silage reserves – leave blank if none. Divide any silage into three quality levels and give:

(i) high quality feed: ______ t Dominant species: ______
(ii) medium quality feed: ______ t Dominant species: ______
(iii) low quality feed: ______ t Dominant species: ______

23. Straw reserves – leave blank if none.

How many bales (ave ________ kg/bale) of straw do you hold as a feed source? ________

24. Concentrate/grain – leave blank if none.

How much concentrate/grain is held as a feed reserve? ________ t
Dominant type: ________

25. FENCES, PADDOCKS AND WATER SUPPLY – leave blank if not applicable.

(i) average size of paddocks/fields ________ ha
largest: ________ ha
smallest: ________ ha
most common: ________ ha
(ii) distance of good quality fences: ________ km
(iii) distance of average quality fences: ________ km
(iv) distance of poor quality fences: ________ km
(v) main type of fence: ________ (describe, e.g. posts and netting)
(vi) no. of paddocks (fields) with:
good shelter: ________
average shelter: ________
poor shelter: ________
(vii) no. of paddocks with:
good water: ________
average water: ________
poor water: ________
(viii) overall reliability of water supply (good, OK, poor): ________
(ix) current average 'fullness' of dams/tanks/reservoirs: ________ %

26. BUILDINGS

(i) Woolshed:
no. of stands: ________
no. of sheep under cover: ________
condition (poor, OK, excellent): ________
area (m^2): ________
(ii) Sheds:
type: ______ area (m^2): ______ condition (poor, OK, excellent): ______
type: ______ area (m^2): ______ condition (poor, OK, excellent): ______
type: ______ area (m^2): ______ condition (poor, OK, excellent): ______
(iii) Hay barns:
no.: ________ total capacity: ________ bales ________ kg/bale
average condition (poor, OK, excellent): ________
(iv) Yards:
sheep: capacity: ______ sheep condition (poor, OK, excellent): ______
cattle: capacity: ______ head condition (poor, OK, excellent): ______

27. MACHINERY – leave blank if not applicable

(i) Tractor:
wattage: ______age: ______ years condition (good, average, poor):______

wattage: _____ age: _____ years condition (good, average, poor): _____
wattage: _____ age: _____ years condition (good, average, poor): _____
(ii) Average capacity of truck(s): ________ t
(iii) Header size: ________ metres cut?
(iv) Baler: size: ________ (kg/bale); age: ________ years; condition (good, average, poor): ________
(v) Four-wheeler bikes: no.: _____ ; condition (good, average, poor): _____
(vi) Cultivation machinery: no. of items: ________
(vii) Irrigation plant (if any): value: $________

28. PHYSICAL

(i) Area flat land:
________ ha soil type ________
current available soil moisture level ________%
(ii) Area rolling but cultivable:
________ ha soil type ________
current available soil moisture level ________%
(iii) Area hill but NOT cultivable:
________ ha soil type ________
current available soil moisture level ________%
(iv) Irrigation:
what area is irrigible: ________ ha
what area is irrigated: ________ ha water use per ha: ________
(v) Rainfall:
average (mm):
spring ________ summer ________ autumn ________ winter ________
highest might expect:
spring ________ summer ________ autumn ________ winter ________
lowest might expect:
spring ________ summer ________ autumn ________ winter ________
how much rain (mm) so far this year: ________

29. PASTURE AND LUCERNE (ALFALFA) PRODUCTION

(i) On average, what do you expect from your pasture/lucerne?

	Pasture		Lucerne
good season (kg DM/year)	________		________
typical season (kg DM/year)	________		________
poor season (kg DM/year)	________		________
highest growth time (month?)	________	kg DM/day	________
lowest growth time (month?)	________	kg DM/day	________

(ii) Stocking rate:
current stocking rate: ________ SU/ha (SU = stock units)
possible maximum rate: ________ SU/ha

30. 'ON HAND' MATERIAL
(i) How much fertilizer of all kinds is currently held? ________ t
(ii) How much grass/clover seed is on hand? ________ kg

(iii) How much spray material (all kinds) on hand? ________ l
(iv) How much drench of various kinds is on hand? ________ l
(v) How much wool is 'on hand' waiting for sale? ________ kg
(vi) How much grain/seed in silos is waiting for sale? ________ t

31. FINANCIAL

(i) What is the net balance of all trading bank balances? $________
Credit/Debit ________
(ii) What money is currently owed from invoices/statements? $________
(iii) What money is currently owed to the farm? (credits held) $________
(iv) Mortgages and Loans:
What is the current outstanding debt for the farm as a whole? $______
For each loan give amount:*

	$ outstanding	$ principal rpyt/year	$ interest/ year	total $ pyt/year
loan 1	________	________	________	________
loan 2	________	________	________	________t
loan 3	________	________	________	________
loan 4	________	________	________	________

* Note – if you don't know the split between principal and interest, just put in the total payment/year.

32. ASSET VALUE – for the whole farm unit:

(i) What is the total current market value of your land and buildings? $________
(ii) What is the total current market value of your machinery and plant? $________
(iii) What is the total current market value of your sheep? $________
(iv) What is the total current market value of your cattle? $________
(v) What is the total current market value of all other assets? $________

33. NET WORTH

(i) Farm's current net worth (sum of assets – sum of loans and debts outstanding) $________
(ii) If any, how much more do you think the farm could borrow if necessary? $________
(iii) What proportion of the amount, if any, would the manager be happy to borrow? $________

Practice at Using the Correct Visual Observation Process

You will recall that the correct process involves the following steps:

1. A quick scan of the scene.
2. Detailed examination of the features that seem important.
3. Deciding on the meaning of these important features.
4. Review and repeat. Go over these steps in your mind's eye. Can you mentally picture the whole, and the important features?
5. Store in your memory a little 'slide show' of the important features.

6. Review the important factors and decide on conclusions. Is any action required?
7. Re-scan the original (perhaps using your mental image) to ensure nothing has been missed.
8. Write in your field notebook any action required for future reference.
9. Final review: cogitate, review the mind's eye snapshots, perhaps discuss with others, and act as appropriate.

Follow through this process using the following guide
Take a quick scan of the scene from the bottom field shown in Fig. 1.3.

Fig. 1.3. Water scene.

What are the important features?

Do you agree that the following sub-scenes are the important aspects?

Sub-scene one (Fig. 1.3a)
An intriguing object...

Fig. 1.3a. Part of the water scene.

The trouble is that it's hard to work out what it is. Therefore maybe a closer look is needed – if this pond was on your farm a closer look would be in order. However, maybe the closer inspection will show it is an old truck tyre, which would mean the waterway is very shallow. Did you think of this as a solution?

Sub-scene two (Fig. 1.3b)
This one is clearer . . .

Fig. 1.3b. Another part of the water scene.

You thought the person was fishing . . . but that's not true!

Sub-scene three (Fig. 1.3c)
They shouldn't be doing this . . .

Fig. 1.3c. A further part of the water scene.

Perhaps they no longer work?

So, it is all clearer after you zeroed in on the important bits . . . but what do they mean? Mentally decide and compare conclusions.

Likely conclusions
The picture clearly indicates someone purposively putting/dragging an object in the water, which could be a lake, a pond or a very slow moving stream. The closer examination pictures show a strange black object in the water, which might be a log, a large tyre perhaps or even an upturned boat – but it is not possible to decide from what you can see.

The pipes leading into the water are clearly for discharge. At first glance they could have been mistaken for irrigation intakes, or, more likely due to their diameter, for a stock or human water supply. So, what might they be discharging? Hopefully not effluent of some kind. Perhaps they are no longer used. Then again, maybe they tap into a high quality spring that is being drained. Further checks will sort this one out, perhaps by tracing the pipes.

The 'net' on the end of the pole is *not* a net. It is a container of some sort, probably being used to collect some water. It would not be for discharging something, though this is a faint possibility (e.g. distributing a weed control agent, or even putting some fingerlings into the water).

Do you agree? Did you store the images in your mind's eye for reviewing?

Recreate the total scene in your mind's eye... did you get the original scene shown above?

Recreate your image of the object at the end of the pole... recreate the picture of the pipes... did you reconstruct the sub-scenes above?

And what did you make of it all?

The truth of it all

You need to work out what is going on and decide whether any action is required, perhaps immediately, or perhaps you need to alter future plans, though in this case you would re-check constantly up till the time some action actually takes place, if at all.

So, it was clear this man was not fishing in your favourite trout spot (perhaps you originally thought he was a 'townie' trespassing), nor was it an employee checking out the water supply (quantity, quality) before turning on the irrigation pumps.

But what it might have been is someone checking that the farmer was not discharging effluent into the lake or stream from those pipes. This could well have been a correct conclusion, in which case the farmer would have wanted to check out his credentials and, indeed, investigate if in fact there was some discharge that was not supposed to be occurring.

The truth of the matter

This person was actually a regional council water tester taking a sample to check the water quality as part of a regular programme for letting the public know the state of the stream. Thus, the farmer would want to obtain the results to check that all is well, and thus whether he might need to take some action on, for example, his fertilizer policy. The farmer would also want to check out the authority the person has to freely move on to freehold land. It would pay to keep up friendly relations, so if any problem arises there is an avenue for cooperative discussion and rectification.

But, did you miss anything?

Just to make sure nothing was missed, bring back the whole picture to mind by referring to the original photograph... are you happy with your conclusions?

Finally, what steps should the farmer take?

Drawing the process to a close

It would be worth comparing notes with other farmers that might be affected by the testing programme, especially the neighbours upstream of the farm, and, of course, discuss the situation with the farm family and employees. They too need to keep their eyes peeled for problems and situations that might cause pollution.

The farmer should not forget to write a note or two in his diary about checking every, say, 6 months with the council about the results of their testing. Perhaps the figures are posted on their website for constant review. Similarly, the farmer should make a mental note to offer the tester a cup of tea next time he visits.

Concluding comments on the exercise

While this exercise is not the same as operating in the field, as in reality each scene would be clearer and many of them moving (dynamic), and you would have prior knowledge assuming it was a familiar farm, the tasks serve to emphasize the need to constantly take careful note of the surroundings, searching for notable factors that might have a bearing on decision making. Farmers must learn to be constantly scanning the environment, and constantly review what is seen for any significant factors that might impinge on decisions.

Reinforcement of Visual Observation

Exercise one

Place a piece of paper over the picture below (Fig. 1.4). Lift the cover off and examine the picture for about 5 seconds. Now re-cover the picture and answer the following questions on a piece of paper.

Fig. 1.4. Ewes and lambs.

1. How many animals are there in the group?
2. What is the average age (weeks) of the lambs?
3. How many ewes did you see?
4. How much wool on the ewes (kg)?
5. How much pasture cover (kg/ha)?
6. Have the ewes got ear tags?
7. Do any of the lambs still have their tails?
8. Are the lambs ear marked?
9. What breed are the ewes?
10. What sire?

Answers
Now check your observation accuracy by comparing your answers with the correct answers below.

1. 7; **2.** 2–4 weeks; **3.** 2; **4.** 1 kg; **5.** 800–1100 kg; **6.** no; **7.** yes; **8.** no; **9.** Romney; **10.** Romney or Kelso.

Exercise two

See if you can use your interpretive skills to find the following 'objects' in Fig. 1.5:

1. The 4th shearer.
2. The wool handler.
3. The skirting process.
4. Cotton.
5. Spare handpiece.

Fig. 1.5. Shearing.

The fourth shearer is last in the row; the wool handler has a striped football-type top on; the two women in the front are carrying out skirting; and the word 'cotton' appears on the right-hand skirter's top; it is impossible to see a spare handpiece, though there is one hanging on the wall above the first shearer.

Exercise three

Examine the picture below (Fig. 1.6) for a minute or two, then cover it with a piece of paper. Now answer the questions below on a piece of paper.

Fig. 1.6. Group of ewes and lambs.

1. What is the dry matter (DM) cover in the foreground?
2. What is the DM cover in the background?
3. What is the breed of the ewes?
4. What is the sire of the lambs?
5. What is the dominant species of the foreground pasture?
6. How many months of wool growth?
7. What is the percentage of clover in the foreground pasture?
8. What is the live weight of the ewes?
9. What is the live weight of the lambs?
10. How many posts per 100 metres?

The likely answers are:

1. 1300–1800 kg; **2.** 900–1000 kg; **3.** Romney; **4.** Romney; **5.** ryegrass; **6.** 6–8 months; **7.** 0–15%; **8.** 60–63 kg; **9.** 10–12 kg; **10.** 25–33 posts.

Exercise four

What is the farmer in Fig. 1.7 doing? Sort out an answer in your mind, then read below the figure what he is actually doing.

Fig. 1.7. Inspection by the farmer.

The farmer is actually inspecting a bad patch of mature and dry scotch thistles to see if he can find any recently released biological control agents (gall fly), which are successfully establishing themselves in the area.

You are most unlikely to have got this one correct, which goes to show you should always have an open mind when interpreting what you see and hear.

Exercise five

Examine the picture below (Fig. 1.8) for a minute or so, then cover it over and write down answers to the following questions.

Fig. 1.8. Cows and calves.

1. What is the DM cover in the foreground?
2. What is the pasture quality?
3. What is the condition of the cows?
4. What breed are the cows?
5. What is the breed and condition of the calves?
6. What varieties are the plants?
7. What is the annual rainfall?

Although there is room for debate over the answers (dependent on country), reasonable answers are:

1. Dry matter cover is mixed, but is close to 2000 kg/ha, despite its openness.
2. The foreground pasture is poor, the background is average.
3. The cows are in reasonable to good condition, and have a live weight of 425 kg.
4. The cows are mainly Hereford, but there are some Hereford cross animals as well (perhaps some Simmental).
5. The calves are a similar mixture, and in average to good condition.
6. The pasture is of mixed quality with mainly coxsfoot-like grass, but no clover.
7. Probably not particularly high, given the species and its condition.

Exercises to Enhance Your Memory

Exercise one

Long-term memory

Think back to last Christmas. Write a brief sentence for each present you received, describing one of its features (e.g. a book with a red dust cover).

How many did you remember? Perhaps less than you actually received?

Exercise two

Repetition

Take some time to learn the little ditty below, then answer the questions.

Build up your nutrients
Nitrogen, phosphorus, potassium
And don't forget sulphur.

Sulphur helps clovers
Clovers help nitrogen
Nitrogen helps grasses
But what about potassium?
In the end animals grow
Provided there is pasture
But what about the trace elements?
Selenium, copper and the others.

Cover the ditty with a piece of paper and answer the following:

1. Potassium use: what did it tell you about the use of potassium in plants?
2. Nutrient requirements of grass: what were you specifically told about which elements grasses need for good growth?
3. Trace elements: how many trace elements were mentioned?

Answers
1. Potassium not mentioned; **2.** Nitrogen; **3.** Two.

Exercise three

Picture-prompted memory
How well does visualization enhance your memory?

Examine Fig. 1.9 for a minute or two, then answer the questions posed about it. See if you can keep the picture in your mind as you do this, and jot down the notable features (writing helps fix items in long-term memory).

Fig. 1.9. A plain with sheep and cattle.

Cover the picture with a piece of paper and then answer these questions.

1. How many cattle were standing up?
(a) two **(b)** four **(c)** six
2. What distinguishing features did the animals have?
(a) horns **(b)** very low body score **(c)** lack of face markings
3. Did the animals have ear tags or marks?
(a) no **(b)** yes **(c)** couldn't see
4. Was there plenty of good quality feed?
(a) no **(b)** yes **(c)** couldn't tell

Answers: **1. c**; **2.** none of these; **3. b**; **4. a**.

Practise picture enhancement of your memory on a daily basis. When you have a spare moment, capture a picture of your surroundings in memory. Then, last thing at night, see if you can recall it and reel off its notable points.

The power of notability
If you are a little sceptical about how vivid/notable events stick like glue in your memory, answer the questions in this little memory test. Remember, to help memorize, think of a notable feature.

Use your long-term memory to provide an answer to:

1. The highest lambing percentage you have ever heard about.
2. The lowest percentage.
3. The year snow was a problem.

4. The most difficult year for adequately feeding stock.
5. Any other farming events, outcomes, situations, etc. that stand out in your mind.

Exercises on Critically Assessing Information Offered

(Note: the advertisements presented below are largely based on magazine presentations, but the identifying material has been removed/changed.)

Magazine advertisement for a boom sprayer

Read the advertisement below, form a critique of it, and then consider the critical discussion below.

> There's more to KillIt than Air Resistance...
>
> KillIt is more than a simple air-assisted sprayer. Its unique nozzle actually injects air into the chemical to produce droplets infused with tiny air bubbles. The advantages of the system are considerable. Lower water volumes. Less drift. Better chemical retention. Higher work rate. Fewer blockages. Greater biological efficiency. Boom widths available from...

Is the sprayer too good to be true?

Do you consider this sprayer is better than anything else on the market because it says so? The article says, for example, less drift (but compared to what?), better chemical retention (what does this actually mean?), greater biological efficiency (meaning, presumably, the chemical absorption is better than competitors' appliances).

To decide about this new technology you should probably obtain some engineering advice and/or an independent assessment (but is anyone independent these days?). Perhaps there have already been some test reports published? You need to work out the key factors for your situation and then compare this with other sprayers.

Editorial article in a magazine reporting on a farmers' conference

Read the article excerpt, form a critique of what was reported, and then answer the questions.

> **Country Paradise land 'best buy' over a 50 year period**
> 'There is nowhere better than Paradise to have your money in farmland', is the conclusion reached by Real Estate Co XYZ's managing director George Profit. Speaking at the national farmers' conference on the land market in Europe and beyond, he said 'Nothing I have seen convinces me that there is a case for selling land in Paradise to buy land overseas'. Mr Profit has been involved in land in all parts of the world. He showed the delegates a graph illustrating that the performance of land in Paradise has kept pace with inflation since 1961, and has outperformed gilts (but underperformed against equities) over the same period. Money invested in the USA would have increased in real terms by 19%, but money in Australia would have declined 90%, he said. New Zealand certainly provides opportunities for low cost production to suit market needs...

Consider the following questions, then read the discussion below.

1. Would you expect the local real estate company to be able to buy/sell land in different countries and to be objective when commenting on worldwide investments?
2. Do you believe it would have been better to invest in Country Paradise rather than the USA?

Discussion
1. Some companies might have executives that are totally objective in their comments, but you would want to know how much they made from selling land in other countries compared to their local area. Assessing vested interests is clearly important.
2. The speaker said that land kept pace with inflation in Country Paradise, but in the USA it had a real (which means over and above inflation) return of 19%. If in fact the figures quoted are true, there is no doubt an investor should have put the money into US land. So, you would want to check out the figures and the rather illogical conclusion of the real estate man. But, of course, it is the future that is important, not the past.

Magazine story about a new line of brush cutters

Read the story, form a critique of it, and compare your critique with the discussion below.

> A range of eight brush cutters has been introduced by firm XYZ. They say the new range is designed to be much easier to use. Electronic ignition and a diaphragm carburettor allow totally reliable starting, and rubber dampers completely isolate the user from any vibrations. The system is whisper quiet by enclosing the engine and silencer inside a plastic outer covering, mounting the air intake on the back of the cutter, and fitting a large silencer. You can hear the birds singing. It's an all-terrain machine, for the working parts can be rotated in any direction to suit the slope. Cost of the eight model range starts at $800 for the basic model.

Discussion
How does this compare with your current brush cutter?

Well, what can you say – always starts, no noise, no vibrations, rotating head (but how is it controlled?) – why would you go anywhere else to buy? However, you clearly need to try it out to see if all the claims are true relative to the competitors. Are there any test results from an independent agency? And how robust is the machine? Do you have any neighbours who have tried it? And what power does it have relative to the competitors and how does the cost compare?

So, the usual questions that you would pose for any purchase need to be considered. The advertisement merely alerts you to the existence of, in this case, the machine, so you can then make an objective judgement.

Summary

This series of examples and associated discussion has been designed to encourage you to become objectively critical of all proposals that come before you – *every* situation needs assessing before being accepted. This does not mean you should be constantly negative about all suggestions and proposals, just realistic.

To test your new-found critical approach, pick up a rural magazine and select an article or advertisement at random. Write notes on:

1. The details of the product/procedure/method being promoted.
2. The type and level of the improvements reported as being possible.
3. The credibility of the proposer (company or person).
4. Your belief in whether it is possible to achieve the benefits being suggested.
5. Which of the current products/procedures/methods would be replaced.
6. Compare the suggested benefits with those currently obtained on a farm of interest.
7. Do your colleagues/web searches/consultants/literature verify the proposed benefits as being probable?

If you are still convinced there is something of value in what is being proposed, then do some partial budgets to assess the likely economic outcomes. Will you, or the case farmer, change?

Magazine advertisement for a grain drier

Read the advertisement, form your critique, and answer the questions.

> **A Dryer Future...**
> With Company Dry's new 'Pay as you earn' finance plan a dryer future has never been more affordable. Our grain driers are second to none. Available till 30 May, choose either 4% interest finance for 2 years, or 8% per annum over 4 years (two payments a year when you can most afford it). Prices start from $20,000 for our brand new model introduced this year. Outputs up to 150 tonnes in 24 hours with our top of the range fully automatic model. For full details, call now on 999-999-777.

1. Do you agree with the statement 'a dryer future has never been more affordable'?
2. Do you believe 'our grain driers are second to none'?
3. Is it better to borrow the money from the bank in contrast to using the finance system they are offering?

Answer and discussion

1. This may in fact be correct, but there is nothing presented that allows you to compare the current costs with those in the past. To determine this, you would need to have this information on hand or readily available.
2. Perhaps you already have sufficient experience of the world of grain driers to know this is, or is not, the case. But one suspects that most people would not have this knowledge, and would contact someone experienced to get an opinion. But, does anyone take such statements in an advertisement seriously?
3. You cannot really tell from what is offered. All you can say is that they do have a finance plan, which will need investigating. The answer will depend on the bank rate and the details of their proposal. Do you pay all the capital at the end of the period, or are there regular payments? Is it just interest that is paid twice per year? You would need more details to be able to calculate the best financial approach.

Part 2 Anticipation

CHAPTER 2.1 INTRODUCTION TO ANTICIPATION AND LOOKING AHEAD SKILLS

The future is the thing – it is what we become! Actions taken now determine what will happen when the future becomes the present. This may seem strange, but it is true. In deciding what to do *now*, a farmer must anticipate its impact, and outcome, on the days, months and years ahead. If the farmer anticipates and imagines incorrectly, the 'here and now', when it arrives, will be a mess.

It cannot be stressed enough: anything done now will have an impact on the *future*. In deciding what to do we must imagine the effect the action will have – have some kind of vision, or image. If this vision is accurate, and we did our sums correctly, the net effect will be positive. If the vision bears little resemblance to reality it is likely a farmer will not be in business for long unless incredibly good luck occurs. Reasonably accurate anticipation of the future is, therefore, an absolute necessity for good management.

This section is about 'looking ahead' skills, and about anticipating what might happen. Farmers who are constantly thinking 'in the future', both as a result of what they might do and as a result of what others do, are more likely to achieve their goals.

Thus, the reasons for looking into the future include:

1. Ensuring the right decisions are carried out in the present. That is, carrying out actions today that will ensure the goals are achieved in the future. What we do today will have a varying effect on the future – some actions will have little impact, for example, painting fence posts, but others will have a greater effect, for example, applying a greater than normal topdressing of phosphatic fertilizer.

Some people are good at imagining the future, others not so good. The aim must be to improve these skills. Having imagined the likely impacts, we can then decide whether the proposed action is profitable (if this is the goal) over the period of the impact. Of course, some managers just simply repeat each year what they did last year; perhaps they have learned through experience that it works. This is acceptable if nothing changes, but this will rarely occur – seasons, prices, opportunities, rules and regulations change every year.

2. Ensuring nothing is carried out that will not work as the future unfolds. Future problems must be guarded against at all costs. For example, it is no good retaining more replacement stock if it will not be possible to feed them adequately in a year or two. Another example might be replacing some machinery only to discover that in 3 months this one-off large expense leads to an overdraft greater than the maximum the bank will allow. No doubt, if the *future* planning and cash flow prediction shows the bank manager that the situation *will* improve, you can probably talk your way out of the situation, but one day this might not be possible. Interest rates vary, and even a small change might tip the balance.

To summarize, it is important to think about the future consequences of any action to ensure the *systems are feasible*. That is, they *will* work.

3. Ensuring decisions and actions are timely. A manager might know the correct thing to do, but if carried out too late a problem bigger than the first may occur, or at best simply waste time and money. While the plan and action a farmer has in mind is feasible, and it is also in line with his objectives over the next few periods, it will not produce what is expected if the decisions and actions taken are not *timely*. To ensure actions are effective you must think ahead and work out the *deadlines* and ensure they are met. To calculate the correct deadline will require forethought and also imagining what might happen. For example, weaning the lambs 2 weeks late can have a major impact on growth rates and production. Rainfall has been low, soil moisture is not what the farmer would have liked, and thinking ahead suggests stock feed will run out in 4 weeks, and then he may have to open the gates on the hay paddocks. Visioning what might well happen suggests 'wean now', and cut back the ewes' feed. It will be too late when all the potential lamb feed has gone.

To ensure *timely action*, a manager must be constantly imagining ahead all the possible scenarios and working back from these to decide whether action is required now. Most farmers do the correct actions, but so often it is not done at the right time, resulting in a less than desirable impact. Getting the timing right requires foresight and organization. Both require imagining the future.

4. Ensuring the farmer constantly undertakes a SWOT analysis. The farmer must consider his (S)trengths, (W)eaknesses, (O)pportunities and (T)hreats – all are factors involving the future. For example: strength – the farmer may be an excellent stockperson; weakness – the farm is in a rain shadow; opportunity – perhaps there are some good early lamb contracts; threats – the TB control measures might impinge on his cattle enterprise.

Good planning and management must work alongside the farmer's strengths and weaknesses, but equally he must be constantly on the lookout for opportunities and threats to the business. An essential component of this is *looking to the future – thinking ahead – envisioning the future* and the *influence the farmer can have over it*.

5. Ensuring contingencies are planned several periods ahead. It is no use having a fixed plan – the future usually confounds it, so you need to be adaptable. Therefore think out several plans for possible eventualities in each area of responsibility.

Running a farm is similar to playing chess: you have to keep in mind the future steps towards your goal. If you do not you will not make the correct first move – in this case, what you do today and in the near future. As in chess, there is a need to have several strategies in mind, as you do not know what your 'opponents' are going to do. In farming, one of your 'opponents' is the weather. Others include the overseas markets, rules and regulations, availability of contractors, etc. The key point here, of course, is that you have to imagine the range of possible futures, and act now to ensure you can cope with each possible situation. If a farmer does not do this, the chance of meeting the goals is considerably reduced.

Exercise

Can you think of the important components in which a farmer must think ahead? List out on a piece of paper the general areas for which it is important to think well ahead regarding likely inputs, outcomes, requirements and situations. Keep the answers to 'categories', e.g. product prices.

In this process you must cover all bases: think about objectives (goals), labour plans, pasture and feeding plans, stock plans, crop plans, asset plans, financial plans, risk management, price forecasts, ownership and retirement plans. Some prompts on components of each area are given below.

Things to think about when using a crystal ball

1. The farmer's *goals* and what they mean in terms of payoffs at various periods into the future (a holiday in 2 months' time, a new fence line in 12 months, fencing off a potential wetland within 24 months, etc.)

2. *Labour plans* – training, needs, contractors, etc.

3. *Pasture/crop policy/renewal* – cultivars, fertilizer, cultivation, topdressing, etc.

4. *Feed plans* – reserves, buying/selling, grazing, stocking rates, feed crops, irrigation, etc.

5. *Stock policy* – breed, replacements, numbers and stocking rate, buy/sell, cattle/sheep, ratios, etc.

6. *Asset structure* – buildings, machines, fences, subdivision, water supply, trucks, off-farm, etc.

7. *Finance policy* – debt, borrowing mix, short/long term, set up, etc.

8. *Price forecasting* – particularly for products, and new possibilities. Success here can have a major impact.

9. *Risk management* – selecting the right approach to suit the farmer's goals and situation.

10. *Ownership structure* – impact on tax, management and asset transference.

11. *Retirement management and plans* – getting the generation transfer right requires looking ahead many years.

There is clearly much to think about – the future is the thing, and a farmer's ability to look ahead and visualize possibilities must be a key to successful farm management.

Can a farmer improve his forward-looking skills? Definitely – as always, it is a matter of concentrating on how to do this, and then practising even more.

Being good at looking forward requires many skills, particularly where it also involves analysing what is happening in less familiar places such as the international market place. However, most farmers have all the technical knowledge available for good success in anticipating and visualizing the future on their own farms. In general the *broad basic skills*, besides technical knowledge, are imagination, creativity and visualization.

- *Imagination and Creativity* – an ability to think of alternatives – different ways of solving problems, different ways of producing products and variations on what is produced.
- *Visualization* – an ability to visualize, or create in your mind's eye, a picture of what you expect the outcome will be following from a decision, a set of decisions or an action.

Imagination

A farmer must be able to think up alternatives and visualize the impact each would have on the farm.

People tend to use mental pictures, then convert these into operational plans. This makes sense, as a picture, or series of pictures, throughout a change phase is a simple way to encapsulate the outcome of many actions.

For example, can you picture the central part of a case farm in 10 years if development money was not a constraint? Note down what you would like the central part of the case farm to look like in an ideal world in which product prices are high.

Visualization

Visualization, or picturing the result of actions, has several essential requirements:

- A farmer must be able to create sufficient detail in his mind's eye for the exercise to be worthwhile.
- The picture must allow for the relationships that exist between all components of the farm – the farmer cannot just consider a part of the farm without the impact on the rest, as it is the totality that matters. If improving the pasture in a particular paddock, the farmer should not only envisage the outcome in that paddock but also the impact on the stock and bank balance.
- The farmer needs to have a reasonable memory that enables keeping the 'picture' of *all* components of the farm in mind. This includes the bank balance, the hay barn situation and the mortgage balance situation, as well as all the physical farm components.

Of course, some people will not think in visual terms to the extent that others do, but whatever the case, some kind of *system* is necessary *to enable tracking outcomes resulting from decisions*.

Once imagined, the farmer needs to put the vision into actual plans on paper.

Capturing the vision

Capturing the vision is an ability to take the mental plans a step further. That is, to connect the imagined system to concrete plans and action.

Decision making is synonymous with alternatives, so the mental visions of these alternatives need to be committed to more formal plans to enable a comparison and choice. Capturing the vision and converting it into a real plan should involve a SWOT type analysis to assess its boundaries, and then a *conversion to a budget* (land utilization, stock numbers and reconciliation, feed plans, purchasing lists, labour requirements, etc. – the usual requirements of a budget and cash flow).

How familiar are you with stock reconciliations? Consider the following situations, and then provide a solution. Write this down and then compare with the answers below.

1. If you have 3000 ewes, and the normal death rate is 3%, after buying 150 2-tooths (young replacement ewes) your ewe flock will have: **(a)** increased, or **(b)** decreased?
2. With 3000 ewes, average deaths of 100/year, culls of 22% including drys etc., you will need, to maintain numbers: **(a)** 760 replacements, or **(b)** 670 replacements?
3. You have 3000 ewes, 25% ewe culling and deaths, 100% lambing survival to sale on ewes tupped (mated), 60% of the ewes go to a flock replacement ram, and 10% hogget (under yearlings) deaths and culling. Will your flock: **(a)** increase, or **(b)** decrease over time?
4. To ensure you get a good lambing in your 3000 ewes at a reasonable cost you should plan to put out: **(a)** 50, or **(b)** 25 rams?

Answers: **1. a**, **2. a**, **3. a**, **4. a**.

Practicality

Practicality is clearly important – no amount of ideas from exercising imagination is any use if the ideas will not work. This means not only being feasible (enough feed, enough labour, enough cash, etc.), but also successful in the sense that the plan is one of the best of the alternatives. The plans proposed must be achievable – part of the skill is the farmer keeping his feet firmly fixed to the ground.

Visions must be converted to plans that work. This means successful project management, operations that work (feasible, e.g. the assumed soil fertility and grass production is actually possible, the assumed lambing percentage is realistic), and plans that incorporate sensible economic principles that ensure, within reason, maximum returns. For example, just because you do not pay yourself a salary does not mean you should ignore your time input when costing whether the block next door is economic to purchase – if you have spare time it may be profitable, but if you do less on the home farm, profit might suffer. This 'drop' gives a value to your time (called the '*opportunity*' *cost*).

The farmer must now choose.

Deciding and acting

The end point of looking to the future and visualizing the possibilities is the decision on which alternative plan to follow, and proceeding with it.

So, the circle is completed – the imagination of the possibilities has given rise to action and consequent production and profit. The better the whole visualization process, the better it is converted to practical plans, the better manager the farmer will be in achieving his goals.

Acting out the plans is not, however, straightforward as it too requires vision. Effective time management is crucial, as is keeping a careful check on outcomes, and restarting the whole process as conditions change. Farmers operate in a risky and uncertain environment, thus plans need constant changing and re-thinking. Thus, monitoring and control is important.

The chapters that follow cover the aspects discussed in more detail providing methods of improving a farmer's skills in each area.

CHAPTER 2.2 IMAGINATION…CREATIVITY

Introduction to Creativity

Success requires that farmers must be constantly reviewing the future – mapping out, imagining, and assessing alternatives. The farmer must break away from following the same pattern year after year unless it can be shown to be the best of all alternatives. However, as conditions seldom remain the same, change is usually desirable.

Thus, planning and management is all about the future. The successful manager must constantly think about, and create, possible future scenarios and what she/he can do to obtain from the future what is wanted to achieve the goals set.

To successfully envisage the future requires imagination and creativity, skills that come naturally to some people, but not to others. However, with practice everyone can map out ideas and pictures of what might well happen, and consider what influence they can have over the future as there are many choices. So often people get stuck into a comfortable pattern and continue to follow standard management patterns and systems that have always been followed – the rams go out on the same date, the shearers are ordered within a week or two of last year's date, crops are planted at the time of a specific event in the year, and so on. Has a case farmer you have studied followed the same pattern over the last, say, 3 years? The 'proven' pattern could be used forever, but maybe the world will not let us do this. Perhaps, for example, the new environmental regulations will force a change.

No matter whether change is forced on us, or whether perhaps there are better ways, the successful manager is always examining the future, considering the choices open to him/her and selecting the best action as seen from the current point in time. It is, therefore, essential for managers to think of, and imagine, the future. You can always improve these skills, the core of which is imagination and creativity.

Furthermore, an appropriate planning horizon varies with the situation. Just how far should a farmer look into the future using imagination depends on each situation. In some cases it is a day or two, in others, many years. Whatever the time span, the farmer needs to develop a creative vision.

The mind's eye must include all time points in the future. Thinking of the future must come not only in very short packages, but also in very long ones. What will the farmer plan to do tomorrow and for the rest of the week? And, what ideas does he have about what the farm will be producing in 5 years, 10 years, and even 20 years? All time spans are important, though the ideas for the 20-year picture will not need to be as detailed as thoughts about actions over the next week – they will encompass different levels of practicability for a start.

Exercise

Imagine you are the manager running a case farm. Share some of your ideas of the future by jotting down on paper your thoughts about the following:

- Tomorrow's job list. By now the manager should have worked out what needs to be done tomorrow, i.e. the immediate future. What might the job list look like in priority order?
- The week's most important job. Your mind has most likely sorted out the plans for next week (or at least it should have). Describe the most important job, as you see it now, and outline the benefits of completing this job.
- Sheep (cattle?) production in 5 years. Give your views on the types of wool and lamb (or cattle), and quantities, that should be produced in 5 years' time. For cropping farms, think of the likely crops.
- The 10-year scenario. What will be the main differences in the case farm in 10 years compared to the present?

Did these little exercises stretch and challenge your imagination? Perhaps you have thought about these issues before, perhaps not. This chapter will encourage you to constantly think of the future in every spare moment, even if you are a farmer working round the farm.

The steps involved in exercising and disciplining your imagination

A farmer must first be very clear about his 'goals' and the 'problems' faced. Solving problems usually requires creativity – how? what? new?

Knowing where the goal posts are…and what's holding you up

To make choices the farmer must know what are his goals and objectives. These must be clearly in mind before thinking about the future – if you have not done so, return to the chapter that encourages setting out the goals. Of course, as a farmer thinks about the future and what might be possible, he may alter the goals in the light of what he sees as being possible and feasible.

Clarifying the problem

The farmer must be very clear in his mind just what the 'problem' is for which a solution is required in the future. This might simply be 'to find ways to make as much money as possible' through to 'getting a better water supply in the back paddock', or perhaps 'solve the looming feed supply problem'. Unless he has a firm statement of the 'problem' and its bounds, a farmer cannot think up possible future-based solutions for comparison and choice.

In the exercise above you listed jobs for tomorrow. Define, and jot down, the 'problems' that each is designed to tackle.

In general, specifying a problem involves: (i) defining details of the problem (e.g. likely feed shortage in 3 weeks); (ii) gathering data about the problem (e.g. how many kg DM will be required per day, what growth (kg DM) is expected and what is the shortfall?); (iii) generating ideas to solve the problem (e.g. sell animals, reduce intake now, buy some ryegrass straw, break into the old silage pit); and (iv) evaluating the alternatives, decide and act. The farmer must also think about forecasting the business environment (prices, rules, inventions) in the future. Hard work and research helps develop a useful 'crystal ball'.

Understanding what the future might hold beyond the farm gate

In envisaging the future, mistakes are bound to be made. A farmer must recognize this, so hedging in various ways is likely to be the best approach (see Part 3, Risk Management). In looking forward and creating possible scenarios the farmer must make sure to think of the range that might occur. Who knows what the weather will do, or what the international market prices will be. Of course, forewarned is, or at least 'should be', forearmed. Thinking about the future helps this process.

Where did it go wrong? It happens all the time … can you think of situations where what was anticipated did not turn out that way? Jot them down, and comment on whether farmers you know had contingency plans in mind for the situations that transpired.

Knowing what is possible

Being able to realistically think about the future requires the farmer to have a good knowledge of what is possible. To acquire this, the farmer's experience and memory of past situations is a very good starting point. The other ingredient is a good knowledge of what is happening around the farm: (i) what research is under way?; (ii) what rules affecting production are the various local body and central governments thinking about?; and (iii) what is happening in other countries, particularly with regard to supply and demand of the products produced?

To make sure a farmer has up-to-date knowledge requires him to read and observe widely – and to store away all the relevant information (see Part 1 Observation).

Write down answers to the following questions:

1. What research is under way that might affect the case farm? See if you can remember *two* of these research projects, the results of which may be of value to the farm.
2. What new rules/laws are being suggested, or under way, that might impact? Central and local government seem to want to change what we can do in the interests of 'societal improvement' – which new rules/laws will probably mean the farmer has to change his ways?
3. What is currently happening in the world that might impact on the farm? The world is a very important component of all farming systems.

Farmers need to take every opportunity to contemplate the future. For example, what will happen to pasture production if the fertilizer application is increased by 3%, 10% or more? What will happen if the sheep breed is changed? What will happen if 20% of the biggest paddocks (fields) are subdivided? What will happen to stock intake, stock production, stock numbers? What will happen if wool is sold using a worldwide internet-based system? What will happen if the irrigation is started up today?

You, and farmers, need to keep challenging yourselves to create possible situations and then thinking about how they will affect inputs, outputs, production systems and, eventually, profit.

Creativity: Areas to Consider in Thinking Ahead

Not one area on a farm should escape from the 'thinking ahead' spotlight, and from creative thinking. A farmer should be constantly thinking of alternatives and what the future outcomes will be if each is followed. The farmer needs to be performing 'mental simulations' – that is, working out the outcomes from 'what if' scenarios.

To help organize mental simulations, the different components of a farm are listed below.

Physical problems and situations

This refers to all the things you can see and touch around a farm, but in this case you are imagining their future.

The physical structure of a farm: what should it be?

A farmer should consider in his mind's eye what the farm should look like, and how to organize making sure it happens. Of course, some ideas will not be practical, nor economic, so the list must be filtered. For example:

- What would be the impact of putting in a new track across the back hill face – ease of access, time saving, re-fencing, pasture control, stock numbers? Cost? Contractor availability, timing, etc.
- What effect on potential subdivision would putting in a new water storage tank on the back hill have? Would this enable better pasture control, pasture improvement?
- What about putting in a new irrigation bore for extending the crop area and range of crops possible?
- And something minor – like fitting a new draw bar on the farm bike. What would this lead to with regard to capabilities and time involvement?

As an exercise, consider the physical changes that might be made on a case farm and jot them down. What would be their impact on the running and output 3 years after their completion?

The products that might be produced

The farmer might think of himself as a producer of wool and meat, or various crops, but it is more complicated than this. For example, think of the latest wool sale report: how many different types were there, and what about crop storage and its impact on sale times?

The country exports a wide range of products: how might you contribute?

This is a crucial area to think about. Some farmers assume there is little choice – wool, meat, milk products, etc. But there are clearly many variations within the basic products (wool fineness, for example, and breed and feeding systems), and then there is the sheep/cattle ratio question, and what about deer (meat, stock, velvet, etc.), and then tourism, herbs, new grains? If you think about it, and let your imagination have its head, there is a wide range of possibilities.

Think back over the last, say, 5 years. What products, and forms of product, have you seen, or have you heard about, being exported? To help the remembering process, list them on a piece of paper.

Casting your imagination wide, but still being practical, what products, or variations of basic products, might be a possibility on a case farm? Jot them down and discuss the list with your partner or colleague.

Of the two most likely alternative products, how much could the case farm produce in 5 years' time?

Production methods

You may well have thought of alternative ways to produce meat and wool, or some other product. Selecting the best method, and effectively putting it into production on a farm, is crucial to success.

No matter what is produced, think of alternative production methods – maybe one will be better?

A farmer's choices of production methods are equally as important as the choice of products. Again, there is a host of alternatives to think about. Major ones include stocking rate – what would happen if the stock numbers are increased by 5%? When would the feed bottleneck occur, how often would significant shortages occur? What about decreasing by 5% – what would the farm look like in 5 years' time and what would happen to the pasture quality, animal weight, wool production/head, lambing percentage? What would happen if you dropped crop fertilizer rates?

More for less

The following is an example of what has happened in New Zealand due to increased efficiency. Even though sheep numbers have dropped markedly in the last few years, the total export of lamb has not dropped to the same extent. For example, there are about 39 million sheep, which is 25% *less* than in 1992. But wool production in 1992 was 296 million kg greasy, whereas it is now about 230 million kg greasy. Total lamb production is now about 319,000 t, whereas in 1992 it was about 360,000 t. Production has *not* dropped 25% – that's efficiency for you.

No doubt you can think of many variations on the management practices currently used on farms – each needs to be considered and envisaged. Each farmer probably reckons he has already done this and settled on the best, but are you sure?

In the quest for efficiency a case farmer might have made changes to the production methods over the last 5 years or so. Jot down the changes that have worked out as planned. Do not forget that 'production methods' will include decisions on buildings and machinery. Buildings, in particular, require looking ahead many years. Sometimes people choose to build relatively flexible and cheap structures as being definite about 50 years in the future is rather difficult.

Financial arrangements

Few farmers have no debt, and perhaps some in this position consider some debt might be beneficial where the returns from extra investment (perhaps even off farm) more than cover the cost of the debt. But your attitude to taking risks might be a factor here.

Whatever the case, a farmer should give thought to changing the financial situation. What are the alternatives? Perhaps the best decision is to leave well alone, but maybe change is necessary, perhaps by re-organizing the debt (e.g. swap an overdraft for a long-term mortgage; defer any farm development to reduce debt; reduce personal expenditure to help the situation). Banks are occasionally open to a little leeway on interest rates when asked, or even when their interest rates are compared with their competitors, or it might even pay to change banks. Clearly, debt re-arrangement involves the longer term, and so the future needs to be carefully thought out.

Exercise for thought

In the modern world the range of financing methods is extensive. Clever reorganization may well give you some cash to use productively. Jot down what the case farmer should do with the extra money available if he managed to reduce debt by 20% in 5 years' time.

Property ownership – is the farm's setup well thought out?

There are so many ways to organize ownership structure, each with pros and cons. Sensible advice is important.

The importance of thinking well into the future with property ownership questions

This is one area where long-term thinking is essential. The ramification for changing the ownership of the control of the farm, and on taxation, can be quite marked. Professional advice is very important, but in the end, the farm family must choose from the alternatives. Thus, it is important to sort out what impacts each will have on: (i) the farmer's control of the assets; (ii) the farmer's ability to transfer assets; and (iii) the tax implications.

Exercise

What ownership organization alternatives have been considered for a case farm? The correct ownership structure varies with each farm. Write down the arrangements that have been considered, and how they might impact on the farmer's personal control over the farm assets.

Labour arrangements

Increasingly, farms are getting bigger, and thus help is required. As a farm is a relatively small business labour wise, getting it right is crucial to both the financial and enjoyment outcomes.

Getting the labour arrangements right: a long-term investment

Ensuring an adequate labour supply is an important task on larger units where employing help is essential. Some farmers are fortunate in that in their district a good supply of reliable and competent labour is available, but for others the opposite is true. Thus, longer-term planning can be very important in terms of setting up training schemes and employment contracts that promote contented helpers that are stable. Getting the relationships right must be worked at. The same goes for contractors. What a farmer does now can have important ramifications for the next 10+ years.

Think of the advantages 10 years in the future if you and a farmer and his neighbours set up a group labour scheme that involves both training and setting up 'good practice rules'.

Exercise
What advantages would you get out of a group labour scheme? Assuming the farm does, or will eventually, need labour, what advantages can you think of that a community labour employment and training scheme might hold? Jot them down and see if your colleagues agree.

Summary

As a summary to this chapter, key words are:

IMAGINE, CREATE, ALTERNATIVES, MENTAL SIMULATION, DECISIONS, ACTIONS

Rolling Out Imagination

Introduction

To think ahead requires imagination and creativity – are farmers you know good at this? Does the farmer (and you) encourage himself to imagine and daydream? If not, it's time he (and you) learned, and practised, the skills involved.

In the last week have you discussed anything to do with the future with your colleagues, spouse, children, neighbour? *Discussing ideas is very important*, and often, in fact, usually, *leads to better ideas!* The following sections give some guidelines on the procedures to follow in encouraging obtaining the habits of 'creativity' and 'imagination'.

Rule 1: Ignore practicality
At least in the first instance, do not be constrained by thoughts of what will work, or will be practical.

Rule 2: Record ideas without fail
Always jot down ideas or images on a piece of paper or even in a diary, or preferably a special notebook to record these ideas (you are bound to lose scraps of paper).

Exercise
Some of the cheapest land is found in drought-prone areas. Take a scrap of paper and:

1. Draw a rough diagram of what you would regard as an ideal animal for such conditions.

2. Describe its special features. Here's your chance to be a designer. What are the features of a sheep (cow, goat, etc.) that could in all reality be bred (given many years, of course) to suit very dry conditions?

Did you baulk at this exercise – is it futile? This brings up the next rule.

Rule 3: Ignore emotional blocks

These include feelings about what others will think of your ideas. It will be necessary to work hard at this. Possible emotional blocks include:

- Fear of what others will think of your ideas – remember your right to your own ideas is greater than anyone else's right to them – stick to your guns!
- Peer-group pressure – similarly, do not be afraid of doing something different. If everyone stuck to the norm none of the recent developments would have occurred.
- A feeling that your abilities will be challenged if you branch out into new systems, products, marketing, etc. This may well be so, but you can always start something in a small way. And besides, most people are very generous of their time in helping people change.

What other reasons are there for restricting the wide use of your imagination and creativity? Imagination creates the wealth of nations. Can you think of any reasons restricting, or causing, your imagination from being as productive as you would like? Write the reasons on to paper and share them with someone else . . . do they agree?

Rule 4: Get your self perception right

Consider the perception you have of yourself – if you think of yourself as not having new ideas, of not imagining what might happen, then *think again*. It has been shown many times that virtually everyone has all these skills, given encouragement and practice. So tell yourself – *you can in fact do it! OR you can convince a case farmer of this fact!*

Rule 5: Focus on the key issues

Practise concentrating on the central part of ideas – do not let less important details confuse and confound. When reading material, concentrate on summarizing the main concepts – eliminate 'noise'. And watch out for 'bandwagon' effects – that is, just accepting what the current trends are. You need to constantly ask yourself, as you come up with ideas, as you listen to, or read, material – 'What basic new idea/information is contained in the thought or message?'

Example

Read the extract below:

Jim was listening to the radio the other day as he spent hours in the wool shed turning over some ewes to check and trim their feet. The reporter was interviewing an expert on feta cheese made from sheep's milk.

> *Reporter*: Is this a product that might be important?
>
> *Expert*: The world market for this cheese is just huge, with many European countries consuming quite large quantities. The cheese sells at an excellent

> price which hasn't declined for many years – in fact, the retail price has been surprisingly stable.
>
> *Reporter*: Do you think a new and emerging industry here could break into the world market?
>
> *Expert*: Any product that is of the very highest quality at the right price will make a mark. The Europeans can hardly refuse to consider any proposition that might be offered. So, all that is required is some entrepreneurs to become involved.
>
> *Reporter*: So you think sheep farmers should be interested?
>
> *Expert*: Undoubtedly – as I noted, the world consumption is quite significant and constitutes an important outlet for sheep farmers in some countries – and of course they also produce some wool.
>
> *Reporter*: I recall from earlier milking experiments the yields are quite variable.
>
> *Expert*: That is certainly true, but some ewes do produce well. Farmers may need to think about specialist milk producing lines and together develop a strong breeding programme. This may, however, take some time. Perhaps, genetic material can be imported?
>
> *Reporter*: Thank you for your time.

Is this significant information for farmers? Jim concluded the following: very little of relevance was provided. What Jim wanted to know included: what are the prices, what volume is required, what are the yields, what processors exist at present, what quality grade can be expected, how does our feta style relate to the types demanded, what costs are involved, milking times, plant costs, etc.?

What did this story tell you, and how did your conclusions compare with what Jim thought?

Next time you read an article, or listen to an item, concentrate on summarizing the points of relevance and real interest covered. Pare off the padding and irrelevant. A farmer should ask '*What do the essential facts/ideas mean for the future of my farm?*'

Rule 6: Be clear about the assumptions

When you map out the future that would result from applying ideas, you make various assumptions about the world and about the attributes of the farm's resources. Do you think about these? It is a good idea to write out the conditions that were assumed. The list often stimulates ideas about changing the assumptions that you took for granted, and, just possibly, some better plans may well emerge.

Example

Read the extract below, and think about Tom and his situation.

> Tom had always imagined he would eventually have one of the top farms in the district. He had read and talked widely, and continued to keep up the fertilizer applications, to use modern cultivars, careful pasture rotations and rams from well known breeders for his replacement stock. He expected pasture yields to increase and, consequently, stock performance and profit to increase. Debt reduction was one of his important goals.

What assumptions had Tom made? Tom thought about this question when pushed by his farm consultant. *What do you think they concluded?*

How did your answers compare with the following:

- Fertilizer applications are at least as great as the maintenance requirement (sufficient to maintain production). To question this we need to know the level of application and relate this to trial data.
- Modern cultivars are better than existing species at the critical feed bottle-neck periods for this particular farm.
- Well known ram breeders are in fact producing genetically superior rams relative to the flock average.
- Prices will be at a level that covers all costs and allows the assumed increased production to give rise to an increasing profit.
- Debt reduction saves more than the extra return that, for example, investing the money in extra subdivision would provide.
- Rotational grazing will increase stock production. But perhaps thought is necessary on the form this grazing pattern should take at different times of the year?

Maybe all these assumptions are in fact true. If so, the imagined future will probably occur. But at least a *careful listing of the assumptions and an assessment of each will help the accuracy of the future predictions*.

Rule 7: The drivers of change

Constantly think about what causes change to the farming environment. Understanding this will, clearly, help create ideas about the future. Write down what you think are the important drivers on a case/own farm.

Did your list include the following?

- Economic conditions in the countries dealt with (exports and imports).
- The move to minimize trade barriers worldwide.
- The *real* cost of worldwide transport (air and sea). For the moment it is just holding, but real costs (after allowing for inflation) will rise given the inevitable rising cost of energy.
- The increasing restrictions on what is permissible with respect to the environment.
- The outcome from research projects both internally, and externally (e.g. pest control work, methane reduction research).

Rule 8: Become an anticipator

Develop a constant 'anticipating attitude'. This is a matter of a mind set, which gets you/the farmer jumping ahead all the time. Developing this attitude simply takes practice and concentration. For example, how soon before buying rams do you think the farmer thinks about: (i) The number required? (ii) The breed/s to buy? (iii) The characteristics required? (iv) The breeders to approach to enable getting the relevant data? (iv) The data wanted about each possible ram? Maybe the farmer followed the same pattern as last year, but is this a reasonable approach? This same general question could be asked about selecting seed lines in a cash cropping situation.

Here is another question to contemplate: when did the case farmer start thinking about the feed plans to use to get through the last winter and early spring? The previous winter perhaps? What leftovers might be expected, what contracts might be necessary, should the farmer increase/decrease stock numbers, what paddocks might be shut up, *or* is it simply an all grass affair and the farmer simply 'goes with the flow'?

Exercise

Here is an exercise to rate a sheep farmer's anticipation skill. The answers will make it clear how well he/you anticipate (you can imagine equivalent questions for other farm types). Has the farmer:

- Ever vaccinated late (after the manufacturer's recommended time of year)?
- Ever sprayed thistles, or other noxious weeds, later than the suggested time?
- Ever crutched the ewes after the desirable time, and been annoyed with himself?
- Ever shorn the lambs later than desirable?
- Ever admonished himself for shutting up the hay, or perhaps autumn saved pasture, later than he would have liked?
- Ever bought in supplementary feed too late (none available, too expensive)?
- Ever been late in putting on an autumn fertilizer top dressing?
- Ever had a year where he called in the lamb buyer later than desirable?
- Ever dithered about increasing/decreasing stock numbers as the longer-term situation changed, making a change desirable?

How did the farmer (you) rate? Maybe you should sit down with pencil and paper and make a list of decisions that must be made annually on a case farm, the date by which they must be made, and the date at which the farmer should start thinking about them. A farmer should put these earliest dates in his diary for next year as reminders! Of course, these dates may well have to be amended as conditions change.

Rule 9: Selecting the moment and the decision environment

A farmer should create an environment which enhances/stimulates forward thinking and must ensure the correct environment is found. Make sure you give yourself every chance to be creative. For example, working in the woolshed or on the harvester on a scorching day with the constant noise, dust, comings and goings, is probably not the best place to envisage the future. However, maybe you are the sort of person who can blank off the extraneous activities and noise and happily concentrate on the future as routine tasks are carried out.

It may help to sit at a table or desk with pencil and paper to just mull, and jot down, random, and organized, thoughts of the future, and your desired outcome. Sometimes a walk round the farm in the evening, or at the weekend, is a valuable time for a farmer to sort things out. Each person needs to work out a system that best suits them and stimulates forward thought and creativity.

Most people need to mull over ideas and, of course, talk to others about plans. The 'self talk' (mulling over) – and real talk – always helps to create new ideas, helps to critique existing ideas and, finally, consolidates into a conclusion on plans. Sometimes the thoughts are about what to do tomorrow, sometimes about rather longer-term and major decisions – such as a bid to buy the block next door.

Thus, if you bring up *in your mind all potential actions well before* they must be implemented, your mind has time to incubate the ideas and eventually come to a decision that you, and the other interested people, are comfortable with.

A creative pause

Edward de Bono, a famous figure in management and creative thinking circles, talks about 'creative pauses'. He suggests you regularly take a minute or two to think of new ideas, and to get into this practice so it becomes a habit. Take a minute now to think how you might improve the subdivision on a case farm. And what would you like to do to the farmhouse? And can you think of how you might change the stockyards to make life easier? Or perhaps the machinery investment? So, start now to get into the habit of thinking about new ways, ideas, and the future – whenever a farmer has a moment, he should make it a 'creative pause'.

Approaches to Thinking Ahead and Creativity

Improving your ability to come up with ideas

Some people have no end of ideas, others find it difficult to think up something different from what they have always done. For either case, it is useful to think about ways of improving your ability to generate new ideas. The methods involve 'logical thinking', 'brainstorming', 'lateral thinking' and 'random input'. Of course, some 'contemplators' find that ideas just pop into their heads – in the end, no matter what approaches you take, the sudden emergence of ideas occurs for everyone. It is just a matter of finding ways to encourage this to occur.

Then there are the concepts of *synergy* and *serendipity* – groupings of people and their interactions, groupings of ideas and thoughts, and other processes too, can somehow trigger new ideas and thoughts about the future. You need to be on the lookout for what stimulates and encourages your forward-looking skills and activity.

Logical thinking

Logical thinking means following one concept through a logical sequence until you get to new ideas. It is largely a matter of following your common sense. The easiest way to describe logical thinking is to consider a simple example.

Example: the logic of Tom's fertilizer increase

Tom plans to increase the normal pasture fertilizer application from 150 kg SSuperphosphate/ha to 200 kg/ha. Is this a profitable move? Simple logic would argue, based on the many fertilizer experiments reported over the years, and the knowledge that if you increase the intake of animals that are not already operating in a surplus feed environment, their live weight and productivity will increase. Thus: (i) increase SSuper by 50 kg; (ii) clover growth increases; (iii) assuming there is a reasonable clover plant population, then the increased growth fixes more atmospheric nitrogen; (iv) the increased nitrogen in the system increases grass growth, and improves its N (protein) content; (v) the animals have higher quality and a greater quantity of feed offered, and productivity increases; (vi) there is a 2-year delay in increased yields as the new soil fertility/plant association takes a while to stabilize at a new equilibrium; (vii) eventually the increased wool and meat is sold, and, after paying for the extra SSuper, provides a net benefit; (viii) estimates of the increased yields 2 years hence, and subsequently, feed into the cash flow estimates; and (ix) the bank manager and the farm profits both gain.

There is a clear and obvious simple logic to this sequence. The areas of doubt are, of course, the level of the eventual pasture increase and the effect this has on animal output. Estimates are required here, probably based on research data that has found its way into extension publications, or acquired by ringing up the right people. In the end, all forward-looking visions and calculations require estimates of the cause–effect relationship. The good manager seeks these out.

Assuming it is technically possible, what would be the impact of increasing cattle numbers on a case farm? Being able to follow through the impacts of any change is a necessity in order to work out its effect. See if you think of all the logical effects of increasing cattle numbers.

Logical thinking is the most common approach to thinking ahead and sorting out the future. You probably use it all the time, though some people do find that ideas just 'pop' into their mind without thinking about it. Whether or not this occurs for you, using logical thinking should always be tried. The only 'resources' needed are a good knowledge of physical and biological processes, market situations (as you need to convert physical inputs/outputs to the eventual monetary value), and the rules and regulations that govern what changes and systems are acceptable to society at large. This background is acquired from reading, listening, observation and experience. Putting it all together requires time, and a pencil and paper so you can jot down all the causes and effects, and when they will occur. The skill is in covering them all, and in estimating the quantities involved. The culmination is a forecast budget.

Brainstorming/lateral thinking

Good basic logic is essential to sorting out the nuts and bolts of the future, and possibly will lead to ideas about what to do. But, if you want to look at *changing* what you do to see if improvements are possible, where do the ideas come from? Try brainstorming and lateral thinking.

Sit down with a clean sheet and let your imagination go – jot down all the ideas that arise. Of course, the ideas generally come from somewhere – probably ideas you have heard at a field day, or read about, or listened to on the radio, and so on. But, you need to make an effort to think beyond the normal, beyond what is currently being done. While you might discard many ideas as impractical, at least try hard to go off on tangents, to go sideways, to let your imagination fly.

Exercise

Here is an opportunity to practise letting your imagination take over:

> Wool has had its ups and downs over the years. For the moment consider what you might do to counteract a further significant drop in the world market for wool, or consider what might happen as the inevitable increase in energy costs occurs. What are your alternatives?

Did you discard any ideas as too difficult, unlikely to succeed or as ideas that others would think stupid? Remember the rules: to start with, ignore any criticism of your ideas, ignore practicality, and do not judge the outcome just yet. These processes will start soon enough when the details are considered.

When you think of brainstorming you usually think of a group process. Probably it is a good idea for a farmer to create his own family group, and/or perhaps include others that work on the farm. If necessary, create an imaginary group and think of two or three of you sitting at a table discussing ideas. Then, if you can, try it in a real group (fellow students, helpers, family, friends).

Example

Jane and Tim were in a stagnant situation – they had taken over a block of land with an old house and ageing buildings that had belonged to an older uncle. The soils weren't quite good enough for serious cropping, but the whole area was cultivatable. Tim had started out as a contractor in the district and this had provided the base to fulfil their dream of being farmers. They lived in difficult conditions on a very tight budget, spending all their time on the farm fixing the fences, buildings and water system, building up stock numbers as the pastures developed, and always managed to meet all the heavy mortgage payments. But, after several years, they had reached the point where the farm was at its limit and they still had to watch the finances very carefully. What was the next step? They decided to seriously sort out the options and come to some decisions. Carrying on in exactly the current form was not an option.

What do you suggest for Jane and Tim? Brainstorm the list of alternative ways of getting into a better situation.

List of suggestions

How did your list of ideas compare with this list?

- Sell the farm and consider a place with greater potential. This would involve, effectively, starting again with very tight budgets.
- Revive the contracting business – depends on what other contractors are in the district, or within reasonable 'commuting' distance.
- Consider various off-farm jobs – perhaps some retraining for either Jane or Tim, or both (e.g. farm secretarial work, accounts, teaching).
- Intensify production (e.g. flowers, fruit, vegetables, herbs), diversify into other stock (e.g. turkeys, ostriches, stud stock) or possibly process some of own produce (e.g. garments).
- Tourist activities (e.g. homestay, district tours, guiding).
- Direct selling to high priced market (e.g. to restaurants – lamb racks, or perhaps combine with others in the district to maintain supply).

There is a lot to think about and investigate. Fortunately, there tends to be many people willing to provide information. Sometimes getting professional consulting help should be considered. Very few of the suggestions can be discounted as being totally impractical – *a lot depends on the price expected*.

Random input

Most of your ideas and beliefs about the future will come from logical thinking and brainstorming. However, to extend brainstorming some people use an approach called ‘random input’ to help stimulate ideas. Pick a word from an agricultural publication and use word association to see where it leads you.

The idea is to open a publication (preferably agriculture related) at random, then just select a point on the page and look for a word nearest your selected point, and then use this word as a starting point for generating ideas. It is best to discard words that do not relate to a physical object.

For example, the word selected might be ‘comb’. This could possibly lead you on the following sequence:

Comb > shearing > wool > carding > processing > selling on own account

Thus, maybe it is worth a farmer investigating joining with neighbours and processing their wool before selling it, with a view to increasing the profit from wool.

Words involving ideas should be discarded. For example, the word ‘justice’ is rather hard to use as a ‘seed’ in thinking up new ideas on systems.

Here is another example. The following is an extract from a page in a magazine: ‘Yet the country’s share of a $40 billion global organic market is tiny. We currently export around $50 million of organic produce…’. Clearly the word ‘organic’ dominates and is an obvious candidate to follow through with:

Organic > wool > meat > prices > markets > production costs > opportunities

Have you thought about what is required to put part of a farm into organics? Is this possible?

To come up with completely new ideas randomly selected seed words can help. To test this consider the word ‘quality’. Using a scrap of paper, jot down the string of words that comes to mind. Write down any new ideas this generates.

If you do not practise the suggestions at every chance the ideas will soon slip from your mind. Thus concentrate on the approaches for a week or two, and watch the improvements in idea generation. People who read a lot, and listen to the radio and to other people, tend to come up with many ideas. One study showed that the best farmers tended to be the readers and listeners.

Futures Approach to Creativity: Stimulating a Forward-looking Attitude

While no one has a perfect crystal ball, reading the signs can give clues to how the primary production world might look like in the longer run. You should put together mental pictures of what you expect as, clearly, ‘forewarned is forearmed’, as is commonly noted. The way of thinking called the ‘Futures Approach’ encourages you to conduct exercises on ‘environment scanning’, ‘issues management’, ‘vulnerability assessments’, ‘scenario production’ and, finally, ‘conclusions on the future’. The sections that follow build on each component and give examples.

Defining the components and stages of the 'futures approach'

The really important 'thinking ahead' involves the 'near future', as decisions have to be made and acted on. However, in general, the 'soon to be made' decisions must be related to a vision of the future – you must have goals in mind that are to be achieved.

Therefore it is important to be constantly looking well into the future to envisage what might be happening. In recent years many large businesses (like the large oil companies), and countries as a whole, have used what is commonly called the '*futures approach*'. You might well borrow the ideas in helping to maintain a forward-looking outlook. The futures thinking attitude, as it is also called, involves: (i) *environment scanning* – working out, from all the material you can find on the future, the likely future situations under which you will operate; (ii) *issues management* – the issues you might well face under the situations you expect; (iii) *vulnerability assessments* – the risks to your activities from the issues; (iv) *scenario production* – considering the likely environments (in their totality, both physical and man-made) under which you will have to operate; and (v) *conclusions*.

Environment scanning

Environment scanning involves studying articles, radio talks and ideas in general that consider the future. They will be given by people postulating about the developments that might occur. We are concerned with both technical developments (e.g. tests for footrot resistance, processing systems that reduce wool conversion to garments in just one machine) and what governments and communities might do to the rules (e.g. ban on products if genetically modified seeds are used anywhere in the country). Having gathered the material, you come to a conclusion on the important factors that might shape what the world of primary production will look like in a decade or so.

One of these factors is there are strong trends *to break down trade barriers* and make it easier for countries to trade. Our particular interest is in primary production trade. An important question is how fast will the barriers be broken down and therefore provide open access to wealthy markets, and thus price increases. Another trend is the move to *reduce pollution* of various kinds. This includes the reduction in pesticide sprays, control of fertilizer use to minimize wasteful run-off, better control of effluent disposal, and so on.

Furthermore, our present is quite different from the previous generation's, but it is likely our future will be quite different again.

Can you think of the trends on the horizon, and already started, that will be important to primary production? Does your list include the following key words?

> Synthetics, artificial, pharmaceuticals, genetic, energy, greenhouse gases, carbon trading, broadband, electronics, traceability, environmental protection, scarce resources, including water and fertilizer feed stocks, cost increases, particularly energy…

If you constantly maintain your list of factors as you regularly read and listen it will focus your attention to potential areas you should be thinking about. How, for example, will a farmer keep fertilizer records when it becomes mandatory to submit a register in a similar way to tax returns?

Note that environment scanning does not just mean the physical environment – it means the general environment under which a farmer does business. So, *a farmer should keep thinking in broad terms to encompass all factors*, health and safety for example.

Issues management

As a result of your 'environment scanning' conclusions, a farmer must now consider the nature of the issues he might face under the 'new world'. Maybe, for example, it is concluded that you will have to learn to become a producer of organic products. If so, you will need to make lists of 'issues' and consider what preparations might be necessary.

Scanning might ask 'will markets and prices become more stable with the globalization trend?', or perhaps free trade will create the opposite due to the natural variation in world supply with weather variability giving rise to more violent swings relative to the old system where everything was controlled. If this is the case, it becomes a real issue if you wish to stabilize your income (see Part 3 Risk Management). This is an example of sorting out the potential *issues* resulting from what might occur.

Your scanning might also have picked up a general trend for the 'real' price (i.e. the value of goods after allowing for inflation and the declining purchasing power of each dollar) of agricultural commodities to generally decline over the years. *Thus the real issue is: how long can you continue with your current system and still make a reasonable income?* If a farmer is near retirement it is not such an issue, but mid-term and younger farmers do need to think about becoming more efficient and, possibly, expanding.

Exercise

With the world changing, both physically and organizationally, what issues do you think will be important to how you might plan and organize a particular form of primary production (dairying perhaps, or cash cropping)? Jot down your thoughts.

Was it difficult to think of any more? Perhaps you need to focus more on articles and talks that talk about the future. Of course, some will be total pipe dreams, but others will have valuable food for thought.

Vulnerability assessments

Vulnerability assessments are similar to the 'threats' in a SWOT analysis, except here we are looking well into the future. What are the weak points in a total farm sense? For example, will climate variability under global warming be a major issue?

Thinking about the 'chinks in a farmer's armour' well ahead of when they might occur will enable ensuring, as much as possible, that problems will not occur.

For example, history suggests that farms need to get bigger and more efficient, and expand output at lower cost if they are to survive. This possibly means farmers will have to work much harder, and smarter, and/or employ additional labour. Yet, it is becoming increasingly difficult to get well trained and experienced labour due to the attractiveness of city life and the reduction in rural facilities. *Your future might depend on overcoming this problem*. In response, in some areas farmers have got together to work out solutions – training programmes, good employer/ee practice rules and flexibility between neighbours have emerged from these groups.

Can you think of any other threats, difficulties or weak points that might impinge on longer run farming systems?

Write in your notebook the parts of a case farming system that are vulnerable due to changes that might occur in the longer run. The changes will be man-made... perhaps to the environment, perhaps to our scientific knowledge, perhaps to the rules of production and trade, perhaps by the introduction of carbon trading.

History tells there is nothing more certain than that the situation under which we work will change in due course. The real question is to assess whether we need to think about what to do now for anticipated changes, or whether the changes will be so obvious and slow that there is no need to try and pre-empt them now. *What do you think*?

Scenario production

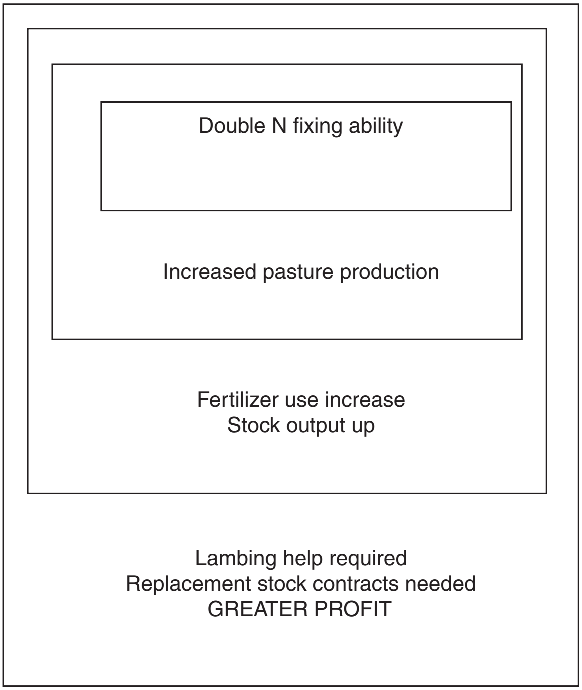
By a scenario, we mean a statement of the conditions under which primary production might occur in the longer run. This includes both physical (animal types, health systems, fertilizer knowledge, fencing technology) and man-made rules/conditions (tariff barriers, pollution control rules, carbon emissions, etc.). The '*scenario situation*' becomes the longer term framework you are planning for. You might hedge your bets by thinking of more than one 'most likely' scenario.

From your 'environmental' scanning, issues management and vulnerability thinking you may be able to imagine how the scenario of the future will appear. Of course, it is not possible to be certain, therefore it is useful to come up with more than one possibility. This scenario is something a farmer can focus on and use to provide a guide when considering longer-term decisions.

For example, consider the following scenarios. *Computers and the Internet will become an important component* of any business, as all ordering of supplies, banking, farm observations via satellites, and a significant percentage of product marketing will be conducted using this medium (sequel – farmers had better start learning more about it, and investigate faster broadband and other electronic farm systems, e.g. precision farming). *Large farms will be necessary to give profitable returns* – but they require large investments. Thus, it is likely farms will need to have multiple owners who supply capital, and, therefore, share the risk without the fixed cost of high debt interest bills (sequel – investigate ownership structures, contracts, etc.). Under free trade, *prices will be more variable* (sequel – use equity capital (as above), but learn more about risk management). Another scenario might revolve round the world-wide push to reduce population growth and, possibly, eventual population decline, and the anti-pollution drives. What if world food requirements decline, but at the same time, *organic food prices increase appreciably* as the average income of world inhabitants increases?

A 'scenario' is a full statement of the conditions you might find in the longer term. Describe what you believe will be the scenario under which farmers will be producing in, say, 10 years.

In thinking about future scenarios and likely impacts you might find it useful to draw a diagram (futures wheel) with the major factor at the centre and radiating from this the likely impacts. For example, what if research produced a rhizobium that doubled the nitrogen fixing ability of common clovers?



Effects of the nitrogen fixing power of common clovers

If you have difficulty thinking of what to expect in the future, and even think little change will occur, take a moment to contemplate the past. Think back to 15 years ago and list the changes/differences between now and then. The changes have been major, and will probably continue.

Question

Might you expect changes over the next 15 years of a similar magnitude to those that have occurred over the last 15 years? And would you have predicted the changes that have occurred?

It would be a fair bet to conclude that farms are getting bigger, financial arrangements more complex, as will be marketing systems, etc. Thus, what skills do you think a successful farmer will need in 15 years' time? Jot them down.

Conclusions on the future

In the end you need to come up with an outline picture of how you see the future scenario under which you will operate. This is critical to your planning. Of course, it would be a brave person who did not constantly go through the steps outlined and assess whether you should review your picture of the future as the years roll by.

The other thing to remember is the golden rule – *never set a decision in concrete until you have to act*. It is common sense not to pre-fix what you will do as conditions may change. However, this does not mean you wait too long – this is equally as bad as acting too late! To know when the final date is nigh you need to have a good idea of the future – keep your brain active – keep scanning and assessing all the time.

All this emphasis on the future in the sections you have recently studied will help shift your focus from the 'here and now', from the 'day to day' problems, and encourage you to *devote an appreciable part of your thinking on to the future*. After all, you can do little about the 'present' (it will soon be history), but you can plan to make the upcoming years (which will become the 'present') much improved.

Retirement Planning

For a significant number of farmers, planning for retirement is a real issue requiring good forward-looking skills due to the need to act well before retirement occurs. *No one should think they are too young to consider this issue.*

What will a farmer want after leaving full-time work? Perhaps they will slowly change the time on the farm as dictated by changes in their physical prowess, or perhaps they will want, and can afford, a major and immediate change in lifestyle. However, no one can be totally sure until much nearer the time, so be sure to keep some flexibility in what is organized.

Thus, a farmer needs to go through several steps in considering possible plans:

- Sit down and, together with others involved, make a list of things he would like to do. These might be divided into: (i) once in a lifetime activities, e.g. visit the area where a particular breed originally came from, or go to an opera in Rome; (ii) ongoing activities, e.g. take up a hobby, spend more time with grandchildren, become involved in various support groups, write some books…
- What resources will be needed to fulfil these ambitions? Clearly, there may need to be changes to the wish lists once the resources required are calculated.
- How is the farmer going to organize the supply of money required: sell the farm and invest the money, lease out the farm, or possibly live

off savings and the interest on the money left in the farm as a mortgage?
- What courses or training might be needed to meet the requirements (e.g. social work)?
- What impediments might occur to impact on the plans, e.g. health problems, downturn in farming? And consequently what backup plans and provisions are necessary.

A farmer may well need professional advice on setting up ownership and saving/investment systems to enable fulfilling the requirements. It is seldom too early to think about these questions. A farmer might like to start now if they have not already done so by writing down their first thoughts on all the questions listed above.

Run through the questions posed as an initial foray into longer term planning. Or if the plans are already in place, perhaps answering the questions might prompt a review.

Thus, what does the farmer imagine he will want to do in retirement? List: (i) once in a lifetime activities; (ii) regular/ongoing activities; and (iii) the courses/training needed to achieve the goals.

Consequently, given the wish list, determine: (i) the annual net income required; (ii) the capital cost to cover 'once in a lifetime' activities; (iii) the source of the annual cash needs; and (iv) the source of capital needs.

There are, of course, several possible impediments to achieving the retirement goals. We look forward to continuing good health, but a breakdown may upset plans. What other problems can occur in setting up and having a good retirement? What provisions have been made to nullify the impediments, where possible?

In considering the annual income requirements a farmer might find it helpful to list and add up all the bills expected. These could include insurance for house, contents, cars and health, rates, telephone, electricity, rent/house repairs, mortgage repayments, food, clothes/shoes, presents, holidays, transport, car maintenance, entertainment, new appliances/car, incidentals and contingency funds. But remember that using professional help in sorting out longer term plans and setting up the necessary legal structures could be a necessity.

Finally, in assessing any plans think about their impact on flexibility, control, taxation, income, costs and communication.

Example

In which of these cases was professional help used?

Bill and Jill: the stuff that dreams are made of

Bill and Jill had a lavish wedding, and returned to the well-developed family farm all set to enjoy life ever after. They had several wonderful children that were supported to enjoy life to the full. Bill and Jill even mortgaged their birthright to purchase the surrounding blocks, and they also built a new house to go with the enlarged property. The old homestead became the house for the employees. The children moved away from home for jobs, and Bill and Jill continued to enjoy the country life. Bill was slightly overweight, and so was Jill. Then, disaster…one day Bill didn't feel too well and visited the local GP. He was sent off for tests. The bad news came back…Bill would have to retire. Family conference calls did not help: none of the children was interested in country life now that they had jobs in big cities, and Bill had not saved anything, thinking the assets would cover the costs. However, the drop in overseas prices, and the higher interest rates, had made the bottom drop out of the land market. The farm had to be auctioned. To cut the story short, there was not much left after paying off the mortgages and the other outstanding bills, and the government had lifted the age at which superannuation started. The outcome was that there was enough for a small flat in town, and Jill managed to get a job, which covered the basics, and the children sent back whatever they could manage. But there was not much joy all round.

Annette and Clent: prudent by nature…but take time to enjoy the fruits
The locals nicknamed them 'Ent and Clent the Prudent', for that is what they were. They acquired their farm through sheer hard work and persistence. They had always dreamed of living life to the full amongst the elements, and started business in a country town running a dairy shop. Careful management meant they soon bought the shop next door, and while they lived off very little, they did manage to get on top of their finances by reducing their mortgages as quickly as possible. Using their town assets they acquired a farm when prices were rising slightly after a major downturn, but at least they were rising. Clent was a good manager, as was Annette, who managed the shop staff extremely well. Soon it was possible for Clent to take over as farm manager with the help of excellent neighbours. The years went by, and the family all moved into the farm homestead as it was possible to use the school bus that went right past the gate. The farm expanded, and slowly the town businesses were sold off. But of course all these businesses were not in sole ownership, for in the early days Annette and Clent had set up a private company to hold their assets. They were the directors. As time went by they sold the shares to their children through lending the children the money. This arrangement had been set up following family discussions. Furthermore, knowing that farming had its ups and downs Annette and Clent had been paying into a superannuation scheme for many years. Furthermore, the proceeds of the town businesses had been invested off-farm so they were well diversified. The years went by, and retirement loomed. They looked forward to doing the many things they were interested in, for they knew that the children would continue to pay them what interest they could for their shares, which were slowly being gifted, and then they had their super pay, and then the government super payments would help when the children's payments decreased. And, what's more, one of their sons wanted to come home and take over…the farm would continue.

Retirement plans, ownership structures and possible pitfalls

Ownership structures suggested by various people can be quite complex and costly. Not only are there setup fees, but there may be ongoing professional costs, too. In assessing any suggestions a farmer should, therefore, check out the likely costs. But he should also, of course, check out the benefits. Besides costs a farmer should consider:

- *Flexibility*. Can you change the setup if conditions change, if your requirements change? Be cautious of setting up a system that is fixed permanently.
- *Control*. Consider what control you will have over your farm and assets. Some systems hand over control, for example, to trustees and shareholders, and if they wanted to, perhaps, they could over-ride your decisions. This might be satisfactory now, but what if the relationship changes? It is not always possible to loosen the ownership of assets at the same time as maintaining total control. Which is more important?
- *Taxation*. Your ownership structure may impact on income tax for the total enterprise. Some arrangements reduce the total tax, others do not. Therefore consider this point, but also remember that governments can change the rules so that you end up no better off. Indeed, in the longer run they will tend to close loopholes. Another kind of taxation is the cost of retirement homes, should you have to use one at some stage. To avoid this, some people divest themselves of assets so any means test does not matter. But who knows what future governments will do?
- *Income and costs*. Clearly, you need to take careful note of the income you will have from whatever arrangement is organized, and the costs, to give your net monthly cash in pocket.
- *Communication*. In all your retirement planning (succession planning) make sure you work hard at communicating with all the family and consider their points of view. Difficulties here can cause deep-seated rifts. Sometimes professional help is useful.

Above all, a farmer should work very hard at communicating with everyone in the family who has an interest. As a report on farm succession notes in the preface, 'Successful succession planning which ensures ongoing sustainability of agriculture and maintains positive family relationships requires transparency, recognition and communication of farm business and family goals' (see 'Issues of New Zealand farm succession', MAF Policy Technical Paper 97/4a, June 1998).

Review: Creativity and Idea Generation

Problems, goals and assumptions

In thinking up ideas a farmer first needs to be clear on what his goals are. The goals direct thinking, and define specific problems and goals that need solving. The farmer also needs to be clear on the assumptions on which the ideas rest.

In thinking creatively about the future, whether it is a problem over how well the stockyards are working, or whether it is about where the farmer is heading over the next 5 years, he needs to start by being clear what constitutes the 'problem', and what the goals are. You cannot make sensible decisions unless you know what you want, and thus have the basis for judging between alternatives.

A farmer also needs to write down the assumptions and the nature of the changes expected in the future. This helps sharpen his thoughts and ensures decisions are based on what is expected. For example, you expect the price of wool relative to lambs to stay the same . . . or perhaps you expect further declines? Whatever the farmer's expectations, he should write them down so that when, for example, he decides to put less emphasis on wool production, the reasons are made clear.

Risks and uncertainties

In creating solutions the farmer needs to be very clear what risks and uncertainties will be faced as these will impinge on both the kinds of ideas, and their risk cover. All this creative thinking does not come easily to some. Thus, farmers must make an effort to put time aside to concentrate on the task. For example, a farmer might feel the relative price of wool could just as easily increase as decrease. This will impact on the decisions. It must be remembered, however, that the only thing that is certain is that whatever the forecast of the wool price for, say, the next 2 years, it is unlikely to be exactly that. But a farmer knows this, and so should plan accordingly with flexibility.

To achieve useful forward thinking requires constant attention to the task. It is not something you start thinking about once a year, but something that a farmer should mull over daily. This means time must be set aside for reading and listening widely – it makes sense to use everyone else's brains beside your own! Most farmers have large amounts of time for thinking and mulling over the possibilities for the future as various tasks are tackled round the farm. Reading time is more difficult, especially at night. Sometimes a farmer should set aside time early in the morning.

Cultivate the forward-looking mentality

Changing habits and your way of thinking is not always that easy, at least initially. A farmer needs to make sure to practise the skills and set aside time to do this: it is a matter of self control to a certain extent. Then, eventually, it becomes second nature, and creativity reaches a new plane, and the farmer does not have to consciously think about new ideas.

It must be stressed that forward thinking is a habit that is easily cultivated – however, it is *difficult* getting into the right frame of mind and habit in the first place. Initially, it is hard work. 'Practice makes perfect' cannot be over-emphasized. Every farmer should make a mental note to practise future thinking for at least 15 minutes each day – perhaps at the dinner table each night through sharing stories and ideas. However, each person needs to sort out what habit best suits them and their family situation. The usual habit change pattern is:

Contentment → Denial → Confusion → Renewal

We get into a contented rut, and if someone suggests change we deny that there is a problem. Then, perhaps the subconscious works away and eventually we feel some confusion about what we should be doing. After further reflection we conclude that habit/procedure change is indeed required, so practice starts and new habits evolve, which become second nature – once more contentment, but on a much higher and useful plane.

Now that you have covered all the sections on creativity, try answering the questions in Appendix A2 (General Review of Imagination and Creativity) on the suggested procedures.

CHAPTER 2.3 VISUALIZATION

Introduction: Visualization and Looking Ahead Skills

Pictures are easily interpreted by the human eye and brain, and contain a large quantity of data and information. Everyone is good at 'brain' pictures, so use them to imagine the future. The old saying 'a picture tells a thousand words' is very true. It pays, therefore, to 'think with pictures'. Fortunately, most people do, so visualizing ideas of the future, particularly regarding what a particular farm will look like, and how a farmer might move from the current situation to the future image, is a relatively easy task for most people given a little practice. Research, we are told, indicates that around 90% of people visualize situations as pictures in their mind's eye. The beauty of this is that it costs nothing to experiment with possibilities, it is very quick, and can be quite detailed. Anyone who does not use these inherent skills to help their management is giving up an essential opportunity.

Exercise

Imagine in your mind's eye what your ideal ewe (cow) looks like 1 month after lambing (calving) (cash crop farmers might consider their ideal crop). Wait until the picture is very clear and precise, then jot down the four main features.

Did your answer include any of these words: two lambs, no fat, well-grown lambs, clear (no wool) face, clear backside (no 'dags'), clear belly, fine wool, 'no break' wool, good conformation, good mother, healthy, good live weight, good disease-free hooves (or the equivalent, in each case, for cows, or crops)? *How vivid was the picture in your mind?*

Pattern matching – the way it works

Your brain has an 'infinite' capacity to store pictures, so recognizing situations and objects is a matter of comparing what you see with your brain-held picture library. When, for example, you see a particular tractor, in most cases you instantly know its make without thinking about it . . . this is your brain automatically 'pattern matching'. In contrast, if you have never seen it before, some research is required – next time you see it, you will probably recognize it.

The human brain has this wonderful ability to create images and to conduct ‘pattern matching’ activities. If you observe a clump of grass, for example some ryegrass, in 90% of cases you will immediately have a word in your mind defining what the species or cultivar is. For example, what is shown in Fig. 2.1?

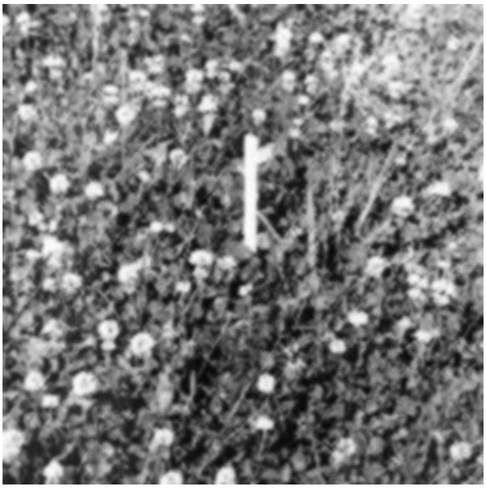


Fig. 2.1. Pasture constituents.

Most people in temperate climate zones would not have to do much thinking – recognition would be virtually instantaneous if this picture holds a grass or clover you have seen before. This is the pattern-matching process in action. You have stored in your memory images of an almost infinite array of objects and situations, so your brain, working at fantastic speeds, compares these images with what is in front of you and comes to a conclusion. Farmers should make the most of the imaging facilities of their brain through combining imagination and forward-looking skills with imaging to create pictures of what is wanted in the future and the possible alternatives. These images, then, can be converted to real plans and subsequent action. As noted before, visualizing what you might do is a mental experiment that is free and instantaneous – everyone should make the most of it.

We are told that 60% of the brain is devoted to vision and that there is a super-highway between this section and the thinking part of the brain. This seems to be rather fortunate in that thinking and imagining the future can be intimately linked to visualizing outcomes. Indeed, it seems imagery is crucial to memory, in that you can echo and reconstruct the past, and this then leads to imagining the future.

Our whole existence depends on our picture imaging capabilities and helps provide a safe existence – walking, driving, fencing, shearing – everything we do is reliant on these instant snapshots of where we are and what we are doing, to enable a safe passage or the successful completion of the job. We automatically use the imaging/pattern matching processes every second of our existence. Using these skills to help planning and forward thinking is just an extension of what we are good at. Practice extends the pictures and images to encompass the future as well as the present. *We end up visualizing and imaging what state we want the farm to be in and the intermediate states and processes involved in getting there.*

Exercise

Imagine the worst pasture you have ever seen. Then imagine the best pasture you have ever seen. Imagine 10 years from now – put a picture in your mind of what this good pasture could look like. Now that you have *three* pictures:

1. What are two noticeable differences between your *worst* pasture and the pasture 10 years into the future?
2. What are two noticeable differences between your *best* pasture and the pasture 10 years into the future?

The other senses

Your imagination uses not only visual images, but your other senses, too. When you think of a shed full of excellent quality lucerne (alfalfa) hay, what comes to mind? What are the components of the visualization? Can you smell anything? The totality of images includes the 'whole' picture, including sound and smell.

Visualization is often more than a picture in that noise and smell may be part of the process; imagery, for example, that tells you whether a bale of hay is high quality probably involves smell. Certainly most people have a picture of good silage that involves both sight and smell. Thus, the stored pattern to which you can match a sample in your hand involves two dimensions – sight and smell.

Exercise

Think of two situations that rely on two senses, rather than just one, for judgement – make one involve sound. In these cases the 'mind picture' has two or more components, and the 'totality' of the picture helps you recognize it in pattern matching.

Another sense sometimes used is, of course, touch. For example, experience has taught you that a relationship exists between ripeness (taste) and feel.

Finally, if you still need convincing about using visualization to conceive of future possibilities, remember that your view and memory of the past is a series of snapshots stored away – a picture of the old fences, the ewes and cattle, or perhaps an old cultivar, before genetic selection started, the buildings, and so on. Just extend this – *jump from the past to the future*.

Visualization procedures

You already know these procedures, and you use them just about every minute of every day – it is an inherent skill that we become good at as children. If we had trouble with these skills it would be difficult to manage day-to-day living. We would have knocked into things, burnt ourselves, could not work out who cared for us when things went wrong, etc.

However, a farmer may not have consciously used these skills in planning, so he will find concentrating on doing this will be helpful. As we are uniquely individual, the best situation for forward looking will vary. Perhaps a farmer needs a quiet spot without interruption, sitting at a desk with a pad to jot down ideas, or perhaps a farmer finds sitting on the tractor while cultivating as good a place as any – but wherever it is, some mental effort at concentrating on the future and possible scenarios is important.

Exercise

You probably have not thought about it before, but concentrate on remembering in what situations you have found yourself thinking about the future, or the past, in which vivid images of the scenes and situations were in your mind. Everyone has situations or conditions under which it is easier to visualize events and/or scenes. What are these for you? Making sure you understand what you need for visualization will help you make sure you use this skill.

Summary

To summarize, the essence of using visualization to help management is:

- Think in pictures rather than words.
- Stay in a quiet, relaxed and calm environment to avoid distractions.
- Make the mind pictures seem as realistic as possible by including all senses and full colour.
- Practise visualization regularly, as it may take months before achieving improvement.
- Picture yourself actually accomplishing the feat, rather than viewing yourself from the outside looking in.
- Only imagine perfection. This will boost self-confidence and reinforce good habits.

Does visualization work?
There is certainly scientific proof from the sports world that it enhances individual and team performances. Have you ever watched a TV shot of a sports person's concentration as they prepare? They are more than likely visualizing success: getting over the high jump bar, kicking the ball over the bar or into the net.

Many people believe it is invaluable, though no documented proof exists in the world of the management of primary production. As noted, in the sports arena those who practise imagining the successful process do get better results. And, what's more, the improvements have been documented at all levels for many personality types. These people get involved in mentally conceiving the actions they must go through and often mentally practise them. They also visualize the rewards of success. In the end they have greater confidence and give of their best. Business texts recommend the same procedure. Visualization of what is wanted from, and on, the farm, and the process of getting there, is a must for successful managers.

The Farm Totality

A farm is a series of intimately linked components including physical (e.g. rain), biological (e.g. growth), economic and financial (e.g. markets, prices) and social (e.g. labour relationships) factors. You cannot change one without impacts all through the farm system. Thus, the need to consider the *farm as a whole* is often talked about when considering change. Visualization of possible changes must encompass all these links.

A good feature of visualization is that a farmer can easily allow for all these relationships. By talking about the 'farm as a whole', you emphasize that if you change one thing it will probably have a chain effect on many other components. When assessing suggested changes, a farmer must include *all* the impacts as a total package in his calculations. For example, if lambing earlier this year, it will probably impact on the supplementary/saved feed requirements, the shearing date, the lambing percentage, the summer feed situation, hay making and so on. Each change must be costed to decide on whether the totality of the change package is worthwhile.

Exercise

Imagine, as a result of attending a field day on fertilizer trials, you suspect it would be worth increasing fertilizer application by 10%. In considering this change you need to be clear on both the short and longer term ramifications. Can you visualize them? The fertilizer level used annually has a major longer term impact on a farm. Thus, given a 10% increase, what differences would you envisage between now and then?

Cross impact analysis

Cross impact analysis is sometimes useful in helping take into account all relevant effects of a change to the management. This involves creating a table with actions/decisions on the top, and possible effects on the side together with crosses to indicate the positions in the table where an action impacts on an 'effect'.

For example, changing the lambing and using nitrogen fertilizer might have the following impacts:

	Action/decision	
Impacts	Earlier lambing	Using nitrogen
Lambing S to S*	×	×
Weaning weights	×	×
Wool quality	×	×
Work bottlenecks	×	×
Clover %		×
Surplus feed/hay	×	×
Weaning date	×	
Shearing date	×	

*S to S: survival to sale or flock replacement.

In general, cross impact analysis involves the following:

1. Define the events/decisions you wish to consider.
2. Define all the possible downstream impacts of each event/decision. Give each a year of occurrence if the outcomes will be in stages over several years.

3. Draw up the matrix and write in the column/row headings.
4. Mark the boxes where an event/decision will change the item listed in each row.
5. Where a box is marked, add a letter to indicate the degree of effect (major, minor, etc.) *and*, where there is uncertainty, write in the chance of it occurring (e.g. 50% chance).
6. Evaluate each impact by doing some budgets on cost/return effects.
7. Summarize.

Note that some impacts will be positive and some negative, both in a monetary sense and in terms of work load, complexity and worry.

Exercise

Draw up a cross impact analysis indicating the effects of reducing the average size of all your paddocks/fields by 25%. Consider physical and financial effects. Note that the impacts will change as the years progress, but for the moment assume that your table can be put into two periods, 'initial' and 'later', rather than one column for each year.

To further help sharpen your skills at thinking of all the connections between change and the various sections/components of a farm, Appendix A2 (Exercises in Anticipating Change Impacts) contains some exercises to follow through.

The imperative of including all components in your picture of the future

It is worth reinforcing that you should constantly practise visualizing the farm as a whole. It is likely the good manager has a mind's eye picture of the whole farm as it is today, and what it will look like in, say, 5 years, and many points between. The time intervals must vary with the circumstances. Visualization must include every component, including the overdraft and mortgage levels. However, be aware that in 2 days the picture might be quite different – perhaps the shearers are due so the sheep will be very different, as will the wool shed, and perhaps even the bank balance.

The key to success is building up skills that ensure the mental pictures include all these components including a graph of the monthly cash flow. Take a moment to picture each component of a case farm as it stands right now.

Pause and think!

Did you find it difficult to visualize any part or component? A farmer can check out his visualization by going through the list of farm components given below. For each statement, the farmer should indicate how well the factor mentioned was visualized by entering a number on the scale of 1 (did not visualize) to 5 (complete success in visualizing). A student could follow through with this exercise for a case farm. (The question set is for a sheep farm, so for cattle and/or crops, equivalent versions need to be used.)

- The numerals that equal the net balance in all bank accounts.
- The numerals that equal the balance of all mortgages.

- The numerals that equal the total saleable value of assets.
- The boundary fence at the back of the property.
- The amount of pasture/crop (kg) in the area at the middle of the back fence.
- The water trough in the paddock closest to the centre of the farm.
- The quantity and types of weeds in the same paddock.
- The number of scouring ewes in your smallest mob of ewes.
- The number of ewes that are one of twins.
- The condition of the piles under the wool/grain shed.
- The amount of tread on the main tractor's front wheels.
- The soil moisture level in the driest soil.
- The level of the fuel in the farm tank.
- The quality and volume (kg) of pasture in the block that will next graze the ewes.
- The rams that are to be culled at the next culling.
- The average condition of the teeth of the oldest ewe group.
- The quantity of useable drench (for internal parasites) stored in the sheds.

What was the total visualization score (add up all the scores) and were there any gaps? Most managers do not take time to rectify their images of the total scene – it requires attention to notice items and a conscious effort to store them as necessary. Thus, using spare moments, a farmer should constantly practise mental visits to each part of the farm – gaps will become clear, enabling a visit to rectify the situation next time it is convenient. Clearly, a good picture of everything enables work planning for the immediate future, and creating longer-term plans.

More practice

1. Look at Fig. 2.2. Bearing in mind that lambs perform poorly for a number of reasons, including bad management, visualize and list out the features of a farm that might well have produced the worst lamb. In thinking of these features, compare it with the farm that produced the best lamb.

Fig. 2.2. Lamb sequence.

2. Always keep your utopia as a vision to aim for. It is important to have your eyes firmly fixed on success. Visualize what a case farm will look like once the farmer has completed all the desired improvements, and what will the farmer do with any spare time. Jot down the main features of the farm, and also the off-farm activities.

3. What impacts will the developments in precision agriculture have on intensive farming? You have probably read about precision agriculture, which is expanding in Europe and North America. Global positioning systems and computers are being used to vary the fertilizer according to the fertility of each patch in a paddock, record the production from individual sections etc. Visualize how electronic developments might impact on cattle and sheep farming. What are the likely outcomes?

4. Some cattle have double muscling (two muscles in the place of the normal one). You have all seen pictures of the winners of human bodybuilding contests. Imagine if all cattle looked like these people with, in addition, double muscles in the place of one. How would this impact on the cattle industry, and its companion sheep enterprises?

Review of Visualization and its Use

Management is largely about the future

Learning to consider possible choices and their merits and disadvantages is a key to making good decisions. Success in this area requires a farmer to be realistic over what will happen if indeed he actually carries out the decisions being considered. These outcomes dictate success or mediocrity. *If you can accurately imagine what will happen over the weeks, months and years, assuming you make a particular decision, this will enable a proper assessment of the decision*. This is where visualization, or imagination and picturing, are so important.

Some people cannot work out what the future might look like resulting from management decisions – they just cannot picture the future. If you are one of these people *it is important to kick-start your visualization skills*. This is a simple procedure of exercise and review combined with encouraging daydreaming . . . which is where it all starts. *Start with simple exercises in imagination*: for example, what will the lawn look like in 3 years given good watering, fertilizer and weed control?

Remember that *most people's imagination stems from seeing or reading* about the components of the final picture somewhere or other in their lifetime. It is just a matter of putting the right bits together in the mind's eye. So, start with simple images and then work up to something more complicated.

What would a case farm look like with a central pivot irrigation system (assuming there is an area on the farm with a suitable contour, even if smallish, and that there is a source of water)? Where might this water come from? How will it be 'transported' to the centre of the arm? What will the pasture look like? What will the stock look like? This then leads on to visualizing the look and quantity of the saleable products resulting from the new-look farm.

With constant practice in encouraging imagination, and the 'mind's eye' in capturing the results, *it does not take long for a farmer to become a creative manager*.

This is the first step on to the ladder of imagining alternatives for a farm … and these do not have to be major changes, for example lambing (calving) a little earlier, perhaps later, taking a contract for some heavier lambs, or a crop contract for farm storage, are all part of assessing better ways. Then the alternatives must be analysed to see whether they will help – possibly more profit, or maybe just make life easier.

CHAPTER 2.4 CAPTURING THE VISION

Introduction: Putting Pen to Paper

The mind's eye pictures of a farmer's vision of his farm, and the vision of how to get there, all imply sequences of actions. These need to be listed, and costed. Is the vision an economic improvement? What other benefits might it have? Comparisons of alternative 'visions' will need checking out to see which is best.

Success in converting plans to concrete proposals is just as important as creating the vision in the first place. Frequently, two or three possible scenarios will have to be thought up. To make a decision the concrete plans, where the proposals are significant changes, need to be costed out. This means quantities of purchases and outputs that result from the changes need calculating. In a nutshell, plans need to be captured on paper or on a computer.

Some farmers find it easy to convert mental plans to facts and figures, in which case it is just a matter of sitting down and doing the sums. Others do not find it quite as simple. Whatever the case, a farmer might find the procedure suggested below useful for the more significant proposals. For simple changes, or situations where the farmer is just carrying out a previously agreed plan, formal documentation of the proposals may not be appropriate. Each case must be assessed on its merits.

General procedure for costing proposals

Sit down and follow through each component of the proposed farm changes from start to finish, taking into consideration all the jobs necessary to achieve the objective. Write down each sub-job needed, and the materials and time required for each. Do not forget the changes to the output of saleable product. Attention to the details is important if the calculations are to be accurate.

The first step is to be clear about all the impacts and changes that would flow from the ideas. Check out the plans with respect to the farmer's strengths, weaknesses, opportunities and threats – having thought of the impacts, a double-check that modifications to the plans might not be appropriate is useful.

The next step is to sequence the plan using action/time charts, which then lead to time-based lists of the supplies needed and the jobs to be completed. With all this completed the farmer is in a position to do the sums on the costs and returns – to create the budgets and monthly cash flows. Many computer packages are available for these steps, and similarly pro-forma budget sheets for guiding the work, so details will not be listed here.

A diagram containing all the impacts of change and the sub-jobs required is often helpful. Lines showing which sub-jobs lead to following sub-jobs are also important. The 'impact lists' are easier if you have a diagram in front of you. This leads to sorting the inputs you will require, and the output changes that will affect the bottom-line profit. These all lead to the budget showing the net profit effect of the vision. Is it a worthwhile change, and are there any variations that will improve the outcomes of an alternative vision?

The key is to devise a system that helps ensure a farmer does not forget any component of the plans. A useful approach is to brainstorm all the impacts. For example, imagine you plan on intensifying production and want to compare the increased returns relative to the costs. A diagram of the changes might look like that shown in Fig. 2.3.

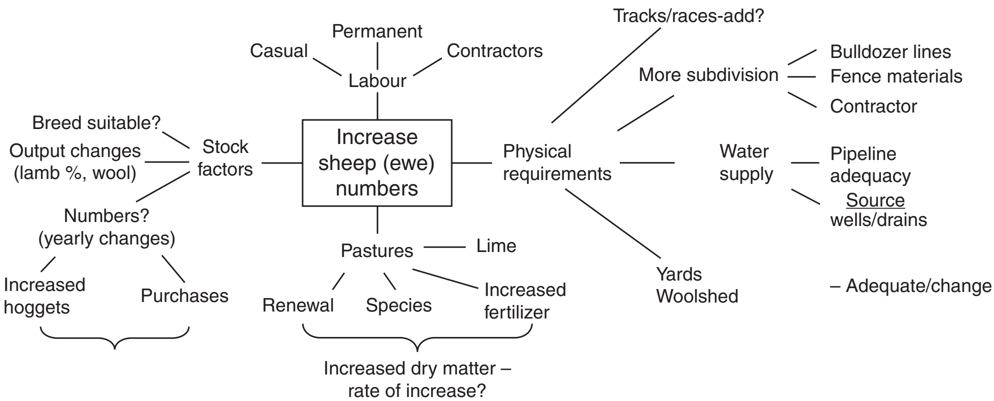


Fig. 2.3. Sheep increase diagram.

There are no rules on how to create such a diagram – just sit down and think of the components, and you will find that one leads to the other.

Exercise one

Using a large sheet of paper, draw a diagram that includes all the factors that should be considered when changing the basic sheep breed (assume the farmer is considering doing this).

How does your answer compare with the diagram below?

DIFFERENT RAMS →

Sources? → feeding (more/less,
live weights? winter?)

Production data? → wool production (diameter? kg?)

Transition period?

NEW FLOCK

→ lambing percentage (timing?)
mature weight? growth? feed requirements?

→ labour requirements?

REPLACEMENTS FOR → NEW FLOCK (numbers required?
sources? deaths, hardiness?)

ALL LEADING TO → COSTS: labour, replacements, rams, feeding changes, etc.

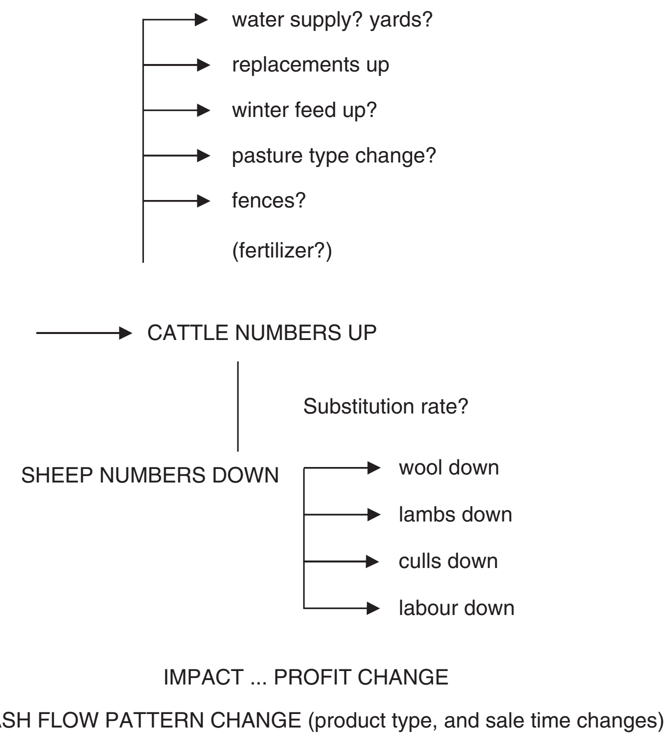
RETURNS: wool, lambs, culls

CASH FLOW PATTERN CHANGES: timing of inputs and sales

Exercise two

Using a sheet of paper, draw a diagram that includes all the factors that should be considered when increasing cattle numbers at the expense of sheep (maybe beef prices have increased as the USA has opened up their market to grass-fed animals in response to consumers' demand for more natural beef).

How does your answer compare with the diagram below?



Checking the Visions – Plans, SWOT and Time Lines

Visions of a prosperous and contented future is just the start. Is it possible and, if so, how do you get there? Whether the plans that fill out the visions will work depends, in part, on the farmer's (S)trengths, (W)eaknesses, (O)pportunities, and (T)hreats. How to implement the plan involves making sure the farmer understands all the jobs, and sub-jobs, that must be planned and completed. This is where a *chart* listing out the jobs and the time each might take to complete puts some detail into the visions.

What, then, are the farmer's SWOTs? A useful start for the SWOT analysis is for the farmer to jot down his strengths, weaknesses, opportunities and threats, at least as he envisages them, and then to ask others to comment on the list.

Think for a moment of the diagram created in an earlier exercise involving the impacts of increasing/introducing cattle. Use your thoughts about increasing cattle numbers to consider the significance of a case farmer's SWOTs on such a change. Thus, for example, his strengths (excellent stockperson; property has excellent summer rainfall), weaknesses (winters are severe; find labour management difficult), opportunities (the US beef market is opening up and the farm grows beef well; a niche market for craft wool in Europe is opening up; perhaps the farmer is likely to be offered a lucrative heavy lamb contract), and threats (environmental questions with regard to the use of water from the local stream; the British consumer is starting to be concerned about lamb that has been dosed with anthelmintics) should all be considered.

The conclusions will impact on the expected *outcomes* of the plans. Effectively, the personal and property strengths will influence the success and productivity of the changes and so affect the quantities of inputs needed and outputs produced, as will the weaknesses of the situation the farmer faces. The benefits of the strengths and the downsides of the weaknesses may mean a plan that allows for the farm's particular situation wins out over others. Opportunities help direct the structure of the plans, as do the threats – and will impact on the risk and uncertainty of each situation. What is best for one farmer may well be different from others around him. Not only may a case farm differ, but the farmer's SWOTs will almost surely differ from other managers'.

Every farmer should know the answers to the questions:

- What are the farmer's strengths? They are one of his greatest assets, to be used to their fullest. The farmer must fully recognize them to enable effective use.
- What are the farmer's weaknesses? Most farms will have some 'not so good' factors, and perhaps the farmer himself has some things that he is not so good at. Whatever these weaknesses are, they should be allowed for in planning, and also how to improve the situation should be considered.
- What opportunities does the farmer currently recognize? He should always be on the lookout for opportunities that might help farming success. Casting his mind to all aspects of the farm, can he think of any opportunities that are emerging?
- What threats does the manager face farming wise? Farming has many challenges. Can he think of the threats that will add to the complexity, and/or create problems to the success of the farming operation?

Action plans to create the vision

Change to a farming system and resources, even small changes, means doing more, altered and new jobs, and purchasing the associated inputs and resources. Job/time charts will help here in making lists of the jobs and inputs required, and the timing involved.

Action–time charts

Having listed out the impacts of a proposal and considered its components with the use of a SWOT analysis, and perhaps made some mental alterations, the farmer needs to look at the fine detail. What actions are required, and when? Actions lead to costs and returns, and the timing leads to lead times (the time before actions occur, e.g. when do you have to order the inputs to be sure they are on hand at the right time for each job?) and subsequent job materials and support organizations. A good way to tackle sorting out these aspects is to make a chart of how long each task takes and its start/completion time. Of course, some tasks cannot be started until others are completed.

Here's an example of a simple chart.

Example

Consider the problem of intensifying production by increasing stock numbers. For simplicity, assume this is a 2-year process (in reality, it would take longer in most cases as soil fertility and pasture production would take several years to build up).

	March		**Time (3-monthly periods)**					
Activity	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Fertilizer/seed	xxxxxxxx				xxxxxxxxxxxxxxxxx			
Fence lines	xxxxxxxxxxxxxxxxxxxxxxxx					xxxxxxxxxxxxxxxxxxx		
Subdivision		xxxxxxxxxxxxxxxxxxx				xxxxxxxxxxxxxxxxxxxx		
Water supply			xxxxxxx			xxxxxxxxxx		
Yards				xxxxxxxxxxxxxxxxxxx				
Stock (rising yearlings)	xxxxxxx				xxxxxxxxxxxxxxxxxxxxxxxx			

In this example the only dependent events are probably clearing the fence lines and subdivision, although, clearly, increasing stock numbers depends on feed production and its utilization improving as a pre-requisite.

It will be noted the action–time chart involves jotting down a list of all the tasks and 'blocking out' the start time plus time involved for each against the time line at the top of the chart. It is useful to use coloured pens to shade the connected tasks so it is clear where a task must be completed before a dependent one can proceed.

This 'charting' helps to think through when each job will be tackled, and consequently when there is a need to organize supplies and contractors. The planner probably will not hit on the finished plan right at the start as thinking about the initial plan may suggest bottleneck difficulties given that the rest of the farm operation must continue. In most cases a farmer will end up using an eraser and re-working the plans (which may again change as tasks get completed and/or delayed due to the weather, other tasks, contractors late, etc.).

Exercise

Jot down on a sheet of paper an action–time chart that represents the tasks involved in changing the sheep breed (you have already drawn out a diagram to show all the components of this change in an earlier exercise).

How does your chart compare with the one shown below?

Possible solution

The jobs and their timing must depend on how the change is organized, and the nature of the breed situation. For example, is it possible to buy replacement ewes, or do they need to be bred having acquired the rams; will there be two breeding flocks (replacements and finishing lambs)? Assuming replacements can not be purchased, and it is a simple one flock situation, the chart is relatively simple. It also depends on lambing dates, the hardiness of the new breed, and thus whether the feeding systems need changing and new shelter and fencing are required, etc.

Here's a start…

	Time (years)				
Activity	**1**	**2**	**3**	**4**	**5**
Purchase rams	××××××××				
Winter/summer feed crops/hay		××××××××××××××××××××××××××××××			
Labour organization:					
Contractors, lambing arrangements				×××××××××××××	
Marketing arrangements		×××××××××××××××			
Shelter/fencing/facilities		××××××××××××××××××××××			
Anything else?					

Budgets: Calculating the Bottom Line – Costing Out the Proposals

You may be quite experienced at budgeting out a farmer's visions, ideas and proposals to see whether they are financially worth carrying out. The skill is in successfully including all relevant factors and in estimating the likely effects of the changes, for example what will the change in pasture production be, how long will it take to change, what will be the change in animal numbers, in wool and meat production, in crop output and yields, etc.? Converting all the physical changes into net costs and returns is relatively easy, however, the accurate estimation of the physical changes and outputs is more difficult. Estimating the prices to be received is another critical skill. *What is important are the relativities*. It does not matter if you forecast the price of, for example, fine wool incorrectly, but if you get the relativities between wool types and other products wrong you will end up with the incorrect conclusion about what is best.

What is important in putting plans on paper. The effects of a proposal on the cash surplus and profit are important parameters in deciding whether to proceed, not that they are the only choice criteria. Work load and type, impact on risk, and the enjoyment associated with the jobs are all further factors to take into account. Furthermore, even if a farmer has already decided to proceed, formalizing all the plans and calculating the quantities of inputs required, clearly writing out the plans for each paddock and so on, are all important activities. The final written plans, and costings where appropriate, act as the blueprint for getting on with the job.

For proposed changes a farmer needs to make detailed lists of the jobs and supplies needed – this gives the costs – and similarly for the outputs, which gives the returns.

Initial steps on costing out proposals

The first step is to list out all the tasks (as taken from your action–time charts) and for each, write down the supplies needed, and when. Similarly, these charts give rise to a list of jobs to be done, and when, and make a clear statement on what contractors will be needed, and when, and thus when they need to be contacted to make the arrangements. Thus, a sheet of paper set out something like this is required:

Task/job	Date	Supplies needed	Contractor requirement	Order date
Track to back	4/xx	Nil	Digger – 4 days @ $280	4/xx
Fence off track	6/xx			
500 m		5 rolls netting 100 thin uprights 50 posts 4 strainers		5/xx
Fertilizer application				5/xx
Area 1 (50 ha)		50 × 100 kg = 5 t superphosphate		4/xx
Etc.				

These lists clearly set out the inputs and relevant dates – leading to budget calculations.

Besides the input requirements, a budget needs to include the income. This requires, of course, calculating the change to animal numbers, the expected production from each, and thus the quantity of saleable product, and crop yields and areas in cash crop situations.

The components of a full budget

If the proposed improvements only involve a small section of the farm, you only need to consider the *changes* to the existing system. However, it is always important to have a *total farm* budget as well. This tells the likely profit surplus, and also the cash flow after putting dates on all the costs and income. A full budget involves all sections of the farm, and includes tax payments/receipts, for it is only then will you know the money available to spend.

In calculating a budget for a whole farm you need to list out:

- *A stock reconciliation* (numbers on hand at the beginning of the year, purchases, sales, births, deaths, transfers (e.g. hoggets become two tooths) and, finally, numbers on hand at the end of the year).
- *A land utilization* (a list of paddocks/fields and what is planned in each paddock leading to fertilizer, seed and cultivation requirements, and also the yields).
- *A feed budget* (feed grown, feed purchased, stock requirements). This is not essential if you are sure of your stock numbers from past experience.

The actual budget flows from the: (i) stock reconciliation (number sold × price, number shorn × yield × price, animal health, transport, etc.); (ii) land utilization (fertilizer, cultivation, hay making contractors, seed, crop yields, etc.); (iii) feed requirements (hay purchased, made, sold, off-farm grazing, etc.); and (iv) labour needs, overheads, administration, repairs and maintenance, finance costs and so on.

As noted before, a range of products and people are available to help with budget calculations, and also in converting annual budgets into monthly cash flows.

Here are some examples of budgets to provide ideas on the form they might take.

Simple enterprise budget (gross margin)

It is often useful to work out the contribution made to profit by one of the enterprises. For suggested new enterprises, or when changing the balance of enterprises in a whole farm system, these so called 'gross margin' budgets are indispensable. They are called gross margin budgets because they include all direct income and expenses involved in the enterprise, but leave out all overheads, for they cannot *logically* be allocated to an enterprise. Thus the 'profit' (gross margin) from the enterprise is the amount it contributes to paying the overheads (insurance, interest, rates, fixed labour, etc.) and the cash surplus. Figure 2.4 (pp. 114–115) is an example of a gross margin budget for a sheep enterprise.

Sheep gross margin
Crossbred '2 year' flock, replacements
by purchase of 5-year-old ewes annually.
(Easy country)

Capital stock wintered:

	No.		Total	S.U.	Total S.U.
Breeding ewes	1,000 @	$60.00	$60,000	1	1,000
Rams	16 @	$100	$1,600	0.8	13
	1,016		$61,600		1,013
Dollar investment in sheep per stock unit			$60.82		

Production parameters:

Lambing – survival to sale	130%
Death rate	6%
First year ewes culled	25%
Export lamb sire; all lambs sold prime	
Ewes wool clip (kg)	4.5
Lambs not shorn	

Income:

Prime m.s. lambs	1,300 @	$65.00		$84,500	
Cull ewes to works	527 @	$40.00		$21,080	
Wool (kg)	3,840 @	$4.00	(net)	$15,360	
TOTAL INCOME					$120,940.00

Expenditure:

Replacement ewes	595 @	$60.00			$35,700
Shearing –					
Sheep	960 @	$240	per 100	$2,304.00	
Tup crutch – ewes	418 @	$80	per 100	$334.40	
Main crutch – ewes	965 @	$95	per 100	$916.75	$3,555.15
Woolshed expenses – plant, packs, etc.					$250.00
Animal health –					
Drench ewes pre-lamb	990 @	$0.07		$69.30	
Drench lambs (3x)	3,900 @	$0.05		$195.00	
Vaccinate ewes	990 @	$0.48		$475.20	
Eartags, footrot and docking, etc.				$300.00	
Dipping – purchased ewes already dipped					
ewes	418 @	$1.00		$418.00	
lambs	850 @	$0.85		$722.50	$2,180.00

Fig. 2.4. Example of a gross margin budget.

Cartage – (based on 50 km travel except for replacement ewes, at 70 km)					
Prime lambs	1,300 @	$1.14	$1,482.00		
Works ewes	527 @	$0.86	$453.22		
Replacement ewes	595 @	$1.90	$1,130.50		
Wool – bales	21 @	$8.00	$168.00	$3,233.72	
Ram purchase	4 @	$450		$1,800.00	
TOTAL DIRECT COSTS					$46,718.87
TOTAL GROSS MARGIN (before interest)					$74,221.13
GROSS MARGIN per dollar invested in sheep					$1.20
GROSS MARGIN per stock unit					$73.28

Gross margin per stock unit at various lamb and wool prices

		Wool price $/kg (net)		
		$3.20	$4.00	$4.80
Lamb	$52.00	$53.56	$56.60	$59.63
Price	$65.00	$70.25	$73.28	$76.32
$/head	$78.00	$86.94	$89.97	$93.00

Interest costs:

Interest on capital stock value:			
$61,600	@	5.5%	$3,388.00
RETURN per stock unit (after interest)			$69.94

Fig. 2.4. Continued.

Full budget example

When proposed changes involve the whole farm it is important to calculate a budget of *all* the components of the farm to enable a full comparison with alternative farm systems that are budgeted out. This example budget, for a straight sheep and cattle farm, does not include a feed budget, so the stock numbers and feeding system have relied on the farmer's judgement on what stock numbers are possible, and what feeding is required. Nor does the example include a monthly cash flow; this may or may not be important. If an overdraft limit is relevant, then a monthly cash flow should be calculated. The full budget is made up of various sections as shown on the following pages.

STOCK RECONCILIATIONS

(a) Sheep

To begin			Sales				
Ewe lambs	966		Lambs	Autumn	1892		
Wether lambs	966			Spring	1894	3786	
2-tooth ewes	525		2-tooth culls			80	
Mixed age ewes	2083		Cull ewes			300	4166
Rams	33	4573					
			Deaths				243
Lambs born							
2460 ewes @ 140%	3444		To end				
450 hgts @ 100%	450	3894	Ewe lambs			1000	
			Wether lambs			1000	
Purchases			2-tooth ewes			440	
Ewe lambs	450		Mixed age ewes			2195	
2-tooth ewes	150		Rams			35	4670
Rams	12	612					
		9079					**9079**

(b) Cattle

On hand at begin			Sales		
R1YO heifers	27		Weaner heifers	15	
R2YO heifers	10		Weaner steers	15	
R2YO bulls	53		1.5YO heifers	26	
R3YO bulls	5		2.5YO heifers	10	
Cows	38		Cows	38	
Breeding bulls	3	136	2YO bulls	51	
			3YO bulls	5	
Calves born		30	Breeding bulls	2	162
Purchases			Deaths		4
R1YO Friesian bulls		75			
			On hand at end		
			R2YO Friesian bulls		75
		241			**241**

CHANGE IN STOCK VALUES

	Number begin	end	Value/head ($)	Value begin ($)	Value end ($)
Lambs	1,950	2,000	50	97,500	100,000
2-tooth ewes	525	440	90	47,250	39,600
m.a. ewes	2,083	2,195	80	166,640	175,600
Rams	33	35	150	4,950	5,250
R1YO heifers	17	0	520	8,840	0
R2YO bulls	53	75	660	34,980	49,500
R3YO bulls	5	0	750	3,750	0
Increase in value				6,040	
				$369,950	**$369,950**

Continued

LAND USE

Field	Area (ha)	Summer	Winter	Next summer (provisional)
1	14.48	3YO grass	Pasture	Pasture
2	13.85	Cocksfoot	Cocksfoot	Fallow – turnip
3	8.45	Impact rye	Impact	Pasture
4	3.00	Brown top	Brown top	Brown top
4a	3.00	Brown top	Brown top	Brown top
5	5.33	Brown top	Brown top	Brown top
6	15.94	Tabu rye	Bareno brome	Brome
7	15.20	Tolosa rye	Tolosa	Tolosa
8	14.34	Unimproved	Unimproved	Unimproved
9	8.24	Unimproved	Unimproved	Kale
9a	11.03	Unimproved	Unimproved	Unimproved
10	9.94	Unimproved	Unimproved	Unimproved
10a	6.31	Cocksfoot	Cocksfoot	Cocksfoot
11	7.06	Lucerne	Lucerne	Lucerne
12	13.46	Ryegrass	Pasture	Pasture
13	14.76	Lucerne	Lucerne	Lucerne
14	12.48	Meridian rye	Meridian	Pasture
15	11.31	4YO grass	Pasture	Pasture
16	12.41	Bareno brome	Bareno brome	Bareno
17	10.72	Fallow	Turnip/grass	Fallow
18	9.34	Unimproved	Unimproved	Kale
19	12.35	Kale	Kale	Fallow
20	13.18	Kale	Kale	Fallow
21	14.27	Meridian rye	Meridian	Pasture
22	15.91	Cocksfoot	Cocksfoot	Pasture
23	8.75	2YO grass	Pasture	Pasture
23a	12.70	Archie rye	Tolosa rye	Pasture
24	13.01	Fallow	Turnips/grass	Fallow
25	14.02	Rye pasture	Pasture	Pasture
26	18.21	Tabu rye	Tabu	Pasture
27a	10.11	1YO grass	Pasture	Kale
27b	10.90	Fallow	Tabu rye	Tabu
27c	10.72	Fallow	Tabu rye	Tabu
28	9.62	Pasture	Pasture	Pasture
	384.40			

FARM WORKING ACCOUNT SUMMARY

INCOME

Sheep sales		220,540		
	Less purchases	54,950	165,590	
Cattle sales		57,075		
	Less purchases	33,750	23,325	
Wool			44,205	
Rent			8,000	241,120

Continued

EXPENSES		
Personnel	25,765	
Farm working	120,326	
Vehicles	8,800	
Repairs	12,000	
Administration	12,400	
Fixed charges	22,000	228,291
CASH SURPLUS		12,829
NON-CASH ADJUSTMENTS		
Change in stock value	6,040	
Depreciation	–7,789	–1,749
SURPLUS		**$11,080**

FARM WORKING ACCOUNT DETAILS

CASH PROCEEDS					
Sheep sales	Lambs (autumn)	1,000 @ $58	58,000		
		600 @ $50	30,000		
		292 @ $40	11,680	99,680	
	Lambs (spring)	1,892 @ $55		104,060	
	Cull 2-tooth ewes	80 @ $60		4,800	
	Cull ewes	300 @ $40		12,000	220,540
Cattle sales	Weaner heifers	15 (trust)		0	
	Weaner steers	15 @ $350 (half)		2,625	
	1.5YO heifers	26 @ $600 (half)		7,800	
	2.5YO heifers	10 (trust)		0	
	Cows	38 (trust)		0	
	2YO bulls	53 @ $800		42,400	
	3YO bulls	5 @ $850		4,250	
	Breeding bulls	3 (trust)		0	57,075
Wool	Ewes	2,500 shorn Dec	4.2 kg/head	10,500	
	Hoggets	450 shorn Sept	3.0 kg/head	1,350	
	Crutching	2,600 shorn Aug	0.3 kg/head	780	
	12,630 kg wool @ $3.50				44,205
House rent					8,000
GROSS CASH INCOME					**$329,820**

Continued

EXPENSES			
Personnel	Manager	49,517	
	Casual	3,000	
	ACC	248	52,765
Stock purchases	450 composite ewes @ $81	36,450	
	150 Coopworth 2-tooths @ $90	13,500	
	10 rams @ $500	5,000	
	75 R1YO bulls @ $450	33,750	88,700
Stock health	$5 per stock unit × 3,600	18,000	
Breeding	Tags and pregnancy testing	1,755	
Electricity		600	
Feed	30 ha silage @ 3,500 kg @ $0.12	12,600	
	200 bales of hay @ $12	2,400	15,000
Seed	Refer schedule 1	2,667	
Contractors	Refer schedule 2		
	Cultivation – ploughing and cult	8,379	
	Spraying	2,012	
	Direct drilling	6,407	
Fertilizer	Refer schedule 3	41,558	
Freight	Lambs in 450 @ $2.5	1,125	
	Ewes in 150 @ $2.0	300	
	Bulls in 75 @ $5.00	375	
	Bulls out 56 @ $10.00	560	
	Wool	700	
	Sundry	1,000	4,060
Shearing	3,000 @ $3.00	9,000	
	2,600 @ $1.00	2,600	
	Sundry crutch	750	
	Wool packs, etc.	500	12,850
Weed control	Roundup 326 l @ $13.00	9,000	
	Lucerne 15 ha @ $70/ha	1,050	
	Thistles (21, 23a) 27 ha @ $50/ha	1,350	6,638
Crop mgmt	Soil and herbage testing	400	400
Vehicles	Petrol	500	
	Diesel	3,000	
	Oil, grease	200	
	Utility	2,000	
	Tractor	2,500	
	Registration	600	8,800
Repairs	Water supply	2,500	
	Fences	5,000	
	Tools, hardware	1,000	
	Plant, machinery	2,500	
	Tracks	1,000	12,000
Administration	Accountancy	2,000	
	Telephone	1,000	
	Stationery	200	
	Supervision	8,000	
	Insurance	1,200	12,400
Fixed charges	Rates	5,500	
	Rent	16,500	22,000

Continued

SCHEDULE 1: SEEDS

Paddock	Ha	Seed	Rate (kg/ha)	Price ($/kg)	Total
23a	12.7	Sub	5.0	6.00	381
17	10.7	Turnips	1.0	23.00	246
24	13.1	Turnips	1.0	23.00	301
9	8.2	Kale	3.5	18.00	517
18	9.3	Kale	3.5	18.00	586
27a	10.1	Kale	3.5	18.00	636
					$2,667

SCHEDULE 2: CONTRACTORS

Paddock	Crop	Ha	$/ha	Sub-totals	Total
2 Ploughing	Turnips	13.85	100.00	1,385	
6 Ploughing	Brome	15.94	100.00	1,594	
Cultivation		30.00	100.00	3,000	
Drilling		40.00	60.00	2,400	8,379
9 Spraying	Kale	8.24			
2	Turnips	13.85			
18	Kale	9.34			
19	Pre grass	12.35			
20	Pre grass	13.18			
27a	Kale	10.11			
		67.07	30.00		2,012
9 Direct drilling	Kale	8.24			
18	Kale	9.34			
23a	Tofosa Rye	12.70			
24	Turnips	13.00			
27a	Kale	10.11			
		53.39	120.00		6,407
					$16,798

SCHEDULE 3: FERTILIZER

Maintenance	Area (ha)	Type	Rate (kg/ha)	Price ($/t)	Total
Pasture	200.00	S SuperP	250	250	12,500
Lucerne	22.00	30% K	400	350	3,080
Sowings new grass					
Paddock 6	15.94				
23a	12.70				
27b	10.90				
27c	10.72				
	50.26	SuperP	375	250	4,712

Continued

Sowings Kale					
Paddock 18	9.34				
9	8.24				
27a	10.11				
	27.69	SuperP	300	250	2,077
	27.69	DAP	200	600	3,323
Sowings Turnips					
Paddock 17	10.72				
24	13.01				
	23.73	SuperP	500	250	2,966
Nitrogen					
New grass	50.26	Urea	100	450	2,262
Kale	27.69	Urea	100	450	1,246
Turnips	23.73	Urea	100	450	1,068
Silage	30.00	Urea	150	450	2,025
Lime	60.00	Lime	3,000	35	6,300
					$41,558

Exercise

Try your calculational skills on a small budget exercise. Is the following offer a good prospect? Complete a budget, then compare your answer with the budget below.

A farmer's neighbour has two paddocks of 10 ha each in good pasture that are surplus to requirements for the February–September period (inclusive). They have been offered to the farmer for $150/ha. *Should the farmer take up this offer* and use them to finish store lambs that are sold off in small lots over the winter (June to September) to the local butchers market?

Data:
– Shorn lambs have been offered for the great price of $40 landed.
– The farmer can run 8 lambs per ha equivalent (initially the rate is high, but then it will get less).
– The farmer needs to buy 1.5 bales of lucerne (alfalfa) hay per head at $7 landed.
– The farmer needs to apply 50 kg urea/ha at $420/t on the ground.
– The farmer will need to drench twice on average at $0.05 per drench.
– The farmer expects 3% deaths.
– The farmer knows that he will get on average $90 per head at the sale yards.
– The transport will work out at $1 per head.
– There is a small cash problem and the farmer will need to borrow the purchase price of the lambs at 10% over February to July inclusive.
– The sales will then be able to cancel out the borrowings.

What is your conclusion?

Sample answer
BUDGET FOR FINISHING STORE LAMBS OVER WINTER

INCOME		
Sales	20 ha @ 8 less 3% deaths = 155 @ $90	= 13,950
	less transport 155 @ $1	= 155
	NET	= $13,795
EXPENSES		
Lambs	20 ha @ 8 = 160 @ $40	= 6,400
Interest	$6,400 @ 10% for 6 months	= 320
Drench	160 × 2 @ $0.05	= 16
Hay	160 × 1.5 @ $7	= 1,680
Urea	20 × 50 @ $0.42	= 420
Rent	20 @ $150	= 3,000
	TOTAL EXPENSES	= $11,836
To pay for the time and effort	GRAND PROFIT	= $1,959

Did you get the sums perfectly correct? Would you proceed on the basis of the expected profit? If so, what risks are there?

Review: Vision Capture

Many farmers are very good at converting ideas, both short and long term, into concrete plans and costs leading to budget estimates; others find it more difficult. For those in the latter category, following through the processes listed in the earlier sections will help with the creation of detailed plans and blueprints for their ideas.

Having been through the exercise for a proposed small change, a farmer will gain confidence in tackling the conversion of ideas to paper for bigger ideas. Again, practice leads to greater success. It is always a good idea for farmers to involve others in consulting over what might have been missed out, or miscalculated.

The essence of moving ahead is thinking up change ideas, working out which is the best, and then getting on with the job!

It should be noted that increasingly what is called 'triple bottom line accounting' (and budgeting) will become important. The *triple* refers to not only the profit/cash, but also the impact of the plan on the *environment* (the second part) and the *social* aspects (the third part, e.g. employment and maintaining local services, personal satisfaction, etc.). In addition, it will not be long before nutrient and chemical budgets also have to be calculated to account for environmental impacts (in some countries this is already happening).

CHAPTER 2.5 PRACTICALITY

Introduction

Over the years studies and research in farm management and commercial practice have created a range of processes to help quantify, and turn into practical reality, ideas you might have about the future. These include a farmer's visions of change and development for the future. These additional processes include project management, critical path analysis (CPA) and monitoring and control. These are briefly explained in the next sections. Monitoring and control is more to do with operational management than initial planning and forward thinking, but it is essential for success. Various other steps involved are also briefly mentioned and include resource consents, employment contracts, quotes and tenders. Mention is also made of the various budgeting concepts that are also useful.

Project Management and Critical Path Analysis

Project management is about successfully managing a project from conception to conclusion. Most of you will be good at doing this for it requires a practical bent, common sense, and a strong eye on the future to anticipate what needs doing now to ensure the future runs smoothly. Project management is an important and, often, complex issue in secondary industry, but in primary production it is relatively straightforward.

Outline of project management

A glance at the shelves in professional bookstores will reveal books about 'project management'. They talk about the steps involved in creating an idea right through to marketing the product. In agriculture, creating a new product, designing and manufacturing it, and marketing generally has somewhat different connotations. However, it is useful to list out the steps involved as they emphasize the thought processes and steps necessary in change to an existing system. When considering the details of farming systems, farmers may indeed be involved in creating a new product – moving into bull beef, changing the style and weight of lambs produced, changing the fineness and style of wool produced right through to something completely new, like a 'homestay' product, or perhaps cut flower production.

The initial steps include defining what the project is about, assessing the need for the product, the feasibility, defining the details of the 'product' and how it is to be produced, trialling the system and product, and finally, putting the product into full production.

Main steps in project management for primary production

Follow the following sequence of processes:

1. Determine the need for the product, and the feasibility of producing it. This involves a statement of the concept, a market analysis and a practicality assessment, and also rough calculations on the costs and benefits – in other words, is the product a potential money maker? Assuming YES, then:

2. Create detailed product specifications stating exactly what the output will be (e.g. bed & breakfast rooms for homestay with specifications x, y and z, with central lounge and external entry; 20 kg lean lambs available in November through to June).

3. Create the project plans: inputs, timing, budgets, job lists, etc.

4. Create a prototype product, where practical, to test feasibility (e.g. use existing facilities to test out a homestay). Given success:
5. Implement plans, perhaps in stages.

Exercise

For a case farm, can you apply the initial steps to a product that might be introduced, or to a change to an existing product? If you are to manage properly the introduction of a new product you need to be very sure what it is that might be produced. What are two such products, what are their detailed specifications and where would you market them?

Outline of critical path analysis

Critical path analysis (CPA) is another planning technique commonly used in business for helping organize the successful completion of a project. It involves working out all the sub-jobs that must be completed and their sequence. This leads to seeing which jobs must be completed before the next can start, and thus the sequence, or path, that is critical to the completion date. Consideration of this path may lead to shifting resources to ensure earlier completion and thus more profit.

Main steps of critical path analysis

CPA is about working out the potential bottlenecks in any project. Managers looking after major projects, such as building an office block or putting in a new bridge, will always conduct a CPA, probably using computer software designed for the task. In general, most agricultural projects are not complicated enough to warrant its formal use as common sense usually indicates where the bottlenecks will arise, and what to do to ensure any problems are minimized.

A simple example of a project might be building a hay barn. Figure 2.5 presents the task.

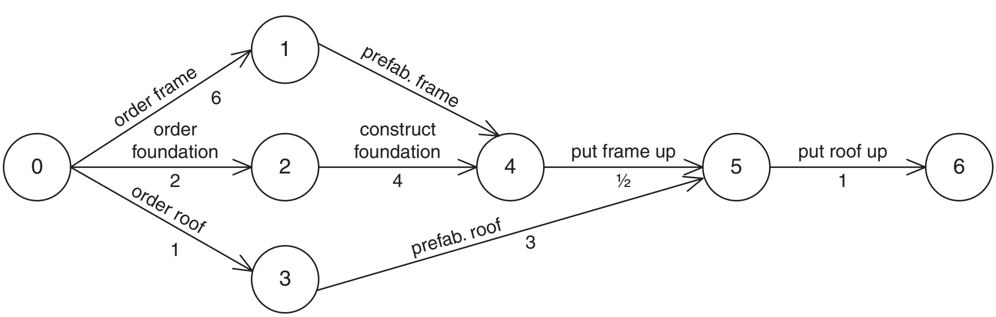


Fig. 2.5. Barn construction times.

The circles represent the completion of the various tasks, and the numbers beside the lines represent the weeks involved in achieving the task. The point to note is that some tasks can not be started until others are completed. There are effectively *three* paths in the overall job of building the hay barn: the foundations, the frame and the roof. One of these paths will determine the time to complete the total task and is the '*critical path*' and forms the bottleneck. If getting the job completed at a specific time is crucial (e.g. the hay needs to be under cover as soon as possible), then every effort must be made to shorten the critical path. In major projects, of course, there are multiple intertwined paths that give rise to intricate critical paths. But this is usually not the case on a farm.

In Fig. 2.5, getting the frame organized takes more time than the other components and so determines the finish time. The other paths have some 'slack' time.

In complex projects the paths are not always obvious. In these situations a computer system would be used to isolate the paths through standard calculation systems that search out both the earliest and latest time a job can be started without affecting the final completion. Where these two times are the same for a job, this job is on the critical path. Where they are different there is surplus time and the job is not on the critical path.

Exercise

It has been decided to convert the irrigable flats on a farm into a dairy farm and contract a share milker to run the operation. Converting an area into a dairy farm can be quite complex, and certainly expensive, usually requiring an amount of borrowing. What are likely to be the three major paths in the conversion process, and which will be the critical one?

Monitoring, Control and Rules

Successful management involves: (i) noting (*monitoring*) exactly what is happening around the farm, and also noting factors beyond the farm gate that might impact on your activities; then (ii) comparing what is in fact happening with what you expected should happen, and in the light of the comparison, adjusting (*controlling*) what you do today to get the plan back on to the correct track. This track might be quite different from what you originally anticipated, but certainly not always.

Successful monitoring and control is a key to good management. There is a saying that starts 'the best laid plans of mice and men'; farming is like that – uncertainty prevails, and outcomes are frequently different from what was planned. Thus, making sure your vision of the future comes to fruition involves constant monitoring and control.

This means constantly observing the outcomes as they unfold (knowing exactly what is happening all over the farm and in the related environment, e.g. the lamb market, the live weight of the farm's ewes at present, etc.) and making plans to cope with each new situation as it unfolds to keep the farm on course (control). Note that the original plan may need to be modified – just doing something to get back on track may not be warranted.

Example of monitoring and control

If the poor autumn means the live weight of the ewes is 5% below target it does not mean you simply go out and buy feed to rectify the situation. This may be one possibility, but it could well be best to sell off some older ewes, or even just accept the weight loss, or perhaps a combination. The key lesson here is to forget the past – you cannot change it. Look to the future – what is the current state of affairs, and which of the available options is the best future course?

Clearly, in this uncertain world, the person who is best at monitoring and controlling is going to stand out as a successful manager.

The planning, execution, monitoring and control cycle is represented in Fig. 2.6.

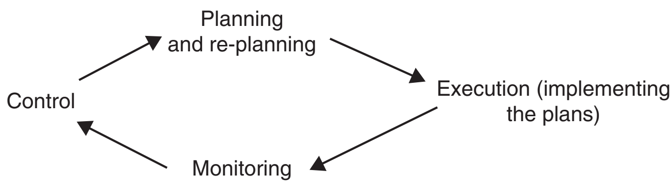


Fig. 2.6. Management cycle.

The process never ends and must be carried out on a daily, monthly, yearly basis for each type of decision, whether large or small. An ability to look ahead and anticipate is crucial to the success of this operation. Farmers need to constantly practise their visualization skills and picture possible outcomes.

Exercise

Give three examples of situations that have turned out to be different from what you had hoped.

Knowing what is 'out of kilter' is one thing, but the key is deciding what to do, if anything, about the situation. Get this wrong, and the outcomes will not be what are wanted. Doing what is correct under the circumstances is the key to success. What changes have you planned that will cover the three situations, mentioned in the exercise above, that are not what was expected?

Recognizing that something is 'out of kilter' requires a farmer to have in mind, or on paper, a list of outcomes that are expected along the way of each production year. These can be called 'benchmarks'. Without these comparison factors the farmer has no idea of whether his plan is working successfully. These waypoint achievements can also be called 'milestones'. For success most farmers need to have, initially, a detailed plan for the year, and a recording system that gives the actual situation to allow this comparison.

Questions must be asked, particularly for processes (e.g. for developing a new area: is the fencing on track?), and 'benchmarks' must be available for critical figures (e.g. lambing percentage, lamb income by the end of January, bank balance next June, hay barn levels next December, pasture cover at the end of April, etc.).

To facilitate a formal system you need to have:

- a formal plan of what you intend to happen, which includes the ratios, milestones and other critical figures that should be achieved;
- a recording system that enables you to observe and calculate all the ratios and figures so you can compare 'actual with planned';
- a review time where you formally consider the discrepancies and decide what to do in getting the system back on track. Note that sometimes it is better to do nothing. You will only know this after an analysis.

Many farmers now have computer-based financial systems that will automatically give a monthly printout of each income and expense category listing both what the original expectation was and the actual value that has occurred. Differences are highlighted for attention. The comparisons can also involve physical numbers if the computer system has them stored (e.g. number of lambs sold in December – actual versus planned).

For general benchmarks, such as lambing percentage, death rates, fertilizer levels, past records form an initial base, but talking to neighbours also provides figures (though not necessarily accurate). Monitor farms also provide figures, as do the statistics from public databases such as economic services (try searching the World-wide Web for data from your area). Sometimes a local farm consultant, or accountant, will have figures for a range of farms also. *But remember that a particular farm is unique, and what happens in other situations may not be possible, nor appropriate, for the particular farm. Be cautious.*

Cash flows

To monitor the financial situation requires calculating a cash flow, i.e. all annual income and expenses divided into the months they will occur, and a reconciliation of monthly bank balances. A farmer can then check not only the projected bank balance with the actual, but also the actual income and expenditure for each item with what was expected. Many financial computer packages will do this, but a farmer must first calculate the cash flow. This involves taking each budget item from the annual budget and dividing each sum into the proportion that will occur in each month. Past records will give information on the relevant months. For example, a farmer will know in which months the council rate/tax bills are due. Armed with the bank balance at the start of the year a farmer can work out the expected balance each month. It may be necessary to calculate the interest expense/income depending on the overdraft/surplus and add this in too. Do not forget to include any sales tax payments/receipts as well as income tax payments as they all impact on the cash flow, as will mortgage payments and all other overheads. A good computer package will do most of this automatically. If the farmer's personal expenses are put through the farm's bank account they must also be included to ensure the monthly balance is correct.

Rules and regulations

You might think we could live by common sense, but 'common' sense is not that common. Thus, we are required to work, produce and live within a vast array of rules and regulations. It is incumbent on all of us, particularly farm managers who must be a 'jack of all trades', to be fully aware of what must be complied with. In particular, most countries have resource management rules that must be complied with, labour regulations including having contracts, occupational safety and health requirements and so on.

When looking ahead and conceiving possibilities do not forget:

- What you can and cannot do to the general environment is controlled by resource management rules generally in the form of district plans. Some things, like putting in a track where the earth movement is minor, may be a permissible activity. Other changes, such as cutting a major track across a hillside, may require resource consent. A farmer can obtain (usually from local councils) copies of district plans and discover what is permissible.

- When employing labour the relevant parts of the current act controlling the employer–employee relationships need to be understood – written and signed contracts are probably required. Seek advice (consultants, solicitors).
- When considering a job involving contractors it may be appropriate to call for quotes/tenders. These need to be clearly documented listing the requirements of the job, the timing, and the quality required. In some cases, hopefully, word of mouth may be all that is necessary, but when in doubt seek advice. Do check the reliability of potential contractors through the local network. Some farmers are reluctant to call for quotes due to past relationships. Certainly, local protocol and systems need to be taken into account, but being clear to people that competitive quotes are being obtained can save problems, as well as cost.
- When employing hired help and contractors, there are usually many safety requirements that must be complied with. Frequently an act of parliament will dictate what is required.

In general, a farmer's lawyer or solicitor will be able to outline requirements for all of the issues listed above, and others too. Local community farms and farm organizations can also usually provide help and advice.

Summary

Part of successful anticipation and 'looking forward' demands a good monitoring and control system and its successful implementation. In managing a farm, farmers and their advisors must be very aware of all the rules and regulations that must be adhered to, and also to anticipate what changes to the rules might happen and start to plan for these changes now.

Getting the Sums Right: Using the Basic Economic Optimization Principles

In creating an estimate of the profit from any proposal there are a number of principles that should be followed to ensure correct comparisons. Of the alternative futures thought up, you need to make sure they are ranked correctly. No doubt any estimate of profit will not be perfect, but that does not matter – what is much more relevant is *getting the relativities between competing proposals and plans correct*.

Principles to follow

Listed below are reminders of what to do in the calculations.

Only include changed costs and returns

In costing proposed *changes* only include the *changed* costs and returns – do this for each proposal and compare. There is no need to include costs/returns that *do not change*. For example, in increasing stock numbers the building insurance probably will not be affected, therefore it can be ignored in the calculations. But be very sure to include *all* the changes that would follow if you implemented the proposals. These will range from stock number/type changes, and thus saleable products, right through to, for example, the repairs and maintenance on the new subdivision fences that might be involved in the proposal.

Unpaid resources

Be sure to allow for any *unpaid resources* (e.g. family labour) if it is in short supply so that using it in a new proposal would mean taking it away from some other activity. Value it (cost it out) at the competing use rate.

Often visions for the future involve using various levels of a farmer's own labour, or perhaps family labour. Where the farmer is not paid a reward directly related to his time input you need to consider whether to cost his time. In these situations the rule is *if* there is *spare* time that might go into a new venture, the cost should be ignored. If, on the other hand, the farmer has to reduce his time input into other activities, the profit from these other activities will *decline* – it is this profit decline that should be charged against the new venture. This cost is called the '*opportunity cost*'. It represents the cost of lost opportunities. Of course, actually estimating this may be difficult, so sometimes where spare time does not exist a reasonable hourly rate that could be earned elsewhere should be charged.

The same principles apply to other unpaid resources, such as any family labour, or, as another example of a 'free' resource, perhaps irrigation water. If the farm uses water that has no cost other than the pumping and reticulation costs you may need to include a notional cost in budgeting a proposal that involves water. If the farm currently uses all the water so that a new venture will mean diverting water from its current use, then this should be costed at the value it has in the venture from which it is being diverted. Actually working out this value is likely to be difficult, so perhaps you need to use a cost akin to any local scheme that actually charges for the water quantity used. However, you could make an estimate by thinking about the loss in profit that would occur if the original use was stopped.

The marginality principle

In looking at potential changes to input levels (e.g. increasing fertilizer levels, increasing the stocking rate) keep adding more of the input (e.g. fertilizer) until the expected *increase* in profit from adding *one more* unit of the input (e.g. 1 kg of N) is just *equal* to the added cost of the extra unit (e.g. the cost of another kg N). At this point we say the *marginal return* equals the *marginal cost*. There is no point in going beyond this point, for with *diminishing returns* the additional cost will be greater than the additional return so profit will decrease.

Usually in agriculture you do eventually get diminishing returns as you add more inputs. As a farmer, for example, intensifies production by increasing fertilizer levels, increasing subdivision and increasing stock numbers, the *extra* return tends to get smaller and smaller as the intensity is increased. Note that the total return might increase, but the rate of increase is declining – thus the term 'diminishing returns'.

At a more direct level, for example, as you simply add more fertilizer per hectare, for each extra kilogram added, the increase in dry matter production gets smaller and smaller until eventually additional fertilizer will not increase pasture production: you have reached the production peak for the current technology (species, fertilizer type and chemistry). This peak production level, however, is unlikely to be profitable.

The golden rule, then, is to keep adding an input until *the additional cost of the last increase in input is equal to the value of the increase in output that results from this last increase in input*.

It is, of course, easy to say this, but to actually decide how much input to use is a little more difficult. In the case of fertilizer, can you estimate the increase in extra wool and meat produced? In the end it becomes a matter of your judgement. Clearly, if adding another kilogram of superphosphate per hectare gives sufficient grass to produce wool and meat that can be sold for more than the cost of the landed fertilizer less the shearing, health and transport costs, then it is worthwhile. In cash crop situations the calculations are usually easier.

In general, keep this marginality rule in mind when thinking of possible future changes.

Example 1

The following example is to determine the optimal level of an input of fertilizer for maximum profit. The data are from experiments on Horitiu Sandy Loam, which gave the following pasture dry matter (DM) responses to increasing quantities of superphosphate (source: *Fertilizers and Soils*, New Zealand Government Printer).

Superphosphate (kg/ha/year)	DM (kg/ha/year)	Marginal increase in DM per extra kg superphosphate
94	8,840	
188	9,230	4.15 (i.e. (9,230 – 8,840) / 94)
376	11,020	9.52
752	12,310	3.43
1,504	13,200	1.18
3,040	13,930	0.48

Note that to calculate the marginal response you calculate the *increase* in DM production and then divide by the *increase* in fertilizer level. Also note that the rate doubles each time to show the limit of response, and that the classical response pattern has occurred with an initial increase in response per kilogram of superphosphate, and then this declines (classical diminishing returns).

To calculate how much you would apply to maximize profit we need to have some idea of the value of grass through the meat and wool it produces. Assuming a ewe needs about 550 kg of DM, and *if* grazing is about 75% efficient, one ewe needs 550/0.75 = 733 kg DM. If the gross margin for the ewe is, say, \$50, the value of DM is about \$50/733 = approx \$0.07/kg DM.

If superphosphate costs \$0.25/kg landed (i.e. \$250/t) on the ground, it would pay to go up to around 752 kg superphosphate/ha as this gives 3.43 kg DM at a value of 3.43 × 0.07 = \$0.24, which is nearly the cost of the fertilizer. If the data were more continuous you would probably find the optimal level was slightly lower to give marginal cost exactly equal to marginal return. However, you can see it does not pay to go any higher on the production function as the marginal cost will be greater than the marginal return. If the efficiency were 60% the requirement would be 916 kg giving a DM/kg value of near \$0.05. This would cut the optimal quantity well back. It is clearly *very* important how efficient you can make your grazing. If the price of superphosphate doubled, this would affect the returns and you would need to lower the application rate.

Further emphasizing the marginality rule, consider the cost and return data on a farm's production data using the same fertilizer levels:

Cost ($/ha)	Total gross income ($/ha)	Net of fertilizer ($/ha)	Ave $ per kg	Net marginal return ($ per kg)
23.5	619	595	6.3	
47.0	646	599	3.2	0.04
94.0	771	677	1.8	0.41
188.0	862	674	0.9	–0.01
376.0	924	548	0.4	–0.17
760.0	975	215	0.1	–0.22

What would you do faced with these data? Would you go for maximum average return per kg, *or* the zero net marginal return (this is where the cost is $188 for 752 kg with a profit of $674). Note that with the lumpy research data you would probably end up somewhere between 376 and 752 kg/ha.

However, each soil type and farm situation will be different. While these data suggest high rates, changes to the lamb and wool prices will mean the optimal amount will change. Do your sums carefully, and anticipate well with regard to expected prices as superphosphate fertilizer, in particular, takes time to take effect.

Example 2

This second example is from fertilizer trial data on less productive shallow soils (source: *Fertilizer and Soils*, New Zealand Government Printer).

Superphosphate (kg/ha/year)	Dry matter (kg/ha)	Marginal response (kg/ha/extra kg superphosphate)
0	4,140	
188	9,500	28.50
375	10,470	5.19
564	11,020	2.91

If your farm was on these soils, how much superphosphate would you use?

Budgeting

The ideas listed above give rise to a number of budget types that farmers can use in assessing their visions of the future.

WHOLE FARM COMPARATIVE BUDGETING. Where the changes involve most components of a farm (e.g. buying the neighbouring farm and completely changing all systems), it is appropriate to assess the proposals using a whole farm budget. That is, estimates of the total farm income and total farm costs are included. Thus, all overheads such as interest, labour, administration, rates, etc. are included.

All costs can be divided into: (i) overheads, sometimes called fixed costs; and (ii) variable costs. Variable costs are defined as those that *vary* as the level and type of *output* changes (e.g. fertilizer, seed, transport, animal health, etc. Overheads *do not vary* (e.g. the manager's wage, the insurance, etc.).

Figure 2.7 is an example of an actual whole farm budget, which could be used as an example of all the items to include. Also see in Chapter 2.4 Budgets – Calculating the Bottom Line, where this is covered in greater detail.

Example of a full budget

Forecast for year ended June 2004

Income summary	$	$	$ per ha	$ per SU
Sheep sales	342630			
less purchases	4000			
Sheep income		338630	770	56
Cattle sales	0			
less purchases	0			
Cattle income		0	0	0
Wool income		138800	315	23
Cash crop income		55850	127	
Other farm income	0	0	0	
Grazing and straw	0	0	0	
Cash farm income		533280	1212	88
Financial summary		$	$ per ha	
			1212	88
Cash farm income		533280	723	52
less cash farm exp.		318176	489	35
Cash farm surplus		215104		
Add				
Other income		0	0	
Capital sales		0	0	
New borrowing		0	0	
Total available cash		215104	489	35
Available for:				
Personal		50000	114	8
living exps	50000			
life and med ins.	0			
school	0			
other	0			
Taxation:		53504	122	9
Income	49504			
ACC	4000			
Financial charges		3480	8	1
Interest on term loan	0			
NB current acc.	0			
Bank charges	500			
Principal repayment	0			
Rent	2980			
Hire purchase	0			
Development exps		0	0	0
Capital purchases		50000	114	8
Total cash expenses		156984	357	26
Cash surplus/deficit		58119	132	10
Depreciation estimate		54400		
Change in equity		49884		

Key performance indices					
Gross farm income (GFI) per hectare	$	1,212			
Farm working expenses: GFI	60%				
Debt servicing:GFI	1%				
Economic farm surplus (EFS)	$	85,704			
Return on capital (EFS/TFC)		1.74%			
Total farm capital (TFC) per ha	$	11,213	per SU	$	811

Fig. 2.7. Example of a full budget.

Farm working expenses

		$	$ per ha	$ per SU
Wages - permanent	34000	34000	77	6
- casual	0			
Animal health		32000	73	5
Contracting		2000	5	0
Crop exps		0	0	0
electricity - farm	38930	42930	98	7
- domestic	4000			
Irrigation		4500	10	1
Feed -hay & silage	10290	11290	26	2
-grazing	0			
-other	1000			
Fertilizer		39331	89	6
-crop	36006			
-other	0			
-lime	3325			
Freight - crop	650	2650	6	0
-stock & other	2000			
Seeds		16830	38	3
Shed expenses		3000	7	0
Shearing exps		19395	44	3
Weed & pest		6250	14	1
Vehicle exps		30000	68	5
-fuel & oil	15000			
-rep. & maint.	10000			
-regist. & lisc.	1500			
-other	3500			
Repairs & maint.		40000	91	7
-house & buildings	5000			
-fences, tracks, etc.	5000			
-plant	20000			
-other	10000			
Admin.		11000	25	2
-phone	3000			
-accts	3000			
-other	5000			
Property charges				
-rates		14000	32	2
Farm insurance		7000	16	1
Other farm exps		2000	5	0
CASH FARM EXPS		318176	723	52

Forecast for year ended June 2004

Estimate of tax to pay

Cash farm surplus	215103.8
Other income	0
Taxable income	215103.8
Less depreciation	54400
Less interest	0
	54400
Add back	
Private share electricity	3000
Private share vehicles	6000
Private share R & M	1000
Private share insurance	1000
	11000
Taxable profit	171703.8
Number of partners	2
Taxable profit per partner	85851.9
Tax per partner	24752.24
Total tax	49504.48

Fig. 2.7. Continued.

PARTIAL BUDGETING. Where the changes involve only part of the farm, it is appropriate to calculate a partial budget. This includes the costs and returns that *change* – the rest are ignored, as if they stay the same they should not influence the decision.

Example

How would you go about budgeting the introduction of cattle (or more cattle if this enterprise is already on the farm) on to a farm?

Imagine you have a back field that currently has sheep on it. You wish to consider the financial impact of reducing sheep numbers and substituting cattle. You currently breed your own sheep replacements and sell store lambs. If you kept cattle you would buy weaners and sell them after a year.

You estimate that sheep numbers would drop by 500 ewes, and would be replaced by 125 weaner cattle. You have calculated that the sheep gross margin is \$50 per ewe and the weaner gross margin (GM) has been estimated at \$240 per weaner (see the next section for gross margins (enterprise budgeting)).

The partial budget:

SHEEP		
500 @ \$50 per head GM	= \$25,000	
less interest on the capital involved 500 @ \$70* @ 8%	= \$2,800	
	NET	= \$22,200
CATTLE		
125 @ \$240 per head GM	= \$30,000	
less interest on the capital involved 125 @ \$600*	= \$75,000	
for extra fencing, better water, and yards, estimate	= \$30,000	
Thus \$105,000 @ 8%	= \$8,400	
Repairs and maintenance on extra facilities \$30,000 @ 3%	= \$900	
	NET	= \$20,700

(*In this example, \$70 and \$600 are used to represent the market value of sheep and cattle, respectively.)

It is clear the cattle are not as good as the sheep using the policies assumed. So, unless the farmer can find other cattle policies that are better, he should stick to the sheep. On the other hand, if the farmer believes the cattle will save his time then maybe he should proceed if he estimates the value of his time over the full year is \$1500 or greater. There is the diversification value. However, you must bear in mind that the relative prices might change, possibly making the cattle option more profitable.

GROSS MARGINS. Where a series of alternative enterprises need to be compared, a series of *gross margin* budgets should be calculated.

For example, if you wish to compare a breeding cow selling weaner enterprise, a buying and finishing weaner enterprise, a bull beef enterprise, a 2-year finished lamb flock and a wheat crop, you would calculate the gross margin for each and see the return per stock unit (SU) to enable a comparison (a SU is a common comparison unit representing the feed consumed by a 50 kg ewe). For each gross margin budget you include *only* the variable costs and direct returns for the enterprise.

For example, for the breeding cow selling weaner enterprise, the income per ten cows would be the cull cows and the weaners. The costs will be the purchase of replacement cows (assuming a purchase policy), the bull costs, the animal health costs, the pregnancy test costs, the TB costs and the transport costs. The net return (gross margin) can then be divided by the total number of SUs of feed used by ten cows to give a gross margin per SU.

Example 1

TWO-YEAR SHEEP GROSS MARGIN

Stock value		
	ewe at $60 plus share of a ram (0.016 @ $200)	= $63.2
Stock units		
	ewe at 1 plus share of ram @ 0.8 (1 + 0.016 × 0.8)	= 1.013 SU
Production parameters		
	lambing 130%, deaths 6%, cull 25% first-year ewes, wool 4.5 kg, all lambs sold	
INCOME		
1.3 lambs @ $65		= 84.50
0.527 cull ewes @ $40		= 21.08
Shearing		
	sheep 0.853 @ 4.5 kg wool @ $4 net	= 15.36
	TOTAL	= $120.94
EXPENSES		
Replacement ewes 0.595 @ $60		= 35.70
Shearing		
	sheep 0.853 @ $270.11 / 100	= 2.30
	crutch 0.853 @ $1.47	= 1.25
Woolshed expenses		= 0.25
Animal health		
	ewe drench 0.99 @ $0.07	= 0.07
	lambs drenched (×3) 3.9 @ $0.05	= 0.19
	vaccine 0.99 @ $0.48	= 0.47

Continued

TWO-YEAR SHEEP GROSS MARGIN (Continued)

Ear tags, docking, etc.		= 0.30
Dipping		
	ewes 0.418 @ $1	= 0.42
	lambs 0.85 @ $0.85	= 0.72
Transport		
	lambs 1.3 @ $1.14	= 1.48
	culls 0.527 @ $0.86	= 0.45
	replacements 0.595 @ $1.9	= 1.13
	wool 0.0021 @ $8	= 0.17
Rams 0.004 @ $450		= 1.80
	TOTAL DIRECT COSTS	= $46.72
GROSS MARGIN (before interest)		= $74.22
GROSS MARGIN/$ INVESTED		= $1.17
GROSS MARGIN PER SU		= $73.26

SENSITIVITY
The gross margin per SU ($) at various price combinations:

Wool/kg net	Lamb per head	Gross margin
3.2	52.0	53.56
4.0	52.0	56.60
4.8	52.0	59.63
3.2	65.0	70.25
4.0	65.0	73.26
4.8	65.0	76.32
3.2	78.0	86.94
4.0	78.0	89.97
4.8	78.0	93.00

Example 2

BULL BEEF GROSS MARGIN
Buy Friesian weaners and keep till 19 to 24 months.

Stock wintered

70 rising 1 year @ $540 =	$37,800 at 3.5 SU	giving 245 SU
20 rising 2 years @ $750 =	$15,000 at 6 SU	giving 120 SU
TOTALS	$52,800	365 SU

Production parameters
3% deaths, sell 70% between March and May at 19–21 months, sell remainder October/November

INCOME

Bulls	68 @ 270 @ $3.70/kg	= $67,932

EXPENSES

Weaner bulls	72 @ 100 @ $3.2/kg	= $23,040

Continued

Animal health				
	drench (6X)	420 × $0.75	= 315	
	pour on	140 @ $2.25	= 315	
	cobalt inj.	70 @ $0.5	= 35	
	copper	70 @ $4.0	= 280	
	five in one	140 @ $0.35	= 49	= $ 994
Transport				
	weaners	72 @ $5.50	= 396	
	bulls	68 @ $11.40	= 775	= $ 1,171
Levies 68 @ $15.00				= $1,020
	TOTAL DIRECT COSTS			= $26,146
	TOTAL GROSS MARGIN			= $41,785
	GROSS MARGIN/$ INVESTED			= $0.79
	GROSS MARGIN PER SU			= $114.48

As noted earlier, many computer packages have budgeting components, and there are books and budget forms available from various groups. Some farmers also use their own computer spreadsheets.

Exercise

To check your understanding of the correct procedures try this short quiz on budgeting techniques (see below for answers).

1. The farm manager is considering developing a small stud flock to boost income from his marginally economic farm. He has more than enough time. His budgets suggest he can make a small profit from the venture when costing his time at the low price of $20/h. Should he proceed?

2. Jill runs a major farm business and is considering buying a nearby farm that is virtually identical to the current property. To decide whether to proceed, should Jill do a 'whole farm budget', which has all the costs and returns of both properties combined?

3. Should the irrigation manager put on a total of 80 mm over the season? The returns to more and more irrigation are given below. The cost of applying each additional mm of water is $1.75. If no water is applied the return is $300/ha, for 20 mm it is $320, for 40 mm it is $370, for 60 mm it is $410, for 80 mm it is $425, for 100 mm it is $430 and for 120 mm it is $418/ha.

4. Is the mini budget given next a true gross margin? The farmer who calculated it was trying to compare buying store lambs for finishing with selling grazing heifers over the winter.

INCOME	0.93 finished hoggets @ $80		
	plus 2.8 kg wool @ $4.5		= $87.0
EXPENSES	1 store lamb landed	= $40	
	plus animal health	= $2	
	plus cartage	= $3	
	plus shearing	= $2.4	

Continued

plus hay	= \$10	
plus hay insurance	= \$0.5	
plus share of manager's wage	= \$2	
plus share of rates	= \$0.5	= \$60.40
NET GROSS MARGIN		= \$26.60

Answers

1. Yes. He should most certainly proceed as currently his extra time gets \$0/h (this is the opportunity cost). However, it will take time to develop a reputation, and there will certainly be risks in that what is paid for rams is very dependent on farmers' surplus cash and expectations of the future profit from the breed.

2. No. The combined profit figure won't in itself help decide unless there is a budget of the existing farm for comparative purposes. Normally it would only be necessary to do a 'partial' budget of the changes – in this case the costs and returns to the investment of the new farm. If there is a net return after charging interest on the investment, it is worth proceeding, assuming the sums were done on the asking price. If the price is less, then the profit will be greater. But there will be an upper limit on the price beyond which it will not be worth going as the interest charge will not be covered by the profit. This assumes there will not be any synergies between the properties so the home farm budget will not be affected in any way. If this is not the case, then a 'whole farm' budget must be calculated for both properties combined.

3. No. The marginal returns are for: 0–20 mm, \$1/mm; 20–40 mm, \$2.5; 40–60 mm, \$2.0; 60–80 mm, \$0.75; 80–100mm, \$0.25; 100–120 mm, –\$0.6. Therefore it certainly does not pay to go beyond 100 mm, for above this figure the total return declines (perhaps disease levels go up with waterlogging). But given the marginal cost of water at \$1.75 the point where marginal cost is equal to the marginal return is somewhere between 60 and 80 mm. Thus, almost certainly, less than 80 mm should be applied.

4. No. The 'gross margin' is probably not a true GM as it contains some overheads. While insurance is a variable cost (it will not be incurred if the lamb enterprise is not chosen), the manager's labour and the rates will be incurred whether or not the lambs are purchased. They are therefore fixed costs and not relevant to the enterprise budget. You have to pay for both of these items whether or not lambs are purchased and finished.

Conclusions and Action

Choosing the correct production system is a critical prelude to acting with success. But the real job is actually putting the plans into effective operation.

Given the farmer has ideas about the future, and he is skilled at envisaging both the near and far future, and therefore anticipates and plans on time and can get it all down on paper, or at least have a mental budget in his mind's eye, the farmer must now decide which course he is going to take, and put it into action. Having done the budgets, and listed out other pros and cons, and discussed the possibilities with other interested and involved people, the farmer should be getting a feeling about what is best. To be happy with this feeling he needs to be relatively sure about the assumptions built into the calculations. If not, the farmer should go back and rework the results with a range of assumptions (prices, yields, etc.).

Eventually what is right for him will become clearer, but if it does not the reasons should be thought out. Some people find coming to a decision and getting on with it easy. Others procrastinate – either due to uncertainty, or perhaps for some other good reason. This needs to be sorted out.

Problems

If a choice is not clear, or if a decision is difficult, maybe there is not in fact an outright winner. This is not unusual as the obviously inappropriate alternatives are usually weeded out well before the calculation stage.

Keep reworking the figures, and discussing the possibilities – a conclusion will often become clear in time. However, think about why a conclusion is not arriving – some people are indecisive because they are anxious about making the wrong decision – perhaps a concern about others commenting, perhaps an unjustified concern about losing money. Whatever the reason, this situation can certainly be uncomfortable. This is where talking to others can help enormously, and also shares some of the burden.

If, in fact, the choices are similar profit-wise, then pick the way ahead that the farmer will enjoy the most, but not forgetting any risk considerations.

Having decided, it is just a matter of implementing the job lists, getting in the supplies and so on. If he is still unsure, some farmers make changes in small steps – increase stock numbers just a little and see how they get on. This way means the farmer can easily backtrack if the plans do not work out.

Eventually, the farmer reaps the benefits, or accepts the mistakes. It is easy to say 'forget the mistakes and get on with the future', but not always easy to do. But, of course, it is very true that *what is past, is truly past*. You can not do anything about it, so the farmer should put it out of his mind and get on with the next best move.

There is no need for a farmer to worry about what the neighbours think, what the farming relatives say – such thoughts do not achieve a thing. The successful manager is able to keep a clear and logical head so the next decisions made are based on their merits, not what occurred in the past.

Making a success of 'getting on with it'

Part of 'getting on with it' is to do with successful *time management*. The next chapter outlines a common sense approach to time management. Of course, besides time management, *execution* of plans involves successful monitoring and control as outlined before. (And, of course, if you use a computer package to manage your finances you probably get reports comparing, item by item, actual expenditure/return, with forecast, or budgeted, expenditure or return. These reports help 'monitoring'.)

Exercise

Have you ever found it difficult to make decisions? Looking back over the last 5 years, think of the three decisions you found the most difficult to make. In hindsight, were the decisions made correctly? *How could they have been better?*

Now that you have thought about decisions that might have been better, can you indicate how the process you used could have been improved. Note that we are interested in the decision process, not the actual mistakes.

Did you find you had not thought carefully enough about the future consequences of each decision? *Did you miscalculate, misjudge, or forget some factor? Or was it just bad luck*? Food for thought?

Exercise

Whether your plans are as successful as they might be does depend in part on how well you anticipate and cope with all the practical problems that inevitably arise. An eye for the detail, practicalities and good anticipation are accepted as being important.

1. For many years the experts have been pushing increasing stocking rates to ensure efficient pasture utilization, which in turn leads to increased yields. If you were persuaded to increase your stocking rate over 2 years by, say, 10%, list the practical problems and difficulties you might face. Often it is the practical problems that thwart a project, so you need to be clear about these to facilitate success.

2. The rise in the bull beef price stemming from the development of the US market has meant a case farmer probably should get quite heavily into producing bull beef at the expense of sheep numbers. Assuming this is the case, jot down on a piece of paper:

(a) What is the maximum number of mixed age bulls the case farmer could run?

(b) What changes would the farmer need to make to the facilities on the farm?

(c) What are the major practical difficulties the farmer would face?

3. It is midwinter. You have a hill country farm of 400 ha with an average cover of 1500 kg DM/ha. The whole farm has improved pasture, and it will grow at 12 kg DM/ha/day over the rest of the winter period. After early spring, feed is not usually a problem.

You have 3000 ewes averaging 50 kg live weight. They are due to lamb in the first week of spring. Past lambings have produced 115% survival to sale (on average). You have on hand 1500 25 kg bales of poor to average quality lucerne hay. Your experience indicates 20% of the hay fed out gets lost, and 40% of pasture gets eaten. You also reckon you can not sensibly graze below 1000 kg/ha. You also know that a ewe requires 1.3 kg/day at this time of year.

What should you do? Buy, or not buy, extra feed? Do your sums on a scrap of paper, then look at the answer below.

Calculations
Requirement

Midwinter to early spring = 50 days	
50 days × 3000 ewes × 1.3 kg/day	= 95,000 kg DM
Supply	
Hay 1500 × 25 @ 80% utilization	= 30,000 kg DM
Pasture 400 × (1500 – 1000) @ 40% utilization	= 80,000 kg DM
Growth 400 × 12 × 50 days @ 40% utilization	= 96,000 kg DM
TOTAL	= 206,000 kg DM

Answer
There is no need to buy, as the farmer has sufficient feed.

Time Management

The future is synonymous with time. You need to use it to most effect to achieve your objectives. Of all the anticipation/forward-looking skills, working out how to spend your time is crucial.

A manager should list the jobs and alternatives from which he can choose, and then make sure he does the important ones first, and does them on time. The trouble is that we are only human, and what we plan to do relative to what actually happens sometimes does not turn out to be the same… so what can we do about it?

The basics of time management: common sense!

Time management is intimately linked to looking ahead and visualization skills. How can you effectively make use of your time, and that of others that work with you? You need to think about the future weeks and months with plans and outcomes firmly fixed and visualized in your mind. The success of much of what you do relies on completing plans at the right time.

To start you thinking of the issues, consider the following: sometimes it is necessary to make a quick decision when unforeseen circumstances necessitate a change to current plans. But even when the time span available is longer for making a decision, the alternatives must be assessed and a timely decision made. Procrastination and panic can lead to inappropriate timing and/or mistakes. For example, a prolonged dry period over the late summer/early autumn may mean feeding plans need altering if live weights are not going to be affected at tupping (mating). The decision can not wait, though sometimes you are lucky and are saved by the drought breaking just in time. To ensure success, however, is not just good luck – alternatives must be thought about and calculations, perhaps mental, must be made to assess what is best, and timely action undertaken.

Should you buy more feed? If so, what quantity and what type? Sell off some stock – which group and how many? Or, possibly, tighten the ration even more and hope for rain. In each case, the flow-on effect must be assessed to enable a conclusion. The impact might last several seasons, the cash used to buy feed necessitating curbing some new fencing, and so on. What impact will there be on the lambing percentage? What will the price of lambs be? If the number of lambs is reduced, will there be a compensatory increase in spring growth rates so total meat produced is similar? What will happen to wool weight?

The procedures

These are largely common sense. The farmer must ask himself the benefits of each job and the effects of delaying each job, and, therefore, make a list of priorities. Armed with these it is just a matter of getting on with the jobs in sequence, but also cut out the not so valuable tasks, and constantly review efficiency and methods.

In considering any situation the farmer needs to: (i) make a list of alternative actions and jobs that he could do first; (ii) list out the impacts each alternative might have; (iii) cost out the impacts for each and add up (including both returns and costs to provide the net financial and other impacts); and (iv) decide on the best and *act in time*.

In hindsight the decision on which jobs to do first might be wrong – there is always a chance of this, but on average (over repeated years) you work towards being right more times than not. Remember that 'costing' out probably involves more than just money. Things like enjoyment and risk, not to mention what the family want, are all components of 'cost' and relate to your objectives in general.

Example

Your 3000 ewes are losing weight and the rams are due out in 3 weeks. You could buy some barley, use some of your high quality lucerne (alfalfa) hay, sell off some of the older ewes, or do nothing (although other alternatives are possible).

You estimate you will need to feed 1 kg/day/head of the best hay to get a slight increase in body weight. Using the hay now means you may have to buy some later. You reckon this will be the case, but you can get away with lower quality hay at $0.25/kg. Alternatively, barley at 0.7 kg/head/day could be used bought in at $220/t. Without hay the ewes are getting the equivalent of 0.6 kg hay/day from grazing. Lambing percentage is expected to drop by 10% if nothing is done, 5% if the ewe live weight is just increased slightly compared with normal.

You reckon it is probable that you will need to feed for 4 weeks to have these effects. To save this amount of feed you will need to sell off two-thirds of the flock – this is not tenable, as when the rain eventually arrives this winter feeding then should be sufficient. It might be possible to sell off as many as 500 and replace in late autumn – it is estimated the net cost per ewe will be $6 per ewe including transport for this option; but the quality will not be as good – say a 5% drop in lambing percentage. Given the time of year, wool production will only be marginally affected over the time period, though there is some doubt whether the quality will be affected. This is hard to value, so at this stage ignore this effect but remember this might be a factor to consider if the calculations suggest the alternatives turn out to be similar on the feed costing basis.

Assume a lamb is worth $60 net. For each lamb ‘not on hand’ you make an extra two bales of hay at a net value $4.

What would you do? Clearly a quick decision is required if any action is warranted (see below for answer).

The sums

First, list the options:

1. Sell off 500 ewes and replace later, and buy some extra hay.
2. Buy extra hay.
3. Buy grain.
4. Sell off 500 ewes and replace later, and buy some grain.
5. Do nothing.

Then list out the impacts of each option:

1. Cost $6 net for each ewe sold/replaced. Remaining ewes get higher ration, but you still need to buy extra feed. Lambing is down 5%, extra spring feed gives some return from extra hay made.
2. Lambing is down 5%, costs increased by hay cost, extra hay/grain made in the spring.
3. Lambing is down 5%, costs increased by grain, extra hay made in the spring.
4. Cost $6 net for each ewe sold/replaced. Remaining ewes get higher ration, but you still need to buy extra feed. Lambing is down 5%, extra spring feed gives some return from extra hay/grain made.
5. Lose 10% of lambs, but gain extra hay in spring.

Note that in all cases lambing is down 5% except for option 5, where it is down 10%. Thus, only in option 5 does the extra lamb loss need to be considered.

Costings

1. Ewe net replacement 500 × $6		= 3,000
Hay purchased		
2500 ewes @ 28 days @ 1 kg @ $0.25		= 17,500
Less feed saving from 500 ewes sold		
e.g. 40 days @ 0.6 × $0.25		= –3,000
Lower lamb numbers 500 @ 5% @ $60		= 1,500
Less savings from extra hay made in the spring		
25 @ 2 @ $4		= –200
	NET	= $18,800
2. Hay purchased		
3,000 ewes @ 28 days @ 1 kg @ $0.25		= $21,000
3. Grain purchased		
3,000 ewes @ 28 @ 0.7 @ $0.22		= $12,936
4. Same as **1** except purchased feed cost is different, thus: Ewe replacement		= 3,000
Grain purchased		
2,500 @ 28 days @ 0.7 @ $0.22		= 10,780
Feed saving from 500 fewer ewes		
40 days @ 0.6 × $0.25		= –3,000

Lower lamb numbers from 500 fewer ewes		
−500 @ 5% @ $60 net		= 1,500
Less saving from extra hay made through lower lamb numbers		
−500 @ 5% = 25		
25 × 2 × $4		= −200
	NET	= $12,080
5. Net loss of 5% of lambs compared to other options		
3000 × 5% × $60 net		= 9,000
Less extra hay made from fewer lambs		
3000 × 5% = 150		
150 × 2 × $4		= −1,200
	NET	= $7,800

Conclusion

It pays to do *nothing*, but, if necessary for extreme conditions, buy some grain. However, the price might have risen markedly, thus keep reviewing.

Would you have followed the results of this calculation? Did you agree with this conclusion and action?

Priorities and goals

Successful time management is about priorities, cutting out the less valuable jobs, matching time available to the tasks in hand, and getting on with it. Have you faced decisions like the feed example outlined above? In hindsight, did you act in time?

In a cropping situation what similar decision dilemmas might exist, for example weed or pest spraying? Similarly, in a very low rainfall year decisions must be made on how much to irrigate each time, and which crops will be given priority, although the equipment available may limit what is possible. Timeliness can be everything in irrigation, as it certainly is in spraying for weeds or pests.

In time management you should constantly remind yourself that the 20/80 rule tends to prevail – that is, 20% of your time produces 80% of the output. *The clear message for farmers, and others too, is*:

- Learn to prioritize the tasks so those that do not get done, or get done late, will not matter a great deal. Listing out the tasks, and assessing each for a priority ranking, is probably one of the most important things.
- Be very clear in your mind what are your goals and objectives. Without clear objectives you have no basis for prioritizing the jobs on your list.
- Ensure the goals are realistic and obtainable, and relate to your capabilities. They must also relate to the next week, next month, next year and so on – each time span goal is brought into play, depending on the task you are prioritizing.

Time analysis

In reviewing time management a farmer should always start by assessing just where all the time goes at the moment. If a farmer does not keep detailed records, he should start now for sample weeks in each season. The farmer should then review his time allocation by cutting out the less valuable tasks, rearranging if efficiency can be improved, and also see if he can improve the methods used to reduce the time taken.

To properly organize time so it is spent on the valuable things, the farmer should have some idea of how much time he has available, and where it currently gets spent. This information can be quite an eye opener. Perhaps a farmer can analyse his time use from his diary. If not, he should sit down every day at a suitable time and record for the last day what jobs were carried out, and how long each one took. Then, at the end of the recording period, he should add up the totals and review time use. To do this it might be helpful to draw up a sheet with common activities, and photocopy repeats. An example of the layout for such a sheet is shown below.

Task	Date | Description	Date | Description	Date | Description	etc.
Phone calls				
Stock shifting				
Animal health				
Feed conservation				
Stock feeding				
Shearing/crutching				
Fence repairs				
New fencing				
Cultivation, sowing				
Harvesting				
Building repairs				
Machinery repairs				
Water supply				
General repairs and maintenance				
Town/shopping				
– business				
– home				
Office				
– accounts				
– general				
Meetings				
– business				
– social				
Other				
TOTAL				

The descriptions should be brief. A farmer may wish to set up a code system.

Once records are on hand he can ask himself:

- Can some activities be reduced, or even eliminated?
- Can some be rearranged to be more efficient (e.g. combine town jobs and only go once per month; use the phone/Internet more?)

- How does each activity contribute to the goals?
- Did he spend time on low priority jobs at the expense of high value jobs?

However, how much time does he actually have available? Perhaps he could add a row for personal activities as they might need reviewing too? For example, add rows for: meals, personal hygiene, social visits, hobbies (including reading), watching TV, sleep.

Exercise

Think about recent activities. Of the ones where you were reacting to circumstances (e.g. putting back sheep that got into the wrong paddock, fixing the water supply due to a bad leak, etc.), could any have been made unnecessary if you had thought ahead more, i.e. did you waste any time?

After the event we often think that some things we did were a waste of time. List out such jobs that could have been prevented if you had spent more time thinking ahead and planning efficient time use.

How much time did you control relative to reacting to the situation? You can not eliminate the non-planned time, but you certainly want to minimize it through good anticipation.

With time logs a farmer is in a good position to think more about time management. He knows how much time is available though, of course, it is going to vary at different times of the year. At some periods working long hours is crucial to produce quality outcomes.

Planning your time management

First, make a list of all the tasks you want to do over the next, say, 2 weeks. Write these down on a sheet of paper. Leave plenty of room on the right; and then consider each task and give it the following information:

1. The time to complete the task
2. Its priority ranking:

(a) very urgent/urgent/soon/can wait
(b) very valuable/valuable/worthwhile/of little value

3. List the tasks in priority order and add up the time required. Will you get all the tasks done in the time available? If not, reorganize and drop non-urgent/non-valuable ones, but still allow some spare time for emergencies.
4. Constantly review the task list and re-order as situations change. Work backwards from deadlines.

Wherever possible, arrange for multi-tasking so travel time is minimized (when going to the back of the farm, a farmer should do *all* the jobs waiting out there).

Exercise

Type up the tasks you have on your list for the next 3 days. Assign each a time to complete, and put them in priority order (value/urgency). If you have fewer than five items on the list, extend the time period.

Keeping to the schedule

Many people do think well ahead and know what should be done, but somehow it does not happen. Has this ever happened to you? Jot down the last times you forgot to do something important, or you did it, but it was late!

Timeliness is almost everything. Have you ever been late in doing something important? Think back and sort out as many such occasions as you can think of. Was the outcome costly? Similarly, if you don't get things done on time, consider the possible reasons and indicate what they are.

Questions to encourage time management reflection

For each question jot down a 1, 2 or 3 depending on the degree of truth. For a strong 'YES' enter a 3, and for a strong 'NO' enter a 1.

For recent tasks you have been involved with did you:

- Set a very high standard; thus fear failure/incompletion?
- Get bored with some tasks – other things were more interesting?
- Lack time for proper completion?
- Sometimes not know how to do the task?
- Not really believe the task was worth doing?
- Find other tasks/problems kept emerging and distracted completion?
- Find the size of the task was daunting – you did not know where to start?

Consider the statements you answered a firm YES to in the questions above. Is the block rational or logical and what can be done about removing this block?

Procrastination

If you are procrastinating, there are a number of 'tricks' that can be used. These include such things as starting on the easiest sub-job, checking out the likely cost of delaying the job, self discipline on beating side-tracks, ignoring perfection and learning to say *no*.

Listed below are some suggestions for beating procrastination:

- Start *now*!
- Define more carefully, and in detail, what has to be done – start on the easiest bit first, it is amazing how the rest follows.
- Re-make the priority list and be convinced the most valuable task is at the top of the list – it is *worth doing*!
- Re-examine the priority list with respect to the deadlines – are you sure you will meet them all? – maybe a shift in the ordering is necessary. Again, if the deadline is real and doing it right is valuable, and you recognize this, maybe that recognition will break the log jam.
- Eliminate interruption – it is amazing how you get sidetracked when the job is unpleasant! Do not accept the visit from a company representative unless it is essential. Do not turn on your cell/mobile phone, etc.
- Reward yourself – set little targets – e.g. if I get this finished by 4 pm there is time for something more interesting!

Other suggestions found to be helpful include:

- Visualize the successful completion of the task.
- Remember to resist the perfectionist trait.
- Tell yourself you are indeed making good progress after starting on the easiest tasks first. You will know that success is a wonderful incentive – and success is your conception of the situation – so it does largely depend on how you view the situation. Are you convinced?
- Another reminder: learn to say *no*! Sometimes you need a break from taking on all the community jobs.
- Deal effectively with 'junk' mail and messages – scan them and toss out irrelevant or low interest material. Have a definite, and limited, time spot for looking at what might be important.
- Minimize paperwork – use e-mails, brief postcard replies, write a note on the bottom of a letter to reply (do you have a photocopier?) – these ideas might clash with standard protocol, but does this matter? Only touch each paper once (deal with it *now* if at all possible). Develop a filing system that suits you – maybe a cabinet with folders for each topic, several for receipts/invoices/statements based on alphabetic ranges, folders for insurance, and so on. (See below for a quiz on office practices.)
- Make copious forward use of your diary – as you know about events, activities, deadlines, write them in your diary – then go back a week (or whatever is appropriate) and put a comment in to note that a certain event, deadline, etc. is coming up in, say, 7 days. This way, provided you check daily, you have plenty of warning.
- Master meetings: have a strict agenda; set time limits; and is the meeting important? If not, cancel it! However, some meetings do have social agendas that are important – do not drop these!
- Practise delegating wherever possible – you can not do everything even though you know you do it better than anyone else. If others do not practise, how can they reach your level? Do not forget to praise, give clear objectives and instructions, set deadlines, monitor progress, review, and be available to help.

Quiz

What are a case farmer's office practices? For each question enter 1, 2 or 3 depending on the accuracy of the statement or question (for a strong 'YES' use 3, for a definite 'NO' use 1), or a value that answers the question.

Thus, indicate whether the farmer:

- Has a regular time/day for office work each week?
- Has a regular time for phoning each day?

and

- How much time per week does he spend in the office (hours)?
- How much time does he spend phoning each week (hours)?
- The number of files kept for storing income information?
- The number of files kept for storing expense information?
- The number of files kept for storing technical information?

Conclusion

It is easy to read and write, and do little exercises on time management, but not so easy to carry out in practice. Constant attention to each point is necessary, with mental lists of procedures to practise and follow. Of course, neither you nor a farmer can change your habits overnight, nor can you concentrate on everything all the time. Take it in stages, and re-read the suggestions from time to time, and take one topic at a time.

Feed Management: the Culmination of Observation and Anticipation (and Comments on the Cropping Equivalent)

Feed management is a pivotal skill on most farms that have stock. Animal production and output is the culmination of the year's activities, and the source of most income in many cases. Getting it right is clearly the most important single thing on stock farms.

Every day decisions are made impacting on animal output. The farmer decides whether to shift each mob, and where to shift them to, whether to feed supplementary feed and how much. What skills are involved?

Successful *observation* of animal condition and the feed situation is critical. And then *anticipating* the growth of both plants and animals enables making the right moves. Thus all the observation and anticipation skills come into play.

In the observation section of this book there is a questionnaire on current food levels for a case farm. Clearly a farmer needs to get these observations right. Similarly, there are questions on the numbers and live weights of animals. It is also important to observe whether the live weights of each group are static, increasing or falling. These observations impact on the actions that should be taken. Skills in both these areas need practice.

Furthermore, it is well known that assessing pasture dry matter levels by eye can be very accurate after practice through sample cuttings and kitchen oven drying, and then there are various devices that can be used to help. Animal live weight estimations similarly require some sample weighing, and allowances for wool cover in the case of sheep. With practice, good accuracy can be achieved. And of course, most managers are always on the look out for health problems.

The *anticipation* involved revolves around projecting plant growth, which then enables making the correct feeding decisions. Plant growth, of course, depends on soil moisture, soil nutrient levels, temperatures, and the state of the plants (dried off, young leafy, cover, shading, etc.). Therefore, particularly for the soil moisture and temperature situation, the time of year has a major influence, but so does any climate trends. A stock farmer needs to assess all these factors, and this can be aided by looking at past records.

Animal growth depends on intake and the quality of the feed ingested. Animals require adequate energy and protein, as well as minerals and vitamins, to maintain their body weight. Intake in excess of the maintenance requirement can go into growth of both body weight and production (wool and/or milk).

Intake generally depends on the food on offer; if offered plenty the intake maximum can be reached. Thus, in a grazing situation, if offered low dry matter per hectare, animals will not reach the intake possible even though it might be theoretically possible if they ate all day. Palatability is also a factor.

Production depends on what is ingested and its quality (energy content, digestibility, palatability). Overall, an assessment of what food is currently available, and what is anticipated, leads to making decisions on whether to move a mob, and the level of any supplementary feeding.

Culmination of skills

Some people make their feeding decisions intuitively – they somehow know when to take action. Others do some form of rough calculation and then act. Often there are various rules of thumb that have evolved. For example, some farmers make sure they shut up sufficient pasture to ensure they have 60 kg hay per stock unit, but whether this applies to you depends on the climate and soil types. Others sit down from time to time and work out a full feed budget. This involves estimating the animals' requirements over the next few weeks, months etc., in terms of energy and stock units, and relate this to what is expected from pastures, feed crops and supplements. This is where accurate anticipation is crucial. Numbers and purchasing, or perhaps selling, can then be juggled to match anticipated feed supply and demand.

Exercise

What rules of thumb do farmers that you know use in their feed management? For example, once feed levels get above 1500 kg DM, a farmer might shut up hay paddocks. Jot down the rules they use. This often takes some thinking about as many rules are automatic and are followed without the farmer thinking about them.

Stocking rate

A key factor in longer run feed management is settling on how many animals to run. On average this determines what feed each will get, and therefore animal output.

Experience on a particular farm leads to adjustments and conclusions. The debate on what is an optimal stocking rate is probably never totally settled. On farms where most feed is purchased the same problem does not exist, though the facilities available will impact on stock numbers.

Exercise

What is the optimal stocking rate in terms of stock units (SU) per ha for a case farm where grazing is the main source of food? To achieve a farmer's objectives there is always an optimal stocking rate for the average season. Specify what you believe this is (in SU/ha: 1 SU is based on a 50 kg ewe). List out the reasons for your conclusion.

Practice

Experience from over the years provides very practical rules of thumb. Another way to practise both observation, but more importantly, anticipation in feed management, and so develop rules, is to use computer 'simulations' of what might happen. A farmer might already use a computer-based feed calculator to help anticipate what a farm's feed situation might be. If not, the farmer can do simple calculations by hand. To find out how using these systems would be useful, a farmer should talk to a local consultant, or possibly a feed company representative. Local farmer groups might also be able to help and make suggestions. However, it is not possible to predict precisely what might happen – weather is a major factor in success (see Part 3 for further details on risk management).

Comments

On farms where feed is largely purchased similar decision problems exist. A farmer must be constantly assessing feed sources and their costs and varying purchases accordingly. Costs per unit of energy and protein should also influence optimal growth rates through the amount it pays to feed. The marginal cost relative to the return is paramount in feeding quantity decisions. The cost of any housing also enters the calculations relative to the growth rates. To increase the throughput in fattening exercises may mean increasing the growth rate is important relative to situations where space is not limiting. High growth rates allow more cycles through the facilities. Similar cost/return comments apply to milk production, but where feeding is lowered for any length of time due to high prices the potential milk yield may be permanently reduced for the rest of the season. This relationship must enter the calculations.

Cropping farms

Where irrigation is used on a cash cropping farm a similar situation to the feeding decisions exists. There should be constant attention to the application of water regarding timing and quantities. The water is like feed: there is a cost in applying it, a limit to how much can be applied in a given time, and possibly the total available is limited. Furthermore, the response in yield varies according to the stage in the growth season, and to add to the complexity of the decision problem, the weather impacts on requirements. Each crop type, and possibly field, needs a different treatment, both due to their response patterns and the value of the crop. The golden rule of matching the marginal cost to the marginal return is paramount. To solve these decision problems requires a knowledge of response patterns, costs of application and the returns. Depending on the relative crop values, it probably pays to irrigate at different levels and application times for each crop.

In the same way as in feeding decisions, the parameters of the soils impact on the decisions. Clearly animal maintenance-feed requirements, and the amounts needed for growth and milk production are critical parameters in the feed decisions. In irrigation the important parameters include the water holding capacity of the soil, the water infiltration rates and, therefore, runoff. Soil depth also influences water loss beyond the root depth. A farmer needs to understand all these influences and intuitively take them into account. In some situations computer simulation packages are available to help in this quite complex and ever-changing decision problem.

Overall, success in both observation and anticipation are critical. The farmer must know the current state of both the soil water and the stage of growth of the crop. Decisions about water application must then use projections of likely growth and yields from different treatments, given the current soil water conditions. Thus, successful anticipation is crucial for comparing the alternative treatments over the whole farm.

CHAPTER 2.6 EXERCISES IN ANTICIPATION

Listed below are two additional exercises on anticipation. The first is on prices (it is crucial to forecast prices correctly for they should influence what you produce, and how much), the second is on time management – something that you are faced with every day.

Exercise One: Beef Prices

Fig. 2.8. Ready for market?

Whether to keep or to sell? – the answer depends in part on price expectations.

Anticipating the price of bull beef

Introduction
The price paid locally for bull beef depends on many factors, most of which are beyond your control. As it is not possible to turn bull beef production off and on at the drop of a hat, it is very important for bull beef producers to be constantly monitoring the price expected and subsequently making plans to increase, or decrease, production within the bounds of what is possible. In unison, the alternatives that might similarly be decreased/increased need considering.

Determining factors

One of the factors impinging on the price is the *exchange rate* between the producing and purchasing countries. In New Zealand, The MW Economic Service believes a US$0.01 increase in the New Zealand dollar reduces the price by $0.073/kg. A US$0.01/lb increase in US imported prices should lift prices $0.027/kg.

Other factors are the *supply of beef in North America*, and the world in general, particularly in countries that can export to the USA (some countries can not, due, for example, to their disease status). Supply depends on many factors including the type of season experienced in the producing areas in the USA and other countries. Similar comments apply to grain and bean prices, which impact on the cost of feed for the feedlots, and fuel too.

Also relevant is the change in the *disposable cash* consumers have to spend on food, especially for certain sections of the community. For high quality beef cuts, increases in spending power increase demand.

On top of these factors comes *import quota restrictions* and the world trade negotiations. For many years there have been discussions on freeing up trade, and slowly, but ever so slowly, the restrictions are being lifted. It is believed that the liberalization will improve meat prices.

The current scenario

If you were told the current bull beef price to the typical farmer was $2.50/kg, should a farmer plan on increasing production at the expense of lamb and wool? Given the lag in output, you would of course examine whether the bull beef outlook will give a rising, falling, or 'just sitting' price.

Consider the following fictitious scenario in the case of New Zealand farmers:

Current exchange rate: NZ$1		= US$0.58
Exchange rate trend:		
	1 year ago	= US$0.51
	6 months ago	= US$0.55
	3 months ago	= US$0.58

One-year forward contracts for the US dollar currently sit at NZ$1.65. US gross domestic product has increased 2.3% over the last year. The Federal Reserve rate has been lifted 0.5% in the last year. There has been a run of bad seasons in North America for both grain and stock producers, and similarly in South America. Stocks of both live and dead resources are currently low. Recently, in a landmark decision, the US authorities have agreed to be party to the World Trade Agreement on free trade.

Having studied this scenario, what do you think will happen to the bull beef price in 2 years' time relative to the current price? Jot down your answer, then study the comments below.

Comments on the outlook for bull beef

It is not possible to be precise in a forecast, for the details provided are just trends, and between now and 2 years hence there are un-forecastable factors that might impinge (such as disease outbreaks and political decisions on the biofuel situation in the USA).

But looking at each of the factors there is likely to be a firming of the beef price. Thus, if you can make money with the currently assumed beef price, then it would pay to plan on at least holding production if not increasing it, *assuming* the profitability of alternatives is not changing.

The reasoning for the firming conclusion is that while the New Zealand dollar is likely to increase in value, especially as the New Zealand interest rates are likely to increase, and therefore decrease the beef price paid here, this must be offset against the low stocks and poor production conditions in other producing countries. Further, the demand is likely to firm, given the growth in US gross domestic product, and of course, slowly, the impact of freer trade will have an impact.

This is of course the kind of anticipation activity farmers must constantly take part in: get it right and they will be able to position their farm to make the most of the ever-changing situation.

Exercise Two: Time Management

The job allocation decision problem

The objective in this time management exercise is to provide practice at following the principles given in Chapter 2.5 on time management. A list of jobs to be completed for an example farm is provided. You must choose which ones to attempt in the first week, and so on for subsequent weeks. In choosing the jobs for a week, you must decide the priority order.

Each job is given an expected dollar value, which accrues on its completion. If you choose wisely the total value achieved will be greater and the total job list finished earlier. As in real life, if you leave a job its value tends to decline due to untimeliness (e.g. perhaps the clover does not strike as well, the rams do not arrive on the farm in good time etc). In some cases the value increases (e.g. weed spraying). Also, as in real life: (i) the time taken, and the value, is not certain due to the impacts of weather, price, cost, job difficulty, etc.; and (ii) unexpected jobs pop up from time to time and must be attended to. This means the existing jobs must be put aside. Thus, some jobs will hang over to the next week and may be partly finished.

The procedure is to select the jobs you wish to attempt in the first week, and so on, i.e. create a priority list.

Job list	Estimated days to complete	Estimated value ($) of finished job
Subdivision fence	8	3000
Vaccinate ewes	2	2800
Trim roadside	0.5	500
Create lambing date mobs	1.5	900
Broadcast pelleted clover	3	1500
Clean out sheds	2	500
Cash flow and OD forecast	1	1200
Get timber and fix yards	3	900
Investigate ram sources	3	5000
Upgrade kitchen	14	600

You might well argue that it is very difficult to make estimates of the dollar value of each job. However, the sequence in which a farmer does a list of jobs does in itself imply a farmer has made intuitive assessments. Such estimates must take cognizance of the current state of a farm: clearly, for example, the value of vaccinating the ewes must depend on past history and the current time relative to lambing.

Given this list, what would your priority order list be? A sensible list would be:

- Investigate ram sources.
- Vaccinate ewes.
- Cash flow and overdraft estimate.
- Trim roadside.
- Create lambing date mobs (but depends on the current date relative to lambing time).
- Broadcast pelleted clover.
- Subdivision fence.
- Get timber and fix yards.
- Clean out sheds (rainy day).
- Upgrade kitchen (rainy days).

This list is based on the dollar return per day of time and maximizes the total return.

Clearly, as the days pass this list needs to be updated according to the uncertain outcomes, and the passing of time. Thus, for example, the lambing mob creation might have to be put forward.

The critical factor is in constantly updating the value of each job as the situation changes, and then updating the $ value/day estimate. The priority list above is based on the $ value/day estimates.

APPENDIX A2: REINFORCEMENT EXERCISES

General Review of Imagination and Creativity

Consider the truth of each of the following statements. A discussion on possible answers follows.

1. John reckons it is crucial to be thinking ahead about the actions of the national road maintenance committees. What they might do will impact on future wool prices, not to mention meat prices.

2. Felicity has been involved in a correspondence course on financial management for small businesses as she thought that one day she might set up business in the local town. Felicity did not believe what she had learned would be much use in planning for longer term farm financing as, after all, shares, equities, ratios, derivatives, exchange hedging were all things that were the stock and trade of the urban businessman.

3. John spent some time explaining to Kendall the importance of studying the ‘drivers of change’. He emphasized that the drivers were under the control of the local government as it was important to give them your views if they were to stop making ineffectual decisions.

4. Jill always reckoned emotional blocks were important and should be developed by anyone interested in becoming a good manager. Armed with EBs, you could stop being influenced by irrelevant trivia.
5. Tom was great at his creative pauses. When talking to others he made a special effort to leave silent moments so the others would have a chance to speak.
6. The local farm consultant made special efforts to encourage his clients to be creative in coming up with ideas to solve problems and 'grow their businesses', to use one of the modern phrases. For people who were somewhat tardy in coming up with ideas he used the random input idea to stimulate discussion. He always explained that this involved getting an 'idea seed' from an agricultural magazine.
7. It is often said you should 'never set a decision in concrete' until it is finally necessary to act (put the decision 'into effect'). This acknowledges that farmers operate in a dynamic environment so that, while it is important to think well ahead, situations might change, so wait until the last moment before acting in case you have to change the decision to suit the current situation and conditions… but do not be too late!
8. Environmental Scanning from the Futures Approach is a requirement now that so much emphasis is on the environment, particularly with respect to the Resource Management Act (RMA – which controls changes that can be made to the natural environment).
9. My neighbours have recently spent some time getting their affairs in order. They believe the flexibility and control issues are much more important than taxation matters when it comes to succession and retirement planning.

Explanations

1. It is doubtful if the roads will have much impact on prices except for the farms that currently have very poor access so their transport costs might decline. Thus, the actions of the roading committees are probably not an area that requires much forward-looking consideration or thought. Concentrate on the matters listed in the chapter.
2. Felicity was wrong. Now that farms are becoming quite major businesses with a need to show a reasonable return on capital, all the tools of the financial people have become important resources and options for the progressive farm manager interested in getting the cost of the capital down to a minimum, and ensuring money is available at 'least cost' for efficient operation. Thus, the world of financing is one area where forward thinking must be concentrated.
3. While some 'drivers' (the root causes of any changes that might in any way impact on a farm's outcomes) are determined by local body politicians, most of the crucial factors will be determined by other bodies and will relate to issues such as overseas markets and the broader rules under which a farmer operates, such as the tax rates and rules. Thus, a farmer needs to think widely when thinking about the factors ('drivers') that determine the environment impacting on his prosperity.
4. Emotional blocks refer to a manager's feelings and biases that prevent a rational view of the future and, therefore, get in the way of making sensible common-sense predictions of what the future will hold. They also impact on whether the manager takes a forward-looking approach at all.

5. Creative pauses are, of course, for Tom himself, and not for anyone he might be talking to. A 'creative pause' is where you take a moment to divest your mind of the 'here and now', and think of something new that might help you in the future. Not that talking to others about new ideas is not a very good idea.
6. That is exactly what the idea is, and it can indeed help people who are not that good at using their imagination. You should stick to 'noun' words that refer to a physical object (e.g. post, fertilizer, vaccine, track, water, etc.).
7. Could not agree more. The explanation is given in the statement – why decide what to do and stick to this decision in advance of the action time? Thinking well ahead is critical, but you do not want to do something immediately that might turn out to be wrong, in the sense that if you had waited you would have got it right without incurring any downsides. But, of course, if there are other things that hinge round your decision you may need to make it 'early' – but this is not really early, as the action time is still as late as possible without being too late for effect.
8. 'Environmental Scanning' might well involve the Resource Management Act, but in this case it refers to a much wider concept: that of searching out information on all the trends and factors that might impinge on the general environment (markets, rules, regulations, knowledge of biology, electronic developments, etc.) under which a farmer will operate over the 'middle' future.
9. Many people would agree with your neighbours. Taxation rules can so easily be changed by successive governments, and that indeed is one reason why some flexibility is important. It would be unusual for any one ownership setup to have significant tax advantages without a government changing this to a more even playing field.

Exercises in Anticipating Change Impacts

This exercise provides practice at ensuring you think of all the outcomes following some sort of change.

For each situation described, write down the answer to the question and compare your answer with that listed below.

Exercise
Imagine that due to the massive new gas field, urea prices have fallen to the point where it pays for you to apply both spring and autumn nitrogen to pasture on a stock farm. List the impacts this will have on all the components of the farming system, including cash flow changes.

Answer
Your comments will depend on current practice. Clearly if a farmer is already using nitrogen to the limit of what is acceptable, there will be little change other than the saving in urea costs. But in other situations, assuming the marginal returns cover the cost of the urea with the drop in price, then an increase in application in both autumn and spring should occur. Thus, if spring and autumn growth were limiting in the total feed system, stock numbers and productivity should increase. This assumes water, and other nutrients, were similarly not limiting in these periods. The cash flow will change in

that the increased urea expense in spring and autumn will increase the deficit in these periods, or reduce the surplus (provided the price drop on the existing urea use does not more than compensate for the increase in use). Once the increased product is marketed, however, the months in which the sales take place will see an increase in cash supply. The total year's balance will, of course, be improved. These conclusions assume labour was similarly not limiting to the increase in stock numbers. If the labour was limiting, then the cash flow and end of year surplus will be changed with either the decrease in stock productivity due to less attention, or the labour bill will increase, but presumably not to the point of decreased profit. With an increase in stock numbers, the capital investment will grow, and probably the interest bill to cover the increased investment.

Exercise

With the decline in the world supply of rock phosphate and sulphur, and the increasing cost of energy, the price of phosphate/sulphate (superphosphate) fertilizers will probably increase. Consider the impact this would have on a farm by considering the degree of truth for each of the following scenarios:

(a) Initially there would be little effect on pasture production, and meat and wool production, and/or crop yields as past fertilizer levels have built up soil supplies of phosphorus and sulphur, which will gradually release for the plants.
(b) Superphosphate will be replaced by rock phosphate and production levels will continue as before.
(c) The decline in pasture levels will lead to more stringent feed planning to enable maintaining lamb and wool output, which will largely be achieved.
(d) It will no longer be economical to apply so much superphosphate, so clover production will decline, which in turn means grass production will decrease, leading to a lower lambing percentage.
(e) With less superphosphate the organic matter content of the soil will decline, leading to an increased water holding capacity of the soil and this will partly compensate for the lower nutrient availability.
(f) It could pay to turn part of the farm over to organic production to receive higher product prices, and continue to use normal levels of superphosphate on the remainder so that production levels are maintained overall.
(g) With all the banks having lent on mortgages to many farmers, they have a vested interest in land prices and will not stand by and see them fall as a result of the declining profitability of sheep farming resulting from increased fertilizer costs.

Answers

(a) Mainly true. If the price of superphosphate increases it would pay to decrease the quantity used unless the price of meat and wool increases to compensate. Assuming the amount of superphosphate applied declines it is, however, true that pasture production will continue for a while at the old levels, as the organic matter and soil clays bind phosphorus, and sulphur to a certain extent, and only release it slowly. This assumes past applications have built up the soil store.
(b) Partly true. Rock phosphate is clearly not the same as superphosphate. What will happen to production levels will depend on the soil and the amount

of rock phosphate applied. Rock phosphate is not as active as superphosphate, so there may be impacts over several years until the levels build up again. But the supply of sulphur may be a factor depending on the soils, as the sulphur in superphosphate can be the most important ingredient.

(c) Sometimes true, depending on the case. In some situations this will be the case, but it depends on how well stocked the farm was. If it was not heavily stocked it could be that production can be maintained, particularly if feed supplies are indeed managed more effectively through careful feed planning.

(d) Partly true. With an increase in the cost of superphosphate it certainly will not pay to use so much, assuming the farmer was applying the correct amount at the old price. This assumes the product prices stay much the same. In this situation the farmer should have been applying an amount such that the increase in pasture that resulted from the last few kilograms applied on a per hectare basis gave just enough meat and wool to cover the cost of the last few kilograms applied. Thus, if the price goes up, the cost would not be covered. Therefore the quantity should be decreased so that the balance would be restored. With diminishing returns, cutting back superphosphate means the grass from the last few kilograms applied will now cover the cost. The lower clover and grass from less superphosphate will impact on the body weight of the ewes, and on tupping (mating), so lambing will decrease (unless if the ewe numbers are reduced, the percentage could stay the same).

(e) Not true. The organic matter in the soil is a very important part of the water holding capacity of the soil; the more there is the better the water-holding capacity. So, a decline in superphosphate will eventually lead to less organic matter and thus reduce the water holding capacity. Eventually a new soil equilibrium will be reached, at a lower plane.

(f) Slightly true. It might pay to change to organic production, but that will depend on the price of the organic product relative to the stable production levels under organics. If it pays, maybe the whole farm should be converted, but this will depend on the market situation and whether the farmer could get contracts for all the production at a good price. Whatever happens with respect to the organic question, there is no reason to keep up the superphosphate on the rest of the farm. You should always apply as much superphosphate that will ensure the return from the last few kilograms applied is covered by the increased produce that results.

(g) Not true. Maybe the banks would like to keep the prices up, as would the farmers about to sell, but they have little means at their disposal to ensure the prices will stay up other than through subsidizing interest rates to, consequently, keep up demand. It is very doubtful whether they would consider that a good investment.

Exercise

List all the impacts you can think of given the availability of an inexpensive biological control agent (a naturally found virus that can now be easily multiplied and distributed), which is highly successful in destroying both grass-root-eating grub and leaf-eating caterpillar populations on a farm without any detrimental side effects.

The virus, once established, remains in the soil, and has no detrimental effects on other soil organisms, though once the pest populations decline it may have to be reintroduced if the insects build up again.

List of impacts

Did you include these comments in your answer?

Increased grass production over winter and spring. Cost of any control measures currently used removed, though this is replaced with the cost of applying the virus initially, and subsequently when, and if, the insects build up again. Increased stock numbers, increased wool production, increased lamb meat – but increased shearing costs maybe, higher wintering costs where stock numbers are increased (maybe greater overdraft as a consequence, but reduced later with the increased sales). Net cash income higher eventually. Possibly need to employ more labour and/or contractors. More hay/silage, maybe more winter feed cultivation, and increased animal health costs with greater numbers. Eventually an impact on tax payments with the greater profit.

Exercise

A local flood irrigation water scheme has become available and it is clearly profitable to make use of as much water as you can get for that proportion of a farm that is irrigable. Remember that it takes a long time for a new scheme to work through its benefits, not least of which is the impact on soil fertility levels. For the first 5 years of your development plan, describe the major impacts and their progression.

List of impacts

Did you include the following impacts?

Considerable disruption to fences and contours when construction occurs. Consequent loss of production until the new pastures start producing. Eventual pasture production increases, and change in the seasonal distribution of the production. The increases would continue for some time until the soil fertility reaches a new, but higher, level. The mortgage no doubt increases with consequent increased payments. Stock numbers increase slowly in line with the pasture production, and possibly other changes (e.g. the lambing date) with the new seasonal pattern. Maybe the ram type should change, given the summer production now possible so the lambs can be taken to a heavier weight. Or maybe the summer surplus is made into hay/silage/winter feed crop thus impacting on wintering. Perhaps ewe live weights are increased, and flushing is better leading to increased lambing percentage. The labour input might need increasing (cost of accommodation?), or you need to work harder, especially at lambing time. Wool weights and meat production are up, as are many costs such as animal health.

So, how does the budget look for each of the 5 years or so that it takes for the system to settle down?

Part 3 Risk Management

CHAPTER 3.1 INTRODUCTION TO MANAGING RISK AND UNCERTAINTY

Primary production is risky and uncertain. Yields, outputs, prices, costs, disease incidences and the like can seldom be predicted with certainty. Profit is ruled by prices and output, which, in turn, is ruled by many variable factors including the weather. In total, farm outcomes are variable. A farmer can, however, do much to alleviate the effects of this risk and uncertainty. His decisions will impact on the day to day, week to week and longer term variability in input requirements and output and, thus, profit. For example, the decision on how many sheep to carry has a major impact on the variability of wool production from year to year. It also impacts on the total longer run average production. But notice the emphasis on *variability*.

Variability is a difficult concept to grasp as in any one year only one value occurs for the factors that affect outcomes. For example, there is only one heifer price for any one lot sold at auction, only one lamb price for any one draft, only one wheat price for a full silo sold. Yet, before the event there are many prices that might be possible, each with a different chance of occurring. When planning, the possibilities and chances for each value need to be taken into account: for example, if there is a high chance of a very good lamb price for an early draft, then this will encourage a farmer to take as big a draft as possible at an early stage relative to selling more later. Yet, when the cheque is sent, only one price features. Hopefully the price was high on the day, but it just might have been less than hoped due to a sudden change in the exchange rate.

The terms *risk* and *uncertainty* refer to the *variability* of outcomes that a farmer faces in response to all the decisions taken. Sometimes good outcomes occur, sometimes bad, all because of the chance events. You cannot predict most of this variability – a farmer has to accept it and make the most of every situation.

However, the two words 'risk' and 'uncertainty' have different meanings. Risk is where the average (or expected) outcome is reasonably predictable (e.g. average lambing percentage) over a period of time. Uncertainty is where the average is not known (e.g. hay yield in a new irrigation area).

Outcomes and control

In some situations risk and uncertainty are partly controllable (e.g. by using techniques such as insurance, forward contracts, etc.) and in others risk can be compensated for. Some people, for example, are in the happy position of being able to hold assets, such as stocks and shares, that can be sold when conditions are bad to compensate for the low income – holding these readily convertible assets could be a deliberate policy in contrast to using the money to buy, for example, a new tractor. Instead of cash reserves, others might use a lower stocking rate than the average so that they have sufficient feed in most seasons – their average income will probably be lower, but at least the year to year variation is low so that in a bad year their income will be higher than their heavily stocked neighbours. Thus, farmers' decisions impact on the degree of outcome and profit variability. However, options that reduce variability also usually reduce the average profit.

To summarize, risk and uncertainty are about:

- Output being variable.
- The particular outcome in any one season, year, week, etc. cannot be predicted, though you might make a reasonable guess at the possibilities.
- Management decisions impact on the degree of variability over the years.
- Usually, management systems and procedures that reduce variability decrease the average outcome, e.g. average wool production is decreased with lower sheep numbers, but is less variable over the years.

Why reduce variability?

There are two basic reasons for decreasing variability: (i) where debt is particularly high and so, if variability is not protected against, a run of bad seasons (prices and production) might mean the farmer cannot pay debts and afford a basic living; and (ii) most people *prefer* a relatively stable income as it makes life easier and more enjoyable. No one likes to have uncertainty about whether they can, for example, adequately feed their sheep in a month's time, whether this year's holiday will be possible, and so on.

However, a small number of people are the opposite – they are prepared to take greater risks for the chance of a good gain – they prefer a riskier environment. Usually their average income will be higher than people who protect against risk but the road along the way can be very bumpy.

Mistakes

Hindsight shows a farmer what he should have done for the conditions that eventuate. However, mistakes do not mean that the farmer did the wrong thing before the event. Chance is not always kind. Clearly, once you know what the season was like, and what the market was like, it is easy to see what you *should* have done – perhaps have run less ewes/cows, sold off earlier, bought hay when the price was low, contracted the crops, and so on. However, a farmer makes his decisions at the beginning of the season, based on current knowledge. On average, if the decision making is good and efficient, the farmer will get good outcomes, but you cannot guarantee this in any one individual season. Thus, it should be noted that the *correct* 'before the event' decision does not always turn out to be correct.

Dealing with risk and uncertainty

To appropriately deal with risk and uncertainty requires:

- Ways of measuring risk and uncertainty.
- Knowing and understanding the sources or origins of risk and uncertainty.
- Knowing and understanding the management options available to reduce risk and uncertainty.
- Knowing how to analyse the alternative management options and therefore being able to choose between them, and to choose the quantity of each option (e.g. diversification).

The chapters and sub-sections that follow cover each of these aspects.

Before moving on to the next chapters it will be helpful to assess a farm's risk and uncertainty situation. It is very important that farmers have a good knowledge of all the risk factors affecting their farm, and also be able to assess the degree of risk each factor creates for the outcomes. To help focus attention on these risk factors, the series of questions in Appendix A3 (A Farm's Risk Situation and Management) should be answered, or at least thought about.

CHAPTER 3.2 MEASURING AND DESCRIBING RISK AND UNCERTAINTY

Many events a farmer deals with (rain, wool price, lambing percentage, crop yield, etc.) cannot be predicted with certainty. In these cases a farmer can plan using very conservative yield/price estimates knowing that it can be no worse, or simply use averages; but, unfortunately, these approaches can lead to bad decisions. On the other hand, a farmer can be more realistic and plan using a range of estimates, not forgetting, though, that a few variables are in fact known with *certainty*. For example, the council taxes (rates) and insurance will be known with relative certainty.

As noted, some people simply use *very conservative yields and prices* when planning and then proceed to follow through with their plans knowing it is most unlikely that outcomes will be worse. From an efficiency point of view this approach may mean many lost opportunities, though if the debt levels are low and the farm big enough, profit will be sufficient to provide a reasonable living even in the worst years.

In contrast, to plan with the knowledge that variability is the reality, it is important to have a means of describing risk and uncertainty. Some people allow for it *using word descriptions*. For example, they might comment that, given the good autumn, their expected lambing percentage will be 115%, with a *slight chance* of getting as high as 118%, but equally a *slight chance* of 110%. Of course, it might turn out to be anywhere round about these figures depending on the winter, spring and just how well the ewes fared in the autumn. However, it is common to think of *three or four possible outcomes* to summarize the full range that we all know is possible. Three, in this case, summary outcomes might be used to give a good idea of the range of lamb gross income that could occur. These estimates then might be used to make plans, for example, to put in extra fencing if a good year does in fact eventuate.

Describing Risk and Uncertainty

While word descriptions can be used, when it comes to calculating the sums it is not possible to work with them, except in a subjective way. Descriptions such as '*most likely*' might only be understood by the individual, but by no one else. Thus, putting numbers on chances is important.

The numbers can be used to calculate the likely, or *expected*, profit. The word 'expected' is used to describe the average. If you took many years of profit records you could calculate the *average* profit, but next year only *one* profit outcome will occur, so rather than talk about the average, we talk about the expected profit.

One number system to use is percentage chance. Thus, for example, to you, 'most likely' might mean there is a 50% chance that the lambing percentage will be 113%. A 'slight chance' might mean that there is a 25% chance of 118%, and similarly for 110%. Note that the *sum* of the chance percentages is 100%. That is, it is *certain* that there will be some kind of lambing percentage outcome. These three figures are being used to summarize reality: any figure between 105% and 120% might occur given extremes, but giving each a percentage chance is worthless and will not change any conclusions.

Another way of describing chances is to use fractions, normally in decimals. Thus, 50% becomes a 0.5 chance, and 25% becomes 0.25 and so on. The two approaches are identical provided you do not mix and match them. If using percentage chances, the total of all outcomes must add to 100%; if using decimals, the total must add to 1.0. When decimals are used then these numbers are called *probabilities*.

The expected outcome

We can work out, for example, the *average* rainfall, because we already have the figures. As noted, for the future we use the word 'expected' instead of 'average'. It is calculated by thinking of possible outcomes (e.g. for January rainfall), and multiplying each possible outcome (mm rain) by the chance (probability) of it occurring, and adding up the results (e.g. 40 mm × 0.3 plus 50 × 0.5 plus 60 × 0.2 to give expected January rain = 49 mm).

Calculating the Expected Value of an Outcome

Often what we expect in the future is virtually the same as the average obtained from past records, for example, the rainfall expected next January. However, there are not many factors that are not changing due to the changing world and its economic and other systems, and often we do not have many records. Thus, it is better to think of what is expected.

For example, to calculate the expected lambing percentage you weight each value by the chance of it occurring. Thus, for one farm the situation might be:

Expected lambing percentage	= 118 × 0.25
plus	115 × 0.50

plus 110×0.25

$= 29.5 + 57.5 + 27.5$

$= 114.5\%$

Note that each possible lambing percentage is weighted (multiplied) by its percentage chance where the percentage chance is expressed as a decimal. Thus, rather than all chance figures adding to a 100% total, the total is now 1.0, i.e. (0.25 + 0.50 + 0.25).

If all possible outcomes are covered, then the sum of all probabilities is 1.0. For example, think of tossing a die which has six sides numbered 1 to 6. Assuming a non-biased die, each side (number) has a 1/6 chance of occurring (16.7% chance), or, in decimal notation, 0.167. As any one of six events can occur in one toss, the sum of each must equal 1.0 if all events are accounted for. This is true in this case: $6 \times 0.167 = 1.0$.

Think about three of the more important uncertain events that impact on farming success. For a sheep farmer they will certainly include rainfall, wool yield and wool price. What possible outcome figures are relevant for a case farm with which you are familiar?

Exercise

Consider this case study farm. What five values and associated probabilities might represent the annual rainfall on the property?

	Value (mm)	Probability
Lowest		
Lowish		
Middle		
Highish		
Highest		

Now check that the total of *all* the probabilities is *1.0*.

What is the *expected* annual rainfall (mm)? Calculate this by multiplying the respective rainfall figures by each one's probability and adding up the total. Does this figure match the average annual rainfall from available statistics?

What three values represent the wool weight expectations in the coming season (if wool is not produced, replace wool below with cattle (meat per hectare), or a cash crop (yield per hectare))?

	Weight	Probability
Lowest		
Middle		
Highest		

Do not forget to check the total of the probabilities equals 1.0.

Calculate the *average* over the last few years (kg/head) and the expected value (value × probability all added up for each possible weight).

The difference between expected wool weight and averages should be minimal.

What prices represent the kinds of prices you think could well eventuate for wool (or beef, or a crop whichever is relevant) this coming season?

	Wool $/kg greasy	Probability
Highest		
Likely		
Lowest		

Again calculate the total probability and the expected value.

The Past as a Basis for Future Probabilities

For some events past records can guide the probability estimates. Rainfall is a good example, as might be wool yields. However, as conditions are constantly changing (e.g. pasture yields improving with new cultivars, genetic makeup of sheep constantly improving), past records are often only a guide as you need to take into account the changing situation. Perhaps past records provide a base, which is then adjusted to allow for the change – this is where skill at assessing the impact of the change comes in. There is probably no perfectly correct answer.

Consider the historical wool (beef, crop) prices on a case farm. Can they be taken into account in estimating possible prices for next year?

Exercise

Write down the price received for the main lot of fleece wool for as many years as can be remembered, or for which there are records.

	$/kg
Most recent price?	
Previous year?	
Year before that?	
4 years back?	
5 years back?	
6 years back?	
7 years back?	
8 years back?	
9 years back?	
10 years back?	
11 years back?	
12 years back?	
13 years back?	
14 years back?	
15 years back?	

What was the *average* for all these years (\$/kg)? What was the range (\$/kg)? How would you summarize these historical prices, and their probabilities?

	\$/kg	Probability
Lowest likely?		
Most likely?		
High value?		

Then calculate the *expected* value for this price set (\$/kg).

In considering the wool prices from the past as a basis for the future, you have to make some adjustments to allow for the condition changes over the years. For example:

- Does this expected price allow for inflationary effects? Prices 5, 10, etc. years ago have greater value than the same figure today. Thus, in using past records you need to adjust for inflation.
- Does the expected price allow for the changing market conditions? The market situation 10 years ago is probably very different from today. Thus, the expectation for next year must account for this.

Comparable Records

What is important is the reading of the signs to end up with the best estimate of the possible prices for this coming season and their probabilities. About the only risky event for which past records can be assumed to be a good guide for the future is the weather.

Graphs

Sometimes it is easier to use a graph to represent possible outcomes for an event (e.g. fleece weight). Such a graph has on the horizontal axis (x axis) the possible values for the event (e.g. the different fleece weights that *might* occur), and on the vertical axis (y axis) the chance (probability) of each one occurring. The very many possibilities can be summarized using representative outcomes and their associated probability.

It was noted before that outcomes can be any one of thousands of possibilities. The actual fleece weight can be anywhere between, for example, 3 and 6 kg (i.e. 3.00 kg/head, 3.01 kg/head, 3.02, 3.03, . . . 5.99, 6.00). It is impossible to do the sums for all these figures and certainly this is not necessary when working out the likely variations and associated consequences. *Using three to five values is usually sufficient*. These values should reflect the likely range and midpoints. In theory, the true situation for risky events can be graphed in the following form (Fig. 3.1):

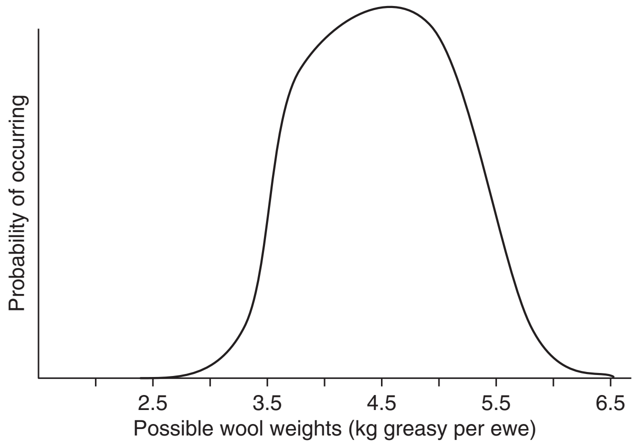


Fig. 3.1. Continuous probability distribution.

To summarize this *continuous* graph you might split the graph into three segments (five could also be used), as in Fig. 3.2:

Here the summary is:

Wool weight (kg greasy per ewe)	Probability			
3.5	0.25	(¼)	or	25%
4.5	0.50	(½)	or	50%
5.5	0.25	(¼)	or	25%
	1.00			

Fig. 3.2. Discrete probability distribution.

The selected midpoints are somewhat arbitrary in that there is no right or wrong values to select, though they should *reflect the most likely value*, and *represent the possible range without being at the extremes* that could conceivably occur. The *probabilities* should reflect the *area of the graph that surrounds each midpoint value*. If the graph is symmetric the outer values will have a similar probability. The probability put on the most likely value should reflect how 'peaked' the graph is – if this value tends to dominate other possibilities the probability will be relatively higher. In contrast, where possible values are more or less equally likely, they should have similar probabilities.

Such a graph would look something like Fig. 3.3.

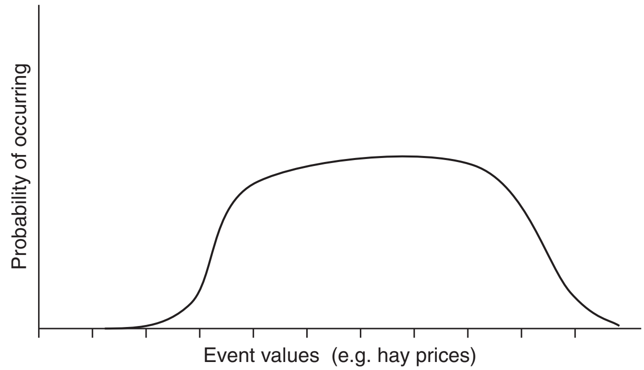


Fig. 3.3. Near equal probability distribution.

The shape of event outcome graphs tell a story. Where there is little uncertainty/risk and a small range of possible outcomes, the probability graph will be peaked, and vice versa.

Looking to the Future

Exercise on probability

For next year's prices/costs, indicate whether you believe the probability graph would be quite peaked (a very high likelihood of getting the midpoint value) or relatively flat (possible representative values have similar probabilities).

Main fleece wool	Flat/Peaked
Early lambs	Flat/Peaked
Main season lambs	Flat/Peaked
Lucerne hay	Flat/Peaked
Replacement 2-tooths	Flat/Peaked
Cull ewes	Flat/Peaked

The combination of all the important event graphs (e.g. wool weight and price, lamb weight and price, crop yield and price) gives the cash surplus graph. Thus, intuitively put all the prices and yields together to estimate what next year's cash surplus graph might look like for a case farm. Is your expectation that there is a main value (e.g. within $2000–3000) that is much more likely than others, or is there a wide range of possibilities with similar probabilities (or chances)? If the top of the range occurs, what will the farmer do with the extra cash, and how will he cope if one of the lower values occurs? What is the chance of either of those and therefore how much time should the farmer put into thinking about contingency plans?

There are no right or wrong answers to these questions (except in hindsight) as the correct action will vary with each individual situation. And, of course, some farmers do not think about risk and uncertainty in any detail. They somehow do what is right. Perhaps you know a farmer like Tom?

Tom's story

Tom was not the most precise of managers. He tended to operate on an intuitive basis. He just got up in the morning and had intuitive insights into what should be done that day. On some days he cranked up the irrigation plant, on others he ordered some nitrogenous fertilizer for immediate spreading, and so on. His records were minimal. Yet, Tom produced good results relative to his more formally organized neighbours. If pushed he could give you his feelings on the chances of the wool price increasing, of the exchange rate changing for the better and so on. He just had a knack of picking up information and letting his intuition go to work on it to produce sound decisions. The real question is: 'how does he do it so successfully?' We will probably never know.

Summary

The important variables and factors in farming outcomes are mainly risky and uncertain. However, it is possible to estimate the outcomes that might occur, and the chance of each possibility occurring (probabilities). The chance of an outcome can be measured using a percentage figure, or on a scale of 1 (totally certain) to 0 (impossible), which is called the probability of an outcome. Multiplying possible outcomes with their associated probability and then adding the results gives what is called the *expected* outcome (the equivalent to the historical *average*). What in fact occurs could turn out to be different to the expected value.

- A large number of the outcomes in primary production cannot be predicted with certainty before the event.
- Past experience, records and observation of what is happening both locally and around the world suggest to each individual likely outcomes and ranges for the next season.
- To express a belief in a particular output occurring in the future, it is convenient to give it a number between 0 and 1 where 0 refers to impossibility, and 1 to certainty. This number (or chance of occurrence) is called a *probability*. The sum of the probabilities of all possible outcomes must be 1.0.
- While a very large number of outcomes are possible in any one 'trial' (year?), it is practical to work on, for example, three to five summary outcomes.
- One outcome is usually the most likely, and this can be called the *expected outcome*. Given many years' records, this expected outcome will tend towards the average outcome.
- While you can predict that the expected outcome will be the most likely outcome to occur, many other outcomes are also possible.
- Having made a decision, given an assessment of the probabilities, it could be that the decision maker should have made a different decision, in hindsight. However, there is no way of predicting this; the decision was the one most likely to succeed and was, therefore, the best option prior to knowing the outcomes. That is the nature of primary production.

Estimating the range of possible outcomes and their chances complicates matters. So, why not just stick to averages? The simple answer is that using just averages can lead to bad decisions. If you consider the ranges possible you prevent possible disasters, or at least consider how to handle them, and you have a plan for most eventualities – *using probabilities (chances) in your sums means that, on average, profit will be greater, and worry less*.

Reasons for allowing for risk and uncertainty in decision making

- To find out the possible range of cash outcomes for alternatives, and their chance of occurring. This enables planning for difficult situations.
- As everyone has a different attitude to risk (some people are happier with safer systems), calculating the risk attached to alternatives enables choosing the most preferred options risk-wise.
- For people with high debt loads, survival dictates allowing for risk, and ameliorating it, as part of planning.
- When everything turns out to be 'average' a farming system will no doubt work (do not run out of feed, do not exceed the overdraft limit, etc.), but in bad years an embarrassing situation could develop. To prevent this requires looking at other than just average outcomes and, therefore, making appropriate contingency plans (e.g. having 18 months' hay on hand).

CHAPTER 3.3 SOURCES, OR ANATOMY, OF RISK AND UNCERTAINTY

Many producers want to reduce the production and income variability they experience. A number of management options are available to do this so that yields and income from year to year are more consistent. Usually reducing variability has a cost in that, on average, the profit tends to be a bit less over many years, though there is less worry, and survival under high debt is more likely. To consider what options are available you first need to determine the different sources, or causes, of risk and uncertainty on any farm. For example, a major cause of variability is, of course, the weather – it impacts on pasture and crop yields and subsequently animal output through feed levels. But, it also has a direct impact on animal productivity, particularly at lambing time, and it also affects disease.

In order to work out strategies and management systems to combat risk problems be clear about the sources/types of risk and uncertainty a farmer is likely to experience.

Write down the types/sources of risk and uncertainty that might be experienced on a case farm, then check below to see which ones, if any, were missed (note that while traditionally each type has been referred to as a source of *uncertainty*, in many cases a better term would be '*risk and uncertainty*').

- *Yield and technical uncertainty* refers to the risk and uncertainty associated with physical production: pasture yields, hay yields, hay quality, fodder and cash crop yields, wool yields, lambing percentage, disease occurrence, fertilizer leaching, irrigation impacts, supplementary feed requirements, etc.
- *Natural hazards* refers to fires, floods, hail and snowstorms, tornados and damaging winds, all of which can cause many problems to output and costs. Note that weather in itself (rainfall distribution and quantity, temperatures) is not specifically listed. Clearly weather is important, but other

than the direct effects of natural hazards, the impact of weather comes through the yield and technical risk and uncertainty.

- *Price uncertainty* is the uncertainty surrounding the prices received for products, and the prices paid for inputs. The latter are largely relatively certain, but prices for variable supply inputs, such as hay, are quite volatile. Another good example is the uncertainty over interest rates, both from a lending point of view and from a borrowing perspective (e.g. overdraft rates). Some people refer to interest rate volatility as *financial* uncertainty.
- *Human uncertainty* is the uncertainty associated with the supply and quality of human assistance – farm workers and contractors. Sickness and absence can cause difficulties, as can the quality of work achieved. Some of these impacts are unpredictable and are, consequently, uncertain.
- *Institutional uncertainty* is the uncertainty over all the rules and regulations that must be complied with, and with the response of institutions to your requests – for example, the success of a loan application, of a resource consent application, of not knowing whether a spraying regulation will change or not, of whether the government will change the tax rate, and so on.
- *Technological advance uncertainty* is the uncertainty associated with innovations. For any new method or product there is uncertainty about its impact on a farm. For example: new pasture cultivars always seem to be appearing but there is considerable uncertainty over whether they will suit a particular farm and provide greater output; new fertilizer mixes are often suggested but what impact will they have? What is the value of a new breed or cross of farm animal?

Exercises

Write down *two* examples of *each* type of risk and uncertainty that has affected a case farm over the last 2 or 3 years. To check your understanding of the different types of risk and uncertainty you might like to answer the questions below. Which category does each scenario fit into?

1. Jack reckoned all-grass wintering was suited to his situation after he attended a field day on a farm not that far away that had given up making, growing, or buying any supplementary feed. The trouble was, Jack mused, he was further up the valley and autumn and winter growth was quite a lot more variable.
2. Bob realized he needed to build a new woolshed. The shearers were putting pressure on him as they found the old shed difficult and slow, and with the disrepair the weather protection was basic. The quotations for the new building exceeded what he had hoped and an extra mortgage was necessary. Both fixed and floating interest rates had been offered – which should he choose?
3. There was talk that the new government would alter the rules on farming taxation. The two most likely changes involved live stock valuation and the ability to carry over book losses from one year to the next. The accountant indicated some decisions were necessary as the end of the accounting year was fast approaching.
4. The new levy on lamb sales, agreed to by a majority vote of all sheep farmers, was being used to fund research on genetic markers for foot rot susceptibility. A new blood test was coming on the market, which was reputed to indicate

whether each animal would pass on the resistance to its offspring and might well be used in selecting hoggets. Should you use the new test, and possibly try it on a portion of the hoggets despite the cost and the time involved? As it is a new test there is not a lot of experience around on its reliability.

5. Jack was contemplating buying an extra block of land, which would have high summer rainfall to complement the wintering capacity of his main farm. He reckoned the complementary nature of such an arrangement would enable both properties to produce more than if they operated as individual units. The trouble was that to get high summer rainfall on reasonable soil it was necessary to look for blocks in the mountain valleys with their large snow-fed rivers and occasional, but significant, snow events. Would the risks be too high?

6. With the marketing arrangements for his superfine wool, Bob found that he had to carefully plan to meet the delivery dates as the spinners he had contracted with in Japan were extremely quick to call in the penalty payments for late and irregular supply. While the shearers he used were very careful, he found they were somewhat unreliable in turning up. It was not uncommon to get a mob under cover the night before only to get a call early the next morning, saying that some of the shearers would not be arriving.

7. On John's farm there is always much discussion about rotating, and minimizing, the use of worm drenches. The trouble is the ewes really go downhill if they start scouring as with the back paddocks it is some time before the situation becomes clear. Thus, should a regular drench regime be continued or should an 'on-demand' system be instituted? The benefits and costs of getting it right are significant, but the situation is so variable from year to year.

8. The opossum (pest) situation is of real concern, not only from a forest preservation and erosion point of view, but from a disease and consequent market access view. While Jack is a long way from forest regions and the opossum population is very low, there is talk that the US government will impose restrictions on all beef exports due to the slim chance of TB contamination from opossums. Some commentators argue that the restrictions relate more to local politics than to reality, but nevertheless they are a serious threat to market access. It will be some months before the situation will be clear.

9. One of the difficulties in calculating detailed feeding plans is the lack of monthly pasture growth graphs for our local area, and for my farm in particular. I also know that pasture production varies quite markedly from year to year for each month. Detailed records are available from a research station, but that is 50 km away with a different rainfall pattern. The only solution is to start cutting metre square plots after putting cages over them in a range of paddocks – and then dry them in the oven. After a few years I'll have a much better idea of growth patterns. If I could get the neighbours doing the same we could pool the results.

10. Insurance is all about sharing the risk with the rest of the community. For large items it would be too much for an individual to cover an item on an individual basis in case of loss, though for small items accepting the risk yourself can be cheaper as the overheads that must be paid with formal insurance (the company's buildings, staff, running expenses, etc.) are not incurred by a farmer. The problem is, you know that from time to time the insurance company will

put up premiums, though they usually give you months, if not years, of warning. In the end, you do decide to stick with formal insurance.
11. You have read, and heard, a lot about the new sheep breed that has been developed. It is supposed to have a short tail, thus reducing the need for docking, little wool production in the crutch area and a clean face. You decide it is worth purchasing two flock rams as a trial. The problem is, you have little idea of what prices the ram auction will create, though clearly they won't be lower than the normal rams purchased in the past.

Answers
1. Yield/technical; **2.** Price/cost; **3.** Institutional; **4.** Technological advance; **5.** Natural hazard; **6.** Human; **7.** Yield/technical; **8.** Institutional; **9.** Yield/technical; **10.** Price/cost; **11.** Price/cost.

Finally, you might like to consider the types of risk that a group of dryland farmers believed they faced in order of importance.

Sample of Farmers' Views on Risks

A large group of (mainly) sheep farmers was asked to complete a questionnaire detailing their views about risk and uncertainty on their farms. Listed below are summaries of their views ranked in order of importance.

Table 3.1. Farmers' ranking of risk source importance. The ranking was on a scale of 1 (not important) to 5 (extremely important). (Source: Harris, S. *et al.* (1991) Farmer risk perceptions and management responses to risk in a NZ dryland farming system: an exploratory study. Paper to NZ branch of the AARES.)

Risk source	Average ranking
Rainfall	4.74
Prices	4.24
World economy and political scene	4.06
Wind	3.85
Disaster (fire, flood, earthquake, etc.)	3.78
Personal safety and health	3.74
Government direction variability	3.65
Diseases and pests	3.59
Interest rates	3.29
Inflation	3.26
Government regulations	3.06
Temperature	2.68
Input costs	2.50
Government agricultural policy change	2.38
Theft	2.24
Other weather factors (snow, hail, etc.)	2.00
Availability of loan funds	1.74
Changes in family plans	1.50
Hired labour	0.91

Management Responses to Risk: Ranking of Alternatives

The same group of farmers listed and ranked their methods of mitigating risk using a 1 (not important) to 5 (extremely important) scale.

Table 3.2. Farmers' ranking of risk-mitigating methods.

Management response	Average ranking	Percentage using
Maintaining feed reserves	4.82	100
Production flexibility	4.21	91
Market information	4.00	97
Plan to prevent overextending cash reserves	4.00	82
Insurance	3.79	100
Careful debt management	3.62	59
Enterprise diversification	3.56	62
Organization flexibility	3.44	65
Overdraft reserves	3.11	59
Under use of production capacity	3.24	62
Liquid cash reserves	3.11	50
Spreading sales	2.71	53
Balancing high/low risk options	2.39	61
Contracting produce	1.85	44
Off-farm investment	1.68	18
Contracting inputs	1.47	21
Occasional cash cropping	1.35	27
Work off farm	1.26	29

It is clear that maintaining feed reserves and understocking are important methods for these farmers, as is production flexibility (being able to change the product produced) and carefully watching the market. How does this compare with your case farm situation? Each case will be different depending on the farm location, opportunities, risk attitude, etc. Thus, each farmer has to make up his own mind to suit the situation.

CHAPTER 3.4 ATTITUDE TO RISK

Everyone is different in their attitude to risky situations – some are happy to take farming risks, others are not. A farmer's attitude can depend on his debt situation in that taking unnecessary risks can lead to disaster. There is nothing right or wrong about having a particular attitude, it is just that everyone is different and a farmer should recognize he will be happier following systems that fit his particular attitude, though sometimes it is necessary to take some abnormal risks in order to progress. A farmer's attitude is probably due to his personality and past experience. Assuming you are a farmer, to get an idea of your attitude to risk, write down the answers to the following situations. For each indicate which choice fits your feelings (this test also appears in Nuthall, P.L. (2009) *Farm Business Management: the Human Factor*. CAB International, Wallingford, UK):

1. Would you prefer to: **(i)** take out a fixed price contract on your lambs of \$3.80/kg; or **(ii)** accept what the market offers at the time?
You anticipate the price will be \$3.90 but there is a good chance (40%) it will be \$4.20, but it could be as low as \$3.20 with a 20% chance.
2. (Ignore this question if you are not involved in irrigation.) Do you have: **(i)** an irrigation system that does *not* get used to its full capacity; or **(ii)** an irrigation system that *is* used to its full capacity?
3. Insurance records show that the chance of your hay barn and its contents going up in smoke from accidental causes is only 0.1% (i.e. one chance in 1000 – the insurance company would expect your hay barn to burn down in 1 year out of every 1000 years). The hay barn holds 1000 small bales (currently selling at \$5 each). The replacement cost of the barn is \$4,000, and you normally have the barn full. If they want to charge an annual premium of \$1,180, will you: **(i)** insure the barn and contents; or **(ii)** *not* insure the barn and its contents?
4. A wool buyer is offering you \$3.60/kg greasy for your fleece wool, but you have a suspicion the market is going to lift. Your reading of the world scene is that the price could be as high as \$4.10 at the next sale, though as low as \$3.40 is certainly not out of the question as the world scene is somewhat shaky. In mulling over the situation you come to the conclusion that there is a 50% chance of getting close to \$4.10, a 25% chance of \$3.75, and a 25% chance of \$3.40. Will you: **(i)** sell to the buyer; or **(ii)** sell at the next auction?
5. You have been contemplating increasing your ewe numbers as in some years you seem to have more than enough feed even after filling all the hay barns. The trouble is, given a series of average to bad seasons you would struggle to feed the sheep at a reasonable level. Your calculations and hunches suggest the following:

- If you stay as you are – average profit per ewe will be \$52.
- If you increase stock numbers by 10%:
  - profit in a typical year \$45/ewe;
  - profit in a good year \$55/ewe;
  - profit in a poor year \$38/ewe.
- Chance of a good year 30%, poor year 20%, typical year 50%.

Will you: **(i)** stay as you are; or **(ii)** increase stock by 10%?

6. Which best describes your betting actions? **(i)** Seldom take lottery tickets and spend less than \$1000/year on sports betting; or **(ii)** take lottery tickets more than occasionally and spend quite a lot on betting.
7. If you rely on hay/silage for winter feeding, do you: **(i)** regularly have more than 30% of your hay and/or silage left over each spring; or **(ii)** seldom have much left over?
8. If you have (had) a mortgage, do (did) you use: **(i)** the fixed rate option; or **(ii)** the floating (variable) rate option (if it was available)?
9. For your extensive subdivision plan requiring fencing, improving the water supply and some track making, would you accept: **(i)** a fixed rate 10-year

mortgage at 7.5%; or **(ii)** a floating (variable) rate mortgage? Your discussions with bank managers and your reading suggest that, worldwide, the long-term average rate is likely to slowly decline, and it is almost certain the average exchange rate will stay much the same as it is now, though there will be minor variations. However, history tells you that there is little that is certain about interest rates and you reckon the average rate for floating rate mortgages could go to 8.5% with a 40% chance, but equally there is a 40% chance it could actually decline with the average over the 10 years turning out to be 6.5%.

Interpretation

Farmers can be divided into three groups depending on their attitude to risk. Some are much keener to have known outcomes, or at least an income that does not vary much. Farmers with this approach are called 'risk averters'. In contrast, farmers happy to try their hand at riskier ventures are referred to as 'risk preferers'. In between, some farmers might be 'indifferent' to risk and are more interested in maximizing the long-term average profit than the yearly ups and downs that do not worry them.

In the scenarios listed above the risk averter would always select option **(i)** (of the choices listed), for in doing so their variability of income would be less. In contrast, choosing option **(ii)** reflects someone with a risk preference attitude.

You can get an idea of your attitude by counting up the number of **(i)**s you chose compared to the number of **(ii)**s. Your degree of aversion or preference depends on the numbers of each selected. If you chose all the **(i)**s you are a strong risk averter, and vice versa.

Your attitude reflects your personality and past experiences, and also your debt levels. Neither attitude can be called right or wrong, they are just inputs and impact on what decision you should make in risky situations to create most satisfaction.

CHAPTER 3.5 MANAGEMENT OPTIONS

Methods of Reducing Risk and Uncertainty: Introduction

Most farmers use techniques to lower the year to year variability of their production output, prices received and, ultimately, their cash surplus. Sometimes the techniques work, sometimes they do not. That is risk and uncertainty. Quite often a farmer does not realize he is selecting management approaches aimed at reducing variability – he just does it as he feels more comfortable with the decisions and actions as a result.

Most farmers have buildings insurance, but have they thought in detail about the costs and returns of insurance cover, for example, for fire in the buildings? It could possibly pay for the farmer to take the risk. But despite that, most take out cover that converts an uncertain cost (of replacement) with a certain annual cost, thus reducing the variability of the cash surplus. Insurance is one of the obvious ways of reducing risk and uncertainty.

You might like to check your understanding by listing out on a piece of paper all the methods of reducing risk and uncertainty that you can think of. Indicate whether your case farm uses each of the methods. Then check whether you have included the following methods: insurance, diversification, contracts, flexibility in systems and management, feed reserves, low debt, cash reserves, investments, asset liquidity in general, irrigation, low stock numbers, good information and knowledge, overdraft facility, sure products and low risk production methods, and geographic diversification.

Insurance as a Method of Reducing Risk and Uncertainty

As noted above, this is the obvious system that converts an uncertain cost to a smaller annual certain cost, thus removing all risk. However, the insurance might not cover all of the loss, so some uncertainty might still remain.

Alternatively, a farmer could bank a sum each year, but it might not cover major problems – if he was lucky, it would be much cheaper in the longer run. Alternatively, he could pay off debt with any money set aside for insurance, and if there should be a problem (e.g. barn burns down) he could rely on his improved equity to borrow money to rebuild.

Taking the risk yourself

In general, the *long run* cost of insurance is greater than the cost of accepting the risk yourself due to the insurance company overheads, but most people's attitude to risk is such that this is not acceptable as a major catastrophe could mean bankruptcy, or at least a very difficult recovery time for many years. Thus, the risk is not worth taking in the case of building and machinery insurance. However, what about crop insurance?

A very diligent farmer could perhaps get all the chance figures and calculate how much, on average, to set aside each year to cover the fire and other risk. But, what happens if the crops are destroyed in one of the early years? Possibly disaster, for the fund would not cover the loss. And if it was building insurance and the house burned down there would be no way the self created fund would cover the loss after just a few years. Thus, insurance companies do reasonable business.

Insurance companies cover their costs by calculating the chance of payouts and charging the premiums to cover average annual costs and overheads. They have many years' records over many clients. For example, they know the chance of a house burning down accidentally and the chance of help arriving in time. These data enable them to estimate, for the whole country, what the likely payout will be in any 1 year, and thus how much individual premiums have to be to cover this payout together with all the organizational costs. Of course, they cannot predict with certainty what the cost will be each year, so they probably allow for a bit extra, and they, in turn, insure with other insurance groups over their layout and so spread the risk. Each company will do this so that, if there should be a bad run of fires just by chance, they share the cost.

Every farmer will have a different attitude to risk and, consequently, will use insurance to a greater or lesser degree depending on the level of risk aversion he portrays. The environment in which he operates and his level of indebtedness should both influence an optimal decision. But of course luck always plays a part and perhaps a farmer who always takes out crop insurance finds he never has a devastating weather or fire impact, and vice versa.

Diversification as a Method of Reducing Risk and Uncertainty

Diversification refers to producing a range of products, or using a range of production methods, in the hope that when one is not producing much profit, another one will. Thus, the returns are evened out over the years. Using a range of production methods might similarly reduce variability as when one is expensive, maybe the other is inexpensive. Of course, if all products produce badly, and have poor prices in the same year, diversification is no benefit at all.

Example

A sheep farmer might have some cattle to spread the risk. Of course, the cattle might also be useful for other reasons, for example, to eat the rough excess growth the sheep will not cope with. For this strategy to work, the cattle and sheep output levels and/or their prices (meat and wool) must not vary together. That is, when wool prices are low, cattle prices, hopefully, are up. Similarly for sheep meat relative to beef, or for a range of cash crops. The variation does not have to be diametrically opposed, just tend in this way.

Can you think of a range of products a case farmer could realistically produce? Cast your imagination wide, but still be reasonably realistic. Write down your answer.

These are some of the possibilities: finished stock, stores, fruit, vegetables, tourists (ecotourism, adventure, hunting), fish farming, homestay, grazing, hay, silage, fibre, cattle, milk, sale time variations, breeding, cash crops of various kinds, investment, shares, apartments.

Alternatives

Clearly, it will depend on the details of each property, but there is a large number of possibilities. For a sheep farmer, for example, these include: variations in sheep breeds/strains and rams to give variation in wool fibre diameter and variation in lamb maturity dates/maturity weights; variations in lambing date and thus selling dates; the sale of store lambs, hoggets, 2-tooths; the introduction of some cattle (or perhaps deer, even goats); variations in breeds, selling dates, selling sizes (finished, store?); sale of grazing, hay, baylage or cash crops. Another possibility is off-farm investment (e.g. rented houses, stocks and shares).

There is the other side of the production process. Can you think of alternative production/management methods that could be called production method diversification? Write them down, but make sure they are feasible on your case farm. Alternative production/management methods include: breed, buy, stocking rate, fertilizer rates/types, labour intensity, grazing, grazing patterns, subdivision, fence types, early shearing, later shearing, lambing time, pasture types, early peas, late peas, etc.

There are quite a few possible production processes, and while some will be less ‘economic’ than others, they might be less risky: a mixed replacement animal system – breed some and buy some (both sheep and cattle); a mixed winter feed system – make some hay and buy some; grow two different kinds of fodder/cash crop; land dispersion – purchase a block of land with a different climatic environment – perhaps assured summer rainfall, that is, diversify land types; have a range of pasture types – at least one should suit the current year's conditions. Of course, it may pay to have a range (e.g. lucerne, similarly rye-grasses with different growth, flowering and heading seasons) for other than straight risk reasons.

Conditions for diversification to work

This usually requires the prices, costs and yields of the different products to vary differently, so when one goes down another goes up, or as a minimum, any variation has different degrees. If they all do vary to the same degree and in the same direction (say, all down) diversification will not achieve the desired effect. The only way to get an idea of this is to find past records to see if the alternatives are *highly correlated*. Does lamb price vary in exactly (or near enough to) the same percentage and direction as, for example, bull beef? Of course, past records are most unlikely to be repeated in exactly the same way, but they tend to give a good indication for future relationships. Provided the correlation is *not perfect*, diversification will have some impact in reducing variability. The poorer the correlation, the greater the impact.

Cost of reducing cash surplus variability

Reducing cash surplus variability usually comes at a cost. Under normal conditions, if you reduce the expected profit variability the average profit will tend to be less than what it might have been.

Diversification means not producing just the most profitable product mix, or not using the least-cost production method. On average over many years, the farmer who diversifies extensively will have a lower average profit, but it will not vary as much. This is not always clear over a small number of years, as good luck does occur sometimes and the systems used may just turn out to be the best, although sometimes the opposite happens.

Example

If you were to grade the degrees of correlation between the price of lamb and beef, or wool and lamb, or wool and beef over the last 10 years on a scale of 1 to −1, where 1 means there was a *perfect correlation* (percentage and direction of change was identical), 0 means there is no association at all and, at the other extreme, −1 means the percentage change was identical, but in the *opposite* direction (a perfect negative correlation), what figure would you give to the association?

Answer

A New Zealand Economic Service publication (G2192 and earlier editions) shows per kg prices were the following (they reflect world prices):

Year	All lamb ($)	All beef ($)	All wool ($ clean)
1992	1.585	1.649	4.371
1993	2.214	2.840	4.328
1994	2.148	2.576	4.138
1995	1.670	2.065	5.538
1996	1.917	1.655	4.944
1997	2.334	1.737	4.431
1998	2.190	2.050	4.489
1999	2.409	2.355	4.084
2000	2.787	2.993	4.394
2001	3.526	3.495	5.200

Notice that lamb and beef tend to increase together, but there are some notable exceptions. With wool, the relationship is more varied. There is a formula (see any statistical methods textbook for a correlation coefficient formula; a simplified method is given below in 'Calculation formulae') that enables calculating the degree of correlation on the +1 to −1 scale. This gives the figure 0.65 for lamb and beef. That is, the two sets of prices are 65% correlated. Diversification into beef will help reduce income variability, but not by a major degree (if the correlation coefficient had been negative, diversification would have a much greater impact). This would be expected as when lamb meat goes up, beef tends to as well as people shift what they buy to compensate. For lamb and wool the correlation is 5% and for beef and wool it is –5%. These two are much less closely related.

Example of the effect of diversification

As an example, consider a farm than can run:

- 3000 sheep and produce 45,000 kg of meat and 11,400 kg wool; *or*
- as an all beef system, producing 54,000 kg of meat; *or*
- a 50/50 mixture of beef and sheep,

where (using the data presented above for the 10 years 1992–2001)

- the average prices of the products are:
  - lamb $2.278/kg
  - beef $2.445/kg
  - wool $4.5917/kg clean
- the correlation coefficients are:
  - lamb/beef 0.65 (65%)
  - lamb/wool 0.05 (5%)
  - wool/beef –0.05 (–5%)
- the price ranges over which 60% of the years will fall:
  - lamb $2.278 ± 0.562/kg
  - beef $2.445 ± 0.582/kg
  - wool $4.5917 ± 0.477/kg

(Note: $2.278 ± 0.562 means within the range (2.278 – 0.562) and (2.278 + 0.562). That is, in the range between 1.716 and 2.840.)

Using the standard 60% confidence interval formula (see any statistical methods textbook), it can be calculated that for each of these systems the *expected* gross income and the ranges for 60% of the years (assuming repeated use of the systems) will be:

	Expected gross income ($)	60% range ($)
Lamb and wool (sheep)	154,855	151,735–157,974
Beef	131,841	105,117–158,565
50/50 sheep/beef	143,348	121,200–165,496

Notice the effect of diversification where the correlation coefficient for lamb and beef is quite high. The system with the greatest gross income is for sheep, and the lowest is for beef, which also has a very high range. In contrast, sheep has a low range because sheep produce two products and their correlation coefficient is low (5%). Beef by itself has a high variability, but when combined with sheep (diversity into lamb and wool) the variability is reduced (wool/beef has a low negative correlation). It can be concluded that sheep not only give a high gross income, but also a low variability. Note that this analysis is based on past prices and records; whether you can conclude that you should follow a sheep only policy depends on what is expected in the future, and on other factors such as the expenses associated with each system, and whether some cattle can be run without dropping sheep numbers.

Calculation formulae

In contrast to looking at historical data to get a feel for the correlation there are calculation systems that allow formalizing the exact correlation between products and production systems.

The correct method of calculating the correlation coefficient and the variability ranges takes a little extra practice and learning (see any statistical methods textbook). But, as the effect of diversification depends very much on the correlation coefficients (the smaller the better, with −1 being perfect and +1 meaning diversification between the two products is a waste of time), it is possible to get an idea of how alternatives relate to each other by examining historical figures. Do the price and yield outcomes tend to vary in opposite directions? It is possible to have a rough and ready simple calculation method to get an idea of the historical correlation coefficient (assuming the future will be similar).

Approximate correlation calculation method

1. For the two items (perhaps historical yields, e.g. lambing percentage and wool clip/head; or perhaps prices, e.g. lamb and wool, or wheat and barley) collect the past data and write them down in two columns, ensuring the data for any particular year are side-by-side.

2. Calculate the average yield/price for each column (add them up and divide by the number of observations).

3. Calculate the average of all the data by adding the averages from step **2** and dividing by two. (Call this average the overall average.)

4. Create two new columns (A and B). These figures should be the difference between the observation in the original column and the average for that column – some will be negative, some positive.
5. Using the columns A and B create two new columns, C and D, by dividing the figure by the overall average. In doing this, *ignore* the sign. For example, if the overall average is 2.10 and a figure in column B is 0.50, then this procedure gives 0.24.
6. Inspect the pairs of figures in columns A and B. If they have the *same* sign put a plus sign in front of the corresponding figures in columns C and D; if the signs are *different*, put a negative sign in front of the corresponding figures in columns C and D. (If the signs are different this means a negative correlation in that particular year.)
7. Now add up *all* the figures in both columns C and D and divide the total by two. The resulting figure is the very approximate correlation coefficient.

You will see from the figures in columns C and D that in some years the fractional change is large, others not so large, and in some years the figures move up or down together, in other years maybe in opposite ways. It is the average of all these fractional changes that indicates the correlation coefficient.

Example from previous data

	Lamb[a]	Beef	A[b]	B	C[c,d]		D	
	1.585	2.649	−0.693	0.2075		0.29(−)		0.09(−)
	2.214	2.840	−0.064	0.3985		0.03(−)		0.17(−)
	2.148	2.576	−0.130	0.1345		0.05(−)		0.06(−)
	1.670	2.065	−0.608	−0.3765	0.26(+)		0.16(+)	
	1.917	1.655	−0.361	−0.7865	0.15(+)		0.33(+)	
	2.334	1.737	0.056	−0.7045	0.02(−)		0.30(−)	
	2.190	2.050	−0.088	−0.3915	0.04(+)		0.17(+)	
	2.409	2.355	0.131	−0.365		0.05(−)		0.15(−)
	2.787	2.993	0.509	0.5515		0.22(+)		0.23(+)
	3.526	3.495	1.248	1.0535		0.53(+)		0.45(+)
Average	2.278	2.4415						
Overall average 2.36								

[a] All values in ¢/kg.
[b] Lamb – Average lamb; e.g. 1.585 – 2.278 = –0.693.
[c] A / Overall average; e.g. 0.693 / 2.36 = 0.29.
[d] The bracket sign is put in based on whether the figures in columns A and B have the same sign (+), or opposite (–).

Finally, add up all the figures in columns C and D using the signs as part of the adding process (i.e. get a net figure):

$$-0.29 - 0.09 - 0.03 - 0.17 \ldots + 0.22 + 0.23 + 0.53 + 0.45 = 1.33$$

and divide by 2 as there are two columns:

$$1.33 / 2 = 0.66$$

Thus the approximate correlation coefficient is 0.66, or 66%.

Off-farm investment

The farmer could consider off-farm investment (e.g. apartments, shares) and/or a block in another area (geographic diversification: a block in a different environment).

Off-farm investments, such as stocks and shares, or perhaps an apartment or two, can be profitable in their own right. However, spare cash is required, some of which might, of course, have to be borrowed. To reduce income variability, the income correlation with farm income must be substantially less than one (100% positive). Simple fixed investments might also be used. In general, rent and interest incomes are relatively stable, though both do vary up and down with general economic conditions.

Shares and stocks, on the other hand, can be quite variable. There is some evidence to suggest that farm income is poorly correlated with stocks and shares, but this does depend on from which year you start using the records.

If off-farm investment is to be considered, this means money that could be invested in more land, or perhaps subdivision, is being diverted from this purpose. In assessing this, remember that you need to include in the calculations the capital gain from land. Historically this has been, in many areas, greater than the inflation rate. However, you must allow for any capital gains tax that might exist.

Summary on diversification

- Diversification into different products, and product variations, is a popular way to decrease cash surplus variability. Diversification into a range of production methods can also help.
- For diversification to work, the correlation coefficient must be less than one, the lower the better with negative correlations giving the most benefit.
- Usually, the long-run average profit will be less when diversifying as you are using products and production methods that are not the most profitable. The payoff is the lower variability (the greater certainty of the cash surplus).

Contracts as a Method of Reducing Risk and Uncertainty

Another important method of reducing variability is to make contracts early on in the season, or perhaps even for several years at a time. A contract ‘seals’ the arrangements, perhaps a price, so the uncertainty is removed.

A *contract* is an arrangement where an agreement is made with a purchaser, or supplier, or perhaps a contractor, to supply a defined quantity of a good, perhaps of a specific quality, at a defined price. This arrangement is made at varying times before the event. Sometimes it is just for a specific quantity, perhaps at the reigning price of the day, sometimes for a fixed price and sometimes for both. Equally, the contract might be for the provision of an input – an example would be for winter grazing, or perhaps the supply of hay.

The impact of a contract is to 'lock in' the conditions well before the event so the quantity and/or price is fixed – the uncertainty is *removed* so you can budget with certainty on what you will receive, or have to pay if the contract is for an input.

Most farmers have contracts for the supply of an input, for example, most have a contract with an electricity company to provide virtually unlimited power at a fixed price.

Exercise

What other contracts does a case farmer have for both outputs and inputs? List on a sheet of paper all the outputs (products) produced and inputs used that are contracted either by price and/or quantity.

While it does depend on the area the farm is in, there are often available many different contracts. Can you think of others that might potentially be used that are not listed above?

Now write down the names of the products/inputs and/or procedures that might be organized/sold/purchased in some way as a contract specifying the price/cost/quantity/timing/etc.

Your list could have included: cultivation, grazing off, hay, silage, water, mortgages, wool, lamb, fencing, seeds, overdraft, fertilizer spreading, spraying, meat, employment, lambing, shearing, tailing, pregnancy testing, harvesting, feed conservation.

Assessing contracts

Each contract must be assessed on its own merits. The prices/conditions relative to the expected open market situation should be assessed, and thought given to how important reducing uncertainty is. Sometimes, of course, a contract will be profitable in its own right, let alone its value due to the impact on reducing uncertainty.

To decide whether to enter a contract must be assessed in each case. There are no special formulae that can be used. Sometimes it is actually profitable to enter a contract in contrast to relying on the open market – you will receive a better guaranteed price/quantity arrangement. This is a matter of the suppliers'/purchasers' view of the future and the expected prices. In some cases it is better for the product buyer to make a contract for a fixed quantity at a fixed price that is above what might be expected in the free market. The manufacturer can then plan production with surety knowing the supplies, for example to keep the factory going at full capacity, will be available.

Contracts can also have penalty clauses. If a contract is made to supply a specific quantity of superfine wool and it cannot be supplied, the purchasing group may well look for compensation to enable buying on the open market.

In the end it all comes down to everyone's assessment of future conditions and the knowledge of markets and conditions expected throughout the world. For any one product/input a farmer must estimate what he expects the free market price to be, and the upper and lower possibilities, and the supply dates and quantities (depending on the case). This can then be compared with any contract on offer. Some people will elect a contract even if the price is lower than the expected price as this gives surety of income. This simply means the farmer is paying a little for removing the uncertainty.

Of course, not all of a product needs to be contracted – perhaps only a proportion and so hedging the bets. However, it may not always be possible to get contracts for the quantities wanted.

Example 1

What would you do for this hill country hay supply scenario?

Being on steep hill country you have always bought in 30,000 kg of lucerne (alfalfa) hay in small (20 kg) bales as a precaution, using an agent who knows where the hay supplies are to be found. You have always ended up with a few bales spare that get used in the early part of next winter, or in the summer dry. Given the wide range of prices over the years the purchase has sometimes stretched the overdraft. Should you consider making a contract for the supply?

For next year, a contract for 1500 bales is being offered at $5.50 plus delivery. You have bought from the producer before and the hay has been of excellent quality and free of weeds. You have to make a decision by mid-spring. General observation of barns and silos suggests there is a lot of hay and silage still around from last season.

Given the data below, which option is the cheapest in the long run, and what are the cost ranges? Would you choose the open market or the contract option?

Historical prices, $/20 kg bale (adjusted for inflation)

1998	$4.20	2004	$5.60
1999	$4.10	2005	$6.10
2000	$5.30	2006	$5.50
2001	$7.10	2007	$6.90
2002	$4.80	2008	$5.00
2003	$5.10		

There is no right or wrong answer, as it depends on your attitude to risk. If you assume the past seasons are a good representation of what you can expect in the future, the *expected* price will be approximately $5.43. Thus, a contract price of $5.50/bale seems a reasonable deal, especially as the total difference for 1500 bales is only $105.00 (1500 × $0.07). But, of course, if the season turned up a good supply of hay the price could be as low as, say, $4, thus costing $2250 if the contract is taken. On the other hand, a bad hay season could see the price at, say, $7, thus saving $2250 if the contract is taken. Plotting the past prices to get an idea of the chances (probabilities) gives:

Price ($/bale)	Years
≤5	1998, 1999, 2002, 2008
5.1–6.0	2000, 2003, 2004, 2006
6.1–7.0	2005, 2007
>7	2001

You could conclude that the tendency is towards the lower figures, but still not much lower than $5.50. All in all, you might conclude $5.50 is a good offer even though on average you are likely to get it for less on the open market – the risk is not worth it unless you really like taking risks.

Example 2

Here is another case study for you to consider for ideas of how to analyse contracts. This one is rather more complicated, given all the details that should be checked, and takes a bit of thinking through. (Note: The months given relate to the southern hemisphere; the months in parentheses are the northern counterparts.)

One of the local meat companies is trying to develop a chilled lamb cut trade in Europe and requires a regular supply of lamb. They are offering contracts for the supply of specific numbers of finished lambs within specified weight ranges in specified months. They are prepared to negotiate both price and quantity as they appreciate each farm is a different situation and, once combined with other farms, they should be able to meet the European's quantity requirements.

Given the background information below, what price would you require to take out a contract?

Current production system: 3000 ewes, lambing mid-August (April) @ 115% S to S. Start drafting end of November (July). All (3450 lambs) gone mid-January (September). Replacements purchased.

Contract requirements:

By end of October (June)	800
By end of November (July)	800
By end of December (August)	800
By end of January (September)	800
Total	3200 lambs

For non-supply – cost of $25/lamb

Lambing percentage variable – S to S

Past records: last 10 years' lambing percentages: 120, 109, 117, 112, 107, 122, 119, 108, 117, 119

Average 115% (production system has not changed)

Lamb price ($/head, inflation adjusted): 23.78, 37.64, 36.52, 28.39, 32.59, 39.68, 37.23, 40.95, 47.38, 59.94, 71.20

The lamb prices are expected to be similar next season to the most recent past, though the exchange rate volatility will impact on the final outcome.

To have any possibility of supplying the lambs it will clearly be necessary to alter the lambing date for at least some of the ewes. You estimate you will need to lamb 750 ewes mid-July (mid-March) to get 800 lambs by the end of October (June), and another 750 planned for early August (April) with the remainder mid-August. You expect the lambing percentage of the mid-July (March) ewes will be down 5% on average, and it will be necessary to ensure a greater area of autumn saved pasture for the early lambing ewes. You plan to achieve this by purchasing extra hay compared with current practices, with 1200 bales being necessary at $5.50 per bale on contract. (While wool production, or rather quality, could be affected, we will assume for this example exercise that wool income does not change.)

Suggested calculations and answer

Current gross income

Lambing percentage: 3000 ewes @ 115% = 3450

Lambing percentage ranges:

< 112:	109 112 107 108 (average 109)
113–117:	117 117 (average 117)
> 117:	120 122 119 119 (average 120)

While the average is 115%, clearly it does vary quite a lot. You might represent this with noting that there is a significant chance of a lower rate of, for example, 109%, and similarly a higher rate of 119%. Your sums might use the expected value of 115%, but also use 110% and 120% with chances of, for example, 40% (so the 'expected' value has a chance of 100 – 40 – 40 = 20%). Thus:

- 20% chance of 3000 @ 115% = 3450
- 40% chance of 3000 @ 110% = 3300
- 40% chance of 3000 @ 120% = 3600

(Note: you might have taken a different view and used slightly different figures, and these might well be more appropriate. There is no right and wrong set of figures when dealing with changing biological situations. The important thing is to explore possibilities that could occur.)

Prices

The average price received over the last 10 years (inflation adjusted, i.e., the earlier prices have been increased by the inflation rate so they have the same purchasing power as today's dollar) has been (adding up all the prices and dividing by 10, this being the number of years) $43.15/lamb. But, the trend over the last 4 years is one of rising prices, and you have not observed anything to suggest next year will be any different. Thus, you might forecast on, say, $68/head average, but with a possibility that it could well be $73.00/head or even, say, $63. Given the rising trend the chance of $73 might be 30%, and of it being less, $63, 30%.

Therefore the *expected* gross income is:

3000 ewes @ 115% @ $68/head = $234,600

but it might also be:

	Gross income	Chance
110% lambing @ $68/head = 3000 × 1.1 × 68	= 224,400	0.16
115% lambing @ $68/head = 3000 × 1.15 × 68	= 234,600	0.08
120% lambing @ $68/head = 3000 × 1.2 × 68	= 244,800	0.16
110% lambing @ $63/head = 3000 × 1.1 × 63	= 207,900	0.12
115% lambing @ $63/head = 3000 × 1.15 × 63	= 217,350	0.06
120% lambing @ $63/head = 3000 × 1.2 × 63	= 226,800	0.12
110% lambing @ $73/head = 3000 × 1.1 × 73	= 240,900	0.12
115% lambing @ $73/head = 3000 × 1.15 × 73	= 251,850	0.06
120% lambing @ $73/head = 3000 × 1.2 × 73	= 262,800	0.12
	Total chance	1.00

Note: (i) it is assumed that there is NO relationship between lambing percentage and lamb price – each combination is possible (i.e. local season does not affect the European price); and (ii) to get the chance of each possible lambing percentage price combination, seeing the two events are independent, you multiply the individual chances.

Therefore, what contract price should you ask for as a break-even figure? To meet the contract the gross income should increase to at least cover the cost of the purchased feed necessary. Thus, the gross income must be \$234,600 (the average non-contract income) + \$6600 (the 1200 bales @ \$5.50) = \$241,200.

Lamb numbers on average:

750 ewes @ 110% = 825
2250 ewes @ 115% = 2587
Total = 3412

Of these, 3200 go on contract and the remainder, 212, on the free market: on average, the 212 will get \$68 = \$14,416. Thus, to break even the rest of the lambs must give \$241,200 – \$14,416 = \$226,784. Thus, the per head price must be 226,784 / 3200 = \$70.87. To make it worthwhile, perhaps your base asking figure should be \$71.00.

But, remember that if you don't meet the quantity numbers there is a potential penalty (which in many cases probably would not be invoked). What is the likelihood of this?

If the early ewes lambed at 105% and the remainder at 110%, what lambs would be supplied (also, of course, a very poor season might mean the lambs took longer to finish and thus the October (June) numbers could not be supplied)?

750 @ 105% = 787
2250 @ 110% = 2475
Total = 3262

Comments on the situation

Overall, the contract could be filled, but with a minor shortfall in the October (June) number (13 lambs @ \$25 = \$325). Thus, perhaps you should contract a bit more to cover this possibility, say \$71.50. While this is an extra \$1600, compared with \$325, the extra would allow for the chance that a poor growth season would mean the shortfall in October (June), and possibly November (July), could be considerably more than 13 lambs.

We worked out the likely gross lamb income range for the existing system, so what is the likely range given we take a contract at \$71.50? The price is fixed for the 3200, but not the remainder.

Possible lamb numbers:

750 @ 105% and 2250 @ 110%	= 3262	chance 40%
750 @ 110% and 2250 @ 115%	= 3412	chance 20%
750 @ 115% and 2250 @ 120%	= 3562	chance 40%

The possible income situations are as follows.

Situation 1

3200 @ 71.50 *plus* 62 @ \$63 *or* \$68 *or* \$73

i.e. \$228,800 *plus* \$3906 *or* \$4216 *or* \$4526

i.e. \$232,706 *or* \$233,016 *or* \$233,326 with chances 30%, 40% and 30%

However, the chance of the low lambing percentage is 40%, therefore the overall chances of both a low lambing percentage and the different prices are:

$0.3 \times 0.4 = 0.12$
$0.4 \times 0.4 = 0.16$
$0.3 \times 0.4 = 0.12$

Situation 2

3200 @ 71.50 *plus* 212 @ \$63 *or* \$68 *or* \$73

i.e. \$228,800 *plus* \$13,356 *or* \$14,416 *or* \$15,476

i.e. \$242,156 *or* \$243,216 *or* \$244,276 with chances 30%, 40% and 30%

The chance of the moderate lambing percentage is 40%, therefore the overall chances of both a moderate lambing percentage and the different prices are:

$0.3 \times 0.2 = 0.06$
$0.4 \times 0.2 = 0.08$
$0.3 \times 0.2 = 0.06$

Situation 3

3200 @ 71.50 *plus* 362 @ \$63 *or* \$68 *or* \$73

i.e. \$228,800 *plus* \$22,806 *or* \$24,616 *or* \$26,426

i.e. \$251,606 *or* \$253,416 *or* \$255,226 with chances 30%, 40% and 30%

The chance of the high lambing percentage is 40%, therefore the overall chances of both a high lambing percentage and the different prices are:

$0.3 \times 0.4 = 0.12$
$0.4 \times 0.4 = 0.16$
$0.3 \times 0.4 = 0.12$

Possible outcomes

The possible outcomes are:

	Gross lamb income (\$)	Chance
110% @ \$63 for ex contract lamb	232,706	0.12
110% @ \$68 for ex contract lamb	233,016	0.16
110% @ \$73 for ex contract lamb	233,326	0.12
115% @ \$63 for ex contract lamb	242,156	0.06
115% @ \$68 for ex contract lamb	243,216	0.08
115% @ \$73 for ex contract lamb	244,276	0.12
120% @ \$68 for ex contract lamb	253,416	0.16
120% @ \$73 for ex contract lamb	255,226	0.12
	Total chance	1.00

Therefore, the *expected* gross income is the various incomes multiplied by their chance, i.e.:

$$(232{,}706 \times 0.12) + (233{,}016 \times 0.16) + \ldots (255{,}226 \times 0.12) = \$243{,}216$$

Summary

Lambing %[a]	Free market price ($/head)	Chance	Gross lamb income ($) No contract	Contract
110	63	0.12	207,900	232,706
110	68	0.16	224,400	233,016
110	73	0.12	240,900	233,326
115	63	0.06	217,350	242,156
115	68	0.08	234,600	243,216
115	73	0.06	251,850	244,276
120	63	0.12	226,800	251,606
120	68	0.16	244,800	253,416
120	73	0.12	262,800	255,226
	Total expected		$234,600	$243,216

[a] For the July (March) lambing ewes the percentage is decreased by 5%.

Therefore, with the contract set at $71.50, it pays to accept the contract.

In six out of the nine possible conditions, contract income will be *greater* than the non-contract situation, but in the other three possible scenarios the situation is reversed. The chance of the latter is 30% (0.3). Of course, this is at a contract price of $71.50. If it is lower, the contract choice will be less attractive.

Comments

The example shows a proper analysis involves a lot of thought and calculating. Doing some of the basic sums helps think about the problem and provides a more informed decision even though the analysis may have made some simplifying assumptions (in this case, effects on wool were ignored – the contract option probably decreases wool income).

The example only considers buying extra feed to allow early lambing, although another possibility is to decrease ewe numbers. Would this have been a better option?

Partial budgets

The examples above used what are called *partial budgets*, which are normally calculated when assessing contracts. They only look at the items that will *change* in the calculations – all the other farm income and expenditure is ignored. Therefore the sums gave a figure of gross income for the current system, and compared this with the net effect of the possible changes.

Concluding comments

Remember, the purpose of contracts is to lock in a price (usually), and possibly a quantity or some other condition, so converting an uncertain situation to a known outcome – the price received, or some other defined condition. Of course, this does not stop other factors in the chain of events, for example, the lambing percentage, from being uncertain. In theory, most uncertain events or outcomes could be contracted away.

Products and Production Methods With Low Variability: a Method of Reducing Risk and Uncertainty

To reduce variability an obvious method is to choose products, and use production methods, that have low risk (variability). This is in contrast to diversification, where it is hoped the ups and downs of different products compensate each other (individually they might be quite variable).

For most sheep farmers there is little choice in the products to produce unless cash cropping is a possibility. Specialist crops, such as potatoes, are usually quite volatile, partly due to the seasonal variation and the variation in area planted from year to year. However, with a bit of imagination small quantities of a range of products can often be produced, including farm tourism.

Possible products that might be produced

What different products could you produce? Write down different products you might produce in order of income variability – the lowest first. ‘Products’ might be variations on a single base product (e.g. strong/finer wool).

The following list contains some possible suggestions for products:

- Non-sheep/cattle activities, e.g. flowers, fruit and herbs, which are specialist, low area, alternatives that may help from a diversification point of view, and may be profitable in their own right (perhaps using labour at a slack time), but usually involve much learning time.
- Stud sheep/cattle.
- Change of sheep/cattle breed (perhaps not totally) (different wool perhaps – look at past records of price – is strong wool more variable than medium?).
- Change of black face (meat) ram – early/late maturing.
- Change of stock type (e.g. deer, goats) and/or class (e.g. bulls, steers).
- Processing meat/wool on your behalf and selling direct to markets (i.e. producing a processed product instead of a commodity. This will take more time, effort and organization, perhaps in conjunction with some others).
- Out of season meat, e.g. early/late lambs, perhaps for the local market.
- Field crops: on reasonable quality land there is a wide range of cash crops that might be considered. In some cases, of course, field crops will be much more important than any animals. And for any one crop there is often a range of sub-variations, such as planting and harvesting dates.

To assess any of these alternatives, and others, it is necessary to collect as many records as possible on past prices/yields to assess the variability, and to calculate budgets to see the 'expected' profitability. (As with previous examples, this involves doing a budget for each set of conditions, and multiplying each with the chance of each situation.) As a general rule, the most profitable tend to be the most variable.

Variations in production methods

Can you think of alternative ways of producing a case farm's current products that have different degrees of variability? List the possible production processes (e.g. use of irrigation) that might be used to reduce the variability in product output levels (i.e. reduce the year to year output variability).

The following list contains production processes/systems that might be considered:

- *Irrigation (if possible)*. This may, of course, be profitable in its own right, but even if not, can markedly reduce variability and so may be worth considering.
- *Use of nitrogen fertilizer* at strategic times. Again, this may be profitable in its own right. Higher levels of fertilizer use build up soil fertility, and thus give more production and greater water holding capacity, meaning feed shortages are less likely.
- *Reducing stock numbers*. This will result in having surplus feed at times, but output will generally be more stable, though, of course, at a lower average total.
- *Increased subdivision* – use of electric fences. More paddocks means more grazing control, which means controlling intake and, usually, increased pasture production. More control and greater pasture production means less variation in the meat and wool output (including lambing/calving percentages). The cost is a greater investment and more labour input.
- *Investing in your own machinery and equipment*, and less reliance on contractors. A good example is hay making and harvesting gear – yields and quality can be greater if hay is cut, turned and baled just when it is ready, similarly with crop harvesting, which is not always possible with a contractor. Variability of nutrients in the hay is reduced, and crop yields and quality improved, but perhaps at a cost, particularly the capital tied up in the machinery investment.
- *Animal husbandry*. Animal health programmes to minimize variations in production. Undertake pregnancy scanning and divide mobs appropriately to allow better feed management and reduced year to year variability in lambing performance and growth rates. Appropriate health care and vaccinations similarly. Fertility testing of rams with obvious benefits in lambing outcome stability.
- *Careful feed management* to enable appropriate feeding of animals throughout the year especially during mating (flushing), pregnancy and lactation.
- *Use of special purpose pastures*. For example, use of summer crops (e.g. lucerne, pasja, chicory) to reduce variability of feed supplies.

- *Feed budgeting*. Helps planning to ensure animal demands are met by the feed supply. Consider application of fertilizer and/or feed purchase to reduce variability, but at a cost.
- *Crop planting date*. Using a range of dates so that at least one will pick up a set of ideal growth and development conditions.

The list is extensive, and you probably have many more examples. To assess each one requires estimates/calculations of the variability and costs.

Method of analysis

It is necessary to: (i) get some idea of the effect of a particular policy on dampening down the yearly variability in cash surplus; and (ii) calculate the costs of achieving this. These will be both the cost of the policy itself, and any decrease in average profitability.

For example, investing in a limited irrigation system will cost:

- interest on the money invested;
- depreciation on the plant (i.e. a share of the capital cost), operating expenses (electricity maybe, maybe some extra labour);
- repairs and maintenance on the equipment;
- water charges.

The output will be at least a minimum assured pasture (crop) supply in the summer/autumn leading to, perhaps:

- assured hay supplies/crop yields;
- assured wool growth;
- assured lamb finishing perhaps;
- assured lambing percentage through assured flushing and ewe body weight maintenance.

All these add up to a more assured cash surplus. Of course, in some cases, the irrigation may possibly be profitable in its own right, particularly if some cash cropping is a possibility.

Question

If irrigation is at all possible on a case property, you might like to consider calculations exploring irrigation. Using the data from the questions below, calculate both the annual costs (do not forget interest on capital borrowed, and interest on your investment (opportunity cost), but not the capital investment itself) and annual returns. What is the rate of return on the capital invested? The list of questions below gives clues on how to include all the factors influencing the profitability of the project.

- What area (ha) could you irrigate?
- What do you think the total capital cost ($) would be?
- What is the current borrowing interest rate (%)?
- What are the likely total running costs to irrigate the maximum area?
- What would be the cost/ha of any extra fertilizer used?
- What is your current lambing percentage survival to sale or replacement?

- What is the difference between best and worst years' lambing percentage?
- With irrigation, what lambing percentage could be expected?
- With irrigation, what difference (%) between worst and best years?
- With irrigation, what per ewe wool production increase (kg)?
- What $/kg greasy do you expect for your current wool?
- With irrigation, by how much would the greasy price increase ($/kg)?
- How much wool do you produce per ewe (kg)?
- What is the difference between the best and worst year's average wool per head (kg)?
- What increase would irrigation give to wool per ewe (kg)?
- With irrigation, what difference between best and worst years (kg/head)?
- What is your current average supplementary feed cost (total $)?
- With irrigation, what would be the total cost of supplementary feed ($)?
- How many ewes do you currently run?
- Given irrigation, by how many would you increase the ewes?
- What proportion (%) of the lambs (after replacements) are sold?
- What average $ price per head do you currently expect per lamb?
- With irrigation, by how much will the average price per lamb increase?

Is irrigation profitable in this situation – and can you think of the questions for a cash cropping situation along the same lines?

Here is another possibility. If N fertilizer is a possibility on at least part of the farm, here is an example worth studying.

Example: the case for and against nitrogen fertilizer

A farmer has successfully moved into all grass wintering, though he does buy some hay as a winter feed insurance policy. The trouble is the autumn period is crucial to flushing (increasing their body weight) the ewes and the subsequent lambing percentage. The hay is not so useful in this situation. In bad years the farmer has used urea to boost autumn production, but the response is usually too late to ensure a live weight gain. Thus, the farmer is considering using urea as a regular policy to improve the reliability of autumn growth for not only flushing, but also to build up autumn saved pasture. A less variable autumn pasture production will make life much easier.

On average, urea increases pasture production by 5–8 kg dry matter (DM) per kg N, depending on the climatic conditions. As urea, which costs $400/t (but that very much depends on the current price of oil per barrel), contains 46% N, each kg produces $0.46 \times 6 = 2.8$ kg DM.

While the live weight growth (LWG) must depend on the quality of the DM (MJ ME/kg DM) and the utilization rate, the efficient break feeding used by the farmer means 2.8 kg DM above maintenance feed gives an extra 0.45 kg LWG. That is, an extra 0.58% lambing, as research has shown each extra kg of LW gives an extra 1.3% lambing (and 4 kg feed gives 1 kg LW but utilization is 64%). Thus, *1 kg urea gives 0.0058 of a lamb worth, say, $70. Thus, on average, the gain is $0.406.*

This is an interesting calculation as it shows, on average, use of urea just breaks even at the assumed costs and returns. (If urea costs more, as it will in some places/years, then it does not pay *on average*. Similarly, for lower lamb prices.)

Conclusion and discussion
It must be concluded, on average, that urea does *not* produce a profit. However, it does mean that pasture production, and therefore lambing percentage and thus profit, will be less variable. The conclusion here is easy as it is probably useful to use urea as it will provide greater income surety at no cost. Even if, on *average*, the extra lamb meat does not cover the cost of the urea, it might well be worth using simply to reduce the variability of income and the uncertainty.

For your case farm, do the suggested figures apply? Maybe the farmer could try some urea (or sulphate of ammonia, which contains much less N per kg) and cut some metre square plots to see what response is obtained in a range of years. Accurate information is clearly the key to making good decisions.

More suggestions on reducing profit variability

A special case of a 'production system' with low variability used by many people is the use of high levels of *feed reserves* (hay and/or silage, which keeps for many years if made well).

Associated with keeping high levels of reserves is the associated stocking rate. To enable building up and maintaining reserves, a farmer probably has to reduce the number of animals kept. There are clearly many levels possible, and many levels of feed reserves to keep. A variable stock number policy might also be used so that in a good year, if reserves are already high, the farmer might run more stock. The farmer might also try to build up some *cash reserves*, perhaps some flexible fixed deposits that can be used to buy feed and/or stock as the case may be. But, of course, when feed is short the prices are usually high. What has been the highest, and lowest, price you can remember from the last 10 years or so for hay?

There was once an old adage, which some still adhere to, that a farmer needs to keep 2 years of winter hay/silage on hand whenever possible, and the stocking rate needs adjusting to allow this. Is this worthwhile? Generally, it is more efficient to eat feed when it is produced as the losses are less and there are no harvesting costs. However, considerable variability exists so reserves reduce this, and in some cases actually pay as the cost of buying is high in a poor season. What policy do farms you are familiar with follow, and why?

Case study – feed reserves
Each situation will be slightly different. Studying case situations helps understand how to decide in each individual case. To see how to work out a stock/feed reserve situation, consider this case study.

What should the farmer, whose situation is described below, do?

Ewes	3000 mixed age
Replacements	purchased 2-tooths
Land	light, stony; 25% in lucerne – mixed age stands, 400 ha

Winter feed	hay (4500 × 20 kg bales) and small area of turnips (helps lucerne/pasture renewal)
Difficult periods	winter, early spring, late summer
Normal year	animals are adequately fed and produce 115% S to S lambing and 5 kg/head wool

In a *good* year (it does depend on which parts of the year are 'good' weather-wise), generally the lambing percentage goes up about 3%, wool production by about 0.25 kg/head and hay production is up by 75% (largely all surplus as there is a limit to what the stock can eat). In reality each year is different and the increased production is always slightly different.

In a *bad* year, hay production drops 50% and the lambing percentage decreases by 5% with wool down to 4.5 kg/head.

Looking at the rainfall records, and from talking to some of the local retired farmers, the farmer reckons the chances of each year category are:

Good 20%, Normal 50%, Bad 30%

Of course, the farmer knows that each year is in fact slightly different from any in the past, but these data represent the ranges.

What happens to feed reserves depends a bit on the sequence of years – a few bad years in sequence causes havoc, and does happen from time to time.

In a 10-year sequence the farmer might imagine getting 5 'normal' years, 3 bad and 2 good. Let us imagine the sequence is:

N N G B N B G N N B

What happens to feed reserves assuming, for example, the farmer starts with a 2000 bale carryover? Assuming in a normal year production equals use, the running balance for each year would be:

2000; 2000; 2000 + 3375 = 5375; 5375 − 2250 = 3125; 3125; 3125 − 2250 = 1750; 1750 + 3375 = 5125; 5125; 5125; 5125 − 2250 = 2875

That is, after this 10-year sequence the farmer ends up slightly better than all square with regard to hay reserves.

If the bad year occurred at the beginning, the situation would be different. For example:

B N B G N N B N G N

Then the reserves would be (*assuming the deficit is purchased to meet the demand*, though in reality the farmer might not buy it all depending on price and thus accept even lower production):

2000 − 2250 = −250; 0; −2250; 3375; 3375; 3375; 3375 − 2250 = 1125; 1125; 1125 + 3375 = 4500; 4500

Thus, 1 year's supply is carried over towards the end, which means, before feeding out, 2 years' supply was on hand. In this sequence, 2500 bales had to be bought (250 year 1, and 2250 year 3), remembering that 2000 were on hand at the beginning.

But, on *average*, over many years, the hay situation will be (deficit in a bad year times the chance of a bad year, plus the surplus in a good year times the chance of a good year):

$$(-2250 \times 0.3) + (3375 \times 0.2) = 0$$

as in a normal year supply equals demand. Thus, given a starting surplus of 2000 bales, it will remain at this over a long sequence of years, but sometimes will increase to over 2 years' reserve, and sometimes extra will need to be purchased.

The question

Like most decision problems, the question is whether to alter the existing situation. The main two alternatives are to *increase* or *decrease* stock numbers. Increasing will clearly mean the farmer must build up hay reserves, and therefore will have to sell stock from time to time, and/or increase productivity.

What would you do?

Write down on a piece of paper the ewe number change – use a plus sign in front of the number for an increase, a negative sign in front of a number for a decrease. Use '0' for no change.

What would an 'expert' do?

First, some calculations after working out the basic parameters:

- If stock numbers are decreased, the farmer is, effectively, increasing the number of good years, and the surplus feed in some years will be even greater, and production per ewe will be greater on average.
- If stock numbers are increased the reverse will be true, and more feed will need to be purchased, and/or production per head decreased.

Impact of a decrease:

Reflection and discussion indicates decreasing stock numbers by 200 ewes changes the chances on the seasons to:

Normal 55%, Bad 20%, Good 25%

Thus, on average (over many years), the hay reserves will be growing by:

$$(-2250 \times 0.2) + (3375 \times 0.25) = 394 \text{ bales/year}$$

These can be sold. In fact the increase will be greater, as with 200 fewer ewes, which were getting on average 1.5 bales each, there will be a surplus of 200 × 1.5 = 300 making a total of 694 bales/year. However, lamb and wool production will change. Production, on average, was:

Normal year	115% lambing S to S, and 5 kg wool
Bad year	110% lambing S to S, and 4.5 kg wool
Good year	118% lambing S to S, and 5.25 kg wool

With 200 fewer ewes, production will be down:

Normal year	230 lambs	1000 kg wool
Bad year	220 lambs	900 kg wool
Good year	236 lambs	1050 kg wool

Thus the expected decrease:

Lambs: $(0.55 \times 230) + (0.2 \times 220) + (0.25 \times 236) = 230$ lambs
Wool: $(0.55 \times 1000) + (0.2 \times 900) + (0.25 \times 1050) = 993$ kg

Compared with an increase of 694 bales.

Thus, if hay is worth \$5/bale, lambs \$65/head and wool \$3.80/kg greasy, the *net effect* is:

$(694 \times 5) - (230 \times 65) - (993 \times 3.8) = -\$15{,}253$

However, there are also some savings with fewer ewes: replacement cost down $(40 \times \$80)$ + health costs down $(200 \times \$2)$ + shearing costs down $(200 \times \$4)$ = \$4400.

NET CHANGE = −\$10,850

Impact of an increase:
Careful thought suggests that an increase of 200 ewes will change the pressure on 'seasons' so that the chances are:

Normal 45%, Bad 40%, Good 15%

Thus, on average (over many years), the hay reserves will be 'growing' by:

$(-2250 \times 0.4) + (3375 \times 0.15) = -394$ (i.e. actually decreasing)

With 200 extra ewes you also need an extra:

200×1.5 bales/year = 300

This is a total average deficit of 694 bales/year.

However, with the extra ewes production will be up. The farmer could let the per ewe production decline by not buying the extra feed, *or* buy the feed and assume production/head stays the same (in reality, it would drop a bit as there are more mouths in the spring, which still has the same production, though perhaps there is less wastage with the more mouths). For 'simplicity', assume production is maintained.

With 200 more ewes, production will be up:

Normal year (115% lambing and 5 kg wool)	230 lambs and 1000 kg wool.
Bad year (110% and 4.5 kg)	220 lambs and 900 kg wool.
Good year (118% and 5.25 kg)	236 lambs and 1050 kg wool.

Expected increases:

Lambs: $(230 \times 0.45) + (220 \times 0.4) + (236 \times 0.15) = 227$
Wool: $(1000 \times 0.45) + (900 \times 0.4) + (1050 \times 0.15) = 967$ kg

Compared with purchase need of 694 bales.

Thus, if lambs are $65/head, wool $3.80/kg greasy, and hay $7/bale, the *net effect* is (note that in poor years hay prices will be more – thus the $7 landed cost):

(227 × 65) + (967 × 3.8) – (694 × 7) = $13,571

The increased ewes require: replacements (40 × $80) + increased health and shearing (200 × $6) = –$4400.

NET CHANGE = +$9171

Analysis

The results show that dropping numbers by 200 ewes loses $10,850, whereas increasing by 200 ewes gains $9171.

Remember, it is necessary to invest in the extra 200 ewes costing, say, $70 at 6% interest ($840 total interest), but there is a saving if 200 fewer ewes are carried, so this changes the average figures to a loss of $10,010 for 200 fewer ewes, and a gain of $8330 for 200 more ewes, on *average*.

Clearly, there are some simplifying assumptions in the calculations above; increasing the number of ewes probably costs more than suggested here when extra costs such as fence repairs, some more fertilizer, etc. are included. But, the tendency in this case is to raise profit – but there is a limit in that if the increase in ewe numbers goes high enough production per head will eventually decline so total production declines – the estimates of the declines are a key factor.

Variability has gone up with the higher stock numbers – the chance of 'bad' years has increased, and in reality, some of the bad years will be worse than portrayed here. This is where a farmer must subjectively assess feelings about the variability and the consequence of bad years. This could be allowed for in the calculation, but would need many more hours with a calculator.

Summary

The feed reserve question boils down to a question of stock numbers, unless you wish to consider a regular policy of buying hay in good years to hold as a reserve – this is another alternative that could be costed out.

In this case study, compared with the current policy which leads to as much as 2 years' hay supply being on hand, depending on the sequence of years that pan out, increasing stock numbers by 200 means more feed would have to be purchased, but the return *increases*, on average, by about $8300, whereas decreasing stock numbers *decreases* the average profit by about $10,000. While the decreased numbers will give less variability year to year, it is a big drop compared with the current 3000 ewe policy. And, increasing to 3200 does increase the existing average by about $8300, so while the chance of bad years is much higher, this increased income can compensate for a lot of variability. A farmer who is very keen on playing it safe might, then, decrease numbers, but those prepared to push their luck a bit could well increase numbers with reasonable safety. Even in the worst year, income is still reasonable. However, if you increase stock numbers too far, the chance of disaster increases.

Principles of analysis

The case study example above provides a feel for how to consider these risk/uncertainty analysis problems. Each decision problem clearly has different elements that must be considered, but in general the analyst needs to:

1. List out the possible alternatives to be compared (in reality there are hundreds of these, e.g. stock numbers can vary from, say, 2800, 2801, 2802,... 3500, but all that is necessary is to take a few representative cases to get a feel for the trends). Usually the comparison is with an existing system to look for sensible changes.
2. List out the factors that are affected by the possible alternatives: what products increase/decrease, what inputs (costs) increase/decrease?
3. Consider the factors that are non-predictable with certainty, i.e. what are the uncertain factors. In reality, large numbers are, so you need to focus on the important ones. For example, spring pasture production, lamb prices, cost of replacements, etc.
4. Decide on how many season/price scenarios should be considered: usually two or three is a practical device to limit the calculations and still indicate the variability of real life.
5. Estimate, perhaps from actual records, perhaps from experience, or some combination, the chance of each representative situation (season) occurring.
6. For each alternative decision set, and for each possible set of conditions (season type, price possibility, etc.), calculate the change in returns and costs to give the net change for that particular decision set and set of conditions.
7. Calculate the average (or expected) net return for each alternative decision set, by multiplying the net outcome for each set of conditions by the chance of it occurring, then summing to give a total – this is the *expected* value.
8. Compare the alternatives and decide on the best. This involves comparing the expected values, and the ranges and their chance of occurring. If the worst should occur, can the farmer and farm cope with this? If not, strike off the alternative with this potentially bad outcome and only consider the others.

Summary

- Most farmers do have a choice in what products to produce, and how to produce them.
- The alternatives will have different levels of year to year income and cost variability.
- The farmer needs to decide, in each case, whether each product or production system is the one for him, given the impact on average profit and the year to year profit variability.
- What's right for one farmer is not necessarily right for others.

Asset Structure Approaches to Reducing Risk and Uncertainty

Having low debt and readily saleable assets can help reduce income variability, particularly in a run of bad seasons (both weather and prices).

There have been years when farmers with high debt levels, perhaps having just purchased, or borrowed heavily to develop the farm, have not been able to meet their outgoings due to a price downturn or an increase in the interest rate. Their asset structure has not withstood the changed circumstances. Generally, a robust asset structure will involve relatively low debt, and access to assets that can be readily turned into cash when needed.

An appropriate asset structure might involve all-purpose buildings (in contrast to highly specialized 'single function' buildings) and a low investment in depreciating machines (multipurpose, perhaps second hand) to provide flexibility. If surplus cash goes into an expensive tractor that sits in the barn for 9 months of the year and a sudden downturn causes problems, the tractor will not help much. However, if the money had been used to pay off debt, the lower interest bill in the poor year might well have meant it was still possible to apply some fertilizer, not that deferring basic superphosphate application for the occasional year when things are difficult will have a major long term impact. Nitrogen, on the other hand, does not get stored in the soil so deferment creates immediate production losses.

Overall, the asset structure a farmer has will impact on the variability of the cash surplus and may even threaten survivability, but will certainly affect the ease of management and living. However, circumstances do not always allow setting up a robust structure. It is in the good times when a farmer can act, so farmers must use any surpluses wisely.

Organizing the right structure

It is all very well to talk about these factors, but as is well known, the situation a farmer finds himself in could well be beyond his control. That is history – what is important is to move ahead.

If a farmer has surplus cash, or has a chance to borrow at a reasonable rate, perhaps from a family member, he must decide whether to reduce formal debt, improve the house in some way, have a holiday, or improve the farm assets. The surplus cash might have come from a good season, good prices, greater efficiency, or careful budgeting and frugal living, or some combination of many factors.

Sometimes the asset structure can be improved through re-organization, possibly by selling off the near new tractor for an older one, converting the high interest rate overdraft into a longer term mortgage, or perhaps even by selling off a small block of land if the farm is near an urban centre, or even perhaps to a neighbour who has a marginally sized farm. Every opportunity must be looked at with respect to the best use of any cash, or whether assets/debts can be re-organized to produce a more robust situation.

The ultimate in robustness is of course a debt-free situation with well maintained equipment and buildings, so downturns cause very little problem, maintenance costs are low, the chance of equipment breakdown is similarly low, supplementary feed reserves are high, soil fertilizer levels are excellent etc. The other extreme is high debt, a poor range of inadequate buildings and so on.

What is right for one family is not necessarily right for another, as attitudes and preferences towards risk levels vary between individuals. A farmer must select what suits him and his family as far as putting cash and time into a robust structure and relate this to the profitability of alternative uses of any surplus money.

Some people just do not sleep well at night if they have even a modicum of debt, others regard debt as a management tool and do not worry about whether it will cause a major problem in bad years, though, clearly there is a limit to how high the debt should be assuming a banker somewhere is still prepared to lend more.

Write down the asset and liability figures for a case study farm, and relate these to a structure that should be aimed for in the longer run. Each case will be different, but looking at an example will give you ideas on how to think about the problem.

Case study

With casual help, Farmer Pete runs 4000 Romney ewes on rolling hill country. He works hard. Farmer Pete comes in several 'versions', each version has used past cash surpluses on different levels of debt reduction relative to keeping the family content, enjoying winter holidays to the sun and surf, renovating the house and so on. When first taking over the farm from his father-in-law, the debt level was very high. Now that the parents-in-law are elderly and require the income they are no longer in a position to defer any repayments; indeed their major trustee and lawyer is quite hard hearted about sticking to the letter of the law, so to speak.

Spending time looking up Year Books, Statistics Department records, consulting the Economic Service records as well as the farm's accountant who still has copies of the accounts for the last 45 years, information on price and output variability (lambing percentage, wool yields, rainfall records and pasture yields) was obtained. The not-so-distant research station, now closed, also published useful records relating to older cultivars and sheep genetics, though certainly with GATT (free trade agreement), world markets have changed, but the records do give a basis for predicting likely cash returns for the next, say, 5 years.

Assuming for the moment that the soil fertility is relatively stable after many years of development, and that it is not planned to change stock numbers nor improve the subdivision (i.e. the basic production set up is relatively stable), Farmer Pete reckons the cash surplus *before* paying debt, tax and living expenses could be as high as $130,000, but could go as low as $70,000 in any of the next 5 years. Beyond that it is hard to estimate.

The basic figures

Pete summarizes the situation with:

Possible cash surplus($)	Chance
130,000	10%
115,000	20%
100,000	40%
85,000	20%
70,000	10%
	Total = 100%

This gives an *expected* cash surplus of:

$$(130{,}000 \times 0.1) + (115{,}000 \times 0.2) + (100{,}000 \times 0.4) + (85{,}000 \times 0.2) + (70{,}000 \times 0.1) = \$100{,}000$$

Now consider the different Petes and their debt levels:

Pete 1 has a debt of \$350,000 @ 7.00% interest flat-rate mortgage. Interest payment = \$24,500/year.

Pete 2 has a debt of \$250,000 @ 6.8% interest flat-rate mortgage. Interest payment = \$17,000/year.

Pete 3 has a debt of \$100,000 @ 6.5% interest flat-rate mortgage. Interest payment = \$6,500/year.

Pete 4 has no mortgage. Interest payment = 0.

Principal repayments

In the past the four Petes have had different approaches to principal repayment. Clearly, some have put a greater emphasis on repayment. For ease of demonstration assume no more repayments occur over the next 5 years (this simplifies interest and tax calculation).

Basic family living expenses are relatively stable at \$30,000/year now that the children are older. Depreciation covers the loss in value of the assets. For the exercise assume \$15,000/year has had to be spent on various asset replacements and this will continue as a non tax-deductible cash expense. In addition, the tractor has had to be replaced. An interest-free deal has been organized requiring capital payments of \$15,000/year over the next 5 years. Thus, \$30,000 must be spent each year on capital items.

Tax rates are:

\$1–38,000 19.5%; \$38,001–60,000 33%; > \$60,000 39%.

Depreciation works out at near enough to \$15,000 each year. Assume tax gets paid in the year it accrues (which is not strictly true of course, thus confusing the situation even further).

Tax deductions, living expenses, and the cash surplus

	Pete 1	Pete 2	Pete 3	Pete 4
Interest	24,000	17,000	6,500	0
Depreciation	15,000	15,000	15,000	15,000
Tax Deductions	39,500	21,500	21,500	15,000

Taxable income

Cash surplus				
130,000	90,500	98,000	108,500	115,000
115,000	75,500	83,000	93,500	100,000
100,000	60,500	68,000	78,500	85,000
85,000	43,300	53,000	63,500	70,000
70,000	30,300	38,000	48,500	55,000

Tax payable

Cash surplus	Pete 1	Pete 2	Pete 3	Pete 4
130,000	26,565	29,490	33,585	36,120
115,000	20,715	23,640	27,735	30,270
100,000	14,865	17,790	21,885	20,520
83,000	9,885	12,360	16,035	18,570
70,000	5,947	7,410	10,875	13,020

Cash income less interest less living expenses less tax less capital replacement

Cash surplus				
130,000	18,935	23,510	29,915	33,880
115,000	9,785	14,360	20,765	24,730
100,000	365	5,210	11,615	19,480
85,000	–9,385	–4,360	2,465	6,430
70,000	–20,447	–14,410	–7,375	–3,020

Expected (i.e. sum of each surplus × probability) cash surplus each year for each Pete:

+ 75	4,994	11,546	17,110

Clearly, on average, all farms make ends meet, but what about a particular sequence of seasons.

Possible outcomes

Given chance, one possible 5-year sequence for case surplus (in $) could be:

115,000; 70,000; 100,000; 85,000; 100,000

Given this sequence, what would have happened to each farmer assuming, for example, a starting bank balance of zero?

Cumulative bank balance

	Year 1	Year 2	Year 3	Year 4	Year 5
Pete1	9,785	–10,662	–10,027	–19,412	–18,777
Pete2	14,360	–50	5,160	800	6,010
Pete3	20,765	13,390	25,005	27,470	39,085
Pete4	24,730	21,710	41,190	47,620	67,100

Of course, the negatives would be worse than shown for Pete 1 as, presumably, he increased his overdraft and had to pay interest (which would have accumulated), though the interest would have been tax deductible so damping the effect just a little. Equally, for Petes 3 and 4 in particular, the surpluses would be greater as they could have been invested and earned extra profit.

This is one example of a sequence of years. A wide range is possible. At worst a sequence of less than normal years might occur, at best the opposite. If, for example, the sequence for the cash surplus (in $) was:

85,000; 70,000; 100,000; 70,000; 115,000 the outcomes would be:

Cumulative bank balance

	Year 1	Year 2	Year 3	Year 4	Year 5
Pete1	–9,385	–29,832	–29,197	–49,644	–39,859
Pete2	–4,360	–18,770	–13,560	–27,970	–13,610
Pete3	2,465	–4,910	6,705	–670	20,095
Pete4	6,430	3,410	22,890	19,870	44,160

Besides using an overdraft facility, if perhaps Petes 1 and 2 had bought some shares, or taken out some fixed deposits, a number of years ago when, through good luck, they had a series of good years the answer might have been different. How else could they stay in business given some, now, bad luck? On average of course, they all break even, or do better, but can Pete1 always be assured of getting a normal sequence of years? And what about Pete 5, whose data are not given here, who might well have had even higher debt?

Each farmer has to consider the debt level she/he is prepared to accept and the associated risks. If the borrowing is for development, and is highly profitable, hopefully the investor will eventually break through to be in a position to withstand a sequence of bad years. But each person, knowing the ups and downs that can occur, must assess how far to go in the debt stakes.

Summary

- A low debt situation with assets that can be readily converted into cash allows a farm business to relatively easily withstand bad years, or a sequence of bad years.
- Creating a robust asset structure is not always easy and new farmers, or those undertaking extensive development, will find moving ahead difficult given some bad years.
- Different people have different attitudes to risk. Some may be relatively content to accept the risks of high debt, particularly where borrowing means new and profitable investments. But, in doing the sums on the investments, be sure to consider both the lows as well as the highs.
- Debt repayment can often be the most profitable investment. The return from alternative use of the money needs to be compared with the saving in interest from debt repayment; e.g. can alternatives make 7% (or whatever the current mortgage rate is)?
- Sometimes family help can create a buffer for the early years. Perhaps, even, a spouse might work 'off farm' to provide some surety and stability to the situation.

Flexible Systems and Resources as a Method of Reducing Risk and Uncertainty

Where there is a choice, using management systems, products and resources that can be changed quickly as conditions and/or prices change dampens down profit variability, and in some cases will provide greater average profit than specialist production.

Flexible systems/resources allow changing as the situation changes. This is in contrast to a rigid system using specialist resources: in this case, if the conditions/prices worsen profit will fall. For example, using a specially built quarantine and embryo transplant building and equipment for importing a new breed that has potential (perhaps through being a good meat producer with very little wool production) locks you into a system. Provided wool prices stay low and meat rises this may be very profitable, but a change back to a good wool demand may quickly mean the investment is largely wasted. And will the systems and buildings be any use following the importation? Rather than using highly specialist buildings and equipment, if a farmer wishes to consider new ventures he should think about developing facilities that can have several uses in a general purpose building that can be easily converted, or use very cheap construction that may not last long, but at least the sunk capital is not high. The same applies to normal buildings and equipment.

Think about *flexible* production systems and resources a case farmer currently uses, or might potentially use, and write down all the production systems, resources and/or products produced that can be quickly changed, repackaged, and/or re-organized to suit changing prices/conditions.

The list could contain systems such as using sires that make it easier to sell store lambs in contrast to finished, and vice versa, depending on the feed and prices, and having storage areas that can be used for a range of activities such as machines, fertilizer and wool storage.

Other ideas for flexibility include:

- Dual breeds.
- Flying flock (have older ewes/cows that only last, for example, 2 years so you can vary the numbers).
- Using contractors instead of your own specialist equipment.
- Different degrees of finishing lambs (cattle) (basic store through to finished).
- A range of sires with regard to lamb/beef maturity dates.
- Maintenance deferral/maintenance blitz.
- Feed storage.
- Free market selling/no contracts.
- Wool/grain storage.
- Range of improved pastures – greater feed/changed production pattern.
- Electric/temporary fences.
- Mixed buy/breed replacements.
- Stocking rate changes: vary numbers depending on conditions and prices.
- Sell/buy ewes and lambs all counted (selling ewes with lambs at foot).
- Buy/sell feed and/or grazing.
- Employ casual labour and vary the hours.
- Range of cash crop variety types.

Utilizing flexible systems and structures

Gaining benefit from flexible systems requires carefully watching the signs and signals. A farmer must anticipate changing conditions and so make use of the flexibility. It is no use having, for example, access to extra irrigation water, and a plant that can cope, if it is used too late.

The principle of flexibility is that expected prices and conditions are constantly assessed so changes to the management to suit the new situation can occur quickly. Reasonable skill at reading the signs and predicting conditions is clearly important. If a farmer frequently gets the assessments wrong, sticking to a generally profitable system may be more appropriate. Like most things in life, good prediction is a key to success.

Flexibility is often a 'state of mind'. Most production systems can be constantly varied, but some farmers stick to what they have always done – it has worked in the past, why not now? The prudent person should think '*flexibility*', constantly asking what should be done and what changes are necessary given the current outlook. Just because feed management has involved putting a particular mob in a particular block/paddock in about July over the past 3–4 years does not necessarily mean it should happen this year. Consider the options, the feed covers, the soil moisture, the condition (live weight – LW) of the animals, and decide from these data, not from what happened last year.

The ultimate in flexibility for a flock (herd) structure is a 2-year system of buying 2-year ewes, perhaps through long standing orders. Half the flock leaves each year so variations in numbers are easy. If feed reserves are well below normal, perhaps buying fewer replacements this year could be prudent and vice versa. Selling/buying ewes and lambs 'all counted' might be a useful approach to cope with spring feed variations. In a cropping situation some crops have dual use, the best of which depends on the situation (prices, growing conditions, etc.). For example, oats can be harvested for grain, or harvested earlier for animal feed (chaff/silage).

Constantly maintained networks might be a useful 'asset' when buying/selling stock, similarly for conserved feed. When the hay barns are only a third full, perhaps a few phone calls are in order.

Assessing the alternatives

First, work out where the choices lie, then cost out the alternatives:

1. List any alternatives that are a reasonable prospect.
2. Collect the data on the alternatives. Much of this must relate to the variability of the system. Maybe some experience-based 'guesstimates' will be necessary, as it can be hard to find adequate records.
3. Do the sums on each and compare.

Even if the sums are not actually carried out, listing the choices and collecting as much data as possible can help the intuitive brain do its job, so that a system that has had the benefit of some thought emerges.

Each situation will be different, so studying case examples is the best way to obtain the general ideas of figuring out the situation. As noted, while the sums might not be followed through, an understanding helps the subconscious mental figuring leading to a better intuitive approach. Watching and conferring with others is also, of course, most helpful.

Case studies

Farmer Bill has traditionally run a mixed age ewe flock on his moderate hill country property, which is now well fenced with good pastures. He does find, however, that the variable springs/summers make life difficult in growing and finishing the lambs, particularly when the saved autumn grass has to be used early when the limited area of lucerne has not produced much hay. Recent seasons seem to have been particularly variable with a feeling of being overstocked some years, and certainly ‘feed to burn’ in others. Having replacements on the farm sometimes exacerbates the situation, though he has always believed in a closed system to prevent disease introduction. But, perhaps a more flexible system could be appropriate. Thus, Farmer Bill decides to do some investigating with the help of his local discussion group, who are always willing to share heads when it comes to calculations.

His recent networking indicates there could well be some farmers in the north on the harder hill country who would consider a semi-formal arrangement for supplying 2-year ewes at the going price.

The discussion group decides it is not necessary to allow for price variability in their sums as the lamb/wool/mutton and replacement prices will be the same for both systems; however, seasonal variability needs considering. Their further discussions and investigations come up with the following data:

Prices

Lambs:
- finished $70
- store $40 (not yet grown sufficiently for the market)

Wool:
- mixed age ewes $3.80/kg
- 2-year ewes $3.50/kg

Ewes:
- 2-year $60
- cull $40

Health, shearing, dipping, ram, etc. costs per ewe $7.50
Hay making $1.50/20 kg bale

Possible seasons are summarized down to three representative situations:
- Good, with chance 20%
- Normal, with chance 30%
- Poor, with chance 30%

Hay price:
- good season $4/bale
- normal $5/bale
- poor $7/bale

Mixed age balanced flock

3000 ewes and 700 hoggets, 3% deaths

Lambing:
- normal 115%
- good 118%
- poor 110%

Proportion of lambs finished:
- normal 90%
- good 100%
- poor 75%
- any remainder store

Wool:
- normal 5 kg (4.5 kg hoggets)
- good 5.25 kg
- poor 4.5 kg

Hay production:
- normal 4500 bales made/used
- good 7875 bales made, surplus sold
- poor 2250 bales made, deficit purchased

Two-year flying flock

3400 ewes wintered (400 more than for a mixed age flock as no replacement young stock), 3.5% deaths

Lambing (older ewes):
- normal 117%
- good 118.5%
- poor 115%

Wool (less on older ewes, lower quality):
- normal 4.25 kg
- good 4.37 kg
- poor 4.125 kg

Hay: neither bought nor sold as stock numbers flexible

Proportion of lambs finished:
- normal 90%
- good 100%
- poor 80%
- any remainder store

Stock number flexibility: the advantage of a 2-year flock is that numbers can be easily varied through the number of replacements purchased. Thus, it is assumed in a bad year when the pastures are eaten out and the hay barns half full 200 fewer ewes are purchased. Equally, when the pasture mass has built up and the barns are full, stock numbers are increased by 200 ewes.

Calculations for Farmer Bill's stock situation

Note: only the income and costs that differ for each system/season are included. The rest, clearly, remain the same.

MIXED AGE FLOCK

	Normal	Good	Poor
Lambs 3000	@ 115%	@ 118%	@ 110%
Less 700 replacements	2,750	2,840	2,600
Wool 3000	@ 5.0 15,000	@ 5.25 15,750	@ 4.5 13,500
700	@ 4.5 3,130	@ 4.75 3,325	@ 4.0 2,800
Cull ewes	610	610	610

Cash

Income		$	$	$
Lambs:	finished	2,750 @ 90% @ $70 = 173,250	2,840 @ $70 = 198,800	2,600 @ 75% @ $70 = 136,500
	store	2,750 @10% @ $40 = 11,000	0	2,600 @ 25% @ $40 = 26,000
Wool		18,150 kg @ 3.8 = 68,970	19,075 @ $3.8 = 72,485	16,300 @ $3.8 = 61,940
Cull ewes 610 @ 40		24,400	24,400	24,400
Hay		no difference	3,375 @ ($4 – $1.5) = 8,437	no difference
Total income		$277,620	$304,122	$248,840

Expenses

General: 3000 @ $7.50	22,500	22,500	22,500
Hay	no difference	surplus (saving on less made) 2,250 @ $7 = 15,750	2,250 @ $1.50 = –3,375
NET TOTAL	$255,120	$281,622	$213,965

TWO-YEAR FLYING FLOCK

	Normal	Good	Poor
Lambs	3,400 @ 117% = 3,978	3,600 @ 118.5% = 4,266	3,200 @ 115% =3,680
Wool	3,400 @ 4.25 kg = 14,450	3,600 @ 4.375 kg = 15,750	3,200 @ 4.125 kg = 13,200
Cull ewes*	1,640	1,640	1,640

*Culls come from the half of the flock purchased the previous year.

Cash

Income	$	$	$
Lambs: finished	3,978 @ 90% @ $70 = 250,600	4,266 @ $70 = 298,620	3,680 @ 80% @ $70 = 206,080
store	3,978 @ 10% @ $40 = 15,920		3,680 @ 20% @ $40 = 29,440
Wool	14,450 @ $3.5 = 50,575	15,750 @ $3.5 = 55,125	13,200 @ $3.5 = 46,200
Culls: 1.640 @ $40	65,600	65,600	65,600
Total income	$382,695	$419,345	$347,320

Expenses

General	3,400 @ \$7.5 = 25,500	3,600 @ \$7.5 = 27,000	3,200 @ \$7.5 = 24,000
Replacements	1,760 @ \$60 = 105,600	1,960 @ \$60 = 117,600	1,560 @ \$60 = 93,600
Extra hay made/saved	0	3,375 @ \$1.5 = 5,012	2,250 @ \$1.5 = −3,375
Total expenses	\$131,100	\$149,662	\$114,225
NET TOTAL	\$251,595	\$269,683	\$233,695

Summary

Season	Mixed age flock	Two-year flying flock
Good (20%)	\$281,622	\$269,683
Normal (50%)	\$255,120	\$251,595
Poor (30%)	\$213,965	\$233,095
Expected (average) value	\$248,074	\$249,663

Comments

While the assumptions put together by Farmer Bill and his colleagues may not be relevant to other situations, in this case the expected gross profits are remarkably similar so you could not say the two systems would be financially different over many years. *However, the variability is quite different*. The flexibility of the 2-year flock relative to the less flexible mixed age flock can be an advantage. Of course, there is nothing to stop a farmer selling off more older sheep from a mixed age flock in a poor season, but this may be a more difficult decision compared with a flying flock where you simply buy in fewer replacements.

Reviewing the situation

Reducing variability tends to have its downsides: in this case the good years are not as profitable. If you could predict for a couple of seasons ahead with any certainty what the growth would be like it would be easy to get the stock numbers right, and if you could also predict the prices, life would be simple. But, that is not the real world. However, the advantage of getting things right does suggest time spent studying the market situations could be a good investment.

How good is your judgement?

The calculations for assessing alternative systems with different levels of flexibility can be quite *offputting* for some managers, not to mention thinking about all the things that need to be included as well as their values; for example, how many more sheep you can carry under a flying (2-year) flock system, and what the lambing percentage will be under different seasons. Yet, most farmers do intuitively consider the alternatives. No doubt many take a keen interest in what other farmers in the district are doing and come to a conclusion. But, care is necessary in getting all the facts – 'across the fence' observation does not always provide them. Sitting down with pencil and paper listing out the pros and cons can be stimulating and useful and may provide the basis for a 'best judgement' decision, particularly after chatting to colleagues.

Remember, all a farmer needs to list out are the *changes/differences* between the alternatives. For example, if a farmer will be employing a person no matter which system the farmer decides to use, the cost can be left out of the calculation. Further, some differences can be ignored as they are unlikely to be a major consideration, though they should be kept in mind as perhaps a factor to tip the balance. For example, in Farmer Bill's worked example above, the mixed age flock requires two ram types assuming the replacement stock are based on a white-faced (produces replacement stock) ram. Thus, the lamb finishing performance for the white-faced wethers is unlikely to be as good as those from the specialist meat sire, but this calculation was not included.

Further ideas on flexibility

What other flexible systems might be considered as a possibility to reduce the cash surplus variability? Select one or two and list out the advantages and disadvantages of each. What is the estimated value of each advantage and disadvantage, and how will they affect the variability? Thus, will the *expected* (average) cash surplus increase or decrease, and to what degree will the cash surplus variability change? On balance, might the change be worthwhile?

How might Farmer Bill approach considering buying replacement young stock instead of breeding his own? Buying, say, 2-tooths is a halfway approach compared to a 2-year flock. He might create a matrix of ideas such as this:

Breed own replacements	Buy 2-tooth replacements
Advantages	
(1) Stock output possibly higher as select own rams/stock	(1) Higher number of productive ewes
(2) Disease introduction less likely	(2) Easy to quickly increase/ decrease flock size
(3) Easier to suit feed conditions	(3) Easier management
Disadvantages	
(1) Lower number of productive ewes as running hoggets as well	(1) Ewes less productive as some one else's culls
(2) White-faced wethers to finish	(2) Disease introduction more likely
(3) Management more demanding	(3) Cash demands higher due to replacement purchase, and, unless contracts made, replacement cost quite variable and complex

To assist with the stock quality and buying replacements, an arrangement with another farmer, perhaps a contract, may help. Assuming sensible contracts are put in place, what impact will the potential change have on net cash and its variability?

Consider each advantage and disadvantage in turn, thinking about the size of the impact. Each above factor has been numbered for ease of reference with the impacts of the three advantages and disadvantages listed below.

Breed own replacements	Buy 2-tooth replacements
Advantages	
(1) Reasonable profit increase, less year to year variability (significant)	(1) Significant increase in saleable product, no feed for replacements
(2) Reduces variability a little	(2) Able to vary numbers with the seasons so profit somewhat less variable
(3) Little impact	(3) So, together slight decrease in variability
Disadvantages	
(1) Reasonably large decrease in saleable product	(1) Depends on contracts, but appreciable profit product loss
(2) Some drop in income	(2) Increases variability a little
(3) Variability increased slightly	(3) Significant impact on variability due to uncertain price

In contrasting the ups and downs, thought must be given to the meanings of the words 'reasonable', 'slight', 'significant', and so on, so that some conclusion can be drawn. In this example, the farmer is swapping a smaller number of slightly more productive animals for a net increase in saleable products, which can be managed to suit the seasons, but the cost is the cash for the replacements – this could be quite variable, so perhaps the key is to be able to reach longer term contracts, which evens out the price and ensures reasonable quality and healthy stock.

It might be useful to repeat this exercise for one of the other potentially useful flexible systems you thought of before.

Knowledge and Information as a Method of Reducing Risk and Uncertainty

Risk and knowledge (or information)

The impact of risk and uncertainty stems from not knowing what the output, and thus the cost and returns, will be at various future times. If there was a way to foretell the future, a farmer would know what the cash surplus was going to be for alternative management policies, and perfect decisions could be made. However, life is not like that and, consequently, it is necessary to use techniques to reduce the cash surplus variability and the effects of its impact.

However, a farmer can sometimes use his time to improve his knowledge of a situation and increase the information he holds. A greater knowledge about likely outcomes means the farmer can make provisions for the expected circumstances and reduce the impact of bad situations, and better gain from the good ones.

Data and information

Data, or lists of numbers and facts, need working on to produce useful information (or knowledge). The distinction is important. For example, 50 years of rainfall records will not help much until a farmer has summed the figures and averaged them out. They might then be related to, for example, pasture production, hay yields, winter feed crop yields and the like. Thus, data must have time spent on them to produce useful information. Similarly, for example, all a farmer's cuttings from papers and journals about, for example, lamb prices need collating and interpreting to produce a forecast for next season.

Feed budgets

Knowledge about the future feed supply and demand is critical to good management on sheep, beef and dairy farms. The data lead to feed budgets (decision information) and action.

On livestock farms, feed information (the supply of pasture and feed crops, and its effective utilization) is probably the most important asset a farmer has. Think of the time spent on forecasting cash flows relative to time spent on forecasting feed flows, yet the latter determine a large part of a farmer's cash surplus whereas the cash flow is a follower, rather than a determinant of success.

Putting time, and therefore cost, into basic equipment (e.g. pencil and paper) and perhaps a computer package, pasture and crop measuring and weighing devices, and also some stock scales, can provide a wealth of information that enables anticipating difficult situations and, therefore, an ability to take action before the difficulty occurs. It might indicate you need to lower stock numbers, perhaps lower the current feed intake using an electric fence, perhaps purchase cheaper feed now and so on.

Consider pasture production records – would a farmer like to have, for example, 15 years of 2-weekly records of the dry matter in each paddock? If paddock/field diaries contained this information, together with associated rainfall records, a few late nights with a calculator could produce pasture growth curves for not only the average of all years, but also the average of the best 3 years, and the worst 3 years. These data can then help to decide, for example, feed storage levels. Knowledge is valuable and can be used to help protect against variability.

A similar situation exists for cash cropping farmers. Here information on different crop prices and on rainfall records can be useful in sorting out next year's mix of plantings. Such records must be adjusted for inflation, and similarly information on world-wide trade deals and tariffs, and production levels in other countries, can all be used to more accurately predict prices.

Many farmers probably already keep various types of data (figures, notes, cuttings, etc.). *But does the farmer make good use of this data*? Write down how he uses the records that are designed for forecasting purposes.

Noting what the farmer currently does probably makes you think of other records and analyses that might be undertaken Write down which ones would help forecasts and reduce uncertainty. But does the farmer have the time to do all this recording and analysis? This is, of course, a matter of time management and priorities.

Some farmers keep a significant quantity of records, but how often do they get consulted and used?

Information has *value* like any other resource.

Example: the value of information

Farmer Jane makes every effort to flush (feed well) her ewes to ensure a good live weight (LW) at tupping (mating). From attending field days she knows that each extra kg of LW at tupping increases the lambing percentage survival to sale (S to S) by around 1.3%. However, she has to rely on the early autumn growth, which is very dependent on the midsummer rainfall. In good years she has more feed than the stock can utilize and the subsequent lambing percentage is high, but in poor years it is clear the lambing percentage suffers. If only Jane could better predict the likely growth as this would mean she could organize some excellent quality hay to extend her pasture and ensure good bodyweights.

Research data shows for each kg of LW growth about 3.3 kg DM are required. A quick sum shows if she can get the hay for \$0.25/kg, this (3.33 × \$0.25) \$0.83 gives 1.3% extra lambing worth (1.3 × \$70)/100 = \$0.91. So feeding this hay is worthwhile *if* the sheep need it, *but* more often than not Jane cannot just rush out and get excellent hay when it is obvious it is needed.

Putting some real information into the problem

After thinking about the problem Jane realizes that pasture output depends on soil moisture and, probably, midsummer rain (and of course the fertility level and species mix). She decides to do some research and hopefully convert it into knowledge of some use. Her father-in-law, after retiring, decided he needed something to do so he started cutting and recording summer pasture production. These data were in the old paddock diaries for the last 10 years or so, along with the rainfall records which had been kept for 50 years. Would the two sets of data match? Out came the calculator, and after several nights of collating and adding data in various combinations Jane discovered that rainfall from mid-January to mid-February (midsummer) was closely related to the pasture levels at the beginning of March (early autumn). Jane summarized this with:

Rainfall mid-Jan–mid-Feb (mm)	Average pasture cover over the farm at the beginning of March (kg DM)
25	800
30	1100
35	1400
40	1600
45	1750

The records also indicated with 1400 kg or more DM/ha of reasonable pasture the ewes ended up at a good live weight for tupping. Of course, this was not always the case as the previous spring also had an impact, but for evaluating the flushing situation Jane reckoned these data were very helpful.

Jane thought that if she used this *information* on the rainfall by organizing some excellent hay to ensure she could start feeding it from late February, allowing better management and utilization of the grass, she could ensure the live weight of the ewes was kept up.

Having done all these sums she now had this *knowledge*, which could be used in the many years to come. Of course she would constantly improve the data as more years of records became available. Jane wondered if all this effort was worthwhile and considered the value of information.

Calculating the value of specific information

Jane wondered about the *value* of the time she spent in sorting out the data. To assess the average *value* of the *information*, Jane realized that in some years it had no extra value as there was sufficient pasture (but at least she knew that), but in other years there was value. Thus, she worked out the chance of each level of mid-January to mid-February rainfall (in reality all levels are possible, but five mid-points were chosen to summarize the levels). The 50 years of rainfall records showed each level occurred in the following proportions:

Rainfall mid-Jan–mid-Feb (mm)	Chance of occurring (%)
25	10
30	20
35	40
40	20
45	10

Given that it is only in the drier years that extra feed was necessary, her calculation revolved round the 25 and 30 mm possibilities.

Jane reckoned in the better years her ewes put on 5 kg LW on average, giving an extra 5 × 1.3% = 6.5% lambing. Her research and reading showed that at 800 kg DM/ha ewe intake was just enough for maintenance. Thus, to put on 5 kg requires 5 × 3.3 = 16.1 kg of excellent hay (3.3 kg DM for 1 kg LW), which cost 16.1 × $0.25 = $4.03. If a lamb is worth, say, $70, an extra 6.5% lambing gives 0.065 × 70 = $4.55.

It is not quite as straightforward as this, as there are a few extra costs associated with the extra lambs, but generally it just makes economic sense. For hay prices less than this, which could be expected at this time of year, profit increases.

With a pasture cover of 1100 kg DM/ha some ewe live weight gain can be expected. The research shows about 80 g/day, or about 2.3 kg over 28 days is possible. To get 5 kg requires feed augmentation of (5 – 2.3) × 3.3 kg = 8.9 kg. The cost will be 8.9 × 0.25 = $2.22 and the gain is (5 – 2.3) = 2.7 × 1.3% = 3.51% lambing with a value of 0.0351 × $70 = $2.46. So, in a 25 mm rainfall year you get an extra $0.52 ($4.55 – 4.03) per ewe, and in a 30 mm year an extra $0.24 ($2.46 – 2.22) per ewe.

What is the chance of each of these? The rainfall data showed 10% and 20%, respectively, so the *expected value increase* is ($0.52 × 0.1) + ($0.24 × 0.2) = $0.1 per ewe.

Was all the research worthwhile? Probably not, but this knowledge was not available until all the sums were completed.

Individualistic approach

Each farmer must decide to what degree they should put time into getting information, both formally and informally. Some farmers have intuitive skills that observe and store away useful information without formally organizing a system. Others need a formal system. Thus, each farmer needs to work out what is best for their personality and situation. There is a special section on record keeping in Part 1 of this book, which may be worth re-reading at this point. Here the emphasis has been on information for reducing variability, but there is little distinction between this specialist use and record keeping in general – the aim is to provide information that leads to better decisions and, mainly, economic gain.

Using a Tax System as a Method of Reducing Risk and Uncertainty

Introduction

In some situations it is possible to use the tax system to reduce income variability. Tax laws often recognize the difficulties in operating in a very uncertain environment with its fluctuating profit, which means, with progressive tax, average tax paid is not simply the tax on average income. If in a particular year you get a high income you will be paying tax at the highest rate; in contrast, in a poor year you may be paying a much lower rate – but often the two do not even out due to the disproportionate difference in rates.

In using the tax laws to legally smooth 'after tax' income, be very sure to consult with tax professionals, as it is important to be fully aware of the details and tax responsibilities. The penalties for incorrect reporting and claiming can be harsh.

Some of the options possible are listed below. Any farm's ownership structure may well influence the best system, so what is listed below must be interpreted in this light.

Income equalization

Income equalization schemes are designed to smooth a farm's taxable income. When income is high some of the returns can be set aside and lodged with an equalization account and is removed from the year's reportable income. It can be withdrawn when income is lower. Tax is not payable in the year of deposit, but adds to taxable income when withdrawn. The net effect can be to reduce profit variability. The schemes will be country specific regarding the details of how they work, but the idea is somewhat common.

Example: the use of an income equalization scheme

Usually a farmer can nominate the amount to be lodged in his account with the tax department in any one year up to several months after the balance date (check the provisions). The minimum period of deposit is usually 1 year, but can be up to 5 years (check the legislation). Normally a farmer cannot both deposit and withdraw in any one year. As an example, consider the following taxable income sequence:

Pre-deposit taxable income	Amount of deposit/ withdrawal	Balance taxable income	Post-deposit	Tax Payable	
				With IE	Without IE
120,000	60,000	60,000	60,000	14,670	38,070
41,000	−19,000	42,800	60,000	14,670	8,400
26,000	−34,000	10,084	60,000	14,670	5,070
130,000	70,000	80,386	60,000	14,670	41,970

19,000	–41,000	41,798	60,000	14,670	3,705
23,000	–36,000	7,048	60,000	14,670	4,485
52,952	–7,048	0	60,000	14,670	12,344
			Totals	102,690	114,044

Notes: all values are $. IE, income equalization. The calculations assume tax is 19.5% for $1–38,000 taxable income, 33% for $38,001–60,000, and 39% for > $60,000.

In this calculation, 3% interest has been added to the accumulating IE account to represent what the tax people pay in this case. You will note that the final balance taxable income has been calculated to give a zero balance for the sake of rounding off the exercise. Note that the scheme has reduced total tax paid by some $12,000. But if you had paid the tax in the year it was incurred, and invested any surpluses at, say, 8%, the figures would have been, where it is assumed drawings (living expenses) were $45,330 ($60,000 less tax of $14,670):

Income	Tax	After tax and drawings	Balance
120,000	38,070	36,600	38,386
41,000	8,400	–12,730	25,656
26,000	5,070	–24,400	1,256
130,000	41,970	18,300	44,017
19,000	3,705	–30,735	16,917
23,000	4,485	–26,815	–9,898
52,952	12,344	–4,722	–14,620

Note: all values are $.

In producing this series tax is paid on the 8% interest, which then leads to the yearly balance allowing for the net investment income. It is clear that this particular sequence leaves the farmer worse off compared with using the equalization scheme. This assumes the drawings are the same each year. If these can be varied to suit the cash available, the situation will alter again.

It is clear that each case needs to be considered on its merits. The difficulty is in forecasting the possible ups and downs in income.

Income estimation

In many countries farmers pay *provisional tax* (usually based on the previous year's taxable income). Often the rules of the system can help to even out the 'after tax' cash flow and, therefore, reduce 'after tax' cash variability. Under the rules of provisional tax the tax liability is often based on last year's reported profit. However, if the farm's income is expected to be much greater, or much less, than last year it is possible to put in an *estimate* of taxable income and, consequently, alter the provisional tax liability. If the estimates turn out to be relatively accurate, the after tax cash flow is less variable. However, of course, the total tax paid will be the same in the end.

Example: the use of income estimation to reduce variability
Making sure the taxable profit is estimated when paying provisional tax can help smooth the after tax income. But it does depend on good estimation and the particular sequence that occurs. Here is an example using the same sequence that was used in the equalization example.

Taxable income	Exact tax	Net of tax with perfect prediction	Provisional tax	Net of tax with provisional
120,000	38,070	81,930	12,344	107,656
41,000	8,400	32,600	38,070	2,930
26,000	5,070	20,930	8,400	17,600
130,000	41,970	88,030	5,070	124,930
19,000	3,705	15,295	41,970	–22,970
23,000	4,485	18,515	3,705	19,295
52,952	12,344	40,608	4,485	48,467
	Average	42,558		42,558

Notes: all values are $; the calculations assume tax is 19.5% for $1–38,000 taxable income, 33% for $38,001–60,000, and 39% for > $60,000.

It is assumed that the sequence repeats itself so that provisional tax in the first year is based on the taxable income in the last year. Also, the rules probably mean there would be slight variations on these figures (e.g. interest on under/over payments is not included; these should be checked carefully).

While the total tax paid is the same, it is worth noting that the 'Net of tax' figure for where the taxable income is forecasted precisely, is much less variable compared with always being a year behind. However, this calculation assumes that tax is paid all at once, so interest advantages of paying in stages is not captured. Note the negative balance in one year caused by the tax payment being high in a year of low income. This would have had to have been funded from overdraft, which creates a further cost not included in the figures.

Claiming development expenditure

Careful use of expenditure that can be claimed can help reduce variability, and sometimes reduce the total tax paid. Of course, usually any loss made in a year can be claimed the next year and similarly reduce tax to be paid and, thus, income variability. However, often there is little discretion in how losses can be claimed, so it is not possible to claim some over several years to reduce the marginal tax rate. Usually a loss must all be claimed at the first opportunity. Generally, however, some development expenditure (e.g. fertilizer) can be claimed with some discretion and, thus, help reduce variability. *But the exact system must be checked in each jurisdiction*.

Pitfalls

It is important to be fairly sure about forecasts of income and expenditure to take advantage of the various options. Sometimes it pays to accept the tax liability and pay the tax in contrast to using the, potentially, alleviating options. There are two reasons: (i) if the forecasts are wrong, a farmer may end up paying more tax and have a high income variability as a result; and (ii) sometimes a 'bird in the hand is worth two in the bush' in that if both the income and tax payments are deferred, opportunities that come up may be lost and, thus, reduce the longer term income. While the income equalization schemes often pay interest on deposits, in some cases a farmer can do much better than this on the open market or in using the 'after tax' money on the farm. This must be matched against the possible tax savings. For example, subdividing a paddock now might return much more than the interest offered and the tax paid on the deferred income.

Whatever you do, always consult a tax expert first.

CHAPTER 3.6 SUBJECTIVE AND OBJECTIVE PROBABILITIES

Probabilities (or chances, depending on which word you prefer) can be based on one of two approaches. These are called *objective* and *subjective* probabilities.

Objective means the estimates are based on actual data, or simple logic. An example of the latter is the probability of 'heads' or 'tails' in the toss of a coin, or the chance of a six when tossing a die. Without doing any experiments you expect the chance of heads as 50% (or 0.5 probability) and the chance of a 'six' as 1/6, or 16.7% (0.167). In primary production there are not many events where the data can come from simple logic.

Objective probabilities come mainly from historical data, the best example of which is the weather. Often weather stations and farms have many years of records that can be used to estimate the chance, for example, of a wet warm spring, and so on.

On the other hand, *subjective* probabilities are defined as your best estimate of the chances – you review what data are available, and subjectively estimate what you expect the possible outcomes to be and their chances. The estimates can then take into account the changing situations. To become comfortable with these ideas, follow through the exercises listed below.

Objective Probabilities

Exercise 1: Objective probabilities – rainfall

1. Collect together all the rainfall records you can find for your district (or maybe for a case farm if you have them, or perhaps from a nearby farm), preferably on at least a monthly basis.
2. Decide the time periods making up what you regard as the early spring, late spring, early summer, late summer, early autumn, late autumn, early winter and late winter. The cut-off dates should depend on the critical growth periods management wise.
3. Decide which of these eight periods are the more critical for the case farm. Drop out the others from the analysis. Perhaps late summer might go, and maybe early winter too, but it will depend on each situation.
4. For the periods you have selected, add up all the years' rainfall data to get a total rainfall over each period for all the years for which you have records. Then calculate the *average* for each period by dividing the total by the number of years for which you have records (e.g. if you have 20 years' records, and the

total for early spring was 1397 mm, the average would be 1397 / 20 which is 69.85, or near enough to 70 mm).

5. For each period create what you regard as the *good*, *typical* and *poor* rainfall levels and allot a range for each (e.g. greater than 90 mm good, 90 to 65 mm typical, less than 65 mm poor).

6. Work out the number of times the rainfall in each chosen period has occurred within the relevant range (e.g. for early spring the rain may have been > 90 mm in 6 years, 90–65 mm in 9 years and < 65 mm in 5 years for 20-year record set).

7. Work out the chance, or probability, that rainfall will fall into each category for each period. Thus, for example, in the case in **6** above, the probability of good rainfall is 6 / 20 = 0.3 (or 30%), typical rainfall 9 / 20 = 0.45 (45%) and poor rainfall 5 / 20 = 0.25 (25%).

8. Think about the sets of probabilities you now have: do there seem to be any *inconsistencies*? This is quite likely as with only, say, 20 years' records there will probably be some strange ups and downs (e.g. for early summer you might have calculated good 45%, typical 25% and poor 40%. This pattern seems illogical, but if you had 100 records it is most unlikely to occur). If the inconsistencies you find are likely to be illogical, smooth out the data to reflect what is more likely, possibly by using the data from the other nearby periods to give some clues. In the example above you might expect something more like 30%, 40% and 30%. But maybe you do in fact have this strange distribution, so do not jump to conclusions too quickly.

9. For a farmer, as the years progress the records and estimates should be updated. If a computer is available, the data could be put into a spreadsheet, and people with a bent for calculations could get the spreadsheet to automatically calculate the probabilities. Updating is then very easy.

Use of probabilities

The rainfall probabilities provide a very useful set of knowledge for details such as planning supplementary feed, stocking rate and likely cash variability outcomes, which may help indicate the overdraft facility that it might be wise to organize.

Subjective Estimates

Many important information items cannot simply be based on historical records in a direct way such as in the rainfall example. For many items the past is not a close representation of what might be expected in the future. Examples include the price of bull beef and wool, the price of milk solids and the price of wheat. In general, this is not the case for the weather, though in some areas the number of records of the past might not be sufficient to allow sensible and reliable estimates to be made. Subjectivity must be used in these cases.

If the wool price data for a particular wool type for the last 50 years was obtained, the average is unlikely to be a good estimate of next year's price. Neither would the 50-year variability data necessarily be a good guide to the chances of next year's price being higher or lower than the expected figure.

Much has changed over the 50-year span, including trade agreements, wool production and handling technology, global transport and communication systems, the average wealth, and thus spending power, in the various countries taking the wool, and so on.

This does not mean the past should be ignored – it is the guide to the future. But you need to add to the historical data your knowledge of the changing conditions and make modifications accordingly. Do not forget that various groups also put out their view of the market situations; this is all information that can be absorbed to come to a conclusion. Therefore:

Historical data + Current knowledge = Best estimates of the future

These estimates are called *subjective estimates* as they rely on subjective (in contrast to 'absolute factual') judgement. This means your best estimates might well be different from, for example, colleagues and neighbours – but both might be legitimate to you as individuals. You are making the judgement from your own personal situation, but this requires constant practice: you should be constantly reading the signs (historical data plus assessments of the current conditions) and making judgements.

Exercise: Subjective probabilities – next year's prices

Write down your estimates of:

1. The coarse wool price for next season ($/kg greasy) as:
- **(i)** the most likely price *and* its chance
- **(ii)** the possible highest price *and* its chance
- **(iii)** the possible lowest price *and* its chance.

Be sure to check that the total of the chances is 100% (probability of 1).

2. Repeat **1** but for wheat.
3. Repeat **1** but for 15 kg lambs ($/head).
4. Repeat **1** but for bull beef ($/kg).

Keep these estimates in your file on prices after dating them – bring them out next year, update them, and ask yourself: how accurate was I?

(Note: you may have already entered some of these data in the Exercise in Chapter 3.2 'Measuring and Describing Risk and Uncertainty': check to see if the estimates are comparable.)

The Future

You might like to think about which factors are the most critical to the success of a case farm's operations, and estimate probabilities for a number of possible outcomes that cover the likely range. These records can then be updated each year. The data could possibly include the following important variables: lambing percentage, lamb growth rate, wool price, lamb price, beef price, replacement stock cost, rainfall and temperatures.

CHAPTER 3.7 REINFORCEMENT: RISK PROBLEM SCENERIOS

Types of Risk and Uncertainty

Being able to classify anything with a risk does not necessarily help reduce the risk! However, understanding the different types of risk that a farmer might face helps confront the problem and provides clarity over its bounds.

Chapter 3.3 contains information about the types of risk – as an introductory exercise check whether you remember the different types by thinking of an example of each. Be sure to state what type each example covers: for example, 'The price for the main shear fleece wool is an example of price risk and uncertainty'.

Comparing Alternatives From a Risk and Uncertainty View

To further develop skill in assessing alternatives where risk is a factor, consider, and provide answers, to the scenarios below. Each one represents the use of one of the risk-reducing methods. In some of the cases you cannot necessarily say with certainty what the correct choice is as it depends on the decision maker's attitude to risk. Thus, the score given for correctness must be interpreted in this light, i.e. just because you do not have many 'correct' answers does not in fact mean you have necessarily chosen the incorrect answer.

An *analysis of each problem* is also provided so that, following answering each scenario, you can check your calculations and intuitions. Do not look at the analyses before at least attempting the problem.

Scenarios

1. Lambs

A meat company is offering a contract for the supply of 1000 finished lambs of at least 17 kg before Christmas (or June depending on your hemisphere). They are offering \$4.18/kg. Should you take the contract on the grounds of increasing income surety? There is little doubt you can supply, though some of the other ewes would need 'pinching' (reduced intake) in a poor season.

You reckon the open market price could be anywhere between \$3.80 and \$4.60/kg, with an expected price of \$4.20/kg. You summarize the prices by noting a chance of 30% for \$3.90, 40% for \$4.20 and 30% for \$4.50. If the ewes have to be pinched it means the rest of the lambs must be sold 2 weeks late at a cost of \$300 in overdraft interest. You estimate the chance of a poor season is 20%.

Should you: **(a)** take the contract; **(b)** stick to the open market; or **(c)** not sure?

2. Bull beef

June has always maintained she has a much surer income in her relatively variable climate by running bull beef in contrast to selling 18 months finished animals (chillers). Despite what some say, bull beef can be sold at different ages depending on the grass supplies and current market. Chillers can too, but the price drop, if they are not finished, is large. Weather information shows poor seasons occur in 3 out of 10 years, and good seasons 2 in 10 years. In good seasons the bulls can be kept and grow an extra 80 kg, whereas in a poor season they get sold early even though they are 40 kg light. Chillers, on the other hand, have to be stocked lighter (in terms of the total LW held) to ensure, even in a normal season, they can reach a finished weight. In poor seasons 10% have to be sold off with a 20% drop in price and 15% drop in weight. Bull beef sells for \$2.35/kg, chillers for \$2.90/kg, but if unfinished \$2.32/kg. June can run 200 bulls sold at 300 kg, alternatively 220 chillers sold at 260 kg.

Do you think June was: **(a)** correct in her conclusion; **(b)** incorrect; or **(c)** don't know?

3. Assets

Ben Clever has always maintained it was better to be conservative in the sense of keeping some readily available assets up his sleeve. This does not mean he was conservative in his farming – indeed he maintained reasonably high stock numbers. To support this he always kept good records and subjectively assessed his profit prospects as making $30,000 cash surplus after all expenses with a probability of 0.4 (40%), and possibly $60,000 with a probability of 0.25 (25%), but of losing $20,000 as the third summary possibility (probability?). In the good years Ben purchased gilt-edged securities, and had built up $60,000 paying 4% post tax.

On the other hand, Ben Smart put his money into buying and selling extra stock when it looked as though he had extra feed. This approach sometimes faltered as he could be left with too little feed and a stock market slump. In some years there was a handsome payoff. Ben Smart also kept good records. He calculated that his expected cash surplus after *all* expenses, other than overdraft interest, was $26,000. This was made up of $80,000 in a good year, and a loss of $30,000 in a poor year. Overdraft interest was currently 15%. Ben Smart had *not* built up liquid assets. His chance estimates of the seasons were the same as Ben Clever's.

Would you choose to be: **(a)** Ben Clever; **(b)** Ben Smart; or **(c)** don't know?

4. Insurance

John Sure lives in a notorious hail belt and has occasionally had his winter feed turnip crop completely stripped in February, cutting back the yield considerably. He considered selling, but eventually decided to approach an insurance company who accepted a lot of cash crop insurance and had a good reputation in the district. As John had a very large farm and, given the turnip crop was a cornerstone to the winter policy, the insurance company believed it was worth their while to offer cover. They worked out a policy that would pay if the yield was less than 50% of an agreed per hectare tonnage. The payout could then be used to purchase feed or grazing. John estimated the chance of a 45% cut in yield was 5%, of 55% it was 7%, of 65% it was 10% and of 75% it was 15%, otherwise he got the full 100% or more (in a good season without a hail event). When he had to make up any feed loss John calculated it cost $600 per percentage loss of turnip yield. The insurance company offered an annual premium of $5000 and a payout of $15,000 should the yield be 50% or less of the normal yield.

Should John: **(a)** take out the insurance; **(b)** take the risk himself; or **(c)** don't know?

5. Knowledge and information

Anne was heavily into producing and manufacturing very fine wool for the craft market. Being a bit of an entrepreneur, Anne had developed quite a world-wide market with internet-based orders. Now Anne wanted to purchase two high country runs to expand production, but would have to borrow heavily. This would expose the business to financial risk. With the variability in wool yields and the exchange rate uncertainties, let alone the luxury market volatility, Anne estimated through her budgeting that the new setup could earn a cash surplus (pre-loan interest) as high as $780,000, but equally it could go as low as –$220,000 if all the conditions experienced a low point. Typically, however, a cash surplus of $410,000 was expected in return for the $5.3 million investment costing 6%. Anne considered the options, and reckoned the chances for good, typical and poor condition sets were 25%, 55% and 20%, respectively. Should Anne proceed even though she was a little concerned about her knowledge of the worldwide scene?

On further reflection, Anne wondered about using an Australian consulting firm (experts in the world fine wool market). They would charge $10,000 but Anne believed they could put more surety into the income estimates. Anne decided to proceed. The new estimates came back as $800,000 with a 30% chance, $400,000 with a 40% chance and –$300,000 with a 30% chance.

Assuming history showed the consulting firm was near enough to being correct, should Anne have invested the $10,000? **(a)** Yes – correct choice; **(b)** no – waste of money; or **(c)** can't tell.

6. Flexible systems

Tom runs a lamb-producing unit that breeds its own ewe replacements. While in general Tom enjoys the east coast environment, he certainly does not enjoy the climatic variability. He often struggles to feed the stock over the summer, and frequently has to buy in hay and barley just to maintain the stock in a position to regain live weight before tupping (mating). Would you suggest Tom should switch to a flexible 2-year flock that can better be matched to the seasonal situation?

Past records, after inflation adjustment, show that Tom's cash surplus situation can be summarized by noting the expected surplus is $52,000, but it might be as low as –$20,000 with a 28% chance or as high as $90,000 with a 35% chance. Tom calculates that the net cash profit per ewe for a 2-year flying flock is $17, and this is relatively stable given he would vary the numbers to suit the feed situation. In a typical season Tom can run a total of 3000 ewes, but in a poor season this drops to 2500, whereas in a good season 3600 ewes are possible.

Should Tom: **(a)** continue to breed replacements; **(b)** move to a flexible 2-year flock system; or **(c)** don't know?

7. Diversification

Felicity recently attended a management institute course on diversification. Currently her whole investment portfolio is tied up in a sheep and cattle operation. She enjoys running the cattle and sheep, but wonders if some diversification out of agriculture would help stabilize her income, particularly as the fixed cost of supporting her ageing parents had to be met come what may. They had passed the farm to her in the first place. Living not far from an urban area the logical thing was to invest in rentable apartments purchased from borrowed money. There was plenty of equity in the farm. Felicity was good with people and believed she could keep the apartments full of good tenants. The assured net return would, conservatively, be \$15,000 per annum, but if everything went extremely well, this could be as high as \$20,000 (15% chance). The time involved, however, meant the farm would suffer: Felicity estimated the drop in income could be as much as \$10,000 (30% chance), possibly \$5000 (30% chance), but equally the return might not be affected at all if everything went well. Felicity did not really expect the farm and flat incomes to be in any way correlated as the town had non-agriculturally oriented industries.

Should Felicity: **(a)** diversify into apartments; **(b)** concentrate on the farm; or **(c)** don't know?

Answers and explanations

1. **(a)** Take the contract.

If you take the contract:
Your income will be:
1000 lambs @ 17 kg @ \$4.18 = \$71,060
less the overdraft = −\$300
Total = \$70,760

If you don't take the contract:
Your income will be:
1000 lambs @ 17 kg × \$3.9 = \$66,300 with 30% chance
1000 lambs @ 17 kg × \$4.2 = \$71,400 with 40% chance
1000 lambs @ 17 kg × \$4.5 = \$76,500 with 30% chance
Therefore the expected value is \$71,400

Conclusion
The best option is not clear-cut. Given the expected income is much the same, most people would tend towards the contract as this is assured.

2. **(b)** June was incorrect.

Calculations indicate that June was wrong in her conclusion. Not only is running chillers more profitable, but the variability of the income is not so great. To see this, calculate the possible incomes for each option.

	Bull beef	Chillers
Good season (chance 20%)	200 @ 380 kg @ \$2.35 = \$178,600	220 @ 260 kg @ \$2.90 = \$165,880
Normal season (chance 50%)	200 @ 300 kg @ \$2.35 = \$141,000	220 @ 260 kg @ \$2.90 = \$165,880
Poor season (chance 30%)	200 @ 260 kg @ \$2.35 = \$122,200	180 @ 260 kg @ \$2.90 = \$135,720 20 @ 221 kg @ \$2.32 = \$10,254
Expected gross income	\$142,880	\$159,908

Of course, the actual costs will be different so this will impact on the analysis – but would this alter the conclusion?

3. (b) Ben Smart

Ben Clever's outcomes: given his investment, he earns \$60,000 @ 4% = \$2400.

Thus:

\$60,000 + \$2400 = \$62,400 with probability 0.25	= \$15,600
\$30,000 + \$2400 = \$32,400 with probability 0.4	= \$12,960
−\$20,000 + \$1600 = −\$18,400 with probability 0.35	= −\$6,440
Expected value	= \$22,120

Note that in the loss year it is assumed that \$20,000 of the reserves are used. Hopefully this will be made up next year.

Ben Smart's outcomes: you will note that a sum is necessary to calculate the typical season cash surplus. Thus, knowing the expected value and the two other values:

Unknown = (26,000 − [(80,000 × 0.25) − (30,000 × 0.35)]) / 0.4 = \$41,250

Thus:

\$80,000 with probability 0.25	= \$20,000
\$41,250 with probability 0.4	= \$16,500
−\$30,000 − \$4500[a] with probability 0.35	= −\$12,075
Expected value	= \$24,425

(Note: [a] overdraft interest)

In the poor years Ben uses his overdraft to make up the deficit. This must be paid back in the good years. Thus, in 35% of the good and typical years the cash surplus will be less.

Conclusion

Possibly Ben Smart is better off than Ben Clever as in most years he will have a greater cash surplus, and similarly on average, *but* in 35% of the years his outcome is worse. Of course, a key factor is the relative interest rates – what might you receive for investments compared with paying overdraft rates when the money is needed?

4. Probably **(a)**

Consider the costs under taking insurance compared with taking the risk yourself:

No insurance:

45% loss… the cost is	45 × \$600 = 27,000 with probability	0.05 =	\$1350
55% loss…	55 × \$600 = 33,000	0.07 =	\$2310
65% loss…	65 × \$600 = 39,000	0.10 =	\$3900
75% loss…	75 × \$600 = 45,000	0.15 =	\$6750
	Expected cost		=\$14,310

With insurance:
The feed costs are the same as for the 'no insurance' case, but for any loss greater than 49% John gets \$15,000, but he also pays \$5000 each year for the premium. Therefore the loss is the expected cost from above plus the premium: \$14,310 from above + \$5000 premium = \$19,310 *but* there is a 'gain' of \$15,000 for the years that the loss is 55% or greater. The chance of this is: 0.07 + 0.10 + 0.15 = 0.32 (32%), i.e. the average gain is 0.32 × \$15,000 = \$4800. Therefore the *expected cost* of 'with insurance' is \$19,310 – \$4800 = \$14,510.

Conclusion
It would be wise to take out the insurance as, while the cost is slightly greater, the peace of mind is an important factor. That is, the variability has been reduced, but at a very small cost.

5. (a) The extra investment was probably wise.

Given that the consulting firm was correct, the *true* expected value from the venture would be:

good condition set	\$800,000 × 0.3	=	\$240,000
typical condition set	\$400,000 × 0.4	=	\$160,000
poor condition set	–\$300,000 × 0.3	=	–\$90,000
	Expected return	=	\$310,000
less the interest \$5,300,000 @ 6%		=	–\$318,000
	Net	=	–\$8,000

and less the \$10,000 consulting fee in the first year. All together, a grand *loss*!

In contrast, Anne's estimates were:

(780,000 × 0.25) + (410,000 × 0.55) – (220,000 × 0.2)	=	\$376,500
less interest (5,300,000 × 0.06)	=	–\$318,000
Net	=	\$58,500

Conclusion
Clearly Anne would have gone ahead if relying simply on her figures. But has the expenditure of \$10,000 to get more information helped the variability of profit? The answer is *yes*, as the potential loss has been avoided, whereas Anne thought a good profit would be made in most years. If, on the other hand, the consulting firm had got it terribly wrong then who knows what the real answer would be. You could have put a chance figure on the accuracy stakes, which in this case was set at 100%. So, clearly, time and money spent on information needs to produce something worthwhile, not that you can guarantee this when obtaining the information. Also, do not forget that the run of years matters – if by chance there was a good run, maybe Anne would have made a huge profit.

6. (b) Tom should move to a 2-year ewe policy.

The expected return from the current breeding flock system was given as \$52,000. But to assess the two options you need to know the likely variability. We know that there is a 35% chance of \$90,000, and a 28% chance of

−$20,000. This means the mid possible summary outcome is given by solving for the amount that satisfies:

$$52{,}000 = (0.35 \times 90{,}000) - (0.28 \times 20{,}000) + ((1 - 0.35 - 0.28) \times \text{unknown})$$

thus $52{,}000 = 31{,}500 - 5{,}600 + (0.37 \times \text{unknown})$

thus unknown $= 26{,}100 / 0.37$

thus unknown $= 70{,}540$

Therefore, the possible income values and associated probabilities are:

$90,000 with a 35% chance
$70,540 with a 37% chance
−$20,000 with a 28% chance

giving an *expected return* of $52,000.

In contrast, the *flying flock* (2-year ewes) will give:

3600 @ $17 (61,200) with 35% chance = $21,420
3000 @ $17 (51,000) with 37% chance = $18,870
2500 @ $17 (42,500) with 28% chance = $11,900

giving an *expected return* of $52,190.

Conclusion

It looks as though the flying flock could be the answer, as the expected values are much the same, but the variability is much higher for the breeding flock situation.

7. (a) Felicity should diversify into apartments.

The fact that there is *no* correlation between the farm and apartments, other than through the time factor, means the analysis just needs to list out all the alternatives and their probabilities. The relevant figure you want for making a decision is the marginal effect, on the return, of investing in the apartments. If this is positive, then the apartments are worthwhile. As it turns out, this is the case, as you can see from the sums below. If this had not been the case you would have to look at the variability of farm versus farm plus flat income.

The tree of possibilities if the apartments are purchased is:

Apartment income($)	Effect on farm($)	Net ($)	Probabilities of contribution of each event to net income	
	0	15,000	0.85 × 0.4 = 0.34	5,100
15,000	−5,000	10,000	0.85 × 0.3 = 0.255	2,500
	−10,000	5,000	0.85 × 0.3 = 0.255	1,275
	0	20,000	0.15 × 0.4 = 0.06	1,200
20,000	−5,000	15,000	0.15 × 0.3 = 0.045	675
	−10,000	10,000	0.15 × 0.3 = 0.045	450
		Totals	1.00	$11,250

Therefore *there is a net gain to having the apartments*. The interest charges are more than covered, and as there is no correlation, there is a 50/50 chance that the flats will compensate for any low farm income years.

Calculating Probabilities

The scenarios below are exercises to develop an understanding of chance effects. Remember that many random, or chance, factors impact on farming conditions and outcomes.

The weather is the classic example, but other chance factors also impact on many variables including prices, disease outbreaks, accidents and labour availability, and so on. But also remember that what happens this next season is also affected by trends as well as chance factors. Thus, the wool price, or perhaps the bull beef price, will undoubtedly be different from this season, and will be either higher or lower depending on, for example, the trend in world economic conditions together with chance factors like the day of sale and whether the buyers happened to miss the plane.

Note that the data in the exercises are imaginary. Do not take them as researched facts.

Consider each of the scenarios below and come to a conclusion. Write it down, then check the correct answer from the list provided at the end.

1. Snow storms and lambing
Lambing is forecast to start late winter with most lambs being born in the first 34 days. A search of the last 50 years' records shows the years when a significant snowfall occurred in this period were 1962, 1966, 1978, 1992, 1996 and 2002.

What is the chance of a significant fall next year? **(a)** 3%; **(b)** 6%; **(c)** 12%; or **(d)** none of above.

2. House fire chances
Council records show there are 520 houses in the district. This number has not changed much over the last 60 years. Over this time the volunteer fire brigade has been called out to 47 serious house fires.

What is the chance of a serious house fire in any *one* house in the next year? **(a)** 0.3%; **(b)** 0.15%; **(c)** 0.05%; or **(d)** none of above. (Note: 0.3% means there are 3 chances in a 1000.)

3. Bull beef prices
Prices are affected by the US supply, which in turn is impacted by the US weather. Currently prices are high. Historically, you expect a poor season in the USA to occur once in 8 years. There does not seem to be much correlation between the weather each year. The season does not impact on the prices until the year following.

What are the chances of the price declining next year? **(a)** 87.5%; **(b)** 43.7%; **(c)** 21.9%; or **(d)** none of the above.

4. Internal parasites
Through faecal egg counts Jim has found that bad internal parasitic worm infection events are correlated with prolonged wet weather and the grazing

rotation length. The data revealed that if there has been prolonged wet weather the faecal egg count rises dramatically if the rotation length was less than 20 days, reasonably for 20–30 days, but seldom for > 30 days.

If the chance of prolonged wet weather is 5%, what is the chance of a bad worm infection if the rotation length is kept at 17 days? **(a)** 8%; **(b)** 12%; **(c)** 15%; or **(d)** none of the above.

5. Spring droughts
They do occur occasionally and have a major impact on meat production. Of course, spring droughts come in various forms from minor to major. Jim reckons rainfall less than 150 mm has a noticeable impact, less than 120 mm a significant impact, and less than 100 mm a major impact. Over the last 50 years, records show the rainfall was less than 100 mm in 5 years, between 100 and 120 in 8 years, and between 120 and 150 in 10 years. The evidence suggests there is no correlation in the weather between years.

What is the chance of a major spring drought next year? **(a)** 5%; **(b)** 10%; **(c)** 15%; or **(4)** none of the above.

6. Wool prices
Prices appear to be dependent on the general economic conditions in the world (greater income, greater prices), the supply from competing countries and the price of oil (synthetics). For the last 10 years these factors have been stable, and no changes are expected next year. The inflation and exchange rate adjusted prices have been, for medium wool ($/kg):

3.90, 3.80, 4.10, 3.95, 3.92, 4.15, 3.82, 4.05, 3.95, 3.78

The ups and downs are due to things like the place in the sale, current buyer orders, etc.

What is the chance of getting $4.00 or greater in the next sale? **(a)** 20%; **(b)** 25%; **(c)** 30%; or **(d)** none of the above.

7. Lambing percentage
Jack has been farming the same way for 20 years, and is debt free. His lambing percentage survival to sale has been:

110, 112, 109, 115, 112, 110, 119, 116, 108, 113, 114, 109, 113, 116, 120, 115, 107, 110, 114, 111

Jack calculated his average as 113%. But he also told people there was a 30% chance he would achieve 116% lambing, or better, due to his careful management and shelter developed over the years.

Was this 30% figure: **(a)** about right; **(b)** too high; or **(c)** too low?

Answers

1. **(c)** 12.0% or 0.12
2. **(b)** 0.15% or 0.0015

3. **(a)** 87.5% or 0.875
4. **(d)** 0% or 0.00
5. **(b)** 10% or 0.10
6. **(c)** 30% or 0.30
7. **(b)** Much too high

Ways of Improving Risk Management

You have (if you followed through each section) listed out details of the variability experienced on case farms. You have probably also reviewed the different ways available to reduce risk and uncertainty. Now, as an exercise, *think of ways you might improve the management to reduce the risk and uncertainty on a case farm*. *However*, if you think this is not possible, skip this exercise.

If you are proceeding – without regard to any priority ordering – write down the list of improvements you might make to reduce current risk and uncertainty. Do not, for the moment, decide whether they will in fact help. Leave this until later – this is a brainstorming session. When you have finished you might like to show the list and reasons to a friend and debate these possibilities.

As noted, if you choose options that reduce risk and uncertainty, you probably also reduce your average profit. If you can find ways to do both (reduce risk *and* increase average profitability), make the change *now*!

To assess the value of each of the possible changes:

1. Make up a table which lists, for each possibility, their advantages and disadvantages (include ease of management, increased/decreased costs, factors/outputs/inputs and time that might get changed, and increases/decreases in sales, difficulties in supplies, organization, etc.).
2. Having considered the advantages and disadvantages, list the possibilities in rank order, with the best first.
3. *Do the sums*: work out the data required to enable assessing the impacts (refer to the worked examples in the previous sections). The calculations must check whether the new idea will reduce existing risk and uncertainty.

- **(i)** decide on what *changes* will occur if you use the new policy, i.e. decrease/increase in purchased inputs, decrease/increase in saleable outputs and decrease/increase in assets/liabilities (and therefore a change to overdraft, etc.)
- **(ii)** formulate, say, three sets of conditions (prices, yields, etc.) that might occur, and their chances (probabilities)
- **(iii)** for each set of conditions calculate the quantities of inputs and outputs that occur (a) currently and (b) under the new policy.
- **(iv)** for each set of conditions multiply out the quantities with the prices (inputs × cost; outputs × price) and add them up to give the total net for (a) the current policy and (b) the potential new policy.
- **(v)** compare the two – what is the expected (average) net return for each? What is the range? Decide which you prefer.

4. Repeat step **3** for any of the other possibilities you listed that you still think might be an improvement. Note that you probably do not need to completely redo the status quo data, just change any new items that change compared with the original calculation.

You will probably find this exercise will take several attempts before you are relatively happy with the modified attempt.

APPENDIX A3: RISK

A Farm's Risk Situation and Management (Questionnaire)

It is very important that farmers have a good knowledge of all the risk factors affecting their farm. To help focus attention on these risk factors a series of questions is listed below to which it is very useful to have answers, or at least to have thought about. Thus, for a case farm, use a notebook to record the answers, or perhaps photocopy the pages and write on them.

1. List up to five uncertain factors/problems/prices/outcomes that worry the farmer the most. List them in order of difficulty. Put as number one the situation that is *most* difficult to handle, and at number five, the situation which the farmer finds the easiest to cope with.

2. For **1** above, which of the following strategies are followed in handling the problems?

(a) Low stocking rate
(b) Insurance cover
(c) Buy feed when needed
(d) Buy feed in surplus periods
(e) Store more than 1 year's supply of conserved feed
(f) Keep cash reserves for emergencies
(g) Hold off-farm assets that can be cashed
(h) Use forward contracts
(i) Local networks to cover sickness
(j) Sell stock when feed short
(k) Use irrigation, or extend its use
(l) Work extra hours
(m) Reduce maintenance work
(n) Reduce maintenance fertilizers
(o) Increase fertilizer (N perhaps)
(p) Sell store (not ready for market) lambs/cattle
(q) Organize an overdraft facility
(r) Diversify into several products
(s) Intensify grazing management and/or feed budget
(t) Read a lot to be a jump ahead and/or have plans ready
(u) Other

3. How many ewes/cows per hectare can the land support if it is grazed to its potential (or for exclusively cropping farms, what is the maximum yield possible for each crop)?

	Average year	Good year	Poor year
Spring			
Summer			
Autumn			
Winter			

4. What is the amount of dry matter (DM) produced? Complete the following table using kg of DM/ha of pasture/lucerne:

	Average year*	Good year	Poor year
Spring			
Summer			
Autumn			
Winter			

*Note: use figures for the average quality pasture/lucerne.

5. If specialist fodder crops are grown, how many tonnes per hectare do they produce?

	Crop name	Season used	Average yield	Good yield	Poor yield
e.g.	Turnips	Winter	20	30	15

6. In how many out of 10 years is there: a good year, a poor year and a typical year?

7. What price is expected for the main fleece wool ($/kg greasy) this coming season?

(a) What price would be regarded as a very good outcome?
(b) What is the chance of getting this price (%)?
(c) What price is regarded as a poor price?
(d) What is the chance of getting this price (%)?

8. For the lambing percentage (survival to sale), lamb weight[a] and fleece wool production per head:[b]

(a) What are typical, good and poor percentages and weights, and the chances?

	Lambing %	Lamb (kg/head)	Wool (kg/head)	Chance %
Typical				
Good season				
Poor season				
Total chance (should be 100)				

(b) What are the extremes experienced over the farm's recent lifetime?

	Highest	Lowest
Lambing %		
Lamb (kg)		
Wool/head (kg)		

[a] If mainly store lambs, can you estimate this? [b] *Or* the equivalent for cattle (calving percentage, sold animals (kg/head), etc.), *or* the equivalent for a major crop (yield and quality will be important).

9. Stock prices: for each class of stock listed, give the expected selling price this coming season (leave blank if not applicable).[a]

	Expected $/head	Highest likely $/head	Chance (%)	Lowest likely $/head	Chance[b] (%)
Finished lambs					
Store (unfinished) lambs					
Cull ewes					
Replacement hoggets					
Replacement 2-tooths					
Replacement older ewes					

[a] *Or* the equivalent for cattle, *or* different cash crops.
[b] 'Chance' means the likelihood of getting/receiving this price, e.g. a 20% chance would mean a reasonable chance, a 5% chance is not very likely.

10. Purchased hay and/or silage and/or concentrate feed and/or grazing. Even if not normally purchased, estimate the following (enter 0 for the quantity if never purchased or, if you have no idea, leave blank):

	Average quantity used	Normal $	Highest $	Chance (%)	Lowest $	Chance (%)
Pasture hay						
Silage						
Bailage						
Grazing						
Concentrate[a]						

[a] Grain, nuts, meal, etc.

As you may not have thought about the details of the variability experienced, the estimates may lack accuracy and perhaps do not reflect any records held. Return to the answers after completing all the chapters on risk and uncertainty and check whether you still agree with the estimates.

Part 4 Concluding Comments – Assessing and Improving Managerial Ability

A farmer with the skill to make the right decisions, and implement them successfully, can be said to have high managerial ability. Such a farmer will be good at all the skills outlined in earlier sections, and have an excellent understanding of the objectives that reflect the family's, and possibly other owner's, requirements, but it must be noted there is more to high ability than just the skills outlined. Research has shown that a farmer's personality, intelligence and, above all, the lessons learned from experience, are all factors in ability. Experience embodies all the skills covered in this book together with some further skills, which are the subject of other books, one example of which is negotiating skills.

Recent research (see: Nuthall, P.L. (2009) Modelling the origins of managerial ability in agricultural production. *The Australian Journal of Agricultural and Resource Economics* 53, 413–436.) suggests the relative contribution to ability of experience is 67%, intelligence 8% and personality 16%. The remaining 9% is attributable to parental influences through the environment they create. No doubt different farmer groups compared to the 700 New Zealand farmers used in the research may well have slight variations on these figures, as would different samples, but it is doubtful if the ordering of the origins of ability would change. The 67% of ability provided by experience makes it very clear just how important is the high skill in all the aspects covered in this book.

It is also interesting to note the list of skills exhibited by accepted experts (in any field). Experts have what are called 'constructs', or decision rules, acquired over the years through training and experience. In developing these successful constructs the experts have exhibited and used the following skills and features:

- excel in mainly their own area or domain;
- successfully perceive large meaningful patterns;
- know which factors are important;
- quickly solve problems with little error;
- have superior short- and long-term memories;
- see and represent a problem at a deeper level than novices;
- spend a great deal of time analysing problems when they are different or new;
- have strong self-monitoring skills;
- good observation skills;
- relate their judgement to the relevant objectives.

Experts are also good at recognizing when a problem exists, and tend to be very selective over factors they observe relative to what a novice records. A ‘novice’, or someone new to decision making, tends to note and record large numbers of factors just to be sure they have taken into account everything that might matter. In contrast, an expert, through experience and feedback, knows which factors are important in making correct decisions. Of course, some novices are the complete opposite and record much too little information.

Most of the attributes experts have, it will be noted, are also largely embodied in the skills discussed in this book. In addition, however, and very importantly, an expert has strong self-monitoring skills, can work out the critically important factors in any decision problem and understands the structure of the problem. Furthermore, while an expert can provide excellent advice, this does not necessarily mean they would be a good manager, for this also requires an ability to successfully follow through with the decisions and accept responsibility. All these important additional factors, it must be noted, are correlated with a farmer’s personality, intelligence and education. These are further discussed below.

A topic covered in this book is the ability to be critical in a positive way. However, to be an expert a farmer must not only critically assess the information he observes, or is provided with, but he must also be critical of himself in learning from experience. Almost all farmers have a rich set of experiences, but not all learn from them. A farmer must stand back from decisions and outcomes, analyse the problem and its solution, and gather the essential lessons. It is always said hindsight is a wonderful thing. But so often it is said in a negative way in commenting on what should have been done. This hindsight, however, can be turned into a positive force in discovering the mistakes made, and thus gleaning improved decision rules for future use. Having an appropriate personality, or management style, and intelligence are all important in learning from experience. Thus, the attributes of high managerial ability are all intertwined and go to create the totality of good management.

One of the most powerful ways of learning from experience is through mentor groups of various kinds. One group that is always available is the family, which can often be used as both a sounding board and a means to debrief and learn from experiences. Whether a group is family, or based on colleagues and professionals, the task is to outline each experience, analyse it, and glean the lessons. Clearly, while a self-critical role is beneficial to this process, so often there is a special synergy and additional ideas from group situations.

It was noted an appropriate personality confers around 16% of ability. Personality is the result of the genetic makeup of a farmer together with early environmental influences. Modern theory concludes that five core traits make up a person’s personality: ‘openness’, ‘conscientiousness’, ‘extroversion’, ‘agreeableness’ and ‘neuroticism’. In terms of the genetic determination of each, neuroticism is the most strongly inherited characteristic and perhaps nurture only contributes some 50% to its expression. There is considerable evidence on how each factor influences managerial ability in general. In farming, research suggests that the factors express themselves through six describable attributes. These might be called ‘management style’ factors.

The six factors are 'correctness' (anxiety over getting it right), 'conscientiousness', 'creativity' (trying new things/experimentation), 'community' (enjoyment in relating to people), 'family' (consultative) and 'benigness' (acceptance of outcomes). 'Correctness' refers to the expression of anxiety, or neuroticism, in managerial activity, and a farmer with a strong correctness attitude tends to worry about following the correct procedures in each situation. Research shows it is undesirable to have a dominant correctness characteristic as it tends to negate good decision making. However, it must be noted there is good evidence that with appropriate support and work a famer can reduce the level of this trait. In fact, this characteristic is the easiest one to modify, though it is certainly possible to 'improve' a farmer's overall management style with professional and family help.

'Conscientiousness' is obviously important in good management, and this conclusion is certainly backed up by the research. However, in comparing the differences between high ability farmers and the rest of the population of farmers, there was nearly a 400% difference in their 'correctness' score, whereas the difference between the 'conscientiousness' of the high ability farmers and the rest was only 135%, though this is still significant. Similarly for 'community' the difference was 129%, for 'benigness' 135%, 'family' 129%, but for 'creativity' the difference was only 68% though, again, this is still significant. Clearly the trait to target for improvement is 'correctness' (anxiety) in those farmers that tend to be overly 'correct' in everything they attempt, but all the others need addressing as well.

Farmers will be interested in their levels of each management style trait. To find this out a test is provided in Part 5 'Assessments'. A series of statements is scored for correctness and an overall score for each trait calculated. These can then be compared with population means.

Another characteristic, which is related to management style and risk attitude, is called the 'locus of control'. This is a measure of a farmer's belief in how much control he has over outcomes. A test for a farmer's 'locus of control' is also provided in the assessment section.

In the test farmers give their degree of belief for a series of statements with their answers leading to a 'locus of control' score. Benchmark figures are provided for comparison purposes. High ability farmers tend to have higher scores, indicating they believe they have reasonable control. However, some farmers believe the weather, markets, disease and the like determine outcomes rather more than what they do themselves. Clearly, there is an element of truth in this, but when careful thought is given to each farming situation there is a surprisingly high amount of control available. Farmers with a low 'locus of control' need to work with others to assess their attitude and what might be done to increase their control belief.

Farmers, as part of their objectives, have a range of attitudes to accepting different risk levels. This was pointed out in Part 3 covering risk. To review whether the attitude used in decision making is appropriate for any one farmer he should assess his attitude and consider whether some rethinking might be sensible. In Part 3 a simple test was provided to assess risk attitude. To check this test outcome a more formal assessment is provided in Assessment 5.6 in Part 5 'Assessments'.

It was pointed out, and you would expect, that intelligence also plays a part in managerial ability. In farming, not all components of intelligence are important, as farming is a very practical occupation. Nor can applied intelligence be totally assessed using paper tests, though some important aspects can be checked out. To this end, what is called ‘managerial aptitude’ can be assessed using the test presented in Part 5, but it must be remembered that the application of intelligence to farming success is best measured in observing actual outcomes. However, the ‘managerial aptitude’ assessment provided can be used as a starting proxy. It covers components of intelligence, involving memory, creativity, logic, understanding shapes, and calculations. Each of these components is thought to be important in farming managerial ability. In improving ability, the assessment can be used as a discussion vehicle to improve understandings.

The other factor leading to ability is parental influence (9%). This impact is, however, historical. Consequently, for most improvement it must be the other factors that should be worked on. However, ‘decision biases’ are one set of parental influences that can be improved. While many parental influences can be very positive and have a major impact on ability, some may be counterproductive and give rise to bad habits, or decision biases. On the positive side, research has shown that parents that involve children in discussions over decisions, both financial and technical, create the potential for the children to move on to becoming good managers. Similarly, if parents encourage their children to observe what is happening, to become creative and to interact well with other humans, the chance is they will be better managers.

Biased decision making can be defined as consistently doing the wrong thing. Everyone makes mistakes from time to time, and this is obvious in hindsight, but it is where the mistake is always made that bias exists. Any farmer interested in improving ability must watch out for bias and ask others to help in discovering specific factors that need attention. To this end one of the discussions and assessment sets in Part 5 addresses types of biases. Once recognized, a farmer can proceed to correct the problem.

Returning to the 67% of ability that comes from experience, this book contains discussions on most of the skills that together make up ‘experience’. If a farmer learns all these skills, and intelligently uses experiences to enhance them, he is a long way on the road to being a great manager. However, as noted, there are one or two other important skills not covered here. Their details are readily available in other books and consequently they have not been included here.

These skills particularly include negotiating and people skills, as well as an ability to create appropriate benchmarks. This is not to forget that managerial ability also depends on an excellent technical knowledge and the skills to apply modern, but economic, technology. It has also been stressed that the ability to profit from experiences, perhaps through mentor groups, is important.

Also critical is the farmer’s ability to be constantly thinking about alternatives as part of a constant review of the current situation and immediate prospects. A farmer must have the ability to be flexible and a willingness to change when the signs show themselves. Planning was covered in the core skills, but successful planning cannot be emphasized enough as a component of success. Thus, constant review and constant analysis and replanning are cornerstones to success in the risky environment that makes up primary production. Part of the skill in this area, as noted as a characteristic of experts, is the ability to simplify issues down to their important variables and relationships. Primary production is complex, and as a result can be confusing to the human mind. Decision making is so much easier if the mind can sort out the important relationships and the areas on which to concentrate. Remember the skill of considering the farm 'as a whole', for indeed each part is integrated.

Negotiating skills are clearly important, for every farmer is constantly dealing with people over outputs and inputs, finances, legal arrangements over ownership, boundaries with others and so on. The essence of negotiation is that there is usually a middle ground somewhere that all parties will at least accept, even if they are not totally happy with it. The task is to find this ground. Often a farmer is too focused on the central theme to the problem when there might be many other elements that can be used to find a match. For example, a nearby farmer might have an access problem to a block enclosed by another person's land. Perhaps some land swapping might encourage the person to provide access, or perhaps a combination of land and cash. The possibilities are endless in many cases, so the task is to think of the other's situation and consider what might be attractive. The farmer can then offer some of these, particularly those that might not be so important to the provider. Perhaps in the access situation, the requesting farmer might have access to a stream that the granting farmer might like for stock water. A right to run a pipe over the land might provide advantages that outway any difficulties in granting access. Thus, imagination and careful thought can often sort out what is so often called a win–win situation.

Furthermore, farmers faced with negotiations should always use what can be called a 'positive' attitude. This is sometimes referred to as assertiveness. Again there are many articles written on assertiveness which a farmer interested in improving his negotiating skills should study. Assertiveness does not mean being aggressive, but it does mean being very aware of your situation so you can sensibly discuss pros and cons in a knowledgeable fashion. Confidence is also important, and a farmer must remember his rights are as good as anyone else's, so he must 'stick to his guns' without being stubborn and stupid.

People skills are clearly related to negotiating skills. Some farmers relate to others with understanding and have an ability to empathize. Understanding the other point of view is always valuable and helps in dealing with employees and professionals. Again, many books on people skills are available and worth studying. Often a group of farmers can get together and practise skills, and review past situations that have not been satisfactory. They might even use role plays to help practise the skills. Having an extroverted personality is commonly a huge advantage. Extroversion, one of the five personality characteristics, is all about enjoying others' company and being enlivened when with others. Everyone knows some extroverts who simply enjoy talking to others. However, such people must be careful to also listen to others if they wish to have lasting and valuable relationships.

Finally, to judge progress in improving farming outcomes, benchmarks are crucial. By a benchmark is meant some kind of measurable activity, or outcome, that is important in the life of a farm whose value can be compared with goal levels. Thus, for example, on a dairy farm an important variable is the milk solids production per hectare, so a farmer needs to know, for his environment, what is achievable if *every* decision is correct. Note, however, what is possible on one farm might not be possible, nor desirable, on another. The resource situation might be different, and the objectives of the farmers also different. However, the world works by benchmarks as we can only judge success, or otherwise, through comparisons of what is possible and achievable. Clearly, to attain high managerial ability, a farmer must know which benchmarks are important, and be able to work out their values for his farm, assuming it is farmed successfully and efficiently.

An ability to define appropriate goals, and then achieve them, will provide enormous pride and satisfaction. The efficient use of benchmarks implies a farmer should keep in his mind the values achieved and details of the current state of the farm including all the financial levels such as the current overdraft level and what it is expected to peak at, and when. Not having the total farm picture to mind makes constantly assessing benchmark achievement levels difficult and time consuming, for farm records will need constant looking up, and therefore gets put off to another day. This skill of having an up-to-date mental picture of the farm and its resources is all part of successful observation.

Every farmer should constantly strive to improve his managerial skill if for no other reason than success will lead to improving goal achievement with little cost other than time. If output can be increased by, say, 5%, all other things being equal, this is free money in the bank. Five per cent is not very much, but it is readily achievable as shown by the survey results, which make it clear the wide range in profit on the same land and farm type that occurs due to managerial skill.

Part 5 Assessments

CHAPTER 5.1 INTRODUCTION TO ASSESSMENTS

The proof of the pie is in the outcomes from the decisions made. Good outcomes involve not only making the right decisions, but also implementing them correctly, with most of the core skills discussed being required for both areas. In the end, positive changes in output are the practical view of whether a farmer has improved his management. In reality, however, a farmer never reaches the pinnacle of managerial skill as he is always learning and improving provided he takes the time to study and practise useful approaches.

This book cannot offer any tests of real life outcomes, but it does contain a series of assessment tests to help a student of farm business management, and thus any farmer, assess his managerial attributes as they relate to the potential to be an excellent manager. In addition, as most people have various biases, or characteristics that lead to decision malfunctions, it is useful to consider the common biases and how they might be assessed. Thus a section containing a discussion on biases is also presented.

To test actual improvements requires an assessment of the farmer's objectives and their measurement through time. This is not always practical, though production and profit can be measured and compared with the changes being obtained by comparable farms. Such comparisons must allow for seasonal changes and trends as they can confound simple one-farm measurements through time.

The assessments presented here fall into two categories. The first are designed to assess the human factors that make up a manager; the second are for testing a manager's knowledge of the core skills covered in this book. For the first category, the assessments that follow provide a test to assess a farmer's (and any student's) managerial style, a test to assess the belief in how much control over outcomes a farmer has, a test to assess managerial ability (being a paper test it cannot be claimed as a definitive test by any stretch of the imagination, but at least it provides food for thought), and ideas on decision biases a farmer might have. Clearly, the human aspects of a manager are critical in understanding a farmer, and for this reason a separate book covers this area (Nuthall, P.L. (2009) *Farm Business Management: the Human Factor*. CAB International, Wallingford, UK). The human factor tests presented here are taken from earlier research, which is also presented in this book. These tests, and many other components of the 'human factor', are discussed in depth in the book, which is designed for relatively advanced students of farm management. The book also contains a discussion on decision biases as summarized in this book, but extends this aspect to also consider farmers and stress.

All the assessments presented here can be used at any stage, and similarly repeated whenever a reader wishes to double-check his/a farmer's attitudes and to assess changes as a farmer works on improving ability. They can also form the basis of group exercises in any discussion group that farmers might be involved with.

The importance and place of each assessment was offered in Part 4. They are all related to the general level of managerial ability a farmer may possess.

The companion set of tests mentioned is presented in Part 6. These enable testing a farmer's knowledge of the core skills involved in observation, anticipation and risk management. Research shows that managerial ability and skill depend on a farmer's experience as well as his managerial style and intelligence, and to a certain extent his locus of control, though this latter aspect is related to a farmer's managerial style. The most important factor of all these appears to be 'experience', the quality of which depends on how well a farmer learns from the lessons on offer. The important thing to note is that 'experience' embodies how good a farmer is in carrying out all the skills covered in this book. That is, observation, anticipation and risk management skills collectively make up a large part of a farmer's experience.

CHAPTER 5.2 ASSESSMENT OF MANAGEMENT STYLE

Every farmer brings to the job a particular style of management. Usually this style is not something a farmer chooses, but rather is a result of the genes they are born with combined with the environment they have been brought up in. This is not to say a farmer's style cannot be changed with careful work and reinforcement, particularly with the help of others. Style is closely allied to a farmer's personality, and so anything that changes personality can also change a farmer's management style.

To assess style, follow through with the test given below, then compare the results with figures given for a randomly selected sample of over 700 farmers. (Note, this test has been published in a number of earlier research articles and in: Nuthall, P.L. (2009) *Farm Business Management: the Human Factor*. CAB International, Wallingford, UK.)

Procedure

For each of the following statements indicate how true it is with respect to your management style. To indicate the 'truth' of the statement write down on paper the number of the question and a number between 1 and 5 reflecting the truth: use 1 for '*completely true*' through to 5, '*not at all true*'.

1. You tend to mull over decisions before acting.
2. You find it easy to ring up strangers to find out technical information.

3. For most things you seek the views of many people before making changes to your operations.
4. You usually find discussing everything with members of your family and/or colleagues very helpful.
5. When there are too many jobs for the time available you sometimes get quite anxious.
6. You tend to tolerate mistakes and accidents that occur with employees and/or contractors.
7. You share your successes and failures with your neighbours.
8. Keeping records on just about everything is very important.
9. You admire farming/grower colleagues who are financially logical and don't let emotions colour their decisions.
10. You sometimes don't sleep at night worrying about decisions made.
11. You find investigating new farming/growing methods exhilarating and challenging.
12. You tend to write down options and calculate monetary consequences before deciding.
13. You tend to worry about what others think of your methods.
14. You are happy to make do with what materials you have at hand.
15. You find talking to others about farming/growing ideas stimulates and excites you as well as increasing your enthusiasm for new ideas.
16. Having to make changes to well established management systems and rules is a real pain.
17. You normally don't rest until the job is fully completed.
18. You normally enjoy being involved in farmer/grower organizations.
19. You sometimes believe you are too much of a stickler for checking and double-checking that everything has been carried out satisfactorily.
20. When the pressure is on you sometimes become cross and short with others.
21. You generally choose conclusions from experience rather than from hunches when they are in conflict.
22. You are inclined to let employees/contractors do it their way.
23. You not only speak your mind and ask questions at farmer/grower meetings but also enjoy the involvement.
24. It is very important to stick to management principles no matter what the pressure to do otherwise.
25. You are much happier if everything is planned well ahead of time.

The scores

Generally speaking, management style can be described using six distinct characteristics that the question answers reflect. These are 'conscientiousness', attitude to 'trying new things/experimentation', your level of 'enjoyment in relating to people', your 'anxiety over getting it right', and your approach to 'acceptance of outcomes' as well as how much you consult ('consultative').

To obtain the score for each of these characteristics add up the scores for the questions.

Conscientiousness	8, 9, 16, 17, 19, 21, 24, 25	Max 40
Trying new things/ experimentation	2, 9, 11, 12, 15, 16	Max 30 (creativity)
Enjoyment in relating to people	7, 15, 18, 23	Max 20 (community)
Anxiety over getting it right	5, 10, 13, 20	Max 20 (correctness)
Acceptance of outcomes	6, 7, 14, 22	Max 20 (benigness)
Consultative	1, 2, 3, 4	Max 20 (family)

Note that some statements appear in more than one characteristic. This is due to the notion they express contributing to several basic characteristics.

Assessment of management style

Compare the scores with the averages of a sample of over 700 farmers given below (the maximum score for each is given in parentheses).

Conscientiousness	20.4 (40)
Trying new things/experimentation	14.3 (30)
Enjoyment in relating to people	11.2 (20)
Anxiety over getting it right	12.8 (20)
Acceptance of outcomes	11.8 (20)
Consultative	9.9 (20)

If a farmer is at the lower end of a scale for one of the style types, this means the farmer tends to comply with the characteristic, and vice versa. For example, if the conscientiousness score is 10, the farmer is very conscientious, whereas if it is 35, the opposite is true.

Note: There are no right or wrong answers/scores. Everyone has their own management style, which is unique, some of which are more suited to management than others.

Research does suggest that it is desirable for good management to tend towards being conscientious, an experimenter, consultative, relater to people, but not anxious or accepting. (See Nuthall, P. (2009) Modelling the origins of managerial ability. *The Australian Journal of Agricultural and Resource Economics* 53, 413–436. This article sets out the farmer characteristics that tend to be associated with good management.)

CHAPTER 5.3 LOCUS OF CONTROL TEST AND ASSESSMENT

Farmers have a range of beliefs about how much control they have over the outcomes from the decisions taken. At one end of the scale are farmers who believe outside forces, such as the weather and markets, have greater influences on outcomes than any decision they might make. At the other extreme are the farmers who believe they largely control the outcomes. Clearly, it is desirable to have a realistic belief in being able to control outcomes as, in most environments, good managers, through their decisions, have favourable outcomes relative to many of their colleagues.

To assess how much control a farmer (or you) believes he has he should write down the 'truth' score for each of the statements below, using a scale of 1 (if the statement is 'completely true') to 5 ('not at all true'). On a piece of paper the person taking the test should write the question number and his 'truth' score as he goes through each statement. Then follow the instructions to assess the respondent's control belief. This is known as his 'locus of control'. (This test has been published in a number of earlier research articles, e.g. Nuthall, P.L. (2010) Should a farmer's Locus of Control be used in extension? *Journal of Agricultural Education and Extension* 16(3) (in press), and in Nuthall, P.L. (2009) *Farm Business Management: the Human Factor*, CAB International, Wallingford, UK. For a more extensive analysis of the test results the first article, in particular, should be consulted.)

1. So far I have managed to largely achieve my goals.
2. I never try anything that might not work.
3. I'm using exactly the same farming methods that I have used for many years, as they have stood the test of time.
4. It's no use being stubborn about a job or management approach that doesn't initially work.
5. I reckon 'good luck' doesn't exist – 'luck' is really good management, and vice versa.
6. It is safer not to rely on others to get the job done well and on time.
7. I'm able to get others to do the jobs my way.
8. Too often I end up having to operate my farm to suit others' demands.
9. While being a good manager involves some training, experience and reading, it is mainly determined by your genes.
10. You can work hard at creating good relationships between neighbouring farmers, but often your efforts fall on deaf ears as people are often uncooperative and self-interested.
11. I find most employees work hard and finish the tasks set very adequately after a bit of training where necessary.
12. The years when the farm has shown poor production and profit have been due to circumstances totally out of my control.
13. In local body affairs it's easy for a hard working and dedicated individual to have an impact in getting changes for the better.
14. Often I get frustrated as circumstances beyond my control impede the smooth progress of my management plans and decisions.
15. Some people seem to be just lucky and everything works out for them, but it hasn't happened to me much.
16. I tend to carefully plan ahead to ensure my goals are achieved, and often do budgets and commit my ideas to paper.
17. I seldom change my management and production systems unless I'm doubly sure the change will be positive. So much depends on chance.
18. When things go wrong it is so often due to events beyond my control – the weather ruins the hay, the wool auction I choose has a sudden price dip, etc.

19. When I know I'm right I can be very determined and can make things happen.

Scoring

To get the respondent's total score add up the score for questions 1, 4, 5, 7, 11, 13, 16 and 19 then subtract this number from 40. For example, if the total is 21, then the initial score is 40 – 21 = 19.

Then add up the total score for questions 2, 3, 6, 8, 9, 10, 12, 14, 15, 17 and 18 and then *add* this number to the result of the first part. For example, if the second total is 33, the grand total is 19 + 33 = 52.

The possible results and their meanings

The possible scores range from 11 to 87. The greater the figure, the *more* control the farmer believes he has over outcomes, and vice versa. To convert this result to a percentage, divide the result by 87 and multiply by 100. For example, in the example above the percentage is 52/87 multiplied by 100 = 59.8% (or close to 60%).

For a large sample of farmers the range was 40% to 90%, with an average of 67%.

If a person's score is somewhere below 49, or 56%, it should be noted that farmers who get what they want from their farming enterprise tend to have a much higher percentage. Consequently, the person might like to discuss with family, friends, neighbours, or perhaps a professional consultant, just how much more they can influence their future, and how they might go about this.

On the other hand, *if the person's score is greater than 49, or 56%, and less than 65, or 75%,* it does seem they have a general belief that they can control, to a reasonable extent, what the outcomes will be on their farm. The person recognizes that chance and luck play a part, but they can control this to a certain extent. However, it might be useful to further examine the areas they believe they cannot do much about – they just might have more control than they think, and achieve better outcomes.

If the person is right at the *high end of the scale with a score of 66, or 76%, or greater,* then they have a firm belief that they do control the success of their farming and related operations. However, they should be encouraged to continue considering ways of improving control and outcomes, though, of course, good luck in some years is always part of success in farming.

Finally, note that these three groupings rely on somewhat arbitrary cut-offs. In reality, there is a full range of beliefs, or 'locus of control' levels, with continuous gradations from one extreme to the other. Figure 5.1 is a graph of the frequency of a farmer sample's locus of control. (For more information, see Nuthall, P.L. (2010) Should a farmer's Locus of Control be used in extension? *Journal of Agricultural Education and Extension* 16(3) (in press).)

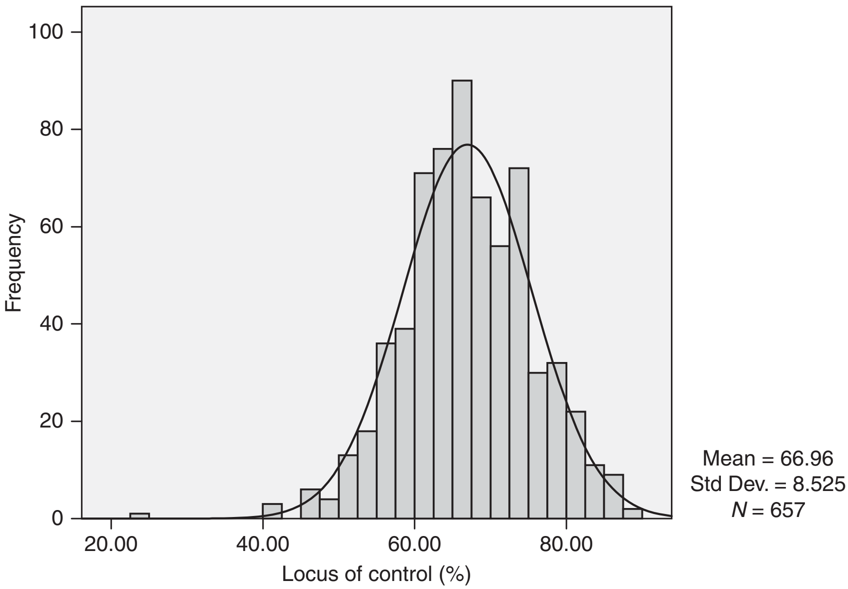


Fig. 5.1. Farmers' Locus of Control distribution.

CHAPTER 5.4 MANAGERIAL APTITUDE TEST AND ASSESSMENT

This test is designed to give farmers an idea of their managerial aptitude relative to other farmers. However, it is, of course, a 'paper' test and is not necessarily a good indication of just how well a farmer manages in the real world. Maybe his intuitive skills, when faced with real world challenges, are very good, but this may not show in this formal test. (This test also appears in Nuthall, P.L. (2009) *Farm Business Management: the Human Factor*. CAB International, Wallingford, UK.)

The test consists of several sections designed to check out the important components of management. These include memory, experience, creativity, general knowledge, interpretation of shapes, and farm calculations. To take the test (which is designed, of course, for farmers) the respondent should write down the answers (both the question number and answer) on a piece of paper. When finished, check out the score by comparing the answers with the 'correct' answers given at the end. *Be sure to ignore the answers until finished*.

Note: For any particular country some of the questions will need altering depending on the current conditions and the dominant farming types. This will be clear. Accordingly the correct answer, and consequent scoring, will need appropriate adjustment. As it stands, the test is best suited to sheep and cattle farming, though most questions do relate to all types of farming.

A: Memory

A1. How many acres are in a hectare? (acres)
A2. How many litres in an imperial gallon? (litres)

A3. How many imperial pounds in a kilogram? (lb)
A4. For sedimentary soils, what is the desirable Olsen P test?
A5. What is a desirable pH for good plant growth?
A6. What is the normal commission on stock sales? (%)
A7. What is *Trifolium repens*? **(a)** White clover **(b)** Lucerne (alfalfa) **(c)** Red clover **(d)** Wheat
A8. In legislature controlling resource use (Resource Management Act (RMA) in some countries), which of the following describes a complying (acceptable) activity?
(a) One where community consultation approves **(b)** One where there are no objectors **(c)** One that is listed in the district plan **(d)** One where the plans must meet the building standards
A9. How many instalments are there for provisional (income) tax?
A10. In legislature to control safety on a farm (Occupational Health and Safety in Employment Act), a farmer is required to: **(a)** keep a register of accidents that harm an employee; **(b)** report all illnesses that keep an employee in bed for more than 1 day; **(c)** put a warning notice on all machines that could cause injury; **(d)** none of the above.
A11. What is the current gift duty rate of tax for gifts less than $27,000/year? (%)
A12. The Government has a contract with the Reserve Bank to control inflation. What is the upper inflation rate in this contract? (%)
A13. Which of the statements below *most* complies with the efforts to minimize internal worm parasites' resistance to drenches? **(a)** Conduct faecal egg counts **(b)** Rotate drench types **(c)** Rotate the mobs drenched **(d)** Minimize ectoparasites
A14. At the manufacturing plant, what is the approximate cost of standard superphosphate? **(a)** More than $250/t **(b)** $230–249/t **(c)** $210–229/t **(d)** Less than $210/t
A15. What is the typical dressing out percentage of finished lambs? **(a)** 42% **(b)** 47% **(c)** 52% **(d)** 57%
A16. Read the paragraph below – you will be asked a question or two on it later.

Helen took over as manager of the family farm from her father a couple of years ago. At first she found having her mother and father living nearby useful as it was possible to talk over most decisions, but gradually Helen gained confidence as the output continued to increase. Soon Helen was using feed budgeting and found it was possible to increase stock numbers without sacrificing production per head. The feed budgeting in itself did not of course produce extra feed, it was the ability to gauge when to move a mob and ensure maximum utilization with good intake that improved the situation, and also the increased use of the electric fences helped. Helen didn't mind the extra work, particularly as the sight of healthy, good live-weight animals with rapidly growing lambs at foot was, simply, a complete joy. Helen's records showed dry matter production seemed to be increasing. Of course, fertilizer inputs had also been maintained. Soon the neighbours, who initially wondered how the youngster would fare, were frequent visitors to see how it was done!

B: Experience

B1. Managing feed supplies is a crucial part of sheep/cattle farming. Think back to a decision you made on feed management (e.g. to buy/sell a significant quantity of hay, to re-grass a paddock, to stop/start irrigation, to use an area that was shut up for, perhaps, hay, or perhaps winter use) that, in hindsight, was very wrong. What was this decision?
Describe the lessons learned:
(a)
(b)
(c)
(d)
…
B2. Have you made this, or a similar, mistake since, or previously? **(a)** Yes **(b)** No
B3. How have you drawn up the rules you follow when considering when to wean lambs? Select the description that is *most* appropriate. Read *all* the options before answering. **(a)** The locals and/or neighbours suggested these rules as being best. **(b)** I have discovered from past experience what is best. **(c)** I decided my rules from reading magazines, books and field day handouts etc. **(d)** An advisor/consultant told me the rules to follow. **(e)** Definitely a combination of most of the above. **(f)** Other.
B4. Over the years, how much have you changed your management as a result of the hard lessons of 'less than hoped for' outcomes? **(a)** A lot as the lessons were learned **(b)** Quite often **(c)** Occasionally **(d)** Hardly ever, as my systems have stood the test of time

Memory Test from Helen's story…
With respect to Helen's story in the Memory section above, answer the following questions *without* looking back!

B5. How long (years) had Helen been the farm manager?
B6. Did Helen have a partner? **(a)** Yes **(b)** No **(c)** Can't tell
B7. Were Helen's parents still alive? **(a)** Yes **(b)** No **(c)** Can't tell
B8. Did Helen use a computer for feed budgeting? **(a)** Yes **(b)** No **(c)** Can't tell
B9. As Helen increased stock numbers what happened to individual animal productivity? **(a)** Went up **(b)** Went down **(c)** Didn't change **(d)** Can't tell
B10. Did Helen change the fertilizer inputs? **(a)** Yes **(b)** No **(c)** Can't tell
B11. What happened to dry matter production? **(a)**Went up **(b)** Went down **(c)** No change **(d)** Can't tell

C: Creativity

Your water supply for domestic and stock uses has come from rainwater and a reliable water race (channel fed from a local river that constantly flows). This has been totally adequate. However, the water race system is to be closed down due to some resource consent problems. What do you think are the best two solutions that might be possible and should be investigated?

C1. What is the best solution?
(a) Obtain legal advice on the resource consent problem and consider the whole reason for the shutdown. **(b)** Investigate wells and/or stream sources. **(c)** Investigate a community water scheme. **(d)** Extend the rainwater collection area and storage capacity. **(e)** Put in more tanks and truck in water.

C2. What is the second best solution?
(a) Obtain legal advice on the resource consent problem and consider the whole reason for the shutdown. **(b)** Investigate wells and/or stream sources. **(c)** Investigate a community water scheme. **(d)** Extend the rainwater collection area and storage capacity. **(e)** Put in more tanks and truck in water.

With the constant decline in real terms (buying power) of wool prices (due to synthetic fibre competition), and given the steep, but spectacular nature of most of your farm and thus the difficulty of producing finished stock, you need to consider alternative sources of income. What farm-based possibilities listed below might be worth considering? Rank the *two* best.

C3. What is the best solution?
(a) Tourism/homestay/ecotourism. **(b)** Horticulture in micro-climate pockets (e.g. grapes, flowers, health products, plant propagation). **(c)** Game hunting. **(d)** Stud stock. **(e)** Processing of wool (e.g. natural wool garments). **(f)** Other.

C4. What is the second best solution?
(a) Tourism/homestay/ecotourism. **(b)** Horticulture in micro-climate pockets (e.g. grapes, flowers, health products, plant propagation). **(c)** Game hunting. **(d)** Stud stock. **(e)** Processing of wool (e.g. natural wool garments). **(f)** Other.

C5. What areas, within sheep and cattle production, would you choose to research assuming quite limited funds? List, in priority order, the most important topics with respect to a good payoff to your country. (Only write down those that you think are worthwhile.)
(a)
(b)
(c)
(d)
(e)
(f)

C6. What additional words could you add to this sequence? Merino, Southdown, Corriedale, Perendale…
(a)
(b)
(c)
(d)

D: General

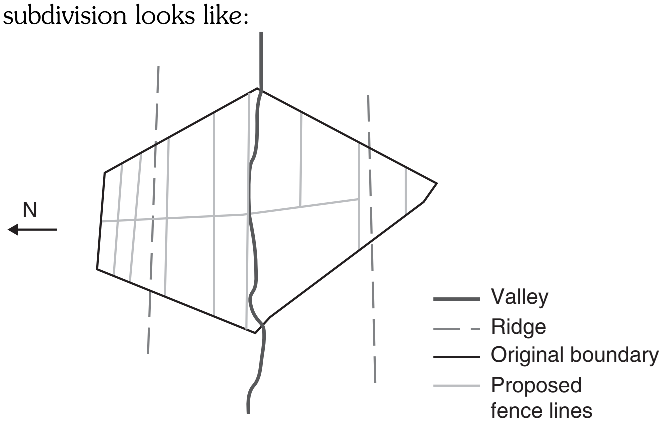
D1. What is out of place? **(a)** Ryegrass **(b)** Phalaris **(c)** Alsike **(d)** Coxsfoot **(e)** Chewings fescue
D2. What is out of place? **(a)** White **(b)** Red **(c)** Lucerne (alfalfa) **(d)** Haresfoot **(e)** Timothy **(f)** Lotus

D3. What is out of place? **(a)** Aberdeen Angus **(b)** Hereford **(c)** Charolais **(d)** *Bos taurus* **(e)** Jersey
D4. Add to the sequence: N, P, . . .
D5. Add to the sequence: Urea, Sulphate of ammonia, . . .
D6. List what you might call your farming mistakes, if any have occurred, over the last 12 months:
(a)
(b)
(c)
(d)
(e)
(f)
D7. Which of the following statements is the most important?
(a) The fence two away from the woolshed has a damaged stretch. **(b)** Your bank's head office has asked all overdraft clients to visit their local bank manager. **(c)** The wool price has dropped quite markedly (15%). **(d)** Soil moisture this spring is 5% above wilting point. **(e)** There is talk of a ruminant tax to help reduce greenhouse gas emissions (methane).
D8. And which is the second most important?
D9. For tax records and income tax return, which is *most* like your practice?
(a) Prepare the tax return myself using my records. **(b)** Give the accountant my cash book with all income/expenses and the referenced documents. **(c)** Use a computer to record all transactions and give the printout and/or disk to my accountant. **(d)** Collect all invoices, statements, sale dockets, etc. and give them to my accountant. **(e)** Other.
D10. Which statement is incorrect?
(a) Escort (metsulfuron) is for broom. **(b)** Tordon (2,4-D and picloram) is for gorse. **(c)** Versatil (clopyralid) is for scrub. **(d)** Glyphosate is for grass.
D11. In the following three lists, what is out of place in each of them? **(a)** Lucerne (alfalfa) **(b)** Clover **(c)** Grass **(d)** Medics
D12. **(a)** *Ostertagia* **(b)** *Haemonchus* **(c)** *Nematodirus* **(d)** Mites
D13. **(a)** Carbohydrate **(b)** Fibre **(c)** Protein **(d)** Vitamins
D14. A break in wool (a section in the strand that is much thinner and can easily break in machines) is caused by: **(a)** Fungus **(b)** A night of severe weather **(c)** Nutritional deficit **(d)** Onset of longer days
D15. A knapsack is to herbicide as a drench gun is to: **(a)** Anthelmintic **(b)** Fungicide **(c)** Sporadicide **(d)** Innoculum
D16. Grandson is to grandfather as ram is to: **(a)** Breed upgrade **(b)** Grand dam **(c)** Ancestors **(d)** Progeny
D17. Given that some sheep are footrot resistant, and some footrot-resistant sheep are a twin, therefore some sheep are twins as well as being footrot resistant. **(a)** True **(b)** False
D18. Vaccine is to disease as antidote is to: **(a)** Poison **(b)** Pulpy kidney **(c)** Applicator **(d)** Vet
D19. Clover is to nitrogen as ewe is to: **(a)** Iron **(b)** Rams **(c)** Milk **(d)** Grass
D20. What is the next number in the lambing percentage series: 90, 95, 105, 120?

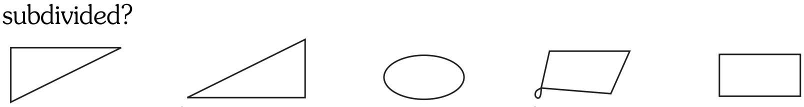
D21. John is a better manager than Peter, and Jim is a poorer manager than John. Which of the following is true?
(a) John is worse than Jim. **(b)** John is better than Jim. **(c)** It is impossible to tell whether Jim or John is best. **(d)** John and Jim are much the same.
D22. You are told that the grass cultivar ‘Smart’ is a selection of the cultivar ‘Slow’. Cultivar ‘Great’ was bred from ‘Smart’. Thus, we must conclude ‘Smart’ grows faster than ‘Slow’. Is this: **(a)** true or **(b)** false?
D23. The DNA gene structure ACDBEA is to growth rate 364.213 g/week as BADACE is to: **(a)** 231.664 **(b)** 362.413 **(c)** 233.641 **(d)** 234.361
D24. Jack won some money in a growth rate competition organized by the drench suppliers. Jack spent it *all* in three competing stock and station companies. In the second store he spent $100 more than half of what he did in the first, and in the third $100 more than half of the amount spent in the second. In the first store he bought $500 of drench. *How much did Jack win?*
D25. The children gathered at school for the pet lamb day. When the children paraded on the tennis court there were 20 heads and 60 ‘feet’. How many children were there?
D26. And how many lambs?
D27. Tom is helping Jack load the trailer as a prelude to a fencing job. Jack says they need 43 thin metal posts. Tom can carry a maximum of five at a time. How many trips did Tom make, assuming he wants to make the smallest number possible?
D28. If you rearrange the letters TPLSAE you would have the name of a: **(a)** Sheep breed **(b)** Clover **(c)** Grass **(d)** Fence component

E: Shapes

E1. John is working out how to subdivide a very large paddock that has recently been successfully sprayed for broom (noxious weed). He is aware that separating sunny and shaded hill sides is important, and that stock drift uphill. So far his subdivision looks like:

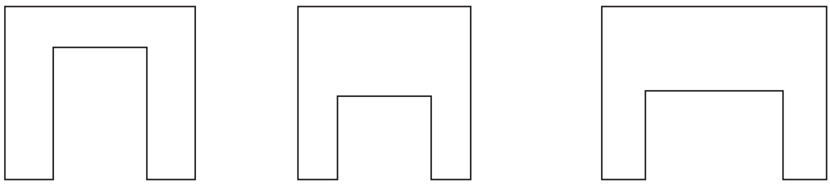


Which shape best fits the shape of the paddocks to go in the area still to be subdivided?



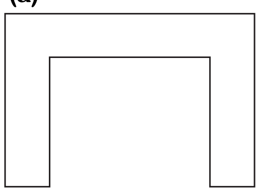
(a) **(b)** **(c)** **(d)** **(e)**

E2. Sally has always had a fascination for breeding improved stock through keeping careful records and resultant sire selection. So far Sally has managed to improve the conformation of the finished lambs quite markedly, as portrayed by the following outline constructed from photos taken of 'on the hook' dressed lambs at 5-year intervals.

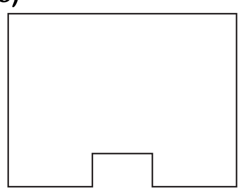


Which of the following outlines best describes what you think Sally will achieve in another 5 years?

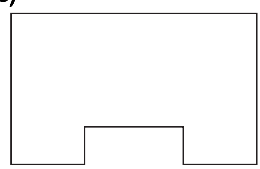
(a)



(b)



(c)



E3. Molly is a keen gardener and has put a lot of time into designing, planting and caring for her 'oasis' in the rather isolated place the homestead is located. The plant outline Molly wants between the edge of the front lawn and distant mountains is:

Currently, the form is: 

Which of the forms below would you expect at the halfway stage?

(a) 

(b) 

(c) 

F: Practical Applications and Calculations

F1. Jack knows he must maintain the sheep energy intake at near maintenance over the summer drought if he is to get a reasonable lambing percentage from his rather valuable stud flock. Extra summer feeding is economic. But he still needs to minimize costs. Given the following information, what should he feed?

Daily requirement: 10 megajoules of metabolizable energy per day (10 MJ ME/day)
Maximum intake per day: 1.2 kilograms dry matter (1.2 kg DM)

Available feeds	MJ ME/kg DM	Cost/kg ($)	DM %
Lucerne hay	8.5	0.30	85
Silage	8.5	0.27	25
Rye straw	7.0	0.15	88
Peas	13.0	0.52	73
Sheep nuts	11.7	0.49	88
Barley	13.0	0.30	87
Pasture hay	8.0	0.25	85

Estimate the amount of each feed (in kg) Jack should use to minimize cost and provide the energy required within the intake restriction.

F2. Given the overdraft interest rate is 15%, which, it is assumed, is paid on the balance at the beginning of each month, what will be *the net interest bill* for the period, given the following cash flows. The year *start bank balance* is $6000 OD. Your bank *pays* you 3% on any beginning of month positive balance.

	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Cash receipts	0	0	0	5,000	0	48,000
Cash expenditure	5,000	6,000	4,000	50,000	10,000	15,000

What is the *total net interest* for the period?

F3. You know the 1000-l diesel tank is about 25% full. The delivery person comes round about every 2 months, but sometimes it is as much as 3 months at most. While you do not do a lot of tractor work at this time of year you seem to use about 50 l/week. How many litres should you order, given you always try to never get the tank below 20% full?

F4. The lambs don't seem to be growing as well as you would expect, despite what seems to be reasonable pasture growth. What are you going to do? Select the three best options from the following list:

(a) Nothing
(b) Weigh a sample of lambs and ewes
(c) Get some faecal egg counts
(d) Change the type of drench
(e) Start a regular programme of drenching anthelmintic and Se
(f) Call the vet

F5. How many ewe lambs are you going to keep? Your flock, just past lambing, is currently 3000 ewes and in 2 years from now you want 3200 ewes and will *not* buy replacements. You have always had 2% deaths in the hogget flock and cull about 15% on wool weights. The ewe flock is mixed age and, in the past, you culled 520 ewes per year. Ewe flock deaths average 3%. **(a)** How many ewe lambs do you need to keep? **(b)** If the lambing percentage is 115% S to S, how many ewes should go to the white-faced (for replacement stock) ram?

F6. Drench is on special offer at your local store – in fact the price is the lowest you have seen it for the 5 years that this excellent drench has been available. While you know it has a shelf life of several years and resistance is not expected to be a problem, you reckon it is worth buying 2 years' supply. In the past you have concentrated on a 'clean pasture' policy through rotation, and haven't used a lot of drench. In fact, you have only drenched the ewes a couple of times per year, and the hoggets three times per year. The recommended dose is 2 ml per 10 kg live weight. How many litres of drench do you need to buy for your 3000 mixed age Romney ewes and replacement flock? **(a)** 30 **(b)** 31–60 **(c)** 61–90 **(d)** > 90

Calculating the Score

Use the answers below for each question to work out the total score. Simply compare the answer for each question to the 'correct' answers given. For each correct answer add the amount given to the score. The scores of a sample of farmers are given at the end to enable a comparison.

Answers for memory

A1. If you got between 2.3 and 2.6 start your score with 1.
A2. If you got between 5.0 and 6.0 add 1 to your score.
A3. If you got between 2 and 2.4 add 1 to your score.
A4. If you got between 20 and 25 add 1 to your score.
A5. If you got between 5.8 and 6.0 add 1 to your score.
A6. If you got between 5 and 6 add 1 to your score.
A7. If you selected **(a)** add 1 to your score.
A8. If you selected **(c)** add 1 to your score.
A9. If you selected **(c)** add 1 to your score.
A10. If you selected **(d)** add 1 to your score.
A11. If you answered 0% add 1 to your score.
A12. If you answered 3% add 1 to your score.
A13. If you selected **(c)** add 1 to your score.
A14. If you selected **(b)** add 1 to your score.
A15. If you selected **(c)** add 1 to your score.

Answers for experience

B1. For *each* lesson learned add 1 to your score.
B2. If you selected **(b)** add 2 to your score.
B3. If you selected **(e)** add 3 to your score, for **(b)** add 2 to your score.
B4. If you selected **(a)** add 3 to your score, for **(b)** add 2 to your score.

B5. If you selected **(c)** add 1 to your score.
B6. If you selected **(c)** add 1 to your score.
B7. If you selected **(a)** add 1 to your score.
B8. If you selected **(c)** add 1 to your score.
B9. If you selected **(c)** add 1 to your score.
B10. If you selected **(b)** add 1 to your score.
B11. If you selected **(a)** add 1 to your score.

Answers for creativity

C1. If you selected **(a)** add 1 to your score.
C2. If you selected **(c)** add 1 to your score.
C3. If you selected **(a)** add 1 to your score.
C4. If you selected **(b)** add 1 to your score.
C5. For each idea listed add 1 to your score.
C6. If you gave one of the sequences below, add 2 to your score.
Romney, Border Leicester
Border Leicester, Coopworth, Texel
Coopworth, Texel, Drysdale
Drysdale

Answers for general

D1. If you selected **(c)** add 1 to your score.
D2. If you selected **(e)** add 1 to your score.
D3. If you selected **(e)** add 1 to your score.
D4. If you concluded K (Potassium) add 1 to your score.
D5. If you concluded DAP or CAN add 1 to your score.
D6. Add 1 to your score for every mistake listed.
D7. If you selected **(c)** add 1 to your score.
D8. If you selected **(e)** add 1 to your score.
D9. If you selected **(b)** or **(c)** add 1 to your score.
D10. If you selected **(c)** add 1 to your score.
D11. If you selected **(c)** add 1 to your score.
D12. If you selected **(d)** add 1 to your score.
D13. If you selected **(b)** add 1 to your score.
D14. If you selected **(c)** add 1 to your score.
D15. If you selected **(a)** add 1 to your score.
D16. If you selected **(c)** add 1 to your score.
D17. If you selected **(a)** add 1 to your score.
D18. If you selected **(a)** add 1 to your score.
D19. If you selected **(c)** add 1 to your score.
D20. If you concluded '140' add 1 to your score.
D21. If you selected **(b)** add 1 to your score.
D22. If you selected **(b)** add 1 to your score.
D23. If you selected **(d)** add 1 to your score.
D24. If you estimated '$1125' add 1 to your score.
D25. If you estimated '10' add 1 to your score.

D26. If you estimated '10' add 1 to your score.
D27. If you estimated '9' add 1 to your score.
D28. If you selected **(d)** add 1 to your score.

Answers for shapes

E1. If you selected **(d)** add 2 to your score.
E2. If you selected **(c)** add 2 to your score.
E3. If you selected **(a)** add 2 to your score.

Answers for practical applications and calculations

F1. If you answered 0.65 kg rye straw and 0.55 kg barley (or thereabouts) add 3 to your score.
F2. If you answered approximately $1644 add 4 to your score.
F3. If you answered approximately 5901 add 2 to your score.
F4. If you selected **(c)** add 1 to your score, and/if **(b)** or **(d)** add 0.5.
F5. **(a)** If you answered approximately 976 then add 2 to your score. **(b)** If you answered approximately 1742 then add 1 to your score.
F6. If you selected **(d)** add 2 to your score.

Score Assessment

As noted earlier, for the test as a whole there is no right or wrong score. Farming is a very practical activity, which is difficult to assess using pencil and paper. However, research has shown there is a positive correlation between scores and managerial ability.

To compare your score with others, add up the totals for each section and then obtain a grand total. The maximum possible score is 100 (though in special situations it might be slightly higher as some of the questions are open ended).

Using the results from a sample of 400 farmers, the average score was 59, ranging between 18 and 100 (Table 5.1). *Where do you stand?* By far the majority of farmers were in the range 37 to 84.

Table 5.1. Management ability test score: percentage of farmers in each range.

	Farm type				
Score range	Sheep	Dairy	Cattle/deer	Arable	Horticulture
1–12	0.6	3.7	1.7	0	8.1
13–24	0.6	0	5.2	0	8.1
25–36	3.0	6.1	3.4	0	10.8
37–48	10.4	10.9	6.9	4.8	32.5
49–60	15.1	15.9	20.7	9.5	16.2
61–72	24.6	31.7	24.2	38.1	13.5
73–84	28.6	23.2	20.7	28.6	8.1
85–96	15.2	7.3	13.8	19.0	2.7
>96	2.4	1.2	3.4	0	0

Remember these are the results for one particular sample, not of all farmers. The test would be easier for some types of farmers as some of the questions are constantly encountered.

From the question-set headings it is clear that 'aptitude' is believed to be made up of several factors or facets including a reasonable memory, appropriate experience, good creativity, comprehension of shapes (abstract representations), appropriate calculational skills and a range of 'general' skills.

CHAPTER 5.5 ASSESSMENT OF MANAGERIAL BIAS IN DECISION MAKING

Introduction

We all make mistakes, and in hindsight often know what we should have done to improve our decisions. Therefore, it is important to recognize where we tend to get things wrong. When we consistently make a particular error, this is called a *bias*. For example, if a farmer always uses a lambing percentage (or perhaps a crop yield) in his budgets that turns out to be consistently higher than what occurs every year, then the estimation process is biased. Sometimes this could be a real problem; for example, maybe a new subdivision fence together with house improvements were planned and carried out on the strength of the forecast budget, but at the end of the year the overdraft could well be at the limit with bills still to pay.

Listed below are *some* of the common biases that a manager might have. A farmer should examine his own situation and decide whether he 'suffers' from each bias, and consequently watch out for it and make corrections to prevent repeat occurrences. The real problem, of course, is situations where a farmer does not recognize he has a particular bias. This situation cannot be fixed without the help of others. Indeed, it is useful to discuss bias with other farmers, professionals and family, as others can often see bias in a farmer that he cannot detect himself.

Associated with some of the bias descriptions is a test to help a farmer decide whether each is a problem in his case. (Note: a limited selection of this material is similar to that in Nuthall, P.L. (2009) *Farm Business Management: the Human Factor*. CAB International, Wallingford, UK.)

Common biases

Objectives

The farmer is not clear in his mind what are the farm's objectives; perhaps he changes his ideas constantly as he has never sat down and discussed the core objectives with his family. Without clear and consistent objectives a farmer cannot decide between alternatives – there is no basis for judging between the choices. A farmer should use the questionnaire on objectives in Part 1 ('Objectives and Skills') to sort out an acceptable set.

Emotional influences

Sometimes emotions influence a decision. In a less-pressured situation the decision maker might have come to a different conclusion. Some people always have a cool head and can cut through feelings and upsets, whereas others make hasty inappropriate decisions. A farmer probably has a good idea of where he falls in the spectrum, particularly if he asks for family help in an assessment. The challenge is to do something about it if the farmer feels his decisions are overly influenced by emotions, not that this is always a bad thing. A farmer's basic managerial style (see Chapter 5.2 'Assessment of Management Style') possibly impacts on whether emotions tend to cloud judgement. Farmers tend to operate in a more stressful environment than many businesses. Research with British farmers makes this clear – if anything, in many countries the environment is more risky (e.g. Australia and many parts of the USA).

Biased data

Making a correct decision is dependent on having the correct facts. However, humans quite often get it wrong even when the correct data are there for the taking. There are a number of reasons why people frequently end up with the wrong data. Examples include:

- *Remembering the good outcomes and ignoring the not-so-good*. For example, when asked about the farm's lambing percentage does the farmer quote a calculated figure that includes all the records of actual weaning numbers to ewes to the ram, or perhaps the numbers sold (or kept for replacements) relative to ewes to the ram? Perhaps the figure is an estimate based on the farmer's memory. In the latter case it is likely that the bad years slip from the radar screen.
- *Remembering the most recent example* (the 'recency' effect), or the first one that stands out (the primacy effect). It is so much easier to use the most recent year's figure for it sticks in the mind, but this is unlikely to be representative. Similarly, some people remember the outcome for an earlier year as it made an impression on their mind. For example, if a farmer is asked to give the overdraft rate that will be used in budgets, would he use the current rate, the rate that was paid when first getting an overdraft, or the lowest experienced?
- *The convenience factor*. Those not so keen on book work sometimes take the data that are most conveniently 'to hand'. For example, when estimating what the new fence will cost a farmer might have on hand a price list received in the post last year; it would be easier to use that than ring up for the most recent and then have to wait (the 'availability' bias).
- *Realistic risk estimates*. It is well known that people have biased estimates of chances and probabilities in their minds. It is not easy to be realistic, for the uncertainty adds a new dimension to decision making. It is common for people to 'smooth' out expected variability and ignore the extremes that might well occur. The result is unrealistic estimates of, particularly, the possible bad outcomes.

Exercise: unbiased estimation of lamb weights

Given the background information below, what is the correct (unbiased) lamb weight estimate that should be used in budgets?

You, a farmer, and your neighbour have been producing finished lambs for many years using the same tried and tested system. You work together for most things, and you have the same soil and climate. Analysis of the killing sheets shows that the *percentage* of lambs in the weight ranges was as follows:

	Year										
Weight (kg)	1	2	3	4	5	6	7	8	9	10	11
< 14	4	12	11	1	0	3	11	8	3	5	5
14–15.9	22	25	18	20	15	16	22	26	22	21	20
16–17.9	50	45	42	55	60	58	50	48	52	51	50
18–19.9	18	16	20	22	17	18	15	15	20	19	20
> 20	6	2	9	2	8	5	2	3	3	4	5

See p. 264 for the answer.

Biased procedures

If a farmer does not understand and follow correct procedure, and/or follow simple logic, the answers will be wrong. How good are farmers' understanding of decision procedures, and do they follow them to the letter of the law? As shown in the module on 'Getting the sums right' in Chapter 2.5. Practicality, including the correct costs and returns is clearly important, but so is following a number of obvious procedures. Examples include:

- *Watch for the 'anchoring effect'*. Research has shown that a conclusion can depend on the point from which the decision maker starts (the 'anchor'). For example, in putting a value on the land next door that is up for sale, the farmer must make sure he is not influenced by rumour and suggestions – he should stick to the facts of the likely returns, and thus value, and the recent comparable sales. Experiments on the results of a valuing exercise showed that professional valuers came to a different conclusion even though they had the same facts available. What was different was the value that was suggested to them at the beginning.
- *Search out* all *alternatives*. When comparing possible approaches (e.g. winter feeding, lambing date, breed selection, crop selection, etc.) a farmer must be sure to make a full list of the alternatives before doing the sums. Sometimes, however, the list can be shortened with some initial estimates to eliminate the obvious non-starters, and be sure to avoid just searching for a system that is satisfactory. For example, if irrigation is now available, does the farmer work out a system that will work, or does he consider all possibilities and select the *best*?
- *Consider the integrated whole*. When a problem is large it is always a temptation to consider it in parts. But so often in primary production the many parts impact on each other and so must be considered as a whole enterprise. For example, if a farmer is considering bringing in some cattle it is not just a matter of budgeting out the return in comparison to the sheep and/or crops they would replace. Cattle are very different in labour requirements, impact on pastures, require different handling and trucking facilities and so on. Each impact must be included in the analysis.

Exercise: including the correct costs

How should Jack analyse the costs of alternative winter feeds? Jack continues to debate with family and neighbours the cost of providing winter feed. He reckons that a good crop of turnips is hard to beat. The others think use of late spring/early summer-made meadow hay is cost effective. The meadow hay is not that good in quality – in fact the energy content of the hay and turnips is much the same, particularly as the hay making conditions can be troublesome.

A good crop of turnips, which takes the land out of grazing for 8 months, produces 12,000 kg of dry matter (DM)/ha/year. Hay yields 3500 kg DM over an 8-week period. Turnips and regrassing costs $850/ha variable costs (cultivation, seed, fertilizer, spray costs and repair and maintenance). Hay making variable costs are $250/ha (cutting, raking, baling, repair and maintenance, cartage and some extra fertilizer). Annual overheads (rates, interest on loans, insurance, repair and maintenance on fences/water supply, labour) cost $203/ha. There is also the cost of the lost production while the areas are shut up and not grazing; given a stock unit (SU) eats about 500 kg DM/year, and grazing efficiency is about 75% on this farm, with a gross margin of $70/SU the opportunity cost of 1 kg DM is $0.105. Pasture produces 8000 kg/ha/year on average.

Which costs should Jack use in comparing the feeding methods, *and* what is in fact the cheapest feed? (The possible answers are: variable costs only; variable and overheads; variable and opportunity costs; overheads and opportunity costs; variable, opportunity and overheads; none of the above.)

See p. 265 for the answer.

Letting the situation take over

So often, circumstances can influence a cool head in making the hard decisions. Has a farmer ever let an exciting situation or person cloud his judgement?

The particular *social* situation a farmer can find himself in can bias his judgement; this is known as ‘social bias’. For example, the enthusiastic and dynamic businessman who comes to visit the local farmer discussion group might well persuade a farmer to join in a group marketing scheme, or perhaps invest in a local tourist venture – but has the farmer done his research and sums correctly, or does he let the social scene influence him in accepting the word of the charismatic businessman?

- *Filtered evidence*. A farmer might have already decided! For example, he has a favourite way of controlling thistles. There is a discussion group meeting on how to control thistles, which are a real problem this year, and a weed scientist from a local research organization has been invited to give his research results. But the farmer knows what is best already, he has made up his mind, though he will go to the meeting to make up the numbers, and perhaps will learn something. Some people carefully note all the evidence that reinforces their views, but the rest gets ignored (called ‘selective abstraction’). Will *this* farmer open his mind?
- *Reckless generalizations*. Sometimes a principle can be carried too far. Do not assume that using a well tried technique will work under different conditions. A farmer might have found, for example, that a well known herbicide is excellent, when mixed with a surfactant, for killing horehound on his light and dry land. When he buys some higher altitude wetter land in the hills behind, he must not assume he will get the same response at the same rates.

- *Sample size*. If something works once, particularly the first time it is tried, do not assume it will always work. Of course, the conclusion must depend on the situation. Sometimes a sample of one can be relied on. If the setting on the spray nozzles gives a good spread, it is more than likely it will do the same next time. But if it rains do not assume the autumn has arrived and the new grass can be drilled (sown) with confidence. Equally, persuading one neighbour to help fund a community water supply does not mean all the others will follow.
- *Infallibility of averages*. A bad outcome does not mean it will be followed by a good one – sun does not always immediately follow rain. If, for example, a farmer expects rainfall to be 300 mm in the spring, and this spring has ended up with 200 mm, there is no way the chances of next year's spring rain being greater than 300 mm will be improved. In the longer run, of course, there have to be some springs with higher rain, otherwise the average would not be 300 mm. But there is no evidence to suggest that a run of bad springs makes the chance of a good one next year any higher than normal.

Exercise: unbiased averages

Planning a share portfolio needs to have good backing data. There are a myriad of unit trusts, and similar, all wanting people to put spare cash into their investments. Perhaps you have decided to invest into off-farm activities for diversification purposes. You study the brochures and consumer institute reports.

Two investments look promising: Must Pay and Will Pay. The material available gives past returns, and they stress that such investments are for the long term. Last year Must Pay returned 12.5% and Will Pay 4%. Must Pay has been going for 4 years, whereas Will Pay has been operational for 12 years. Over the previous 5 years the average payout has been 7.2% for Must Pay (though they only have results for 3 years of this 5) and for Will Pay 5.8%. In the previous 5 years Will Pay produced 4.8%, and the 1 year prior gave 15.2%. Currently the local trading bank is offering 5%, and a finance company 6%. The mortgage is costing you 7%. What should you do using profit as the criterion? (The possible answers are: invest in Must Pay; invest in Will Pay; pay off some mortgage; a mixture; none of the above.)

See p. 266 for the answer.

Concluding comments

All but the most successful of managers have biases. For a farmer to recognize his biases, and correct them, is not easy, for many are convinced that they get it right. It is always helpful to discuss possible biases with family and friends as so often others can see biases quite clearly. Overall, a farmer still needs to be regularly reminding himself of the possible biases as listed above, and constantly guarding against them. If the data, information and processes a farmer uses in decision making are wrong there is no way he can make the right decisions.

Answers

Answer for unbiased estimation of lamb weights

You should use a dressed weight of 17 kg.

It is not possible to work out an exact average from the data provided. However, if you assume a weight that is in the midpoint of each range, and assume 13 kg per head for the lower range and 21 kg for the upper range, you can work out the most likely average weight. Thus, for example, the year one average is:

$$(4 \times 14) + (22 \times 15) + (50 \times 17) + (18 \times 19) + (6 \times 21)$$

This gives a total of 1700, so when divided by 100 this gives the average weight of 17 kg per head. Similarly for each year you get:

16.42, 16.96, 17.08, 17.36, 17.12, 16.5, 16.58, 16.96, 16.92 and 17.0 kg/head

respectively. Averaging these out gives 16.90, or approximately 17 kg/head.

However, to be more accurate you would estimate the expected percentage in each weight range and use these proportions to budget the expected gross income. If in fact the price per kilogram is the same in each range, then you would get the same answer compared with using the average weight.

How does the calculated weight compare with the estimate you made by inspection of the data, or did you do all the sums to get the correct answer? This is clearly the only way, otherwise you open up the possibility of a biased result.

Answer for including the correct costs

The answer is 'variable and opportunity costs'. An explanation follows.

The answer is relatively straightforward in that both the variable and the opportunity costs should be included in the analysis if the farmer wishes to make a decision designed to maximize profit (minimize cost). That is, overhead costs should *not* be included in the analysis, because overhead costs *must be paid no matter what production method is used*. Whether or not the farmer produces anything at all he must pay the rates, interest, permanent labour and so on. The only way to change this is to sell up, but assuming this will not occur, the overheads should not be included in the analysis. Of course, in the longer run the farm does need to make a profit sufficient to cover overheads, otherwise he will go out of business.

The variable costs are part of producing dry matter and cannot be escaped. If the paddock is shut up and not producing any grazing, there is lost profit, though it is hoped to be more than compensated for by the production from the animals being winter fed. In order to make a comparison these opportunity costs need including to allow for the different 'shut up' times.

So, what should Jack use? Well, he was right, turnips are a cheaper source of winter feed given the costs quoted. Of course, in any other case the costs may be different.

To agree with this, consider the costs below.

Costs per kg DM ($/kg)

	Variable costs	Overheads	Opportunity costs	Total
Turnips	0.07	0.0113	0.047	0.1283
Hay	0.071	0.0089	0.105	0.1849

The variable costs are the per hectare costs divided by the DM production. The overheads are based on the time the paddock is out of production (i.e. $8/12 \times 203$ divided by 12,000; $8/52 \times 203$ divided by 3500). The opportunity cost for turnips is DM produced per hectare from normal pasture $\times$ 8/12 multiplied by the per kg opportunity cost. For the hay the costs are simply the opportunity cost per kg as the pasture could have been fed to the animals *in situ*.

Answer for unbiased averages
The investor should use 'A mixture'.

- Must Pay have a returns record of 12.5, 7.2, 7.2 and 7.2%, giving an average of 8.52%.
- Will Pay have a returns record of 15.2, 5.8, 5.8, 5.8, 5.8, 5.8, 4.8, 4.8, 4.8, 4.8, 4.8 and 4.0%, giving an average of 6.07%.

These returns must be compared with the bank, finance company, and paying off the mortgage, which returns 7%.

On a straight average returns point of view you would go for Must Pay. But if Must Pay had been operating in earlier years, assuming Will Pay gives an indication, they would probably not have earned greater than 6.07 so that their average would have been reduced. This, of course, assumes that the past indicates the future. We have no reason, given the evidence presented, to assume otherwise. On this basis, then, a good policy could well be to put some money into Must Pay, and some into paying off the mortgage for the return is totally assured, and the return in the alternatives is little greater.

Some people might have taken a gamble on Will Pay given the high return in the most recent year, but averages seldom let you down.

CHAPTER 5.6 ASSESSING RISK ATTITUDE TO DECISIONS

To check a manager's attitude to risk, the person should answer the questions that are given below then analyse the answers. Before answering the questions a farmer might like to spend time thinking about how he approaches risk, and come to a conclusion on his attitude to risky situations. This conclusion can then be compared with the answer from the test.

The questions ask the respondent to jot down a value that reflects what are called '*certainty equivalents*': this refers to a sum of money that, for the respondent, is equivalent in value to a risky choice that is offered. For example, if I'm offered a chance of entering a lottery in which the prize is \$50,000 if heads turns up on the toss of a coin, or \$10,000 if tails turns up, would I enter this lottery if, on the other hand, I was offered \$28,000 with certainty, i.e. enter the lottery, or take the \$28,000? I suspect I would definitely take the \$28,000 rather than take the 50% chance of getting \$50,000, and the associated 50% chance of getting \$10,000. However, if I was offered \$25,000 with certainty or the gamble, I might be uncertain as to which one to select. If this was the case, we say that the \$25,000 is the *certainty equivalent* of the 50/50 gamble, i.e. I am indifferent as to which option to take.

The questions below ask the respondent to give their certainty equivalent to a series of 50/50 gambles. The certainty equivalents (or 'indifference' sums) are then used to assess the attitude to risk.

You might note that in real life you do not get such offers in which there is a certain payoff. However, extensive world-wide research has shown that putting the questions in this way enables people to clearly understand the choices that reflect their attitude.

Exercise: certainty equivalent questions

For each of the 50/50 lottery questions listed below, jot down the sum ($) that you feel is your certainty equivalent to the chance of getting the first $ sum with a 50% chance, and the second similarly with a 50% chance. That is, give the sum that would make you indifferent to entering the lottery, or accepting the sum you enter which is assumed to be offered with certainty.

What is your indifference $ sum to a 50/50 chance of:

(a) $120,000/$0
(b) $60,000/$0
(c) $120,000/$60,000
(d) $50,000/$30,000
(e) $30,000/$0
(f) $90,000/$60,000?

To assess your risk attitude calculate the following:

1. Take the value you gave for **(a)** and subtract 60,000. Jot down the answer.
2. Take the value you gave for **(b)** and subtract 30,000. Jot down the answer.
3. Take the value you gave for **(c)** and subtract 90,000. Jot down the answer.
4. Take the value you gave for **(d)** and subtract 40,000. Jot down the answer.
5. Take the value you gave for **(e)** and subtract 15,000. Jot down the answer.
6. Take the value you gave for **(f)** and subtract 75,000. Jot down the answer.
7. Add up the total of the answers to **1** to **6**: this number might be negative or positive.

Compare this figure with the ranges below. Depending where the number falls, this will tell you your attitude to risk. If the number is:

- < −70,000 'you tend to be very risk averse and probably make every effort to avoid and/or diminish the risk experienced on the farm'.
- −69,999 to −30,000 'you are probably a mild, or slightly stronger, risk averter. You are, no doubt, slightly wary of risky investments, and make efforts to reduce risk using risk ameliorating techniques.'
- −29,999 to +30,000 'you are somewhat neutral to risky situations. You probably make decisions based on the expected return and do not take special efforts to use risk ameliorating techniques.'
- +30,001 to 70,000 'you tend towards preferring risky investments and farming methods. This does not mean you seek risk, but rather you are quite happy to farm using techniques and investments that some might regard as slightly risky.'

- > 70,000 'you could be called a strong risk preferer in that you are quite happy to get involved in quite risky ventures, and you do not tend to use what might be regarded as safe farming techniques. You probably enjoy taking on ventures where the gains could be substantial, but equally they might turn out rather poorly.'

Clearly, the risk attitude given depended on the answers, but remember that there are cut-off points in moving from one category to another, although these are arbitrary. *There is in fact a continuum*. But at least the comments will give the respondent some idea of how they approach risky situations. It must be stressed that there is no ideal classification, there is *nothing right or wrong about any particular score*, though clearly sometimes it pays not to be a strong risk taker when heavily indebted, as a failed investment could be the cause of bankruptcy.

Compare the results with the similar assessment offered in Chapter 3.4, Attitude to Risk.

Part 6 Tests

Any training programme is enhanced through a student testing acquired skills, or at least testing their knowledge of the important factors associated with each core skill. Furthermore, the test results might suggest reworking selected sections of the book to further improve skills.

Presented here are sets of tests and questionnaires for each major part of this book: risk, observation and anticipation. Of course, the real test is success in managing a farm, but the next best thing is written tests as provided here, especially if carried out in conjunction with others and subsequent discussion.

6.1 RISK TESTS

Probability Estimates

We live in a world of uncertainty, particularly in primary production where just about everything we deal with cannot be predicted with any surety, other than some costs.

To enable making decisions in this variable environment it is important, as much as possible, to get a feeling for the outcomes that might occur, and the chance of each occurring. The following quiz will assess your knowledge of the formal procedures involved. Write your answers on a piece of paper and, when finished, check them with the answers given at the end. Alternative answers are offered, but the answer might also be '*none* of the choices'.

Probability estimation quiz

1. Jack had just spent a couple of evenings doing multiple budgets for introducing bull beef on to the farm. Each budget reflected the outcome for a different type of season, and for different price/cost levels. Jill, his partner, complained that he was spending too much time on bookwork. Why not just do one budget based on the average season using expected prices/costs? Which of the following answers should Jack give to be nearest the crux of the matter?

(a) I must assess the year-to-year variability as you get nervous if I take on risky ventures.
(b) I must look at the low points as the bank manager has made it clear we are near the limit.
(c) I need to look at both the high and low points, and between, to ensure I have plans ready for all eventualities.

2. Anne was precise by nature. She made sure excellent records were kept, and scanned many reports to get price and cost data. All these past records enabled estimating probability figures for items such as wool price, lamb price, lambing percentage and so on. Anne recorded the number of times the various prices and costs fell within each band, enabling the probability estimates to be produced. Which of the following did Anne calculate?

(a) Objective probabilities.
(b) Subjective probabilities.
(c) Prospective probabilities.

3. The difference between the average outcome and the expected outcome can be described as:

(a) being mainly imaginary, as where there are good records the two are much the same.
(b) being quite variable depending on a person's attitude to risky situations, as some people worry unless risk situations are covered.
(c) particularly large where the future situation is quite different from the past that gave rise to the data used in calculating the average, and vice versa.

4. The best farmer in the district spent quite some time in his office working on collecting and analysing information. Despite using all the correct methods, in one particular year he lost a lot of money as the prices received were quite different from those expected. Do you think this farmer:

(a) clearly did not know how to analyse the situation.
(b) had bad luck, clearly shown up in hindsight.
(c) used expected prices rather than the averages.

5. When a completely new product/production method is first introduced it is difficult to obtain data on its likely variability. You do not know the likely range, nor the chance associated with each possible outcome (which you do not know anyway). This situation is described as:

(a) a combined risk and uncertainty situation.
(b) an objective probability situation.
(c) a clear case of risk aversion.

6. When you are facing a lamb market heavily controlled so the price will not vary much around the likely mean (or expected value), the probability (chance) graph can be described as:

(a) quite flat.
(b) exhibiting significant risk.
(c) quite peaked.

7. The local farm consultants believe next year's bull beef price will be around \$2.10/kg. They reckon the chance of \$2.10/kg is about 50%. This means:

(a) they believe there is a high chance of getting \$2.10/kg.
(b) they believe there is little chance of actually getting \$2.10/kg.
(c) the probability of \$2.10/kg is 5.0.

8. Tim's family has been on their high country farm for 150 years running Merino wethers. The average per head wool yield has hardly changed in all this time.

The records show that in 30 of the years the yield per head was about 3.5 kg. Does this mean Tim can expect:

(a) 3.5 kg with a probability of 0.2.
(b) 3.5 kg with a probability of 2.0.
(c) 3.5 kg with a probability of 0.3.

Answers
1. (c); **2. (a)**; **3. (c)**; **4. (b)**; **5.** None of the options offered; **6. (c)**; **7. (a)**; **8. (a)**.

Reducing Risk

Without consciously working at it, most farmers probably already use some of the methods available to reduce the year-to-year variability of their cash surplus. Of course, it is largely impossible to reduce all the variability as you do not control the weather and international markets. As most people are happy to reduce the average profit they might make in return for a less variable surplus, it is important to be aware of all the methods available so you can choose the mix that best suits the situation. A farmer should also be aware of his risk attitude – it explains why some people are happy taking risks, others are not.

Risk reducing methods quiz

You need to choose one of the options provided, *or* note that *none* of the options is correct, *or* that *all* of the options are correct. Write your answers on paper and then compare with the answers given after the quiz.

1. Technological advance uncertainty refers to:

(a) the difficulty in understanding how to use a technological advance (e.g. fetus scanning).
(b) the doubt about whether a new technique will get financial support.
(c) the lack of knowledge on the impact and likely outcomes of using the advance.

2. Managers face human uncertainty. This is likely to impact on:

(a) the speed at which a new employee gets the job done.
(b) the quality of the jobs carried out by a new employee.
(c) the number of ‘sick days’ a new employee might need.

3. Brigid, having just recently taken over the farm, was facing a high debt situation. She was worried that a bad year could force her off the farm. Brigid wondered about introducing beef on to the currently all sheep property. Her consultant suggested it was her decision, knowing that beef would not be quite as profitable as sheep in her situation. The correlation coefficient between sheep and beef profit was, however, 0.7. Should Brigid concentrate on:

(a) diversifying into beef quite significantly.
(b) not diversifying at all.
(c) re-financing.

4. Jack has considerable cash reserves. Despite this, he believes he should insure against low hay yields. Jack's whole system depends on coping with the critical late winter. Only a few insurance companies will take this on – the best quote was $6500 in which the company would pay Jack sufficient to make up his hay to 500 bales if he harvested less. Should Jack take the risk himself, or insure? On average Jack makes 500 bales, and on average the 'barns' are empty by the end of the year. The situation can be summarized by noting there is a 25% chance of 200 bales and a 25% chance of 350 bales. There is a 50% chance of making 500, or more, bales. In a poor year hay costs $70/bale. Currently the barns are empty. Should he:

(a) take the risk himself this year.
(b) insure this year.
(c) insure next year.

5. A wool buyer has a contract with an English spinner. The buyer has offered to take your wool if you will sign up to sell him all your fleece wool at $3.80/kg. Your analysis for the next season's open market suggests you might well get $3.95, but even as high as $4.10 is possible, but the Chinese market uncertainty means if they pull out the price could plummet to $3.40. You reckon there is a 30% chance of this, but equally a 30% chance of the $4.10. Should you take the contract knowing you are quite averse to risk, and will sleep much easier if you know the price is fixed. Should you:

(a) take the contract.
(b) sell on the open market.
(c) half and half.

6. You do not know whether to change your production system in the interests of reducing your year-to-year cash surplus variability. You are happy to drop your average income if the variability is reduced, but within reason. You have decided you must choose between: **(a)** carrying on with your mixed age sheep flock for which you breed your own replacements; **(b)** shifting to a 2-year flying flock (i.e. replace half each year); or **(c)** moving into a bull beef system. Your calculations show that for the last 7 years the gross margin per hectare would have been (in dollars, after adjusting for inflation):

MA flock	480, 320, 510, 490, 360, 570, 430
Flying flock	560, 450, 570, 550, 495, 610, 550
Bull beef	640, 600, 350, 360, 900, 620, 950

Should you:

(a) stick with the mixed age flock.
(b) change to a flying flock.
(c) move into bull beef.

7. Amanda was keen to set herself up to enable coping with the ups and downs of sheep farming. Which option would most likely meet her requirements and still give a reasonable income?

(a) Invest in a wide range of specialist machinery to enable coping with any demands that might occur – e.g. a big enough range and size of hay making equipment to enable rapid hay making to cover all situations.
(b) Maintain a reasonable level of readily saleable assets (shares, deposits, etc.) so that funds are available to cope with the not-so-good seasons.
(c) Use a stocking rate somewhat below what the worst season could cope with so that the high levels of per animal production are maintained.

8. In trying to reduce profit variability, is there any point in running breeding cows so that the progeny might be sold at a range of ages/weights depending on the feed situation that unfolds, and the expected prices?

(a) Yes.
(b) No.
(c) It mainly depends on the quality of the labour.

9. Jack reckoned that a study of what affected his situation was worth the time and cost. He spent some $600/year on obtaining international publications and reports on the world-wide meat and wool market, and factors affecting it (such as national incomes). Might this reduce his income variability?

(a) Probably yes, depending on his skill.
(b) Definitely a waste of money, as the real information is seldom published.
(c) It would only be good luck if it did.

Special note
One method that was mentioned for risk reduction was the *use of the tax system*. You may be aware that in many countries it is possible to use the tax system to smooth out income, and this sometimes also improves the average profit if it means lowering the total tax taken. An accountant will help here, but a farmer must be sure he does not make choices to reduce the tax bill just for its own sake if it leaves his net profit worse off on average. If a farmer is paying a large amount of tax he must, in general, be making a large amount of profit. That is an objective for many people.

While the effective use of the tax system might slightly increase the average profit, do not forget a bird in the hand is worth two in the bush: i.e. having money *now* instead of in a year or two's time means it can be used invested perhaps) *now*. The benefit from this might be more than the extra cash next year obtained from using a tax system smoothing scheme, so sometimes it pays to bite the bullet and pay the tax!

Answers
1. (c); **2.** *all* of the options are correct; **3. (b)**; **4. (b)**; **5. (a)**; **6. (b)**; **7. (b)**; **8. (a)**; **9. (a)**.

Risk Knowledge

(Retake this test whenever you like, to improve your overall average score. The test will help gauge how well you remembered the various components of the skills covered in the text.)

Write down on a piece of paper which of the choices offered is correct for each question posed. Alternative answers are offered, but the answer might also be '*all* of the choices' or '*none* of the choices'.

1. The 'expected value' of an outcome that is not certain (e.g. spring rainfall) is described as:

(a) the commonly occurring outcome.
(b) the value based on the possible outcomes weighted (multiplied) by their individual probabilities and summed.
(c) the value that you hope will occur.

2. If the graph describing possible values of an outcome that is not certain is peaked, this means:

(a) the range of possible outcomes is low and the mid-point, or thereabouts, has a high chance (probability) of occurring.
(b) the range of possible outcomes is high, but there is a distinct peak associated with a single outcome.
(c) the range of possible outcomes is peaked.

3. In risk analysis, 'chance' and 'probability' are two words that:

(a) mean the same thing, with chance being a percentage and probability a fraction.
(b) mean different things, with probability being the correct word to use.
(c) express risk with 'chance' referring to word descriptions only, while probability only has numeric values.

4. Risk and uncertainty are all around the farming environment. The types include:

(a) price, yield, human, institutional, natural, technological.
(b) insurance invoice, rate demand, contract quantity, tax rate, accountant's fee.
(c) all variables/inputs/outputs that can easily be forecast.

5. Your attitude to non-certain situations can be described as:

(a) something you must guard against to ensure you make the correct decisions.
(b) something that means what you choose can rightly be quite different from your neighbours' choice.
(c) something that appears in 'gambling' situations (e.g. cards, sports betting), but has no place on the farm.

6. Diversification relies on:

(a) product prices and/or yields being highly correlated.
(b) product prices and/or yields being highly uncorrelated.
(c) production costs from alternative products/production systems being quite stable.

7. Contracts reduce risk because:

(a) the marketing costs are usually paid 'up front', meaning there is certainty about the cost.

(b) they remove some producers from the free market so that the majority knows there is a smaller number of bidders.
(c) they fix the quantity and/or price at a known value at an early stage.

8. Obtaining additional relevant information has little impact on risk as:

(a) profit variability is caused by the weather, overseas markets and other unforseen factors.
(b) the best information in the world may help you understand why, for example, the price dropped, but only after the event.
(c) even armed with all you need to know does not mean your prediction will be correct and so reduce the unforseen.

9. Product flexibility is an important factor in reducing risk, partly because:

(a) you are not forced to sell to a particular market at a particular time and, therefore, can escape an unexpected downturn.
(b) while you have to sell when the product is ready, the price hedge will help maintain your income.
(c) the variable nature of the product insurance cover means a payout is possible to compensate for any unexpected losses.

Answers
1. (b); **2. (a)**; **3. (a)**; **4. (a)**; **5. (b)**; **6. (b)**; **7. (c)**; **8.** None of the options; **9. (a)**.

6.2 OBSERVATION TESTS

Observation Exercise One

1. Cultivar selection.
The art of observation 'in general' is sorting out what is relevant. With modern plant rights legislation there has been a major increase in the range of grass, clover and crop cultivars available world-wide. Farmers are constantly receiving information on the cultivars and their 'superiority' – but *how should you sort out the cultivars?*

Being bombarded with pleas to use a particular product requires clear criteria to allow assessments. What criteria are important in enabling deciding as to which grass and clover cultivars should be used? (If grass and clover are not relevant to you, try the equivalent set of criteria for cash crop cultivars.) Write them down on a piece of paper, then compare your list with the possibilities listed below. (Hint: think of all the factors that determine whether a pasture will be useful in producing more useable energy and protein at the right times.)

2. Visual observation.
Look at Fig. 6.1 and observe the relevant facts.

Fig. 6.1. Observation test – sheep.

Cover the picture with a card and, having sharpened up your observation and interpretation skills, list on a piece of paper all the factors you noted in Fig. 6.1.

When you have finished, refer to the list below to see if your observation has picked up the complete list of potentially important factors.

Answers

1. Criteria for sorting out cultivars on your farm:

- total yield
- seasonal pattern
- nutrient content
- production in spring/winter
- production in summer
- summer production
- autumn production
- spring production
- persistence
- cost
- disease resistance
- fertilizer requirements
- drought tolerance
- protein content
- dry matter total
- climate requirements

2. Relevant observations from Fig. 6.1:

- sheep are Corriedale or half-bred or other finer wool breed depending on country
- mountains
- cold climate
- high fence
- shorn
- small mob?
- road

- poor feed
- good condition/live weight
- large sheep
- clear face
- mountain basin
- plateau
- 13 sheep
- snow

Observation Exercise Two

Observation and interpretation skills assessment: expected wool price

You are a high country/rangeland sheep and cattle farmer. Clearly the price of fine wool is critical to your financial success. Your scanning of various sources in recent times has located the material reproduced below.

In calculating your fleece wool income from your Merino flock (produces very fine garment wool) for the next season:

1. *What price will you use per kg clean fleece weight?* Write the answer down and compare it later with the suggested answer given below. Your conclusion should be based on the information supplied, not on any other information you might have seen.
2. *Why will you use that price?* Be sure to base your reasons on the information provided below. Write your reasons down and then consider the comments made below with regard to the suggested answer.

(Hints: the wool price depends on the demand and the exchange rate, as most wool is being purchased for use in a range of countries. What is happening to demand relative to current prices, and how will the exchange rate affect your forecast price?)

Note: the information provided is not current. However, make your judgement based on what is provided – this will evaluate your observation and interpretation skills, not your current knowledge. Do not make current actual decisions based on the information provided.

Information provided
Commodity market report

	This week	1 month ago	1 year ago
Lamb 15 kg ($/head)	69.74	69.14	51.84
Steer 280 kg ($/kg)	3.83	3.75	3.19
Stag 60 kg ($/kg)	8.55	7.91	6.01
Wool 35 m ($/kg clean)	4.59	4.56	4.40
Butter ($/kg FOB)	3.30	3.27	2.50
Wheat 11% ($/t)	353	378	306
Pine logs (K grade: $/t)	53	51	66
Rural mortgage rate (%)	7.5	7.5	8.9

Great price . . . read on . . .
updated 30 June

Both the Australian rural press and the Australian Financial Review reported this week the sale of the world's finest bale of Merino wool to Italian spinner Loro Piana.

The bale is reported to have averaged 12.5 micron on an OFDA (Optical Fibre Diameter Analyser) test and 12.9 micron on laser scan. The purchase price was disclosed as $136,000 (about $854/kg!). The bale came from the ultrafine operation of John and Helen Brown in Nerrawak, Casterton, Victoria. (The Woolmark Company).

WStock to be wound up...
24 April

WoolStock Australia shareholders voted to place the Company into a voluntary liquidation and to appoint liquidators at the final Annual General Meeting held on Wednesday 24 April in Melbourne. The liquidators of WoolStock, Mr Simon Wallace-Smith and Mr Andrew Beck, are Partners in the chartered accounting firm Deloitte Touche Tohmatsu. In concluding the final AGM, Mr Donald McGauchie, outgoing Chairman of WoolStock, said that WoolStock had completed the task of selling the stockpile and it was pleasing to have the overwhelming support of shareholders to voluntarily wind up the Company.

WoolStock was formed on 1 July 1999. Since that date, the Company had commercially sold 1.058 million bales of stockpile wool, paid off $217 million in debt, and distributed $478 million to security holders. Now that liquidators have been appointed, WoolStock security holders who have not cashed their cheques from previous distributions are urged to do so as soon as possible. Unpresented cheques will be cancelled and any unclaimed amounts remitted by the liquidators to Unclaimed Monies, said Mr McGauchie.

'In just over two and a half years we have sold the stockpile and achieved the final distribution to all security holders registered on 28 February.'

Source: WoolStock Australia media release The Woolmark Company.

Exchange rates and wool prices (updated 8 June)
Exchange rate:

	Last week	1 month	3 months	1 year
US$	0.492	0.453	0.431	0.423
Euro	0.519	0.498	0.489	0.495

Wool prices ($/kg clean):

21 m	10.73	11.61	12.20	8.20
25 m	9.50	10.25	11.35	7.10
27 m	8.90	9.55	9.70	6.78
29 m	8.50	9.10	9.20	6.56
35 m	5.25	5.32	5.23	4.56
37 m	4.70	5.00	5.10	4.26
39 m	4.58	4.82	5.02	4.18
2nd shear 37 (75 mm)	4.24	4.50	4.55	4.28
Lamb 31 (75 mm)	5.25	5.55	5.35	4.18

Chinese wool quota

Woolgrowers to benefit from increases in Chinese wool quota – 13 February

Woolgrowers will benefit from a 5% increase in China's wool import quota allocation, The Trade Minister said.

While welcoming the quota announcement by Chinese authorities, the Minister said the Government would continue to raise with China its concern about the split in quota between wool for domestic use and wool for processing and re-export.

The Chinese State Development Planning Commission has announced a quota allocation of 337,000 t for 20XY – an increase of 17,000 t on last year. The total amount of the raw wool tariff quota is 264,500 t, of which 94,500 t is for the processing trade. The total amount of the wool top tariff rate quota is 72,500 t, of which 20,000 t is for the processing trade.

'The 5% increase in the level of quota allocation is good news for Australian woolgrowers,' the Minister said. 'China is Australia's largest wool customer. Total wool exports reached the historically high level of AUS$1.28 billion…, accounting for 36% of Australia's wool exports.

'A very positive development is that a first-come, first-served system will be adopted experimentally on wool and wool tops in . . . . This means that Australian exporters with valid supply contracts to China will, for the first time, automatically get a share of the quota set.'

The Minister said 'improved access for wool into China has been and will continue to be one of the top priorities in the Chinese market for the Australian Government'.

Source: Australian Minister for Trade, Media Release (The Woolmark Company)

Segment indicator report

Month	Fine	Medium	Strong
January		5.76	3.52
February	9.19	5.54	3.37
March		5.57	3.57
April		5.39	3.49
May	8.48	5.46	3.80
June	8.47	5.52	4.09
July			3.57
August	8.04	4.90	3.59
September	7.40	4.66	3.67
October	6.74	4.53	3.69
November	7.33	4.69	3.71
December	7.24	4.63	3.83
January	6.98	4.51	3.65
February	7.17	4.21	3.53
March	7.76	4.25	3.64
April	7.88	4.31	3.64
May	7.73	4.19	3.62

Continued

Month	Fine	Medium	Strong
June	7.77	4.10	3.57
July			3.57
August	9.05	4.37	3.63
September	8.93	4.12	3.61
October	8.98	4.02	3.71
November	9.47	4.28	3.76
December	9.14	4.25	3.68
January	10.13	4.51	3.62
February	10.20	4.42	3.78
March		4.37	3.71
April	10.94	4.36	3.71
May	11.56	5.12	4.07
June	10.20	5.05	4.05
July			4.02
August	15.05	5.37	4.24
September	16.97	5.85	4.46
October	17.01	5.82	4.40
November	15.85	5.28	4.10
December	15.38	5.38	3.88
January	16.19	5.21	3.79
February	16.52	5.43	4.03
March	16.43	5.59	4.02
April	16.96	6.06	4.22

(Note: values are $/kg)

Answers

1. The price for budgeting should be somewhere close to $14/kg.

2. The reasons for concluding on the price expected should include some of the following key words:

- top range
- trend
- demand increasing
- favourable reports
- exchange rate
- lower exchange rate
- quota
- price
- improving

Checking Reading Skill

Reading is possibly one of the most important potential sources of information. There is evidence that successful farmers spend a significant part of their time reading and searching out information. Being skilled at noting all that is written and filtering out the relevant information is important.

Read this story on satellite monitoring, then answer the questions at the end of the section.

Spy in the sky pasture monitoring
(Source: *Wool Innovation*, Autumn 2003, p.36)

If (when) the Kyoto protocol one day becomes a reality, satellites may be used to help calculate how much greenhouse gas is generated by our farm animals.

In Australia, satellites are being successfully used to monitor forage supplies in the outback. This helps graziers budget feed and plan fertilizer applications.

In New Zealand, Landcare Research is using some satellites to get measurements of forage quality that will help estimate methane emissions.

A preliminary report was done for MAF last year. This year, Landcare aims to calibrate satellite information by comparing it with pasture samples taken at different times of the year.

Methane and nitrous oxide emissions from almost 100 million stock units contribute about half of the country's total greenhouse gases. Pasture quality influences methane emitted by each animal and so is important to help work out the national methane inventory.

MAF's Dr Gerald Rys says the technology is not 100 per cent accurate, but satellite information is the only way to get regular forage quality estimates over the whole country at a reasonable cost. The technology is improving rapidly and could soon be a commonly used farm tool.

'Satellite imagery has improved and there are now factors that are getting farmers interested in the process, such as drought monitoring', says Rys.

National reporting of methane emissions currently relies on fixed annual emission factors for each class of livestock and estimates of livestock populations. However, the reporting requirements of the Kyoto Protocol mean the country is likely to need a better method of estimation requiring inputs of animal numbers, feed intakes, and herbage quality, for different animal species and regions of the country on a monthly/seasonal basis.

Now, did you pick up new information about Kyoto? Answer the questions posed below without referring back to the story.

Questions

Write down on a piece of paper which of the choices offered is correct for each question posed. However, the answer might also be '*none* of the choices'.

1. According to the story, satellites can be used to directly record:

(a) the nitrous oxide emitted by the soils.
(b) the methane (marsh gas) coming from swamps.
(c) the quality of forage grown across the country.

2. According to the story, Australian authorities are using satellites to:

(a) monitor outback forage supplies.
(b) measure soil moisture to help graziers do feed budgets.
(c) locate outback mobs of cattle.

3. According to the story, the greenhouse gases carbon dioxide and nitrous oxide mainly come from:

(a) the large area of forests in the country.
(b) the shoreline/ocean interface, of which the country has an enormous area relative to the population.
(c) the excessive use of nitrogenous fertilizers.

4. According to the story, the Kyoto Protocol requires reporting:

(a) the annual livestock emission of methane and other deleterious gases.
(b) the animal consumption of different quality herbages.
(c) based on the animal numbers for different species, herbage quality, all the different regions on a monthly/seasonal basis.

5. According to the story, some 100 million stock units emit about:

(a) a quarter of the country's greenhouse gases.
(b) a half of the country's greenhouse gases.
(c) three-quarters of the country's greenhouse gases.

Read this next extract on breeding the sheep of the future, then answer the questions at the end.

The ethical sheep is on its way
(Source: *Meat and Wool Innovation*, Summer 2002, p.25)

By (early in the 21st century) the sheep of the future may be with us.

'Dubbed the Fernmark, or "ethical" sheep because it will require less dipping and manhandling, it will have a short tail and no wool on the head, legs, belly or backside.

Agresearch Lincoln scientist David Scobie says he now has a good understanding of patterns of inheritance for tail shortness and bareness of heads, legs, and backsides.

He predicts he will also have a better understanding of belly bareness within 12 months.

'In five years' time we would like to have sheep with all those traits in the one animal and evaluate them against a conventional sheep.'

Ten years down the track, Scobie foresees a larger diversity of animals in the national flock, and some producers opting for specialist meat-only animals.

He expects the future to be shaped by the current use of crossbreeding, widespread use of composites, more use of terminal sires and exotic breeds without wool.

'In size, shape, colour and pattern we are already moving away from bog standard woolly-headed Romneys.'

Scobie predicts multiple gains:

- Animal welfare – the elimination of flystrike, docking (tail/scrotum removal) and, in the case of Merinos, mulesing.
- Convenience – no more docking or dagging. Lambs will no longer need to come into the shed two to three times before they go to the processing plant.
- Economic gains – easier and safer shearing may lead to a reduction in accident insurance levies and, hopefully, less pressure for increases in the cost of shearing.

The project involves investment and ownership of ideas from Ovita, with support from WoolPro and now its successor, Meat and Wool Innovation.

Scobie says selection for some traits is simple; bare heads and legs can be seen in a drafting race; short tails are easy to see at docking.

Based on his experience, Scobie says traits like bare backsides and bare bellies are probably inherited via recessive genes. These are hard to find and reproduce, but once found, are there for keeps.

'Any breeder who has used Texel, East Friesian or Finnish Landrace in crossbreeding – or anyone who has used composite rams containing these breeds – will already have some of all of the genes.'

Scobie says Wiltshires are a good source of bare belly and bare backside genes; and genes for bare backsides are also known to be 'hiding' in Cheviots, Poll Dorsets, Suffolks and probably many other breeds.

'We say "hiding" because the traditional breeds have been selected for appearance for a long time and these traits don't win ribbons in the show ring.

'There is a range of bareness in many breeds which commercial breeders should exploit.'

Though the formula for producing sheep varies according to the starting point, Scobie illustrates the point by assuming the use of a Romney ewe.

He expects most breeders will want to avoid dags (wool to which large quantities of faeces have stuck, usually at the rear end of the animal), crutching and flystrike (maggots hatched from fly eggs deposited usually at the rear end of sheep) before they get too concerned about tail docking. They should begin by discarding the ewes that produce the most dags and those with the woolliest heads.

The remaining ewes should be mated to a ram which has a large bare area around its backside. It will probably be an East Friesian or Wiltshire, or a composite containing genes from one of these breeds.

From the progeny, breeders should select those with the barest backside and least dags. Though these are correlated traits, it is essential the progeny have both.

To produce short tails, Scobie says it is necessary to begin with a Finnish Landrace sire, or a composite breed containing some Finn.

Tail length seems to be controlled by a small number of genes, and by selecting progeny with the shortest tails it is possible to work rapidly towards an animal with the best of both parent breeds.

'Within 5 years you will have many lambs that don't need docking.

'Naturally a composite with both East Friesian and Finnish Landrace will allow progress in both short tails and bare backsides, though progress in each trait will be slower.'

He predicts big advantages in shearing once bare-bellied sheep are being bred.

'It's good open shearing and high quality wool coming off; we're talking about 80% of the fleece, shorn in half the time.

'You don't have to shear anywhere near the udder so there's no chance of damaging teats. You don't even have to put sheep into the first opening blows position; you can start at the back leg.'

Questions

Did you learn about the attributes of the sheep that are required? Write down the answers to the following questions.

6. According to the story, an ethical sheep will:

(a) cost less to run due to disease resistance.
(b) produce just as much wool despite having a clear face, legs, belly and backside.
(c) require less dipping and manhandling.

7. According to the story, the scientist involved says he will understand the inheritance of belly wool breeding within:

(a) 3 years.
(b) 4 years.
(c) 5 years.

8. According to the story, it is believed that once ethical sheep are commonly available:

(a) the European markets will not be able to exclude the sheep on animal welfare grounds.
(b) animal welfare issues will no longer be a factor due to the elimination of flystrike, docking and mulesing.
(c) lambs will grow faster as they will no longer be disturbed for docking and other procedures.

9. According to the story, traits like bare backsides and bellies are:

(a) easily observed through modern DNA testing.
(b) based on dominant genes that are expressed through traits not easily observed.
(c) due to recessive genes not easily found.

10. According to the story, the scientist sees big advantages in shearing as:

(a) we are talking about 80% of the fleece shorn in half the time.
(b) the shift in wool from faces, legs, bellies and backsides will create a cleaner fleece, easily entered by the shearer.
(c) composites will have a larger live weight so fewer sheep will need to be shorn to get the same total production.

11. According to the story, the business of breeding 'ethical' sheep is:

(a) quite complex, needing careful measurements and an understanding of gene inheritance.
(b) not that complex despite there being so many aspects to be improved at the same time.
(c) within the reach of most people, given the traits that are currently available in many sheep.

Answers
1. (c); **2. (a)**; **3.** None of the choices; **4. (c)**; **5. (b)**; **6. (c)**; **7.** None of the choices; **8. (b)**; **9. (c)**; **10. (a)**; **11. (c)**.

General Observation Knowledge

As part of your assessment, it is useful to take this multi-choice quiz on your formal understanding of the observation modules. You can retake the test whenever you like in order to improve your overall average score. The test will help you to gauge how well you remembered the various components of the skills.

Write down on a piece of paper which of the choices offered is correct for each question posed. However, the answer might also be '*none* of the choices' or '*all* of the choices'.

1. From a management perspective, 'biological observation' refers to:

(a) noting relevant facts about the plants, animals, soils, diseases and processes around the farm.
(b) getting a microscope to inspect likely problem insects, and pathogens in general.
(c) keeping track of noxious specimens (e.g. birds, rodents, etc.).

2. 'Base observation' involves:

(a) taking careful note of your financial base.
(b) visual, auditory (listening) and reading skills.
(c) having a good memory for basic physical theories.

3. It is often noted that you should have a 'sceptical attitude'. This refers to:

(a) joining and supporting the local chapter of the sceptics society.
(b) checking everything you are told against your own knowledge and/or other sources.
(c) being very sure about rejecting information provided by sales people.

4. 'Interpretation and filtering skills' refer to:

(a) ensuring you select the correct criteria when selecting the replacement stock, and correctly interpreting the attributes of each animal.
(b) ensuring you select the right screens when asking the seed dresser to prepare your small seeds.
(c) the attributes needed to sort out the relevant and important information from all the handouts received in the mail, at field days and shows.

5. In observation, the concept of 'scanning' refers to:

(a) making good use of scanning devices as part of observing stock pregnancy.
(b) making sure you can scan the sky and horizon as a backup to weather forecasts.
(c) casting your eye over the farm scene currently of relevance and storing the image for mental analysis, and re-scanning to confirm conclusions.

6. 'Active reading' refers to:

(a) standing up from time to time to stretch and keep up your concentration and content review.
(b) skimming, summarizing, questioning and concluding all with respect to your goals.
(c) being quite proactive in searching out relevant material to read with respect to managing the farm.

7. 'Junk science' refers to:

(a) conclusions that relate very much to waterways and their relationship to run-off (source: Chinese junks and waterways).
(b) careful analysis of the nutritional content of junk food that is suppressed by manufacturers.
(c) conclusions published by 'scientists' that aren't really worth the paper they are written on and weren't discovered using accepted procedures.

8. What is SQR3?

(a) A series of steps to follow when getting the most out of reading.
(b) An example of the kind of code used on brass tags on stud rams (S = stud, etc.), which makes observing their identity much easier.
(c) A typical call sign in VHF radio communication in rural areas, especially used in hill country situations.

9. Reciting, and reviewing, with critical thinking is all about:

(a) poetry appreciation practised at the local book club.
(b) being quite critical of poorly thought out advertising that is constantly recited in the media.
(c) the steps involved in getting the most out of reading about farm-related material.

10. The concept of the 'whole farm approach' refers to:

(a) considering the impact on all aspects of a farm when assessing a change to any component.
(b) reviewing the whole farm financial situation when calculating net assets.
(c) recognizing that an investment might impact on the 'whole farm' return.

11. When your week's work is divided into four basic activities, the hours you would expect to spend on what is defined as 'living' are probably around:

(a) 20 hours.
(b) 80 hours.
(c) 110 hours.

12. Isolating a 'remarkable' thing/event about something you have observed is useful when:

(a) working out the key components determining the net pay-off.
(b) concluding what you will present to the next meeting of your farm discussion group.
(c) ensuring the thing/event is locked into long-term memory.

13. Research has shown that brain-held memory can be divided into:

(a) a segment for words and numbers.
(b) a brain cell set similar to a computer disk.
(c) constantly developed segments appearing as the years go by.

14. In management 'speak', a problem is:

(a) where something unexpected occurs.
(b) where you worry and lose sleep over what an outcome might be.
(c) a situation where a decision is required over choosing between alternative solutions/actions.

15. When assessing the 'relevance' of an idea/suggestion for your farm it is important to:

(a) assess the credibility of the person suggesting the idea.
(b) check out the reliability of the evidence being presented.
(c) calculate a partial budget to check out the effect of any change to inputs, outputs and the hours required.

16. The three basic reasons for keeping records are:

(a) tax, personal interest and efficient management.
(b) efficient management, traceability and tax.
(c) fertilizer controls, personal interest and tax.

17. The old saying 'data is not information' refers to:

(a) data are essential for decisions, whereas information is too general to help on a particular farm.
(b) the confusion over the fact that information refers to general concepts and data to facts and figures in your annual tax return.
(c) data are the raw figures that need processing to produce information useable in making decisions.

18. Active, and effective, listening involves:

(a) interrupting when you disagree, and giving your view to ensure the record is put straight.
(b) not interrupting at all, keeping quiet and ensuring you suppress any non-verbal language.
(c) not interrupting, but providing occasional comments of support, providing summarizing feedback to ensure the message received is correct.

19. In listening to mass audience talks (radio, TV, large conference, etc.), successful passive listening involves:

(a) making sure you remove automatic filters and biases as well as keeping an open mind.
(b) making sure you can vouch for the credentials of the speaker.
(c) making sure you can get access to a tape of the talk so you can follow up on anything that interests you.

Answers
1. (a); **2. (b)**; **3. (b)**; **4. (c)**; **5. (c)**; **6. (b)**; **7. (c)**; **8. (a)**; **9. (c)**; **10. (a)**; **11. (b)**; **12. (c)**; **13.** None of the choices; **14. (c)**; **15.** All of the choices; **16. (a)**; **17. (c)**; **18. (c)**; **19. (a)**.

6.3 ANTICIPATION TESTS

General Anticipation Skills

Check out your anticipation, visualization and imagination skills by answering the following questions. While there *are* right and wrong answers to these questions, the answers are not given at the end as they will depend very much on your situation. Thus you might like to write down your answers and review them with fellow students or colleagues, and perhaps with a family member or friend.

1. The key to efficient grass production and utilization is in part to do with electric fences. Whether or not you currently use an electric fence to temporarily split areas, with or without a back fence, describe what you believe would be an ideal arrangement for winders, standards, unit, etc., so that shifting the fence is easy and very quick. Describe how it would work. Consider both rolling hill country as well as flat land.
2. Having in your brain stores of useful information is a key to good management. The memory banks of information cover many practical questions that involve anticipating what might happen. For this example, consider when the hay will be ready. Describe the smell, feel and look of high quality hay a day before it is ready to bale. Or if more appropriate, consider a crop of wheat ready to harvest.
3. Technological improvements are the key to moving ahead. One improvement that could help put some profit back into the wool industry is an economical way to automate shearing. That is, a system to easily and simply remove the useable fibre from an animal's skin. What are your ideas on a shearing robot, or some other likely way of 'shearing' that is an advance on current methods. Or if more appropriate, consider an apple picking machine, or a machine to harvest maize, which is then sorted into different quality kernels.
4. Water is a crucial and pivotal input to primary production. While not every farm has the luxury of potential, or actual, irrigation, assume you are planning a new/upgraded irrigation system for your farm which is 80% irrigable and you have consents for a reasonable amount of water. Describe how you would decide when to irrigate, and how much water to irrigate, so you make the most profitable use of the limited and expensive water supplies and comply with any conservation requirements that could be imposed in the future.
5. From farmer to science, and then back to the farmer for use – the case of improved genetics and wool. Researchers at a leading agricultural research institute have been given four intriguing 2-tooth sheep by a farmer who has been watching them since birth. Their mother was not special. They concluded they resulted from a mutation and believe they could have an enormous impact on the wool industry. The wool is very fine, not crimped and has extreme tensile strength with constant diameter despite the bad drought of the last season. Furthermore, their fleece weights and yield were slightly better than the flock average. Assuming the find turns out to be useable industry-wide and that modern egg implantation methods means flock rams are available in 5 years' time, imagine the impact on the sheep industry.

Thus, describe what impact a sheep breed that produced fine high tensile constant diameter wool with production and yield levels better than existing ones would have on a farm with which you are familiar. Explain the reasons for the change(s), and describe what the farm will look like in 10 years' time.

Or if more relevant, consider a patch of wheat that has double the yield of the rest of the field, and the grain has much higher protein.

6. The environment is attracting increasing consideration. Improving the environment might not only impact on the aesthetics of our countryside, but also have, in the longer run, economic benefits.

In New Zealand, possums are said to eat some 24,000 t of vegetation per night, and are a major source of TB infection for domestic animals. Assume a fatal possum disease appears naturally and is spreading very quickly. Imagine what a fenced off 20 ha native bush reserve, which borders a national park, will look like in 5 years, 10 years, 20 years. Will there be any economic impacts on your farm? Describe what you expect to happen to all components of your farm. Most countries have introduced pests that are a threat to indigenous flora and fauna. Use a local example of this situation if it is more appropriate.

7. Nutritious pasture is the key ingredient in sheep and cattle production. Getting the maximum amount of pasture eaten by the maximum number of productive animals is a key to primary production. Feed budgeting can be a key to efficiency in this regard. Yet, few farmers formally feed budget. Maybe a crucial factor here is making feed budgeting much easier. Like cash flow budgeting, feed budgeting could be a key to success for many farmers. Tell us what inventions would make formal feed budgeting easy and worthwhile?

Again, if more appropriate, consider nutrient budgets. Can they be made easier and accurate?

8. Preparing for future sheep advances. With the increasing understanding of what makes up the genetic base of sheep, it is not beyond the realms of imagination that all sheep could produce triplets survival to sale. This would probably mean concentrating on meat production at the expense of wool. What changes would you make to an existing farming system? What impact on profitability? What impact after 1 year, 2 years, 8 years on profit and systems? Describe all these impacts.

Or if more familiar to you, consider a grain crop that can be tailored to produce various ratios of protein of various kinds in relation to the carbohydrate content.

9. Forecasting product prices. We know that the cost of inputs will steadily creep up, and their relativities will stay similar in general. But what will happen to product prices? Getting this right for the next 10 years or so will mean you can plan to make the most of the situation.

Describe what will happen to the relative prices of sheep meat (lamb), wool and beef (or crops if cropping is your forte, or dairy products relative to alternatives if you are familiar with dairying) over the next 5–10 years. Give the reasons for your conclusions.

Anticipation Skills Knowledge

As part of your assessment it is useful to take this multi-choice quiz on your formal understanding of the anticipation modules. You can retake the test whenever you like in order to improve your overall average score. The test will help you gauge how well you remembered the various components of the skills learned.

Write down on a piece of paper which of the choices offered is most correct for each question posed. However, the answer might also be '*none* of the choices' or '*all* of the choices'. The correct answers are given at the end.

1. Anticipation is important in managing your farm, if for no other reason than:

(a) decisions made today can impact on the future state of your assets.
(b) you can get involved in the politics of preserving threatened species.
(c) it allows impacting on the world wool markets.

2. A good manager knows that the planning horizon involves:

(a) everything encompassed by the firm's horizon.
(b) the time horizon relative to the expected life of the farm.
(c) the number of years that tax records must be kept.

3. Anticipation is important when considering a farm ownership setup because, primarily:

(a) legal fees can be quite expensive and should be minimized, though they can be tax deductible.
(b) you do not know when the government will change the rules, leaving your mortgage unsupportable.
(c) it can impact on future asset control, the ability to transfer assets, and tax commitments.

4. Thoughts about the future should largely concentrate on:

(a) markets around the world as well as product processing systems and their costs.
(b) research into animal health, animal genetics, similarly plant breeding and disease, and fertilizer use.
(c) physical assets, products and markets, production methods, financial arrangements, property ownership and labour arrangements.

5. A 'creative pause' is Edward de Bono's way of describing:

(a) a pause while trying to sort out a taxing problem, such as why the tractor will not start.
(b) something people involved in the local community broadsheet use when thinking up something to entertain their readers.
(c) where he has writer's block.

6. An 'emotional block' is best described as:

(a) the impact of irrational beliefs and feelings restricting your imagination.
(b) strong feelings you have about some of the impractical projects proposed by local communities.
(c) protective beliefs developed to prevent others hurting your feelings over your predictions.

7. The 'drivers of change' phrase refers to:

(a) the important people in business positions that manage major assets.
(b) the factors impacting on future prices and production efficiency (economic conditions, trade barriers, environmental control and production research).
(c) the conclusions of research into improved rural telecommunications and high speed data transmission systems.

8. The 'random input' procedure refers to:

(a) randomly selecting a noun as a 'seed' to follow through a word sequence in creating new ideas that might be worth evaluating.
(b) trying out a range of randomly selected levels of an input (e.g. fertilizer) to see which is most profitable.
(c) using a random event (e.g. a coin toss) to choose between similar alternatives.

9. Jack attended a lecture on 'The Futures Approach'. He came away believing that 'environmental scanning' involved:

(a) constantly observing the waterways in the neighbourhood for signs of pollution.
(b) working hard to support community efforts to beautify the countryside and its buildings.
(c) collecting information to conclude on the factors that are likely to determine the shape of the world's primary production scene in the future.

10. Which list below best describes the most important five factors you should consider when making retirement plans?

(a) Health, age, unit trusts, asset renewal and income reliability.
(b) Farm ownership, investment risk, location, hobbies and leisure.
(c) Flexibility, control, taxation, income and costs, and communication.

11. 'Contentment > denial > confusion > renewal' are frequently the steps in:

(a) looking to the future and consequently changing old habits.
(b) considering the fervour of pushing ahead with 'all grass wintering'.
(c) classifying people into groups when a new technology is proposed.

12. 'Pattern matching' in visualization is all about:

(a) completing jobs around the farm following a successful pattern (e.g. a fencing plan).
(b) identifying a particular weed by comparing a sample with descriptions given by the local spraying contractor.
(c) the process the brain uses when identifying an observed object.

13. 'Cross impact analysis' is a technique for:

(a) ensuring you consider all effects to all components of a farm in a proposed change.
(b) ensuring you check out the impact of a proposed change on the labour requirements of each competing farm enterprise.

(c) ensuring the impact of a proposed change does not cross into other processes on the farm.

14. 'Kick starting' your management-oriented visualization skills refers to:

(a) taking time off to concentrate on your mind's eye.
(b) getting involved in classes on appreciating modern art as a first step in encouraging your imagination into action.
(c) getting a family member to administer a sharp reminder kick when you revert to your old habits.

15. The first step in capturing the vision of your farm in its perfect state should be to:

(a) draw a rough sketch/plan of your vision to be clear what you are talking about.
(b) work out all the physical impacts that will result (inputs, outputs, asset changes, etc.), and whether the change is feasible.
(c) check with the local council and government authorities that you will be in compliance with the rules and regulations.

16. A 'SWOT' analysis refers to:

(a) sheep, wool, opportunities, thoughts.
(b) strengths, weaknesses, opportunities, threats.
(c) sorting, weights, openness, total price.

17. When planning out your vision for the farm it is useful to create a time line because:

(a) when reviewing the success of the venture after several years you can compare plans and reality.
(b) you will know the timing of each task and, consequently, job scheduling requirements.
(c) it will enable predicting when the contractors required will be available.

18. Creating a gross margin for your vision of a new enterprise involves:

(a) estimating the amount of product produced and, net of agent fees, calculating the gross margin.
(b) estimating the requirement for fixed resources, and calculating the gross income per unit of fixed resource.
(c) estimating the gross income from, for example, a hectare of the enterprise, and deducting the direct production costs to give the gross margin per hectare.

19. 'Triple bottom line accounting' refers to:

(a) calculating the profit, environmental and social impacts of a venture or plan.
(b) calculating the profit, return on assets and total capital involved in a venture or plan.
(c) using modern computer-based financial packages to cater for the three management tenets of 'planning, execution, and control'.

20. In project management, a critical path can be defined as:

(a) the roadway, or path, that is a critical connection in the transport of resources.
(b) the sequence of jobs that determines the earliest time a project can be completed.
(c) the sequence of vaccinations that are critical to ensuring animal health in developing a new stock venture.

21. The first step in project management is:

(a) creating the project plans.
(b) creating a prototype version of the product being proposed.
(c) determining the need for the product, and production feasibility.

22. Benchmarks are useful in management. They relate to:

(a) the critical marks on the boards located in streams for monitoring river levels.
(b) the standards set by accountants for calculating your tax commitments.
(c) an essential part of planning, execution and control in the ever changing world.

23. In assessing the financial return from a production system, it is important to work out the:

(a) marginal net return.
(b) average net return.
(c) cost of production.

24. The 'opportunity cost' of a resource refers to:

(a) the loss in profit (cost) of not taking up past opportunities that would have used the resource.
(b) the return possible from using the resource in the best alternative project.
(c) the cost involved (time, consultant costs, etc.) in vetting opportunities.

25. In a management sense, having a 'bad case of the dithers' refers to:

(a) being rather reluctant to rise early and face the winter mornings.
(b) situations where you have worked too hard for too many hours and become quite shaky and find clear thinking difficult.
(c) situations where you have calculated that a new project is worthwhile, but for some reason you just cannot get started on it.

26. What is said to be the most important task in time management?

(a) Listing out the jobs on hand.
(b) Prioritizing the jobs on hand.
(c) Estimating the time and cost to complete each job.

Answers

1. (a); **2.** None of the choices; **3. (c)**; **4. (c)**; **5.** None of the choices; **6. (a)**; **7. (b)**; **8. (a)**; **9. (c)**; **10. (c)**; **11. (a)**; **12. (c)**; **13. (a)**; **14.** None of the choices; **15. (b)**; **16. (b)**; **17. (b)**; **18. (c)**; **19. (a)**; **20. (b)**; **21. (c)**; **22. (c)**; **23. (a)**; **24. (c)**; **25. (c)**; **26. (b)**.

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