Australian Wool Innovation Limited

WHICH SHEEP DO I KEEP?
A GUIDE FOR SHEEP PRODUCERS IN DROUGHT

CONTENTS

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INTRODUCTION

When confronted with a pasture shortage, sheep producers must determine whether to sell or supplementary feed all, some or none of the flock. Unfortunately there is no recipe which provides foolproof answers for such a situation. It is not as simple as sell the wethers and old ewes and keep the core breeding stock. History tells us that each drought or feeding period will bring its own unique circumstances. Sheep and wool prices, feed grain prices, and the resources available to handle the drought will vary between years and between farms within years. Therefore, the manager must have a disciplined approach to working out the best strategy at the time. To work it out they must be able to estimate the following

- The current value of the livestock.
- The probable cost of feeding.
- The value of any production that would be gained should sheep be kept.

The answers to these questions are not straight forward or certain as they involve unknown future events. However, uncertainty is not an excuse for not planning and therefore this document aims to provide a robust framework from which an educated opinion can be formed and plans implemented.

There are three parts to this process. The first is some preparatory work that needs to be done so that you are organised enough to make the decision. The second is calculating the variables mentioned previously for each separate class of sheep in the flock. The last step is to put all of the information together to make the best possible decisions.

Predicting the future value of sheep is a particularly difficult part of the whole exercise.

SECTION 1: PREPARATORY WORK

Letting organised to make the decision involves separating your flock into different stock classes, making an assessment as to their current condition, and finding and analysing historical rainfall information.

The sheep that are scheduled for sale within a twelve month period are identified first. These are sheep that will not need replacing once the drought breaks. Having identified these sheep the decision is whether or not to bring forward the sale. In other words, will the cost of feeding them for a period of time outweigh the additional value that will be added to them? There is a worked example for this in Section 4.

The remaining classes of sheep are those that if sold would need to be replaced when pastures allow. It is important to separate these by age and sex because they may have different nutritional requirements throughout the feeding period.

Whilst going through this process make a note of the condition score of the sheep. This will help you make decisions, firstly on the current value of the livestock and secondly on the time period you have until feeding will be required to either slow weight loss or maintain their condition score.

TIME FED

Uncertainty about the length of time and quantity of feed required during a feed shortage is the largest hurdle in deciding the best strategy.

Historical rainfall information can help you make these decisions because it will allow you to assess the chance of significant rainfall. There are no accurate long range (greater than three days) predictive tools for rainfall, therefore probabilities based on past rainfall provide the best information.

The objective is to find out in what proportion of previous years on record there has been enough rain received in any specified month and the surrounding months to provide sufficient pasture growth for feeding to stop. Consider how hot the weather is and therefore how effective the rainfall will be. For example, this may require 50mm in March followed by another 25mm in April. Table 1 shows the probability of this happening at Wagga Wagga is 34 per cent.

On the other hand, in July when the temperatures are lower, a much smaller amount of rainfall will be needed for pasture growth.

If we look at the Wagga Wagga example in Table 1 we can safely say that in the event of a failed spring there is not much chance of having received enough rain for significant pasture growth until at least the following May. Even then, there is some chance that it will go on even longer as the probability of sufficient rainfall is still only 80 per cent. If we assume feeding starts in December, it is likely that the sheep will need to be fed for seven months.

If on the other hand a feed shortage occurs in April the historical rainfall records would suggest that there is a reasonable chance of having adequate pasture growth within two to three months.

If you have more than 50 years of historical records on farm then you can use them, otherwise historical rainfall data is available from the Bureau of Meteorology through Climate Data Online. Here you can choose the weather station closest to you and analyse the historical monthly rainfall figures.

TABLE 1: The chance of receiving adequate rainfall for pasture growth in Wagga Wagga at any given time of the year based on historical data.

MONTH	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PER CENT OF YEARS	16	21	34	47	79	85	83	81	69	56	26	12

SECTION 2: DOING THE SUMS

This section concentrates on how to do the sums to work out whether selling or feeding is likely to leave you in the best financial position at the end of the drought. As was mentioned earlier, the key things that need to be quantified are the current value of the livestock, the cost of feeding, the income earning potential over the feeding period and the likely replacement value.

COST OF FEEDING

The purpose of this exercise is to look for opportunities to sell sheep rather than to feed them. To calculate this you must value the feeding. A useful rule of thumb to work out what it will cost to feed is 'each DSE will require 3.5kg of grain per week, assuming a minimum of 90 per cent dry matter for the grain' over the feeding period.

In this section some of the details such as the need for and cost of roughage in the diet and the cost of infrastructure and equipment have not been addressed. It is not because they are not worth consideration but rather because they should only contribute a small part of the total costs and with all of the other uncertainties surrounding what is to come, the additional accuracy adds little value. The initial aim is to formulate the likely cost to feed the sheep rather than work it out to the last dollar.

Cereal grain is usually the cheapest supplementary feed on an energy basis that can be purchased and therefore it is a good guide to the likely cost of feeding. Obtain a cost for the grain delivered to your farm. It is important to value the grain at its current market price not what it costs to grow it or buy it at an earlier date. This allows you to compare the choice of selling the grain and sheep against feeding the grain to the sheep.

INCOME EARNING POTENTIAL

Because the value of wool grown is likely to be significant when compared to the feeding costs it must be quantified. To do this calculate the expected fleece value for a whole year and deduct the value of the fleece that will be grown outside the feeding period. For instance if the sheep would usually cut 5.5kg of greasy wool per year with a 70 per cent yield then you would expect 3.8kg of clean wool per annum. If the main fleece line is worth $10.00 per kilogram clean and an allowance of 30 per cent is made for non fleece lines then the total fleece value under normal circumstances is expected to be 3.8 x 10 x (1 – 0.3) = $26.60.

If the feeding period is five months, and there were no discounts applicable to the wool, then the value of fleece grown is $26.60 ÷ 12 x 5 = $11.10. However, this must be adjusted further for possible discounts due to staple length, strength and dust.

TABLE 2: DSE ratings for Merino sheep.

Weaned lambs	**25kg**
gaining100g/day	1.3
gaining100g/day	1.9
Mature Sheep	**50kg**
Dry ewes, wethers	**1.1**
gaining 50g/day	1.4
Pregnant ewe (singles)	**1.3**
Pregnant ewe (twins)	**1.5**
Ewes with lambs at foot	**3.1**

Do not assume that what was the correct decision last time will still the case this time.

EXAMPLE 1
COST OF FEEDING MERINO EWES

In this example there is a feed shortage starting in April for Merino ewes joined to lamb in July. The DSE rating of these ewes will change each month as they enter late pregnancy and then lactation. In the month of May, the ewes are considered to be dry for two weeks of the month, and in the last six weeks of pregnancy for two weeks of the month, therefore, they are given an average of those two DSE ratings.

It is assumed that feed will be limited until August however, there will be some pasture growth and therefore it can be expected to supply some of the nutritional requirements of the ewes.

A useful tool for making these decisions is Grazfeed®. This computer program is a decision support tool that helps calculate sheep and cattle feed requirements. In Grazfeed® you can create a pasture scenario and ascertain what amount of feeding is required to maintain condition. For instance, you might estimate that over the period of early winter there will be 400kg of dry matter per hectare of green pasture.

To maintain ewe liveweight in the last six weeks of pregnancy Grazfeed® recommends feeding 2.1kg of grain per week. At a DSE rating of 1.3 per head the full ration was 4.6kg (1.3 x 3.5 = 4.6), therefore the pasture will supply close to half of the total requirements.

The amount of feed required per ewe is calculated by multiplying the DSE rating she has for the month by the number of kilograms to feed each DSE per week (3.5kg), by the number of weeks in each month and the proportion of total feed requirements that will be fed via supplementation. For simplicity we have used an average number of weeks per month calculated as 52÷12=4.3.
The total supplement required for May is 9.1kg per head. The total feed required per head over the five months of feeding is 73.6kg. If the grain required is valued at $180 per tonne then it will cost $13.25 to feed each ewe.

TABLE 3: The cost of feeding Merino ewes.

		Dry	Last 6 weeks pregnant			Lacting		
DSE rating		1.1	1.3			2.5		
			Apr	**May**	**Jun**	**Jul**	**Aug**	**Total**
Average DSE rating	(a)		1.1	1.2	1.3	2.5	2.5	
Per cent of feeding requirements (100% = full ration)	(b)		100%	50%	50%	75%	25%	
Weeks	(c)		52÷12	52÷12	52÷12	52÷12	52÷12	
Ration (kg/DSE/week)	(d)		3.5	3.5	3.5	3.5	3.5	
Montly ration requirement (tonnes)	axbxcxd=(e)		16.7	9.1	9.9	28.4	9.5	73.6
Ration cost ($/t)	(f)		$180	$180	$180	$180	$180	
Ration cost ($/hd/month)	(e x f÷1,000)		$3.00	$1.64	$1.77	$5.12	$1.71	$13.25

EXAMPLE 2
COST OF FEEDING MERINO WETHERS

Some situations will involve a much longer feeding period and therefore greater uncertainty about the length of the feeding time and how much feeding will be required. This example shows how to calculate the expected feeding cost based on the probability that the drought would break in any given month.

Table 4 shows a drought feed budget put together for a mob of wethers starting in November. The probability of a break is not considered good until the end of May, however given the sheep are in good condition and there is some residual dry matter left in paddocks it is estimated that only 50 per cent of the full ration will be needed in November.

With grain estimated to cost $350 per tonne and 3.5kg of grain needed per DSE per week it is calculated that the cost of feeding would be $5.80/head/month. To assess the probable feed cost over the total expected feeding period an allowance is made for the chance that the drought would end as defined by the probability of a break in each month.

The cumulative probable feed cost is calculated by multiplying the ration cost per head for each month by the chance that there would not be a break (i.e., 1 – the chance that there was a break) and then adding it to the previous month's total.

For March this was calculated as $16.82 + (16.7 x (350 ÷ 1,000) x (1 – 0.34)) = $20.67

Over the total feeding period in this example each wether was expected to consume $24.99 of grain.

TABLE 4: Drought feed budget for a mob of Merino wethers.

		Nov	Dec	Jan	Feb	Mar	Apr	May
DSE rating	(a)	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Ration (kg/DSE/week)	(b)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Per cent of feeding requirements (100%=full ration)	(c)	50%	100%	100%	100%	100%	100%	100%
Weeks in month	(d)	4.3	4.3	4.3	4.3	4.3	4.3	4.3
Montly ration requirement (kg/hd)	axbxcxd=(e)	8.3	16.7	16.7	16.7	16.7	16.7	16.7
Ration cost ($/t)	(f)	$350	$350	$350	$350	$350	$350	$350
Probability of drought breaking (from Table 1)	(g)	26%	12%	16%	21%	34%	47%	79%
Probable feed cost ($/hd) previous month=(ex(f÷1,000) x (1-g))		$2.19	$7.30	$12.20	$16.82	$20.67	$23.77	$24.99
Example for March: $16.82 + (16.7 x ($350 ÷ 1,000) x (1 – 0.34)) = $20.67								

TABLE 5: Earning income potential.

Undiscounted value of wool grown in feeding period		**Ewes**	**Wethers**
Fleece value	(a)	$26.60	$31.85
Months feeding	(b)	5	5
Value of wool grown in feeding period	(a÷12) x b=(c)	$11.10	$13.30
Allowing for discounts			
Step 1: Value of staple strength and dust discount			
Fleece value	(a)	$26.60	$31.85
Style discount for dust	(d)	20%	20%
Discounted fleece value	a x (1 - d) = (e)	$21.30	$25.50
Months feeding	(b)	5	5
Value of wool grown in feeding period	(e ÷ 12) x b = (f)	$8.90	$10.60
Step 2: Value of staple length discount			
Months wool growth prior to feeding	(g)	6	6
Discount	(h)	15%	15%
Value of staple length discount	(e ÷ 12) x g x h = (i)	$1.60	$1.90
Corrected fleece value for style discount and length	f + i	$10.50	$12.50

STEP 1: Adjusting for possible staple strength and yield discounts

Where staple strength or dust discounts are likely due to wool being grown through the drought an allowance should be made. Step 1 in Table 5 shows how to adjust the value of the fleece for expected discounts as a result of feeding through a drought.

In this instance we have discounted the wool by 20 per cent. The assumptions used are purely for demonstration and you should check what would be an appropriate value for your wool with an advisor. The result is that the value of the total fleece falls to $21.30 which means that the value of the wool grown in the drought falls to $8.90. This is significantly below the original value of $11.10.

STEP 2: Adjusting for possible staple length discounts

If the wool already grown on the sheep prior to the feeding period would have incurred a discount if it had been shorn and then sold, then keeping and feeding the sheep will add additional value to that wool because it would prevent it being discounted. So not only would you get the value of the wool grown when feeding but you would also get the value of the discount that would otherwise be incurred.

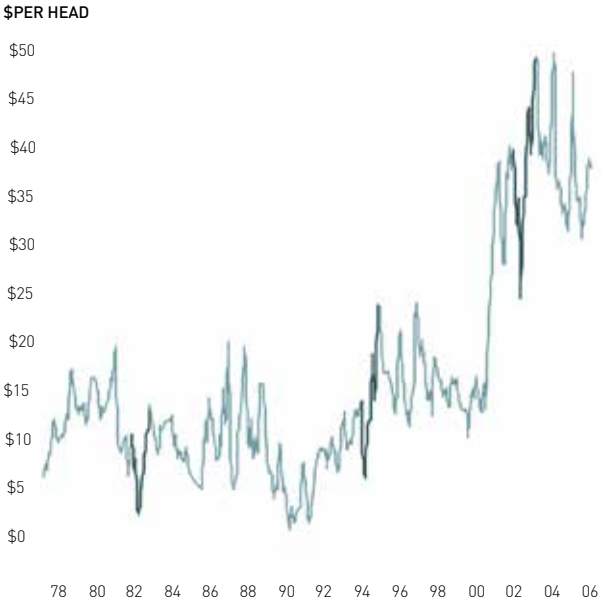
Step 2 in Table 5 shows how to calculate the value of this to the feeding decision assuming six months of wool growth already and a 15% discount for short staple length. An additional $1.60 worth of wool income is added to the value of wool grown in the drought which brings the total to $10.50.

Predicting the future value of sheep is particularly difficult.

FUTURE VALUE

Predicting the future value of sheep is a particularly difficult part of the whole exercise because it involves use of your crystal ball. Don't be perturbed by this, because as with weather prediction, your informed decision is likely to be as good as the next person's. Also, as you will see in Section 3, it is useful to work backwards based on the assessment of what the net financial benefit of feeding will be at various opening and closing values.

In past droughts, after allowing for some short term spikes in prices immediately post drought, the price trends have returned to their pre-drought patterns. Graph 1 shows historical mutton prices from January 1978 to June 2006. The dark blue sections highlight times of widespread drought across the industry.



Source: Independent Commodity Services

GRAPH 1: Historical mutton prices (178-2006).

The presence of a drought may increase the rate at which the national flock declines.

In all cases, there was a fall in price through the drought and then a spike in prices immediately post drought. The spike is of the magnitude of $5-$10 per head. This is worth keeping in mind when you are forecasting the value of your stock.

During these periods of widespread drought, the longer term prices tended to maintain their pattern from the pre-drought period to the post-drought period. If prices are on the rise as they were prior to the 2002/03 drought because of low sheep numbers, then the presence of a drought may increase the rate at which the national flock declines and therefore accelerate the price increases. This sort of information is readily available and can be very useful in making an informed decision.

SECTION 3: THE DECISION PROCESS

Having worked out the current value, the cost of feeding and the income generated over the feeding period for each class of sheep, you now have a basis for making your decision on whether or not to feed.

To do this you need to follow the steps shown in Table 6. The case study values are those that were calculated for the joined ewes in Example 1 and allow for a discounted fleece value due to dust. The replacement value has been nominated at $65. The result of feeding the sheep is a $7.25 benefit over selling and then restocking later.

As was mentioned in Section 2, the most difficult part of the exercise can be determining the expected replacement value at the end of the drought. It is useful therefore to create a table that shows the return from feeding over a number of different opening and closing value scenarios (Table 7). In the left hand column there is a range of current values for the ewes, and in the top row a range of possible closing values for the ewes. If we take a current value of $55 as an example then as the restocking price increases from $45 to $85, the benefit from feeding increases from a loss of $12.74 to a gain of $27.26 (Table 7).

Where the restocking price is the same as the current value of the sheep the figure presented in the table is the net income over the period after feeding costs. In this case where the current value is $55, if the restocking price was $55, the net income earned would be -$2.74 (Table 7). In other words it would be better to sell the ewes rather than feed them through the drought.

CAN YOU AFFORD TO FEED?

Having gone through the steps to this point you must check your cashflow to work out whether you can afford to feed. If it is going to cost $13.25 per head to feed (Table 3), will you have sufficient reserves to carry this strategy through until the end of the drought? At this point, it is useful to work out the supplementary feed that you have on hand, as well as your cash reserves. It is wise also to run the scenario showing a worse case than what your expected outcome is. How comfortably will you be able to feed these sheep until the drought ends?

There is a good chance that you may not have the resources to feed all livestock through the drought. Even if you do, it is equally important for you to consider the physical and emotional strain that feeding will place on the manager and family. Consider the infrastructure that you have in place. Consider your experience in coping with this sort of situation. If all these things are considered unfavourable, then it is not just the cashflow that is limiting. Taking a partial loss by selling some sheep may be a safer and more sensible strategy than aiming for the best outcome financially.

WHICH SHEEP TO SELL

Assuming cashflow is limiting you still have to decide which sheep stay and which sheep go.

To get a meaningful comparison between stock classes it should be made on a per DSE basis using the closing DSE value per head for each stock class. Tables 8 and 9 show the net outcome from Example 1 compared to some wethers that are being run on the same property.

TABLE 6: Steps for the calculation of returns from feeding.

		Case Study Value	Your Value
Income	(a)	$10.50	
Feeding cost	(b)	$13.25	
Net income	a - b= (c)	-$2.75	
Current sheep value	(d)	$55	
Replacement value	(e)	$65	
Net trading position	d – e = (f)	-$10	
Net return	(c – f)	$7.25	
The net return from feeding sheep through the drought is the net income generated minus the net trading position			

Table 7: Net benefit of feeding versus selling ewes at different current values and restocking prices.

		Restocking price ($/hd)				
		$45	**$55**	**$65**	**$75**	**$85**
Current value ($/hd)	**$35**	$7	$17	$27	$37	$47
	$45	-$3	$7	$17	$27	$37
	$55	-$13	**-$3**	$7	$17	$27
	$65	-$23	-$13	-$3	$7	$17
	$75	-$33	-$23	-$13	-$3	$7
	$85	-$43	-$33	-$23	-$13	-$3

Table 8: Net benefit from retaining ewes ($/DSE).

		Restocking price ($/hd)				
		$45	**$55**	**$65**	**$75**	**$85**
	$35	$3	$7	$11	$15	$19
	$45	-$1	$3	$7	$11	$15
	$55	-$5	**-$1**	$3	$7	$11
	$65	-$9	-$5	-$1	$3	$7
	$75	-$13	-$9	-$5	-$1	$3
	$85	-$17	-$13	-$9	-$5	-$1

Table 9: Net benefit from retaining wethers ($/DSE).

		Restocking price ($/hd)				
		$45	**$55**	**$65**	**$75**	**$85**
	$35	$12	$21	$30	$40	$49
	$45	$3	$12	$21	$30	$40
	$55	-$6	**$3**	$12	$21	$30
	$65	-$15	-$6	$3	$12	$21
	$75	-$24	-$15	-$6	$3	$12
	$85	-$33	-$24	-$15	-$5	$3

For the ewes, all assumptions are the same as per the example shown in Table 7, and the change in net benefit from feeding is solely as a result of having divided by the closing DSE rating of 2.5.

The wethers were assumed to cut 6.5kg of greasy wool in a normal season compared to the ewes' 5.5kg. After that the wethers have been treated under exactly the same assumptions as the ewes. The calculations for the wool income grown in the feeding period are shown in Table 5. The total wool income generated in the feeding period is $12.50.

At a DSE rating of 1.1/head they will consume 3.9kg of grain per head per week of full feeding. With grain prices at $180 per tonne that amounts to $0.70 per week ($180÷1,000 x 3.9). Assuming the wethers are fed for the same period as the ewes and get the same proportion of their total requirements supplemented, then they incur a total feed cost of $9.00. The net cost of feeding per head is therefore $12.50 - $9.00 = $3.50.

The two results are compared on a per DSE basis in Tables 8 and 9. Assuming no rise in post drought value for these stock then on a per DSE basis the net benefit of feeding the wethers of $3 (Table 9) is greater than the net benefit of feeding the ewes which is -$1 (Table 8).

However, if the ewes are expected to rise in value by $10 (because they now have lambs at foot) whilst the wethers remain at the same value as they are now then it would be better to keep the ewes.

It is also important to consider some other important ramifications of a decision to sell the ewes. First and foremost ask yourself whether this decision will leave you with enough ewes to maintain flock numbers in future years.

Give some consideration to your genetics. There are large differences in the genetic merit between bloodlines so make sure you are valuing your genetics objectively. If you have above average genetics for which the equivalent cannot be readily sourced then don't give them away at mutton prices without serious consideration for the ongoing loss of income from their replacements. At the same time do not kid yourself about the quality of your genetics. The quality of the flock is not directly proportional to the time over which they have been bred. If your genetics are suboptimal, than this might be a good opportunity to upgrade your flock.

There is also going to be a risk of disease entering the flock when and if you restock. If you feel that you cannot manage this risk then weigh that against the benefit of selling the sheep.

It is important to re-emphasise that you need to do these calculations yourself for each different class of sheep on the property at the beginning of every feed shortage that you enter. Circumstances and assumptions change so be ready. Do not assume that what was the correct decision last time will still be the case this time.

SECTION 4: PRODUCTION FEEDING

Production feeding looks at the decision of whether to bring forward the normal sale of sheep or whether to feed them in order to gain additional weight. Feeding for weight gain requires a different rule of thumb to the one used for maintenance. The rule of thumb to use is 7kg of dry matter (of grain quality) is required for every 1kg of liveweight gain' on average across the whole mob.

If your genetics are suboptimal, this might be a good opportunity to upgrade your flock.

The process involves estimating the total weight gain required, the total amount of feed that would be required for that weight gain and then calculating the cost of that feed. For the purposes of this example if you have some 38kg lambs that you want to grow out to 45kg by supplementary feeding then you can create your budget for feeding costs as shown in Table 10.

If you are feeding to prepare an animal for sale you need to consider the additional value gained. Using the example of the lambs that are being production fed the target liveweight is 45kg, a gain of 7kgs. At lamb prices of $4.00 per kilogram dressed weight (using a 46 per cent dressing percentage), this represents $12.90 worth of income. If their value, unfinished is only $3.00 per kilogram liveweight then they are going to go from a value of $66.42 to $82.80 which is $16.38 worth of income. In this example, it cost $8.46 to feed the lambs for that additional weight gain, therefore, it is worthwhile.

TABLE 10: Calculator for estimating the cost of feeding.

Weight gain	45kg - 38kg = 7kg
Grain required per kg of weight gain	(@ 90% dry matter) 7 ÷ 0.90 = 6.7kg
Total grain requirements	7 x 6.7 = 47kg
Cost of grain	$180/tonne ÷ 1000 = $0.18 per kg
Cost of feeding	47 x 0.18 = $8.46

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