11 ANALYTICAL TOOLS

This section discusses the various analytical tools available to assist with farm business decision making and provides a summary of each tool's strengths and weaknesses.

11 ANALYTICAL TOOLS

The farm business management budgets covering liquidity, efficiency and wealth, outlined in section **5, Module 2**, provide a sound guide for measuring farm financial performance. These measures are fundamental to analysing past and present farm business performance and can provide a basis for future planning. A variety of analytical tools are available to do this future analysis and help guide your business' strategic planning and decision making. However, like any analytical modelling, these tools are only as good as the information used in them, so you need a good set of records to ensure these measures are realistic.

KEY POINTS

- There are a number of analytical tools that can be used for effective farm business decision making.
- Be aware of these tools and select the best for the types of decisions you are making.
- Understanding these tools will help you select an adviser, if needed.
- The best decisions are made when given the best information, but risk and uncertainty also have to be considered.

Using these analytical tools should clarify the potential outcomes of different strategic choices available to your business. Use of these tools will not guarantee your success, but will improve decision making which will increase the probability of your business being successful. If you do not wish to develop your skills in this area, at least you will be better informed when choosing an appropriate adviser, knowing what questions you should be asking and the correct measures to use to answer them.

These analytical tools are similar to flight simulators used to train pilots, refining and testing their skills under different scenarios without the fear of risk or damage to passengers and aircraft. The tools in this section provide you with the same ability to develop a 'business simulator' to clarify questions such as:

- What are my break-even yields?
- How sensitive are seasonal outcomes on my profitability?
- Which farm plan has the lowest risk?
- Those important 'what-ifs' e.g. 'What would happen to the business if I purchased the neighbour's property?'

These tools bring a greater understanding of what the future may hold for your business.

11.1 ANALYTICAL TOOLS: ADVANTAGES AND DISADVANTAGES

The aim of this section is to illustrate what is possible, and to raise awareness of how to answer high-level questions you may have of your business. The analytical tools identified to be of most use for farm business management are listed in Table 11.1. The advantages and disadvantages of each tool are listed as a quick reference for selecting the most appropriate tools to answer your business questions.

Most of these analyses can be undertaken using computer based spreadsheets. While some of these tools are quite straightforward, such as partial budgets, others are more complex and will require an understanding of how to build budgets and mathematical models in a spreadsheet in order to undertake the analyses accurately. Alternatively, software programs can be used to undertake these more complex analyses.

Table 11.1 also indicates which of these programs could potentially provide the best method for calculating each analysis.

Table 11.1: Farm Business management analytical tools

Analytical tool		Questions best answered by this tool	Advantages	Disadvantages	How best calculated?	
					Using a Spreadsheet	Using P2PAgri
1. Sensitivity analysis	Gross margin sensitivity analysis	• What effect do changes in price and yield have on gross margins?	• Indicates the sensitivity of gross margins to price and yield. • Easy to calculate.	• Should not be used to determine cost of production, as not all costs are taken into account in gross margins.	Easy	Once data is entered, these analyses are straightforward
	5% shift whole farm sensitivity analysis	• What variables have a significant impact on whole farm profitability? • Where should tactical management be focused to have the greatest impact on profit?	• Provides a simple 'first look' at those variables that have the greatest impact on farm net profits.	• Does not take into account the true variability or each variable, and so does not provide a complete understanding of risk.	Challenging	
	Whole farm modelling of seasonal outcomes	• Is the farming business viable given a range of season? • At what movements in price and yield does the business make losses?	• An excellent test to assess farm business viability. • Provides a good understanding of the business' financial capability.		Challenging	
	Whole farm risk profile	• What farming system provides the best risk profile? • What season is needed to achieve a break-even? • Which farming system makes the biggest losses and gains?	• A simple concept to illustrate the risk profile of various farm plans. • Provides an understanding of the types of seasons required for the business to break-even.	• Need to have a good understanding of the production levels given various seasonal outcomes. • Does not model all risks such as succession and relationship breakdown.	Challenging	
	Monte Carlo business simulation model	• What is the risk profile when comparing the various farming systems? • How much variability is associated with each farming system?	• Provides a comprehensive understanding of the financial risk profile of the business. • Provides results using probabilities.	• More difficult to interpret probability results. • Requires skill to obtain validated results. • Does not model all risks. • Better suited as a research tool for farm business management than for farm consulting.	Challenging (using @Risk)	
2. Partial budget		• What will be the financial benefit or loss of a change in the business where the impact is experienced in the first year?	• It is a simple concept to use once the solution is clearly understood. • Can be applied to many farming decisions.	• Only useful for solutions that can be implemented in a one-year time frame.	Easy	
3. Break-even analysis		• What prices, yields or costs have to occur before the business is at a break-even point?	• Easy concept to understand • Provides simple insight into major farming business decisions.	• Needs a good understanding of the business and be a good modeller.	Challenging	Once data is entered, these analyses are straightforward
4. Scenario analysis		• What is the 5-year plan for the business and how does that compare with other possible plans? • By assessing those 'what-ifs', which one provides the greatest estimated financial rewards? • What is the impact on liquidity, efficiency and wealth creation of all the scenarios being considered?	• Provides clear insight of the likely financial outcomes of all 'what-if' questions. • Models the full range of farm business management tools for liquidity, efficiency and wealth changes.	• Needs a good understanding of the business.	Challenging	
5. Development budget		• What is the impact of an investment over time (many years)?	• Takes into the account the value of money over time and the effects of discounting.	• Needs a high level of spreadsheet and analytical skills.	Very challenging	Challenging

Source: P2PAgri P/L

11.2 SENSITIVITY ANALYSIS

This is a simple and powerful approach to assess variability and elements of risk. This method can be used for simple analyses, like assessing the effects of yield and price variation on enterprise gross margins, to more complex analyses where the whole farm is modelled to assess the range of expected profit outcomes given seasonal and price variability. This section provides examples of how sensitivity analysis can be used. All examples are based on 'Upndowns Farm'.

11.2.1 Gross margin sensitivity

Table 11.2 shows the wheat gross margin for 'Upndowns Farm' and Table 11.3 shows how this gross margin is affected by changes in yield and price. The results show how sensitive the gross margin is to both yield and price changes, especially when you compare the variation of +10% and -10% change. Note that some costs are yield related, such as harvesting costs.

Table 11.2: 'Upndowns Farm' wheat gross margin

Gross Income ($/ha)	$/ha
4.5 t/ha @ $200/t	900.00
Variable costs	
Seed	24.00
Fertiliser	104.40
Chemical	129.50
Insurance	5.50
Repairs & maintenance	21.70
Casual labour	5.60
Contract harvesting	11.30
Total variable cost	**332.92**
Gross Margin	567.08

Source: P2PAgri P/L

This type of analysis is easily undertaken and a number of software programs are available to provide these results. However, a common mistake is to use this analysis to assess the break-even yields and prices needed by a farming business to make profits or annual net cash flow. You cannot get this important information from a simple sensitivity analysis of a gross margin, as the overhead and finance costs are not taken into account in an enterprise gross margin.

When using this analysis, it is important to note that the probability of prices improving by 10% may be less than the probability of yields improving by 10%. Giving equal weighting to a 10% movement in yield and price may not be a true reflection of what occurs in reality.

'Sensitivity analysis is a very important tool in understanding your risks. If you put in worst case rainfall or yield expectations and realise that this year we won't make any money but that's all…or you might put in worst case yield and it looks like we'd lose a million dollars; if that happens, ouch! I think that sensitivity analysis is really important in working out what parameters really do matter to your business.'

Tony Geddes,
'Yallock', Holbrook, NSW

11.2.2 The '5% shift' whole farm sensitivity analysis

This analysis was used in section **7, Risk Management, Module 3** to illustrate the sensitivities on 'Upndowns Farms' net profit if major variables in the business were shifted by 5%. It is shown again here to illustrate both the approach and the results. Essentially, 'Upndowns Farm' was modelled using P2PAgri and each variable was changed independently by 5%, with the resulting change in farm net profit recorded. The results, ranked according to the impact on farm net profit, are shown in Table 11.4.

These results clearly indicate the factors that most influence the profitability of this business: both commodity prices and yields dominate the top of this table. The exchange rate has the single greatest impact as most grain is traded internationally in $US, so a shift in currency influences all commodity prices. This analysis also illustrates that yields and prices generally have a greater influence on profit than do costs.

This is a useful sensitivity tool but care is needed in interpretation. The probability of a 5% change in price and yield may be greater than a 5% change in interest rates, given the relatively stable interest rates in recent years. Considering this analysis more deeply, some of these factors are more likely to experience 5% variability than others. It is more likely this business will experience increased variability in yield and price than in costs. Those items at the top of the list in Table 11.4 tend to be price and yield related, so the impact of these variables on farm profitability is even greater than is indicated by the 5% shift.

11.2.3 Whole farm modelling of seasonal conditions

An effective way to assess the risk profile of a farming business is to model the effect of seasonal change on net profit. The seasonal effect on profit and loss is modelled using 'Upndowns Farm'. The results, shown in Table 11.5, indicate that cropping income is more vulnerable to seasonal conditions than livestock income. As most seasons will be in the range of Decile 3 to 7 growing season rainfall, these results illustrate that the business will remain profitable and viable. This demonstrates that this business is well insulated from seasonal variability and has a good risk profile. If a farm

Table 11.3: A wheat gross margin affected by yield and price changes

Yield		4.05t/ha	4.50t/ha	4.95t/ha
Price		-10%	Average	+10%
-10%	$180/t	$396	$477	$558
Average	$200/t	$477	$567	$657
+10%	$220/t	$558	$657	$756

Source: P2PAgri P/L

Table 11.4: Sensitivity analysis: effect on net farm profit (before tax) of a 5% change in value

Factors		Original value	New value	Change in value	Net profit increase	Rank
Exchange rate	$US/$A	0.90	0.86	0.04	51,464	1
Lambing %	%	100	105	5	20,980	2
Prime lamb prices	$/hd	110	115.5	5.5	16,581	3
Canola price	$/t	520	546	26	15,616	4
Canola yield	t/ha	2.0	2.1	0.1	15,616	5
Wool price	$/bale	1,200	1,260	60	11,642	6
Wool production	kg	37,234	39,096	1,862	11,642	7
Interest rates	%	8.5	8.075	0.425	11,050	8
Wheat price	$/ha	200	210	10	8,213	9
Wheat yield	t/ha	4.5	4.725	0.225	8,213	10
Bean yield	t/ha	3.8	3.99	0.19	7,529	11
Bean prices	$/t	250	262.5	12.5	7,529	12
Chemical costs	$	149,055	141,602	7,453	7,453	13
Permanent wages	$	124,600	118,370	6,230	6,230	14
Feed barley yield	t/ha	4.5	4.725	0.225	5,751	15
Feed barley prices	$/ha	180	189	9	5,751	16
Fertiliser costs	$	108,841	103,399	5,442	5,442	17
Living expenses	$	87,000	82,650	4,350	4,350	18
Malt barley price	$/t	200	210	10	3,623	19
Malt barley yield	t/ha	4.5	4.725	0.225	3,623	20
Machinery ownership cost	$	61,300	58,235	3,065	3,065	21
Chickpea price	$/t	$250	262.5	12.5	1,875	22
Chickpea yield	t/ha	2.5	2.625	0.125	1,875	23
Fuel costs	$	35,000	33,250	1,750	1,750	24
Insurance	$	31,331	29,764	1,567	1,567	25
Repairs & maintenance	$	26,000	24,700	1,300	1,300	26
Livestock costs	$	25,335	24,068	1,267	1,267	27
Rates and taxes	$	22,500	21,375	1,125	1,125	28
Calving %	%	100	105	5	450	29
Vealer price	$/hd	450	472.5	23	405	30
Account fees	$	6,000	5,700	300	300	31

Source: P2PAgri Pty Ltd

generates a loss in a Decile 3 year, it may indicate that risks are not as well managed and effort needs to be put into assessing strategies to improve risk management in the business.

This analysis can be taken one step further by including price variability. Table 11.6 shows the impact on net farm profit of price and yield variations experienced in Decile 3, 5 and 7 events. This models the extremes that are possible in 'Upndowns Farm' and indicates that net farm profit varies widely from $76k to $806k. As no losses are expected even in an extremely poor Decile 3 event of prices and seasons, the risk profile of this farming business is very good. It is not uncommon for a farming business to experience losses when a Decile 3 occurs in both seasonal event and commodity prices, so this is a good result.

Table 11.6: Whole farm estimate of seasonal and price outcomes

Season & price	Poor Decile 3	Average Decile 5	Good Decile 7
Farm gross farm income	1,257,109	1,582,129	1,987,654
Total costs	952,978	952,978	952,978
Farm EBIT	**304,131**	**629,151**	**1,034,676**
Finance costs	227,842	227,842	227,842
Farm net profit before tax	**76,289**	**401,309**	**806,834**

Source: P2PAgri Pty Ltd

11.2.4 Whole farm risk profile

Another way to identify the spread of expected net farm profits is by assessing the whole farm risk profile, as shown in Figure 11.1. The only variable changed in this 'Upndowns Farm' example is seasonal expectations. Commodity prices and cost expectations have remained constant. This graph illustrates the expected risk profile of this business given the range of seasons that could occur. It shows that this business is profitable when it experiences a Decile 3 or above season, and is very profitable in conditions above Decile 7.

Table 11.5: Whole farm estimate of seasonal outcomes

	Season		
	Poor Decile 3	Average Decile 5	Good Decile 7
Cash Income:			
Wheat	146,000	164,250	182,500
Malt barley	102,240	115,020	127,800
Feed barley	102,240	115,020	127,800
Canola	255,528	312,312	312,312
Beans	118,875	150,575	158,500
Clover	21,000	21,000	21,000
Chickpeas	37,500	37,500	37,500
Prime lambs	171,819	171,819	171,819
Self-replacing merinos	526,703	526,703	526,703
Cattle	10,500	10,500	10,500
Gross farm income	**1,454,565**	**1,582,129**	**1,629,134**
Cash production expenses:			
Cropping variable costs	312,736	312,736	312,736
Livestock variable costs	213,789	213,789	213,789
General overhead costs	256,800	256,800	256,800
Non cash production expenses:			
Managerial allowance	120,000	120,000	120,000
Depreciation	49,653	49,653	49,653
Farm EBIT	**501,587**	**629,151**	**676,156**
Interest:			
Interest on existing farm loans	227,542	227,542	227,542
Bank fees	300	300	300
Farm net profit before tax	**273,745**	**401,309**	**448,314**

Source: P2PAgri Pty Ltd

This modelling technique is also very useful when a major strategic decision is being considered. In the example shown in Figure 11.2, a continuous cropping system is modelled for 'Upndowns Farm' with the following major assumptions:

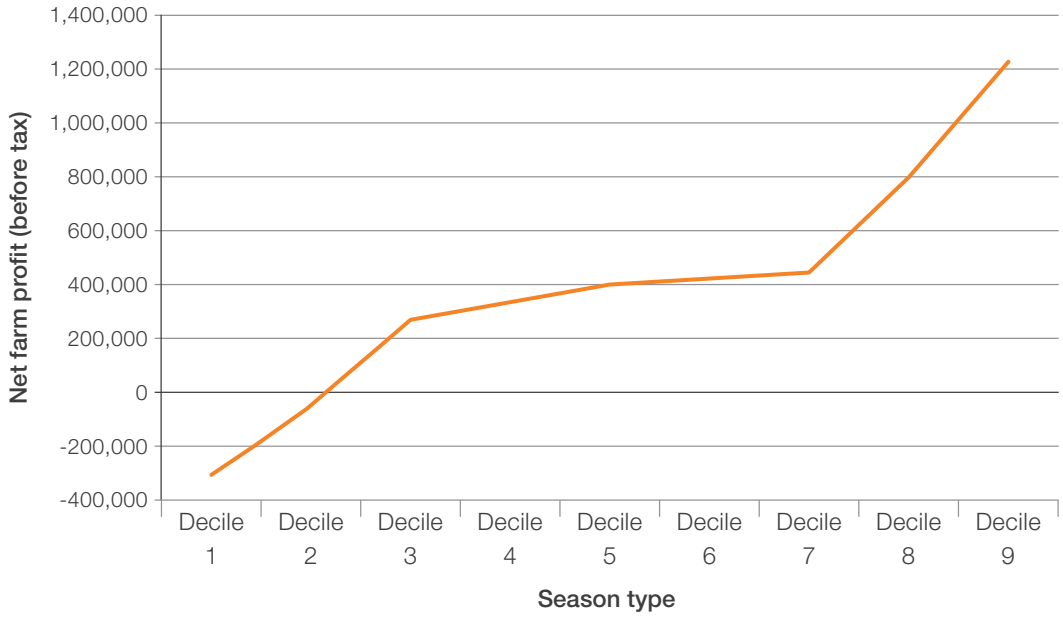
- All livestock are sold and machinery value is doubled.
- Surplus capital left over from selling livestock is used to purchase additional machinery and reduce debt.
- With pastures changed to crops, the cropping variable costs are increased by 10% to represent the increased use of spray and bagged nitrogen.
- Permanent labour used in the business has also been doubled.

Figure 11.2 shows the comparison of the mixed farming system currently being used on 'Upndowns Farm' with a continuous cropping system that could be adopted. The modelling clearly shows that:

- The continuous cropping system is only financially equivalent to the mixed farming system when a Decile 9 season is experienced.
- The risk profile of the continuous cropping system is higher, as profits are only experienced at seasons above Decile 4.
- Significant losses are experienced below Decile 4, whereas the mixed farming system only experienced losses below Decile 2.
- The continuous cropping system is estimated to experience greater losses in the poorer seasons.

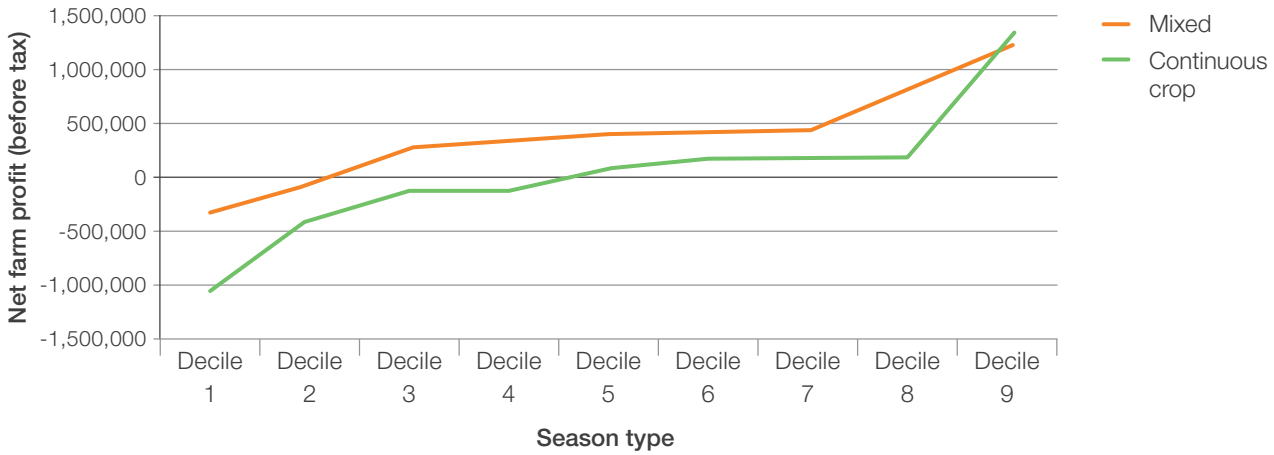
This analysis appears to indicate that a move to a continuous cropping system for this farming business would be a very poor business decision. NB. This result is given for demonstration purposes only, and a similar analysis on your business may not reflect the same outcome (Hunt, 2014).

Figure 11.1: Farm net profit (before tax) for a mixed farming system



Source: P2PAgri P/L

Figure 11.2: 'Upndowns Farm' net profit (before tax) compared to a continuous cropping system



Source: P2PAgri P/L

11.2.5 'Monte Carlo' business simulation model

One modelling approach uses a probability-based method, known as Monte Carlo simulation. This is where major variables of the farming system are studied to determine their expected distributions, or probability of occurrence. The distribution of yields and prices for each crop type, and the variation of the major costs, are studied and determined. The relationship between these major variables (correlation) is also determined and allowed for in the modelling. The Monte Carlo simulation then uses a random number generator to determine an estimated result for each season with yield, price and costs generated to reflect reality for that season. The model is then run for many seasons (say 1,000 seasons) to determine the distribution of the likely outcomes such as farm net profits or cash flow.

A study conducted by Nicholson (2012) used this method to model the comparison of a continuous cropping system against a sheep farming system on a farming business in southern Victoria. Figure 11.3 indicates the distribution of both farming systems with the mean and mode profit per hectare. This study concludes that if the comparison was undertaken given only average expectations, the cropping system would generate an average of $419/ha profit and the sheep system an average of $352/ha profit. It could be concluded the cropping system was the most profitable. However, when taking into account the expected volatility and whole range of outcomes, the mode is assessed. This is the value that appears most often in a set of possible outcomes. The mode result of $290/ha profit for the cropping system was lower than the mode for the sheep system of $368/ha profit. Once risk is modelled and considered, the sheep system provided better farm profit more often than the cropping system. The probabilistic budgeting methods that simulate the impact of risk are useful as they reveal both returns and the risks associated with those returns.

While this method of risk simulation has been available for some time, it is only just beginning to be used in farm business management research and more recently, by some farm business advisers with their farmer clients.

Figure 11.3: Distribution of profit for a cropping and sheep farming system

Source: Nicon Rural Services

11.3 PARTIAL BUDGETS

Partial budgeting is an analysis that focuses only on those parts of the business that would be affected if a simple change were implemented, such as leasing more land. It compares the gains (added income and saved costs) of such a change, against the losses (income lost and added costs) once the change is fully operational, known as the 'steady state'. Table 11.7 indicates the framework for constructing a partial budget. The advantage of a partial budget compared to a whole farm profit and loss budget is that is can be undertaken more quickly and easily as it requires less data.

To demonstrate a partial budget, a 'what if' question is asked of the 'Upndowns Farm': 'What would be the effect on farm profitability if the prime lamb enterprise was replaced by an expanded self-replacing merino enterprise?' The results, shown in Table 11.8, are based on the following assumptions:

- Self-replacing merino gross margin is $56/DSE.
- Prime lamb gross margin is $45/DSE.
- Total DSE in the current prime lamb flock is 1,720DSE.
- Asset value of the prime lamb enterprise $168,250 or $98/DSE.
- Asset value of the self-replacing merino enterprise is $806,250 or $112/DSE.
- Opportunity cost of capital is 10%.
- There is no change in the pasture program.

This analysis would indicate that the farm net profit should improve by $18,920 if the prime lamb enterprise were replaced by an expanded self-replacing enterprise. However, this figure alone does not tell if the change is a good use of capital. We need to estimate the return on the extra capital invested to make the change.

In this case, the 1,720 extra merino DSEs are worth $24,080. This is calculated by taking the asset value of the merinos of $112/DSE and subtracting the asset value of the prime lambs of $98/DSE, which gives $14/DSE added capital. This $14/DSE is multiplied by the added 1,720DSE required, giving $24,080. An extra $24,080 is invested in sheep as a result of this change. The return on extra capital is $18,920 ÷ 24,080 = 79%. The return on the extra capital clearly covers the 10% opportunity cost of the capital.

Other issues to consider are the effects on:

- Enterprise mix, as more enterprises help spread risk. The change from prime lambs to self-replacing merinos increases exposure to wool price volatility.
- Labour and management requirements.

Table 11.7: A partial budget framework

Gains	Losses
Extra income + saved costs	Extra costs + lost income
= Total gains	=Total losses
Net gain or loss = Total gains – Total losses	

Source: P2PAgri Pty Ltd

Table 11.8: A partial budget example

Gains		Losses	
Extra income:		Extra costs:	
Additional gross margin of 1,720 DSE @ $56/DSE = $96,320		Added merino capital opportunity cost any extra cost allowed for in gross margin.	
Saved costs:		Lost income:	
Any saved costs allowed for in gross margin		Lost gross margin of 1,720 DSE @ $45/DSE = $77,400	
Total gains	**$96,320**	**Total losses**	**$77,400**
Net gain or loss = Total gains – Total losses			
= $96,320 - $77,400 = $18,920			

Source: P2PAgri P/L

11.4 BREAK-EVEN ANALYSIS

Break-even analysis is of use when particular variables are identified as crucial to the business, to determine what these variable values need to be for the business to achieve break-even. Break-even is defined as being achieved when the business has a positive cash flow, a required return on managed capital, or a level of farm net profit that is as good as an alternative strategy.

11.4.1 Using the partial budget

Using the partial budget analysis discussed in 11.3, it would help to know what the prime lamb price would have to be before a break-even was achieved between expanding the self-replacing merino enterprise and maintaining the current balance. This analysis was undertaken using an average prime lamb price of $110/hd. Using a spreadsheet to perform the break-even analysis, the answer is that prime lamb prices would need to increase to $127.50/hd to be as rewarding per DSE as the self-replacing merino activity. As a manager, you would need to make a judgement on whether this break-even price was achievable in average conditions. This provides valuable added information to allow a sound decision to be made.

11.4.2 Cost of production

Cost of production, covered in section **5.2.6, Module 2**, is also a form of break-even analysis, as it assesses the cost of production given an average productivity level and the option selected to allocate overhead and finance costs. The example shown in Table 11.9, based on 'Upndowns Farm', indicates that the cost of production to grow wheat is $124.38/t. For this enterprise to be profitable, the price of wheat needs to be above this figure.

11.4.3 Target yield and price

This is an analysis which could help drive tactical goal setting to achieve specific profit levels for the business. Again using 'Upndowns Farm' as an example, and using the P2PAgri program, these profit levels could be determined by analysing the following two variables:

- Target yields
- Target prices

When doing this analysis, you need to determine how you are going to allocate overhead and finance costs as well as the profits. Once you have selected a method, then the following tables can be used for the calculations. This example shows the target yields (Table 11.10) and target prices (Table 11.11) needed for 'Upndowns Farm' to achieve a $400,000 net farm profit (before tax), representing a 5% return on equity.

These targets may not be achievable, but it does provide some insight into the yields and prices needed in order to achieve this profit level. Once these are determined, they can be set as goals to be achieved by the business.

Table 11.9: Cost of wheat production allocating overheads by % land area

Enterprise	Wheat
Enterprise area	500ha
Percentage of total area	14%
Wheat production	1,600t
Variable costs	$150,000
Overhead and financial costs	$350,000
Cost of wheat production	$124.38/t

Source: P2PAgri Pty Ltd

Table 11.10: Target yields to achieve a net farm profit of $400,000

	Budgeted prices	Target yields
Wheat	$200/t	6.1t/ha
Malt barley	$200/t	6.4t/ha
Feed barley	$180/t	5.1t/ha
Canola	$520/t	2.0t/ha
Beans	$250/t	4.0t/ha
Clover	$2.50/kg	400kg/ha
Chickpeas	$250/t	3.4t/ha

Source: P2PAgri Pty Ltd

Table 11.11: Target prices to achieve a net farm profit of $400,000

	Budgeted yields	Target prices
Wheat	4.5t/ha	$270/t
Malt barley	4.5t/ha	$287/t
Feed barley	4.5t/ha	$203/t
Canola	2.2t/ha	$475/t
Beans	3.8t/ha	$261/t
Clover	300kg/ha	$3.19/kg
Chickpeas	2.5t/ha	$343/t

Source: P2PAgri Pty Ltd

Table 11.12: Impact of seasonal variation on profitability

Farm management profit and loss	2015	2016	2017	2018	2019
Cash income:					
Wheat	164,250	319,500	524,400	163,800	129,150
Malt barley	72,450	27,500	26,800	38,700	
Feed barley	115,020	54,000	40,320	451,170	451,170
Canola	115,020	54,000	40,320	451,170	20,250
Beans	150,575	255,500	18,750	26,125	148,200
Clover	21,000				
Chickpeas	37,500				
Prime lambs	171,819	171,819	171,819	161,799	156,789
Self-replacing merinos	526,703	526,703	526,703	526,703	526,703
Cattle	10,500	10,500	10,500	10,500	10,500
Non cash income:					
Net livestock movements					
Farm gross farm income:	**1,582,129**	**1,665,250**	**1,463,904**	**1,510,357**	**1,677,992**
Cash production expenses:					
Cropping variable costs	309,436	309,730	312,820	307,082	327,640
Livestock variable costs	218,574	222,204	217,089	218,904	216,429
General overhead costs	256,800	256,800	256,800	256,800	256,800
Non cash production expenses:					
Managerial allowance	120,000	120,000	120,000	120,000	120,000
Depreciation	61,300	55,170	49,653	44,688	40,219
Farm EBIT	**616,019**	**701,346**	**507,542**	**562,883**	**716,904**
Interest:					
Interest on existing farm loans	242,435	235,282	227,542	224,230	222,679
Interest on new farm loans					
Interest on overdraft and stock					
Mortgage	22,950	7,069			
Bank fees	300	300	300	300	300
Farm net profit before tax:	**350,334**	**458,694**	**279,701**	**338,353**	**493,925**

Source: P2PAgri Pty Ltd

11.5 SCENARIO ANALYSIS

Scenario analysis is a challenging but very powerful analytical tool. Complex spreadsheets can be developed to undertake scenario analysis. One type of scenario analysis is developing a profit and loss projection for a certain plan and then comparing this to another strategy. The analysis should indicate which scenario provides the best financial result by comparing profitability, efficiency levels and wealth.

The following three scenarios are developed using 'Upndowns Farm' data, to illustrate how scenario analysis can be used to inform business decision making.

Scenario 1: Current plan given seasonal variations

Table 11.12 indicates a possible 5-year scenario to assess the impact of seasonal variations on the business' profitability, with seasons modelled as follows:

- 2015 an average season (Decile 5)
- 2016 a good season (Decile 7)
- 2017 a poor season (Decile 3)
- 2018 an average season (Decile 5)
- 2019 an average season (Decile 5)

The projected net farm profit (before tax), shown in Figure 11.4, indicates the business is expected to be profitable in all 5 years under the current plan, but with some variation due to seasonal expectations.

Scenario 2: Assessing the impact of losing the share farming agreement

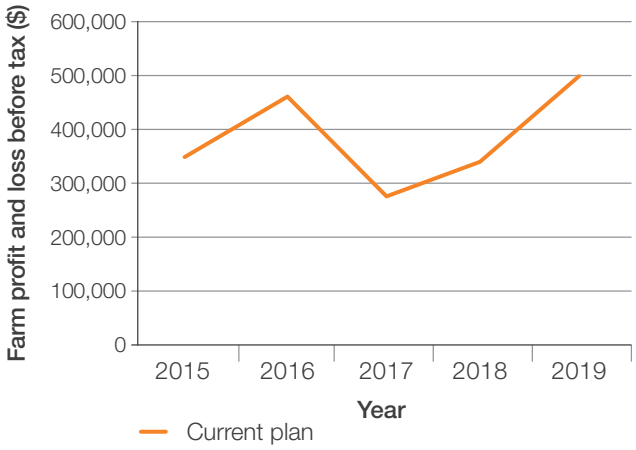
'Upndowns Farm' has 453ha in share farming, representing 24.7% of the total land area managed. There is some uncertainty about the long-term availability of this share farmed area, so a scenario is developed to assess the business risk if this share farming were lost. This second scenario was modelled using P2PAgri software. The expected net farm profit compared to the current plan is shown in Figure 11.5.

Losing the share farming is not catastrophic to this business. The result indicates that even though losing the share farming would decrease net farm profits by about half, the business would still remain viable in all seasons. Additional information from this scenario analysis is:

- The return on total capital managed (ROMC) is estimated to fall from 5% to 3%, indicating the business will be less efficient.
- The 5-year projections on the balance sheet indicate that losing the share farming in the first year and not replacing it would reduce the balance sheet by $545k over the 5 years, a loss in equity of 1%.
- The cumulative cash held by the business at the end of the 5 years would be reduced by $695k, a 34% reduction of projected figures if the share farming were retained.

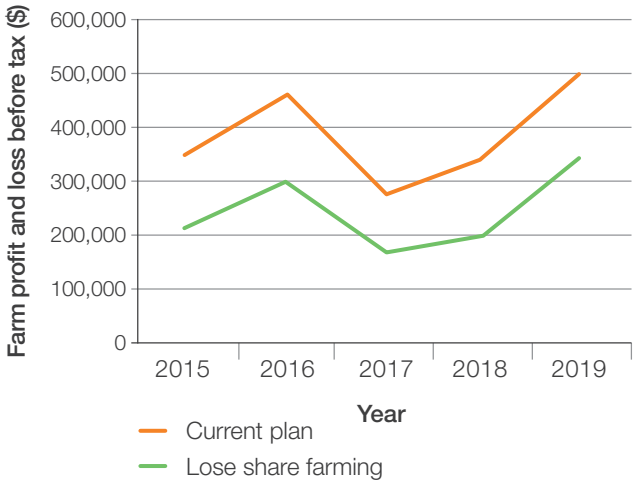
The conclusion for this farm business is that the share farming, while not vital to the business survival, does have a significant impact on financial performance. Strategies should be assessed to either maintain the share farming or look for other share farming or leased land to replace this land if it is lost to the business.

Figure 11.4: Farm net profit projections given the current plan



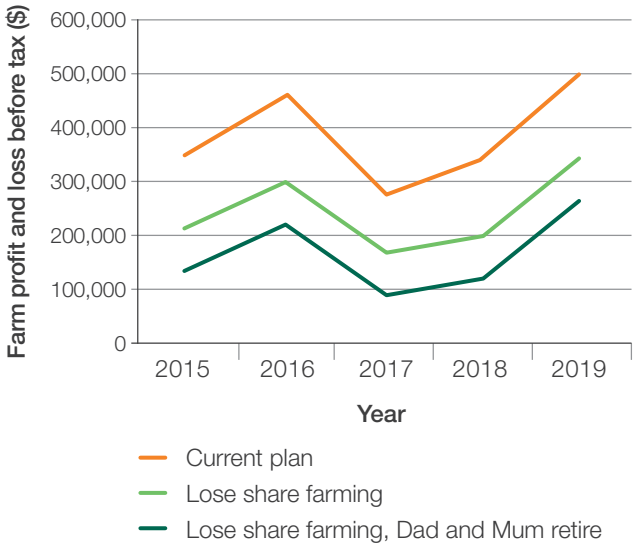
Source: P2PAgri Pty Ltd

Figure 11.5: Farm net profit projection if share farming were lost



Source: P2PAgri Pty Ltd

Figure 11.6: Impact of retirement plan on 'Upndowns Farm' profitability



Source: P2PAgri Pty Ltd

Scenario 3: Can the business fund retirement plans and afford to lose the share farming agreement?

Within the next year, the older generation on 'Upndowns Farm' want to move into the local town to retire but will not be eligible for the aged pension for the next 5 years. They will need $300,000 investment to help fund their move into town and need an annual income of $50,000 to allow them to live off-farm. The $300,000 is to be borrowed as an interest only loan at 8% (nominal). This scenario analysis assesses whether the farm business can fund this retirement plan based on the current business structure, against the worst case scenario of losing the share farming. Figure 11.6 indicates the estimated effect on the farm's net farm profit.

The impact of the parents retiring and losing the share farming, while not catastrophic, does significantly decrease the farm's financial performance. This analysis is useful as it shows that despite these two negative impacts on the business, it remains viable even during challenging seasons.

Scenario analysis is a very useful and powerful tool to support the decision making process in your business, particularly at the strategic level. Its capacity to help farmers analyse potential scenarios can significantly impact on the business' long-term sustainability.

11.6 DEVELOPMENT BUDGETS

More sophisticated analytical tools such as 'development budgets' help answer questions about significant investments that take a number of years to implement before full economic benefit is achieved. Examples include the development of a new vineyard, building stock numbers in a livestock enterprise, or a change in business structure, strategies that will all take a number of years to implement. This type of analysis requires an understanding of discounting and will produce significant investment measures such as net present value (NPV), internal rate of return (IRR) and benefit cost ratio (B/C ratio). Professionals with investment analysis skills generally use this type of analysis technique (Malcolm, B et al, 2005).

Action points

- List the business decisions you are currently contemplating for your farm. Which analytical tool would best determine their impact on the farm business?
- List advisers in your area who could help model your most important business questions.
- Ask neighbours for referrals to advisers who could help, if you do not know where to start.
- Investigate analytical tools available for farm business management.