Drought management and recovery

For South Australian Pastoralists 2020-21

Government of South Australia
Department of Primary Industries and Regions

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Feedbase management

The effects of drought on the pasture feedbase in the pastoral zone is extremely variable and subject to a large number of factors.

No matter what the species of the feedbase, not over grazing in the recovery phase, introducing rotational grazing strategies, allowing grasses and forbs to set seed and shrubs to recover are all important when managing drought affected pastures. Allowing plants to establish and tiller to maximise growth particularly through winter will ensure pasture production for the rest of the season is maximised.

Annual feed

The timing and amount of rainfall determines the type and quantity of annual feed. Winter rains produce annual herbs, and winter growing grasses. Summer rains promote the growth of summer grasses.

The annual grasses and herbs provide the bulk of nutritious, palatable feed. These more palatable annual species are selected in preference to perennial vegetation by stock. As the quantity of annual vegetation diminishes, stock turn to the perennial vegetation for feed. Whilst stock are grazing mainly on green feed their requirement for water is reduced. Dry annual trefoil and clover provide nutritious feed for many months.

Perennial feed

Many perennial bush species of shrub lands are palatable to stock. These include bladder saltbush, low bluebush, pearl bluebush and black bluebush. Stock grazing on perennial bush require more and fresher water because, although quite nutritious, perennial bush is high in salts.

Perennial grasses such as Mitchell grass and neverfail (*Eragrostis setifolia*), and native millet (*Panicum decompositum*) which occur in gilgais and some creeks, are a valuable source of feed when green. These grasses are of low nutritional value when dry.

Impact of climate in pastoral areas

The impact of drought on the feedbase in pastoral areas will vary significantly across the different land areas and will also be impacted by total grazing pressure. Whilst shrubs may take a significant period of time to regenerate post a drought, annual grass and other species may flourish given adequate rainfall.

The high temporal and spatial climatic variability of arid rangelands means that developing broad indicators is difficult and resource intensive. However, pastoralists, who observe their pastures and the species favoured by stock under a range of conditions, can provide information on local indicators.

Rainfall

In the South Australian Arid Lands, 10 mm of rainfall is a critical threshold for feed growth to begin. On average, Woomera gets about five rainfall events (single or multi-day) of 10 mm or more each year, and Marree gets four, however this can range from zero to 12 events at both locations. There have been three years since records began that Woomera did not receive at least one 10 mm rainfall event. Marree has had only one year without a 10 mm rainfall event (2002). (Source: CSIRO Climate Factsheet)

Pastoral areas can benefit from rainfall at any time of the year, however due to higher temperatures and increased evaporation in the warmer months more rain is required, during this period to be effective.

Although 10 mm is often sufficient for feed growth to begin it is generally not sufficient to produce significant pasture biomass or to sustain long term growth. Generally, 30 mm or more would be required over a three-week period to maintain annual pasture growth and to produce minimal to moderate biomass - but this will be dependent on soil type and feedbase type.

Table 1: Rainfall required over a 20-day period for pasture growth

Pasture Growth	November to March	April to October
Nil / Poor	< 40 mm	< 20 mm
Low	40 to 80 mm	20 to 40 mm
Moderate	80 to 120 mm	40 to 60 mm
High	120 mm +	60 mm +

References

Land and Water Conservation (1989) *A Graziers' Guide to the Saltbush-Bluebush Downs Country of Western NSW*

North East pastoral District Plan (1997)

Logistics of feeding in the pastoral zone

The cost and logistics of providing supplementary feed to livestock in pastoral areas has not been considered viable from both a financial and logistics perspective. However, the current situation (high lamb and ewe prices) has posed some significant challenges to enable pastoralists to rebuild their flocks and all options should be considered in an effort to increase numbers and cashflow.

If breeding back or a combination of breeding and restocking are used, retaining older ewes (sound mouths), reducing culling levels of productive animals and management to maximise lamb survival and weaning rates should be considered. There will be a need to sell some stock to maintain cashflow with an opportunity to identify the most productive animals and cull across year groups, instead of just culling on age. Refer to “Culling poor performing ewes” (page 13)

When buying in replacement ewes these need to be identified as either part of the core breeding flock (i.e. they meet the current breeding objectives of the sheep enterprise) or they may be short term breeders to help rebuild the core flock and only kept for a few years before being sold

Pregnancy scanning, ensuring ewes have adequate nutrition, especially in late pregnancy and early lactation and limiting mob size (this may not be an option in pastoral areas) can improve lamb survival by 10 to 20%. Pregnant ewes can also be placed into paddocks that have better quality feed and shelter to help them maintain condition and improve lamb survival.

Pregnancy scanning has proven to be difficult in the pastoral area, especially on larger pastoral properties due to the time and stress of mustering. The option of using portable yards for mobs further away from permanent yards could help.

It is important to cost out and budget any decision and understand the impacts on future income when making a recovery plan. This is of particular importance if the business is in a tight financial situation, as poor decision making now can have a significant effect on the long-term viability of business. Utilising all available land to generate an income should be considered in line with available finance.

Pastoral board policy

Currently stock numbers on most properties are less than 50% of normal, so if managed correctly vegetation will have a chance of rejuvenating following adequate rainfall, while stock numbers are low.

In 2018, the Pastoral Board rescinded its policy on supplementary feeding, however pastoralists still have legislative responsibilities. These include:

Pastoral Land Management and Conservation Act 1989*:* prevent degradation of the land and its indigenous plant life; and that land is well managed and utilised prudently so that its renewable resources are maintained, and its yield sustained

Native Vegetation Regulations 2017*:* native plants (e.g. grasses, shrubs and herbs) are protected, advice from the Native Vegetation Council should be sought before any clearance (including residual adverse impacts) that will permanently remove or degrade native vegetation is undertaken

Natural Resources Management Act 2004*:* Provides for the prevention or control of impacts caused by pest species of animals and plants that may have an adverse effect on the environment, primary production or the community.

When considering containment and supplementary feeding in the Pastoral Zone:

- Formal approval is not required to undertake supplementary feeding or containment feeding in the pastoral zone.
- Supplementary and containment feeding may reduce overgrazing of the existing feedbase.
- Request Commodity Vendor Declaration (CVD) forms when purchasing stock feed.

- Monitor supplementary and containment feeding areas for ‘new’ weeds and pests which may have been introduced from grain or hay.

Further information is available in *Containment and Supplementary Feeding in the Pastoral Zone* Factsheet.

Feeding options

There are a range of options available for providing supplementary feed to livestock with cereal grain generally the most economic per unit of energy, however the cost of transport and logistics of handling also needs to be considered.

It will not be feasible to feed all ewes without putting them into containment. Agistment may be a cheaper option, if it is available.

Strategies could include:

Activity	Option	Potential Benefit	Potential Downside
Pregnancy scan all ewes 40 days after rams have been removed			
Separate dry ewes	Sell	Cashflow More feed available for remaining sheep	Less breeding ewes
	Re-mate	Additional lambs	Feed availability to finish lambs
	Run as wethers	Wool income Re-mate in following year	
Condition Score ewes and separate those below CS 2.5	Provide best feed to increase condition	Increase lamb and ewe survival	May not gain enough condition and will have a higher risk of mortality
	Supplementary feed with grain, starting 3 weeks before lambing	Increase lamb and ewe survival	High cost to increase CS
	Sell	Cashflow	Reduced ewe and lamb numbers
Ewes above CS 2.5	Provide feedbase of average or better quality to maintain condition	Ensure reasonable lambing percentage	
	Supplementary feed with grain, if feedbase below average quality	Increase lamb survival	Cost and logistics

Feed requirements to increase lamb and ewe survival

Ewes in higher Condition Score (CS) at joining conceive more lambs and therefore have a higher reproductive rate. It is linear between CS 1.5 and 4.5 with the average response being 20 extra lambs per 100 ewes for each additional CS at joining (Figure 1). However, in the pastoral zone lamb survival is often just or even more important than the number born.

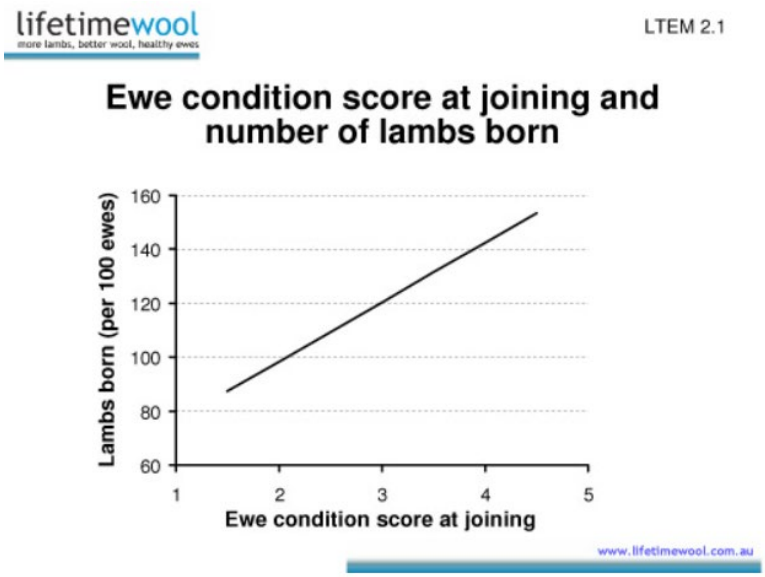

Figure 1: Number of lambs born relative to ewe Condition Score at joining

Improving lamb survival

In the pastoral zone it is important to ensure reasonable conception rates, by providing good nutrition to rams before joining. There is limited benefit in increasing conception rates much above 100% as the ewes will often not be able to support twin lambs. Therefore, it is more important to focus on increasing the survival of the lambs that are born (Figure 2).

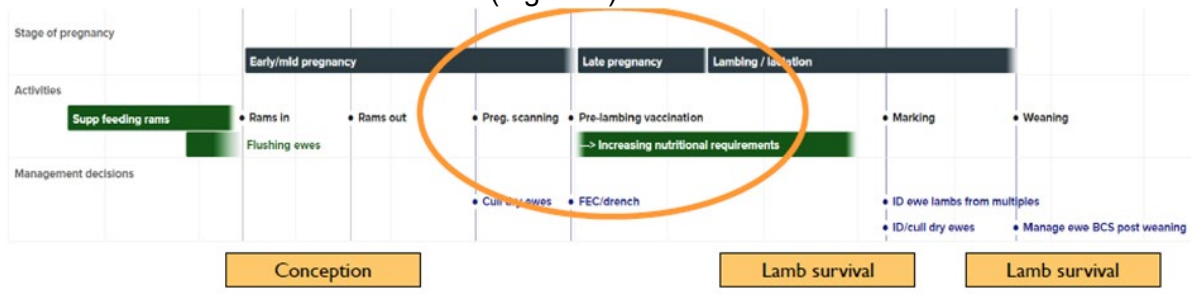

Figure 2: Stage of pregnancy and management options

Predator management is also important to reduce lamb losses. Refer to page 17.

Around 70% of lamb mortality occurs within the first 48 hours of a lamb's life and there are a number of factors that impact lamb survival.

1. Shelter / weather – the ability of ewes to find shelter during unfavourable weather
2. Mob size – smaller mobs reduce the risk of mis-mothering
3. Predators – controlling predators will increase the chance of lamb survival

4. Ewe Nutrition - this is the major factor impacting on lamb survival as it is related to lamb birth weight, which is strongly related to the nutrition of the ewe during pregnancy, particularly late pregnancy.

The optimum birthweight is 4.5 to 5.5 kg (Figure 4) for maximum lamb survival but this depends on the environment and whether it is a single or twin. Ewes in better condition at lambing produce bigger lambs, with each CS decrease in ewes during pregnancy (particularly late pregnancy) reducing lamb birthweight by 0.4 to 0.5 kg (Figure 3). Lamb survival decreases rapidly when birthweight drops below 4.0 kg.

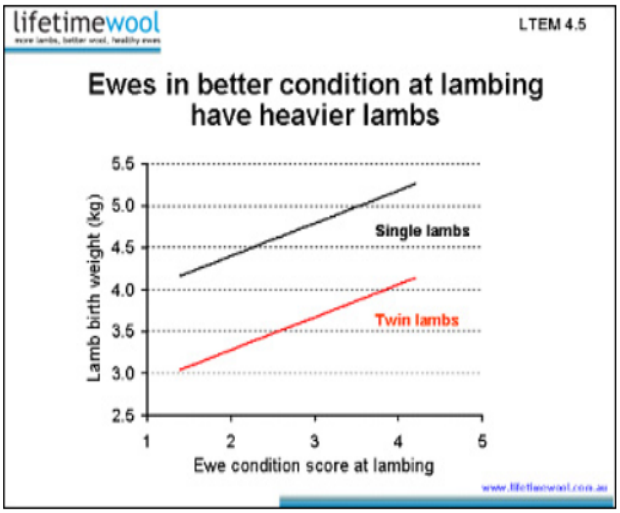

Figure 3: Ewe Condition Score and lamb birth-weight

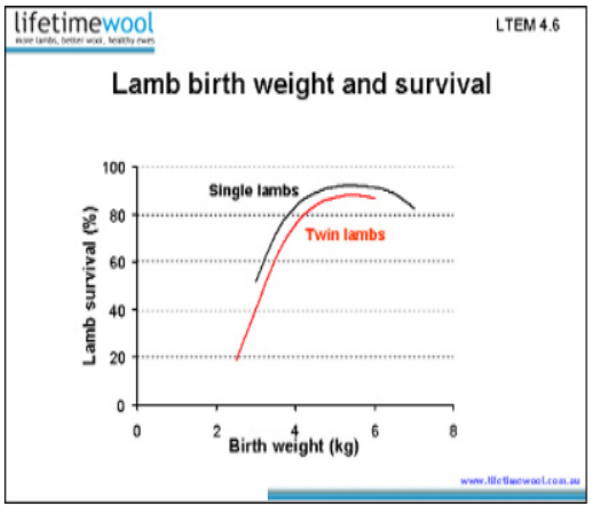

Figure 4: Lamb birthweight and survival

Ewe nutrition

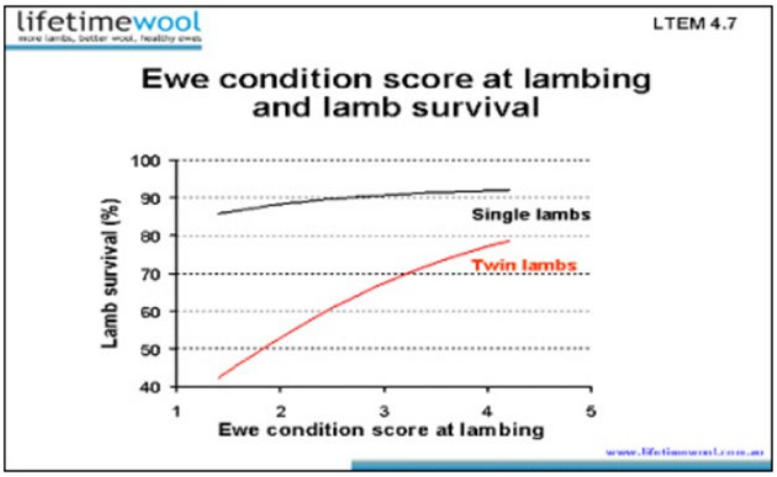

Figure 5: Ewe condition score at lambing and lamb survival

Lamb birthweight is determined by ewe nutrition both in early pregnancy (during placental development) and in the last 50 days of pregnancy, due to rapid foetal growth. With ewe nutrition during late-pregnancy and lambing having a large effect on lamb survival (Figure 5).

By ensuring that ewes are in CS 2.8 to 3.0 by lambing will optimise lamb survival. It will not be possible or economic to feed ewes for twins in the pastoral zone, as ewes are unlikely to be able to support and finish twin lambs in most seasons.

Managing ewe mortality

Ewes at less than CS 2 during late pregnancy have a much higher risk of mortality (11%) compared to ewes at CS 3 (2.5%).

Poor ewe nutrition and low condition at lambing will reduce maternal behaviour and lamb behaviour resulting in increased lamb mortality. The ewe and lamb should remain at the birth site for at least 6 hours to increase the chance of lamb survival.

Table 2: Nutrient Requirements for different sheep classes

Class	Protein (% DM)	Energy (MJ/hd/day)
Dry sheep	8	7.8
Early pregnancy	8	8
Late pregnancy single	9	10
Late pregnancy twins	10	12
Lactation single	12	19
Lactation twins	12	25
Weaners	14	10

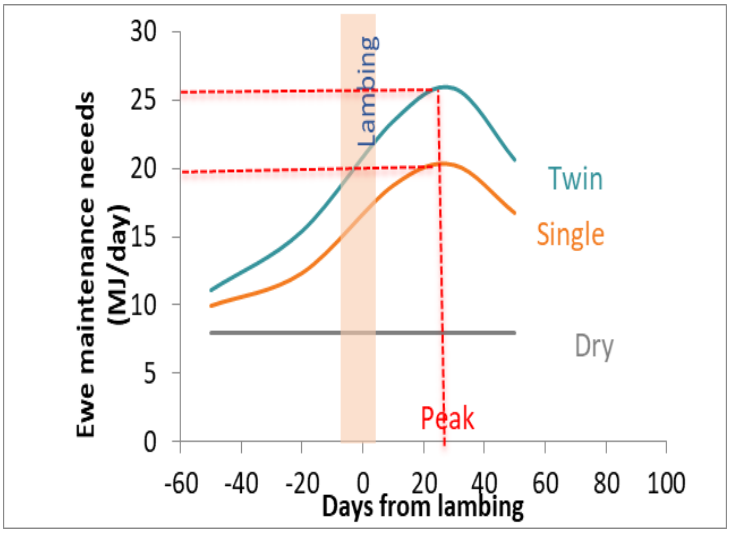

Figure 6: Ewe energy requirements pre and post lambing

Table 3: Nutritional value of a range of pasture species

Pasture	Energy (MJ/kg)	Protein (% DM)	NDF (%)#	Issue
Annual saltbush (*A. holocarpa*)	10		30	High salt
Annual grasses				
- *immature*	10.6	13		
- *mature*	9.5	5.2		
Barley Mitchell grass (*Astrebia pectinate*)	4.5-11.3 (8.1)	3.3-23.1 (12.1)	68	
Black head grass (*Enapogen nigricans*)				
- *spring*	9.1	14.8	60	Actively growing
- *autumn*	6.2		71	dry
Black bluebush (*Maireana pyramidata*)	9.1	15	38	High salt
Bladder saltbush (*A. vesicaria*)	6.5-11.2	6.8-21.6	42	High salt
Bluebush – Low (*Maireana astroticha*)	7.6-10.1 (9.4)	10.4-23	36	Slow growing
Bindii (*Soliva pterosperma*)				High NDF, low ME
Buffel grass (Cenchrus ciliaris)	6.8	7.4	75	High NDF; low ME
Buckbush/Roly-poly (*Salsola kali*)	7.9 -12.4	8.3 – 19.2		
Button grass (*Dactyloctenium radulans*)	6.0-10.0	4.2-22.1		
Climbing saltbush (*Einadia nutans*)	9.7	> 20	31	High salt
Creeping saltbush (*A. semibaccata*)		15-19	36	
Copperburrs (*Sclerolaena sp.*)	4.6-11.2 (10.2)	12.3-30	42	High salt
Cotton bush (*Maireana aphylla*)	5.7-10.8	6.8-29.5		
Cullen – Short virbine (*C. cinereum*)	8.7-12.7	14.1-24.1		
- Tall virbine (*C. australasicum*)	6.1-14.4	8.1-22.8		
Desert Spear grass (*A eremophila*)				
- *winter*	10.8	11.7	48	Actively growing
- *late summer/autumn*	4.5		80	Dry; low ME, high NDF
Eodium, Storksbill (***Erodium crinitium***)	9.4 - 10.3	7.9 - 20.9		
Flinders grass (***Iseilema membranaceum***)	7.6-10.1	10.4-23		
Grey saltbush (*A. cinerea*)		15-19	25	Low NDF
Kerosine grass (*Aristida contorta*)	6.7-8.5	5.2-12.2		
Mallee saltbush (*Rhagodia preissii*)	12.5	< 15	18	Low NDF; high salt
Mealy saltbush (*Rhagodia parabolica*)		15-19	18	Low NDF

Medics (*Medicago sp.*)				
- *dry*	5.5		60	Dry stubble
- *actively growing*	11	17-23	35	
Native clover (*Trigonella suavissima*)	8.6– 2.6	15.0-29.6		
Nitre bush (*Chenopodium nitrariaceum*)	5.2-11.9	> 20	18	Low NDF
Old man saltbush (*A. nummularia*)	11	11 - 13	28	High salt; low NDF
Pearl bluebush (*Maireana sedifolia*)	9.4	23	42	High salt; slow growing
Prickly acacia (*Acacia victoriae*)	4.6-10.4	10.2-22.7		
River saltbush (*A. amnicola*)	9.9	> 20	29	Low NDF
Sandhill canegrass (*Zygochloa paradoxa*)	3.5-6.9	1.8-10.3		
Silky blue grass (*Dichanthium sericeum*)				
- *winter/spring*	9.6	10	53	Actively growing
- *autumn*	6		71	dry
Spear grass (*A nodosa*)				
- *winter*	11	8.2	55	Actively growing
- *late summer/autumn*	5.4	2 - 4	81	Dry; high NDF, low ME
Swamp canegrass (*Eragrostis australiasica*)	3.4-9.2	3.1-15.2		
Tar bush (*Eremophylia glabra*)		< 15	30	
Umbrella grass (*Enteropogon acicularis*)	9.3	18.8	65	
Wallaby grass				
- *winter*	8.5	9.6	64	Actively growing
- *summer*	3.9		81	Dry; high NDF, low ME
Ward's weed (C*arrichtera annua*)	9.7		42	Pre-flowering

NDF - neutral detergent fibre; target 30%; Metabilizable energy target 8 MJ/kg DM

Source: *Perennial forage shrubs providing profitable and sustainable grazing,* Enrich Program; StATS;

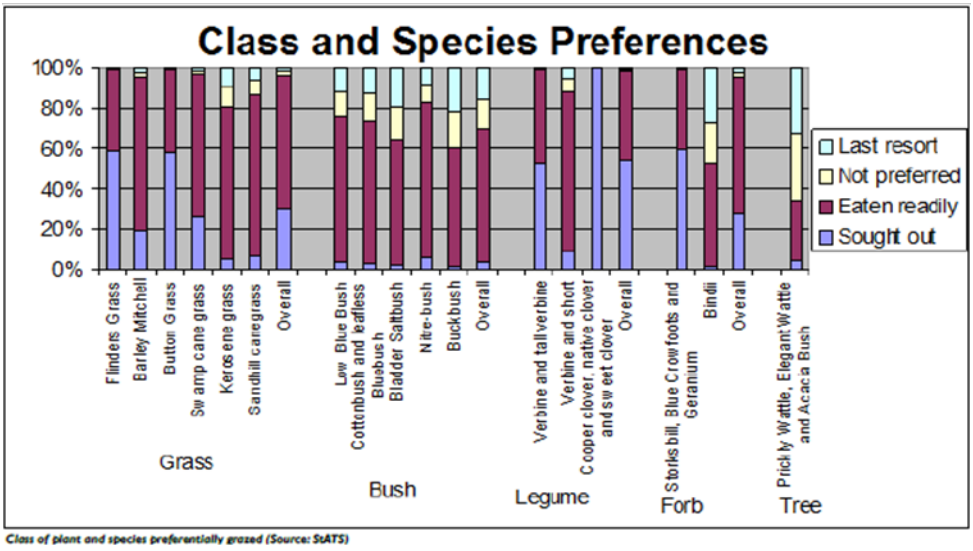

Figure 7: Grazing preference of different plant classes and species

Example Feed Requirement

Merino ewe 60kg at late pregnancy (single) *10 MJ/hd/day (Table 2)*
Merino ewe 60kg at early lactation (single) *19 MJ/hd/day*
Pasture feed – mainly dry annual grasses with some perennial bush *8 ME/kg and 60% NDF*

The amount of a particular feed an animal can eat will depend on its digestibility and Neutral Detergent Fibre percentage (NDF) is a good predictor of voluntary intake by an animal.

Dry Matter Intake (% of body weight) = 120 / NDF of pasture
= 120 / 60
= 2% of body weight

Ewes eating: 60kg x 2% = 1.2 kg/day of pasture

Energy is generally the most limiting factor during late pregnancy and early lactation.
This pasture will provide: 8 ME x 1.2 kg = 9.6 MJ of energy per day
This is sufficient for late pregnancy but will not be sufficient for lactation.

Energy shortfall during lactation = Energy requirement – Energy intake
= 19 MJ – 9.6 MJ
= 9.7 MJ/day

In the past this shortfall has meant that ewes have drawn on fat reserves to provide sufficient milk to feed their lamb. This has resulted in high mortality of both ewes and lambs.
What is the economics of providing additional feed to ensure ewes are maintained or at least do not lose condition as quickly.

This energy could be provided by:

Feed	Dry Matter %	Energy (MJ/kg)	NDF%	Requirement (kg/day)	Price ($/t)	Cost ($/hd/week)
Barley	90	11.9	20	0.9	$240	$1.51
Sheep pellets	80	12	40	1.0	$500	$3.54
Oaten hay	85	9	52	1.27	$250	$2.22
Pasture hay	85	9	48	1.27	$270	$2.40

Managing Grain Supplementation

1. Safety factor – introduce grain slowly over 10 (oats) and 14 days for wheat and barley
2. Feeding frequency – feed every day for the first 20 days when being introduced to a new ration, after this they can be fed every second day
3. Ensure fibre intake – use higher rates of roughage when introducing a new ration;
4. high levels of fibre will keep the rumen working effectively and reduce the risk of acidosis;
5. lactating ewes require at least 15% roughage to ensure they can produce sufficient milk
6. Think about the rumen bugs – they take time to adapt to a new ration
7. Take your time - start with low levels of grain (50 gm/head/day) and slowly increase

Table 4: Example daily ration of wheat or barley per sheep (grams/day) when introducing

Day	Containment Feeding		Grazing Below Average Quality Pasture (8 MJ/kg ME; 60% NDF)	
	Dry sheep/Early	Lactating Ewe	Late Pregnancy	Lactating Ewe
1 – 2	50	50	50	50

3 – 4	100	100	70	100
5 – 6	200	200	70	200
7 - 8	300	300	70	300
9 – 11	350	350	70	350
12 – 15	430	450	70	450
16 - 19	430	550	70	550
20	860#	700		700
21	0	700	140	700
22	860	700		700
23	0	700		700
24	860	1400#	210	1400#
25	0	0		0
26	1300	1400		1400

high risk of acidosis at this time

Livestock management

Recovery will be affected by strategies implemented during the drought. This may have included a complete destock, to the retention of just the base breeding flock/herd, or variations on these.

Rebuilding numbers

It is important to have a clear plan for your business which takes into account the capacity of the business from a financial perspective to rebuild livestock numbers. Purchasing replacement animals may be the only option available but will come with considerable challenges including sourcing animals and the financial cost.

If buying in replacements it is important to have a biosecurity plan in place.

Breeding and restocking strategies may include retaining older females, reducing culling levels of productive animals (i.e. wether lambs for a wool clip), and increasing inputs and management to maximise lamb/calf survival and weaning rates. Weaner management can also play a key role in rebuilding the herd and flock through not only maximising survival but ensuring target maiden ewe and heifer weights are achieved maximising fertility. This will be more difficult in pastoral areas but still may be a better option than buying in replacements.

Rebuilding numbers provides producers with the ability to review breeding objectives and ensure you are not only producing more animals but are introducing top quality genetics and improving overall productivity. A number of different strategies to re-build the flock are explored in this document with example budgets provided. A simple Excel program has been produced to enable producers to input their own figures to evaluate the best option for their property. This can be downloaded at https://pir.sa.gov.au/grants_and_assistance/drought_support/farm_advice .

Weaners

To ensure weaners grow and reach their full potential, it is important to allocate them the best quality feed on offer. They will need high amounts of protein and energy in their diet to enable them to grow.

Agistment

Where stock numbers are low there may be an opportunity to bring in agistment to get cashflow, when you are rebuilding stock numbers. Contact your local Stock Agent to discuss possible options and likely return from agistment.

Keeping ewe hoggets

Rather than culling ewes with undesirable traits there is an option to identify these with a separate ear tag and place in another mob. You will still need to do a light cull removing any obvious culls, however these could include ewes with lower wool cut, poorer quality wool, small frame, muffled face or any other undesirable traits. Although these ewes will be kept in the short term as breeders to increase numbers, they are run separately from the main breeding mob. An option is to mate these ewes to Prime lamb Terminal sires for cashflow. They can be classified as a “sacrifice mob”, being the first to sell if further destocking is required or additional cashflow is required.

A Partial budget has been undertaken (Table 5) to evaluate the economics of selling cull ewe hoggets in 2020/21 compared to keeping them for 3 to 4 years and mating to prime lamb sires.

Assumptions

Starting merino ewe flock of 5,000; wool price 1000 c/kg clean at 64% yield; ewe hogget price $200/head; cast for age ewe price $130/head; shearing, crutching and mustering $10.50/head; other costs as per 2020 Farm Gross Margin Guide.

Table 5: Cost Benefit of keeping extra Ewe Hoggets

	Sell cull ewes after shearing		Keep cull ewes and mate to Prime lambs	
Benefits				
Additional Income				
Wool			Ewe wool discounted by 2% for 2021 value	$25,300
Cull ewe hoggets	50% of ewe hoggets sold @ $200/hd	$187,500	10% ewe hoggets culled @ $180	$33,750
Additional lambs			Prime lambs @ 85% weaning @ $130/hd	$82,875
CFA ewes			Discounted by 10% for 2025 value	$87,750
Reduced Costs				
Labour savings				
Total benefits		**$187,500**		**$229,675**
Costs				
New variable costs				
Shearing			Shearing costs	$6,375
Animal health				$1,238
Mustering				$1,500
Wool selling costs				$1,552
Sheep selling costs		$12,863		$15,704
Wool freight				$474
Lamb Freight				$6,375
Ewe Freight		$4,594		$4,406
Water				$1,330
Vehicle Fuel & R&M		$0		$1,330
Total Costs		$17,456		**$40,283**
GROSS MARGIN		**$170,044**		**$189,392**

Keeping wethers to 4 or 5 years of age

Traditionally most wether lambs are sold as weaners or grown out to larger lambs and sold after shearing. This has been a profitable strategy as ewes are more profitable per DSE than wethers, due to current high lamb prices. However, during the flock rebuilding phase following the drought this strategy needs to be reconsidered.

Although wethers are less profitable most properties will not be in a financial position to buy in sufficient ewes to replace those that have been sold off over the drought. Some replacements may be able to be purchased with remaining funds but due to the current high price of quality ewes it will be a high-risk strategy to buy back large numbers.

Another strategy to consider is keeping wether lambs for 3 or 4 years and then reducing wether numbers as ewe numbers are slowly rebuilt through natural increase.

The downside to this is a significant reduction in short term cashflow. This will be partially offset by the increase wool production from the wethers but not completely. The decision then needs to be made as to whether the business is able to manage this short-term reduction in cashflow.

A Partial budget has been undertaken (Table 6) to evaluate the economics of selling wether lambs in 2020/21 as weaners compared to keeping them for 3 to 4 years. Another option is identifying higher value animals and culling the poorer performers across all age groups.

Assumptions

Starting merino ewe flock of 5,000; wool price 1000 c/kg clean at 64% yield; lamb price $90/head; adult wether price $130/head; shearing, crutching and mustering $10.50/head; 75% weaning rate; other costs as per 2020 Farm Gross Margin Guide.

Table 6: Cost Benefit of keeping wethers from 2020/21 lambing

	Option 1		Option 2	
	Sell wether lambs after shearing		**Keep wethers and cull at 5 yo**	
Benefits				
Additional Income				
Wool			Wether wool discounted by 2% for 2021 value	$66,400
Wether lambs	All wethers sold as weaners after shearing	$168,750	10% wether lambs culled and sold at lower price	$16,875
CFA wethers			Discounted by 10% for 2025 value	$188,554
Reduced Costs				
Less ewe losses				
Labour savings				
Total benefits		**$168,750**		**$271,750**
Costs				
New variable costs				
Shearing			@ $8.50/head	$14,129
Animal health			@ $1.64/head	$2,743
Mustering			@ $2/head	$3,694
Wool selling costs				$4,075

Sheep selling costs	$15,788		$15,794
Wool freight			$1,243
Lamb Freight	$18,750		$1,875
Wether Freight			$8,100
Water		@ $1.50/DSE	$3,000
Vehicle Fuel & R&M	$0	@ $1.50/DSE	$3,000
Total Costs	**$34,538**		**$57,653**
GROSS MARGIN	**$134,213**		**$214,097**

Culling poor performing ewes

Information from AWI shows that lifetime ewe performance matters. In a typical self-replacing merino sheep flock, there is a huge difference in the income generated between the Passengers (bottom 25%) and Performers (top 25%), often almost double.

- Performers rear at least 1 lamb each year, succeeding at their first 2 attempts.
- Passengers fail to produce a lamb from their first 2 attempts. They learn and repeat poor maternal behaviours.
- Passengers are hard to detect visually as maidens and are best identified and culled after their 2nd failed lambing attempt.

Table 7: Characteristics of Top and Bottom performers as hoggets

Trait	Bottom 25%	Top 25%	Difference
Clean Fleece Weight	3.05	3.08	same
Fibre Diameter	20.4	20.5	same
Body Weight	41.4	43.2	+ 1.8 kgs

As adults the top performers often cut less wool and have a lower body weight and could be wrongly culled. This is because they are putting more energy into raising lambs.

Table 8: Performance of Older Ewes

Trait	Bottom 25%	Top 25%	Difference
Clean Fleece Weight	4.39	4.09	300gms/year less
Fibre Diameter	21.8	21.7	same
Body Weight	64.2	62.6	1.6 kgs lighter
Lifetime Income	$718	$1,132	

Merino ewes reach their reproductive peak later in life (6 – 7 years old). In average and better seasons their mortality is similar, however in poor/drought seasons mortality of old ewes increases.

The heritability of reproduction is low (5 – 15%) and is mostly environmental and learned behaviour.

By identifying and culling the bottom 25% of ewes, lamb mortality can be reduced by 6%, weaning rate per ewe increased by 15% and lifetime value increased by over 10%.

Potential Management Options

Pregnancy scan ewes and separate dry ewes. Depending on the season the dry ewes can either be re-mated or sold.

At lamb marking wet and dry ewes and ear notch those who have not raised a lamb. Next year when they are wet and dried at lamb marking, any dry ewes with an ear notch are culled (have not raised a lamb for two consecutive years).

In the example below with a starting ewe flock of 5,000 the flock will be rebuilt by a combination of breeding and buying in replacements. In Option 1, ewe hoggets are culled after shearing with one third kept to increase ewe numbers. In Option 2, ewe hoggets are only very lightly culled (10%) after shearing with the remainder kept to increase flock numbers. Ewes that do not raise a lamb are identified at lamb marking with an ear notch and any that do not raise a lamb the following year are culled. This can be done across all age groups to ensure the most productive ewes are kept and any poor performing ewes are sold. This will ensure that the whole flock is more productive.

Assumptions

Starting merino ewe flock of 5,000; wool price 1000 c/kg clean at 64% yield; cull ewes $130/head; crutching and mustering $10.50/head; 75% weaning rate; other costs as per 2020 Farm Gross Margin Guide.

Table 9: Cost: Benefit of rebuilding the flock on performance

	Option 1		Option 2	
	Sell cull ewes hoggets after shearing		**Cull ewes on performance**	
Benefits				
Additional Income				
Wool			Ewe wool discounted by 2% for 2021 value	$19,300
Cull ewe hoggets	41% of ewe hoggets sold @ $200/hd	$153,750	10% ewe hoggets culled @ $190/hd	$37,500
Additional lambs			Wether lambs @ 75% weaning @ $90/hd	$39,234
CFA ewes	920 head @ $130	$119,600	140 head @ $130	$18,200
Cull passenger ewes			Bottom 21% culled and discounted by 5% for 2023 value	$171,587
Increased weaning rate			15% additional lambs from older ewes (50% of flock) after two years	$33,750
Reduced Costs				
Less ewe losses				
Labour savings				
Total benefits		**$273,350**		**$319,579**
Costs				
New variable costs				
Shearing			Shearing costs	$4,940
Animal health				$959
Mustering				$1,163
Wool selling costs				$1,185
Sheep selling costs		$11,578		$23,345

Wool freight		$367
Lamb Freight		$8,109
Ewe Freight	$3,032	$8,372
Water		$1,015
Vehicle Fuel & R&M	$0	$1,015
Total Costs	**$33,940**	**$50,470**
GROSS MARGIN	**$239,410**	**$269,109**

Summary

With rapid changes in both wool and sheep prices the economics of these different options will continue to change. However, despite the large drop in the price of wool some of these options are still highly profitable, particularly keeping wether's. This will only be a short-term option while ewe numbers remain low. As ewe numbers are increased wether numbers could be reduced.

Animal health

Livestock need particular attention following drought-breaking rain. This period brings its own specific problems, not the least of which are those brought about by the change in diet arising from the new pasture growth. There are a number of livestock health conditions that are common following a drought. The key issues are summarised in Table 10. Further detail on each of these conditions are provided in Appendix 1.

Table 10: Common livestock health conditions following a drought

Issue	Predisposing situation	Signs/Symptoms
Nitrate/nitrite poisoning	Rapid growth of improved grasses, cereals and broadleaf weeds	Nitrate poisoning - diarrhoea and vomiting; salivation; abdominal pain. Nitrite poisoning - rapid, noisy and difficult breathing; rapid pulse; salivation, bloat, tremors, staggering; dark, chocolate-coloured blood; abortions; weakness, coma, terminal convulsions, death.
External parasites	Animals in poor condition; weather conditions conducive to flystrike	
Internal parasites	Animal in poor condition exposed to high worm burden	Anaemia; Lethargy and collapse; Weight loss from decreased appetite; Scouring.
Pulpy Kidney (Enterotoxaemia)	Not vaccinated, grazing on lush pasture or grain.	Animals in good condition found dead, often on their side with limbs extended and head thrown back; die quickly with convulsions.
Vitamin E deficiency	No access to green feed for extended periods of time	Poor growth; stiff gait; •arched back; •apparent lameness; reluctance to move; sudden deaths.
Vitamin A deficiency	No access to green feed for extended periods of time	Reduced feed intake / weight loss; Rough, dull hair coat; Deaths.

Disease risks when restocking

When purchasing replacement animals there is an increased risk of introducing disease to your flock or herd. The risks have increased with some deregulation of livestock movement, and the ability to purchase sheep from Western Australia and eastern states. Be diligent and obtaining as much information regarding property disease history, disease status, vaccination history and previous

treatments for lice and worms is useful. Ensure movement documentation and sheep health declarations are correctly filled out and meet their expectations.

It is important that purchased replacements are quarantined for 2-3 weeks upon arrival, are monitored and any health treatments applied.

Sheep lice are difficult to detect particularly on sheep that have less than 3 months wool. If lice are detected use a long wool product to keep lice numbers in check until shearing. Keep sheep isolated until they can be treated post shearing.

Johnes disease is a wasting disease of sheep and cattle. The strains of bacteria that cause Johnes disease in rare situations can be transmitted between sheep and cattle. Obtaining a vendor declaration or animal health statement is important to assess the risk of buying infected livestock.

The target markets and any market accreditations for your cattle enterprise will determine if Hormone Growth Promotant (HGP) status is of concern or not.

Following drought there is also a risk of residues from contaminated feed. Failed crops that are still within a withholding period and are grazed or conserved will often be fed to replacement or breeding animals. Obtain a vendor declaration to determine if the livestock have consumed feed that is within a withholding period.

Pest management

Weeds

A significant issue during the recovery of drought is the presence of new and existing weeds. Weed seeds are well preserved during drought conditions as the fungi and bacteria which break weed seeds down under normal conditions, require moisture to function. Therefore, weed seeds do not break down during a drought and remain viable. Following a drought, it is also likely that the competition from other plants is reduced allowing weeds to quickly establish and they are often some of the first plants to establish after a drought. Weeds can spread quickly, and their densities increase.

When purchasing fodder, ensure that you obtain a Fodder Declaration and get as much information about the source of the grain or hay as possible to reduce the risk of bringing in new weeds. This is not fool proof and in times of fodder shortages options may be limiting. Therefore, it is best to feed purchased hay and grain in a confinement feeding facility or in a sacrifice paddock and monitor these areas for any unusual weeds that may germinate when it rains. There is also the potential that herbicide resistant weed seeds are introduced, such as annual ryegrass, through grain that is contaminated with seed during periods of supplementary feeding.

Weeds can pose a health threat to livestock with some weeds being poisonous, causing health issues and in extreme cases death. Livestock can also contribute to the spread of weeds, particular animals that are purchased in or are returning from agistment. Up to 12% of the seed that an animal consumes remains viable when it passes through the digestive tract. In addition, it is important to understand that some weed seeds such as silver leaf nightshade can be carried internally by the sheep for up to a month. Livestock should be quarantined for at least 2 weeks when being introduced to a property or after returning from agistment. This will reduce most of the risk of weeds being distributed via the animal. It is also then important to monitor paddocks introduced livestock graze following a 2-week quarantine period.

Remain vigilant during the recovery phase so that weeds do not become a serious issue on the property. Monitoring feeding areas and watering points and controlling weeds quickly after they germinate and before they set seed is recommended. Once weeds have established and set seed the problem can escalate quickly.

Vertebrate pests

In South Australia, foxes, rabbits, kangaroos and wild dogs where prevalent tend to be the most important to control during the drought and through the recovery phase. Although these species are noted to be the most important species to control, it is vital that producers are vigilant in control of all vertebrate pests to minimise competition for feed, disease spread and predation to provide adequate conditions for flock/herd recovery.

Foxes

Foxes are the main cause of predation losses in lambs. Predation can in some areas account for 5-10% lamb losses. Foxes may remove the entire lamb and leave no evidence of predation and losses may not be obvious until marking. Most foxes will take the lamb that is not being defended by the ewe. Foxes not only kill lambs but also disrupt lambing, resulting in mismothering.

Strategies for fox eradication include strategic selection of lambing paddocks, fumigation of dens, shooting, baiting, and the use of guard animals such as Maremma dogs and alpacas. A coordinated approach with neighbours to control foxes is more effective than tackling the issue alone on your own property. Fox control is particularly important to maximise lamb survival and allow flocks to rebuild.

Wild dogs

Dingoes and their hybrids often attack hind legs of livestock, ultimately incapacitating them. Wild dog attacks are identified by the pattern of blood flowing down the hind legs that indicates that the animal was attacked while standing up. In comparison, domestic dog breeds often attack the throat of animals.

Other indications of wild dog presence include:

- Unusual livestock behavior
    - Flighty stock
    - Stock pushed into corners of paddocks
    - Stock in unusual locations
- Wildlife behavior, injury or death
- Domestic or working dog behavior
- Scats and tracks of wild dogs

Wild dog control options include baiting, Canid Pest Injectors, leg-hold trapping, shooting, maintenance of exclusion fencing and the use of guardian animals such as Maremma dogs and alpacas. SA Arid Lands Best Practice Guidelines for wild dog control provides guidelines around the level of control required for effective wild dog management.

There are also initiatives which producers can engage with to ensure adequate wild dog management. Contact your local Landscapes Board office for more information on programs in your area. SA Arid Lands mailto:saal.landscapeboard@sa.gov.au

Rabbits and kangaroos are significant contributors to total grazing pressure

Rabbits

As the drought breaks and conditions improve, rabbit numbers may increase. Controlling rabbits is important to allow pastures to recover. Strategies for rabbit control include biological control, baiting, warren destruction or fumigation, shooting or trapping.

Biological control methods such as using the Rabbit Haemorrhagic Disease Virus (RHDV) require an integrated approach.

Baiting early when rabbit numbers are low will ensure pastures recover quicker following rain. Baiting with 1080 is effective and inexpensive. Oats are ideal to use as bait - training rabbits with no poisoned oats first to prevent shy feeders and then follow up with oats treated with 1080 is most effective. Baiting can be followed up with warren destruction using mechanical ripping. It is important that any new holes that are reopened following ripping should be fumigated to maximise the success of ripping.

A coordinated approach with neighbours to rabbit control using integrated strategies is the best long-term approach. Rabbits if not controlled will compete with livestock for feed, increasing the grazing pressure and reducing the overall carrying capacity.

Kangaroos

Primary production has favoured kangaroos as a result of increased access to water and grazing land and less predators. Their numbers have increased as a result which have detrimental impacts on the environment and economics. These effects are often compounded in times of drought or when recovering from drought particularly with regard to feed base and land degradation. Kangaroos are protected under the National Parks and Wildlife Act 1972.

The South Australian Commercial Kangaroo Management Plan allows for the commercial harvesting of the three common kangaroo species in South Australia including red kangaroos, western grey kangaroos and euros, and the commercial export of kangaroo products. The plan outlines how the industry is regulated by the Department of Environment and Water and the Australian Government.

Appendix 1: potential animal health issues post drought

External parasites

Cattle lice are more common in winter and cattle that are in poor condition are more susceptible as their immune system is often compromised allowing lice numbers to build up.

Following a drought, some producers may not have applied preventative fly treatments or opted not to mules lambs, particularly in situations where early weaning has occurred. If rainfall is received and the weather is still warm, producers need to be vigilant for flystrike and apply preventative treatments as required.

Internal parasites

Worm eggs can tend to accumulate during a drought, as there is insufficient moisture for them to hatch and stocking densities can be higher than normal due to confinement feeding. As a result, livestock can have a build-up of worm eggs following the breaking rains posing a greater than normal risk to livestock. Livestock that are in less than ideal condition and/or are receiving poor nutrition will be more susceptible to worms and worm burdens can build quickly. Regular worm tests on key mobs from 6 weeks after the break is essential and drenches administered accordingly.

Pulpy kidney/enterotoxaemia

Pulpy kidney or enterotoxaemia is a common issue following drought as a result of a sudden change in diet when lush pasture becomes available and livestock change from drought feeding regimes to green pasture. Livestock should have ideally been vaccinated during the drought, particularly in situations where high levels of grain feeding were required. If not already, livestock should be brought up to date with their vaccination for pulpy kidney/enterotoxaemia. Be mindful if giving the initial vaccination, that it takes 14 days for that animal to be covered. It then requires a booster vaccination 4-6 weeks after the initial vaccination to be fully covered. If the last vaccination was more than 3-4 months prior, administering another booster is advisable in situations where there is a change of diet, such as releasing livestock onto pasture following containment.

Vitamin E deficiency

Vitamin E deficiency can occur when livestock do not have access to green fed and are fed dry feed such as dry pasture, stubbles, or grain for a prolonged period of time. Vitamin E deficiency results in white muscle disease. The symptoms include stiff legs, decreased growth rates, decreased wool production and red coloured urine may be observed. Vitamin E can be administered via injection or drenches or supplemented using powder.

Vitamin A deficiency

Vitamin A deficiency can be observed in mature sheep that have had no access to green feed for 8-12 months and in lambs at 4 months that have had no access to green feed since birth. Vitamin A deficiency results in night blindness, impacts semen quality in rams and results in weak or still born lambs. Other symptoms include a lack of appetite, incoordination, muscle weakness, convulsions and death. Lambs are often most susceptible if born in a drought as they have had no opportunity to build up reserves. Vitamin A can be given via injection or as a drench.

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