



# Chapter 14

## Calculating Rates and Costs

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## 14 Calculating Rates and Costs

### 14.1 Introduction

Fertiliser inputs are a significant portion of the farm budget, and it is therefore important to provide the *Right Source* of fertiliser, at the *Right Rate*, in the *Right Place*, and at the *Right Time* (4Rs). Under application of nutrients can lead to reduced pasture and stock performance, while over application of nutrients can be an unnecessary waste of money.

#### **Learning outcomes**

At the completion of this chapter, you should be able to:

- Calculate the amount of fertiliser needed to apply the required amount of nutrients.
- Calculate the amount of nutrient applied by a particular amount of fertiliser.
- Calculate the cost of various fertilisers, and compare fertiliser products for value.

### 14.2 Fertiliser application rates and nutrient application rates

With an increasing range of fertiliser products now available on the market, fertiliser recommendations are often given as kilograms of nutrient per hectare (*kg nutrient/ha*), rather than as an amount of a specific fertiliser product. For example, the unit of measure for phosphorus is **kg P/ha**. This is called the **nutrient application rate**. To order your fertiliser, you need to know how to convert the nutrient application rate into the fertiliser application rate.

On the other hand, if your fertiliser recommendation has been given as an amount of fertiliser (for example, 350 kg/ha of superphosphate), then it is useful to know how to convert this **fertiliser application rate** into a nutrient application rate, so you can record how much N, P, K, S or other nutrients you will be applying to your paddocks.



### 14.2.1 What is the fertiliser application rate required to apply a particular nutrient application rate?

To calculate the fertiliser application rate required for a particular nutrient application rate, use the formula:

Nutrient application rate (kg/ha)	÷	% of nutrient in the fertiliser	x 100	=	Fertiliser application rate (kg/ha)
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**Example.** How much *single superphosphate* per hectare is required to provide 25 kilograms per hectare of phosphorus (25 kg P/ha)?

If you decide to apply 25 kg P/ha, you can calculate the fertiliser application rate required when using single superphosphate. This example uses a generic single superphosphate, which contains 8.9% total P (see Appendix G).

Nutrient application rate (kg/ha)	÷	% of nutrient in the fertiliser	x 100	=	Fertiliser application rate (kg/ha)
<b>25</b>	÷	<b>8.9</b>	x 100	=	<b>281</b>

**Example.** How much *triple superphosphate* per hectare is required to provide 25 kg P/ha?

The fertiliser application rate needed to apply 25 kg of P/ha when using triple superphosphate can also be calculated using the above formula. This example uses a generic triple superphosphate, which contains 20% total P.

Nutrient application rate (kg/ha)	÷	% of nutrient in the fertiliser	x 100	=	Fertiliser application rate (kg/ha)
<b>25</b>	÷	<b>20</b>	x 100	=	<b>125</b>

So, if you use triple superphosphate, you need less fertiliser to apply the same amount of phosphorus/ha because it is a high-analysis fertiliser.

Exercise 14.1 provides additional practice in calculating the fertiliser application rate required to apply a particular nutrient application rate.



### Exercise 14.1

**What is the fertiliser application rate required to apply a particular nutrient application rate?**

You have calculated that your farm needs 20 kg P/ha applied per year.

The following formula allows you to calculate the fertiliser application rate that will result in a particular nutrient application rate. You can use the same formula with a different nutrient application rate or with a different nutrient, such as N, K, or S. Just follow the three steps given below.

**Step 1.** Write the required nutrient application rate in the boxes in column 1 of the table below. (In this exercise, we have done this for you, using a rate of 20 kg P/ha.)

**Step 2.** Using the generic fertiliser product links (Appendix G); write the percentage of phosphorus for each product in the boxes in column 2. Remember to use total P, not available P.

**Step 3.** Calculate the rate of fertiliser to be applied, using the formula below, and fill in the boxes in column 3.

$$\boxed{\text{Nutrient application rate (kg/ha)}} \div \boxed{\% \text{ of nutrient in the fertiliser}} \times 100 = \boxed{\text{Fertiliser application rate (kg/ha)}}$$

Fertiliser Product (Nutrient)	1 Nutrient application rate (kg/ha)	2 Percent of nutrient in the fertiliser	x 100 =	3 Fertiliser application rate (kg/ha)
Generic single superphosphate Phosphorus	20	8.9	x 100 =	225
Generic MAP Phosphorus	20		x 100 =	
Generic DAP Phosphorus	20		x 100 =	



## Exercise 14.1 Answers

### What is the fertiliser application rate required to apply a particular nutrient application rate?

The following formula allows you to calculate the fertiliser application rate that will result in a particular nutrient application rate. You can use the same formula with a different nutrient application rate or with a different nutrient, such as N, K, or S. Just follow the three steps given below.

**Step 1.** Write the required nutrient application rate in the boxes in column 1 of the table below. (In this exercise, we have done this for you, using a rate of 20 kg P/ha.)

**Step 2.** Using the fertiliser product links (Appendix G), write the percentage of phosphorus for each product in the boxes in column 2. Remember to use total P, not available P.

**Step 3.** Calculate the rate of fertiliser to be applied, using the formula below, and fill in the boxes in column 3.

$$\boxed{\text{Nutrient application rate (kg/ha)}} \div \boxed{\% \text{ of nutrient in the fertiliser}} \times 100 = \boxed{\text{Fertiliser application rate (kg/ha)}}$$

Fertiliser Product (Nutrient)	1 Nutrient application rate (kg/ha)	÷ 2 Percent of nutrient in the fertiliser	x 100 =	3 Fertiliser application rate (kg/ha)
Generic single superphosphate Phosphorus	20	8.9	x 100 =	225
Generic MAP Phosphorus	20	22	x 100 =	91
Generic DAP Phosphorus	20	20	x 100 =	100



### 14.2.2 How many kg/ha of nutrient are applied by a particular fertiliser application rate?

To convert the *fertiliser* application rate (kg/ha) to the *nutrient* application rate (kg *nutrient*/ha), use the formula:

Fertiliser application rate (kg/ha)	x	% of nutrient in the fertiliser	$\div 100$	=	Nutrient application rate (kg/ha)
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**Example.** What is the nutrient application rate of P/ha when 450 kg/ha of single superphosphate is applied? This example uses generic superphosphate, which contains 8.9% total P.

Fertiliser application rate (kg/ha)	x	% of nutrient in the fertiliser	$\div 100$	=	Nutrient application rate (kg/ha)
<b>450</b>	x	<b>8.9</b>	$\div 100$	=	<b>40</b>

**Example.** What is the nutrient application rate of S/ha when 450 kg/ha of single superphosphate is applied? This example uses a generic single superphosphate, which contains 11% total S.

Fertiliser application rate (kg/ha)	x	% of nutrient in the fertiliser	$\div 100$	=	Nutrient application rate (kg/ha)
<b>450</b>	x	<b>11.0</b>	$\div 100$	=	<b>50</b>

Exercise 14.2 provides practice in calculating the amount of nutrient applied when you know the fertiliser application rate.



## Exercise 14.2

**How many kg/ha of nutrient are applied by a particular fertiliser application rate?**

You have just bought more land, and the previous farmer tells you he has used 400 kg/ha of single superphosphate every year. The two farmers next door have been using the same fertiliser application rate but different fertiliser products. You want to know what amount of nutrients they have been applying.

The following formula allows you to calculate the nutrient application rate that will result from a particular fertiliser application rate. You can use the same formula with different fertiliser application rates or with a different nutrient, such as N, K, or S. Just follow the three steps given below.

**Step 1.** Write the fertiliser application rate in column 1. (For this exercise, we have done this for you, using a rate of 400 kg/ha for each product.)

**Step 2.** Using the fertiliser product links (Appendix G), write the percentage of phosphorus for each product in the boxes in column 2. Remember to use total P, not available P.

**Step 3.** Calculate the nutrient application rate, using the formula below, and fill in the boxes in column 3.

$$\begin{array}{|c|} \hline \text{Fertiliser} \\ \text{application rate} \\ \text{(kg/ha)} \\ \hline \end{array} \times \begin{array}{|c|} \hline \% \text{ of nutrient in the} \\ \text{fertiliser} \\ \hline \end{array} \div 100 = \begin{array}{|c|} \hline \text{Nutrient application rate} \\ \text{(kg/ha)} \\ \hline \end{array}$$

	<b>1</b>		<b>2</b>		<b>3</b>
Fertiliser Product (Nutrient)	Fertiliser application rate (kg/ha)	x	Percent of nutrient in the fertiliser	÷ 100 =	Nutrient application rate (kg/ha)
Generic single superphosphate  Phosphorus	400	x	8.9	÷ 100 =	36
Generic MAP  Phosphorus	400	x	<input type="text"/>	÷ 100 =	<input type="text"/>
Generic DAP  Phosphorus	400	x	<input type="text"/>	÷ 100 =	<input type="text"/>



## Exercise 14.2 Answers

### How many kg/ha of nutrient are applied by a particular fertiliser application rate?

The following formula allows you to calculate the nutrient application rate that will result from a particular fertiliser application rate. You can use the same formula with different fertiliser application rates or with a different nutrient, such as N, K, or S. Just follow the three steps given below.

**Step 1.** Write the fertiliser application rate in column 1. (For this exercise, we have done this for you, using a rate of 400 kg/ha for each product.)

**Step 2.** Using the fertiliser product links (Appendix G), write the percentage of phosphorus for each product in the boxes in column 2. Remember to use total P, not available P.

**Step 3.** Calculate the nutrient application rate, using the formula below, and fill in the boxes in column 3.

$$\begin{array}{|c|} \hline \text{Fertiliser} \\ \text{application rate} \\ \text{(kg/ha)} \\ \hline \end{array} \times \begin{array}{|c|} \hline \% \text{ of nutrient in the} \\ \text{fertiliser} \\ \hline \end{array} \div 100 = \begin{array}{|c|} \hline \text{Nutrient application rate} \\ \text{(kg/ha)} \\ \hline \end{array}$$

Fertiliser Product (Nutrient)	1 Fertiliser application rate (kg/ha)	x	2 Percent of nutrient in the fertiliser	÷ 100 =	3 Nutrient application rate (kg/ha)
Generic single superphosphate  Phosphorus	400	x	8.9	÷ 100 =	36
Generic MAP  Phosphorus	400	x	22	÷ 100 =	88
Generic DAP  Phosphorus	400	x	20	÷ 100 =	80





## 14.3 Calculating the cost of fertilisers and nutrients

The next step is to work out the cost of the fertiliser per hectare and the cost of individual nutrients per hectare for various fertiliser products. The most accurate costing will include all costs and discounts. For example:

	Product cost ex factory
plus	Bin hire
plus	Cost of delivery
plus	Costs of spreading
minus	Discounts for early purchase, prompt payment, etc.

When the 'as-spread' cost is considered, high-analysis fertilisers are often cheaper per hectare than are low-analysis fertilisers because of the smaller amount of fertiliser product to be transported and spread to achieve the same nutrient application rate.

### 14.3.1 The cost of fertiliser per hectare

When calculating the following fertiliser and nutrient costs, refer to the following table of generic bulk fertiliser costs which are ex-factory and excluding GST as of March 2013.

**Table 14.1** Generic bulk fertiliser costs as quoted ex-factory and excluding GST as of March 2013.

FERTILISER PRODUCT	BRISBANE	NEWCASTLE	GEELONG	ADELAIDE
Urea	\$ 618	\$ 632	\$ 628	\$ 628
Calcium Ammonium Nitrate (CAN)	\$ 577	\$ 644	\$ 577	\$ 577
Di Ammonium Phosphate (DAP)	\$ 716	\$ 704	\$ 704	\$ 704
Mono Ammonium Phosphate (MAP)	\$ 716	\$ 704	\$ 704	\$ 704
Triple Superphosphate (TSP)	\$ 851	\$ 801	\$ 756	\$ 801
Muriate of Potash (MOP)	\$ 670	\$ 670	\$ 658	\$ 681
Sulphate of Potash (SOP)	\$ 890	\$ 890	\$ 890	\$ 890
Sulphate of Ammonia (SOA)	\$ 529	\$ 529	\$ 503	\$ 503
Single Superphosphate	\$ 454	\$ 364	\$ 342	\$ 358

Fertiliser cost per hectare is calculated using the following formula:

$$\boxed{\text{Cost of fertiliser (\$/tonne)}} \times \boxed{\text{Fertiliser application rate (kg/ha)}} \div 1000 = \boxed{\text{Cost of fertiliser (\$/ha)}}$$



**Example.** What is the total cost per hectare to apply 25 kg P/ha using single superphosphate?

In [Section 14.2.1](#), we worked out that you need a fertiliser application rate of 281 kg of generic single superphosphate (8.9% P) per hectare to apply 25 kg P/ha. The total cost per hectare can then be calculated using the formula:

$$\begin{array}{|c|} \hline \text{Cost of fertiliser} \\ (\$/\text{tonne}) \\ \hline \end{array} \times \begin{array}{|c|} \hline \text{Fertiliser application} \\ \text{rate (kg/ha)} \\ \hline \end{array} \div 1000 = \begin{array}{|c|} \hline \text{Cost of fertiliser} \\ (\$/\text{ha}) \\ \hline \end{array}$$

If you assume a freight and spreading cost of \$40/tonne and a bulk cost of \$364/tonne (ex. Newcastle – see Table 14.1), then the total cost is \$404/tonne, or \$113.52/ha.

$$\begin{array}{|c|} \hline \text{Cost of fertiliser} \\ (\$/\text{tonne}) \\ \hline \end{array} \times \begin{array}{|c|} \hline \text{Fertiliser application} \\ \text{rate (kg/ha)} \\ \hline \end{array} \div 1000 = \begin{array}{|c|} \hline \text{Cost of fertiliser} \\ (\$/\text{ha}) \\ \hline \end{array}$$

$$\begin{array}{|c|} \hline \mathbf{\$404} \\ \hline \end{array} \times \begin{array}{|c|} \hline \mathbf{281} \\ \hline \end{array} \div 1000 = \begin{array}{|c|} \hline \mathbf{\$113.52} \\ \hline \end{array}$$

**Example.** What is the total cost per hectare to apply 25 kg P/ha using generic triple superphosphate?

Using generic triple superphosphate (20% P), you need a fertiliser application rate of 125 kg/ha to apply 25 kg P/ha (see [Section 14.2.1](#)). If you assume a freight and spreading cost of \$40/tonne and a bulk cost of \$801/tonne (ex. Newcastle – see Table 14.1), then the total cost is \$841/tonne, or \$105.13/ha.

$$\begin{array}{|c|} \hline \text{Cost of fertiliser} \\ (\$/\text{tonne}) \\ \hline \end{array} \times \begin{array}{|c|} \hline \text{Fertiliser application} \\ \text{rate (kg/ha)} \\ \hline \end{array} \div 1000 = \begin{array}{|c|} \hline \text{Cost of fertiliser} \\ (\$/\text{ha}) \\ \hline \end{array}$$

$$\begin{array}{|c|} \hline \mathbf{\$841} \\ \hline \end{array} \times \begin{array}{|c|} \hline \mathbf{125} \\ \hline \end{array} \div 1000 = \begin{array}{|c|} \hline \mathbf{\$105.13} \\ \hline \end{array}$$

**Note:** Freight and spreading costs vary with both application rates and location.

### 14.3.2 Which product would you choose?

The obvious choice on the basis of the phosphorus cost per hectare would be triple superphosphate, but there are other factors that need to be considered. For example, are nutrients other than phosphorus needed? For instance, this generic triple superphosphate contains only 1% sulphur, whereas single superphosphate contains 11% sulphur. If your soil test result showed a sulphur deficiency, then you might choose single superphosphate or other products containing sulphur.

Comparing fertiliser products can be very difficult because of their different nutrient analyses. You should never compare only the price per tonne of fertiliser products. You should always take into account the nutrient analysis and then compare the cost per kilogram of the actual nutrients - See [Section 14.3.3](#).

There is usually not a great difference in price for similar products between the fertiliser companies. The biggest savings that can be made are by identifying what product you need. In other words, what nutrients are actually required as determined by careful soil testing or plant tissue testing and nutrient planning (see Chapter 15). The choice of product or company may depend on the reliability of supply and also financial incentives that may be offered for buying early.



### 14.3.3 The cost of a nutrient in a fertiliser product

The cost of a nutrient in a product can be calculated using the formula:

Cost of 1 tonne of fertiliser (\$ / tonne)	÷	Amount of nutrient in 1 tonne of fertiliser (kg / tonne)	=	Cost of 1 kg of nutrient (\$ / kg)
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#### 14.3.3.1 Bulk cost per kg of N in urea

Urea is 46% nitrogen. Thus, 1 tonne of urea contains 460 kg of nitrogen. Using the formula and assuming the cost per tonne of urea is \$628 we can calculate the cost of 1 kg of nitrogen in urea.

Cost of 1 tonne of fertiliser (\$ / tonne)	÷	Amount of nutrient in 1 tonne of fertiliser (kg / tonne)	=	Cost of 1 kg of nutrient (\$ / kg)
<b>\$628</b>	÷	<b>460</b>	=	<b>\$1.37 / kg of N</b>

#### 14.3.3.2 Bulk cost per kg of P in a generic triple superphosphate

A generic triple superphosphate has 20% phosphorus. Thus, 1 tonne contains 200 kg of phosphorus. Using the formula and assuming the cost per tonne is \$756 we can calculate the cost of 1 kg of phosphorus in this product.

Cost of 1 tonne of fertiliser (\$ / tonne)	÷	Amount of nutrient in 1 tonne of fertiliser (kg / tonne)	=	Cost of 1 kg of nutrient (\$ / kg)
<b>\$756</b>	÷	<b>200</b>	=	<b>\$3.78 / kg of P</b>

#### 14.3.3.3 Bulk cost per kg of K in muriate of potash

Muriate of potash (MOP) is 50% potassium. Thus, 1 tonne of MOP contains 500 kg of potassium. Using the formula and assuming the cost per tonne of MOP is \$658 we can calculate the cost of 1 kg of potassium in MOP.

Cost of 1 tonne of fertiliser (\$ / tonne)	÷	Amount of nutrient in 1 tonne of fertiliser (kg / tonne)	=	Cost of 1 kg of nutrient (\$ / kg)
<b>\$658</b>	÷	<b>500</b>	=	<b>\$1.32 / kg of K</b>

#### 14.3.3.4 Bulk cost per kg of S in gypsum

Gypsum products contain varying amounts of sulphur. For this example, we have chosen a gypsum source containing 17% sulphur. Thus, 1 tonne of this gypsum contains 170 kg of sulphur. Using the formula and assuming the cost per tonne of gypsum is \$140, we can calculate the cost of 1 kg of sulphur in this gypsum.

Cost of 1 tonne of fertiliser (\$ / tonne)	÷	Amount of nutrient in 1 tonne of fertiliser (kg / tonne)	=	Cost of 1 kg of nutrient (\$ / kg)
<b>\$140</b>	÷	<b>170</b>	=	<b>\$0.82 / kg of S</b>



### 14.3.3.5 Bulk cost per kg of P in MAP

Mono ammonium phosphate (MAP) has an NPKS analysis (see Chapter 11.4.1) of 10 : 21.9 : 0 : 1.5, so contains both nitrogen, phosphorus and a small amount of sulphur. In order to work out the cost of a kg of P in MAP, realistically the value of the nitrogen component should also be taken into account. The first formula will calculate the cost of 1 kg of P without considering the 10 % nitrogen component, assuming the cost per tonne of MAP is \$704.

Cost of 1 tonne of fertiliser (\$ / tonne)	÷	Amount of nutrient in 1 tonne of fertiliser (kg / tonne)	=	Cost of 1 kg of nutrient (\$ / kg)
<b>\$704</b>	÷	<b>219</b>	=	<b>\$3.21 / kg of P</b>

If however, *both* nitrogen and phosphorous are needed, and the value of the nitrogen in the MAP were considered, the calculations would give a very different figure for 1 kg of P. In 1 tonne (1,000 kg) of MAP there is 10% or 100 kg of nitrogen. Assuming that 1 kg of N is \$1.37 (as calculated from urea – see [Section 14.3.3.1](#)) then there is 100 kg x \$1.37/kg N = \$137 worth of nitrogen in 1 tonne of MAP. This value is then deducted from the total cost/tonne of MAP:

$$\text{\$704} - \text{\$137} = \text{\$567/tonne MAP}$$

Cost of 1 tonne of fertiliser (\$ / tonne)	÷	Amount of nutrient in 1 tonne of fertiliser (kg / tonne)	=	Cost of 1 kg of nutrient (\$ / kg)
<b>\$567</b>	÷	<b>219</b>	=	<b>\$2.59 / kg of P</b>

Following these steps will allow a cost comparison to be made of phosphorus on a \$/kg basis from a range of different phosphorus containing fertilisers.

### 14.3.3.6 Bulk cost per kg of N in Manure

Table 14.2 shows the averages and ranges of the major nutrients (N, P, and K) for a variety of animal manures.

**Table 14.2** 'Typical' nutrient analyses (dry matter basis) for animal manures (average and ranges)

SOURCE	NITROGEN (%)	PHOSPHORUS (%)	POTASSIUM (%)	MOISTURE (%)
Poultry (cage)	3.4 (2.8 - 4.8)	2.5 (1.9 - 4.0)	1.5 (1.2 - 2.1)	35 (15 - 65)
Poultry (litter)	2.6 (1.4 - 4.2)	1.8 (1.6 - 2.8)	1.0 (1.1 - 1.9)	25 (10 - 51)
Cattle	1.5 (0.7 - 2.5)	0.5 (0.2 - 1.4)	1.2 (0.7 - 1.8)	40 (9 - 54)
Horse	1.2 (1.0 - 1.5)	0.2 (0.1 - 0.4)	0.8 (0.3 - 1.0)	35 (6 - 62)
Sheep	1.7 (1.3 - 2.6)	0.5 (0.3 - 0.8)	1.2 (0.6 - 2.5)	30 (8 - 60)
Pig	2.3 (1.4 - 2.7)	2.3 (1.4 - 3.7)	0.6 (0.2 - 1.3)	60 (50 - 76)

**Note:** Moisture content must be taken into account when costing the nutrients provided in organic fertilisers and when calculating the rate of the spread nutrients.



Therefore, to calculate the kg of nitrogen in **Cattle** manure (based on the results from the above table) the amount of moisture (water) in a tonne of fresh manure must be deducted.

1 tonne (1,000 kg) contains 40% moisture; therefore the amount of dry matter left is simply:

$$1,000 \text{ kg} - 40\% (400 \text{ kg}) = 600 \text{ kg dry weight}$$

The average nitrogen proportion is 1.5%, therefore  $600 \times 1.5\% = 9 \text{ kg N/tonne}$  of manure. It is important to understand that nitrogen in manure is in many different forms with varying rates of plant availability. Hence not all of the N in manure will be available in the first year, and will require mineralisation over time before it is plant available.

Therefore, the value of total N in the manure can be estimated assuming that 1 tonne of manure will release 9 kg of nitrogen over a few years. Using the formula and assuming the cost per tonne of manure is \$15 we can calculate the cost of 1 kg of nitrogen in manure.

Cost of 1 tonne of fertiliser (\$ / tonne)	÷	Amount of nutrient in 1 tonne of fertiliser (kg / tonne)	=	Cost of 1 kg of nutrient (\$ / kg)
<b>\$15</b>	÷	<b>9</b>	=	<b>\$1.67 / kg of N</b>

It is important to remember that only a portion of the N valued will be plant available in the first year. Refer to [Making the Most of Animal By-Products](#) - Fact sheet #3, for more information on how to calculate what manure is worth.

Exercise 14.3 provides practice in calculating the cost of nutrients.



### Exercise 14.3

**Using the cost of one nutrient in various fertiliser products to compare prices.**

In this exercise, we assume that you are interested in the cost of phosphorus in the various fertiliser products.

The following formula allows you to calculate the cost of one nutrient in a fertiliser product. You can use the same formula for different fertiliser products or for a different nutrient, such as N, K, or S. Just follow the three steps given below.

**Step 1.** Using Table 14.1, write the bulk price ex-factory for the products listed in the table below in the boxes in column 1.

**Step 2.** Using the fertiliser product lists (Appendix G), find the percentage of phosphorus for each product and write the amount of phosphorus per tonne in the boxes in column 2. Remember to use total P, not available P. (See Chapter 11.4.1 if you want to review how to calculate the amount of nutrient in 1 tonne of a fertiliser product.)

**Step 3.** Calculate the cost of 1 kg of phosphorus for each product, using the formula below, and fill in the boxes in column 3.

**Note:** When calculating the cost of nutrients for *your* farm, use the **total cost** (adding freight, spreading, etc. and deducting any discounts), not the ex-factory price.

$$\boxed{\text{Cost of 1 tonne of fertiliser (\$/ tonne)}} \div \boxed{\text{Amount of nutrient in 1 tonne of fertiliser (kg / tonne)}} = \boxed{\text{Cost of 1 kg of nutrient (\$/ kg)}}$$

Fertiliser Product (Nutrient)	1 Cost of 1 tonne of fertiliser (\$/tonne)	÷	2 Amount of nutrient in 1 tonne of fertiliser (kg/tonne)	=	3 Cost of 1 kg nutrient (\$/kg)
Generic single superphosphate  Phosphorus	\$342	÷	89	=	\$3.84
Generic MAP  Phosphorus	\$704	÷	<input type="text"/>	=	<input type="text"/>
Generic DAP  Phosphorus	\$704	÷	<input type="text"/>	=	<input type="text"/>



## Exercise 14.3 Answers

*Using the cost of one nutrient in various fertiliser products to compare prices.*

The following formula allows you to calculate the cost of one nutrient in a fertiliser product. You can use the same formula for different fertiliser products or for a different nutrient, such as N, K, or S. Just follow the three steps given below.

**Step 1.** Using Table 14.1, write the bulk price ex-factory for the products listed in the table below in the boxes in column 1.

**Step 2.** Using the fertiliser product lists (Appendix G), find the percentage of phosphorus for each product and write the amount of phosphorus per tonne in the boxes in column 2. Remember to use total P, not available P. (See Chapter 11.4.1 if you want to review how to calculate the amount of nutrient in 1 tonne of a fertiliser product.)

**Step 3.** Calculate the cost of 1 kg of phosphorus for each product, using the formula below, and fill in the boxes in column 3.

**Note:** When calculating the cost of nutrients for *your* farm, use the **total cost** (adding freight, spreading, etc. and deducting any discounts), not the ex-factory price.

$$\boxed{\text{Cost of 1 tonne of fertiliser} \text{ (\$/tonne)}} \div \boxed{\text{Amount of nutrient in 1 tonne of fertiliser} \text{ (kg/tonne)}} = \boxed{\text{Cost of 1 kg of nutrient} \text{ (\$/kg)}}$$

Fertiliser Product (Nutrient)	1 Cost of 1 tonne of fertiliser (\$/tonne)	2 Amount of nutrient in 1 tonne of fertiliser (kg/tonne)	3 Cost of 1 kg nutrient (\$/kg)
Generic single superphosphate  Phosphorus	\$342	89	\$3.84
Generic MAP  Phosphorus	\$704	220	\$3.20
Generic DAP  Phosphorus	\$704	200	\$3.52



## 14.4 The cost saving of applying the correct blend of fertiliser

The financial benefit of applying the correct blend of fertiliser can be substantial. For example, a cost comparison of three options (each supplying 35 kg P/ha) is summarised in Table 14.3. This comparison clearly demonstrates the importance of the following:

1. Calculate nutrient requirements first - see Chapter 15.
2. Select fertiliser/s that supply the closest match of required nutrients, at the lowest cost.

**Table 14.3** Effect of fertiliser choice on total fertiliser cost when applying 35 kg P / ha over a 200 ha farm

OPTION	NUTRIENTS SUPPLIED (kg/ha)*	TONNES REQUIRED (Cost/Tonne)**			TOTAL FERTILISER COST***	
		P	K	S		
1	600 kg/ha of Super Potash 2:1 (0 : 5.9 : 16.6 : 7.3)	35	100	44	120 (\$446)	\$53,520
2	500 kg/ha of Super Potash 4:1 (0 : 7 : 10 : 8.8)	35	50	44	100 (\$404)	\$40,400
3	169 kg/ha of Triple Super (0 : 20.7 : 0 : 1) plus 100 kg/ha of MOP (0 : 0 : 50 : 0)	35	50	2	33.8 t Triple Super (\$756) plus 20 t muriate of potash (\$658)	\$38,713

\*All nutrient quantities have been rounded to the nearest whole number.  
 \*\*Based on generic Fertiliser Price List effective March 2013, GST exclusive  
 \*\*\*Costs for freight, spreading etc. have not been included.

This table highlights the potential savings (or potential extra cost) when working out a farm nutrient application strategy based on the P requirements. The cost of option 3 is \$14,807 less than option 1.

Options 1 and 2 would be more favourable if K and S were required in larger quantities. Option 1 applies P, K and S; option 2 applies less K than option 1; and option 3 applies less K and less S than option 1.

It is worth taking the time to do the calculations when deciding the fertiliser program on your farm.

## 14.5 Key Points

- The amount of fertiliser you apply should be based on the required amount of nutrients.
- Fertiliser rates are calculated in kilograms of nutrient per hectare.
- Calculate the amount of fertiliser you need to apply to obtain the required amount of nutrients per hectare.
- Calculate the amount of nutrient applied by a particular fertiliser application.
- Fertiliser costing should be based on the total cost delivered and spread to give cost/ha/nutrient as spread.