



Horticulture Australia

# InnoVeg

Horticulture Australia Limited



## CASE STUDY

# Using Cost of Production for Decision Making



Horticulture Australia

*"The Vegetable Industry Development Program is funded by HAL using the vegetable levy and matched funds from the Australian Government".*



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## Case Study

# USING COST OF PRODUCTION FOR DECISION MAKING

## Introduction

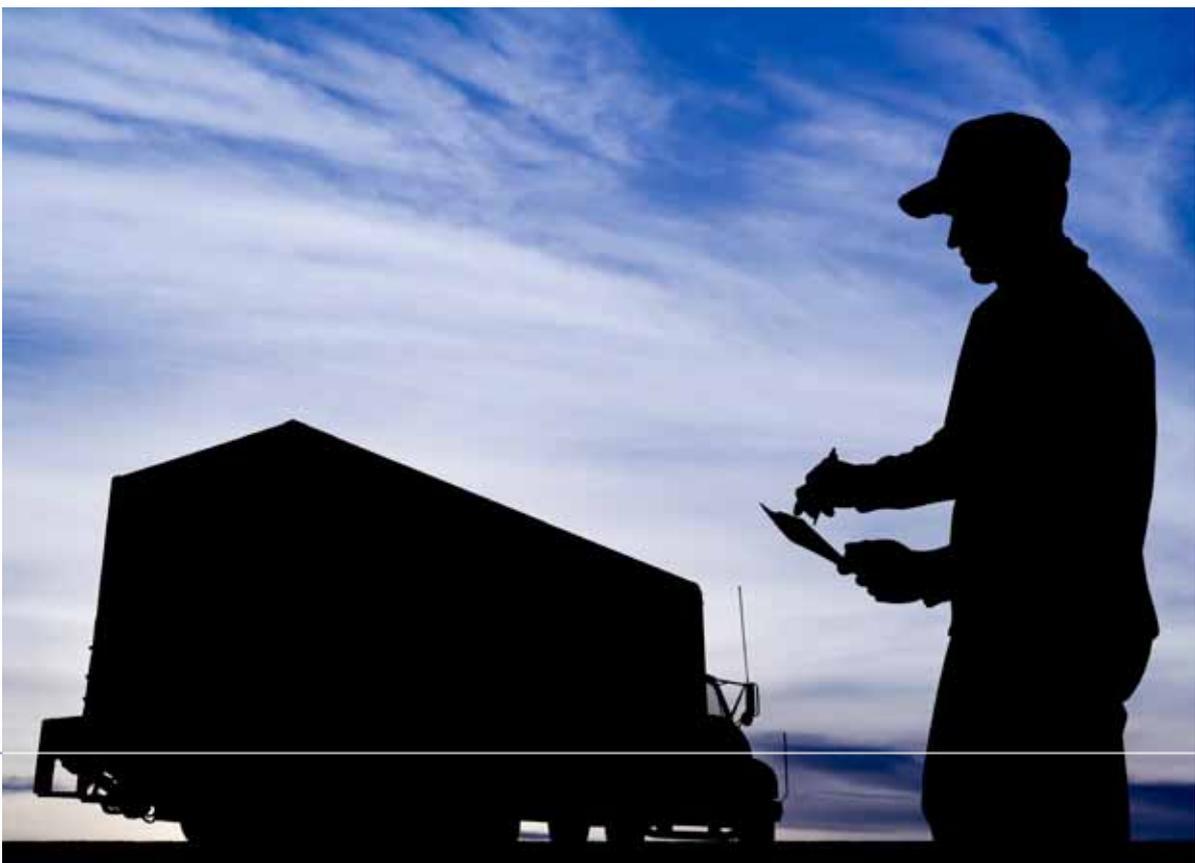
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*This case study shows how calculating *cost of production* can be used to help vegetable growers make decisions.*

Knowing your cost of production can help when making business decisions as it provides a quick way of relating your cost of producing a product with the price you are going to accept for the product. The cost of production can be calculated for any unit of production – tonnes, cases, bunches or the whole paddock. For some crops you might calculate cost of production for more than one unit. For example, it may be useful to know the cost of production of capsicums per tonne and per case as you may be selling different units of production.

The case study describes:

- What is included in cost of production
- How to calculate cost of production
- When cost of production can be useful and why you need to be careful using cost of production
- How a grower can use cost of production to make business decisions



## What is included in cost of production?

*It is very important to firstly think about what all of your costs are to grow a crop. It is useful to look at your financial records (refer to the case study, "How is our business going?") and take your total costs on the farm and ask yourself – **how much of this was used for this crop?** This way you are less likely to underestimate the costs. A simple calculator has been developed to help you calculate the cost of production. The first column includes your total farm costs, whilst the second column is for the costs for the particular crop you are looking at.*

The costs that will be used in the calculation include:

### *Crop inputs*

- Crop establishment – seedlings, soil preparation and amendments
- Growing costs – fertiliser, herbicides, water
- Fuel
- Labour – external
- Other costs

### *Post growing costs*

- Harvesting – fuel and labour
- Packing
- Transport
- Other post growing costs

### *Overheads*

- A share of overheads such as rates and accounting need to be included
- The appropriate share for each crop can be worked out on an area or gross value basis
- Many people like to do it on an area basis, as this is what they relate to and how some overheads, e.g. rates, are calculated
- However, we favour doing it on a gross value basis, as this is a more accurate estimate of the value of the particular crop to your business

### *Machinery*

- Depreciation on the plant used to grow this particular crop
- The opportunity cost of the capital invested in that machinery

- Where the machinery used includes items that are used for a range of crops, you will need to allocate a share of their depreciation and opportunity cost, as with overheads

### *Land rent*

- The cost of owning or renting the land you use to grow the crop. All the capital used to grow the crop has an opportunity cost. For example, the land uses capital, which could be used somewhere else. The cost of using this capital is the opportunity cost. A simple way of including the opportunity cost of capital is by using a cost of leasing the land. Alternatively you can apply an interest rate on the value of the land.

### *Finance*

- Interest on the input costs used to grow the crop. In the cost of production model, this has been calculated as all cash costs at 8% interest. This is an estimate assuming the money is borrowed or could be earning money somewhere else.

### *Owner's labour*

- The cost of the family labour used in growing the crop.

### *Profit*

- After you have paid all of the above costs, you need to make a profit. Thus, we have included profit in the calculation of cost of production, even though it is not a "cost". Therefore, if you receive a price equal to the cost of production, you will have covered all costs and made the profit you were targeting. You may decide to be flexible with the amount of profit you include and use this as part of your negotiating range. However, it is important to **explicitly count it, so you do not forget it!**

## Calculating cost of production

The cost of production is calculated by adding up all of the costs above and dividing by the unit of production. It is useful to calculate a number of parts of the cost of

production. Doing this helps understand where the biggest costs are, how much of the costs are input or growing costs and how much are the capital costs.

The following table gives an example of a cost of production analysis for capsicums.

ASSUMPTIONS				VALUE				
Area (ha)					5			
Yield (tonnes per ha)					100			
Cartons per tonne (no.)					100			
CALCULATIONS				TOTAL	CROP	PER	PER	% OF
				<i>farm</i>	<i>COST</i>	<i>TONNE</i>	<i>CARTON</i>	<i>COP</i>
<b>Crop Input Costs</b>								
Fertiliser			\$50,000	\$5,600	\$11.20	\$0.11		
Seedlings			\$40,000	\$5,000	\$10.00	\$0.10		
Labour			\$70,000	\$10,000	\$20.00	\$0.20		
Chemicals			\$5,000	\$3,000	\$6.00	\$0.06		
Fuel			\$25,000	\$5,000	\$10.00	\$0.10		
Other input costs			\$5,000	\$2,000	\$4.00	\$0.04		
<b>Total crop input costs</b>			<b>\$195,000</b>	<b>\$30,600</b>	<b>\$61.20</b>	<b>\$0.61</b>		<b>28%</b>
<b>Post Growing Costs</b>								
Harvesting - labour			\$70,000	\$6,000	\$12.00	\$0.12		
Harvesting - other			\$40,000	\$3,000	\$6.00	\$0.06		
Packing			\$20,000	\$2,000	\$4.00	\$0.04		
Transport			\$10,000	\$5,000	\$10.00	\$0.10		
Other post growing costs								
<b>Total post growing costs</b>			<b>\$140,000</b>	<b>\$16,000</b>	<b>\$32.00</b>	<b>\$0.32</b>		<b>15%</b>
<b>Overhead costs</b>			<b>\$50,000</b>	<b>\$5,000</b>	<b>\$10.00</b>	<b>\$0.10</b>		<b>5%</b>
<b>Total operating costs</b>			<b>\$385,000</b>	<b>\$51,600</b>	<b>\$103.20</b>	<b>\$1.03</b>		<b>47%</b>
<b>Capital Costs</b>								
Machinery depreciation			\$35,000	\$5,500	\$11.00	\$0.11		
Opportunity cost of machinery ownership								
value of machinery	\$200,000							
% apportioned to crop	25%							
opportunity cost of capital	8%		\$16,000	\$4,000	\$8.00	\$0.08		
Land rent			\$4,000	\$4,000	\$8.00	\$0.08		
Financing total operating costs								
total farm operating costs	\$385,000							
total crop operating costs	\$51,600							
cost of finance (e.g. overdraft)	10%		\$38,500	\$5,160	\$10.32	\$0.10		
<b>Total capital costs</b>			<b>\$93,500</b>	<b>\$18,660</b>	<b>\$37.32</b>	<b>\$0.37</b>		<b>17%</b>
<b>Return for Labour, Management and Ownership</b>								
Owner's labour			\$80,000	\$20,000	\$40.00	\$0.40		
Profit			\$100,000	\$20,000	\$40.00	\$0.40		
<b>Total return for labour, management and ownership</b>			<b>\$180,000</b>	<b>\$40,000</b>	<b>\$80.00</b>	<b>\$0.80</b>		<b>36%</b>
<b>Total cost of production</b>			<b>\$658,500</b>	<b>\$110,260</b>	<b>\$220.52</b>	<b>\$2.21</b>		<b>100%</b>

The analysis in the table shows that:

- The total cost of production for our example capsicum grower is \$220.52 per tonne or \$2.21 per carton.
- The operating costs make up less than half (47%) of the total cost of production.

- The largest component of the total cost of production is the return for labour, management and ownership (owner's labour and profit) at 36% or \$0.80 per carton.

This table is available as a simple calculator. This helps you to use your own figures when calculating cost of production.

## Changing yield and costs

The cost of production calculator makes a sensitivity analysis very easy. For example if the crop yield changes, the cost of producing the product will change. An example of this is shown below:

Crop input costs (\$)	YIELD (t/ha)		
	80	100	120
36,720	\$2.77	\$2.22	\$1.85
30,600	\$2.77	\$2.22	\$1.85
24,480	\$2.75	\$2.20	\$1.84

If crop input costs remain at \$30,600, then this table shows a poor yield (80 t/ha) will increase the cost of production to \$2.77, while a good yield (120 t/ha) will lower the cost of

production to \$1.85 per carton. If the price for the product is fixed, the profit will increase or decrease depending on yield.

## Using cost of production to make decisions

Knowing your cost of production can be very useful for a range of farm decisions. Cost of production provides information, which can help answer a range of questions.

For example:

- At what price will I make a profit?
- At what price will I cover my input costs?
- What price do I need to harvest the crop and sell it?

If a vegetable grower knows the cost of producing all of their crops and is developing new enterprises, selling crops

all year and sowing new crops, this knowledge can be used to decide:

- Whether to grow a crop
- When to harvest a crop
- Whether or not to harvest the crop and sell it
- Whether to invest capital in a new crop

## Should I harvest or cut my losses?

*Sometimes, the price available at harvest is not attractive. Knowing your cost of production can help you make the decision whether to harvest, wait longer or plough in the crop.*

This can be a difficult decision, but it may be more profitable to plough in the crop than harvest.

It is important that you focus on the costs you face now, i.e. harvesting, packing and transporting the crop to market, not the costs you have already spent, i.e. crop input, land rent and capital costs. In this situation, the costs you have already spent are what economists call “sunk costs”, i.e. they are already gone and you cannot get them back.

Using the figures from our example cost of production calculation above, you can see in the table below that it is still worth harvesting the crop in scenario A even when

the price is well below the cost of production i.e. you can reduce your loss. However, in scenario B, the loss incurred when you harvest is greater than that incurred if you do not harvest.

Note:

- Calculations are presented per carton.
- Deficit = price less total cost of production.
- Actual return for labour, management and ownership (L, M & O) = price less crop input costs, post growing costs, cost of ploughing-in, overhead costs and capital costs.

	SCENARIO A		SCENARIO B	
	Harvest	Plough-in	Harvest	Plough-in
Price	\$1.20	\$0.00	\$0.28	\$0.00
<b>Cost of Production</b>				
Crop input costs	\$0.61	\$0.61	\$0.61	\$0.61
Post growing costs	\$0.32		\$0.32	
Cost of ploughing-in		\$0.03		\$0.03
Overhead costs	\$0.10	\$0.10	\$0.10	\$0.10
Capital costs	\$0.37	\$0.37	\$0.37	\$0.37
Return for labour, management & ownership	\$0.80	\$0.80	\$0.80	\$0.80
<b>Total cost of production</b>	<b>\$2.21</b>	<b>\$1.92</b>	<b>\$2.21</b>	<b>\$1.92</b>
<b>Deficit</b>	<b>-\$1.01</b>	<b>-\$1.92</b>	<b>-\$1.93</b>	<b>-\$1.92</b>
<b>Actual return for L, M &amp; O</b>	<b>-\$0.21</b>	<b>-\$1.12</b>	<b>-\$1.13</b>	<b>-\$1.12</b>

The key principle is that the extra income (price of crop) has to be greater than the extra cost of harvesting, packing and transport (post growing costs = \$0.32 per carton) less the cost of ploughing it in (\$0.03 per carton). Thus, in this example the price would have to fall below \$0.29 per carton (scenario B) before the crop is not worth harvesting.

This is an extremely low price and, obviously, one at which you would not even consider growing the crop in the future, if it were to continue.

In this example, the price at which it is still profitable (reduce loss) to harvest is very low because the post

growing costs are such a low percentage (15%) of the total cost of production. However, these costs are often a much higher percentage of the total cost of production in other crops. Thus, the price for these crops would not have to decrease anywhere near as much as the example crop before it would not be worth harvesting.

Finally, knowing your cost of production helps you answer the financial component of the decision to harvest or not, but before making the decision you need to consider the consequences for your customers (contractual obligations, continuity of supply and reliability) and your production system (rotation, disease and weed impacts).



## Should I grow a new crop?

When thinking about growing a crop, you can estimate the total cost of production, then, if the price offered does not cover all of the costs, you can ask yourself:

- Is there a chance my yields may be a bit higher?  
This will reduce the unit cost.
- Am I prepared to accept a lower price and not cover all of my costs? That is, profit may not be as high as I would like, or we may not earn a full return on our capital.

By calculating the full cost of production, the grower will have a reference point on which they can base these decisions.

An example cost of production calculation for growing a fresh herb crop (per bunch) is provided in the table below.

COST OF PRODUCTION	COST (\$)	PROPORTION (%)
Crop input costs	\$1.43	20%
Post growing costs	\$0.80	11%
Overhead costs	\$0.25	4%
Capital costs	\$2.52	36%
Return for labour, management & ownership	\$2.00	29%
<b>Total cost of production</b>	<b>\$7.00</b>	<b>100%</b>

The cost of production calculation has been done using the same calculator as the capsicum example above, however in this example, the grower has to make a \$400,000 investment in infrastructure to grow the new crop, which has a total cost of production of \$7.00 per bunch. Thus, capital costs are the largest component (36%) of the cost of production at \$2.52 per bunch.

In this example, the cost of production at \$7.00 per bunch was well above the price offered and the grower decided not to proceed with the investment. A thorough knowledge of cost of production prevented them making a poor decision.

## Conclusion

Knowing and understanding your cost of production is an essential element of running a successful business. This case study has demonstrated how to calculate the cost of production and how to use that knowledge to help make sound financial decisions, in the short-term (harvest or not?) and in the long-term (invest in a new crop).

The first step now, is to gather together your financial records and use the calculator provided to calculate your cost of production.

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### *Disclaimer*

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