How to use the Phosphorus Budgeting Tool

The **Phosphorus Budgeting Tool** has been developed by Holbrook Landcare Network as part of the 'Carbon Farming and Your Business' program.

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For many farming enterprises in the high rainfall zone, the application of phophorus is one the largest annual expenses.

The old rule of thumb of one kilogram of phosphorus per dry sheep equivalent (dse) has been greatly refined through research to improve profitability and minimise environmental impacts.

The Phosphorus Budgeting Tool enables farmers to calculate the rate of phosphorus required for their property based on stocking rates, current phosphorus levels and production goals. An annual fertiliser plan and budget can be developed using this tool.

This tool will help farmers to get the most out of their soil test results and design efficient fertiliser programs.

Go to **www.holbrooklandcare.org.au/carbon**
to download your free copy of the
Phosphorus Budgeting Tool

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Why use the Phosphorus Budgeting Tool

The Phosphorus Budgeting Tool can be used in a number of ways:

- To create an annual fertiliser programme
- To inform the annual farm budgeting process
- To best allocate fertiliser given a pre-determined budgeted amount
- To maximise fertiliser efficiency

How the Budgeting Tool will help you:

The Phosphorus Budgeting Tool will:

- Calculate the total Phosphorus requirements for each paddock (maintenance + capital)
- Allow you to compare the cost of using different fertiliser products
- Help you to prioritise which paddock to fertilise and what rates to use
- Help you to create a list of products and quantities required to assist with ordering, as well as an indicative budget based on current fertiliser prices

What you need to complete the Budgeting Tool:

This tool is designed to create an annual fertiliser plan and budget for improved pastures.

To complete the Phosphorus Budgeting Tool, the following information is required:

1. Paddock size (ha)
2. Stocking rate (dse/ha). (This can be per paddock or farm average)
3. Current soil test results
4. Current fertiliser product information including: price, phosphorus % and spreading cost

Regular soil testing should be carried out to monitor change over time.

Note: The recommendations in this tool are designed to supply an adequate amount of phosphorus fertiliser for improved pastures. It assumes other major nutrients and pH are within optimum range. This is to get the full benefit of the applied phosphorus.

Completing the Phosphorus Budgeting Tool

> *Step 1* **Enter paddock details in the 'Fertiliser Budget' tab.**
>
> ⇒ Enter paddock name
> ⇒ Enter paddock size in hectares
> ⇒ Enter stocking rate (dse/ha) (This can be per paddock or farm average)
> ⇒ Delete the details of any unused paddocks

> *Step 2* **Calculating Maintenance P requirements (kg P/ha).**
>
> ⇒ Using the Maintenance P charts determine your 'Soil Loss' factor based on soil type (Chart 1) and your 'Animal Loss' factor based on grazing management (Chart 2)
> ⇒ From Chart 3, determine your 'Maintenance rate' for your average rainfall
> ⇒ Enter the 'Maintenance rate' figure in the 'Fertiliser Budget' tab

> *Step 3* **Calculating Capital P requirements (kg P/ha).**
>
> ⇒ Using your current soil test results enter your 'Current P level' (Olsen or Colwell) for each paddock into the 'Fertiliser Budget' tab
> ⇒ Using the Capital P charts determine the 'Target P level' (Olsen or Colwell) you're aiming for (Chart 4)
> ⇒ From Chart 5, determine your 'Capital rate' (Olsen or Colwell) based on your soil type or known PBI
> ⇒ Enter the 'Target P level' for each paddock and the 'Capital rate' figure in the 'Fertiliser Budget' tab
>
> *The tool will automatically calculate the amount of fertiliser required to lift phosphorus to the target level in one year*

Step 4   **Selecting fertiliser products.**

⇒ In the 'Fertiliser Product' tab enter your current fertiliser product information including: name, composition (%), fertiliser cost and spreading cost. You may update the default products or enter up to 6 products of your own.

⇒ In the 'Fertiliser Budget' tab select the product you wish to use for each paddock, you can do this by using the 'Change all' drop down box or select a product for each paddock individually.

The tool will automatically calculate the fertiliser rates based on the chemical composition of the product selected, it will also use the prices to calculate a budget figure as well as the total tonnes of each product required.

Step 5   **Tailoring your Fertiliser Budget to meet your goals.**

The Phosphorus Budgeting Tool has now calculated the overall phosphorus requirements of each paddock, including maintenance to replace what has been removed and capital to raise the available P to a desired level. It has also calculated a fertiliser rate and total budget figure based on the products you selected for each paddock. In a perfect world this is what each paddock requires.

However, if you don't have enough funds to do everything or you want to split the capital application over a number of years, you can tailor the budget in a couple of ways:

1. For each paddock choose whether to exclude it, apply maintenance only or maintenance and capital.

   ⇒ If the current P level is higher than the target P level you may choose to apply maintenance only or if it is substantially higher, none at all. To do this select **No or M only** in the Fertiliser Product column.

   ⇒ If the current P level is below the target P level, you may choose to apply maintenance rate plus capital rate. To do this select **M+C** in the Fertiliser Product column.

2. Alter the target P level for each paddock.

   ⇒ If the current P level is substantially below the target P level, you may choose to build up the capital P in that paddock incrementally over a number of years. To do this, lower the target P level for that paddock until it fits your budget or calculates what you consider to be a reasonable fertiliser rate.

Calculating Maintenance P requirements

Chart 1: Soil Loss factor

Select your predominate soil type to establish soil loss factor.

Soil Type	Soil Loss factor
Loams / Sandy loams	Low
Clay loams	Medium
Clays	High

Chart 2: Landscape and grazing management loss factor

Select your grazing management and landscape to determine your animal loss factor

Grazing Management	Landscape	Animal Loss factor
Rotational grazing	Flat and rolling	Very Low
	Easy Hills	Low
	Steep Hills	Medium
Set Stocked	Flat and rolling	Low
	Easy Hills	Medium
	Steep Hills	High

Chart 3: Maintenance Rate kg P / dse

Using the soil loss factor from chart 1 and the animal loss factor from chart 2 along with the annual rainfall of your property, determine your maintenance rate of phosphorus (kg P / dse).

Soil Loss Factor	Animal Loss Factor	Rainfall 600	Rainfall 700	Rainfall 800
Low	Very Low	0.5	0.5	0.5
	Low	0.6	0.7	0.7
	Medium	0.8	0.8	0.8
	High	0.9	0.9	1.0
Medium	Very Low	0.7	0.7	0.8
	Low	0.8	0.9	0.9
	Medium	1.0	1.0	1.1
	High	1.1	1.2	1.2
High	Very Low	0.9	1.0	1.0
	Low	1.1	1.1	1.2
	Medium	1.2	1.3	1.3
	High	1.3	1.4	1.5

Determining your Target P Level

Target P Level

The target P level (also known as critical soil test value) is the soil test value at which 95 per cent of maximum pasture production occurs. Increasing P levels above this value will result in only minimal further increases in pasture production.

The target P level has been determined for Olsen and Colwell P.

- Decide whether you are going to use either Olsen or Colwell P and then use this test consistently through all of the calculations, (**you cannot use both**).
- For Olsen P the target P level is 15.
- For Colwell P the target P levels is influenced by the Phosphorus Buffering Index (PBI), which can be found on your soil test results. (Refer to chart 4),
- Phosphorus Buffering Index (PBI) indicates the availability of soil P by showing how much phosphorus fertiliser a soil can lock-up into unavailable forms. Soil with low PBI (under 100) will lock up a small amount of P and lower rates of phosphorus is required to increase P levels. High PBI levels lock up more P and require higher rates of P to increase P levels.

Chart 4: Critical soil test value

Select Target P level

Test	PBI	Category	Target P level
Colwell	15-35	Very Low	26
	36-70	Very Low	29
	71-140	Low	34
	141-280	Moderate	40
	281-840	High	55
Olsen			15

Enter this figure into the Target P level column of the fertiliser budget.

Calculating Capital P requirements

Capital Phosphorus

Capital P is the amount of phosphorus required above and beyond maintenance to increase phosphorus reserves available for plant growth. This is influenced by soil type and the PBI of the soil. It is expressed in kilograms of phosphorus per unit (kg P / unit).

Chart 5: Kg/ha of phosphorus required to raise P level by one unit
Use this chart to determine how much P (kg/ha) is required to raise phosphorus level by one unit.

Soil Type	PBI	Colwell	Olsen
Sand	0-50	2.2	**6**
Loams / Sandy loams	50-300	2.5	**9**
Clay loams	301-400	2.8	**10**
Clays	401-500	3.0	**11**

Enter this figure at the **bottom** of the **Capital** column of Fertiliser Budget.

(In the cell to the right of Capital rate kg P/unit)

For example: Capital rate = 9 kg P/unit

Entering Fertiliser Products

Fertiliser Product

Fertiliser cost ($/t) and spreading cost ($/t) can be altered according to current costs.

Additional fertiliser products can be added by replacing "other" in the products column with the name of the fertiliser. You will need to add the percentage of P, N, K and S of the new product as well as the fertiliser and spreading costs.

Tailoring your Fertiliser Budget

Fertiliser Rate

The tool will calculate 'Total' requirement (kg P/ha) (M Only or M+C).

The 'Budget Rate' (kg fert /ha) is the exact rate of fertiliser to achieve the targets based on the product you have selected.

The 'Spread Rate' is the 'Budget Rate' rounded to the nearest 25 kg/ha increment to make it simpler for fertiliser spreaders when applying the products.

Change the fertiliser product to compare the cost of different products.

Budget

The tool will calculate 'Total' tonnes required for each paddock by multiplying out the Ha.

It will also add up the total tonnes of each product required to assist with ordering product.

The tool will calculate a total cost per paddock and an overall budget figure based on the products selected and using the fertiliser prices that you have entered into the Fertiliser Products table.

Change the fertiliser product and/or the toggle buttons to tailor the overall budget.

Acknowledgments and further information

Meat & Livestock Australia : The "Five Easy Steps" phosphorus tool.

Vic DEPI : Making Better Fertiliser Decisions for Grazed Pastures in Australia.

Vic DEPI / NSW DPI : Accounting for Nutrients on Dairy Farms.

NSW Agriculture : Phosphorus for Sheep and Beef Pastures.

EverGraze resources : www.evergraze.com.au

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