

# User's guide to the MLA feed demand calculator (Sheep)

Prepared for MLA by CSIRO Plant Industry, with DJM Livestock Consultants



## Introduction

The MLA feed demand calculator<sup>1</sup> has been developed to support the MLA/AWI Making More from Sheep and the MLA More Beef from Pastures programs. It calculates, for each month of the year, the total feed demand of all the livestock on a property and compares the total demand to the likely supply of pasture.

### The aim of the calculator is to help producers to measure

- the way in which the numbers and classes of livestock on their property drive the total demand for pasture;
- the match (or mismatch) between the supply of and demand for pasture;
- the proportion of pasture growth that is eaten by livestock, and
- the weight of sheep or beef produced per hectare.

### It can be used to plan

- times when it is possible to increase stocking rate, so as to use more pasture;
- times when stocking rate may need to be reduced, or supplement fed to livestock, to avoid overgrazing pastures; and
- ways to change the structure of the flock or herd to improve the match between feed demand and pasture supply.

1. The feed demand calculator has been built for MLA by CSIRO Plant Industry, with the assistance of DJM Livestock Consultants P/L. The underlying calculations are based on CSIRO's GrazFeed and GrassGro decision support tools.



*Microsoft Excel 2000™ or later must be installed on your computer before the feed demand calculator can be used.*

## The feed demand calculator tutorial - for sheep producers

Open the feed demand calculator.

A dialog like that in the box at right may appear, asking you whether you wish to enable the macros in the spreadsheet.

If so, respond by clicking the 'Enable Macros' button.



*If the 'Enable Macros' button is inactive you will need to change your security settings in Excel before returning to click the Enable Macros button. To change your security settings, close the MLA feed demand calculator and open Excel.*

*From the 'Tools' menu in Excel, select Macro, then Security, and then select the medium security level. Reopen the MLA feed demand calculator and start again.*

A splash screen will then appear. The first time the calculator is opened, there will be a pause while the internal calculations are set up; they have been compressed to save space while it is downloaded.

**Proceed**



Once you have read the introductory information on the splash screen, click the 'Proceed' button to move on to the next step.

The calculator is split into Pasture, Cattle, Sheep, and Feed Demand sections. The Pasture, Cattle, and Sheep sections are where you enter your data into the blue boxes. The Feed demand section is where you see the results. You can move from page to page using the 'Proceed' and 'Go back' buttons at the bottom of each page.

Read through the information in the How to Use pages. Then move to the Pasture page.

How to Use information is also attached to the input and result cells in the calculator. Just click on the cell of interest and a 'pop up' comment will appear that describes the cell.

## Defining the feed supply- the Pasture screen

The Pasture page allows you to describe the pattern of pasture growth on your property.

First, however, you must enter a location, a starting date and the effective grazing area of your property, and choose the livestock enterprise or enterprises that you will work with.

**Location.** When you select this cell, a drop-down list will appear. Select the location that is closest to your property.


**Start Date.** The MLA feed demand calculator will compute pasture supply and feed demand for a 12 month period. Use the drop-down list to choose a date for the start of the forecast year.

**Effective Area.** Enter the total area of pasture available to livestock on your property, on average, for the 12 month period selected.

**Enterprise type.** If you are working with a sheep flock only, choose 'Sheep only'. This will simplify the calculator by removing the Cattle page and the cattle-related outputs on the feed demand page. Similarly, if you are working with a cattle herd only, choose 'Cattle only'. If you have both sheep and cattle on your property, select 'Both cattle and sheep'.

### Pasture

<b>Location</b>	<input type="text" value="NSW - South West Slopes"/>	
<b>Start Date</b>	<input type="text" value="15 Feb"/>	
<b>Effective Area</b>	<input type="text" value="600"/> ha	
<b>Enterprise type</b>	<input type="text" value="Sheep only"/>	
<b>Use your own values for pasture growth rates?</b>	<input type="text" value="No"/>	
<b>Use your own values for pasture quality?</b>	<input type="text" value="No"/>	
<b>Month</b>	<b>Pasture growth (kg DM/ha/day)</b>	<b>Pasture quality (MJ ME/kg DM)</b>
Jan	6	8.85
Feb	6	8.08
Mar	10	8.16
Apr	20	9.19
May	20	10.83
Jun	11	11.86
Jul	9	11.95
Aug	18	12.12
Sep	33	12.12
Oct	49	12.03
Nov	33	10.74
Dec	11	9.71

 *Dates in the input pages are always given to the nearest half month. When entering a date, choose the date on the list that is closest to the date that you have in mind.*

You can enter your own figures for pasture growth and quality, or use default values that are supplied by the calculator for each region. To enter your own values, select 'Yes' to the corresponding question; you will then be able to edit the table of monthly values.

### Pasture growth rate

Growth rate for each month is entered in units of kg dry matter per hectare per day. They are property-wide averages, so if you have pastures with very different patterns of growth you will need to calculate and enter area-weighted averages of the monthly growth rates.

## Pasture quality

The quality of the pasture is expressed as the average metabolisable energy content of the animals' herbage intake during the month, in units of MJ ME/kg DM (mega joules of metabolisable energy per kilogram of dry matter). If you are not clear what this means, use the default values.

### Pasture

Location	NSW - South West Slopes
Start Date	15 Feb
Effective Area	600 ha
Enterprise type	Sheep only
Use your own values for pasture growth rates?	No
Use your own values for pasture quality?	No

Set the pasture page up as shown at left.

The summary of annual pasture growth at the bottom right of the Pasture page should look like this:

Tonnes DM/year	
Per ha	6.9
Total	4135

Then click the 'Proceed' button to move to the Sheep page.

## Livestock management – the Sheep and Cattle pages

The Sheep page is divided into three parts:

- In the top left quarter there is an area where you enter information about the sheep breed, an average reference liveweight for the breeding females, and the management of the reproductive cycle.
- At the bottom there is a 'livestock inventory' where you enter the numbers and weights of animals that are on the property at the starting date you entered in the Pasture page, plus any purchases or sales that you plan over the coming year.

**Clear inventory**

Click this button to remove all the data that can be entered into the inventory. This can be useful when making a major change in flock or herd structure.

- The top right quarter contains the 'Head of Stock' chart. This shows the numbers of stock in each class at each half month during the 12 months from the start date.

## Breed

Select the breed type that is closest to that of your sheep, from the drop-down list.

## Ewe weight (mature)

Enter the weight of a mature, non-pregnant ewe of your main breed when it is in average body condition. (GrazFeed users will know this as the 'standard reference weight' of the breed.)

## Join 1-2 year heifers

Select 'Yes' if your herd will include 1-2 year old ewes at joining and they are to be mated.

## No. of joining periods:

You can specify either 1 or 2 distinct joining periods. For each joining period you must provide the following information:

### Joining time

Enter the dates at which joining begins and ends (Entering '1 Jan' to '1 Jan' will result in completely uncontrolled mating.)

**Proportion joined** Enter the proportion of the ewes that are joined during this joining period. If you have selected 2 joining periods, the two values must add up to no more than 100%.

### Weaning date

Enter the average date on which lambs born from this joining are weaned.

### Lambs weaned per ewe

Enter the number of calves that you will expect will be born and survive until weaning.

## Sheep

Breed	Meat sheep (e.g. Border Leicester)	
Ewe weight (mature)	55	kg
Join 1-2 year old ewes	Yes	
No. of joining periods	1	per year
<b>Joining Period 1:</b>		
From	1 Feb	to 16 Mar
Join	100%	of breeders
Wean on	16 Dec	
Expect	1.20	lambs weaned per ewe



*If you are considering not joining your ewes, select 1 joining period and set the proportion of breeders to join to 0%.*

Breed	Meat sheep (e.g. Border Leicester)	
Ewe weight (mature)	55	kg
Join 1-2 year old ewes	Yes	
No. of joining periods	1	per year
<b>Joining Period 1:</b>		
From	1 Feb	to 16 Mar
Join	100%	of breeders
Wean on	16 Dec	
Expect	1.20	lambs weaned per ewe

Set up the breed and reproduction options as shown at left.

Then look at the livestock inventory at the bottom of the Sheep page.

The livestock inventory is set up with a row for each of several classes of stock. The first seven rows are for ewes in the breeding flock and their offspring; these are followed by six rows for classes of stock that are traded more opportunistically.

	Stock class at the start date	Stock at start date			Purchases			Sales				
		Animal Age (months)	Number of stock	Weight at start	Purchase Date	Animal Age (months)	Number Purchased	Purchase Weight (kg)	Sale Date	Animal Age (months)	Number Sold	Target Weight (kg)
Breeding stock and young	Ewes (>2 years)	55			1 Feb	67		51	1 Jan	66		54
	Ewes (1-2 years)	19			16 Jun	23			16 Nov	28		
	Wethers (1-2 years)	19			1 Feb	31			16 Nov	28		
	Weaned young ewes	7			1 Feb	19			1 Mar	8		
	Weaned young wethers	7			1 Feb	19			1 Mar	8		
	Lambs weaned this year								1 Feb	7		
Trading stock	Wethers				1 Jul				1 Dec			
	Wethers				16 Jul				16 Dec			
	Wethers				1 Feb				16 Nov			
	Wethers				1 Feb				16 Nov			
	Wethers				1 Feb				16 Nov			
	Wethers				1 Feb				16 Nov			

Go back    Proceed

Sales from a stock class refer to animals that started the year in that class.

For each stock class, you can enter:

- the number and weight of animals on the property at the start date;
- the date of a single purchase of stock, the number and the weight of purchased animals;
- the date of a single sale of stock, the number to be sold and their weight;
- for trading stock only, the age of the animals at each of the above times and whether the animals are wethers, rams, or dry ewes.

### Entering livestock weights is optional.

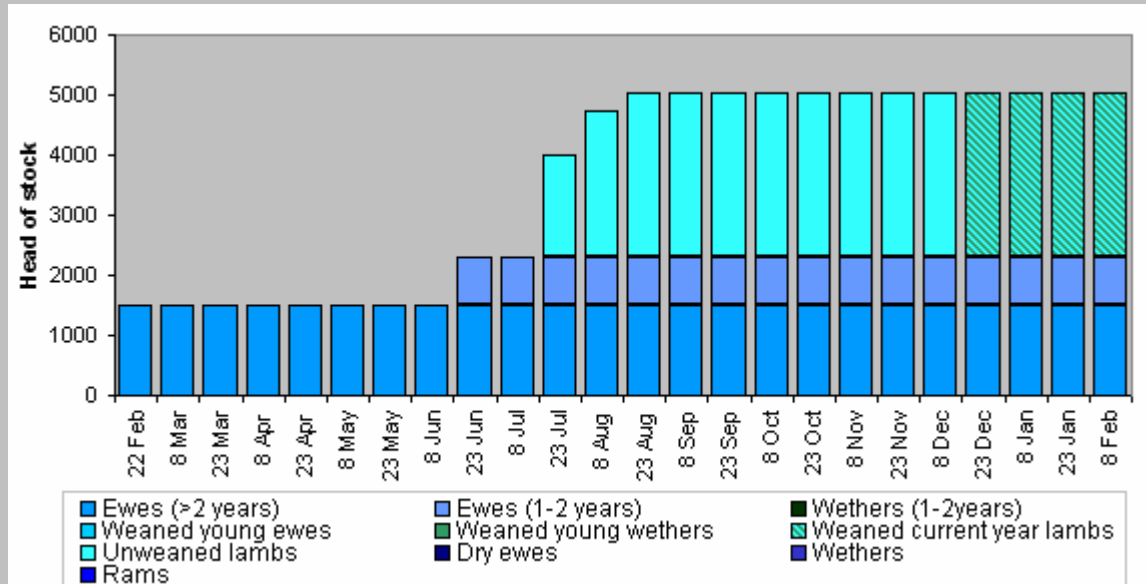
If you leave a weight cell blank, the calculator will estimate the corresponding weight from the stock class, its age, and a locality-specific pattern of live weight change through the year. You can see the liveweights estimated by the calculator for each stock class by clicking on the liveweight cell for that stock class.

If you disagree with the liveweight estimated by the calculator you can type in your own estimate (this is with the exception of the purchase and sale weights of the breeding females, which, for simplicity, are set by the calculator). The inventory will show the age of animals in each stock class in the breeding flock at the nominated start, purchase and sale dates.

- ❗ *If you have a group of trading stock that is present at the start date, then you will not be able to purchase animals into this group. Use a new row of the trading stock inventory instead.*
- ❗ *If you retain home-bred wethers or steers beyond the 1-2 years age group then enter each as a group in one of the trading stock rows.*

Set up a livestock inventory for a producer who is rebuilding their sheep flock after a drought.

Enter 1500 ewes (> 2 years) present on the start date and purchase 800 ewes (1-2 years) on the 16<sup>th</sup> of June by entering 800 in the Purchases column in the cell for the Ewes (1-2 years) stock class row and select 16 Jun from the pull down menu. Leave the initial weights blank. The chart in the top-right part of the page will change to show the numbers of stock present through the year:

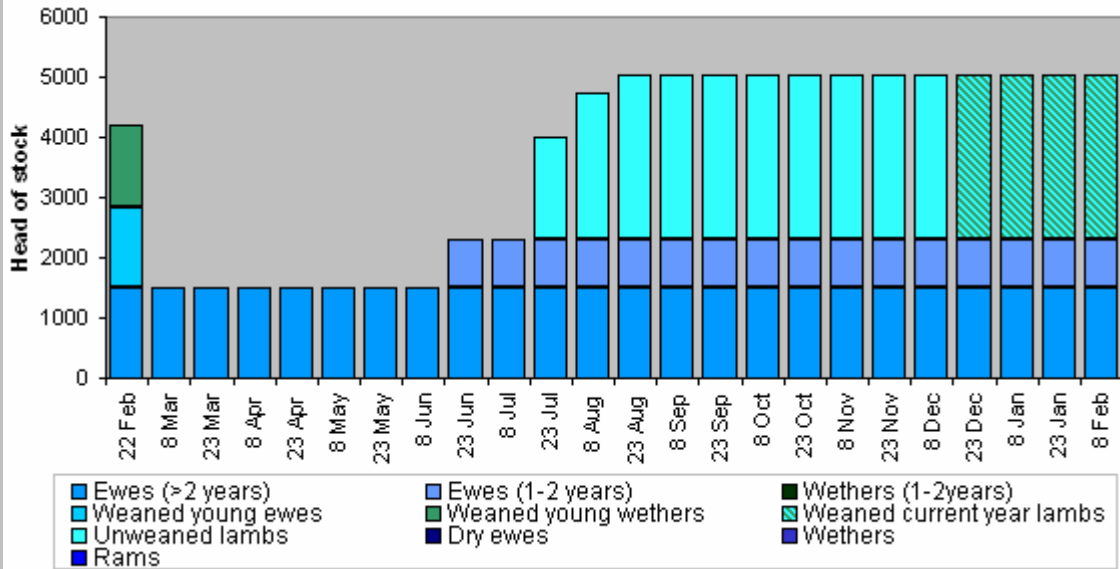


**Note:** that the maximum number of animals is not  $1500 + 800 = 2300$ , but just over 5000. The calculator has used the reproductive cycle that was entered earlier to work out that the ewes have lambed during July and August and these appear as the light blue bars. These lambs are weaned at the nominated date (16 Dec) and appear in the chart as hatched light blue bars thereafter. At this stage the calculator is assuming that all “Lambs weaned this year” are sold at the end of the 12 month period specified (15 Feb).

⚠ *If you wish to check the numbers of stock at a given date on the Head of Stock chart place the cursor on the colour representing that stock class for the bar of interest and the calculator will display the number of head in that class and confirm the name of the stock class and the date.*

Now, what if we want to sell some of the lambs that were weaned on 16 Dec a few months later on 1 Mar?

The weaners will need to be carried forward to the next year so enter 1350 **‘Weaned young ewes’** and 1350 **‘Weaned young wethers’** at the start date. Then in the Sales column for those stock classes select 1 Mar and enter 1350 animals each of those stock classes. You should see the ‘Head of Stock’ chart change to the following:

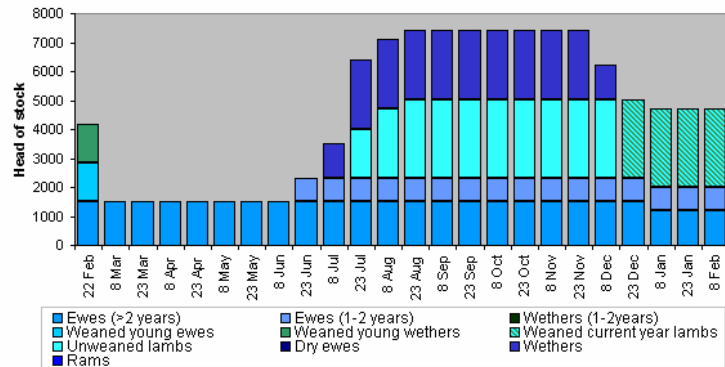


Complete the inventory by selling 300 cull ewes on 1 Jan and adding a group of 1200 trade wethers bought at 12 months old on 1 Jul and sold five months later on 1 Dec, and a similar group of 1200 trade wethers bought on 16 Jul and sold 16 Dec:

### Sheep

Breed: Meat sheep (e.g. Border Leicester)  
 Ewe weight (mature): 55 kg  
 Join 1-2 year old ewes: Yes  
 No. of joining periods: 1 per year

Joining Period 1:  
 From: 1 Feb to 16 Mar  
 Join: 100% of breeders  
 Wean on: 16 Dec  
 Expect: 1.20 lambs weaned per ewe



Clear inventory

Stock class at the start date	Stock at start date			Purchases			Sales				
	Animal Age (months)	Number of stock	Weight at start	Purchase Date	Animal Age (months)	Number Purchased	Purchase Weight (kg)	Sale Date	Animal Age (months)	Number Sold	Target Weight (kg)
Breeding stock and young	Ewes (>2 years)	55	1500	1 Feb	67		51	1 Jan	66	300	54
	Ewes (1-2 years)	19		16 Jun	23	800		16 Nov	28		
	Wethers (1-2 years)	19		1 Feb	31			16 Nov	28		
	Weaned young ewes	7	1350	1 Feb	19			1 Mar	8	1350	
	Weaned young wethers	7	1350	1 Feb	19			1 Mar	8	1350	
	Lambs weaned this year							1 Feb	7		
Trading stock	Wethers			1 Jul	12	1200		1 Dec	17	1200	
	Wethers			16 Jul	12	1200		16 Dec	17	1200	
	Wethers			1 Feb				16 Nov			
	Wethers			1 Feb				16 Nov			
	Wethers			1 Feb				16 Nov			
	Wethers			1 Feb				16 Nov			

Once you have entered all the values, and the numbers chart matches the one above, click the 'Proceed' button to move to the Feed demand page.

If you had chosen 'Cattle only' or 'Cattle and sheep' on the Pasture page, then the Cattle page would become visible. Input options for cattle are the same as for sheep, except that the set of stock classes in the inventory is slightly different:

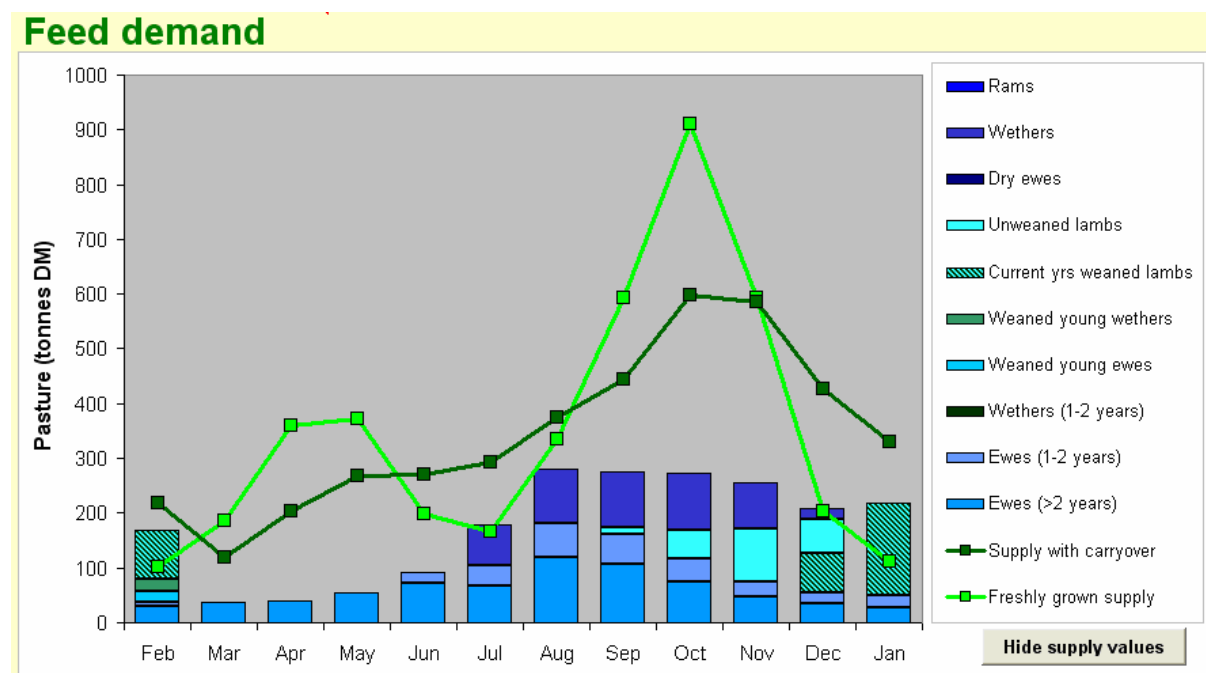
	Stock class at the start date	Stock at start date			Purchases				Sales			
		Animal Age (months)	Number of stock	Weight at start	Purchase Date	Animal Age (months)	Number Purchased	Purchase Weight (kg)	Sale Date	Animal Age (months)	Number Sold	Target Weight (kg)
Breeding stock and young	Cows (>3 years)	78			1 Oct	85		547	1 Jul	82		475
	Cows (2-3 years)	30			1 Oct	37		507	1 Jul	34		432
	Heifers (1-2 years)	18			1 Oct	25			1 Jul	22		
	Steers (1-2 years)	18			1 Oct	25			1 Jul	22		
	Weaned young heifers	6			1 Oct	13			1 Jul	10		
	Weaned young steers	6			1 Oct	13			1 Jul	10		
	Calves weaned this year								1 Jul			
									1 Jul			
Trading stock	Steers				1 Oct				1 Jul			
	Steers				1 Oct				1 Jul			
	Steers				1 Oct				1 Jul			
	Steers				1 Oct				1 Jul			
	Steers				1 Oct				1 Jul			
	Steers				1 Oct				1 Jul			

Go back    Proceed

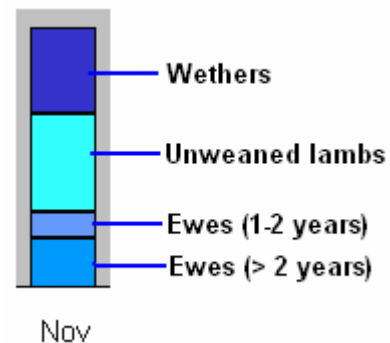
Sales from a stock class refer to animals that started the year in that class.

### Viewing the results - the Feed demand page

The Feed demand page of the calculator shows the calculated demand for, and supply of, pasture based on the information that you have entered into the Pasture, Cattle and Sheep pages. At the top of the page is a chart showing the month-by-month pattern of supply and demand.



The bars show the total demand for pasture in each month, sub-divided into the demands by each stock class. For example, in November the total demand for feed is just over 250 tonnes. The unweaned lambs and trade wethers are the largest contributors to the demand for feed in November.



If cattle are included in the enterprise, the feed demand bars will include each class of cattle.

The calculation for the feed demanded by each class of livestock per month is based on how much feed the livestock need to perform, divided by the energy content of the feed, according to the equation:

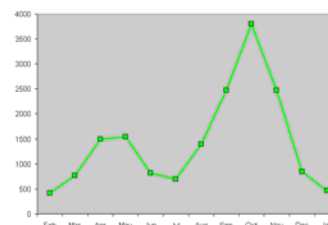
$$\text{Feed demand} = \frac{(\text{ME requirement per head per day}) \times (\text{number of animals}) \times (\text{days in period})}{(\text{ME content of pasture intake})}$$

It's important to note that in situations where feed is of particularly low quality, the calculated demand may be unrealistically high. The calculated demand may be more than the livestock can truly eat. In the interests of simplicity, the MLA feed demand calculator makes no attempt to estimate intake in these situations.

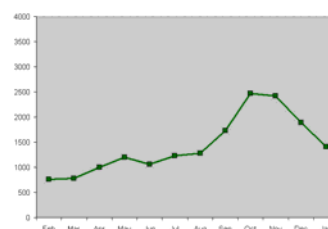
When feed quality is low, feed demand can be reduced by strategies designed to increase pasture quality.

Two pasture supply curves are also shown on the chart. When comparing feed demand with supply, choose the pasture curve that best suits your pasture management aims:

The light green supply curve shows the amounts of pasture that is grown on the property in each month.



The dark green supply curve takes account of the fact that pasture grown but not eaten in one month can be kept and used in a later month. The total pasture supply is the same as for the light green curve.



*If you wish to check the amount of pasture demanded by a stock class at a given date, go to the Feed demand chart and for the bar representing the date of interest, place the cursor on the colour representing that stock class. The calculator will display tonnes of pasture dry matter demanded by that stock class for that half-month.*

All the values in this chart are in units of tonnes of pasture dry matter per month. What is more important than the actual values though is the relative size of the demands by different classes of stock, and the way that the balance between pasture supply and demand shifts throughout the year.

Below the chart is a set of summary values for the enterprise:

<b>Key Performance Indicators</b>	
Pasture deficit, using freshly grown supply	<b>191</b> tonnes/year
Pasture deficit, using supply with carryover	<b>0</b> tonnes/year
Liveweight produced, cattle	<b>0</b> tonnes
Liveweight produced per ha allocated to cattle	<b>0</b> kg/ha/year
Liveweight produced, sheep	<b>151</b> tonnes
Liveweight produced per ha allocated to sheep	<b>252</b> kg/ha/year
Pasture demand as a % of pasture grown	<b>50</b> %

### **Pasture deficit**

Is the sum over each month of the difference between demand and supply (zero when demand is less than supply in a month). Smaller pasture deficits mean less risk of having to provide supplementary feed. In this tutorial example, the months of greatest risk are January/ February and to some extent July/August.

Approximately 191 tonnes of supplement, in pasture DM equivalents, might be required by the flock for that year, if you have to rely on using pasture as fast as it grows. If you are able to manage 'carry-over' feed effectively then you may not need any supplementary feed at all.

### **Live weight produced**

Is the sum of the total weight of cattle or sheep at the end of the year, plus the total weight of animals sold, less the total weight of animals present at the start and the total weight of animals that are purchased. Liveweight produced is expressed both as total tonnes per year and as kilograms per hectare.

If sheep and cattle were grazing together the kilograms of liveweight per hectare calculation would be based on the hectares allocated to either sheep or cattle. That is, the effective area grazed, as entered on the Pasture page, is split by the calculator between the sheep and cattle enterprises.

The calculator works out this split. The split is based on the relative ME (metabolisable energy) intakes of the sheep compared to the cattle enterprise. For example, if cattle were added to the above example the effective area grazed by all the sheep plus cattle on the property would total 600 hectares.

If the calculator estimated the sheep demanded 20% of the ME consumed and the cattle 80% then the effective area allocated to the sheep enterprise by the calculator would be  $20\% \times 600 = 120$  hectares.

Liveweight produced by sheep per hectare would then be calculated as total liveweight produced by sheep divided by 120 hectares. Similarly, liveweight produced by cattle per hectare would be calculated as total liveweight produced by cattle divided by 480 hectares.

**Pasture demand as a % of pasture grown** (or 'utilisation rate') is the ratio of the annual total demand by the animals to the total supply of pasture. It is important to be realistic about how much of your pasture growth can be utilised. As a rough guide:

- ⇒ The average producer in the high rainfall zone of southern Australia uses about 30% of the pasture grown per year.
- ⇒ Using 50% of your pasture is achievable. An increase in pasture used from 30% to 50% can mean a doubling in profit.
- ⇒ If you push the enterprise well beyond 50%, you might be asking too much of your system and of the MLA feed demand calculator!

**Print report** 

Click this button to print out the inputs and results of your calculation. This can be useful when you want to compare several options.

**Hide supply values**

Click this button to make the pasture supply curves disappear. This can be useful when supply is much greater than demand in some months and you want to look at the feed demand results more closely.

## Where to next

The MLA feed demand calculator has helped you to understand the pasture supply and demand for your enterprise.



*Remember, both the feed supply and demand curves are approximate. Treat them as such. The quality of the reports generated by the MLA feed demand calculator are highly dependant on the quality of data you enter. This applies particularly to the pasture data. Example pasture growth rates and quality values are pre-programmed for the location you select but you should cross check these against other data you may have and adjust them accordingly. Of course, the very best data for entry will be based on measurements that you or your advisors have made on your own pasture supply and you are encouraged towards developing and using such data.*

Matching feed demand to supply is a key driver of profitability. Before you implement any strategies to change feed supply, or the make-up of your herd or flock, it's strongly recommended that you:

- engage a suitably qualified advisor who can test your ideas thoroughly using more sophisticated computer tools;
- enrol in a suitable training course, such as those offered through the MLA EDGE Network and read the MLA More Beef from Pastures *producer's manual*.

## Disclaimer

Care is taken to ensure the accuracy of the information contained in this publication and calculator. However MLA, CSIRO, and DJM Livestock Consultants cannot accept responsibility for the accuracy or completeness of the information or opinions contained in the publication. You should make your own enquiries before making decisions concerning your interests.