Project No. DG11003

(30 July 2012)

Final Report

Modelling to Test Management Strategies and Performance in the Dried Grape Enterprise

Report by

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Purpose of report

This report provides a description of BizMod for Dried Grapes and an example scenario demonstrating how the product might be used to assist the dried grape industry test management strategies and performance of a dried grape enterprise.

Funding Source

This project has been funded by HAL using the Dried Grape levy and matched funds from the Australian Government.

30th July 2012

Disclaimer

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Abbreviations

DCF – Discounted Cash Flow

DPP – Discounted Payback Period

GM – Gross Margin

IRR – Internal Rate of Return

NPV – Net Present Value

Definitions

Discounted Cash Flow (DCF) is the process of valuing an investment by discounting its future cash flows by a chosen discount rate so as to determine the investment's value in today's dollars.

Discounted Payback Period (DPP) is the length of time required for an investment's discounted cash flows to equal its initial cost. An investment is acceptable if its discounted payback period is less than a particular number of years e.g. a grower may invest $16 000 in year 1 to establish a dried grape enterprise and expect the discounted cash flows from the enterprise to pay back the $16 000 by year 10.

Gross margin is the difference between revenue (price x quantity produced) and total variable (direct) costs.

Required rate of return (RRR) or the discount rate is the rate used to calculate today's value of future cash flows. Inflation generally means $100 today is worth less in one years' time. If a person had $10 000 to invest they could place it in a risk free investment such as a bank at 5.5% interest rate less inflation of 3% leaving them with 2.5% (excluding taxation). An investment in agriculture has risk attached to it so the person would want to be compensated for that risk by getting a higher return on their money than they might by having cash in the bank. The person needs to decide what return on investment they would expect from an investment in dried grapes.

Internal Rate of Return (IRR) is closely related to NPV. It represents the single rate of return that summarises the merits of a project. It is referred to as 'internal' because it depends only on the cash flows from the productive assets in which the investment is made.

Net Present Value (NPV) is the difference between an investment's market value and its cost i.e. it is a measure of how much value (measured in $) is created or added by undertaking an investment. In general terms an investment is acceptable if the NPV is positive and unacceptable if it is negative.

Scenario analysis is the determination of particular enterprise situations and settings and what happens to key performance measures such as gross margin, Net Present Value and Discounted Payback Period

Sensitivity analysis is the investigation of what happens to key performance measures when only one variable is changed.

1 Media Summary

Australian dried grapes; sultana, currants, sunmuscats and raisins, are well regarded by consumers and command a premium price because of their colour and taste. There is emerging interest by existing and potential growers to invest in the production of dried grapes because of the strength of market demand.

The aim of the project is to provide industry with a product that will enable existing and potential growers to test management strategies, operational performance and financial feasibility of the dried grape enterprise consisting of sultanas, currants, sunmuscats and/or raisins.

BizMod for Dried Grapes has been designed and built on commercially available software. It uses iThink® software as the primary user interface with time based multiple simulation capacity. The interface is easy to use with groups in a workshop situation or as an individual user.

It also uses Microsoft Excel® in two ways. Firstly, as an input file to hold detailed data about specific assets and activities related to the enterprise. This allows the iThink model to be less cluttered and complicated to use but allows the user to explore the logic and rationale behind the numbers they are using. Data generated in the Excel® input file can be directly imported to the iThink program saving time and the potential for translation error. Secondly, Excel® is used to receive data from iThink®. This can be in the form of specific enterprise statements or to examine and further develop the comparative data of specific enterprise or investment performance indicators.

While BizMod for Dried Grapes has been built to be easy to use either individually or in group situations, interpretation of output may challenge some people. It is powerful because it will report gross margin (GM), earnings before interest and tax (EBIT) and discounted cash flow (DCF) over a twenty year time frame and provide multiple scenarios and simulations quickly and easily. The product contains a considerable body of industry knowledge.

An investment decision in dried grape production is difficult with many uncertainties, technical complexities and requiring well developed goals. It is generally assumed in the industry that dried grape production is profitable and further investment in the industry is feasible although some uncertainty exists because of lack of methods to test the feasibility of the many scenarios within the industry.

The case study scenario in this report tested a hypothetical situation where an existing grower with 10 hectares of sultanas and 10 hectares of currants purchased 10 new hectares of land and developed a block of sunmuscats for the purpose of producing dried fruit. Many growers will be faced with similar investment dilemmas. Based on the assumptions and data from 9 simulations the proposition of developing 10 new hectares of dried grapes and integrating them into an existing 20 hectare enterprise appears a feasible opportunity.

Every individual grower's situation, goals, assumptions and approach to risk will be different. BizMod for Dried Grapes provides a significant step forward to assist in the enterprise decision making process.

2 Technical summary

The aim of the project is to provide industry with a product that enables existing and potential growers to test management strategies, operational performance and financial feasibility of the dried grape enterprise.

BizMod for Dried Grapes is an easy to use computer model that enables industry to test management strategies and performance of a dried grape enterprise. The model focuses at the enterprise level and allows for a wide variety of enterprise scenarios and simulations to be tested. The model allows for examination of an enterprise comprising sultanas, currants, sunmuscats and/or raisins over a 20 year period.

The model uses two software programs: Microsoft Excel® and iThink®. Microsoft Excel® is used to prepare the detailed data that sits behind the variables in the iThink® model. There are fifty-one variables generated in Excel® that can be directly imported to iThink® making it easier and faster for the user and reducing translation error. The iThink® software allows for multiple scenarios and simulations and retains the data from each run. This data can be viewed in graph or spreadsheet form in iThink® or it can be exported to Microsoft Excel® either by direct data link or by the copy and paste method for further development.

BizMod for Dried Grapes helps growers develop their strategic, operational and investment decisions regarding the dried grape enterprise. Examples of the reporting focus are as follows.

1. Production of dried fruit (dried tonnes)
2. Revenue (price x dried tonnes) also allowing for deductions
3. Direct costs of production
4. Establishment costs
5. Overhead costs
6. Machinery and equipment costs and depreciation
7. Gross margin
8. Earnings before interest and tax (EBIT)
9. Net enterprise income
10. Discounted Cash Flow (DCF), Net Present Value (NPV), Internal Rate of Return (IRR) and Discounted Payback of the investment over a 20 year period.

The case study scenario in this report tests a hypothetical situation where an existing grower with 10 hectares of sultanas and 10 hectares of currants purchased 10 new hectares of land and developed a block of sunmuscats for the purpose of producing dried fruit. Many growers will be faced with similar investment dilemmas.

Based on the assumptions and data from 9 simulations the proposition of developing 10 new hectares of dried grapes and integrating them into an existing 20 hectare enterprise appears a feasible opportunity. The cash flows from the investment were discounted at 6.5 per cent per annum over 20 years. At the end of the period all cash flows from each simulation returned positive figures. The IRR on every simulation was greater than the required rate of return of 6.5 per cent. Five simulations had an IRR of 9 per cent or greater. The average DPP was 16 years, the minimum 14 years (simulation 5) and the maximum 20 years.

Every individual grower's situation, goals, assumptions and approach to risk will be different. BizMod for Dried Grapes provides a significant step forward to assist in the enterprise decision making process.

3 Introduction

In 2002, the Australian Dried Fruits Association commissioned a benchmarking study of dried fruit businesses for the seasons of 2002/03 and 2003/04 (RMCG & Scholefield Robinson 2005). This study compiled a range of useful data about the financial performance of dried fruit businesses in Australia. The study has much useful information about business performance at that point in time however it provides static data that is not easily adapted to sensitivity testing and interrogation by growers themselves particularly for future planning and investment activities.

In response to the need for future planning and investment decisions the industry engaged Scholefield Robinson (2007) to adapt a Microsoft Excel® model developed by the Primary Industries and Resources South Australia (PIRSA 2002) to suit dried grape production. This detailed Excel® based model was designed to enable growers to assess the financial feasibility of development and management of a dried grape enterprise consisting of carinas, sunmuscats and sultana grapes. The model contained significant data about the development and operating costs and income for a dried grape enterprise however it had a number of limitations. It was difficult for individual growers to use because it required a reasonable knowledge and ability in using the Excel® software. It was not able to be used in group learning situations. It was not good at testing the effect of specific events such as the effect of a hail event in one specific year or trends over time in key variables such as yield. It was unable to quickly test multiple changes in variables and retain the output from each test in data and graphical form for immediate discussion in a one on one or group situation.

The most common form of economic determination of farm enterprise profitability is the gross margin analysis carried out by various state government departments (Montecillo & Reeves 2006; Gatrell 2000 are two examples). Gross margins enable easy comparison between farms and are an indicator of profit margin but fail to bring into account the full financial performance of the enterprise and only account for performance in one year rather than the multiple years associated with a perennial horticulture enterprise.

Microsoft Excel® has been used to produce more sophisticated financial and economic analysis (Rural Solutions SA; Hassell & Associates 2000; Rural Solutions 2007). Microsoft Access® has also been used to provide a tool to calculate gross margins, costs of production, cash flow, profit/loss and equity to assist horticulturalists with their financial and risk management planning (AgriGater 2009). Microsoft Excel® and Microsoft Access® are powerful ways to manage numbers for gross margins and to a lesser extent cash flow analysis but they are cumbersome at representing events, trends over time and enterprise structure and they are weak at simulation and scenario analysis.

Benchmarking is a common enterprise or activity-based approach that focuses on the physical/technical processes used and the consequences of those processes in terms of unit revenue and costs, enterprise efficiency and enterprise profitability (Ronan, G. & Cleary, G. 2000). Benchmarking can provide data that builds confidence in the numbers used for modelling enterprise profitability and cash flow analysis.

Recent times have presented challenging conditions for the dried grape industry. Increasing costs of production, water scarcity, price variability and challenging domestic and international trading conditions have led some growers to consider alternative uses of land and resources or to exit dried grape production completely. On the other hand, technology improvements and innovations are providing improved practices and cost efficiencies. Also, Australian grown dried grapes command a premium position in the market place and demand exceeds supply. This presents growers with difficult decisions about technology adoption,

practice change and the merits of further investment in the industry. The overarching context for intensive horticulture is the continuing decline in the terms of trade. To combat this situation, growers need to increase scale and productivity (Barr 2009).

The project objectives were:

1. To build a model using iThink® software that provides sensitivity and simulation analysis of income, operating costs, capital investments associated with the production of dried grape varieties including sultanas, sunmuscats, currants and raisins. The model aims to have a twenty-year time frame with annual time increments. Files provided in itm and itr format.
2. To supply associated Excel® spread sheets and booklets.
3. To provide a training program for selected industry people to be able to operate the iThink® model in a one-on-one and one on many situation.

This project will allow growers to test the implications of further investment in the industry either through redevelopment of old hectares of vines or development of new hectares. As a result of the use of the outputs from this project the industry will be more able to use its collective knowledge, benchmarking data and other quantitative and qualitative data to develop greater insight and more futuristic thinking about enterprise profit drivers, management strategies and future research and development initiatives.

4 Materials & Methods

Primary and secondary research was conducted to gather data and information about the metrics and structure of the Australian dried grape enterprise. A particular emphasis was placed on understanding the activities conducted by growers and the language they used to describe these activities because the model needed to be consistent with the activities and language of the industry and the decisions based around the structure of the enterprise to be managed.

BizMod for Dried Grapes allows the user to test management strategies and performance of hectares of sultana, currants, sunmuscats and raisins over a twenty year time frame. It allows for 'old' hectares to be redeveloped or new hectares to be bought and developed.

BizMod for Dried Grapes uses two commercially available software packages i.e. Microsoft Excel[1®] and iThink[2®] software. There are four Microsoft Excel® files supporting the iThink® model.

Microsoft Excel® is used to prepare the detailed data that sits behind the variables in the iThink® model. The user does not have to use Excel® to prepare data for use in iThink® however the data in Excel® provides a more rigorous analysis and rationale for the numbers used in iThink if that is what is required by the user. Some data generated in Excel® and required in the iThink model can be directly exported from Excel® to iThink® making it easier and faster for the user and reducing translation error.

The iThink® software allows for multiple simulations and retains the data from each run. This data can be viewed in graph or spreadsheet form in iThink® or it can be exported to Microsoft Excel® either by direct data link or by the copy and paste method for further development.

There are three Excel® files used to receive data from iThink®. The first (BizMod_DriedGrape_Statements) receives basic statements of physical and financial performance over a twenty year time frame of the last model run. These can be further developed and/or printed and presented to a third party such as a bank (Appendix 1: Content Details of Excel Files, Appendix 2: Example of the Income Statement Account Structure).

The second Excel® file (BizMod_DriedGrape_EnterpriseKPIs) receives key performance data of the whole enterprise from each model run for analysis and reporting (Appendix 1: Content Details of Excel Files).

The third Excel® file (BizMod_DriedGrape_InvestmentKPIs) receives specific data related to the investment in development of new or redevelopment of existing land (Appendix 1: Content Details of Excel Files).

[1] Microsoft Excel® 1997-2003 version is used to accommodate people who run earlier versions and is sufficient for the degree of complexity of the spread sheets used.
[2] iThink® software is a product of iseesystems. It is a time based stock and flow software product very suitable for modelling and communicating the dynamics of physical and financial systems, www.iseesystems.com

The remainder of this report will focus on a case study scenario that will test a hypothetical situation where an existing grower with 10 hectares of sultanas and 10 hectares of currants will purchase and develop 10 new hectares of sunmuscats. In many industry situations the new land purchased might be that of a neighbour. The main assumptions surrounding the initial base case are summarised below. For further details and the full range of Base Case variables refer to the appendices (Appendix 3: Major Base Case Variables).

- The Base Case (the first simulation) assumes the grower operates 10 hectares each of sultana and currants.
- Price is assumed to be uncontracted which is the lowest price offered in the market place. Price is a function of fruit grade and price per grade. The model has 10 years of industry history on fruit quality to assist assumptions about futures prices paid.
- Yield for mature vines is assumed to be consistent with grower expectations expressed in the Cost of Production Survey (RMCG & Scholefield Robinson 2005), refer to Table 1.
- Direct costs of production (excluding finish drying costs) for mature grapes of each variety are assumed to be $5 838 per hectare.
- Labour is a component of direct costs. The model costs labour at $20.76 per hour and assumes 164 man hours per hectare per year which equates to $3 400 per hectare excluding the activity of finish drying.
- Finish drying is treated as a separate cost related to the amount of dried fruit produced each year.
- Overhead costs (excluding depreciation) are assumed to be $2 490 per hectare.
- Permanent irrigation water of 180ML is owned to cover the existing 20 hectares and additional water will be leased at a cost of $30 per ML.
- The value of machinery and equipment allocated to the enterprise is $250 000 and has been fully depreciated.

5 Results

The data to support the Base Case simulation as outlined in the previous section was collected from discussions with growers during a workshop held on 11th July 2012. Some of the major variables in the Base Case are compared with the Benchmarking Study Cost of Production Survey (RMCG & Scholefield Robinson 2005) to test validity of the data (Table 1). A comparison of the BizMod Base Case (2012) data with the medium data point of the Benchmarking Study suggests a reasonable fit with yield, price, costs and labour accepting that the 2003-04 data has not been adjusted for inflation or seasonal variation.

Table 1: Comparison of major Base Case variables with the Cost of Production Survey (2003-04)

Benchmarks		Benchmarking Data (2003-04)			**BizMod Base Case (2012)**	% Diff from Medium
		Low	Medium	High		
Target yield (Sultana)	dt/ha	6.0	**7.0**	9.0	**7.0**	0%
Target yield (Currants)	dt/ha	5.0	**8.0**	10.0	**8.0**	0%
Target yield (Sunmuscats)	dt/ha	8.0	**10.0**	11.0	**10.0**	0%
Average Price Sultana	$/dt	$1,350	**$1,419**	$1,485	**$1,726**	22%
Average Price Currants	$/dt	$1,800	**$1,829**	$1,892	**$1,719**	-6%
Average Price Sunmuscats	$/dt	$1,400	**$1,464**	$1,530	**$1,748**	19%
Variable (direct) costs	$/ha	$3,232	**$4,017**	$5,055	**$5,838**	45%
Gross margin	$/ha	$2,517	**$4,586**	$6,775	**$7,079**	54%
Overhead costs	$/ha	$1,095	**$1,410**	$2,324	**$2,490**	77%
Operating costs % of revenue	%	52%	**66%**	87%	**64%**	-3%
Labour as a % of Revenue	%	4%	**18%**	35%	**26%**	44%
Owners Labour	$/ha	$2,179	**$2,899**	$3,558	**$3,400**	17%

Note: Figures from the 2003-04 Benchmarking study are a guide only and have not been adjusted for inflation or seasonal variation. They may not reflect current industry benchmarks.

The following section presents the scenario and tests 9 simulations. Each simulation is retained and follows on from the previous one unless a specific note is made.

5.1 Results of each Simulation

5.1.1 The Base Case

The data comparison (Table 1) indicates the Base Case to be conservative. Yield is the same as the medium benchmark for each grape variety and price reflects current market offerings. Variable costs are 45 per cent higher than the medium benchmark. Gross margin is 54 per cent higher and overhead costs are 77 per cent higher. Operating costs as a per cent of revenue are close to medium. Labour as a per cent of revenue is 44 per cent higher and the cost of labour ($/ha) is 17 per cent higher. Overall the data used for the Base Case appears plausible for use in a Base Case modelling situation in 2012.

The first simulation of the Base Case has 20 hectares under management, produces 150 dried tonnes per year, has a gross revenue of $258 330 per year, no debt and an earnings before interest and tax of $91 780 per annum.

5.1.2 Simulation 2: Buy more hectares

Growers are often faced with the decision to either maintain their area under management or increase the scale of their operation. If they decide to maintain the area under management, vines will age, yields may gradually decline and additional funds may be needed to improve machinery and redevelop unproductive vines. If they decide to increase the area under management they will create a debt to be repaid and they will expect a return on the investment made.

The second simulation will test the purchase of 10 hectares of land which will be developed into an operational orchard producing sunmuscat grapes for drying. The additional assumptions are listed below.

- Development costs are assumed to be $25 000 per hectare.
- The cost of new land is assumed to be $6 000 per hectare.
- New machinery to the value of $70 000 is purchased in year 4 to assist in operating the extra 10 hectares and is depreciated over 10 years.
- The required rate of return on the investment is 6.5%

As a result of the change direct costs increased to $5 998 per hectare (+2.75%) most likely because of the extra costs associated with handling and drying the higher yielding sunmuscats. Overhead costs reduced to $1 990 because of the effect of increased enterprise scale and no change to the assumption of no change to overhead costs. Operating costs as a per cent of revenue reduced by 4% as the cost base was lowered because of a 30 per cent increase in production area and a lower overhead cost per producing hectare. Gross margin per hectare increased to $8 438. The discounted payback period was 19 years (Table 2, Appendix 4: Simulation Details and Performance Summary).

5.1.3 Simulation 3: Shift to a contract price

The Base Case and simulation 2 assumed uncontracted prices which are lower than contract prices. Simulation 3 will assume three year contract prices are paid per dried tonne for sultanas (+$130), currants (+$202) and sunmuscats (+$139). While operating costs were unchanged, revenue increased and operating costs as a per cent of revenue reduced to 55 per cent and gross margin increased to $9 755. The discounted payback period reduced to 16 years (Table 2, Appendix 4: Simulation Details and Performance Summary).

5.1.4 Simulation 4: Reduce Variable (direct) costs

In the previous simulation direct costs were $5 998 per hectare. Simulation 4 will assume direct costs can be reduced by 5 per cent to $5 698 per hectare. This lowered operating costs as per cent of revenue a further 2 per cent to 53 per cent and gross margin increased to $10 055 per hectare. The discounted payback period reduced further to 15 years (Table 2, Appendix 4: Simulation Details and Performance Summary).

5.1.5 Simulation 5: Increase yield of new vines

Simulation 5 will assume the yield of the new sunmuscats will be 5 per cent higher than originally thought i.e. 10.5 dried tonnes per hectare. As a result direct costs of production increased to $5 712 (+0.2%) because of the extra tonnage produced but operating costs as a per cent of revenue reduced by 1 per cent to 52 per cent and gross margin increased by 3 per cent to $10 356 per hectare. The discounted payback period reduced to 14 years (Table 2).

5.1.6 Simulation 6: Increase in land and development costs

Simulation 6 will assume the cost of land and development was under-estimated by 20 per cent. Instead the cost of land was set at $7 200 per hectare and the development cost was $30 000 per hectare. Operating costs as a per cent of revenue and gross margin remained unchanged because these costs are capital costs unrelated to production activities. These changes affected the return on investment and the discounted payback period increased to from 14 years in the previous simulation to 16 years (Table 2, Appendix 4: Simulation Details and Performance Summary).

5.1.7 Simulation 7: Price increase

Simulation 7 will assume that because of good orchard management and weather conditions, prices received will be 1 per cent better than expected. As a result, gross margin increased marginally to $10 517 (1.5%) and the discounted payback period reduced to 15 years (Table 2, Appendix 4: Simulation Details and Performance Summary).

5.1.8 Simulation 8: Price decrease

Instead of simulation 7, simulation 8 will assume that because of bad seasonal conditions fruit quality is less than targeted and prices received will be 1 per cent less than expected. Gross margin decreases to $10 196 (1.5%) and the discounted payback period was increased to 16 years (Table 2, Appendix 4: Simulation Details and Performance Summary).

5.1.9 Simulation 9: Bad weather conditions

Simulation 9 will assume poor weather in year 9 will reduce production of sunmuscats only by 50% in that particular year. It will also assume the original contract price settings from simulation 6 and negate the previous two pricing changes. In the year 9 only direct costs of production reduce to $5 564 because less fruit was dehydrated but operating costs as per cent of revenue increase to 66 per cent because the change in direct costs was small relative to the change in revenue. Gross margin was $7 045 per hectare in year 9 only and had the effect of increasing the discounted payback period by one year to 17 years (Table 2, Appendix 4: Simulation Details and Performance Summary).

5.1.10 Simulation 10: Increase Overhead costs

Simulation 10 will assume overhead costs are 20 per cent higher than originally thought ($2 190 per hectare). It will also negate the previous scenario and assume smooth production throughout the 20 year time period i.e. year 9 is a normal year. Operating costs as a per cent

of revenue increase from 52 per cent in simulation 6 to 54 per cent but the discounted payback period remained unchanged at 16 years (Table 2, Appendix 4: Simulation Details and Performance Summary).

5.2 Results of the Scenario Analysis

BizMod for Dried Grapes examines the full enterprise under management, in this case 20 hectares of mature vines with 10 hectares of new vines reaching mature production 5 years after establishment. The model will separate the reports for the full enterprise activities from any new investment because a grower will want to be able to determine the return on the specific investment made apart from existing enterprise activities. The following section reports on the results of the scenario analysis from a whole of enterprise and a return on investment perspective.

5.2.1 Production

The introduction of 10 new hectares of sunmuscats increased total production of dried fruit from 150 to 250 tonnes per year. Average production from all simulations and once all vines were in full production was 243 dried tonnes per year or 8.1 dried tonnes per hectare (Appendix 5: Scenario Performance, Whole enterprise production).

5.2.2 Direct Costs

Total direct costs of production ranged from $672 to $778 per dried tonne once all hectares reached full production. An exception was year 9 ($835 per dried tonne) when the production of sunmuscats was reduced by 50% (simulation 9) (Appendix 5: Scenario Performance, Whole Enterprise Direct costs).

5.2.3 Overhead Costs

General overhead costs include the usual costs of electricity, rates, insurance etc. but also include the water delivery charge imposed by Lower Murray Water. Overhead costs ranged from $1 990 to $2 490 per hectare. The overhead costs decreased as the scale of the enterprise increased i.e. the maximum overhead costs were incurred by the Base Case (Appendix 5: Scenario Performance, Whole Enterprise Overhead Costs - Figure 7).

5.2.4 Operating Costs

Operating costs expressed as a per cent of total revenue changed over time. Once the enterprise reached full production operating costs ranged from a high of 66% (yield reduction of sunmuscats of 50% in year 9 simulation 9) to 47% (1% price increase). The increase in scale helped to lower operating costs over time (Appendix 5: Scenario Performance, Operating Costs - Figure 8).

5.2.5 Gross Margin

The gross margin for the Base Case was $7 079 per hectare. Introducing 10 new hectares of sunmuscat grapes increased the gross margin because more dried tonnes were produced off each hectare of sunmuscats which accounted for one third of the area under management. Other positive simulation changes served to increase gross margin further. A reduction in yield for sunmuscats in year 9 of 50 per cent reduced gross margin to $7 045. The maximum was $10 517 in simulation number 7 (Appendix 5: Scenario Performance, Gross Margin - Figure 9).

5.2.6 Return on Investment

There are three ways to check return on funds invested. The first is Net Present Value (NPV) which is a measure of how much value (measured in $) is created or added by undertaking an investment. In general terms, an investment is acceptable if the NPV is positive and unacceptable if it is negative within an acceptable period of time. The scenario analysis assumed the required rate of return (the discount rate for future cash flows) was 6.5 per cent[3] and the time period under analysis was 20 years i.e. the cash flows from the investment in 10 hectares of sunmuscat grapes for drying were discounted at 6.5 per cent per annum over 20 years. At the end of the period all cash flows from each simulation returned positive figures (Figure 1).

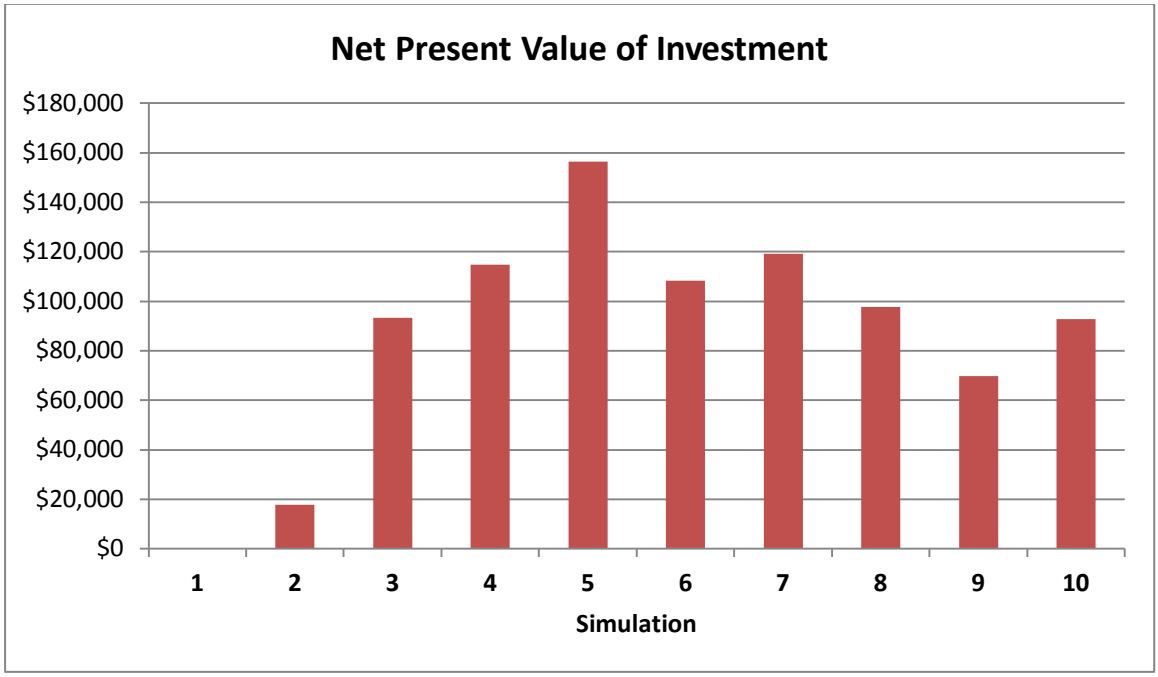

Figure 1: Net Present Value figures for each simulation.

Simulation 1 is the Base Case. All NPV's were positive which meant they exceeded the 6.5 per cent required rate of return.

Another measure, closely related to NPV is Internal Rate of Return (IRR). It represents the single rate of return that summarises the merits of a project. It is referred to as 'internal' because it depends only on the cash flows from the productive assets in which the investment is made. The IRR on every simulation was greater than the required rate of return of 6.5 per cent. Five simulations had an IRR of 9 per cent or greater (Figure 2).

[3] A 6.5 per cent expected return may be too low for a dried grape enterprise. A more appropriate rate might be 7.5 per cent which accounts more appropriately for the risk a grower takes. Required rate of return can be calculated more thoughtfully using mathematical techniques such as the Capital Asset Pricing Model (CAPM) or the Weighted Average Cost of Capital (WACC). This is outlined in more detail in the Excel® input data file.

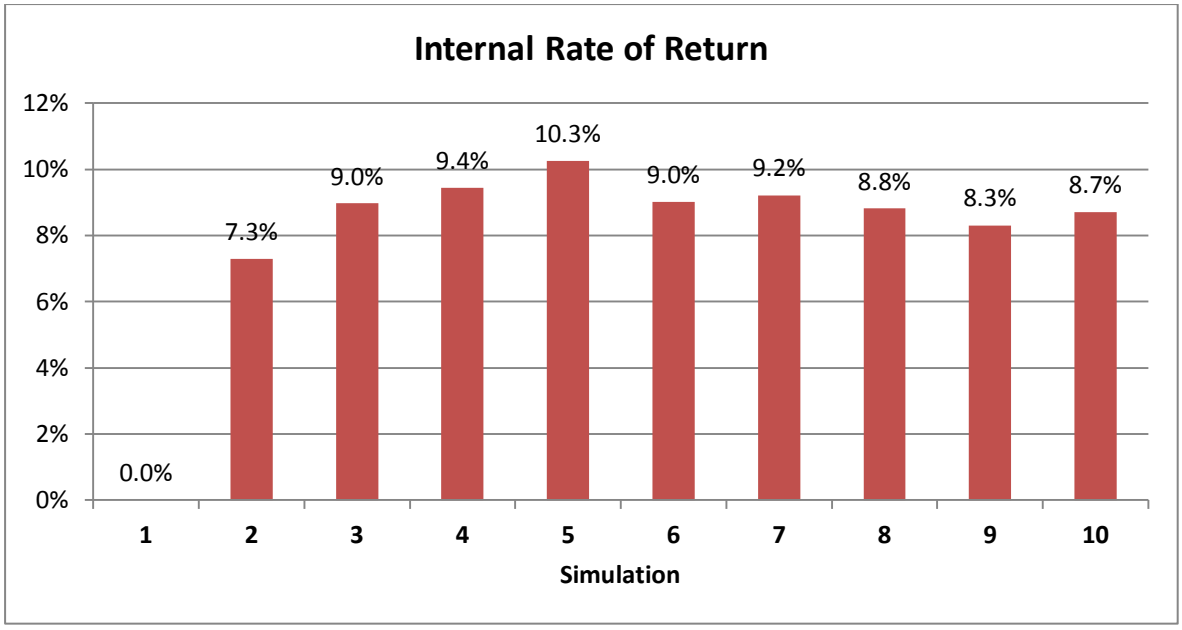

Figure 2: Internal Rates of Return for each simulation.

Simulation 1 is the Base Case. All IRR's exceeded the 6.5 per cent required rate of return.

A third measure of return on investment is the Discounted Payback Period (DPP). The DPP is the length of time required for an investment's discounted cash flows to equal its initial cost. An investment is acceptable if its DPP is less than a particular number of years. In the scenario outlined above the average DPP was 16 years, the minimum 14 years (simulation 5) and the maximum 19 years (simulation 2) (Figure 3).

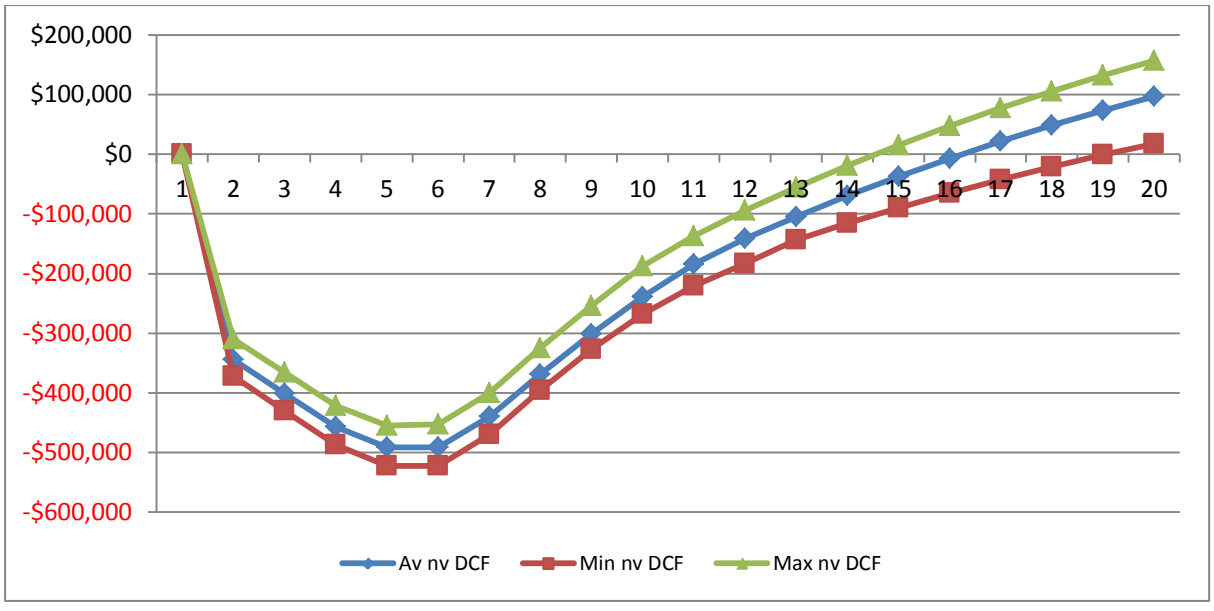

Figure 3: Discounted Cash Flow and average, maximum and minimum Discounted Payback Periods from 9 simulations.

The shortest DPP was 14 years and the longest was 19 years.

6 Discussion

The aim of this project was to provide industry with a product that enables existing and potential growers to test management strategies, operational performance and financial feasibility of the dried grape enterprise consisting of sultanas, currants, sunmuscats and/or raisins. A desirable outcome from this project is for the industry to become more able to assist individual growers to consider their growth and expansion options and management plans for dried grape varieties leading to more considered investment activities and/or improved insights that lead to on farm productivity improvements and innovations.

The case study scenario aimed to test a hypothetical situation where an existing grower with 10 hectares of sultanas and 10 hectares of currants purchased 10 new hectares of land and developed a block of sunmuscats for the purpose of producing dried fruit. Many growers will be faced with similar investment dilemmas. The investment decision is difficult with many uncertainties, technical complexities and requiring well developed goals. It is generally assumed in the industry that dried grape production is profitable and further investment in the industry is feasible although some uncertainty exists because of lack of methods to test the feasibility of the many scenarios within the industry.

In the scenario developed in this report the proposition of developing 10 new hectares of dried grapes and integrating them into an existing 20 hectare enterprise appears a feasible. However every individual grower's situation, goals, assumptions and approach to risk will be different. The scenario outlined in the previous section gives rise to a range of research questions. The questions offered below are examples of the enquiry that might arise as a result of using BizMod for Dried Grapes. It is important for experienced people in the industry to frame the right questions.

- What is the long term average yield of dried grapes? How can a grower increase yields in the future?
- How can a grower respond to specific adverse climatic situations so that long term average yield is maximised?
- What are industry best practice direct costs per hectare or dried tonne?
- What are the big drivers of direct costs and how might they be reduced?
- What are industry best practice overhead costs per hectare and how might they be minimised?
- What is the range of enterprise scale best suited to the industry of the future?
- What are the conditions that make an investment in new vines for dried grapes attractive?
- What are the enterprise and grower business models that are most likely to succeed in the future? What are least suited?
- What are the risks and uncertainties associated with an investment in the dried grape industry and how might they be best managed?

BizMod for Dried Grapes has been designed and built on commercially available software. It has been built to be easy to use either individually or in group situations although interpretation of output may challenge some people. It is powerful in that it will report GM, EBIT and DCF over a twenty year time frame and provide multiple scenarios and simulations quickly and easily. The BizMod for Dried Grapes product represents a considerable body of industry knowledge which will increase with use over time.

7 Technology Transfer

There have been a number of activities undertaken to engage with industry and to build support for adoption. In the design and building phases of the project consultation with growers helped design the structure and language of the model. The creation of the Industry Development Group and the running of two workshops enabled progressive models to be reviewed by experienced growers and feedback obtained. Ongoing communication with Mr John Hawtin, Industry Development Officer (IDO), has occurred throughout the project.

A system of training has been trialled where remote access to the IDO's computer has significantly improved the value of over the phone tutorial sessions. Presentation at the industry Annual General Meeting in October 2012 will further advance development and industry adoption of the BizMod for Dried Grapes product.

8 Recommendations

This project provides the industry with a product that enables existing and potential growers to test management strategies, operational performance and feasibility of a dried grape enterprise consisting of sultanas, currants, sunmuscats and raisins. It will be useful in enabling growers to test the implications of further investment in the industry either through redevelopment of old hectares of vines or development of new hectares.

The following recommendations are made.

1. To test the iThink® model in small group situations and record people's reactions and discussion content and refine a facilitation process for small groups.
2. To test the base settings in the Excel® input file and implement a process to refine and develop the Excel® input file so that it becomes an important and ongoing body of industry knowledge.
3. To investigate beneficial partnerships that can enhance the adoption of the BizMod for Dried Grapes product so that it becomes an important tool for learning in the industry.
4. To continually seek ways to improve and innovate with BizMod for Dried Grapes in terms of product refinements and access e.g. a simplified version, web based version, education and extension processes etc.

9 Acknowledgments

Phil Chidzey, General Manager, Dried Fruits Australia

John Hawtin, Industry Development Officer, Dried Fruits Australia

Mark King, Chairman, Dried Fruits Australia

Industry Development Group

- Ashley Johnstone
- Allan Long
- Rodney Trigg
- Stephen Bennett
- Warren Lloyd

Ross Elliot, Agribusiness Manager Westpac Bank

Phil Grahame, Business Manager, Sunraysia Water Exchange

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11 Appendices

11.1 Appendix 1: Content Details of Excel Files

The Excel® file named 'BizMod_DriedGrape_Statements' reports the following statements.

- Hectares
- Production of dried grapes
- Irrigation water
- Whole Enterprise Revenue
- Costs of Production
- Enterprise Assets and Liabilities
- Financing Arrangements
- Whole Enterprise Income Statement
- Whole Enterprise Cash Flow
- Investment in New Vines Income Statement Investment in New Vines Discounted Cash Flow
- Dashboard of Graphical data

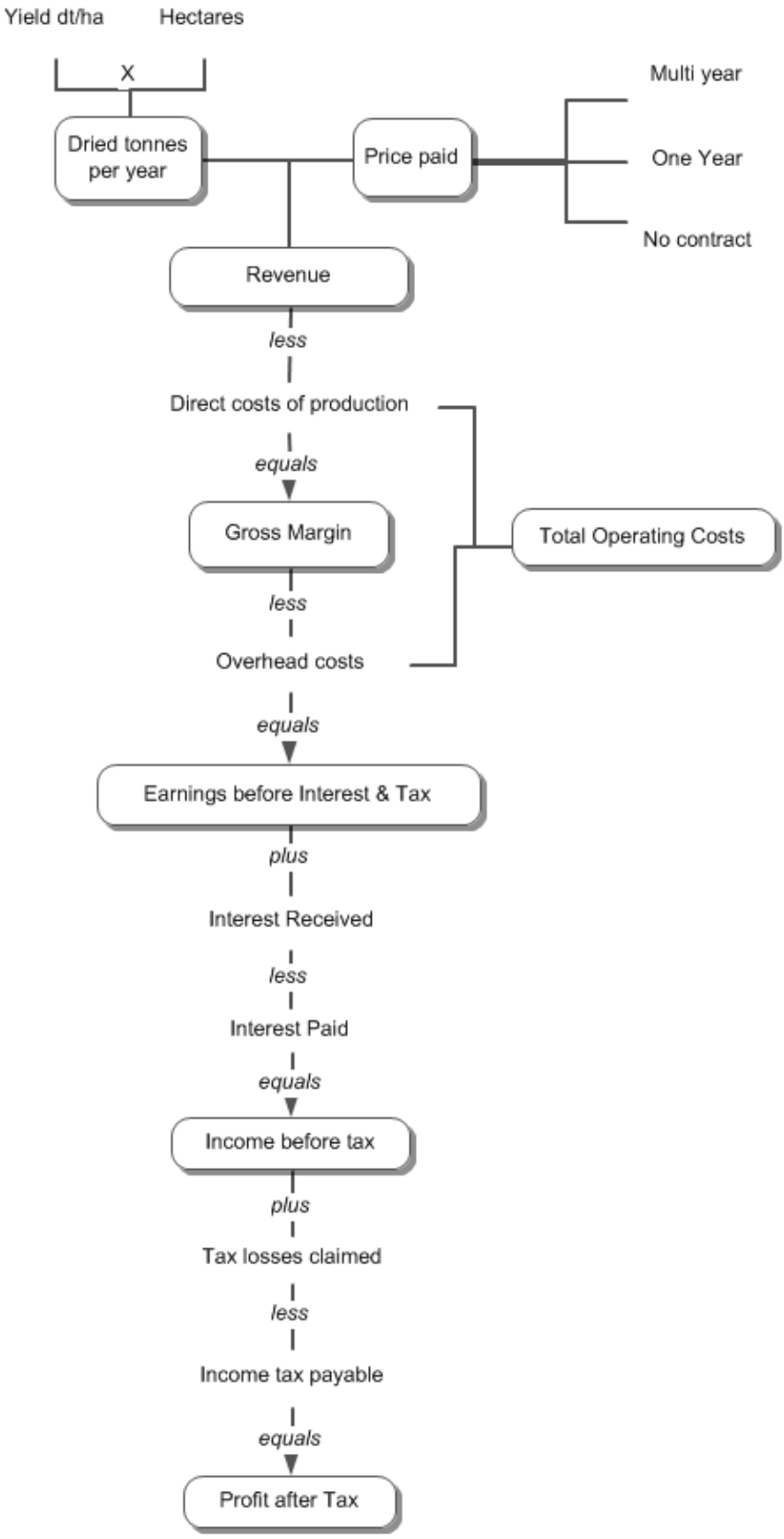
The Excel® file named 'BizMod_DriedGrape_EnterpriseKPIs' reports the following.

- Total Production (dried tonnes per year)
- Total Direct Costs - ($ per dried tonne)
- Total Overhead Costs ($ per dried tonne)
- Total Overhead Costs ($ per hectare)
- Total Operating Costs ($ per dried tonne)
- Total Operating Costs as a per cent of Revenue
- Gross Margin ($ per dried tonne)
- Gross Margin ($ per hectare)
- Net Enterprise Assets
- Enterprise Debt to Equity (%)

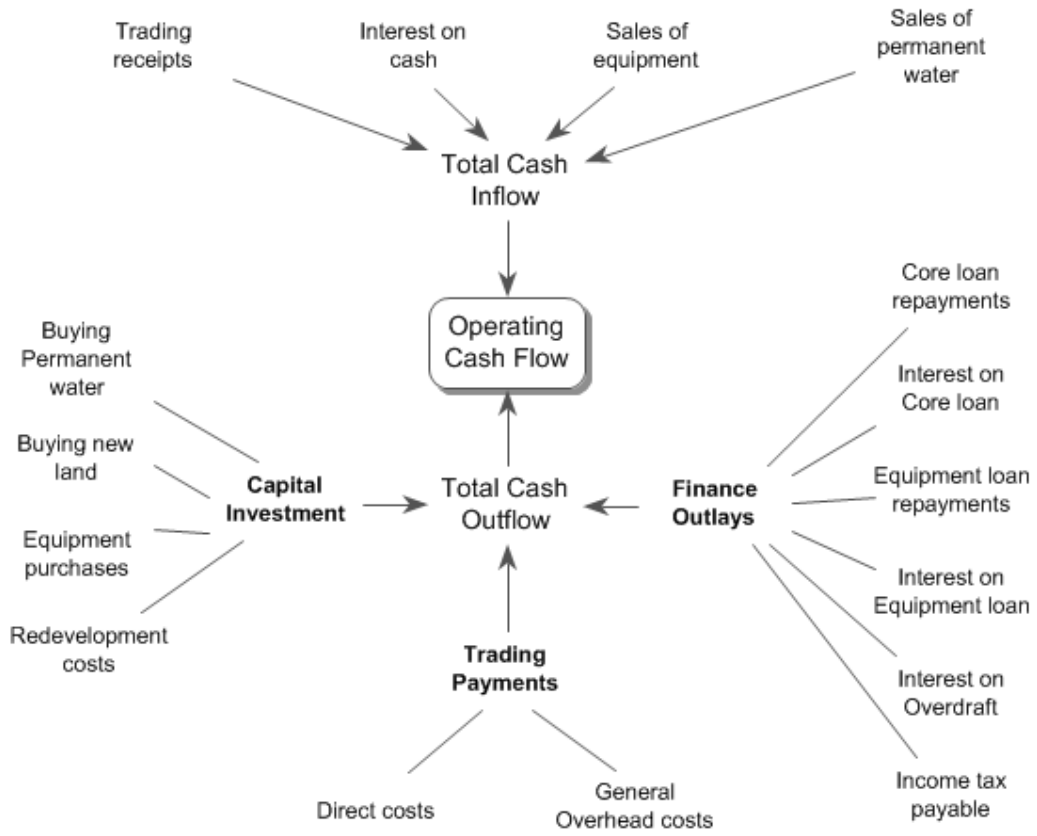
The Excel® file named 'BizMod_DriedGrape_InvestmentKPIs' receives specific data related to investment in development of new or existing land and reports the following.

- New Vine Total Production (dt/yr)
- New Vine Direct costs ($/dried tonne)
- New Vine Direct costs ($/hectare)
- New Vine Direct Costs (% of Revenue)
- New Vine Overhead costs ($/hectare)
- New Vine Total Operating costs ($/dried tonne)
- New Vine Gross Margin ($/dried tonne)
- New Vine Gross Margin ($/hectare)
- New Vine Operating Cash Flow
- Discounted Cash Flow, Discounted Payback Period and Net Present Value

11.2 Appendix 2: Example of the Income Statement Account Structure



11.3 Appendix 2: Example of the Cash Flow Account Structure



11.1 Appendix 3: Major Base Case Variables

The variables in the table below represent those used to generate the outputs for the Base Case only.

	Range of Variables	Unit	Figures for Export to iThink				KPA
A	**Owned Hectares**		Sultana	Currant	Sunmuscat	Raisin	
1	Owned hectares of old vines	ha	**10.0**	**10.0**	**0.0**	**0.0**	Hectares
2	Hectares of Old vines to Redevelop	ha	**0.0**	**0.0**	**0.0**	**0.0**	Hectares
3	Switch on Old Ha Redevelopment	Yes = 1/No = 0	**0**	**0**	**0**	**0**	Hectares
4	Years to Redevelop Old hectares	years	**0**	**0**	**0**	**0**	Hectares
5	Start year for redevelopment	year	**1**	**1**	**1**	**1**	Hectares
B	**New Hectares for Development**		Sultana	Currant	Sunmuscat	Raisin	
1	New hectares for Development	ha	**0.0**	**0.0**	**0.0**	**0.0**	Hectares
2	Years to develop New hectares	years	**0**	**0**	**0**	**0**	Hectares
3	Start year for new development	year	**0**	**0**	**0**	**0**	Hectares
C	**Yield**		Sultana	Currant	Sunmuscat	Raisin	
1	Yield for 3 year old vines	dt/ha	**5.0**	**5.0**	**5.0**	**4.5**	Yield
2	Yield for 4 year old vines	dt/ha	**7.0**	**7.0**	**7.0**	**7.0**	Yield
3	Yield for vines 5 to 19 years old	dt/ha	**8.0**	**8.0**	**10.0**	**8.0**	Yield
4	Yield for Old Vines	dt/ha	**7.0**	**8.0**	**10.0**	**7.0**	Yield
D	**Prices Paid**	Go to	Multi year	One year	Uncontracted		
1	Sultana	$/dt	$ 1,861	$ 1,786	$ 1,726		Price
2	Currant	$/dt	$ 1,921	$ 1,846	$ 1,719		Price
3	Sunmuscat	$/dt	$ 1,887	$ 1,808	$ 1,748		Price
4	Raisin	$/dt	$ 1,950	$ 1,885	$ 1,825		Price
				Direct Costs Yr1		**Direct Costs Yr2**	
E	**Direct Costs Years 1 & 2**	Go to	Excel figure	iThink figure	Excel figure	iThink figure	
1	Sultana	$/ha	$3,073	**$3,073**	$3,337	**$3,340**	Op costs
2	Currant	$/ha	$3,073	**$3,073**	$3,337	**$3,340**	Op costs
3	Sunmuscat	$/ha	$3,073	**$3,073**	$3,337	**$3,340**	Op costs
4	Raisin	$/ha	$3,073	**$3,073**	$3,337	**$3,340**	Op costs
F	**Direct Costs Year 3**	Go to	Excel figure	iThink figure			
1	Sultana	$/ha	$5,105	**$5,100**			Op costs
2	Currant	$/ha	$5,105	**$5,100**			Op costs
3	Sunmuscat	$/ha	$5,105	**$5,100**			Op costs
4	Raisin	$/ha	$5,105	**$5,100**			Op costs
G	**Direct Costs Year 4 on**	Go to	Excel figure	iThink figure	Old Vine Costs		
1	Sultana	$/ha	$5,197	**$5,200**	**$5,200**		Op costs
2	Currant	$/ha	$5,197	**$5,200**	**$5,200**		Op costs
3	Sunmuscat	$/ha	$5,197	**$5,200**	**$5,200**		Op costs
4	Raisin	$/ha	$5,197	**$5,200**	**$5,200**		Op costs
H	**Finish Drying**	Go to	Excel figure	iThink figure			
1	Finish Drying cost (labour)	$/dt	$41.53	**$45.00**			Op costs
2	Cost of Gas for dehydration	$/dt	$40.00	**$40.00**			Op costs
I	**Overhead Costs**	Go to	Excel figure	iThink figure			
1	O'head costs ex depreciation $\yr	$/year	$36,550	**$30,000**			Op costs

J	**Development Costs**	Go to	Excel figure	iThink figure			
1	New area development costs	$/ha	$36,042	**$25,000**			CapX
2	Old area redevelopment costs	$/ha	$36,042	**$36,000**			CapX

K	**Land Variables**						
1	Value of owned Land	$/ha	**$10,000**				CapX
2	Cost of new land	$/ha	**$6,000**				CapX

L	**Water Variables**						
1	Irrigation rate	ML/ha/yr	**9.0**				Op cost
2	Water delivery cost LMW	$/ML	$110	**$110**	Go to		
3	Volume of existing permanent water	ML	**0.0**				Op cost
3	Year to buy Perm water	year	**0.0**				Op cost
4	Volume to buy Perm water	ML	**0.0**				Op cost
5	Year to sell Perm water	year	**0.0**				Op cost
6	Volume to sell Perm water \ML	ML	**0.0**				Op cost
7	Cost of temporary water	$/ML	graph pad				Op cost
8	Price of permanent water	$/ML	graph pad				Op cost

M	**Machinery and Equipment Assets**	Go to	Assets A	Assets B	Assets C	Assets D	
1	Current value of owned assets	$	**$250,000**	**$0**	**$0**	**$0**	CapX
2	Depreciate Assets	Yes = 1/No = 0	**0**	**0**	**0**	**0**	Op cost
3	Year to replace Assets	year	**0**	**4**	**0**	**0**	CapX
4	Cost of future Assets	$	**$0**	**$0**	**$0**	**$0**	CapX
5	Effective life of Assets	years	**10**	**10**	**10**	**10**	CapX
6	Total value of Owned Assets		$250,000	Total value of future purchases		$0	CapX

N	**Finance and Tax Variables**						
1	Initial working capital	$	**$0**				Finance
2	Years to repay Core loan	years	**15**				Finance
3	Years to repay Equipment loan	years	**10**				Finance
4	Interest rate on cash	%/year	**5.2%**				Finance
5	Overdraft interest rate	%/year	**9.0%**				Finance
6	Interest rate on Equipment loan	%/year	**9.0%**				Finance
7	Interest rate on Core loan	%/year	**9.0%**				Finance
8	Tax rate	%/year	**30%**				Finance
9	Required Rate of Return	%/year	**6.5%**	Go to			Finance

11.2 Appendix 4: Simulation Details and Performance Summary

Table 2: Summary of the changes that occurred in key variables as result of each simulation

				Simulations								
	Enterprise Variables	**Unit**	**Base Case**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	Hectares under management	ha	20	30	30	30	30	30	30	30	30	30
2	Target yield (Sultana)	dt/ha	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
3	Target yield (Currants)	dt/ha	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
4	Target yield (Sunmuscats)	dt/ha	10.0	10.0	10.0	10.0	**10.5**	10.5	10.5	10.5	5.0	10.5
5	Total production	dt/yr	150	250	250	250	255	255	255	255	200	**255**
6	Average Price Sultana	$/dt	$1,726	$1,726	**$1,861**	$1,861	$1,861	$1,861	**$1,879**	**$1,842**	$1,861	$1,861
7	Average Price Currants	$/dt	$1,719	$1,719	**$1,921**	$1,921	$1,921	$1,921	**$1,940**	**$1,902**	$1,921	$1,921
8	Average Price Sunmuscats	$/dt	$1,748	$1,748	**$1,887**	$1,887	$1,887	$1,887	**$1,906**	**$1,868**	$1,887	$1,887
9	Variable (direct) costs	$/ha	$5,838	**$5,998**	$5,998	**$5,698**	**$5,712**	$5,712	$5,712	$5,712	**$5,564**	$5,564
10	General Overhead costs	$/ha	$2,490	**$1,990**	$1,990	$1,990	$1,990	$1,990	$1,990	$1,990	$1,990	**$2,190**
11	Operating costs % of revenue (yr10)	%	64%	**60%**	**55%**	**53%**	**52%**	52%	52%	**53%**	**66%**	54%
12	Development cost	$/ha	$25,000	$25,000	$25,000	$25,000	$25,000	$30,000	$30,000	$30,000	$30,000	$30,000
13	Cost of land	$/ha	$6,000	$6,000	$6,000	$6,000	$6,000	$7,200	$7,200	$7,200	$7,200	$7,200
14	Gross margin	$/ha	$7,079	$8,438	$9,755	$10,055	$10,356	$10,356	$10,517	$10,196	$7,045	$10,356
15	Discounted payback period	years	0	19	16	15	14	16	15	16	17	16
16	Net Present Value	$	$0	$17,721	$23,005	$14,652	$15,198	$29,424	$8,000	$20,208	$18,733	$15,143

Note: The figures in this Table are more fully understood by reviewing the graphs in the Appendix 4: Scenario Performance

11.3 Appendix 5: Scenario Performance

11.3.1 Whole enterprise production

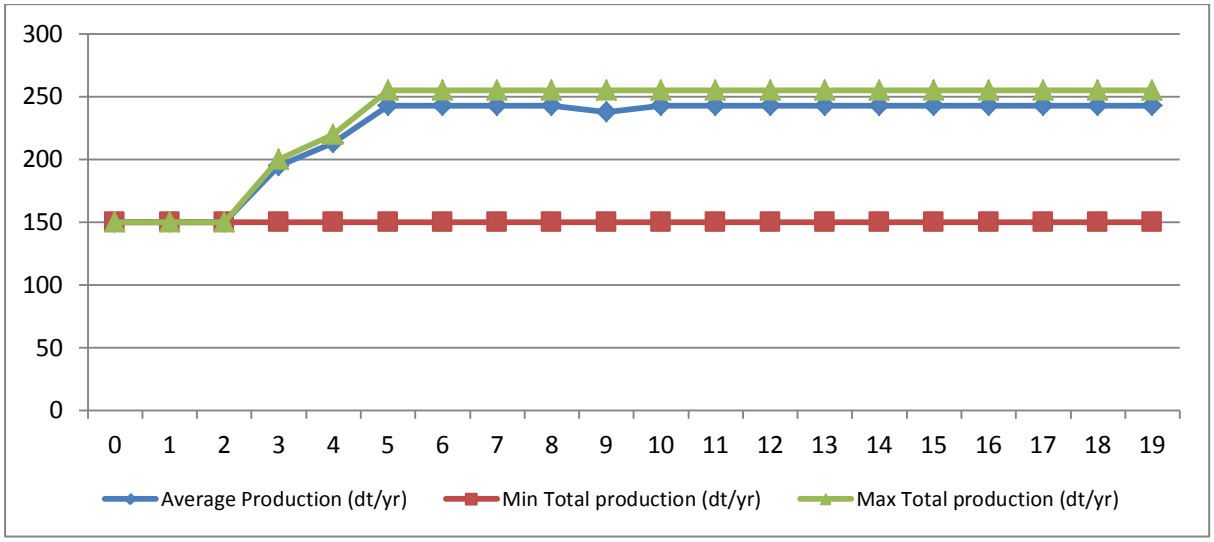


Figure 4: Maximum, minimum and average whole enterprise production figures (dried tonnes per year) for 10 simulations.
The Base Case is represented by the minimum total production. Maximum production comes on line in the 5th year. Simulation 9 reduced yield of sunmuscats by 50% in year 9 this can be seen in the average production curve.

11.3.2 Whole Enterprise Direct costs

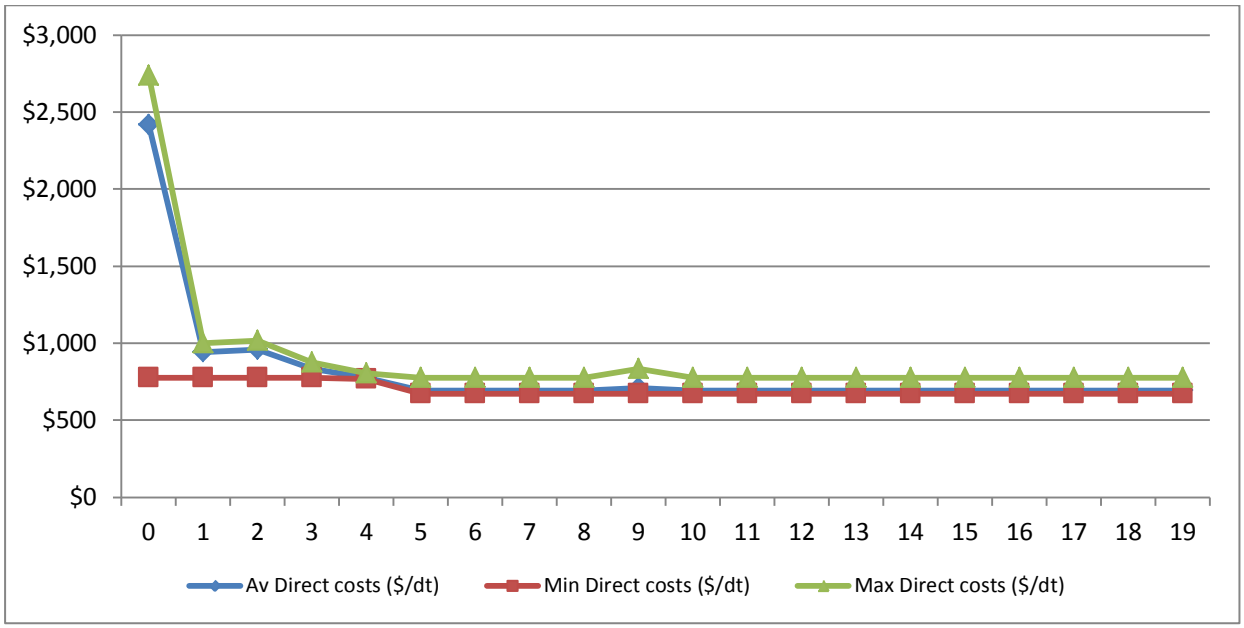


Figure 5: Direct costs of production ranged from $693 to $778 per dried tonne.

An exception was year 9 ($835 per dried tonne) when the production of sunmuscats was reduced by 50% in simulation 9 direct costs per dried tonne produced increased.

11.3.3 Whole Enterprise Overhead Costs

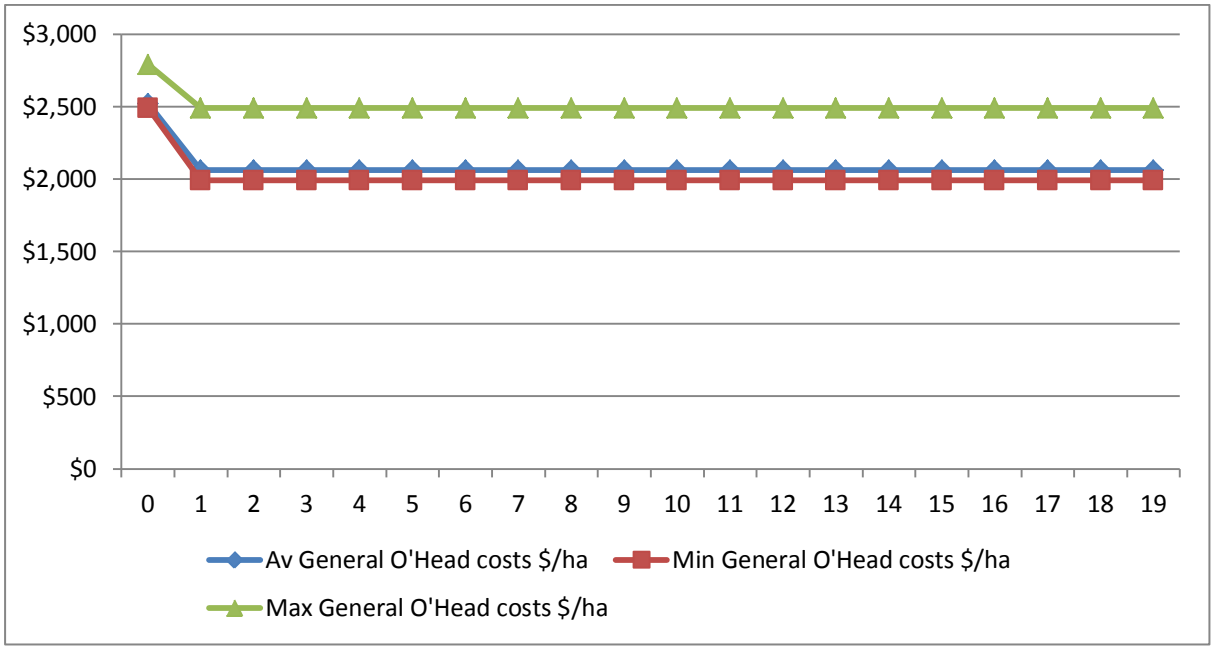


Figure 6: Overhead costs ranged from $1 990 to $2 490 per hectare.

The overhead costs decreased as the scale of the enterprise increased i.e. the maximum overhead costs were incurred by the Base Case.

11.3.4 Operating Costs

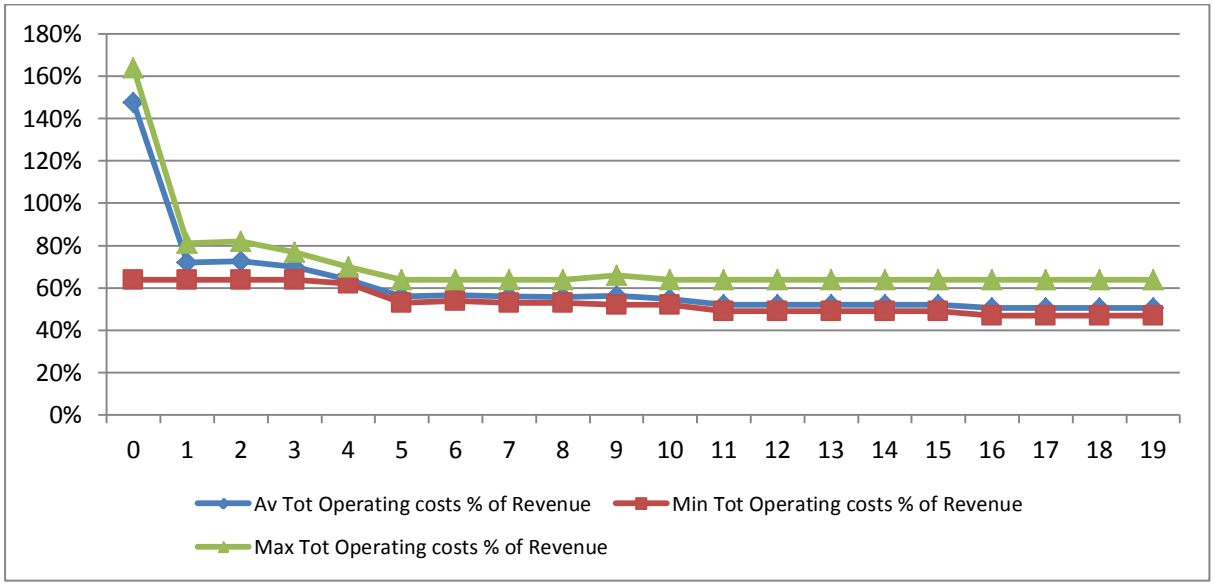


Figure 7: Operating costs expressed as a per cent of total revenue changed over time and ranged from 64% (Base Case) to 47%.
Once the enterprise reached full production, operating costs ranged from a high of 66% (yield reduction of sunmuscats of 50% in year 9) to 47% (1% price increase).

11.3.5 Gross Margin

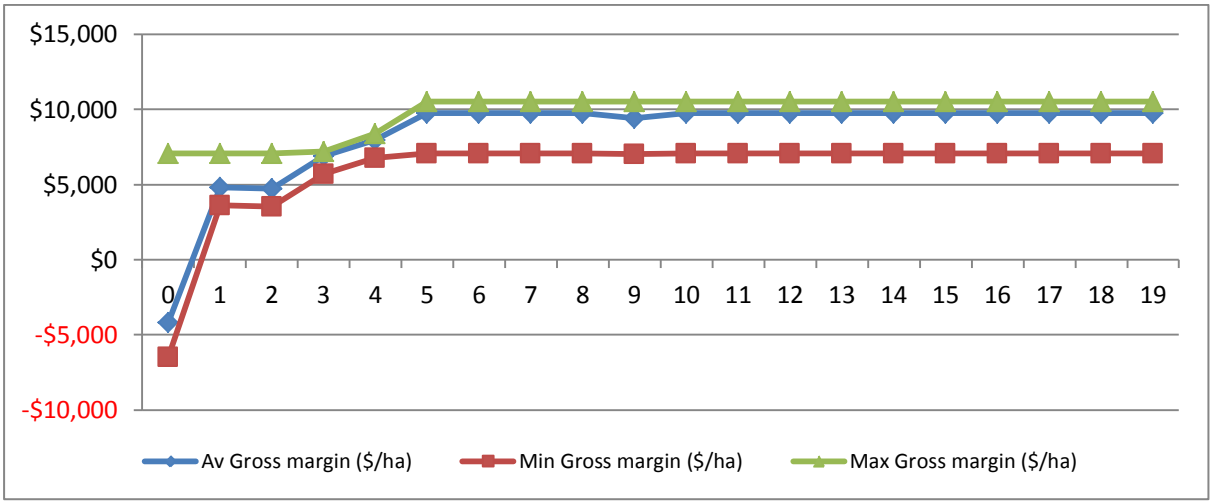


Figure 8: The gross margin for the Base Case was $7 079 per hectare.

Introducing 10 new hectares of sunmuscat grapes increased the gross margin because more dried tonnes were produced off each hectare of sunmuscats. Other positive changes served to increase gross margin further. A reduction in yield for sunmuscats in year 9 of 50% reduced gross margin to $7 045. The maximum was $10 517 in simulation number 7.