

CHAPTER 4

Feeding sheep – how much and how often



This chapter pulls together the information on nutritional requirements for different classes of sheep to assist in working out rations, how to get started and how often to feed.

Key messages

- **Prioritise paddocks for grazing by different livestock classes to utilise the best feed early.**
- **Manage ground cover, protect valuable pastures and utilise paddocks that will run out of water first.**
- **Where pasture feed will become limited, set feed and ground cover targets for destocking and containment feeding.**
- **Train lambs to eat supplements when on their mothers, even in non-drought years.**
- **Start feeding before sheep reach the targets set for maintenance feeding.**
- **Introduce grain feeding gradually over 3–4 weeks.**
- **Monitor live weight and/or condition score to review rations and whether targets are being met.**
- **Check mobs regularly for health issues and remove shy feeders early for separate management.**
- **Calcium must be provided to pregnant ewes and young growing stock when they are on high grain diets.**
- **Ration good-quality hay supplies and/or safe grains (e.g. lupins) for events that require quick increases of rations (e.g. cold weather/shearing).**
- **Shandy or carefully introduce sheep to new batches or grain sources.**
- **Gradually introduce sheep back to pasture after the drought breaks.**

The start and finish of feeding, level of supplementation and feed introduction strategy are all important components of drought management. As sheep need to adapt to high-grain diets, feeding needs to start several weeks before full rations are required. If stock have not been trained to eat grain at some stage (e.g. as lambs on their mothers) the training will take longer. Unlike fire or flood, when sheep may have

to suddenly rely on hand feeding alone, the onset of a drought is usually gradual. This means that dry standing pasture is a valuable resource to use in conjunction with supplementary feeding. Assessing how much to feed and when to start can be tricky without good feed assessment skills, so monitoring stock for live weight and/or body condition is critical to ensure targets for production are being met.

At the end of drought, the weather can turn wet and cold quickly. Continuing to feed until pasture availability meets sheep needs will prevent undoing all the good work in managing sheep over the drought. Often the largest stock losses occur after the drought has broken.

Making the most out of pastures

During droughts, the nutritive value of standing dry feed can be quite reasonable and be retained for longer due to the dry conditions and decreased rates of decay. As a rule of thumb for mixed perennial pastures with a perennial component the digestibility of the pasture will be around 60 per cent when the pasture dries off and will decline by about 5 per cent per month until it reaches minimum of 35 per cent. For annual pastures, digestibility is about 70 per cent when the pasture dries off but then rapidly decreases in digestibility during the first two months to around 50 per cent. Dry sheep can usually maintain weight on pastures that are at or above 50 per cent digestibility.

A Drought Action Plan (Chapter 1 – Preparing for droughts) should include an audit of the feed available, the state of your pastures at the beginning of the drought and target levels for removing stock (or reducing stocking rates) to protect pasture and soil cover. Feed budgeting can be used to estimate when those pastures are likely to reach threshold levels of feed on offer (FOO, kg DM/ha) and percentage of ground cover for de-stocking and containment feeding.

If containment feeding is likely to be used and you have sufficient fibre reserves (e.g. hay) in storage it is worth using as much pasture as possible while the feed quality is reasonable, as long as productive pastures are not over-grazed and

ground cover thresholds are met. If fibre resources are limited and sheep will be supplemented on pastures, the pasture will be an important component of fibre supplied in the diet and will need to be rationed more carefully. Also consider that some classes of stock may not be managed as easily in containment (e.g. weaners/shy feeders/lambing ewes) so reserve suitable paddocks for these animals. Water supplies may also reduce access to some paddocks so use these while they still have good water.

Utilisation of pastures early in a drought will be very similar to normal grazing management. Other aspects to consider are:

- Use of rotational grazing and periods of spelling to optimise productivity of perennials and improve persistence.
- Using those pastures with high nutritive value earlier rather than later to capture benefits before digestibility decreases.
- Identify any paddocks that can withstand heavy grazing for use as sacrifice paddocks and potential paddocks for resowing after drought.
- Consider the potential for weed introduction in paddocks where introduced hay and/or grain are fed.

Management of pastures later in drought will need to consider:

- When to destock or reduce grazing due to critical ground cover.
- Restricting grazing to increase persistence of perennials.
- Animal health issues, such as nitrate poisoning or phalaris toxicity, that can occur when hungry sheep chase the green pick after summer or the first autumn rains.

Courses on assessing how much feed and their value or quality in the paddock are available and are invaluable in making feed budgeting estimations based on these assessments with the needs of the stock. The feed budgeting of sheep while on pasture can be achieved using the tools and tables available at www.lifetimewool.com.au/Tools/dryfeedbud.aspx

When to start feeding

Feeding should start well before sheep become lower than the targets for Condition Score (CS) and live weight you want to maintain them at (Chapter 2 – Setting targets for sheep). If they have not been fed grain before, it will take some time before they become accustomed to hand feeding and begin eating their ration. Even if they have been supplemented before, it will take a while to adapt to the supplement and full rations cannot be reached quickly. If sheep have lost too much condition before feeding has begun, or before they readily accept grain, it may be hard –

and expensive – to lift them back to the desired level. This is particularly applicable to lambs or weaners that were not fed supplements when grazing with their mothers. Weaners in this situation can take up to 3 weeks to become accustomed to the feeding of supplements.

Feeding should start before sheep meet target weights or condition to allow for some weight loss as sheep adapt to the supplement and you get the ration right. If you start feeding at that stage, the sheep can lose weight during the introductory period without drastically altering their chances of survival or the cost to bring them back up to the desired weight.

Table 4.1 provides some guidance on weights to start feeding sheep to maintain them at CS 2 and CS 3.

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 but also has implications for future production and the risk of mortality and poor animal welfare (Chapter 2 - Setting targets for sheep).

The period of controlled weight loss can coincide with the feeding of introductory rations. The flock can safely lose from 1 to 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.

Table 4.1: Suitable weights for starting to feed sheep to maintain at CS 2 or CS 3.

	CS 2		CS 3	
	Average live weight (kg)	Bottom ¼ of mob (kg)	Average live weight (kg)	Bottom ¼ of the mob (kg)
Small frame Merino	35	32	45	42
Medium frame Merino	40	37	50	47
Medium frame cross-bred	50	47	60–65	57
Large frame cross-bred	60	57	70–75	72

Introducing sheep to hand feeding

Sheep have to be brought onto grain gradually to allow the rumen to adapt to the change in source of energy (Chapter 3 – What to feed sheep). This is critical for cereal grains or supplements that have high starch and low fibre content. A sudden change in diet can cause acidosis. Chronic acidosis can lead to poor intake, weight loss and ill thrift. Acute acidosis leads to deaths (Chapter 7 – Sheep diseases associated with drought).

If sheep are not accustomed to grain feeding, it can also take a while to get them to recognise and eat grain. Sheep need to learn to graze, browse or eat supplements. They usually learn this as lambs and are strongly influenced by the grazing behaviour of the mother and other sheep in the flock. Sheep can be fearful of new or novel feeds, new ways of feeding and/or feeding in new situations where they need to interact closely with many other sheep (e.g. trail feeding, containment feeding and feedlots).

Training sheep to feed

Training sheep to feed on supplements is best done every year when they are still lambs following their mothers. It is a valuable management practice to do before weaning, even if supplementary feeding is not expected to be needed, as they will remember for some years into the future when feeding may be required. As little as 3–4 feeds of 100 g/ewe will allow the ewe to teach the lamb to seek and eat the supplement. Lambs may need to be mustered onto the trail a few times to ensure they are all recognising the feed. If practical, it is worth feeding a variety of supplements that are normally used in your feeding programs as sheep remember different types of supplementary feeds later in life. If this is not practical, training them to a supplement is still very valuable and if a different grain type or ration is used later, they will adapt to this more quickly than if they had not been trained.

When starting the hand-feeding program introduce the feed to the sheep while there is still reasonable paddock feed. If sheep have not been trained to grain before, include a few adult sheep that have been fed before in the mob to encourage the inexperienced sheep to feed. Untrained sheep are best educated in small paddocks. Placing a grain trail over a trail of good-quality hay can sometimes help show inexperienced sheep (particularly weaners) the location of the feed trail and introduce sheep to the feed. Once the sheep start recognising both the feeding process and the feed and all of them come to the trail by themselves and eat, the hay can be removed. Sheep will soon learn to recognise the vehicle that is used to feed them.

When introducing a new or unfamiliar feeds (e.g. changing over types of grain) offering a shandy of the old and new feeds can help sheep accept the new feed.

It is important that untrained sheep are started on a feeding program earlier so that they have extra time to learn and adapt. Good training of sheep can take time and observation. Some sheep may need to be encouraged onto the feeding trail and the paddock should be checked to ensure all sheep are brought on to the feeding trail. A sheep or groups of sheep with their heads down grazing may not notice the feed cart at the other end of the paddock. Using a sound (e.g. honking the horn) when starting feeding can help attract animals that are further away and ensure all animals are given equal chance to feed on the supplement. It will also save time later when feeding sheep in larger paddocks with a range in topography.

Putting effort upfront to train sheep will make it easier to ensure all animals are feeding well and that sheep gain equal access to the feeding trail. This will mean individual animals are less likely to gorge on the grain.

Adapting sheep to grain

Start the ration at a rate of up to 50 g/head/day for adult sheep (25 g for weaners) and increase slowly to the full ration over about 3–4 weeks (Table 4.2). Once the desired feeding rate is reached, the introduction program can stop. 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/week, you could start feeding 300 g every second day from day 7.

The table is only a guide to educating animals to take grain. Some farmers have commented that they can get sheep onto rations quicker, possibly due to the type of grain. Others have had to progress to the higher rates more slowly. If the ration is increased too quickly, you may notice sheep with signs of acidosis that are standing away from the feed with a belly ache and will generally have scours. As acidosis becomes more severe they may appear lame or walk with a disjointed gait. These need to be differentiated from shy feeders. There will always be a proportion of shy feeders that do not take to supplementing easily. They will tend to eat only when most of the mob have finished and left the trail. They will be harder to get onto grain because of this. Getting onto a level that allows feeding every second or third day will help (as there will be grain left after the main mob has eaten). Alternatively, draft these sheep off and feed separately. 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 and are feeding from the trail.

If a day is missed early in the feeding program, stay at the same level feeding for that day rather than stepping up to the next level. If there are multiple days missed at different stages of the program start again at the level sheep were last fed for at least 2 days. For example, if sheep were being fed 300 g/day and were due to increase to 600 g/day and the sheep were then not fed for 3 days do not re-introduce the feed at 600 g/day. Instead, step back to 300 g/daily for 2 days and then proceed to the higher feeding rate.

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. See Chapter 7 - Sheep diseases associated with drought for diagnosis and treatment.

The educational ration may be fed out in thin trails so that it can be eaten along with paddock feed on the ground. If no paddock feed is available, the ration will need to be boosted with hay (or similar) until the full ration is reached and then hay can be included at as little as 10 per cent of the ration.

Table 4.2: A program for bringing sheep on to grain.

Feeding days	Amount of grain per feed	grams/head	kg/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.

This feed introduction program applies to wheat, barley, maize, sorghum and pellets, or rations with a high starch and low fibre content. Oats have higher fibre content than the other grains and the rate of feeding can be increased a little more quickly. Lupins also have a higher fibre and much lower starch content and can be introduced more quickly. This can be particularly useful when introducing grain feeding to lambs and weaners or when there is an immediate demand for extra energy such as post-shearing in cold weather. While there is little risk of causing digestive upsets with lupins, it is still good practice to build the rate of feeding up over 14–21 days.

A guide to the amount of feed you will use in the first few weeks for a flock of 1,000 sheep is provided in Table 4.3.

Table 4.3: 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 4.2
** Will depend on type of sheep and feed

Feeding frequency

Frequency of feeding will be determined by class of sheep, type of feed, practicality and whether a full ration (as in containment) is being fed or part ration on pasture. Some circumstances such as cold weather or a change of feed type may require reverting from feeding 2 or 3 times per week to daily feeding.

Dry sheep and ewes up to the last 6 weeks of pregnancy can be fed 3 days apart or twice weekly. A number of trials have illustrated no benefits of feeding dry sheep more frequently and in some cases performance was lower for sheep fed daily. Much of the explanation for this was that daily fed sheep ate the ration quickly (in one trial they took 15–30 minutes on high-grain diets), so there was insufficient time for slow and shy feeders to get enough. With more fibre in the diet, they took longer (45–30 minutes). When sheep were fed weekly, they took 4 days to finish the ration, so that there was plenty of time for the shy feeders to get a feed. There was also a wide variation in intake with daily feeding and a tail developed. As slow feeders died, the difference between daily and weekly feeding was less. The majority of sheep that died had lost 40 per cent or more weight over the feeding period. Table 4.4 shows results of one of these early drought feeding trials that looked at frequency of feeding (weekly or daily) on grain and fibre mixed rations. The daily fed sheep had more sheep gaining weight (the greedy ones that consumed most of the ration quickly) but the death rate was high, due to shy and slow feeders being unable to get enough feed. With weekly feeding, there were fewer sheep gaining weight (and the gutses may have had some mild acidosis), but death rates were reduced and wool production was higher.

Table 4.4: Impacts of feeding drought rations daily or weekly on sheep performance (proportion gaining weight and wool production) and mortality rate. Source – Franklin, 1952

	Daily	Weekly
% sheep gaining weight	41.9%	14.2%
Death rate	30.2%	11.8%
Mean wool production	3.05–3.15 kg/sheep	3.26–3.43 kg/sheep
% sheep heavier at the end than beginning	41.9%	14.2%

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.

Managing and monitoring

Monitoring sheep is critical to ensure that the ration is sufficient; that tail end sheep or poor doers are identified, removed and fed separately; and that disease is identified early. While sheep that are not doing well may be identified by eye, the only way to ensure that sheep are maintaining condition is to weigh or condition score them regularly. By the time weight loss is observed, the loss could be too high, requiring more intervention and costly feed to prevent deaths. Wool length and pregnancy can hide condition to even experienced eyes. By having sheep identified individually with Electronic Identification or visual tags, may allow those sheep that are continually poor adapters to be identified and culled later if appropriate. Chapter 2 – Setting targets for sheep, outlines the numbers of sheep to monitor.

Identify and manage shy feeders separately

A variable proportion of sheep and lambs will not adapt to drought feeding. Shy feeders are generally later to join the feeding trail and will leave the trail earlier to graze. They show less interest in the food. During an introduction and adaptation period, the shy feeder is often the one you are moving around to coax up to the trail. Some may adapt but if they are repeatedly the same sheep they could be a problem in the longer term. Shy feeders may also spend more time with their head up rather than eating, even if they are on the trail next to other sheep that have their heads down.

Shy feeders can be identified by watching the behaviour of the flock and individuals and doing a flank check if sheep aren't in full wool. After a number of days with low intake, shy feeders will look hollow in the flank (compared to other sheep) even though they may still seem quite healthy. Over time these sheep will become more lethargic and show signs of ill thrift.

Shy feeders can also be identified by monitoring individual live weight gain or loss and condition score over 2–3 weeks. Sheep that continue to lose weight and condition score below target levels should be separated from the main flock groups and fed and managed separately. It may be difficult to differentiate the shy feeders from those with acidosis, so when feeding these sheep separately assume they have not adapted to grain. Good-quality hay or silage and safe feeds such as lupins and oats should be provided to these animals.

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.

To minimise the incidence of shy feeders, ensure that all sheep have easy access to the supplement. If trail feeding, make sure the trail is long enough for all sheep to feed. If containment feeding or feeding in troughs, you may need to allow more trough space for shy feeders.

Use a separate hospital paddock or pen for animals that are unhealthy or are not responding well to feeding. Check animals for underlying animal health problems such as foot abscesses, infections, pneumonia, poor teeth or any other external symptoms that can cause reduced intake and weight loss. When specific health issues (Chapter 7 - Sheep diseases associated with drought) are identified, seek veterinary advice and/or euthanase animals that do not respond to management or treatments.

Breaking routine or changing feed

If a break in the normal 2–3 day feeding routine occurs, 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.

Avoid sudden changes in the ration. Sheep that have become accustomed to one type of grain cannot immediately adjust to another. Even a change in source or batch load of the same grain has caused acidosis issues. New batches of pellets have also caused digestive upsets, as sometimes the main ingredients or energy source will change, depending on availability and cost.

Deaths and a high incidence of tender wool can result from a sudden switch of feed.

It is necessary to estimate early in the program how long supplies will last by feed budgeting. This will allow time for planning of a gradual changeover from one feed to another.

When getting a new source or batch, the ideal is to shandy this with the old batch, gradually increasing the concentration over at least four feeds before a total change over. If this is not possible, and it is necessary to use a different grain, it may be necessary to go back to an introductory phase again and include more hay until the full ration is again achieved. 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.

How much to feed

The total weekly energy requirements for different classes of sheep, maintained at CS 2, are given in Table 4.5 along with minimum crude protein as a percentage of the dry matter of the diet fed. Full rations are provided for small-framed sheep of 40 kg and large-framed sheep at 60 kg. All sheep are assumed to be rearing single lambs. Tables 4.6 and 4.7 give the weekly energy requirements for a range of sheep sizes and stage of pregnancy at CS 2 (Table 4.6) and CS 3 (Table 4.7).

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/head/week) for each 5 kg of extra live weight.

For example, a wheat ration of 3.5 kg/head/week should keep a medium-framed sheep in store condition at about 40 kg live weight. 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 10 per cent more ration 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 4.5: Total drought rations for sheep maintained at CS 2.

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 • 45 kg liveweight small framed • large framed, or crossbred ewe at 60 kg liveweight	46	6	Wheat	3.8		
			or Oats	4.6		
			or Hay (good)	5.4		
			or Hay (poor)	1.6		
	57	6	Wheat	4.75		
			or Oats	5.7		
			or Hay (good)	7		
			or Hay (poor)	10		
2. Pregnant ewes, last 4-6 weeks before lambing • small framed • large framed, or crossbred ewe at 60 kg liveweight	70	8	Wheat	5.2	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	7		
			plus Hay (good to av.)	1		
			or Hay (good) alone	8		
	87	8	Wheat	6.2		
			or Oats	7		
			plus Hay (good to av.)	1.5		
			or Hay (good) alone	10		
3. Ewes with lamb at foot* • small framed • large framed	103	10	Wheat	7.5	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. Wheat alone is satisfactory feed for lactating ewes, if roughage as paddock feed or straw is available.	
			or Oats	9		
			plus Hay (good)	1.5		
			or Hay (average)	2		
	123	10	or Hay (good) alone	10		
			Wheat	9		
			or Oats	11		
			plus Hay (good)	2		
4. Lambs • Early-weaned lambs up to 15 kg live weight gaining 1 to 2 kg per hd/wk • Weaned lambs greater than 15 kg liveweight	35	12	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.	
			Wheat	2		
			or Oats	2.3		
	35	10	plus Hay (good) plus grazing (about 1/3 ration)	3		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). If hay is very scarce, reduce to 0.3 kg and increase grain by 0.8 kg (per week).
			or Hay (good) alone	4.5		
			or 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.

If you know the energy value of the feed you have, you can calculate your own ration requirements using Tables 4.6 and 4.7. These tables give estimates for the weekly energy requirements of a range of sheep sizes maintained at CS 2 (Table 4.6) or CS 3 (Table 4.7).

Table 4.6: Total weekly energy requirements for sheep maintained at CS 2 with single lambs.

Sheep weight (kg) (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	70	103	-
50	50	76	108	-
60	57	87	125	-

* 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.

Table 4.7: Total weekly energy requirements for sheep maintained at CS 3 with single lambs (or twin lambs).

Sheep weight (without foetus) kg	Total weekly energy requirements in megajoules (MJ ME)		
	Class of sheep		
	Dry mature	Pregnant – single (twins)	Ewe and lamb – single (twins)
Small frame 45 kg	52	79 (100)	120 (152)
Medium frame 50 kg	56	86 (108)	130 (164)
Large frame 60 kg	65	101 (124)	150 (188)
Large frame 70 kg	70	114 (140)	168 (210)

If sheep are fed in containment, they will generally require 10–16 per cent less energy in walking around paddocks looking for feed.

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, maintained at CS 2 requires 46 MJ ME/ week

Feeding wheat of 12 MJ ME/kg

Full ration = 3.8 kg wheat per week

Example 2: 50 kg ewe with twin lambs at foot, at CS 3, requires 164 MJ ME/ week (1 week old)

Feeding maize at 13 MJ ME/kg

Full ration = 12.6 kg maize/week (protein may be limiting)

Adjustments to rations

In cold conditions, the sheep's energy requirements 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 at least double the rations.

Hay and lupins are 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, 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/head if grain is trailed to make up for wastage caused by trampling.

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 (see Table 4.8, assumes the drought will break in mid-April).

1,000 weaned lambs (25 kg) fed in the paddock at a **half ration**. Supplementation starts in December but does not reach the required ration until January.

A full ration of pellets at 12 MJ ME/kg is 3.3 kg/head/week. Pellet price = \$350/tonne.

Table 4.8: Example of a feed budget assuming the drought will break mid-April.

	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

In the Table 4.8 example, you would require 34.8 tonnes of pellets for this mob at a total cost of \$12,180 or \$12.18 a head.

A simple budget like this will provide you with timings for when you need to order or organise delivery of more grain, depending on your storage capacity.

Example 2 (see Table 4.9, assumes 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 MJ ME/kg is 3.5 kg/head/week. Wheat price = \$310/tonne.

Table 4.9: Example of a feed budget assuming the drought will break in June.

	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 the Table 4.9 example, you will require 104 tonnes of wheat at a total cost of \$32,240 or \$32.24/head. Some hay or roughage would need to be supplied when in containment and this cost would need to be added in.

Further tips for feeding

Ground feeding versus troughs

Laying a trail on the ground is the simplest and most practical method of feeding grain in the paddock, despite there being some wastage. A long thin trail has the advantage of allowing all animals in the mob easy access to the feed. Feed space for all animals can often be limited when using troughs, making it harder for shy feeders. The apparent wastage may not be as great as it appears and the scatter of grain may only represent a small proportion of the total feed. Wet and boggy conditions can be a problem (particularly for pellets) for ground feeding and rations will need to be increased if feeding in these conditions.

To reduce the risk of weed contamination from purchased grains, feed out on the same area so that any weeds that do germinate can be easily controlled.

Feeding in troughs is recommended for feeding in containment areas to reduce wastage and animal health issues. Bacterial diseases spread through faecal contaminations, such as Salmonella, Coccidiosis, Listeria etc, can become a higher risk when animals are fed continually on the same space. The risk will only be reduced by trough feeding if the troughs are regularly cleaned out. Troughs can be made from simple materials that may be on hand or bought cheaply (e.g. corrugated iron, rubber belting or purloins).

Feed out trailers

There are a variety of feed trailers available. Some have built-in weighing systems, electrical actuator opening feed-out chutes and augers for filling self-feeders. If buying a trailer, consider the amount and type of use. For example, an unsprung trailer may not be suitable on rough or stony country. Consider the number of animals being fed and the capacity to feed a number of mobs in a load, to avoid frequent trips back to the silo.

Some spinner super spreaders can be converted to a feed trailer by removing the spinner. Don't leave the spinner on when feeding grain.

Considerable time can be spent waiting to fill the feeder, so also consider the auger size; a larger auger may save significant time over the number of loads and months you may be filling up and feeding out.

Calibrating a feed trailer

It is important to know how much is being fed out. This requires calibrating the trailer for each batch or load. The bulk densities of grains vary, so that for the same volume of grain, some will weigh considerably more than others. Even different loads of wheat or barley say, can vary enough to make checking worthwhile. The simplest way to calibrate is to weigh and time some feed coming out of the trailer. Place a container (e.g. a wool pack or tarp) under the feed out chute and open the chute for 60 seconds. Weigh the grain that has run out, divide this by 60 to give the flow per second. Sixty kilograms in 60 seconds would give a flow rate of 1 kg/second. Use this to provide the time for feeding out in each mob, so if one mob requires

200 kg of grain, run the trailer for 200 seconds (3 minutes and 20 seconds). A cheap digital timer in the ute is a simple addition to get the rates reasonably accurate.

Adding limestone

If supplying calcium separately as limestone, do not add it to the silo as it is very corrosive. Add it to the feed trailer as it is being filled. For example, if the trailer holds 1 tonne of grain, then 20 kg of limestone in a bucket (a rate of 2 per cent) can be slowly added with the grain. Further mixing will occur with travelling. Alternatively, calcium (and salt) can be provided separately as a lick, as a pile on the ground or in troughs.

Self or lick feeders

There are many models of self-feeders. A 'lick' feeder means that each animal has to lick the grain in order to get it, which restricts the intake. Feeders can be wound down to reduce intake, and lick feeders may require regular cleaning as the saliva on the grain dust can clog up the gap. Full flow feeders mean that animals are on full ad lib feeding and they are used for production feeding.

Lick feeders may give more control over the feed consumed. When using lick or self-feeders ensure that sheep are well adjusted to a high-grain ration (at least 75 per cent of full ration); provide sufficient feeders to allow all animals reasonable access; and check for cleaning when filling.

Deciding when to stop feeding

Stop feeding when sheep are able to maintain their target level of production based on the pasture available. 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 and there are problems 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, keep sheep confined to restricted feeding areas until adequate pasture is available. At that point, allow increasing grazing time at about an hour per day until full grazing is provided after 6–7 days. Allowing immediate full grazing will lead to digestive upsets and could cause animal issues such as pulpy kidney. Feed sheep so that they have a full stomach before releasing them. See diseases in the section 'After the Drought' in Chapter 7 – Sheep diseases associated with drought, for more information.

Be aware that it may be difficult to get sheep back into containment once they have been let onto pastures.

Further information

Tools and resources

- Feed Budgets on dry feed: www.lifetimewool.com.au/Tools/dryfeedbud.aspx
- Sheep Farming for Meat and Wool. Edited by J. Court, J. Webb Ware and S. Hides. CSIRO.
- Feedlotting lambs at: www.agriculture.vic.gov.au/agriculture/livestock/sheep/feeding-and-nutrition/feedlotting-lambs

Scientific references

Franklin, M. and P. Sutton (1952). 'Maintenance rations for Merino sheep. 1. A comparative study of daily and weekly feeding on rations containing high proportions of wheat and several proportions of roughage to concentrate.' *Australian Journal of Agricultural Research* 3(2): 168–186.

Briggs, P., M. Franklin, et al. (1957). 'Maintenance rations for Merino sheep. IV. The performance of adult Merino ewes fed daily and weekly at three levels of energy intake.' *Australian Journal of Agricultural Research* 8(1): 75–82.

Foot, J.Z. (1987). *Sheep Nutrition in the Victorian Environment*. J. Z. Foot, Egan, J.K. and Love, K.L., Department of Agriculture and Rural Affairs: 86.

Franklin, M., G. McClymont, et al. (1955). 'Maintenance of rations for Merino sheep. II. The performance of weaners fed daily and weekly on rations of wheat and wheaten chaff at maintenance levels and the effect thereon of vitamin A supplements.' *Australian Journal of Agricultural Research* 6(2): 324–342.

Hodge, R.W., B. Bogdanovic, et al. (1981). 'Wool production of merino sheep fed daily or twice weekly on oats or lupins.' *Australian Journal of Experimental Agriculture* 21(110): 277–279.

Langlands, J., J. George, et al. (1967). 'Observations on the calcium intake and serum calcium status of grazing ewes during drought.' *Australian Journal of Experimental Agriculture* 7(27): 325–328.

Rice, M., E.C. Jongman, et al. (2016). 'Characterisation of Shy-feeding and Feeding lambs in the first week in a feedlot.' *Applied Animal Behaviour Science* 179: 39–45.

Watson, M.J., R.A. Leng, et al. (1975). 'Metabolic studies on daily and weekly feeding of ruminants given all-wheat diets. I. Digestibility and nitrogen balance in sheep.' *Australian Journal of Agricultural Research* 26(2): 329–336.