

Drought Feeding and Management of Sheep

A guide for farmers and land managers

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Edited by Jane Court

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Glossary of abbreviations

kg	_____	kilograms
g	_____	grams
mm	_____	millimetres
cm	_____	centimetres
l	_____	litres
m ²	_____	square metres
MJ	_____	megajoules
T	_____	tonnes
ME	_____	metabolisable energy (energy units)
ppm	_____	parts per million
DM	_____	dry matter
CP	_____	crude protein
N/kTex	_____	Newtons per kiltex (a measure of staple strength)
EC	_____	electrical conductivity

Introduction

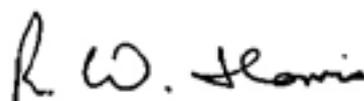
Droughts are very much part of farming in Australia. They come at irregular intervals and bring hardships to farming enterprises, farmers and their families and rural communities. Farmers put in place a range of measures to prepare themselves for such events.

This booklet is a practical guide on sheep feeding and management during a drought to help producers break down into manageable steps the daunting planning phase, and see the plan realised as a successful way of combating the drought.

As no two droughts are the same, this booklet cannot cover all situations. Rather, it aims to provide general recommendations which can then be modified to fit the requirements of the individual. Application of the best information and advice can assist in developing a plan to suit your situation in managing through drought. Plans should include conservation issues, animal feed requirements, feeding in confined areas and making an assessment of water reserves and water quality.

I know droughts can be demoralising events, but planning and management based on sound information can help you through the experience. I also know how resilient sheep producers and their communities are at combating such adversity. I hope this booklet will contribute to you and your family successfully managing through the drought.

If you require more information on the many dimensions of drought, contact the Department of Primary Industries on 136 186.



Ron Harris
Executive Director
Catchment and Agriculture Services
Department of Primary industries

Chapter 1

Preparing a Drought Action Plan

Introduction

Droughts are part of life for sheep farmers in Victoria, so producers generally make provision for them by storing fodder and improving water supplies during good seasons.

However, each drought brings its own set of difficulties. How well you survive the drought will depend on the initial plan of action and the modifications undertaken to the strategy as the drought progresses.

Planning and decision making must be done as soon as you recognise the possibility that the poor season may progress to a drought. If you leave the decisions until the drought worsens, many of the management options available early may be closed to you. Prices for sale stock usually drop dramatically, agistment dries up, fodder prices generally soar and off-farm employment becomes difficult to find.

The first step is to list the farm's financial and physical resources so that the effects of various strategies, both short and long term, can be calculated. Water is probably the first thing to consider, because if this resource is inadequate it will be difficult to retain large numbers of stock.

The next step in choosing a drought action plan is to estimate when you think the drought will break. This will affect your calculations on how long you will be feeding sheep, how much it will cost and whether you will decide to sell stock or not. It is best to over estimate the time you expect to hand-feed your sheep to be on the safe side.

You will need to address the list of questions below on your action plan when deciding what to do.

Important questions to ask

- What is my current financial situation?
- Do I need to see a financial counsellor?
- Have I the time and equipment to feed sheep?
- How long will I have to feed for?
- Am I aiming at maintenance or production targets?
- What are the feeding needs of the various classes of sheep?
- What fodder will I use and what will they cost at various stages of the drought?
- Have I adequate water supplies to survive the drought?
- How widespread is the drought?
- Is suitable agistment available?
- Is droving an option? Regulations on droving differ between shires and in some shires droving is not an option
- What prices are sheep now?
- What prices will sheep be after the drought?
- What effect will reduced stock numbers have on my overall feeding costs?
- What effect will my strategy have on my pastures and soils?
- What effect will my action plan have on my long-term viability?
- Should I see my bank manager now?

Allowing stock to starve is not an option and is an offence under Victorian law.

The plan does not need to be implemented all at once and should be flexible to allow for changes in circumstances. For example you may only sell a certain class of stock or buy some fodder if conditions do not improve by a certain date.

You will find that having a plan of action will greatly reduce the amount of stress on you and family members. Though the plan may need continual modification as the drought progresses, each family member will be working towards specific aims, especially if you have discussed the plan with them beforehand.

Environmental impact of your plan

You need to consider the long-term effect your plan will have on your pastures and soils. If your pastures are mostly annual species or your soil type is unstable, then you may need to lower the number of stock you intend to keep so that you minimise the long-term effects your plan has on the environment. You should seriously consider confining at least some of your flock to a small part of the farm. This option has been successfully undertaken by farmers in previous droughts with the stock, pastures and soils emerging from the drought with minimal impact (see Chapter 5 for further details).

If you were not on your farm during a previous drought, talk to neighbours or relatives about what happened to your district during that period. They may be able to suggest strategies that reduce the impact of the drought without significantly increasing your financial burden.

Tips from past droughts

Farmers who successfully survived the 1982 and 1994 droughts were asked what they did to ensure they got through. In summary, they:

- made plans and took actions early
- did simple budgets for various feeding and selling options
- knew their hay supplies and were prepared to ration roughage
- prepared cash flow budgets for 2-3 years
- reviewed decisions regularly
- acted quickly and decisively
- looked for opportunities
- remained positive
- planned a holiday
- were prepared to put sheep into stock containment areas to preserve their pastures and soil.

In 2002, more farmers fed sheep in containment areas or droughtlots. The experiences from this are included in Chapter 5.

Effect on you and your family

Undoubtedly, you are only too aware of the stress the drought will have on you and your family, even leaving aside the financial impact. It is essential to discuss your drought strategy with your family and then with others that may be effected. It is also important to keep up social contacts, such as church and sporting groups, to give you and your family a break from farming activities.

Management options

Toughing it out

It is your legal responsibility to ensure that sheep do not starve to death or become distressed during a drought. Therefore, doing nothing is not an option open to you in the long term. Even in the short term, it is of questionable value. You may be tempted to do nothing in the hope that the poor season will not turn into a drought. In the mean time, paddock feed diminishes, the condition and value of stock slip and feed prices soar. These changes close off many of the other options available to you earlier on in the drought.

The message is to plan early and set deadlines to activate specific actions. Doing nothing is not an option unless the drought is not severe or you are highly understocked.

Agistment

Sending sheep away on agistment is sometimes more economical than feeding and the time saved from feeding might be more usefully employed. It also releases more feed for the stock remaining on the property. Don't forget to inquire in your own district, especially early in the drought, as you may be able to find ungrazed paddocks for rent. However, if the drought becomes more widespread, agistment becomes harder to find and the cost rises rapidly. It may then be cheaper to feed stock at home. It may also be costly and impractical to supervise sheep (especially lambing ewes) at a distance.

The cost of transport and the possibility of disease and losses must be taken into account. The possibility of selling the stock after the drought in the area of agistment may also be considered, thus eliminating the return transport costs.

Droving

Another method of finding off-farm feed resources is by droving stock along roadsides. This is allowable in only some shires. There are legal restrictions and local environmental considerations which apply to this practise and which vary between shires and may change. The risk of disease spread also needs to be considered. Check with the shires involved before starting this option.

Selling

Early planning and action improves the options for selling sheep. In particular, selling decisions need to be made before stock have lost too much condition to be saleable and market prices have started to drop.

When deciding what stock to sell and when, the following factors should be considered:

- present value of stock (including the wool value)
- the quality of stock
- capacity to carry stock through
- taxation effects
- likely demand for the stock at the end of the drought
- likely length of the drought
- possibility of improving the quality of the sheep.

In general, a sound policy is to sell some stock and feed the rest. Cast for age and cull sheep will normally be the first to go.

Further sales should be planned, keeping two general aims in mind. One is to maintain as many breeders as possible to assist in building up stock numbers quickly after the drought breaks. The second is to keep the most productive sheep. Wethers would generally be sold before ewes and older sheep sold before the 2- to 4-year-old groups (1 - 3 years for wethers).

Better grown ewe weaners should be given preference for available feed over other weaners. Given a suitable ration, weaners may be carried through a drought, but they are more susceptible to nutritional stress and disease than mature sheep.

Finally, taxation can have an important bearing on selling policy during a drought. Its effects, especially if a large part of the flock is to be sold, need to be worked out before the stock are sold, particularly where low 'cost price' valuations are used for taxation purposes.

Identifying livestock leaving the farm - NLIS requirements for sheep and goats

Sheep and goats born before January 2006 have no National Livestock Identification System (NLIS) requirements until 2009.

Sheep and goats born after 1 January 2006 must be tagged with an NLIS Sheep tag before leaving their property of birth.

Sheep or goats born after 1 January 2006 sent on agistment, on return must be accompanied by a completed National Vendor Declaration form (NVD – see Appendix 1) or be tagged with an NLIS Sheep Post-Breeder tag printed with the property identification codes (PICs) of the agistment properties. In some cases agistment properties can be linked to the PIC of the home property, which would eliminate the need to use an NVD or attach an NLIS Post-Breeder tag.

For more information contact the DPI Helpline on 1800 678 779.

Purchasing sheep after the drought

Sheep and goats born after 1 January 2006 must be tagged with an NLIS sheep tag before leaving their property of birth.

To minimise the risk of introducing disease, sheep must be accompanied with a completed animal health statement (Appendix 2).

Humane Destruction

If some classes of stock are unsaleable, and no other option is feasible, then these animals should be humanely destroyed. In past droughts, shires have made facilities available to dispose of carcasses after destruction. Information on appropriate methods of destruction can be obtained from animal health staff from your local DPI office.

Feeding

Feeding is an expensive and time-consuming option.

Sheep will normally be fed rations just sufficient to maintain their weight in a condition of at least Condition Score 2 until the drought ends.

In some cases, short-term fattening rations may be justified for stock suitable for sale as prime lambs or shipping wethers. However, budgets need to be carefully calculated as the profit margins are generally small.

Previous experience shows that the quality of dry pastures, stubbles and failed crops is often much better than first anticipated. This reduces the feeding levels needed to maintain liveweight and thus, the estimated cost of retaining stock. Weighing and assessing the condition of stock ensures that feed (paddock supplement) is adequate and also that stock are not overfed. The cost of sheep scales can often be recouped by avoiding over-feeding or preventing under-feeding during a drought.

Information on nutritional requirements of various classes of sheep, feeding rates and stock management is given in the following chapters.

Other management decisions

Shearing, pregnancy and lactation all increase the nutritional requirements of the sheep flock. Changes to mating, weaning and shearing times can sometimes be used to reduce feed demands during the drought.

The cost of drought-feeding a breeding ewe for 6 months (including late pregnancy and lactation) is about 50 per cent more than for a dry ewe, so savings can be made by delaying joining or by not joining. However, the long-term effect of this action needs to be carefully considered.

Delaying the time of joining for an early autumn lambing flock has the potential to greatly reduce supplementary feeding costs. Joining may be put back a few weeks or changed to a late winter or spring lambing.

Potential feed savings for producers who already lamb in late winter or spring are unlikely to be as great.

A more drastic measure is to not join some or all of the ewes. The most obvious age groups not to join would be the maidens and the old ewes, especially if liveweights are low (see Chapter 2).

Although a change in the time of joining or reducing the number of ewes joined may save money or supplementary feed in the short term, this benefit must be weighed against long-term costs. Factors such as complicating management, disrupting the flock structure and altering future income levels need to be considered.

Early weaning, if not already practised, can reduce feed costs and simplify management of both the ewes and the lambs. The ewes can then be managed as dry stock and the lambs given priority.

The crucial factors for success of early weaning are that:

- the lambs are at least 6 weeks old and preferably close to 12 weeks
- they have reached at least 9 kg liveweight
- they receive high-quality rations.

Changing the time of shearing may help to reduce feed costs, especially if shearing is currently during a cold time of the year. For most people this means bringing shearing forward to a warmer and drier time of the year which reduces feed demand and losses. This option is not always practical and the benefits must be balanced against disruption in management and discount in wool prices due to the shorter wool.

Chapter 2

Setting targets

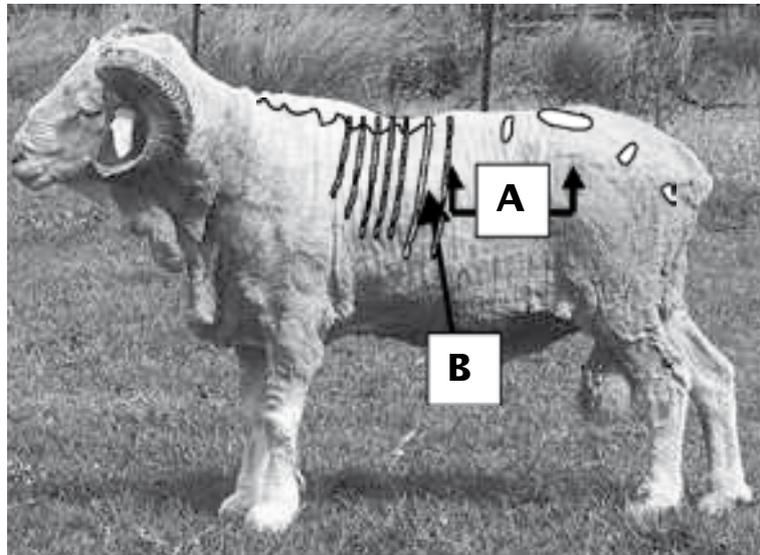
Before choosing a drought feed and deciding on quantities, it is important to set targets for feeding each class of stock. The targets for the feeding program may be, for example, to maintain ewes in a suitable condition for joining, or to hold weaners at their present weight and body condition for the next 3 months. Different targets will impose a different feeding regime, and cost, on the producer. In addition, the targets set may affect the most economical choice of feed.

Assessing fat reserves of sheep

Assessing the amount of fat that an animal has on reserve is a very useful tool for monitoring the stock and assessing the needs of animals to either gain weight or even to lose weight. It is very quick, cheap and easy to do, while remembering that monitoring liveweight is a must for young animals (lambs) that have little fat reserve and need to gain weight.

Fat cover in sheep is measured either at the short ribs (condition score) or the long ribs (fat score).

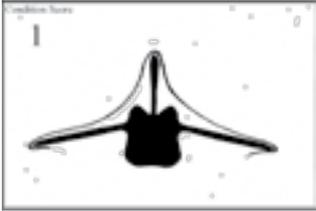
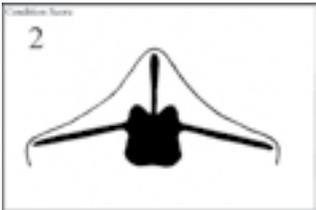
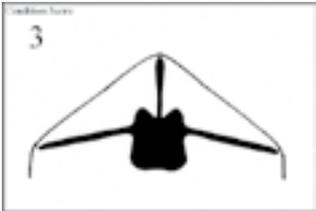
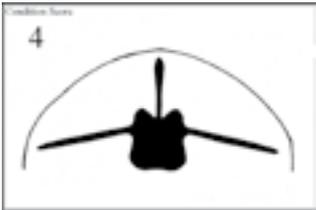
Figure 1. Picture of the sites on the sheep for assessing fat reserves



- A) Site for assessing condition scores.
- B) Site for assessing fat scores – 10 cm down the second last long rib is the GR site and the site for measuring fat depth in slaughter lambs.

Condition scoring is more sensitive for merinos in monitoring their condition and guidelines on what to feel is outlined in the table below.

Table 1 – Condition scores and what to feel

	<p>Backbone Prominent and sharp</p> <p>Short Ribs Ends are sharp and easy to press between, over and around</p> <p>Eye Muscle Thin, the surface tending to feel hollow</p>
	<p>Backbone Prominent but smooth</p> <p>Short Ribs Smooth well-rounded ends – can feel between, over and around each smoothly</p> <p>Eye Muscle Reasonable depth with the surface tending to feel flat</p>
	<p>Backbone Can be felt but smooth and rounded</p> <p>Short Ribs Ends are smooth and well covered – firm, pressure necessary to feel under and between short ribs</p> <p>Eye Muscle Full and rounded</p>
	<p>Backbone Detectable with pressure on the thumb</p> <p>Short Ribs Individual short ribs can only be felt with firm pressure</p> <p>Eye Muscle Full with a covering layer of fat</p>

Target Condition Scores

A rule of thumb used for drought and maintenance feeding is that stock be at least Condition Score 2 in tough times of the year and need feeding when half the mob are at a Low Score 2 or less (lean or backward store).

Ideal targets for joining and late pregnancy through to lambing is Condition Score 3. Running ewes below this level may compromise reproduction but this needs to be balanced with the cost of getting them through a drought.

Fat scoring

Fat scoring assesses the fat cover over the long ribs. It is also a useful measure for monitoring the status of the animal but has been more widely used in the prime lamb and crossbreds for market reasons. It is a measure of the depth of fat over the GR site – 10 cm down from the backbone on the second last long rib (Site B on Figure above), which is the site measured for fat depth after slaughter.

Fat scores range from 1 to 5 and each score is equivalent to an addition 5 mm of fat. So a sheep with a Fat Score 5 will have over 21 mm of fat at this site compared to an animal of Fat Score 1, which may have 0-5 mm fat.

Liveweight

Measuring liveweight, for most of us, is more sensitive for monitoring changes in animals. A drop in a fat or condition score is equivalent to a loss of about 7 kg. Therefore if you don't have the skill to distinguish animals less than a condition score apart, weight loss may be too great before you pick it up. A set of scales can pay for itself if used to assess feed requirements through animal weight change.

Liveweight can be misleading for assessing ewes in late pregnancy as they will be putting on considerable weight associated with the lamb and may be losing some of their own fat reserves to do this.

Weaners need to be monitored by weight as fat reserves are usually low in young animals and they have a requirement to grow. The table below shows some critical weights to aim for to increase survival.

Targets for sheep

Lambs

Early weaning can reduce feed costs and simplify management of both ewes and lambs. One of the main advantages is to wean before ewes lose too much condition so they can be maintained at a weight for getting back into lamb at joining. The important factors for the lambs are an absolute minimum age of 6 weeks, a minimum liveweight of 9 kg, and the use of high quality rations and good management. For merino breeders that wean at 12 - 14 weeks anyway, there are not a lot of opportunities to wean much earlier.

Weaners

In a "normal" season, the growth target for weaners would be to achieve 50 per cent of their mature (4-year-old) weight by the autumn break. Some later compensation for poor growth during drought months could be included as part of the target drought-feeding strategy. However, severe under-nutrition of ewe weaners in their first year can reduce lifetime reproduction by up to 20 per cent. Table 2 shows target weights for young sheep from birth to first joining.

Table 2 - Target weights for weaners

Mature weights	Target weights (kg)				
	Birth	Pasture drying off	Autumn break	Late winter	Joining
45 kg	4	20	22.5	27	24-36
50 kg	4.5	22.5	25	30	37.5-40
55 kg	5	25	27.5	33	41-44
60 kg	5	27	30	36	45-48
70 kg	5.5	31.5	33.5	42	52.5-56
% Mature weight	8-9%	45%	50%	30%	75-80%

Finishing prime lambs

If the season is such that lambs are not finished before feed limits production, then finishing lambs on full grain diets must be costed carefully. There are a number of good sources of information and feed budgets available through DPI offices and Meat and Livestock Australia (MLA).

Ewes and reproduction

The cost of full drought feeding for a breeding ewe for 6 months during late pregnancy and lactation is 50 per cent more than for a dry ewe. Considerable cost savings can be made by not joining, or by delaying joining.

When making decisions about joining ewes in a drought, two points to keep in mind are:

- Ewe liveweight - chances of successful reproduction decline rapidly as liveweight falls below 35 kg for Merinos and 40 kg for larger framed sheep. If ewes are below the critical liveweight, it may be best not to join them.
- Roughage to be available to supplement a drought-fed grain ration during later stages of pregnancy and in early lactation.

Severe under-nutrition of the pregnant and lactating ewe can permanently decrease the lifetime wool production of her lamb and also reduces the chances of getting back into lamb at the subsequent joining.

If a decision is made not to join ewes in spring or summer because of drought, a later joining may still be possible following rains, which may occur in early autumn, as happened in 1983.

Lambing per centages after droughts are often low, particularly in maiden ewes. Maintaining ewes at Condition Score 2 or less is likely to impact on lambing per centages (if ewes are on average Condition Score 2, then 50 per cent of the mob are less than score 2). You may wish to consider maintaining ewes in better condition to improve per centages and recovery after the drought. This needs to be balanced against the cost to maintain them at a higher weight. As a guide, responses in the number of lambs born per each additional kilogram in ewe weight at joining per 100 ewes joined, varies from about 1.5 - 2.5 per cent. Autumn lambing crossbred ewes and small merinos are likely to be at the lower end and spring lambing crossbred ewes and highly responsive ewes may give the higher responses.

For every extra kilogram heavier that a ewe is maintained, about 70 grams extra of barley or wheat is needed per week. The table below illustrates how you might estimate the cost of maintaining ewes at a higher condition to improve lambing per centage. Table 3 shows the ration of barley needed to maintain ewes at a weight of 40 or 47 kg (on a full ration) with the expected increase in lambing per centage and estimated cost per additional lamb born.

Table 3 – Estimated costs of feeding for more lambs

Target weight of ewes	Target condition score of ewes	Ration of barley needed to maintain target weight	Extra number of lambs born per 100 ewes joined	Ration cost for 6 months per 100 ewes with a feed cost of \$300 per tonne	Ration cost per additional lamb born (Ration cost per lambed weaned at 80% of lambs born)
kg	CS	kg/head/week		\$	
40	2.0	3.5		\$2520	
47	3.0	4.0	10 ^{#1}	\$2880	\$33.60 (\$42.00)
			14 ^{#2}	\$2880	\$25.20 (\$31.50)
			18 ^{#3}	\$2880	\$20.16 (\$25.20)

^{#1} 10 lambs per extra 100 ewes born is equivalent to 1.5 extra lambs per ewes joined per kg liveweight (responses might be expected in some merino flocks and autumn lambing crossbred flocks)

^{#2} 14 lambs per extra 100 ewes born is equivalent to 2 extra lambs per ewes joined per kg liveweight (responses expected in some merino flocks and winter lambing crossbred flocks)

^{#3} 18 lambs per extra 100 ewes born is equivalent to 2.5 extra lambs per ewes joined per kg liveweight (spring lambing crossbred ewe flocks and highly responsive merino flocks).

In this example, at a cost of grain at \$300 per tonne and feeding is for 6 months, the extra cost per lamb born is between \$20 and \$33. The cost will be higher per lamb for survival to weaning and beyond weaning. At a weaning survival rate of 80 per cent the cost per lamb in this example is between \$25 and \$42. This survival rate also will vary widely and this is an example only.

You need to do your own sums and expectations on responses, but this will give you a guide to balancing feed costs and reproduction.

The outcome will vary depending on:

- The cost of grain
- If roughage is added to the diet and similarly increase, the cost will be higher
- The response in conception, as this has been found to be quite variable on different farms
- Length of maintenance feeding (6 months used in this example)
- Lamb survival. The example has used 80 per cent survival to weaning but this will vary widely.

There may be additional benefits of having heavier ewes such as fewer deaths and more wool to help offset these costs. The cost will also be higher if money is borrowed.

While nutrition and condition of ewes have the most impact on conception and lambing percentages, there may be other contributing factors. Rams should not be ignored and need to be on the same level and type of rations as the ewes well before joining.

Maiden ewes

Maiden ewes need to be about 75 per cent of their mature weight at joining. If maiden ewes are well below this you may consider not joining.

Chapter 3

Feeding sheep during a drought

The aim of feeding sheep in a drought is to maintain weight in dry sheep and to meet the requirements of late pregnant and milking ewes. Lambs and weaners need to grow sufficiently so that they do not suffer permanent checks (Chapter 2). Other targets can be selected (for example, fattening of stock for quick sale) if a producer judges them appropriate. Feed levels can then be adjusted for these aims.

Selecting the types and amounts of feeds to give sheep during a drought involves five steps:

- Calculating total energy and protein requirements of each class of sheep
- Assessing how much can be met from pasture and or crop residues
- Calculating which available and suitable fodder are cheapest (Which feed)
- Calculating the amount and cost of the selected feed
- Assessing water requirements
- Monitoring the individual mobs and adjusting ration up or down.

Total energy and protein requirements

Feed energy is a major requirement and normally the first limitation during a drought. The energy derived from digested feed to maintain body functions and to produce wool, foetal growth, milk or more body weight is termed metabolisable energy (ME). It is therefore the energy that can be used by the animal and is also measured as digestibility. The units used to measure the energy content of a diet are megajoules (MJ) of metabolisable energy (MJME). It is standard practice to describe energy value of feeds and energy requirements in units of ME (hereafter called energy units).

In Victoria, protein is generally not the limiting factor in drought rations that supply adequate energy to meet the needs of the stock. However, for those sheep with special requirements, care is needed to make sure that their protein needs are met.

The total energy requirements for different classes of sheep are given in Table 4, along with minimum crude protein as a percentage of the dry matter of the diet fed.

Adjustments for liveweight

Table 4 gives full rations for 40 kg and 60 kg sheep. Rations for sheep of different weights need to be adjusted accordingly. Increase the ration if necessary by 10 per cent (which is equal to 0.4 kg of wheat or 0.6 kg of medium quality hay per head per week) for each 5 kg of extra liveweight.

For example, a ration of 3.5 kg of wheat per head per week should keep a medium-framed sheep in store condition at about 40 kg liveweight. A further increase of 0.4 kg would be needed to keep a sheep at about 45 kg.

Similarly, rams are larger framed than ewes or wethers of the same breed. They will need a ration 10 per cent greater to maintain their condition in the non-breeding season. Depending on their condition, they may need an extra 10 per cent to 20 per cent added to their ration for 4 - 6 weeks to ensure that they reach a strong "forward store" condition at joining.

Table 4 - Total drought rations for sheep

Weekly energy requirements for maintenance and minimum dietary protein concentrations for different classes of sheep, assuming no paddock feed is available. Check adjustments to rations for allowances needed for larger breeds, and setting your own rations for more detail.

Class of stock	Energy requirement MJ/week	Minimum crude protein % DM		Feed	Ration kg per head per week	Remarks*
1. Adult dry sheep, ewes in early stages of pregnancy in store condition	42	6		Wheat	3.5	
			or	Oats	4	
			or	Hay (good)	5	
			or	Hay (poor)	7	
			or	Hay (poor)	7	
▪ large framed, or crossbred ewe at 60 kg liveweight	57	6		Wheat	4.75	
			or	Oats	5.7	
			or	Hay (good)	7	
			or	Hay (poor)	10	
			or	Hay (poor)	10	
2. Pregnant ewes, last 4-6 weeks before lambing	62	8		Wheat	5	Some hay (or dry paddock feed) is desirable but, if in short supply save until after lambing and increase grain ration by 0.5 kg as a substitute.
			or	Oats	5.6	
			plus	Hay (good to av.)	1	
			or	Hay (good) alone	7	
			or	Hay (good) alone	7	
▪ Large framed, or crossbred – 60 kg liveweight	84	8		Wheat	5.5	
			or	Oats	6	
			plus	Hay (good to av.)	1.5	
			or	Hay (good) alone	10	
			or	Hay (good) alone	10	
3. Ewes with lambs at foot*	84	10		Wheat	7	Rates apply to mobs with normal lambing patterns from start of lambing. If lambing is concentrated, increase Rations by 1 kg grain plus 1 kg hay for first 3-4 weeks following the lambing peak, for full milk production.
			or	Oats	9	
			plus	Hay (good)	1.5	
			or	Hay (average)	2	
			or	Hay (good) alone	10	
▪ Large framed	120	10		Wheat	8.5	Wheat alone is not a satisfactory feed for lactating ewes.
			or	Oats	10	
			plus	Hay (good)	2	
			or	Hay (average)	2.8	
			or	Hay (good) alone	14	
4. Lambs	35	12	plus	Mixed cereal grain (3 parts) and lupins (1 part) Hay (good) at 10%	Feed to appetite (3.5)	Combine the mixed grain feed with hay and feed the combined ration.
			or	Wheat	2	
			or	Oats	2.3	
			plus	Hay (good) plus grazing (about 1/3 ration)	3	
			or	Hay (good) alone	4.5	
▪ Weaned lambs greater than 15 kg liveweight	35	10		Wheat	2	Give access to the best grazing at all times. If no useful grazing is available, give extra 1.5 kg good hay (or 2 kg average hay).
			or	Oats	2.3	
			plus	Hay (good) plus grazing (about 1/3 ration)	3	
			or	Hay (good) alone	4.5	
				Hay (good) alone	4.5	

* Energy requirements for lactating ewes assume that ewes maintain body condition. If lambs are kept on the ewes longer than 6 - 8 weeks, requirements will increase as the lamb requirements increase.

Feed supplied from pasture and crop residues

It is relatively easy to estimate a fully supplementary ration for a particular class and weight of sheep but it is very difficult to estimate what proportion of this ration to feed if stock have access to pasture or stubble.

The simple answer is to start with about one third to a half of a full ration and monitor the sheep for weight gain or loss. The ration can then be altered appropriately. Of course, this starting proportion can depend on what fodder is being fed, the condition of the sheep, the aims of feeding and how much paddock feed is available.

Experience from previous droughts indicates that more paddock feed is available than would first appear. Sheep can scavenge quite a bit of feed from sparse, dry pasture and buried clover or medic burr. The presence of paddock feed early in a drought makes it easier to get the sheep accustomed to the drought rations before they have to be fed close to full rations.

The other consideration is ground cover and the need to protect the soil, the nutrients and the vegetation. As bare ground increases (see Chapter 5) areas of bare ground start to join, creating opportunities for washing and dust blowing. The critical level of cover will vary depending on the soil type and the slope.

Crop stubbles

In many part of southern Australia, crop stubbles are an important part of the feed supply for the sheep flock over summer. The nutritive value of stubbles varies considerably and is primarily related to the amount of residual grain left after harvest. Stubbles will vary within the paddock considerably as they include grain, weeds, leaf, chaff and stem. Sheep will eat the most digestible feed first and leave the least digestible (the stem) until last. Weight loss will occur accordingly.

The following table provides the range of nutritive values of commonly available stubble plant material (excluding grain) and grain alone.

Table 5 – Nutritive values of common available stubble plant material

Material	Crude protein %	Metabolisable energy (MJ/kg DM)
Cereal straw*	2-4	5-7
Pea straw*	4-7	4-7
Bean straw*	4-7	5-7
Canola straw*	4	6
Barley / Wheat	8-14	11-13
Peas / Beans	20-27	11-13
Lupins	28-36	12-14

* FeedTest®, DPI Hamilton

As the table shows, most of the straws are below energy and protein levels that will maintain stock.

Accurate feed budgeting is difficult in cereal stubbles but is relatively simple in crops with large grain size such as lupins, peas and beans. This is done by measuring the amount of grain in the stubble by randomly throwing a quadrat of known size and collecting and weighing the seed to determine kilogram of grain per hectare.

If you assume that sheep will eat 0.5-1.0 kg grain a day (they can eat 2.5 - 3.5 per cent of body weight) then you can estimate how long before sheep will start to lose weight. Stubble grazing trials in North-West Victoria in 2001 produced growth rates in lambs of between 180 and 220 grams per day on pea and bean stubbles. Lentil stubbles were more variable with growth rates ranging from 140 to over 200 grams per day. Cereal stubbles over a 6-week period resulted in an average growth of 90 grams per day.

However when grain is no longer available, weight changes have been reported from minus 176 grams per head per day to gains of 65 grams per head per day (when summer rains produced growth of green feed).

In a separate cereal grazing trial in the Horsham district, wethers on weed free wheat stubble lost 4 kg over a 12-week period. In the same trial, the addition of molasses and urea blocks resulted in a live weight loss of 1.5 kg where as the addition of 100 grams of lupins per head per day gave a 0.5 kg gain over the same period.

Lupin and legume stubbles provide a higher value grain and stubble. Lupin stubbles can be toxic to sheep when infected with a fungus, which causes lupinosis.

Protein and roughage

It is usually safe to say that where stock are receiving sufficient energy from pasture then for dry stock at least, protein will not be limiting. Where some green is available, energy may be limiting but the green pick will still provide protein requirements to stock.

Where stock are fed in paddocks where there is some dry feed, roughage or fibre is unlikely to be limiting.

Choosing a supplementary feed

Feed resources held on the farm are often the most obvious choice for a drought ration, but may not necessarily match the feeding targets. If the farm feed resources are in demand commercially, it may even pay to sell them and buy in something else at a cheaper price, provided that the feeding targets can still be met with the bought supplement.

Feed values rise as drought progresses, so do not be too anxious to sell off surplus feed, only to discover that it is needed later on.

Energy is one of the most important requirements for animals in a drought. Common energy supplements for sheep also usually provide enough protein, vitamins and minerals. Unless your stock have a special need for protein, vitamins or minerals, choose the drought feed that provides energy at the lowest cost.

Energy values of feeds differ (see Table 6), as does the relative cost of the energy they contain.

Feed values (energy and protein) can be highly variable. Variations are due to district, variety, season and growing conditions. Table 6 shows the energy and protein ranges commonly found in feeds in Victoria. However, having the feed tested by a registered laboratory such as FeedTest® is the best way of being confident about the quality of purchased or home grown feed.

The feed values in Table 6 are 'as fed' which means dry matter has been taken into account. For example, wheat may have a FeedTest, energy value of 13 MJ per kg of dry matter so for every kilogram of wheat fed to sheep, they will get 12MJ ($13\text{MJ} \times 90 \div 100$), if wheat has 90 per cent dry matter. (See the section on calculating the cheapest source of energy to do your own calculations).

Table 6 - Nutritive values for drought feeds

Feed type	Energy		Protein	
	(megajoules/kg as fed)*		(% Crude protein)	
	Average	Common range	Average	Common range
Wheat, Triticale	12	11.5-13.5	11	9-15
Barley	11	11.5-12.5	10	8-14
Maize	13	13-14	9.5	7.5-12
Lupins	12	12-14	32	28-36
Peas	12	11.5-12.5	24	20-27
Faba Beans	12	10-13	25	18-28
Oats	10	5-11	9	6-12
Sheep pellets (brands vary)	10	6-13	12	4-21
Lucerne hay	8.5	7-9	20	16-25
Clover hay (early)	8.5	7-9.5	18	15-20
Pasture hay (mid-season)	7	6-7	11	8-16
Oaten hay	7	6-8	8	5-10
Grass hay	6	5-7	8	5-10
Cereal straw	5	4-8	4	2-5

* Approximately 90 per cent dry matter (DM), except hay and straw at 85 per cent DM. A FeedTest® report will give figures for MJ per kg of DM and so will be higher than 'as fed' figures.

Other nutritional requirements

Protein

As already mentioned, protein is usually adequate for mature dry sheep in commonly available drought fodders. Occasionally, though, protein concentrations in poorer grass hays and oaten grain are below 7 per cent. If this occurs, appetite may drop in the long term as the diet is unsuitable for rumen micro-organisms. They will break down the feed in the rumen at a slower rate so the animal cannot eat so much feed.

In this situation, either the next cheapest feed will have to be replaced by lupins or another high protein feed.

Weaner sheep and lactating ewes have higher requirements for protein and may need supplementation of cereal grain or hay diets with a protein rich diet.

It is clearly important to know the protein content of some feeds before they are used as a diet. This is particularly the case for grass hays and oats. The only way to obtain this information is to have samples tested in a laboratory (eg. FeedTest®).

Minerals and vitamins

Only two major minerals, calcium and sodium, are likely to be needed as additional supplements during a drought.

Calcium is deficient when diets consist mainly of cereal grain. To prevent calcium deficiency, add 2 per cent of finely ground agricultural limestone (calcium carbonate) to cereal grain (that is, for every tonne of grain add 20 kg of limestone). Do not use builders lime, burnt lime or slaked lime. Spread lime onto grain when filling the feed out bin. Lime is largely not lost when feeding out as the fine particles stick to the grain. Do not add lime to stored grain when filling the silo as lime may corrode the lining of the silo.

Sodium is deficient in most grains. Common salt can be provided at 0.5 per cent if needed, but often water supplies have sufficient salt to alleviate the need to supplement.

Alternatively, both salt and calcium can be provided in a salt lick. The percentage of each mineral can vary, but calcium levels above 30 per cent start to limit uptake. You can mix your own licks cheaply or take the more expensive option of buying commercial blocks. One difficulty with licks is that some sheep in the mob do not partake and the intake of the others can be highly variable. There have been reports of calcium deficiency in young animals that have been lot fed with calcium supplied via licks.

Only two vitamins, A and E, are likely to be deficient as a direct result of drought feeding, and are rare in adult sheep.

Vitamin A is obtained from green pasture, hay with a good green colour and yellow maize. Even a short green pick will supply adequate quantities of the vitamin. Vitamin A is stored in the liver. Young sheep usually experience deficiencies when they have been without green pasture, green hay or yellow maize for 6 months, but deficiency is very rare in adult sheep.

Symptoms include night blindness, eye discharges and illthrift. Treat with a Vitamin A drench if lambs and adult sheep have been without a source of the vitamin for 3 - 4 months and 9 - 10 months respectively. A single drench protects the sheep for about 6 months. An inter-relationship exists between Vitamin E and selenium. Grains and hays are fair to good sources of Vitamin E, although considerable variation does occur.

Vitamin E deficiency induces symptoms similar to selenium deficiency (that is, still born lambs and older lambs that suffer from a stiff, stilted gait, lameness and illthrift). The deficiency is usually treated with a water-soluble drench.

If you suspect these or other vitamin deficiencies, seek veterinary advice for confirmation and dose rate instructions.

Fat

Some feed sources have a higher concentration of fat than others. Although fat represents a concentrated form of energy, levels greater than 5 per cent fat in a sheep diet will decrease intake. (For example, the fat levels in maize can vary from 4 - 8 per cent). This is important when considering some alternative feed sources and how much needs to be incorporated into a ration.

Calculating the cheapest source of energy

The units used to describe the energy content of a diet are megajoules (MJ) of metabolisable energy. Table 7 calculates some of the relative prices of feed energy, over a range of prices. It can be used to compare the purchase of feeds with different energy levels.

Example: Comparing the energy cost of different feeds.

If you can buy wheat for \$210 per tonne, you are paying a unit energy cost of 1.8 cents per MJ. This would be the same value as oats at \$180 per tonne, or lucerne hay at \$150 per tonne. If oats or lucerne hay were selling for less than these prices, they would be better value on an energy basis.

Table 7- Comparing the cost of energy in different feeds over a range of feed prices

Feed	Energy value (MJ/kg as fed)*	Cost per unit of energy (cents/MJ) Feed cost (\$/tonne):							
		120	150	180	210	240	270	300	350
Wheat, Triticale, Lupins, Peas	12	1.0	1.3	1.5	1.8	2.0	2.3	2.6	3.0
Oats	10	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.5
Lucerne, Early Clover hay	8.5	1.4	1.8	2.1	2.5	2.8	3.2	3.5	4.1
Oaten, mid-season pasture hay	7	1.7	2.1	2.6	3.0	3.4	3.7	4.2	4.8
Late grass hay, Cereal straw	6	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.9

* Approx. 90 per cent dry matter, except hay or straw at 85 per cent DM

Comparing feeds with different dry matters

Table 7 uses energy values 'as fed'. In other words it takes into account the dry matter content of the feed. (If you feed out a grain that is 90 per cent dry matter and has 13 ME then for each kilogram fed, the actual ME consumption is 12 ME as 10 per cent is water).

Grains and even hay are quite similar in dry matter or water content and so can be compared without taking this into account. However, when considering feeds that are quite different in dry matter then this must taken into account when comparing costs. This includes silage and also some of the more unusual feedstuffs which are considered as alternatives in droughts such as the example below.

Example: Which are cheaper, onions or barley?

Onions costs \$50 per tonne 11 per cent dry matter (DM) 13 MJME per kg DM	Barley costs \$300 per tonne 90 per cent DM 13 MJME per kg DM
<p>Onions</p> <p>Cost per kg of dry matter: 1,000 kg onions costs \$50 1,000 kg at 11 per cent DM = 110 kg DM (1,000 × 11 ÷ 100) 110 kg DM costs \$50 so 1kg costs 45 cents (\$50 ÷ 110)</p> <p>Cost per MJME 1 kg DM supplies 13 MJME at 45 cents 1 MJME costs 3.5 cents (45 cents ÷ 13)</p>	<p>Barley</p> <p>Cost per kg of dry matter: 1,000 kg barley costs \$300 1,000 kg at 90 per cent DM = 900 kg DM (1,000 × 90 ÷ 100) 900 kg DM costs \$300 so 1kg costs 34 cents (\$300 ÷ 900)</p> <p>Cost per MJME 1 kg DM supplies 13 MJME at 33 cents 1 MJME costs 2.5 cents (33 cents ÷ 13)</p>

How much to feed

Drought rations and feed requirements are outlined in Table 4. If you know the energy

value of the feed you have, you can calculate your own ration requirements using Table 8 below.

Table 8 - Total weekly energy requirements for sheep

Sheep weight (without foetus)	Total weekly energy requirements in megajoules (MJ)				
	Class of sheep				
	Dry mature	Pregnant (last 4 weeks)	Ewe and lamb*		Weaned lambs**
15	-	-	-		35
20	-	-	-		37
25	30	-	-		40
30	34	49	90		45
35	38	55	93		42
40	42	62	97		-
45	46	68	100		-
50	50	74	104		-
60	57	84	120		-
70	64	90	130		-

* Requirements are for the ewe to maintain body condition. If the lambs are not weaned early, these requirements for the ewe and lamb will increase as the lambs get bigger.

** assumes reasonable growth rates.

To calculate the total feed needed, simply divide the number of energy units (ME) in your chosen feed into the energy units required for each class of stock.

Example 1

45 kg wether requires
46 MJME per week
Feeding wheat 12 MJME per kg

Full ration = 3.8 kg wheat per week

Example 2

50 kg ewe with lamb at foot
104 MJME per week (1 week old)
Feeding maize at 13 MJME per kg

Full ration = 8 kg maize per week (protein may be limiting)

Proportion of a full ration to feed

It is relatively easy to estimate a fully supplementary ration for a particular class and weight of sheep but it is very difficult to estimate what proportion of this ration to feed if stock have access to pasture or stubble. The simple answer is to start with approximately one third to a half of a full ration and monitor the sheep for weight gain or loss. The ration can then be altered appropriately. Of course, this starting proportion can depend on what fodder is being fed, the condition of the sheep, the aims of feeding and how much paddock feed is available.

Adjustments to rations

In cold conditions, the energy requirements of the sheep increase and the rations will need to be increased by 20 per cent or even more under severe conditions. If cold conditions occur when sheep have just been shorn, provide whatever shelter is available and boost rations at least twofold.

Hay is the safest for such a sudden increase in the ration, but it can be gradually replaced by grain if the increase has to be sustained. If grain alone is to be fed, then the frequency of feeding rather than the amount offered at each feed should be increased.

On muddy ground, increase rations by about 0.5 kg per head if grain is trailed to make up for wastage caused by trampling.

Total feeding costs

The information found in Tables 4, 7 and 8 in this chapter can be used to calculate the amount and the cost of the total ration for different classes of sheep. This figure then needs to be adjusted for the proportion of the total ration being fed eg. one third during the early part of the drought up to one half for most of the remainder.

Example: Cost of fully drought-feeding dry adult sheep.

If a 40 kg wether or dry ewe requires 42 MJ of energy per week for maintenance, the cost is calculated by using the energy cost from Table 7 multiplied by the weekly energy requirement.

For example:

For wheat at \$210 per tonne
42 MJ per week at 1.8 cents per MJ = 76 cents per week

For oaten hay at \$90 per tonne
42 MJ per week at 1.3 cents per MJ = 55 cents per week

Once you have calculated the relative costs, you need to check that the least-cost ration will be suitable in all other respects for the classes of sheep you wish to feed.

The checklist for this is:

- is there adequate protein in the diet?
- can sheep eat enough to satisfy their needs?
- will the supplement, plus paddock feed, provide adequate roughage?

Whatever the aim, the important point to remember in drought feeding is to continually monitor the condition of the mob. The present condition of the mob, the amount of paddock feed left in the paddock and weather conditions all have important effects on the

amount of hand feeding needed. Only by watching the condition of the sheep in the mob and modifying feeding in response to changes, can you be sure that you are feeding neither too much nor too little.

Feed budgets

A simple feed budget will help to estimate likely grain requirements, predicted total cost as well as monthly cash flow requirements. This will also help you decide whether to keep and feed stock or sell and buy back. Two examples are given below. The cost of grain, your prediction of when the drought will break and the amount of a ration fed will change as a drought progresses. Budgets must be regularly updated.

Example 1

Assumptions: The drought will break in mid-April.
1,000 weaned lambs (25 kg) fed in the paddock at a half ration.
A full ration of pellets at 12 MJME per kg is 3.3 kg per head per week.
Pellet price = \$ 350 per tonne

	Nov	Dec	Jan	Feb	Mar	Apr	May
kg/head/week	0	1	1.6	1.6	1.6	1.6	1.3
Monthly kg required for the mob	0	4,000	6,400	6,400	6,400	6,400	5,200
Cumulative grain requirement	0	4,000	10,400	16,800	23,200	29,600	34,800
Cost per Head/month	0	\$1.40	\$2.24	\$2.24	\$2.24	\$2.24	\$1.82
Cumulative cost per head	0	\$1.40	\$3.64	\$5.88	\$8.12	\$10.36	\$12.18
Cumulative cost per mob	0	\$1,400	\$3,640	\$5,880	\$8,120	\$10,360	\$12,180

Therefore, in this example, you will require 34.8 tonnes of pellets for this mob at a total cost of \$12,180 or \$12.18 per head.

Example 2

Assumptions: The drought will break in June.

1,000 wethers (40 kg) fed wheat in the paddock at a half ration and then put in a stock containment area in January. A full ration of wheat at 12 MJME per kg is 3.5 kg per head per week. Wheat price = \$310 per tonne

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
kg/head/week	1.5	1.5	3.5	3.5	3.5	3.5	3.5	3.5	2
Monthly kg required for the mob	6,000	6,000	14,000	14,000	14,000	14,000	14,000	14,000	8,000
Cumulative grain requirement	6,000	12,000	26,000	40,000	54,000	68,000	82,000	96,000	104,000
Cost per head	\$1.86	\$1.86	\$4.34	\$4.34	\$4.34	\$4.34	\$4.34	\$4.34	\$2.48
Cumulative cost per head	\$1.86	\$3.72	\$8.06	\$12.40	\$16.74	\$21.08	\$25.42	\$29.76	\$32.24
Cumulative cost per mob	\$1,860	\$3,720	\$8,060	\$12,400	\$16,740	\$21,080	\$25,420	\$29,760	\$32,240

In this example, you will require 104 tonnes of wheat at a total cost of \$32,240 or \$32.24 per head.

Other considerations

The cost of feeding sheep is not just the feed purchase price. Labour costs, freight costs, extra storage and handling costs, and the likely amount of wastage have all to be taken into account when calculating the relative costs of feed on your farm.

The introduction of weeds can be a problem with buying in feed, and samples should be inspected carefully for weed seeds. However, it is not always possible to detect a potential problem, or even to refuse a feed on these grounds.

One way to minimise a potential weed problem is to restrict feeding out of any suspect fodder to a limited number of paddocks. There are several issues regarding feeding and management of sheep during drought which significantly increases the risk of importing new weeds onto farms. DPI's Landscape Protection portfolio has produced a brochure on this topic which can be accessed from the DPI website at www.dpi.vic.gov.au/weeds 'Weed Warning - Drought, Fire & Flood'.

Stock must be boxed together in large mobs on the most stable soils, but this can have the added advantage of preserving some vegetation on destocked areas of the farm, reducing the likelihood of severe erosion.

The holding periods of chemicals used before harvest is an important consideration when purchasing fodder from crops or failed crops.

Water requirements

Quality and quantity of water is often a major concern during a drought. Sheep drink about 3 - 5 litres of water during hot weather but this can climb to 9 litres in extreme heat. Often of greater concern is the evaporation of water from dams. About 1.5 - 2 m of depth is evaporated from a dam each year although this can vary with the depth and orientation of the dam. Measuring the depth of water in each dam early in the drought helps to assess whether your supplies will last until at least next winter or, preferably, the one following. You may need to box some mobs later in the drought when the more shallow dams dry up.

The major water quality problem during drought is high levels of salt, although algae and animal manure can foul water following heavy summer rains or strong winds.

Young sheep have difficulty thriving on water supplies with higher than 5,000 ppm salt while adult stock can handle up to 10,000 ppm, especially once they get used to it. Levels above 10,000 ppm salt need to be treated with caution. As well as the total salt level, if the water contains more than 400 ppm magnesium salts, then the water is risky to use, especially for young sheep.

Chapter 4

Managing sheep during a drought

The start and finish of feeding, level of supplementation and introduction strategy are all important components of drought management. Feeding too early or too long can waste feed, while starting too late or stopping too soon can result in stock illness or deaths. Often the largest stock losses occur after the drought has broken, especially if the weather turns cold.

Unlike fire or flood, when sheep may have to suddenly rely on hand feeding alone, the onset of a drought is usually gradual. Drought conditions rarely deteriorate to the stage where no grazing is available and sheep have to rely solely on hand feeding.

Experience from previous droughts indicates that more paddock feed is available than would first appear. Sheep can scavenge quite a bit of feed from sparse, dry pasture and buried clover or medic burr. The presence of paddock feed early in a drought makes it easier to get the sheep accustomed to the drought rations before they have to be fed close to full rations.

On the other hand, the presence of paddock feed can have its down side. The gradual onset of drought can mean that producers do not notice that stock have lost so much condition that they are disadvantaged right through the drought.

From a wool quality aspect, relatively hunger fine wool can have very good tensile strength, provided that sudden feed changes are avoided. This requires vigilance in feeding and disease avoidance.

When to start

Feeding should start well before sheep become weak. It may take some time before they become accustomed to hand feeding and begin eating their ration. If sheep have lost too much condition before feeding has begun, or before they readily accept grain, it may be hard to lift their liveweight back to desirable levels. This is particularly applicable to lambs or weaners that were not fed supplements when grazing with their mothers.

One rule of thumb used by scientists at DPI Hamilton is: Feed a half ration, normally of grain, when half the sheep in a flock have fallen to a Condition Score of low 2 (lean or backward store) or below. If condition still falls, lift the feeding rate to a full ration, preferably using some hay. Stop feeding when only a quarter of the stock remain at a Condition Score 2 or less after the drought breaks.

Another criterion often used is a weight 3 kg above the critical weight for survival. If you start feeding at that stage, the sheep can lose weight during the introductory period without drastically altering their chances of survival.

Table 9 - Suitable weights for starting to feed sheep

	Average kg	Bottom ¼ of mob kg
Small-framed Merino	35	32
Medium-framed Merino/ Polwarth	40	37
Large-framed Merino	45	42
Corriedale	45	42
Border Leicester-Merino cross	50-55	48

If sheep are being introduced to a straight grain diet with no roughage or standing dry feed to help hold weight while the grain ration is built up, the above weights need to be adjusted upwards another 3 kg.

Adult sheep above these starting weights can be allowed to lose some weight and condition at the start of a drought. This weight loss needs to be controlled. A drop in weight of 5 kg over a number of weeks and a drop back to store condition will save a lot of feed.

The period of controlled weight loss can coincide with the feeding of introductory rations. The flock can safely lose from 1 - 1.5 kg on average a week for this period. Losses of 2 - 2.5 kg (or more than 3 - 4 per cent of bodyweight), or more per week should be avoided.

Introducing sheep to hand-feeding

Sheep have to be brought onto grain gradually because a sudden change in diet can cause grain sickness or founder. If possible, educate sheep on to feed while there is still reasonable paddock feed.

Train sheep that have not been fed before by including previously fed sheep in the mob to encourage the inexperienced sheep to feed. Untrained sheep are best educated in small paddocks.

Start the ration at the rate of up to 50 grams per head per day, for adult sheep, (25 grams for weaners) and increased slowly to the full suggested ration over about three or four weeks (see Table 10).

Once the equivalent weekly rate is reached, the introduction program can stop. So, if you have decided to feed 2 kg of feed per week you can stop the program after day 17 when the stock have been established on the less regular feeding regime. If you have decided to feed only 1 kg per week, you could start feeding 300 grams every second day from day 7.

The table is only a guide to educating animals to take grain. In the early stages it is unwise to progress to higher levels of feeding until nearly all of the sheep have taken to the ration or shy feeders have been drafted off.

Table 10 - A program for bringing sheep on to grain

Feeding days		Amount of grain per feed	
		gram per head	kg per 100 sheep
1, 2	feed daily	50	5
3, 4	feed daily	100	10
5, 6	feed daily	150	15
7, 8	feed daily	200	20
9, 10	feed daily	250	25
11,12,13, 14	feed daily	300	30
15, 17	feed on alternate days	600	60
19, 21	feed on alternate days	850	85
23, 26, etc	feed every third day	1,300*	130*

* Gradually adjust to suit final ration

If many cases of grain sickness or founder (lameness) occur, particularly at the 2-3 week stage, the program needs to be modified by not increasing the ration for a few days or reverting to daily feeding.

The educational ration may be fed out in thin trails so that it can be eaten along with paddock roughage on the ground. If no paddock roughage is available, hay must be fed at as little as 10 per cent of the ration.

The above comments apply to wheat, barley, maize, sorghum and sheep nuts, or rations with a high starch and low fibre content. Oats and lupins have a higher fibre content than the other grains and the full rations recommended may therefore be built up more quickly over a period of from 14 - 21 days, with little risk of causing digestive upsets.

A guide to the initial amount of feed you will use in the first few weeks for a flock of 1,000 sheep is provided in Table 11.

Feeding frequency

Frequency of feeding is determined by the state of the sheep, type of feed, availability and capacity of troughs, and risk of feed losses through rain, birds and other animals.

Feed dry sheep, and ewes up to the last 6 weeks of pregnancy, 3 days apart or twice weekly for best results. However, ewes in late pregnancy or during lactation and young weaners require daily feeding. This can be achieved with a self-feeder or by feeding hay and grain on alternate days.

Table 11 - Feed consumption in the first month of a drought*

Week	Tonnes per 1,000 sheep
1	0.8
2	1.9
3	2.9
4	3.0
(Full feeding)**	(3 to 5)

* based on table 10

** will depend on type of sheep and feed

Managing and monitoring

The management of sheep during this period and throughout the drought depends on knowing how the animals are faring.

Recommendations in this book are only guidelines, because the amount of pasture, size of sheep, value of grain and amount of energy required for walking around will vary from farm to farm. The only real way to know how they are going is to weigh them. Tag or brand 25 - 30 sheep from each mob and weigh them regularly throughout the drought. Individual tagging will give you a more accurate estimate of weight gain and loss. However, if it is easier to randomly draft sheep each time, you will need to weigh more – 10 per cent of the mob or a maximum of 80 would give you a good estimate. Knowing weight changes can save you the cost of unnecessary feeding as well as prevent deaths of sheep that slip too far before being fed or are not getting enough to eat.

A variable proportion of sheep and lambs will not adapt to drought feeding. The proportion of shy feeders depends on age, previous feeding history, ration, mob size (the proportion rises steeply once the mob size is above 400), but up to 10 per cent is not uncommon. Remove shy feeders from the mob and feed them separately. Some will eventually eat the ration. Those that don't can be fed good quality hay, or sold.

Breaking routine or changing feed

If a break in the normal 2 - 3 day feeding routine occurs through delay in the availability of supplies, do not resume feeding the full ration when supplies become available. Begin feeding again daily, on about half-rations, and build up to the full ration over a few days before returning to every third day.

It is especially important to avoid sudden changes in the ration. Sheep which have become accustomed to one type of grain cannot immediately adjust to another. Deaths and a high incidence of tender wool can result from a sudden switch of feed. Even the same grain type obtained from a different source has caused losses. It is desirable to estimate early in the program how long supplies will last. This will allow time for planning of a gradual changeover from one feed to another.

In the 1982-83 drought, digestive problems often occurred when a new batch of sheep nuts was fed, even when the sheep had been well accustomed to the previous batch. Manufacturers sometimes change the major grain ingredients, or change the processing procedure, from one batch to the next.

If it is necessary to use a different grain, arrange the supplies early and mix the old grain with the new, gradually increasing the concentration over at least four feeds. Additions to the ration of 1 per cent sodium bentonite or 1 per cent salt may reduce the risk of grain poisoning during the change.

Deciding when to stop feeding

Using the rule of thumb based on condition scores, stop feeding when less than a quarter of the stock remain at a Condition Score of 2 or less, after the drought breaks. Do not do this suddenly.

In previous droughts, many properties have experienced their heaviest losses during the period immediately following drought-breaking rain.

Prolonged wet conditions turn sheep off their feed. Problems exist under these conditions if grain is fed on the ground. As soon as the first green pick emerges, sheep will chase it and expend more energy.

In most circumstances, sheep are kept confined to restricted feeding areas until adequate pasture is available. At that point, allow increasing grazing time each day until full grazing is provided after 6 - 7 days. Allowing immediate full grazing will lead to digestive disorders.

Chapter 5

Feeding in stock containment areas

The risk of losing valuable soil during a drought increases because ground cover is reduced. If cover is reduced below about 30 per cent wind will start to blow soil particles away causing erosion and loss of valuable nutrients and topsoil. Bare areas will also be more prone to washing once the break does come.

Another potential loss is newly-improved pastures, which may be vulnerable to overgrazing. Pastures that you have invested money and time in establishing can be lost if continuously overgrazed and should be among the first paddocks to consider destocking.

The pictures (right) illustrate various levels of ground cover to show that as ground cover starts to drop below about 70 per cent, the bare patches are quite large and are starting to join and so create opportunities for soil movement. Slope of the land and stability of the soil type will effect the critical level of cover.

80 per cent ground cover



70 per cent ground cover



< 50 per cent ground cover



Feeding in stock containment areas provide an opportunity to take the pressure off susceptible parts of the farm. Containment areas are yarded sections where stock are lot fed for survival or maintenance and hence enable stock to be removed from pastures before they become too bare. Lot feeding for production, such as for finishing prime lambs, is a separate issue and is not covered in this chapter. If seeking this option seek specialist advice from your local stock adviser.

Feeding in stock containment areas could be considered:

- to protect vegetative cover on pastures or failed crops
- where weeds in bought feed are of concern.
- to protect areas vulnerable to erosion
- Where stock are losing weight on full drought rations in paddocks
- to facilitate stock feeding, watering, monitoring and handling.

Site

Location of the site is important and it should be set up as a permanent structure, like sheep yards, for future emergencies (drought, fire or flood) or possible lot feeding opportunities.

The site should have :

- a moderate slope and a well drained, stable soil such as a clay or clay loam
- ready access to the house
- no important remnant vegetation
- shade, shelter and good drainage
- access to good quality water and clean facilities
- minimal problems with noise and smell which will not cause concern to you or your neighbours.

Consider water quality in terms of runoff. The stock containment area should be set back from watercourses and water storages by 500 metres, if no other management methods are used. As an alternative, a nutrient filter should be established on the down slope side of the site.

Structure

The **minimum** area required for different classes of sheep under the Model Code of Practice for the Welfare of Animals are:

Lambs (up to 41 kg) – 1 m ² per head
Adult sheep – 1.3 m ²
Ewes and lambs – 1.8 m ²

Areas between 2.5 and 5 m² per sheep have been used successfully. Stocking heavier may have the advantage of increasing soil compaction in the containment area to reduce dust but this also very dependant on soil type. A good management size mob is about 500 sheep. If you are considering containing more than one group, you will need good subdivisional fencing as well as boundary fencing. You may consider a separate yard for grain feeding troughs as this will allow you to mix feeds and additives before stock start to eat. You will also need to consider access of vehicles, ease of filling feed troughs, water and ease of cleaning. Monitoring stock is extremely important and you may also consider ways of weighing or monitoring a group fortnightly.

If there are trees in the area you propose to use, protect these with guards as they will be ringbarked.

Water

A good, reliable water supply is extremely important in stock containment areas. Generally stock will be fed diets very low in water content and therefore must be supplied with water at all times.

Maximum desirable salt levels for stock water are given below.

Dry sheep	10,000 ppm (16,700 EC)
Lactating ewes	5,000 ppm (8,300 EC)
Young sheep	5,000 ppm (8,300 EC)

Bore water should also be tested for other toxic minerals such as magnesium.

When budgeting on a water allowance you can plan for average daily consumption of 4 L per head per day, however this can change dramatically with the weather. On very hot days, intake will be greatly increased so you need to be able to supply the maximum rate of up to 9 L per head per day. Trough space is less important than flow rate. Water trough allowance does not need to be more than required in a paddock, sheep will adjust and take turns to drink at the trough. A good rule of thumb is that the flow rate should pump enough water for the mob in 2 or 3 hours.

Troughs need to be checked daily and cleaned regularly.

Feed

Allow 15 - 20 metres of double-sided trough for 100 sheep. Use the bigger area for large or full woolled sheep.

Feed troughs can be bought or made cheaply from materials like roof capping, folded roofing iron and suspended cloth.

Full rations for different classes of stock are given in Chapter 3. If you wish to keep stock in better-than-store condition you could increase rations 20 - 30 per cent. As stock will not have access to any pasture, inclusion of roughage is important. Ideally 30 per cent hay should be included but as hay is very expensive during droughts the proportion can be reduced to 10 per cent. Hay in the diet is likely to cause less problems with grain poisoning and is the safest to increase quickly in cold conditions and with shorn sheep.

As outlined in Chapter 3, the deficiencies likely to occur with high grain diets as in a drought or lot feeding are sodium, calcium, fibre and Vitamins A, E and B1. Adding a 50:50 mixture of limestone and salt at two per cent to the grain will fulfil sodium and calcium requirements. Roughage will be adequate with some hay or straw in the diet, especially with grains of low fibre content. Oats has about 12 per cent fibre, compared to barley at 5 per cent and wheat at only 2 per cent.

Management

Adult sheep are the easiest to manage in a feedlot. Feedlotting ewes and lambs should be avoided if possible. Adult sheep, weaners and hoggets should be yarded separately. Sheep must be vaccinated against enterotoxaemia (pulpy kidney) if the ration is high in grain. They should be drenched into the area, worm tested regularly, and ideally drenched before being released.

It is better to start sheep on grain in the paddock before introducing them to a feedlot situation (two weeks). If you can't do this, make sure that most of the diet in the first two weeks is hay and then increase the grain ration gradually. Start at 50 g per head per day grain and make up the rest with grain building up to the desired ration over two weeks. Feed your best hay first and feed hay before grain. Start off feeding daily for the first two weeks and then cut down to two to three times a week. You can then feed hay one day and grain the next.

It may take a while to get the ration right and, as the cost of feed is especially high during a drought, consider weighing 20 - 50 sheep regularly. Over and under feeding is costly. Aim to keep older stock at a minimum of Condition Score 2.

There will always be a number of sheep that do not take to a lot feeding situation and should be identified regularly and removed to pasture, smaller yards or sold.

In cold, wet and windy weather, increase the feed by 30 per cent, preferably by feeding more hay. With recently shorn sheep, increase the feed by 50 per cent. If extra hay is not available, give one extra feed during the week. Replace any feed wasted, as a result of rain damage, with new feed.

Releasing sheep

When the break does come, the change in feed can be quite sudden and may cause digestive problems. Therefore, when you are considering releasing the sheep from the containment area, do it when sheep have a full stomach and continue to feed hay for a few days. Ewes that are lambing may need the full ration for a few weeks.

There have been reported cases of hypocalcaemia in late pregnant ewes, despite being fed sufficient limestone. Removing ewes in late pregnancy from access to feed, such as by mustering or crutching has been the most common cause. It may also occur due to a reduced ability to maintain calcium balance with limestone supplemented diets and/or poor absorption of calcium from green pastures post the drought breaking.

Strategies to prevent this may include ensuring that ewes are not stressed or off feed for long periods. Restricting limestone in the diet for 2-3 weeks pre-lambing may assist in the ewes' ability to mobilise and absorb calcium. Feeding of roughage on short lush pastures may increase calcium absorption. Older ewes are more susceptible.

Growers' Experiences

A considerable number of farmers have used stock containment areas or drought lots during droughts. The most recent study of their experiences was produced by Australian Wool Innovation (AWI) after 2002. Some of the key messages from this were:

- 85 per cent of the reasons for deaths in a containment area was due to acidosis and shy feeders (or poor doers).
- Reducing death rates from acidosis includes training animals onto grain carefully, including roughage and taking care with diet changes (including releasing onto pastures)
- Shy feeders must be removed from containment areas regularly and this needs to be more frequent as mob size increases
- Mortality can be reduced and production improved by having stock densities at about 2,000 sheep per hectare and mob sizes at 1,000 or less.
- Including roughage reduced death rates and also the number of poor doers. This response was better with straw than with hay.
- There were no advantages of feeding in troughs rather than on the ground with mob sizes less than 2,000 head. In fact, at low mob sizes there were fewer deaths with ground feeding, possibly due to reduced smothering and feed access.

Animal health

Experiences with stock containment areas in South Australia in 1988 showed that pregnancy toxaemia was the next most common problem after acidosis. This can be reduced by recognising the higher demands of ewes in late pregnancy. A full late pregnancy ration should be reached by 6 weeks pre-lambing. Feed at least 20 per cent of the ration as hay.

Accidents, pulpy kidney, suffocation and flystrike were other causes of death. The problem where sheep are confined to small areas is that if there is any disease it can spread very quickly. Therefore, diseases like flystrike and pink eye need to be identified quickly. Problems have been experienced with changes in batches of processed feeds and even with new sources of grain. Therefore, some caution should be taken when changing to a new load of feed, such as mixing the new and old over a number of feeds.

Stock need to be monitored daily and sick animals removed. Avoiding stress such as boggy ground, overcrowding, dust and irregular feeding will help reduce diseases such as Salmonellosis and Pneumonia. Regular cleaning of feed and water troughs will also prevent diseases.

General

Farmers who lot fed in previous droughts believed it to be a worthwhile exercise, and it is now part of future drought management strategies. However, managing a stock containment area involves a transition from a broad acre manager to an intensive manager where you are in control. All feed and water is supplied by you and sick sheep can't go off by themselves and sit in the shade. It therefore does require constant vigilance and good management. It also means you can have better control over weight loss and gain and come out of a drought with valuable land assets and stock numbers intact.

For further information contact any DPI office or visit the website: www.dpi.vic.gov.au. Select - Agriculture and Food – Agriculture & LandCare Notes - use the search box to search for stock containment.

Water

Each pen has one 12 foot water trough (about 600 litres). Water is supplied by pressure with gravity as a back up and provides water flow of about 50 litres per minute. Troughs are cleaned out weekly.

Wool quality

The Allens shear in March. In 1995, the wool quality of the ewes in the stock containment areas was fairly similar to a normal year. Yield was 62 per cent (compared to 67 per cent normally) and staple strength was 37 N per kTex.



2. CHARLIE CROCKER

Charlie and Marie Crocker run a wool producing enterprise near Violet Town. In 1994, Charlie decided to put adult sheep into stock containment areas to retain the high investment in improved and fertile pastures. Pens were set up to hold mobs of 1000 sheep stocked at roughly 1 sheep per 2.5 m². Pen design was a simple, 6-line ringlock with one plain wire and no stay assemblies.

Location was along an unused roadside that provided afternoon shade and had easy access to water. Soil type is a sandy loam.



Stock management

Sheep were vaccinated and drenched into the sites in January 1995. Tail enders were taken off. For example, in the wether mob about 100 were taken out over two drafts and remaining sheep maintained condition well on the ration provided.

The ewes were joined in the feedlot at 2 per cent. Lambing percentage was 50 per cent – given they were maiden ewes in a drought, this was not too bad.

Feeding

Feeding in the containment areas was pretty easy. Once the sheep were used to the routine, the tractor could be driven in to fill the troughs without sheep running round the vehicle. The troughs were placed near the fence which also helped. After a while they didn't need to shut the gate while feeding.



The sheep were fed three times a week, Monday, Wednesday and Friday and the Crockers had the weekend off. They were fed 3 kg wheat per head per week plus hay on Friday. When the break came and it got wet and cold, the area was very wet so they increased the hay feeding. Limestone and salt were added, using a bucket, directly into the feeder.

They started feeding on sawdust, but due to some concern about salmonellosis, used troughs which could be cleaned out. They got some decking iron from a yard in Melbourne, which meant the tractor could easily straddle the troughs for ease of feeding. The hay rolls were fed out on the sawdust.

Wool quality

The wethers were shorn in late January and the ewes were May shorn. The wool was tender – either because of acidosis getting the sheep onto grain quickly or when they were let out onto green feed. They tried feeding hay to reduce the changing feed but it is hard to stop the wool breaking with these feed changes.

Dust wasn't a problem. The sheep were stocked at this density to increase compaction in the pens.

Water

Each mob of 1,000 sheep had one four foot diameter concrete trough with one inch polypipe (trough capacity of 500 litres). The troughs were on the garden pressure pump. The flow rate was about 35 litres per minute - and this kept up to the sheep. The system was also hooked up to a gravity system as a back up if there was a power failure.

Tips

Pens and troughs can be made quite cheaply, using laneways is a possibility. The system worked well and will be repeated. High stocking density was a key to the dust problem and removing shy feeders into another pen helped retain good health of the mob. Getting sheep onto grain slowly in the paddock will help reduce acidosis problems getting them into the pens.



Troughs can be made cheaply using materials on hand



Where containment areas are close to dams, or water ways, silt traps are required to protect dam or stream water quality

Chapter 6

Sheep health

Past experience indicates that if sheep remain in good store condition during the drought then they will experience very little disease – in fact, less than in a normal season. However, if the stock are stressed, then diseases are much more likely to occur.

Regardless of the care you take, there are a number of conditions that may occur in drought-feeding situations, especially when sheep are congregated onto small areas for feeding. You do need to keep an eye on the health of your sheep. In addition, the type of disease likely to occur will change as the drought progresses. You should contact your animal health adviser about recommendations for prevention and control if you have any concerns.

Most common diseases

Pregnancy Toxaemia (twin lamb disease) and Hypocalcaemia

Pregnancy toxaemia is a metabolic disorder of ewes that may occur in the last six weeks of pregnancy. It is caused by a lack of energy in a period when there is a high demand causing a rapid breakdown of body tissue. Therefore mature pregnant ewes with inadequate nutrition are susceptible and those in poor condition, or over-fat or with twin or multiple lambs are most at risk. Pregnancy toxaemia can be induced by stress or other conditions causing low intake (eg. worms, foot abscess and yarding).

The disease usually appears over several weeks with a few ewes showing signs of standing alone or lagging behind, unsteady walk and apparent blindness. Clinical signs may progress over a number of days. Ewes that are down become very dull and finally may go into a coma. Occasionally the foetus dies and the ewe recovers, though often with difficulty during lambing. Clinical signs of Pregnancy Toxaemia are the 'tip of the iceberg' and are a sign that the mob is underfed. Severe under-nutrition in late pregnancy and lactation will have other production impacts on poor lamb growth, survival and long-term production.

Treatment with registered products containing propylene glycol may be successful in the early stages, especially if ewes are still able to stand. Ewes that are down or in a coma usually die despite treatment. Good quality supplementary feed should be provided to, at least, those ewes most at risk. Prevention involves close observation, supplementary feed and careful management during the last weeks of pregnancy.

This disease should be differentiated from **Hypocalcaemia**, which is also seen in late pregnancy and early lactation but caused by metabolic calcium deficiency. The disease occurs over a short time frame and usually affects more ewes in the flock. Stock that have been held in yards overnight prior to transport or shearing may also develop hypocalcaemia. The only clinical sign may be sudden death during or after transport. Grain diets can predispose stock to this condition and prevention relies on the addition of 1 - 2 per cent ground limestone to the ration.

There have been reported cases of hypocalcaemia in late pregnant ewes, despite being fed sufficient limestone. Removing ewes in late pregnancy from access to feed, such as by mustering or crutching has been the most common cause. Hypocalcaemia may also occur due to a reduced ability to maintain calcium balance with limestone supplemented diets and/or poor absorption of calcium from green pastures post the drought breaking.

Strategies to prevent this may include ensuring that ewes are not stressed or off feed for long periods. Restricting limestone in the diet for 2-3 weeks pre-lambing may assist in the ewes' ability to mobilise and absorb calcium. Feeding of roughage on short lush pastures may increase calcium absorption. Older ewes are more susceptible. Animals with hypocalcaemia may respond to treatment with calcium solution.

Grain poisoning (Acidosis)

Grains are carbohydrate rich foods and if excessive quantities are eaten, there is a sudden change in the microbe population in the rumen. This leads to the formation of large amounts of lactic acid which causes grain poisoning. The same effect may occur with a change in grain types.

In practice the condition commonly occurs:

- when sheep are introduced to grain too quickly
- when there is a sudden increase in the amount of grain being fed

- when there is a change in the type of grain or concentrate being fed or even the same grain type but from a different source
- when feeding pellets and other highly digestible carbohydrates such as bakery bi-products.

Clinical signs vary from mild to acute depending on amount of grain and previous experience with grain. In milder cases sheep have a depressed appetite and are unstable on their feet. In severe cases symptoms include scouring, abdominal pain, acute lameness with heat and pain around the feet, apparent blindness and death.

Initial management involves removing the immediate source of grain, assessing the flock and sitting up any sheep that are down. Treatment is based on neutralising the excessive rumen lactic acid. Treat any affected sheep with 15 grams of sodium bicarbonate in 1 litre of water as an oral drench. Most sheep once down, however, will rarely recover despite treatment. Valuable stock should receive veterinary attention. The flock should be given roughage such as hay until recovered. Monitor faecal consistency and drafting off the affected cases may be practical in large mobs with small numbers affected.

To reduce the risk of this condition, follow guides for introducing sheep to grain (Chapter 4). When changing feeds, do so gradually and ideally mix the new feed into the old feed over at least four feeds and before the old feed cuts out. Adding 2 per cent sodium bentonite to grain rations will help reduce the risk of poisoning during grain introduction.

Pulpy kidney (Enterotoxaemia)

Pulpy kidney is an acute toxemia caused by clostridial bacterial in the intestine. This disease is more common in sheep when there are changes in diet and upsets. Clinical signs are sudden death with rapid rotting of the carcass.

All stock should be given a 5:1 or 6:1 booster vaccination prior to feeding. If in doubt about the vaccination status of the sheep, give two vaccinations 4 - 6 weeks apart. On occasions, another booster may be required as the drought progresses if sheep are dying with the telltale symptoms.

Ovine Johne's Disease (OJD)

OJD is a fatal wasting disease of sheep. Many sheep infected with the bacteria may carry the bacteria in the gut and spread the disease without showing obvious clinical signs. During periods of stress and crowding shedding of the OJD bacteria may increase and more animals may become infected. Therefore it is important that sheep in containment areas are vaccinated against OJD.

Worm and liver fluke infestations

Normally worms are not a problem during hot dry conditions. However, sheep that are stressed for any reason may have reduced immunity and may show the effects of worm infestation. Clinical signs are illthrift, anaemia and scouring. However, if sheep are scouring it may not be worms. It is important to determine the cause of the scouring before reaching for a drench gun.

When worms are confirmed by either a faecal egg count or post mortem, drench the sheep with an effective drench. Worm burdens should be regularly monitored through the use of faecal egg counts.

Liver fluke is more common in dry times when sheep graze wet fluke-prone areas such as wet gullies and creek beds. Chronic fluke results in anaemia and illthrift. Severely affected sheep can develop bottle jaw and die suddenly. It can be confused with barbers pole worm. If in doubt consult a vet or submit faeces for a worm and fluke egg count. Affected sheep should be treated with a flukicide that effectively removes both mature and immature fluke.

Less common diseases

The following are a range of other diseases that can be encountered during a drought. The list is not exhaustive and you should contact your animal health adviser for an accurate diagnosis and remedial action.

Plant poisoning

Often plants not normally considered toxic may be eaten in excessive amounts and can cause mortalities. In drought situations, hungry sheep will eat plants that are not normally eaten. Seek veterinary advice if plant poisoning is suspected, as there is a wide range of plants which can cause problems during a drought.

The introduction of hungry stock onto any new feed sources (eg. failed crops or even young rapidly growing pasture following rain) may cause stock losses so it is important to introduce sheep gradually to new diets. If sheep are kept in containment areas over a drought, ensure they have ready access to hay and other supplements during the first few days of release into a paddock.

Urea poisoning

This problem can be caused by intake of excess amounts of urea from blocks or in mixed feed. Another possibility of urea poisoning is when sheep drink pools of water on the top of urea blocks after rain. Try to ensure that urea is mixed thoroughly with feed when used as a supplement. Keep urea blocks out of the rain in sheltered areas.

Salmonellosis

Faecal contamination of feed and water supplied with *Salmonella* organisms can cause an outbreak in stressed sheep. It is more likely to be a problem when the area becomes wet or muddy following heavy rain or from overflowing water troughs and large mobs are feeding from the same area. Symptoms are fever, scouring and sudden death. Treatment requires antibiotic treatment and advice should be sought from your vet. Try to reduce the risk by feeding on new trails or clean troughs, if possible.

Urinary Calculi (bladder stones)

The common predisposing cause is a limited water intake. This can occur as a result of faecal contamination of water, stagnant water or a high salt content in the water. Losses can also occur when sheep are fed on grain rations for over three months without a calcium supplement. It is usually only a problem in rams and wethers. Affected sheep may be dull and down or found after sudden death. There may be a grossly enlarged or even ruptured bladder caused by obstruction to urine outflow, or 'water belly' due to urine straining. Treatment is rarely successful. The disease is best avoided by providing the sheep with the highest quality water possible at all times and adding ground limestone when feeding grain.

Pneumonia

Pneumonia is caused by bacterial infections aggravated by dry dusty conditions. It is more common with lambs being fed on dry, dusty feeds in troughs, especially finely hammer milled hay. Symptoms are nasal discharge, coughing, illthrift and sudden death. To lower the risk of this disease, avoid feeding dry and dusty feeds. This may require some damping down of the feed in troughs.

Vitamin A deficiency

Vitamin A deficiency can occur in lambs born to grain fed ewes in drought. Grain and most hays are low in Vitamin A. Lambs must be completely off green feed for some months before clinical signs will occur. For further details, see the section on Minerals and Vitamins (Chapter 3).

Vitamin E deficiency

Vitamin E deficiency is often associated with feeding weaners on hay or grain over extended periods, especially young weaners. Affected animals appear bright and alert but they are reluctant to stand. In other cases there is sudden death. Examination of dead animals reveals pale muscles.

Vitamin E and selenium deficiency may have an interrelationship and present with identical signs. Again see the section on Minerals and Vitamins (Chapter 3) for further details.

Polioencephalomalacia (PEM)

PEM occurs due to a deficiency in thiamine (vitamin B1). It can occur in feedlot animals due to reduced intake or destruction of thiamine as a sequel to acidosis. Sulphur toxicity may also lead to PEM. Typical signs include blindness, aimless wandering and a 'star gazing' appearance.

Coccidiosis

Stress and overstocking of lambs and weaners under warm, moist conditions can precipitate this disease. The clinical effects are aggravated by concurrent worm infestations. Signs are scouring with watery faeces which may contain blood, lack of appetite, and dehydration, with anaemia and illthrift in some cases. Consider a faecal worm test to differentiate from worms and fluke and consult a veterinarian for treatment and management advice.

Chronic copper poisoning

Long-term excessive intake of copper in the diet, or as a result of a build-up of copper associated with liver damage caused by grazing on Paterson's curse or heliotrope. The disease is brought on by some form of stress (for example, nutritional or lactation stress).

Listeriosis (circling disease)

This is caused by bacterial infection which may harbour in silage or possibly associated with close intense grazing. The condition occurs sporadically and there are two main disease patterns that generally don't occur together:

- single animals may be found circling or wandering, uncoordinated, convulsing or dead
- a syndrome of abortion in ewes and death of newborn lambs.

Remove silage from sheep and replace with hay while seeking veterinary advice for a definite diagnosis.

Animal welfare

All farmers realise that animal welfare is an issue at all times, but especially during a drought. Activities, such as shearing or transport, may exacerbate problems associated with sheep in poor condition. An outbreak of any disease or condition which reduces intake, such as high worm burdens, footrot or pregnancy toxemia will have a bigger harder impact than on sheep in good condition.

Sheep being fed for survival should be observed carefully at feeding times. Weak animals may require segregation for special treatment.

Sheep should not be allowed to starve to death. Where minimal water and food requirements cannot be met they should be agisted, sent for slaughter or humanely destroyed on the property. Drought affected sheep are highly susceptible to stress and require careful handling if they:

- are unable to rise and walk they should be humanely destroyed on site
- go down after limited exercise they are not fit to travel and should be humanely destroyed on the property
- are weak but still able to walk they should be agisted or sent directly to the nearest slaughtering plant. They should not be consigned through saleyards.

(From the Code of Practice for the Welfare of Sheep.)

Destroying stock on property is often a distressing task, so seek advice from DPI officers and other farmers who may be undertaking the same task.

Chapter 7

The feed value of unusual feedstuffs

There is a wide range of unusual feedstuffs that can be safely and effectively fed to livestock.

Although such feedstuffs are commonly available in a fairly regular supply, inquiries about their value for feeding to livestock increase when feed for grazing livestock is short, such as during droughts.

Apart from these unusual feedstuffs generally being of poor nutritional value, they can also contain chemical residues that can cause contamination of meat and animal products when used as livestock feed.

All supplementary feeds may contain chemical residues. However, unusual feedstuffs not normally used for feeding livestock pose a much greater risk, because residue transfer assessments are unlikely. The same applies to imported feedstuffs, which may have high feed value to stock, but have an unknown history of chemical usage.

Agricultural chemicals used on fruit and vegetable crops are typically designed to be eliminated from the edible parts of the plant at harvesting, however some residues may still be present and in some cases concentrated, in the waste plant material after processing. It is when this waste plant material is fed to stock that problems can occur.

Agricultural chemicals are not designed to be ingested by livestock. Unless animal residue studies have been conducted, little is known about the effect of these chemicals on stock and about the persistence of residues of these chemicals in animal tissue.

There is a very real possibility that the meat and animal products from stock fed unusual feedstuffs containing chemical contaminants will themselves become contaminated with these chemicals. This can impact severely on trade and market access as well as animal and human health.

For this reason, the best policy is to not feed unusual feedstuffs to stock without first establishing that the material is suitable. Producers should ask the supplier of unusual feedstuffs to certify that the material they are supplying is suitable for the purpose for which it will be used. A by-product vendor declaration should also be requested to verify this information. This will allow the producer to see the full chemical use history of the potential feed.

Ideally, unusual feedstuffs should be tested for chemical contamination by an accredited testing laboratory before being used as drought feed, although this in itself may not provide a satisfactory guarantee of suitability as analytical tests typically only screen for a narrow range of chemicals. It should also be noted that the chemical content of unusual feedstuffs may vary from batch to batch.

It should also be realised the composition of many feedstuffs varies widely because of differences in climate, soil conditions, maturity, variety, management and processing factors.

Therefore, the data presented in this chapter should be considered as a guide rather than a precise statement of nutrient composition. Before finalising plans to feed any by-product or unusual feedstuff to livestock, it is advisable to have a sample analysed by a feed analysis service, such as FeedTest® at DPI Hamilton.

Ph: (03) 5573 0910
Fax: (03) 5573 0939

Most by-products and unusual feedstuffs should be used with caution and introduced into rations gradually, even when low prices favour their use. Factors to consider about unusual feedstuffs are: their nutritive value, palatability, possible toxicity or contamination with pesticides or heavy metals and the effects upon digestion and utilisation of the total ration. The use of by-product stockfeed needs to be declared when completing National Vendor Declaration form (see Appendix 1).

High moisture content feeds

Stock can eat up to 3.5 per cent of their liveweight per day when the feed is in a dry form, such as hay or grain, but they cannot eat as much dry matter if the feed has a high moisture content.

Fresh, high-moisture feeds are often quite palatable to livestock but most such feeds will ferment and sour quickly unless they are dried or ensiled.

Blending and levels of feeding

Many unusual feedstuffs are a reasonable source of energy for the livestock - but quality can be variable. It is very important that any new feedstuff be gradually introduced to livestock over a period of about two weeks.

As a rule of thumb, most unusual feedstuffs can be effectively incorporated into the rations of livestock to a maximum of about 30 per cent of the total ration without any significant influence on the health of livestock.

Types of feeds

Stock feed is usually categorised as either concentrates (high in energy) or roughage (higher in fibre, but lower in energy). Concentrates can be high in either energy or protein content. Protein concentrates generally contain more than 20 per cent crude protein.

By-product energy concentrates

Almond hulls

Almond hull products vary considerably due to varietal differences and harvesting procedures. Soft almond hull, having about 10 per cent fibre, is a good feed and has about 85 per cent of the energy value of barley grain. However, some supplies of almond hulls are contaminated with sticks, dirt, hard shells and other foreign materials at harvest time. This greatly reduces their feeding value and acceptability by livestock.

Almond hulls can be used as a partial roughage replacement when roughage supplies are short and forage prices are high.

When mixed with other ingredients in commercial concentrate mixes, almond hulls usually are restricted to 20 per cent or less in order to maintain high nutrient levels and palatability of the concentrate mix. In complete feedlot rations, almond hulls are limited to about 30 per cent or less.

Apple pomace

Apple pomace is the by-product of apples used for cider or vinegar production. It can be fed fresh, ensiled or dried.

Two problems have hampered feeding of apple pomace in recent years. Pesticide contamination has been a problem in some areas, making the pomace unacceptable in dairy and (occasionally) sheep and beef rations. A second difficulty is that urea or other non-protein nitrogen compounds should not be fed with apple pomace due to the possibility of abortions or abnormalities of offspring. The reason for this is unknown.

Apple pomace is a highly palatable feed, medium in energy but very low in protein. When properly supplemented, it can replace up to about one-third of the concentrates in rations and 15-20 per cent in complete feedlot rations.

Bakery waste

Large amounts of unsold bread, doughnuts, cakes and other pastries are available in some areas and are excellent energy sources for ruminant rations. Bakery waste however, may potentially contain meat or other animal protein and so should be used with caution and in accordance with ruminant feed ban legislation.

They are usually high in fat and low in crude fibre. Protein levels (on a dry-matter basis) in the range of 10-12 per cent are typical. The low fibre content of the baked material and the baking process itself result in a feed which tends to stimulate ruminal propionate and reduce ruminal acetate production. This is desirable for feedlot livestock being fattened for market.

Up to about 10 per cent can be included in feedlot rations when supplies and economics are favourable. Supplies should be fed quickly.

Brewers' grains

Brewers' grains have 20 - 25 per cent crude protein (on a dry matter basis), making them a good protein source in addition to their energy value.

The brewing process makes this protein less soluble than that from many protein supplements. This could be valuable in rations, such as silage supplement with non-protein nitrogen, which contain large amounts of soluble protein.

Brewers' grains are fed both wet and dried. In the dry form they have about 80 per cent of the energy value of barley grain (the energy value varies depending on the brewery and additives used in the brewing process). They are not as palatable in the dried form as the original grain and usually are included as 25 per cent or less of a dairy concentrate mix, and 1 - 20 per cent in feedlot rations.

Citrus pulp

Citrus pulp is classified as a concentrate but is also valuable as a partial roughage replacement because of its high level of digestible fibre.

It commonly contains about 15 per cent crude fibre in the dry matter. Its energy value is about 94 per cent the value of barley grain. It has only about 7 per cent crude protein in the dry matter.

Citrus pulp is usually fed dehydrated. It must be introduced gradually into a ration to let stock get accustomed to its distinctive smell and taste. Levels up to 15-20 per cent are acceptable in feedlot rations.

Citrus pulps can also be fed fresh or as silage. Both are very acceptable to stock but pulp and peels from lemons are somewhat more acceptable than those from oranges and grapefruit. Transportation costs preclude the wet pulp from being fed very far from processing plants.

Citrus pulps are high in calcium and low in phosphorus, and aggravate the high calcium-to-phosphorus ratio in a ration when fed with legumes such as lucerne. Unless counter-balanced by other feeds low in calcium and high in phosphorus, citrus pulps can result in higher incidences of milk fever in cattle at, or soon after, parturition.

Fat

Fats and oils have an energy value about 2.25 times that of carbohydrates. Fats are also used to settle the dust and as a lubricant for feed processing. About 2 - 5 per cent fat is an acceptable level in commercial feedlot rations. Care must be taken to ensure the fats and oils are not contaminated with extraneous chemical during collection, storage and use. Tallow and used cooking oil may only be used when in accordance with Ruminant Feed Ban Regulations.

Grain screenings

Grain screenings result from the cleaning of small grains before they are milled for human consumption. The best grade of screenings consists primarily of broken and shrunken kernels of grain, wild oats and other palatable weed seeds. When ground, good screenings approach grain in feeding value and have been used as 25 per cent or more of concentrate mixed and 15 - 20 per cent in feed rations. However, light, chaffy screenings are much higher in fibre and resemble straw more than grain in feeding value. Such screenings should be restricted to 10 per cent.

Grape pomace or marc

Grape pomace or marc is the refuse in the production of grape juice and wine. It consists mainly of some combination of grape seeds, stems and skins. It has little feeding value, being very variable in both energy and protein and highly variable in dry matter. When included in a concentrate mix, it can be considered only as a filler to reduce the price of the mix. With new harvesting and winery techniques, grape pomace containing few or no stems can be produced. This waste feed has been fed successfully to a 15 - 20 per cent level in complete feedlot rations.

Grape marc has been found to be extremely palatable to sheep and lambs in pen trials have consumed 350 grams per head per day when fed with straw. This diet was effective in reducing weight loss only.

Studies have found partitioning of oil soluble chemicals in grape seeds at violative levels, which would readily transfer to animal fat upon ingestion. There are also concerns regarding residual levels of copper, which can be toxic to stock, used in fungicides on grapes.

Onions

Onions have been fed successfully to sheep and cattle and they eat them readily. They can cause anaemia in sheep so it is recommended to introduce onions over a period of time and only up to 50 per cent of the total ration.

Molasses

All types of molasses are good energy sources but are low in protein. The energy value of cane molasses decreases rapidly when it is increased from 10 - 30 per cent of the total ration. In feedlot rations, up to 15 per cent is an acceptable level. Molasses and urea have been added to poor quality straw to improve both palatability and protein levels of straw when the main component of a diet.

Rice bran

Rice bran results from the processing of rice grain for human consumption. Besides the bran itself, it contains the germ from the grain and fragments of the hull not removed in milling. Levels of up to 15 per cent have been fed successfully to livestock. At these levels, it is roughly equivalent to wheat bran in nutritional value.

Wheat bran and other wheat by-products

Wheat bran consists of the coarse outer coatings of wheat kernels. It is a bulky feed which is relatively high in protein and phosphorus. It is highly palatable to livestock and is utilised efficiently when included up to 25 per cent of the concentrate mix. About 10 - 20 per cent of wheat bran and other wheat by-products can be used in feedlot diets. The bulky nature of wheat bran and its high phosphorus content make it a popular by-product feed for livestock.

Whey

Whey is the residue from cheese production and consists primarily of lactose, minerals and water. It can be fed dry or liquid. Pollution control regulations and the high cost of drying have resulted in increasing amounts being used as feed liquid in recent years.

Dried whey is a major component of many dry milk replacers fed to calves. It is usually too expensive to be included in rations for older animals, but sometimes is included at low levels in pelleted feeds because of its binding characteristics and nutrients.

Liquid whey contains only 6 - 7 per cent solids and must be fed quickly or it will spoil. In cool climates it can be stored for 3 - 4 days before feeding. In warm climates it should be fed the same day that it is delivered.

Liquid whey is frequently available for only the hauling costs, making it an inexpensive source of nutrients for animals located near cheese plants. However, supplies are often variable and storage of whey attracts fly problems.

Tomato pomace

The feeding value of tomato pomace on a dry basis is comparable to good-quality hay. Variability (especially moisture content) is one of the main problems associated with the use of this by-product feed. In one study, dry matter varied from a high of 27.5 per cent to a low of 11.9 per cent. Pesticide contamination can also be a problem with tomato pomace.

By-product protein concentrates

Many crops grown for oil production also produce by-products high in protein. These by-products are the primary source of supplemental protein in livestock rations. These include coconut meal, corn gluten meal, cottonseed meal, linseed meal, safflower meal, soybean meal and sunflower meal. Some of these have high fat levels and so should not be fed as the whole diet.

Additionally, such by-products as distillers' grains are used extensively as protein supplements in livestock rations. Brewers' grains, previously discussed as an energy feed, are also relatively high in protein content.

Coconut meal

Coconut meal, popularly known as copra, is one of the most palatable feeds available for livestock. It is high in energy and contains about 20 per cent protein. Rancidity can be a problem during storage if the meal is high in fat but high-fat copra contains considerably more energy than copra produced by the solvent process.

Cottonseed meal

Cottonseed meal is a by-product of the production of cotton lint and cottonseed oil. It contains about 40 per cent protein and is well liked by livestock. The amount of oil left in the meal affects its energy value (amounts vary according to the method of processing).

However, energy levels are somewhat lower than those found in some other protein supplements such as coconut meal, soybean meal and linseed meal.

Linseed meal

Linseed meal, the by-product of the extraction of linseed oil from flaxseed, is an excellent protein supplement for livestock. Protein content varies from about 30 - 38 per cent depending on the source of processing method. When reasonably priced, it can be used as the only protein supplement in livestock rations because it is very palatable.

Poultry litter and manure

Poultry waste (litter and or manure) has been included in the diets of sheep and cattle but is now prohibited under the Ruminant Feed Ban.

Safflower meal

Safflower meal has increased in availability and importance as a protein supplement in recent years because of the popularity of safflower oil in human diets. Safflower meal from unhulled seeds, has about 20 per cent protein, is high in fibre and is relatively low in energy. Meal made from well-hulled seeds has about 40 per cent protein and is much higher in energy.

However, safflower meal from either source is not as palatable to livestock as the more common protein supplements and is usually restricted to 20 per cent or less of concentrate mix.

Soybean meal

Soybean meal contains from 40 - 50 per cent protein, is high in energy and is highly palatable to livestock.

Sunflower meal

Protein levels vary from 20 - 25 per cent, depending on the processing method and whether the seed is hulled or not. It is roughly equivalent to cottonseed meal as a protein supplement for livestock.

By-product roughage

Canola hay and silage

Canola hay and silage are likely to be available as a fodder source in droughts where frost damage has occurred. Both hay and silage can be of good quality but this can vary and there are some livestock considerations. The table below is a summary of sample results conducted by FeedTest® in Victoria on canola hay and silage samples submitted during 2002–05.

Canola hay that has not been aggressively conditioned may have sharp stalk ends and these can pose a problem to animals by piercing the rumen. There have been reported instances of nitrate poisoning from canola products and it is recommended that canola hay or silage is not fed as a sole ration or to starving animals.

Table 12 - Canola hay and silage FeedTest® results

	Digestibility DDM%		Crude protein CP%		Energy ME MJ/kg		Fibre Neutral digestive fibre %	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Silage (21 samples)	60.5	44.3- 71.4	17.4	6.6 - 25.5	8.8	6.1 - 10.4	46.9	33.3 - 58.2
Hay (79 samples)	59.2	41.7- 82.1	13.9	5.5 - 22.9	8.4	3.6-12.1	49.0	26.9 - 68.6

Rice hay

Rice hay is generally a good, palatable roughage of equivalent feed value to cereal hays. Rice hay is known to contain significant levels of silica and oxalate, both of which may cause problems to livestock. High dietary silica levels can predispose animals to urinary calculi.

If rice hay is fed as the roughage in a hay and grain diet, it is suggested that 1.5 per cent limestone and 0.5 per cent salt be fed to correct the calcium: phosphorus balance and levels in the ration. Rice hay can contain a range of weeds, such as umbrella sedge, barnyard grass, starfruit and wild millet.

Rice hulls

Rice hulls have practically no feed value but can be useful as bedding material for livestock.

They are very high in crude fibre and silica and the fibre is largely indigestible. However, up to 15 per cent of unground rice hulls can be included as a roughage source in drought rations being fed to livestock.

Sawdust

Sawdust has virtually no feed value for sheep or cattle due to its high level of lignification, although it has been shown to be useful when feeding high concentrate diets to sheep or cattle during droughts. Sheep survival rates in drought have been shown to be better when 15 - 20 per cent sawdust (hoop pine and spotted gum) was included in the wheat rations.

Sawdust has also been successfully used as a diluent for adapting cattle to concentrate diet. The inclusion of 5 - 15 per cent sawdust in maize-based diets for cattle was found to maintain better rumen function as evidenced by fewer cases of bloat and liver lesions and less ruminal parakeratosis.

Coarse sawdust was better than fine sawdust in maintaining rumen function. Sawdust from treated timber should not be used.

Seaweed

Kelp represents the most common type of seaweed that might be available for feeding. The dry matter of kelp contains about 30 per cent minerals (compared to 5 - 6 per cent in hay, pasture, etc). Kelp contains 0.15 - 0.2 per cent iodine. Seaweed is sometimes used as a mineral source for livestock.

Kelp can be fed quite satisfactorily at up to about 25 per cent of the diet of livestock. The composition of dried kelp is: Dry matter 91 per cent, Crude protein 6 per cent, Minerals (ash content) 30 per cent; ME value is about 5 MJ per kg DM.

The rich mineral content of seaweed, especially salt, can make the material quite palatable to livestock.

Waste paper

Waste paper has little or no feed value for sheep or cattle unless it is treated in some way to improve its digestibility and palatability. It has been fed as a roughage source, on some occasions.

However, due to its poor feed value and the risk of the paper containing contaminants such as lead, cadmium, polychlorinated biphenyls and other toxic substances, the feeding of waste paper to sheep or cattle is not recommended.

Treating straw with urea

Where straw is widely available and relatively cheap there has been some success in improving the nutritional value by adding urea. This can improve the protein level significantly (eg. 2 - 14 per cent) but is likely to be low in energy and will require supplementation with grain or other high energy ration.

To treat 1 tonne of straw, dissolve 50 kg of urea fertiliser in 850 litres of water and spray the solution onto the straw. The straw needs to be contained airtight (covered in plastic) and left 7 - 10 days in summer (longer in winter). Animals will take a while to adapt and caution must be exercised to avoid urea toxicity.

Table 13 – Energy and protein compositions of unusual feedstuffs

If known, ranges in feed values are given in brackets. It is likely that most of these feedstuffs will vary and values are a guide only.

Feed	Approx. dry matter (DM)%	Metabolisable energy (ME) (MJ/kg DM)	Crude protein % dry matter
Acorns	70	7	5
Almond hulls, 15% CF	90	8	2
Almond hulls and shells, 20% CF	90	7	2
Apple pomace, dried	89	10	5
Apple pulp silage	21	11	8
Apples	17	10	3
Apricots, dried	90	12	6
Bakery waste, dried	92	13	11
Banana skins, dried, ground	88	9	8
Bananas	24	13	4
Bread, dried	92	13	13
Brewers dried grains	92	9	22
Brewers dried grains, 25% protein	92	10	25
Brewers grains, wet (range)	28 (14-61)	11 (8-14)	22 (10-29)
Broccoli	11	10	33
Brussel sprouts	15	11	33
Buckwheat	87	11	12
Cabbage	9	13	25
Cabbage leaves	15	10	14
Canola meal (range)	91	12 (10-16)	38 (27-42)
Carrot pulp (range)	10 (8-16)	13 (9-14)	10 (6-15)
Carrots	13	12	10
Cauliflower	9	10	30
Citrus pulp (range)	14 (11-17)	13 (10-15)	9 (6-12)
Copra (coconut) meal	90	11	21
Corn cobs, ground	90	7	3
Cottonseed meal, 41% protein mech-extd	93	3	44
Cottonseed meal, 41% protein, solv-extd	91	11	46
Cottonseed, whole	92	14	23
Grape marc or pomace (range)	55 (20-94)	6 (2-12)	12 (5-17)
Grape/pear/apple pomace, dried	92	6	7
Grapefruit	14	13	8
Kelp, dried	91	5	7
Lemon pulp, dried	93	12	7
Lettuce	5	8	22
Linseed meal, 36% protein, solv-extd	90	12	38
Linseed meal, 37% protein, mech-extd	91	12	38
Melons	4	11	11
Milk, cattle, skim, dried	94	13	36
Milk, cattle, whole, dried	94	15	27
Milk, colostrum	25	15	46
Molasses, cane	75	11	6
Oat hulls	93	5	4
Oat straw	92	7	4
Oats, sprouted 5 days	13	10	18
Onions	11	13	10
Orange pulp, dried	88	12	8
Orange pulp, wet	25	12	9
Oranges	13	12	7
Palm kernal meal	88	11	17
Pea hay	88	9	14
Peaches	10	12	9
Peanut meal, mech-extd	93	12	52
Peanut meal, solv-extd	92	12	52
Peanut skins	94	10	17
Pears	17	13	6
Pineapples	15	12	3
Potato meal, dried	91	12	11
Potatoes	23	12	9
Pumpkins	9	13	16
Raisin pulp, dried	89	8	11
Raisins, cull	85	7	4
Rice bran	90	14 (9-15)	16 (13-20)
Soyabean meal	85 (12-94)	15 (13-16)	44 (30-54)
Sunflower meal	91	10 (8-14)	34 (20-39)
Whey	8 (2-27)	14 (12-14)	30 (20-40)

It is important to assess the risk of these feedstuffs and take appropriate precautions to ensure the quality and integrity of the meat or other end product is not jeopardised.

Appendix 1 – Example of Completed NVD Form



Who is responsible for completing the NVD Waybill?
Part A: The sheep or lamb owner or the person responsible for the husbandry of the sheep or lambs.
Part B: The livestock carrier.
Part C: The livestock agent.

Who keeps the copies?
Top sheet: (White) goes with the sheep and lambs to the purchaser.
Middle sheet: (Green) goes to the carrier.
Bottom sheet: (Pink) stays in the book and should be kept for auditing purposes.

How do I order copies of the NVD Waybill?
 1. Go to www.mla.com.au/lps or phone 1800 683 111, to order your NVD Waybill.

IF PIC IS PRE-PRINTED DO NOT CROSS OUT

NATIONAL VENDOR DECLARATION (SHEEP AND LAMBS) AND WAYBILL

Owner of sheep or lambs: Leah's South - 488 South
Property/properties where the sheep or lambs are held: Leah's South - 488 South
Property Identification Code (PIC) of this property: S A 5 6 1 2 3
Description of sheep or lambs: 20 2000
Sex: M
Age: 1
Weight: 20
Marking: 12345678
Details of other statutory documents relating to this movement: e.g. animal health certificate

Have all sheep or lambs been related consistent with the rules of an independently audited genetic program on this property the PIC of which is shown above?
 Yes No If Yes, give details: Leah's South

Have all sheep or lambs in this consignment still within a Withholding Period (WHP) or Export Slaughter Interval (ESI) following treatment with any veterinary drug or chemical (if different)?
 Yes No If Yes, give details: (None)

Were all of the sheep or lambs born and raised on this vendor's property?
 Yes No If No, how long ago were the cattle obtained or purchased?
 If purchased at different times, list the date corresponding to the area of the most recent purchase:
 A. Less than 2 months B. 2-4 months C. 6-12 months D. more than 12 months

Are any of the sheep or lambs in this consignment still within a Withholding Period (WHP) or Export Slaughter Interval (ESI) following treatment with any veterinary drug or chemical (if different)?
 Yes No If Yes, give details: (None)

Do not send sheep or lambs to slaughter if they are still within the withholding period or export slaughter interval.

Some markets require that sheep have never been fed stockfeed containing these materials.

Once you have signed this form you have legally met the requirements of a Waybill and declared that all livestock covered by this NVD have met the LPA program requirements and animal material feeding restrictions.

The carrier should fill in Part B.

The agent should fill in Part C.

Help Australia lead the way – Fill in your declaration honestly and accurately

Appendix 2 – Victorian Sheep Health Statement

SHEEP HEALTH STATEMENT VICTORIA

CONSIGNMENT DETAILS

I of
 PIC
 am the person with day to day responsibility for the husbandry of the sheep described below

DESCRIPTION OF CONSIGNMENT SHEEP

Number	Year born (drop)	Breed, Sex and Type (eg: cross-breed wether lambs)	Identification (eg: PIC on ear tag, brand)

HISTORY OF CONSIGNMENT SHEEP

Sheep born on above property: Yes No

If no, date introduced:

Former owner (if known):

Former property address:

..... PIC:

ABC Score (when purchased):

DECLARATION

As the seller and / or person responsible for the husbandry of the sheep in this consignment I declare that the information in this declaration is true and correct and, where applicable, I hold supporting documentation.

Signature: Date:

Name (Print):

Contact phone number/s:

NOTE: PERSONS MAKING FALSE STATEMENTS MAY BE LIABLE UNDER FAIR TRADING LEGISLATION AND THE STOCK(SELLER LIABILITY AND DECLARATIONS) ACT 1993

This consignment has an ABC SCORE of (refer and complete overleaf)

Category A (Area credits) Category B (Test Credits) Category C (Vaccine credits) Category D (Low risk credits)

TOTAL ABC SCORE (UP TO A MAXIMUM OF 10)

Tick where applicable

- The Sheep in this consignment are terminal 'T' tag lambs
- Sheep that are of a lower score than the sheep in this consignment have been introduced into the flock in the last two years

The flock of origin (tick where applicable):

1. Has been examined and is NOT known or suspected to be infected with VIRULENT FOOTROT
2. Was examined and showed NO evidence of sheep LICE at the last shearing
3. Is OVINE BRUCELLOSIS ACCREDITED FREE. Flock Accreditation No
4. Had all rams test negative for OVINE BRUCELLOSIS within the last 30 days (Veterinary Certificate attached)

OTHER CONSIGNMENT HISTORY (eg lice treatments, last drench type, 5 in 1 vacc.)

Treatment Date(s)

.....

.....

.....

.....

.....

Appendix 3 – How To Calculate Your ABC Score

HOW TO CALCULATE YOUR ABC SCORE

OJD ASSURANCE BASED CREDIT (ABC) POINTS

Select only one line from each category that is applicable to your sheep, then add for total score

Category A: Flock or origin – Location / Description	Possible Credits	Credits for this consignment
The Flock is located in:		
A Very Low Prevalence Area and is not suspected to be infected	5	
A Low Prevalence Area and is not suspected or known to be infected	3	
A Medium Prevalence Area and is not suspected or known to be infected	1	
A High Prevalence Area	0	
Any Area and is suspected or known to be infected	0	

CATEGORY B: OJD Testing

The Flock is:

In the SheepMAP and has had 3 negative sample tests	SheepMAP Status	4
In the SheepMAP and has had 2 negative sample tests	MN: Expiry date: / /	3
In the SheepMAP and has had 1 negative sample tests		2
Not in the SheepMAP but has had a negative PFC 350 test in the last 12 months		2
Not in the SheepMAP but is eligible for Abattoir 700 status		2
Not in the SheepMAP but is eligible for Abattoir 200 status		1
A test low level infected flock		1
None of the above		0

CATEGORY C: OJD Vaccination

The flock is a second generation approved vaccinate flock		4
The consignment sheep are approved vaccinates and were born when the whole flock were approved vaccinates		3
The whole flock are approved vaccinates		2
The consignment sheep are approved vaccinates		1
None of the above		0

CATEGORY D: Consignment Sheep – Risk Assessment

The consignment sheep are:		
Sourced from a flock infected or suspected to be infected but are certified low-risk by a SheepMAP approved veterinarian		1
None of the above		0

TOTAL ABC SCORE FOR THIS CONSIGNMENT OF SHEEP

(CATEGORY A + B + C + D) =
Max ABC is 10

EXPLANATORY NOTES

Flock of origin – flock from which sheep are being consigned

Prevalence area – four prevalence areas are defined: Very Low, Low, Medium and High. These have been agreed nationally and are reviewed annually. Details are available from Department Primary Industries (DPI) or www.dpi.vic.gov.au/farming/ojd

Infected flocks – flocks are no longer regarded as infected when either: (1) the whole flock consists of approved vaccinates and has undertaken a PFC 350 test, with negative results, at a minimum of 2 years after the last detected infected animal has been removed; (2) the whole flock is a second generation approved vaccinate flock which has undertaken a PFC 350 test, with negative results; OR (3) a de-stocking/decontamination program approved by the CVO of the jurisdiction, has been completed.

Flock suspected to be infected – if the owner has reasonable grounds to believe the flock has been exposed to OJD infection based on: (1) trace back or trace forward contact with an infected flock; (2) contact with OJD contaminated land or facilities; (3) a positive Johne's disease screening test; (4) the flock neighbours an infected flock; (5) the flock has introduced sheep with an ABC score of 0; (6) clinical signs of OJD; OR (7) advice from the Department of Primary Industries, AND the flock has not resolved suspicion.

SheepMAP flocks – the number of Sample Tests applies to the actual number of negative Sample Tests that contributed to attaining the current flock status.

Sample Test – test of a sample of a flock, in accordance with the Sheep Market Assurance Program (SheepMap) guidelines, which is undertaken within the flock's current SheepMAP program.

SheepMAP approved veterinarian – a current list of SheepMAP vets is available at www.dpi.vic.gov.au/farming/ojd

PFC 350 test – test of 350 representative sheep over 2 years of age (or all sheep over 2 years of age in small flocks) by Pooled Faecal Culture in pools of up to 50 sheep.

Eligible for Abattoir 700 status – 700 representative sheep over 2 years of age have been submitted to an abattoir in the past 24 months with at least 500 sheep, in 1 or more lots, being examined and found negative for OJD.

Eligible for Abattoir 200 status – 200 representative sheep over 2 years of age have been submitted to an abattoir in the past 12 months with at least 150 sheep, in 1 or more lots, being examined and found negative for OJD.

Tested low level Infected flock – an infected flock which has a history supporting a low level of infection, an approved Property Disease Management Plan (PDMP) in place, and a flock profile demonstrating a detection rate of not more than 1 in 7 pools by Pooled Faecal Culture (PFC) within the previous 2 years. Sheep mobs that contributed to the positive pool are not eligible for this point.

Approved vaccinates – sheep vaccinated by 16 weeks of age or sheep vaccinated after 16 weeks of age where, in the written opinion of a SheepMAP approved veterinarian, vaccination occurred when there was a low risk of previous exposure to OJD (and identified by an NLIIS  tag).

Second generation approved vaccinate flock – a flow comprising entirely approved vaccinates which were born when the whole flock were approved vaccinates.

Certified low risk sheep – sheep which are sourced from a flock that is infected or suspected to be infected and which are certified in writing as low risk by a SheepMAP approved veterinarian on the basis of: (1) a risk assessment, and (2) an approved Property Disease Management Plan (PDMP) that includes profiling and strategic culling, being implemented in the flock. Other strategies such as vaccination of sheep which are unlikely to have been heavily exposed, may also be appropriate.

Terminal 'T' tag lambs – crossbred lambs to be slaughtered before they cut their first permanent teeth and identified by an NLIIS  tag.

For further information, please contact your nearest DPI office or visit:

www.dpi.vic.gov.au/farming/ojd

Notes:

