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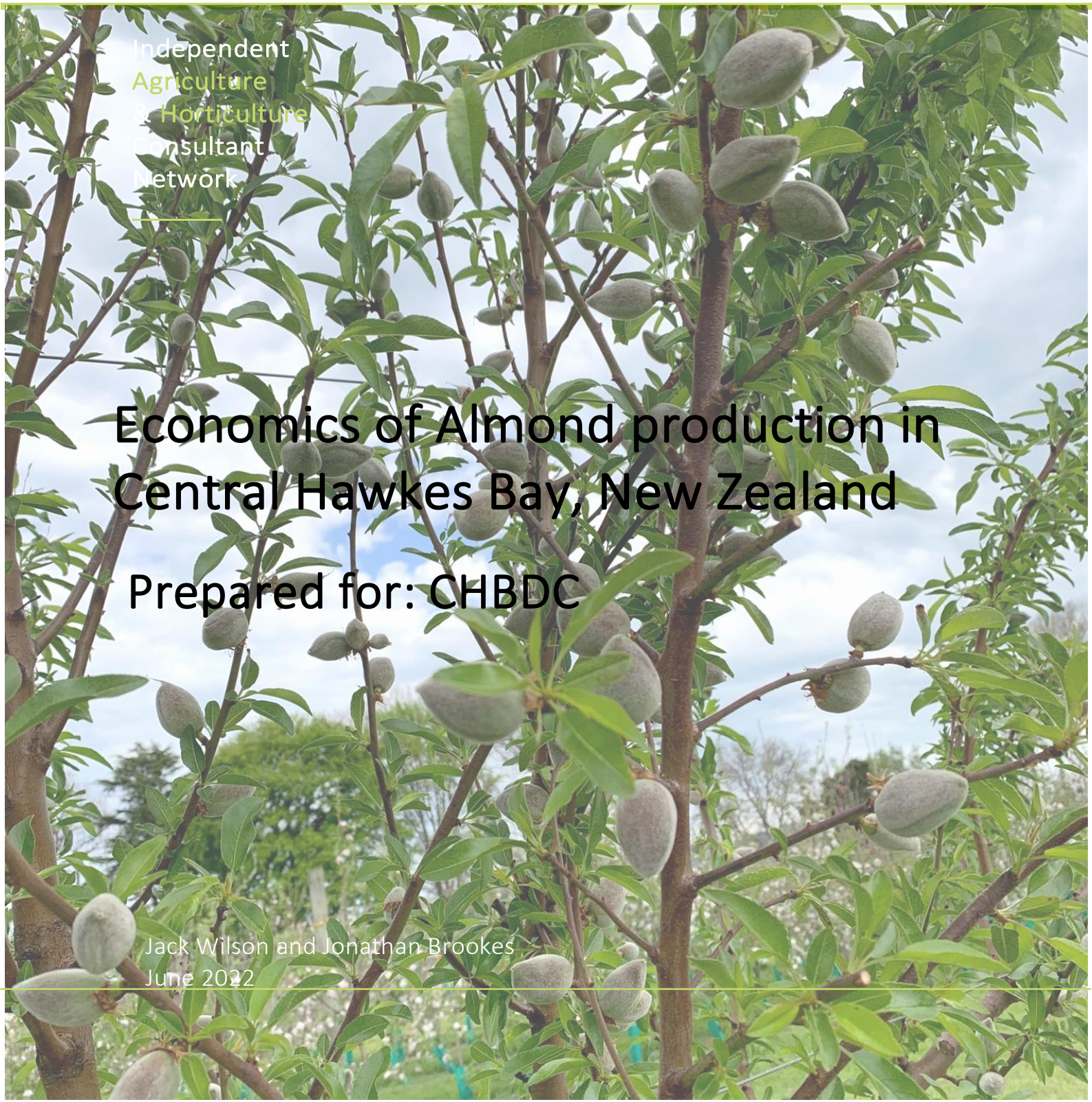

# Economics of Almond production in Central Hawkes Bay, New Zealand

## Prepared for: CHBDC

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## 1.0 BACKGROUND

The scope of this project is to investigate the economic feasibility for establishment of a New Zealand almond industry. This industry would be based on a premium quality product, produced using sustainable agronomic practices including, optimised light utilisation for higher yields and quality, lower water and nutrient footprint and integrated pest management approaches for reduced use of synthetic crop protection compounds.

New Zealand has a temperate climate, good water availability and a strong reputation for producing high quality food. Even though high quality almonds can be grown in New Zealand, currently there is no commercial almond production, just a few small growers scattered across the country.

This project provides a method of financial analysis for individual business performance scenarios. The outcomes have been the development of a capital budgeting model used to analyse current business performance in almonds and development of a series of important financial indices. A simple group of financial benchmarks has been created, to compare potential results from future almond businesses in Central Hawkes Bay, New Zealand with actual results being achieved with existing almond growers. This system of analysis can assist an individual manager's understanding of their business, while measuring critical factors (and risks) in a development proposal. It can also act as a catalyst, to improve the industries competitiveness in the international scene as the New Zealand almond industry potentially grows.

## 2.0 ACKNOWLEDGMENTS


| | |
|---|---|
| Funding: | MPI, SFFF, CHBDC, HBRC, HDC, WDC, Picot Productions and PFR |
| Co-operators: | Tony Kuklinski, almond grower CHB<br>Graham Farnell, almond grower, Marlb |

## 3.0 EXECUTIVE SUMMARY

This project set out to analyse the economic feasibility of almond production in the Central Hawkes Bay. Through the use of capital budgeting, multiple scenarios have been stress tested to help develop an economic budget that a grower can use to base their own almond orchard investment on.

The project has provided:

- The economic information needed for potential adopters to invest in almond growing
- A detailed report on the major economic factors influencing the viability of growing almonds in Central Hawkes Bay
- References to the model including expected cost breakdown, return and yield figures, development budgets, cumulative cash flow, and IRR results.

A whole business farm approach over a 15 year period was analysed, to produce results categorised by several different performance indices. These included total business performance and cost analysis.

Two models were created and stress-tested with variations in price/kg and yield/ha to analyse their impact on economic performance indices over a 15 year period. The models included development budgets which assumed the development of a 10ha almond orchard. The two models are referenced in the report as:

1. Normal/high input system. This system assumes full irrigation is installed and run. Benefits seen from overseas experience (although limited here in New Zealand), is an increase in productivity and quality / size of almonds.
2. Low input system. There is speculation in New Zealand as to whether almonds require irrigation. Therefore, using the experience and evidence of existing almond producers, this model assumes production and quality is reduced without the upfront development cost of irrigation installation (including bore, headworks and reticulation).

The primary findings of this study show the results of several financial performance indices, demonstrating how differences in yield and price/kg will alter the IRR of the potential almond orchard investment. Although data was limited, the analysis took into account the experience of a few scattered New Zealand almond producers and the knowledge gained from overseas industries.

Table 1. Primary study results.

| | Normal input system | Low input system |
|---|---|---|
| 3-yr average yield | 2.7t/ha | 2.0t/ha |
| Price per kg | $20.00/kg | $20.00/kg |
| Cost of production | $6.88/kg | $9.14/kg |
| Development costs | $71,716/ha | $62,096/ha |
| Breakeven year | 12 | 17 |
| Internal rate of return (IRR) after 15 years. | 5.5% | -4.9% |

## 3.1 Key Recommendations:

This study identified that with the right inputs and management structure, it is feasible to invest in an almond enterprise. With no existing industry, it is important to realise assumptions made are to the best of our knowledge and research at this time, and factors such as price per kg of kernel may change.

This study has highlighted the importance of yield on financial performance in the short and long term. Therefore, it is recommended more research is focussed on areas such as irrigation best practice, nutrition and pest and disease control in a New Zealand context.

The other key highlight is the influence price has on a 15 year IRR. More research needs to be completed to identify the size of the market and the range of different revenue streams that can be utilised with the production of class 1 and class 2 almonds. Additionally, more research needs to be completed on the requirement for a processing industry to dry and package almond products.

## 4.0 INTRODUCTION

Almond production in New Zealand has been lightly explored with only a few scattered growers throughout the country. Like anywhere in the world, growing almonds requires skill in management, production and business. For the growth of an almond industry in New Zealand, we need to have the documentation to support starting a venture such as this.

The development of an economic feasibility study is the process of determining whether a new venture is worth the cost and time investment. This project is set out to assist new adopters in almond growing and to stress test the viability of an almond industry in NZ. This economic feasibility study is particularly important in an NZ context, because the business structure and climate are so different to major almond growing regions around the world such as Australia and the USA.

Although profitability is a key driver to successful almond production, factors such as cashflow, sensitivity and risk need serious consideration or potential financial difficulty is likely. Capital budgeting is used to analyse a farm business over a 15 year period, helping to calculate economic indices such as gross margins, cumulative cashflow, internal rate of returns and breakeven years.

For the purpose of this study two major models have been created to base stress-tested assumptions around. The difference in the models consider environment and climatic factors, more specifically the impact of higher rainfall in comparison to international almond growing regions. The two models are referenced within the report as:

1. Normal/high input system. This system assumes full irrigation is installed and run. Benefits seen from overseas experience (although limited here in New Zealand), is an increase in productivity and size / quality of almonds.
2. Low input system. There is speculation in New Zealand as to whether almonds require irrigation. Therefore, using the experience and evidence of existing almond producers, this model assumes production and quality is reduced without the upfront development cost of bore and headwork installation.

Both models were stress-tested under a number of different scenarios through a sensitivity analysis, which led us to identify several economic drivers where the viability of almond production is feasible in the Central Hawkes Bay, New Zealand.

## 5.0 GLOBAL ALMOND INDUSTRY OVERVIEW

USA and Australia are the main producers of almonds around the world. The climate is consistent with the need of an almond tree and with the addition of irrigation, they are successful in producing mass quantities. The USA (California) and Australian almond industries are very industrialised, operating on vast areas achieving very low costs of production, using machinery to do the majority of physiological tasks such as pruning and harvesting.

New Zealand imported 3,900 tonnes of almonds in 2020, totalling NZD $41 million – mostly from countries with limited water resources and increasingly experiencing extreme drought conditions (USA and Australia). The New Zealand retail market for snacking almonds in 2020 totalled NZD $19.4 million and is forecast to grow by 6% annually over the five years to 2025.

As stated earlier, the current production of almonds in NZ is made up of only a few scattered growers will small area so is therefore negligible.

The difference in eating experience from a supermarket bulk buy almond to a fresh almond is greatly improved. A premium could be expected on fresh NZ grown almonds in quality food stores, or likely those sold in local markets or farmers markets. No attempt has been made to judge the size of the potential market for NZ locally grown almonds in the economic section of this project.

The potential New Zealand almond industry is likely to be based on a low area, high price, niche model. It has been discovered there is a premium market for locally grown, fresh consumption almonds in New Zealand by existing almond growers in both Central Hawkes Bay and Marlborough. The New Zealand climate has been identified as being potentially suitable for almond production, therefore a feasibility study looking at its viability has been undertaken.

The New Zealand almond industry is yet to be developed and likely to look considerably different to that of the USA and Australian industries. Almonds in NZ are going to be produced to fit into a niche market - a high value premium product, giving growers the ability to be price makers not price takers. Economic consideration of this factor has been made in this study, and comparisons to an international scenario are made throughout.

## 6.0 PROJECT AIMS

The project aims to analyse the financial performance of a potential almond industry in the Central Hawkes Bay of New Zealand. It sets out to use capital budgeting over a 15 year period and to establish economic performance indices and information to give a clearer picture of the economic performance or viability of an almond orchard in NZ.

The project will aim to deliver:

- Feedback on the key management issues that affect business performance
- A detailed report on the major economic factors influencing the validity of a New Zealand almond industry.
- A model allowing property performance, development proposals and 'what-if' scenarios to be assessed and stress-tested.

## 7.0 METHODOLOGY

### 7.1 Data gathered

A complex financial development budget was developed, to assess the viability of an almond orchard over a 15 year period. The model uses input and outputs of a business. Then while considering current value costs of these inputs and outputs, it will produce a series of performance indices including gross margins, development budgets, sensitivity analysis, cumulative cash flow and IRR.

#### *7.1.1 Inputs*

The inputs include land size, water, chemicals, fuel, machinery and labour. These inputs have been valued at current prices with the use of NZ grower experience and the knowledge of the

AgFirst team in relation to the cost of production for other relative tree crops grown in NZ. The cost based analysis indicates where major costs are incurred in almond production.

Other inputs include block information such as area, row and tree spacing and total tree numbers. The block assumptions for all examples are as follows: An Orchard development of 10ha with trees planted at a 5.0m row spacing and a 6m tree spacing, totalling at 333 trees/ha. The planting distance has a large bearing on early production and needs further research to ensure it is optimised for NZ conditions. The spacings used in this model are based off New Zealand experience and standard practice in Australia. The model assumes market results for an average of a range of varieties.

### *7.1.2 Outputs*

For this analysis, the value of the almond product has been split into grades and set at a standard value per kilogram. No market analysis has been undertaken in this study. We have gathered a range of prices that have been achieved for the almond crop (all varieties) and assumed a reasonable long-term price of $20/kg for class 1 premium almonds and $10/kg for class 2 almonds. Average yields over a 3-year period were used to account for biennial swings in the almond crop.

## 8.0 WHAT-IF ANALYSIS

The model allows analysis of the way changes in inputs and outputs effect the project's outcome. Factors such as timing of yield growth, machinery investment, market performance can be stress-tested to give a measure of viability and potentially, a performance strategy to help growers plan for different performance outcomes.

The what-if analysis included in this feasibility study will include a low input method of low water which will result in limited yield and a high input/high yielding scenario. Each of which will have sensitivity analysis done to assess the impact of price and yield on IRR.

## 9.0 KEY PERFORMANCE INDICIES FOR ALMONDS

Using the whole farm approach to examine a business, the data was analysed to produce several performance indices. They can be categorised into:

- Total business performance
- Cost analysis

The three important components of profit can be divided broadly into yield, price and costs. The performance indices focus on aspects of each of these components.

## 9.1 Total business performance

The performance indices allows analysis of selected scenarios using different levels of performance to compare their likelihood of success. As a result of information gained in the study, the most critical financial indices are those that had the greatest impact on profits or the bottom line. These basic concepts allow analysis of data that is usually readily available from growers, and represents accepted standards in economic analysis. Keep in mind, the level of performance from New Zealand almond growers in this study are based on very few real-

life examples and the experience AgFirst has with the almond crop. The performance indices that have significant representation of an almond orchard viability are described below.

### *9.1.1 Best average 3-yr yield*

Like all horticultural production systems, the climate is a risk that can be extremely hard to manage. The almond crop is susceptible to frosts, poor weather at pollination, wind, hail and increased disease pressure with high humidity or rainfall, all of which can happen in any given season. By using a 3-year average yield as opposed to a snapshot in time, a clearer long-term view is given, of yields that are possible in a NZ almond context. Yields in this study are based off existing NZ almond growers and although this data is limited it gives us a good indication of what is currently achieved, to then assume what could be achieved with a full-time production system.

### *9.1.2 Price of almonds*

The price is not always an economic factor the grower can manage or change. It is up to the marketing business, which in some cases is the grower, to set the price. The price achieved has a direct relation to the supply and demand ratio. If the demand is high the price can be high, if the supply is high the price can drop. Price in this study is quoted at $20kg of kernel class 1 and $10/kg class 2. This study also assumes the marketing and selling of the product is outsourced.

### *9.1.3 Cost of production*

The cost of production per kg kernel includes all annual cash costs, overheads, machinery costs and labour. The cost of production is measured against yield ($/kg) as it acts as an indicator that is independent of price and property size. The cost of production is an area which can be manipulated to the analysis of a low or high input production system. Keeping in mind, the difference in low and high input systems will result in changes in production in terms of yield per ha.

### *9.1.4 Cumulative cash flow*

Cumulative cash flow is critical to the success of almond investment. It will determine, in part, the viability of the project and an almond investment and is therefore an important consideration. Almonds, being a permanent crop, can result in substantial peak debt, hence calculating cumulative cash flow and determining peak debt is important. Cumulative cash flow provides an indication of the year in which peak debt will occur. The number of years to a positive cumulative balance is the point at which the project has paid for itself.

### *9.1.5 Years to positive annual cash flow*

The number of years to positive annual cash flow is the point at which annual income is greater than annual cash costs, which indicates the point at which debt can start to be reduced. These potential early returns can be a valuable aspect of the profitability of a particular crop and being able to bring forward early yield cumulation benefits the 15 year investment IRR. In an almond crop, this point is likely to be reached in year five or six, but delays from weather or management decisions will have impacts on profitability. In a New Zealand model the cash spent on an almond investment is likely to be vastly different to that seen in the USA or Australia due to the nature of the production system being of smaller scale with higher costs per kg of kernel.

### *9.1.6 Gross margin*

Gross margin provides a simple tool to easily assess enterprise performance between years, crops or similarly equipped properties without the need for complex financial analysis. Gross margin is a traditional measure of a particular crop's price for the product by the gross yields per hectare less cash costs. For example labour, chemicals, fuel and irrigation pumping costs are included in the analysis and no allowance is made for overheads such as machinery depreciation, accountancy or development costs.

### *9.1.7 Water sustainability*

Almonds internationally are a relatively high water use crop especially at important times during the growing season. CHB is a high rainfall area in comparison to common almond growing areas such as desert land in Australia. No attempt has been made to judge the need for irrigation for CHB in comparison to a desert growing environment. We know that for best practice almond production, water is vital at key parts in the growing season and therefore the normal/high input model accounts for irrigation installation. Due to there being high rainfall in CHB (approx. 600mm/year) the low input model has accounted for no irrigation installation and a reduction in yield and quality as a result.

## 9.2 Cost analysis

The profit margin of an almond orchard details the success. To achieve this, particular attention needs to be placed on yield, price and costs in order to improve margins. Many growers place a strong emphasis on reducing costs. In this study the costs are divided into three categories reflecting their nature and effect on profit. The cost categories are labour, annual overheads and variable costs.

### *9.2.1 Labour costs*

Labour costs are mainly calculated on a per tree or per hectare basis and include the time taken to do all tasks such as pruning, harvesting and spraying. Labour has been valued at a standard of $25/hr with an additional allowance for management. Depending on the activity, the labour costs are distributed by a combination of tree canopy fill and production for the year to ensure integrity of the figures. For example, pruning costs in year 3 are a fraction of what they are in year 8 when the tree is at full maturity. The majority of labour costs for tree husbandry practices have been developed from experience observed from existing New Zealand growers. This area is likely to be where NZ almond production varies largely from that seen overseas because of the lack of industrialisation.

### *9.2.2 Postharvest costs*

Postharvest costs are those attributed to the processing of the almonds from shell to kernel. Postharvest costs include reprocessing, drying and shelling, freight and an anticipated industry levy. One of the key areas of difference for the New Zealand almond industry is that most regions around the world are desert climates, and most of the drying needed to keep the nuts from decomposing is carried out naturally in the field. It is likely that in New Zealand conditions the nuts will need some sort of assisted drying to get them to the required moisture content.

### *9.2.3 Annual overheads*

Annual overhead costs are paid to ensure property upkeep and business administration. The costs include lease costs, administration, property charges and crop insurance. The total costs vary with the size of the property, but annual overheads per hectare are not particularly sensitive on a per hectare basis. This study assumes a lease deal rather than including land purchase into the development budget. Lease land is valued at $4000/ha. This is relatively low for high value horticultural land such as the Heretaunga plains, but potentially a good return for sites in the next tiers of soil class or desirability.

### *9.2.4 Variable cash costs*

Variable cash costs are those that are allocated on a per hectare basis included in the gross margin, except the labour costs described above. Variable cash cost include weed and pest control, pollination, fertiliser, orchard sundries, vehicle expenses, fuel, repairs and maintenance and electricity.

## 9.3 Other indicators

### *9.3.1 Development budgets*

The long-term development costs are vital to the success of a project and allow the development to be viewed from a long-term cash flow basis. Interest costs for borrowed funds are not part of the study. The model builds up a development budget that is typical of a low area almond grower with the ability to mechanically harvest the almonds. The difference between the two models being the exclusion of a bore and headworks installation into the low input model.

### *9.3.2 Sensitivity analysis*

The use of sensitivity analysis enables us to view changes to the IRR when different scenarios for price and yield are given. In a New Zealand context, we are limited to the amount of data we can collect due to the lack of growers and practical experience growing almonds. Thus, the sensitivity analysis gives a broad range of the likely financial result obtained if an investment or project were to take place, based on the model and assumptions made in this study.

## 10.0 RESULTS OF THE STUDY

### 10.1 Business indicators and performance

The data from this study was based experience from existing New Zealand almond growers, as well as the knowledge experienced internationally, with specific relation to the Australian almond industry. The 15 year budgets referred to can be found in Appendix 1.

#### *10.1.1 Total business performance*

##### Yield (Best 3-yr average)

The best consistent figures in New Zealand collected from two known growers in Marlborough and Central Hawkes Bay have been up to 2.7 t/ha of kernel fresh weight. These yields are quoted from mature development in their best season. The level of variability from year to year was low in the orchards studied, therefore the 3-yr average yield is likely to be 2.5-2.7t/ha. The target stands at 3.3 t/ha but due to the secondary nature of the businesses studied this has not been achieved. With more attention to detail in terms of canopy manipulation and fertiliser applications, and the rolling 3-yr yield average of 3.3-3.5t/ha is likely to be achievable.

With a low input system, i.e. no water and minimal attention to detail, it is likely that the yield profile will not exceed approximately 2t/ha on a rolling 3-yr average. Almonds have the tendency to be biennial so for the indicator of yield performance, a 3-year average must be taken into account. With low input you are more than likely going to push the trees into a biennial trend, and therefore the rolling 3-year average is likely to decline.

In a high input scenario where water requirements are met at the right time and growth stage, and pest and disease management is front of mind, it is likely that yield potential will be similar to that of the US and Australia at 3.5-4t/ha. This is based on anecdotal evidence, with no one grower achieving yields to this level in New Zealand. The highest yields achieved that are noted are 2.7t/ha being a low input, low management business.

In comparison, the 2007 Australian average was 2.97t/ha, from mature trees, on good soils, good irrigation systems, usually frost-free and a high level of management skill.

Yield is the primary driver for profitability and in conjunction with price it is the most sensitive indicator of financial performance. It is not hard to believe that blocks which produce higher yields will have excellent gross margins, better and faster cumulative cash flow and better internal rate of returns.

A yield by price sensitivity analysis suggests that for an almond business to be successful in terms of IRR, the minimum yield achieved must be no lower than 2.5t/ha and the return no lower than $20/kg.

##### Price per kg of kernel

From discussion with NZ growers, they were in a situation where there was no marketing body. Therefore, they processed, marketed and sold the product themselves. In this market where the supply was limited the growers were able to achieve a minimum of $38/kg of kernel for their freshly NZ grown almonds.

This is a scenario where demand is high and supply is very low, therefore price is high. For this feasibility, it is expected that as supply increases, the price will drop and therefore the price per kg used in the modelling is $20/kg class 1 premium and $10/kg for class 2 process grade almonds.

The price per kg of almonds found in the Australian market is NZD$8.48/kg[1]. The difference being the NZ grown almond is a locally grown niche product. Australian almond business models can sustain such low prices because they farm on vast areas with a high degree of mechanisation, and therefore the cost of production per hectare is low. The NZ almond industry does not have the ability to farm on such areas due to land availability and cost, so therefore must base their business model around a niche, locally grown product at a high price.

#### *10.1.1.1 Cost analysis*

### Cost of production per kg kernel

With the New Zealand almond growing experience to date, growers have kept the cost of production very low. The main reason for this is the prioritisation of the almond business being secondary to other sources of income. This will have prevented high potential yield and fruit quality. For the purpose of this study, budgets have been developed for a high (normal/expected quantity input system) and a low input system with key reference around water and how that will influence yield and quality of the crop (Appendix 1).

It is important we do not directly corollate our assumed methods of production to that seen in Australia or USA because of the reasons discussed above. NZ is likely to have higher costs of production per kg of kernel but the ability to sell the fruit at a much higher price.

The cost of production per kg of kernel takes into account all operational and labour expenses. The cost to produce a kg of kernel almond is estimated to be $6.88/kg in an "normal" input system. Alternatively, for a low input system it is estimated to cost $9.14/kg (Table 2). Although this may seem counter intuitive, the major difference is the reduction in yield per hectare and quality of the almonds when taking a low input, no irrigation approach.

Table 2. Cost of production per kg of kernel

| | Cost of production per kg kernel | Assumptions |
|---|---|---|
| **Normal input** | $6.88 kg | Full water access = higher yields and quality |
| **Low input** | $9.14 kg | Low water = reduced yields and quality |
| **Australia** | $2.01 kg | |

The breakdown of costs will tend to range between property sizes, regions and management strategies. Variable cash costs, which include everything from labour to the cost of fertiliser, make up the greatest cost and are arguably an area where costs can be reduced in an almond operation. Almond growing in a NZ aspect has been lightly explored and the ability to compromise on different costs is unknown. However, it is AgFirst's opinion, with the support of the sensitivity analysis, that if a high price and moderate yield can be maintained, there will be no need to compromise on operational costs in an attempt to make a profit.

1. Source: https://www.selinawamucii.com/

Figure 1 and Table 3 below display the cost breakdown for an expected almond orchard. This breakdown does not change for the normal and low input models. Three main variable costs make up 53% of the total. These are wages of management (22%), other wages (16%), and pruning cost (15%). Other wages include miscellaneous jobs such as mowing and mulching and are considered a significant part of the almond operation. Harvest costs in comparison to other horticultural enterprises are low, as the model assumes the almonds are being mechanically harvested which, from NZ experience, comes to $416/ha. All other costs shown in Figure 1 are important to the almond production system and all have a direct or indirect impact on the performance of the orchard.

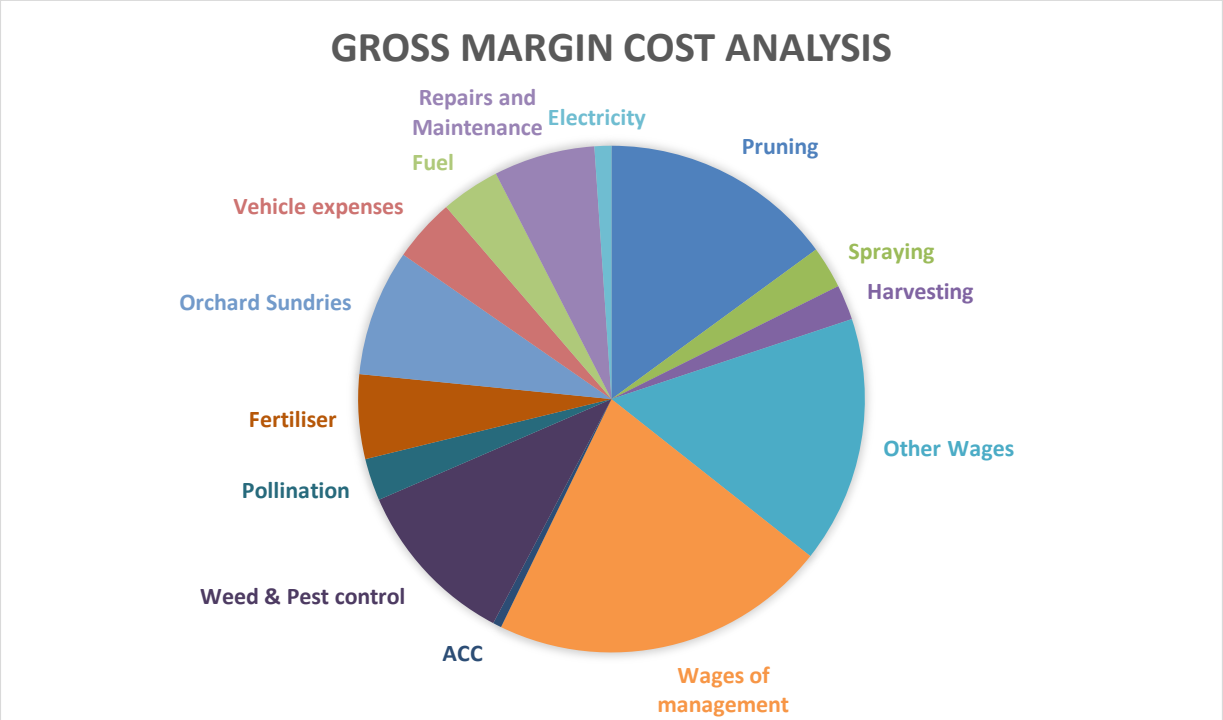


Figure 1. Expected annual cash cost breakdown in Almonds

Table 3. Expected annual cash cost breakdown by $/ha and % of total costs.

| Cost | $/ha | % of costs |
|---|---|---|
| Pruning | $4,167 | 15% |
| Spraying | $500 | 3% |
| Harvesting | $416 | 2% |
| Other Wages | $2,925 | 16% |
| Wages of management | $4,000 | 22% |
| ACC | $115 | 1% |
| Weed & Pest control | $2,000 | 11% |
| Pollination | $500 | 3% |
| Fertiliser | $1,000 | 5% |
| Orchard Sundries | $1,500 | 8% |
| Vehicle expenses | $750 | 4% |
| Fuel | $700 | 4% |
| Repairs and Maintenance | $1,200 | 6% |
| Electricity | $200 | 1% |

## Labour costs

As stated above, labour represents the majority of the costs in an almond operation (as is typical for most permanent horticultural crops). Pruning, harvesting, spraying and other wages make up an estimated 36% of costs. Different management strategies (low input/high input) will have different quantities of labour costs depending on their level of detail. Labour costs on a New Zealand almond orchard are expected to be $6,618/ha, which includes the aspects stated above. A management component of $4,000/ha has been added in addition to the above labour costs to account for all overhead and day-to-day business management needs.

$25/hr was used as a labour rate to account for a range of abilities that might work on the orchard doing a range of tasks from spraying to pruning.

## Gross margin

Gross margins will vary depending on yield and the level of input in the production system. Gross margins are based on operating costs and do not include overhead costs. The expected gross margin at full production of a normal input system is expected to be $25,197/ha and $12,270 for a low input system.

Gross margins demonstrate the importance of management efficiencies of any horticultural system. The difference in gross margins between the normal input system vs the low input system in this study is the investment in irrigation during development, which led to an increase in yield by 0.7t/ha and 10% class 1 produce at full maturity. The same goes for factors such as fertiliser. Both of these practices can increase yield, therefore that coupled with practices adopted to substantially reduce the risk to crop loss can increase gross margins significantly.

## Cumulative cash flow

Cumulative cash flow is critical to the success of almond investment. Almonds, being a permanent crop, can result in substantial peak debt, hence calculating cumulative cash flow and determining peak debt is important. Cumulative cash flow provides an indication of the year in which peak debt will occur as well as the number of years to a positive cumulative balance, which is the point in time the project has paid for itself. Keep in mind the model has been created assuming a 10ha orchard is being developed.

The normal input model had a peak debt in year 3 of $1,249,759 and a break-even year was year 12. The low input system with limited production and quality due to the lack of irrigation had a peak debt in year 4 of $1,223,472 and a break-even year estimated to be year 17, outside of the 15 year scope of the capital budget (Figure 2).

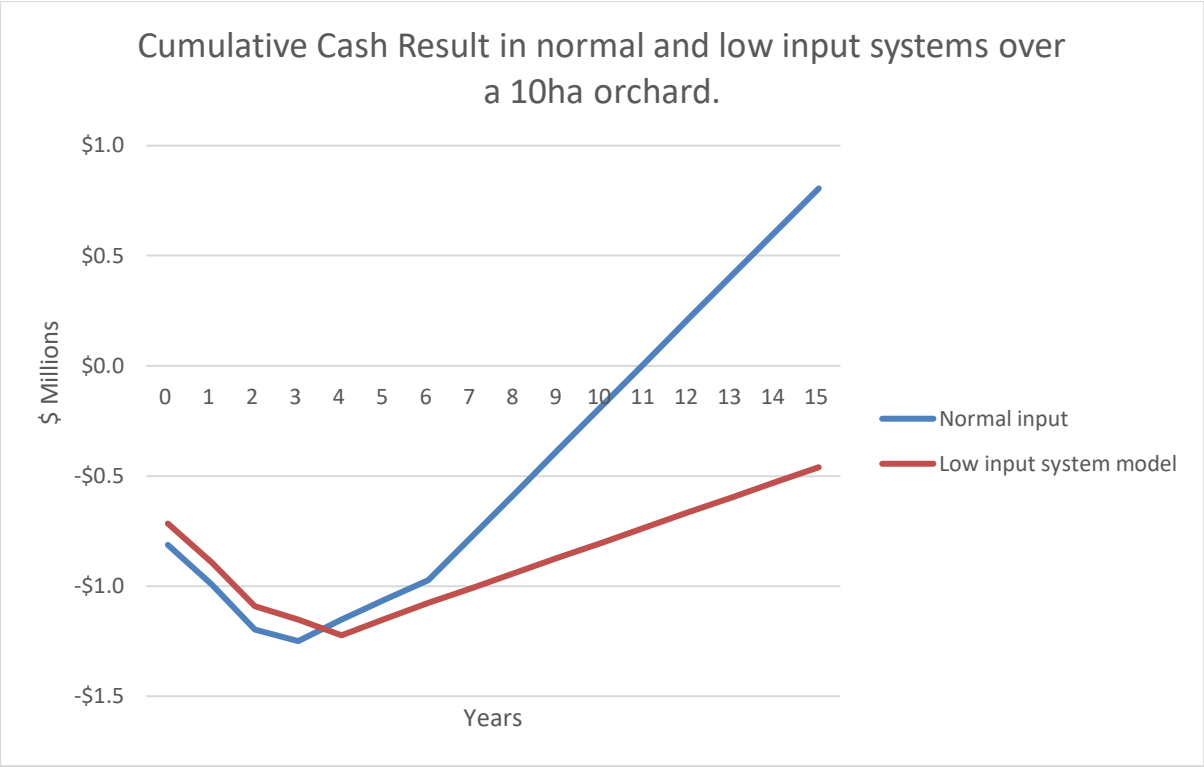


Figure 2. Cumulative cash flow of the normal and low input almond models.

### *10.1.2 Other indicators*

#### Development budgets

As part of the capital budgeting, a development budget was created using experience from NZ growers as well as the information AgFirst has on orchard establishment and what is required. This cost is required upfront in year 1.

The total development cost for a 10ha orchard came to a total of $717,164 in the normal input system and $620,964 in the low input system. As stated earlier, the difference is the exclusion of a bore and headworks installation in the low input system.

Table 4 shows the breakdown of what is included in the development budget and their relative cost.

Table 4. Development cost breakdown for a 10ha almond Orchard development.

| DEVELOPMENT & CAPITAL EXPENSES (10ha Orchard) | Normal input | Low input |
|---|---|---|
| Ground prep | $9,250 | $9,250 |
| Drainage | $100,000 | $100,000 |
| Shelter establishment | $4,500 | $4,500 |
| Irrigation | $15,200 | |
| Plants | $83,333 | $83,333 |
| Planting | $6,667 | $6,667 |
| Grassing down | $5,000 | $5,000 |
| **ORCHARD ESTABLISHMENT** | **$223,950** | **$208,750** |
| | | |
| Bore | $30,000 | |
| Headworks | $50,000 | |
| Implement and spray shed | $50,000 | $50,000 |
| Office, Kitchen, Toilets | $25,000 | $25,000 |
| Shade sheds, Loading bays, tracks | $50,000 | $50,000 |
| Tractor | $65,000 | $65,000 |
| Sprayer | $37,500 | $37,500 |
| Tractor/harvester | $50,000 | $50,000 |
| Mulcher & sweeper | $10,000 | $10,000 |
| Fertiliser spreader | $5,000 | $5,000 |
| Mower | $9,000 | $9,000 |
| Herbicide sprayer | $5,000 | $5,000 |
| Frost Fans | $85,714 | $85,714 |
| General Orchard Equipment | $20,000 | $20,000 |
| **INFRASTRUCTURE AND MACHINERY** | **$492,214** | **$412,214** |
| **TOTAL DEVELOPMENT COST** | **$716,164** | **$620,964** |

## Sensitivity analysis

The sensitivity tables are based on expected internal rates of return (IRR) of a New Zealand almond operation, as described in the above report. It uses a range of almond prices/kg for a range of given yields. The two models have been used to produce a sensitivity analysis to estimate the impact a normal and low input system has on the feasibility of an almond business in the Central Hawkes Bay.

Table 5. Sensitivity assumptions and results for both models

| | 3-yr average production | Class 1 (%) | Class 1 price per kg | IRR (%) |
|---|---|---|---|---|
| Normal input | 2.7 t/ha | 70% | $20 | 5.5% |
| Low input | 2.0 t/ha | 60% | $20 | -4.9% |

### *Normal input production system*

The sensitivity analysis suggests for a normal input system, IRRs after 15 years could range from -19.5% to 32.2%, depending on yield and price performance. With experience from NZ growers, we know that with irrigation and passive management it is possible to achieve 2.5-2.7t/ha. Thus, the likelihood to achieve greater than 2t/ha over a 3-year average is relatively high. We have unknown experience of having a normal input system managed well, therefore the potential optimum yields are largely unknown. However, an orchard with a conducive climate, frost free with good soil and good irrigation, yields of 3—3.5t/ha could be possible, which is the point where IRRs increase significantly.

Price will depend on the market and its potential size in relation to the supply. NZ almond growers were regularly achieving greater than $35/kg for their products however it is of AgFirst's opinion the demand at this price point could be limited and therefore the price will not stay as high.

Table 6. Internal Rate or Return (IRR) at 15 years by yield and weighted price per kg for a normal input system

| 5.5% | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 |
|---|---|---|---|---|---|
| $15.00 | -19.5% | -5.0% | 1.4% | 5.8% | 11.2% |
| $20.00 | -3.6% | 3.8% | 8.6% | 12.5% | 18.0% |
| $25.00 | 3.5% | 9.6% | **14.0%** | 17.6% | 23.5% |
| $30.00 | 8.5% | 14.2% | 18.3% | 21.8% | 28.1% |
| $35.00 | 12.5% | 18.0% | 22.0% | 25.5% | 32.2% |

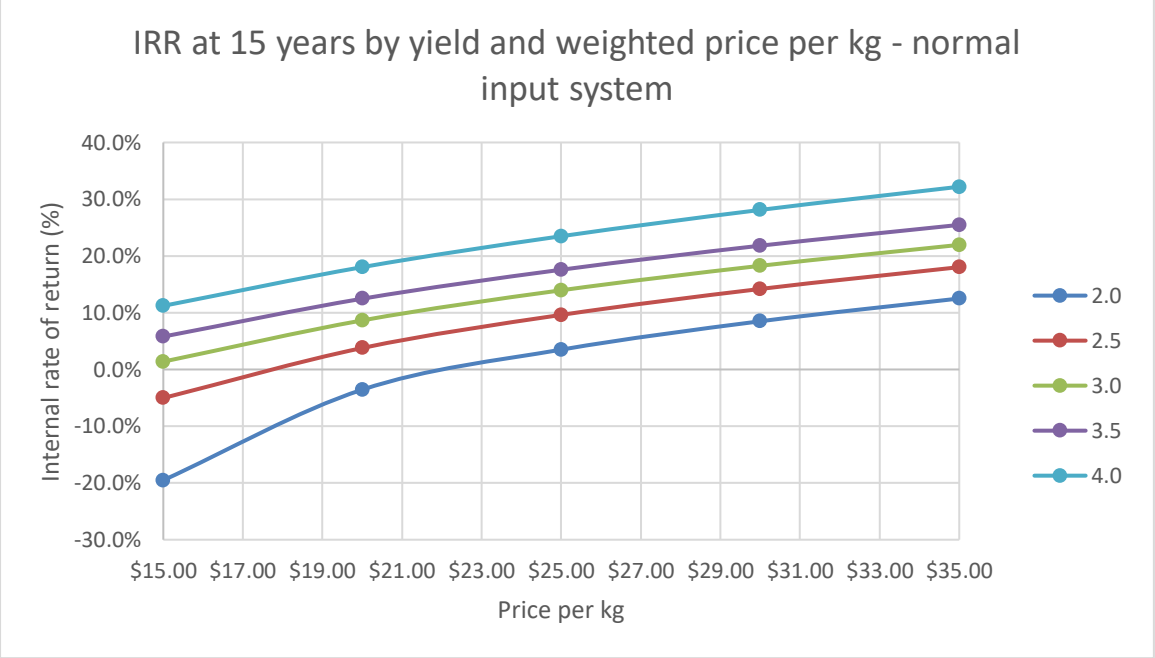


Figure 3. Sensitivity analysis showing IRR at 15 years by yield and price per kg for a normal input system.

### *Low input production system*

The sensitivity analysis of the low input model is significantly different to that of a normal input model. It shows that restricting yields and quality through no irrigation will make the

investment in terms of IRR not sustainable. With a maximum of 2.2 t/ha at $35/kg, the IRR is 12.9%. This is okay however, a significant number of factors need to be optimised for this to happen.

Table 7. Internal rate of return (IRR) at 15 years by yield and weighted price per kg for a low input system.

| -4.9% | 1.4 | 1.6 | 1.8 | 2.0 | 2.2 |
|---|---|---|---|---|---|
| $15.00 | | | | -22.9% | -12.8% |
| $20.00 | | | -11.5% | -4.9% | -1.7% |
| $25.00 | -17.8% | -8.8% | **-2.4%** | 2.2% | 4.5% |
| $30.00 | -6.8% | -2.0% | 3.1% | 7.2% | 9.2% |
| $35.00 | -0.9% | 2.7% | 7.3% | 11.2% | 12.9% |

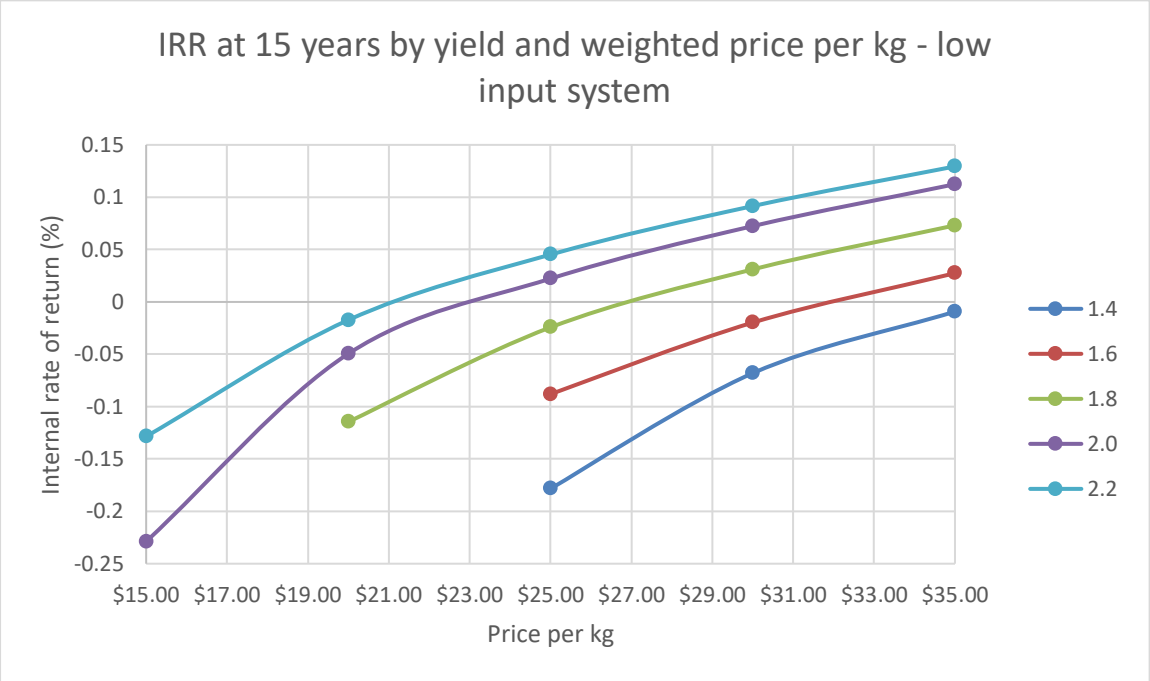


Figure 4. IRR at 15 years by yield and weighted price per kg for a low input system

| ANNUAL INCOME & EXPENSES | Normal input system | | | | | | | | | | | | | | | Price/cost per unit at full production | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | $/kg GROSS | | $/HA AREA |
| **INCOME** | | | | | | | | | | | | | | | | | | | |
| Yield - T/ha | 0 | 0 | 0 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | | | |
| - Kg (Gross) | 0 | 0 | 0 | 10,000 | 20,000 | 20,000 | 20,000 | 27,000 | 27,000 | 27,000 | 27,000 | 27,000 | 27,000 | 27,000 | 27,000 | 27,000 | | | |
| Total Income | 0 | 0 | 0 | 170,000 | 340,000 | 340,000 | 340,000 | 459,000 | 459,000 | 459,000 | 459,000 | 459,000 | 459,000 | 459,000 | 459,000 | 459,000 | *$17.00* | | *$45,900* |
| **EXPENSES** | | | | | | | | | | | | | | | | | | | |
| **Post Harvest Expenses** | | | | | | | | | | | | | | | | | | | |
| Reprocessing | 0 | 0 | 0 | 2,000 | 4,000 | 4,000 | 4,000 | 5,400 | 5,400 | 5,400 | 5,400 | 5,400 | 5,400 | 5,400 | 5,400 | 5,400 | *$0.20* | | *$540* |
| Drying | 0 | 0 | 0 | 2,100 | 4,200 | 4,200 | 4,200 | 5,670 | 5,670 | 5,670 | 5,670 | 5,670 | 5,670 | 5,670 | 5,670 | 5,670 | *$0.21* | | *$567* |
| Hulling and Shelling | 0 | 0 | 0 | 2,100 | 4,200 | 4,200 | 4,200 | 5,670 | 5,670 | 5,670 | 5,670 | 5,670 | 5,670 | 5,670 | 5,670 | 5,670 | *$0.21* | | *$567* |
| Freight (orchard to packhouse) | 0 | 0 | 0 | 1,000 | 2,000 | 2,000 | 2,000 | 2,700 | 2,700 | 2,700 | 2,700 | 2,700 | 2,700 | 2,700 | 2,700 | 2,700 | *$0.10* | | *$270* |
| Industry Levy | 0 | 0 | 0 | 700 | 1,400 | 1,400 | 1,400 | 1,890 | 1,890 | 1,890 | 1,890 | 1,890 | 1,890 | 1,890 | 1,890 | 1,890 | *$0.07* | | *$189* |
| Total Post Harvest Expenses | 0 | 0 | 0 | 7,900 | 15,800 | 15,800 | 15,800 | 21,330 | 21,330 | 21,330 | 21,330 | 21,330 | 21,330 | 21,330 | 21,330 | 21,330 | *$0.79* | | *$2,133* |
| Orchard Gate Income | 0 | 0 | 0 | 162,100 | 324,200 | 324,200 | 324,200 | 437,670 | 437,670 | 437,670 | 437,670 | 437,670 | 437,670 | 437,670 | 437,670 | 437,670 | *$16.21* | | *$43,767* |
| **Labour Expenses** | | | | | | | | | | | | | | | | | | | |
| Pruning | 6,942 | 6,942 | 10,274 | 13,883 | 19,437 | 22,213 | 24,990 | 27,767 | 27,767 | 27,767 | 27,767 | 27,767 | 27,767 | 27,767 | 27,767 | 27,767 | *$1.03* | | *$2,777* |
| Spraying | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | *$0.19* | | *$500* |
| Harvesting | 0 | 0 | 0 | 1,748 | 2,622 | 3,284 | 3,705 | 4,163 | 4,163 | 4,163 | 4,163 | 4,163 | 4,163 | 4,163 | 4,163 | 4,163 | *$0.15* | | *$416* |
| Other Wages | 2,925 | 5,850 | 14,625 | 21,938 | 26,325 | 29,250 | 29,250 | 29,250 | 29,250 | 29,250 | 29,250 | 29,250 | 29,250 | 29,250 | 29,250 | 29,250 | *$1.08* | | *$2,925* |
| Wages of management | 20,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | *$1.48* | | *$4,000* |
| ACC | 335 | 555 | 671 | 793 | 896 | 958 | 988 | 1,019 | 1,019 | 1,019 | 1,019 | 1,019 | 1,019 | 1,019 | 1,019 | 1,019 | *$0.04* | | *$102* |
| **Operating Expenses** | | | | | | | | | | | | | | | | | | | |
| Weed & Pest control | 2,000 | 7,000 | 14,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | *$0.74* | | *$2,000* |
| Pollination | 0 | 0 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | *$0.19* | | *$500* |
| Fertiliser | 10,000 | 20,000 | 20,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | *$0.37* | | *$1,000* |
| Orchard Sundries | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | *$0.56* | | *$1,500* |
| Vehicle expenses | 750 | 3,750 | 5,625 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | *$0.28* | | *$750* |
| Fuel | 700 | 4,900 | 5,950 | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | *$0.26* | | *$700* |
| Repairs and Maintenance | 0 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | *$0.44* | | *$1,200* |
| Electricity | 200 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | *$0.07* | | *$200* |
| Total Variable Expenses | 63,851 | 122,996 | 150,145 | 161,862 | 172,781 | 179,205 | 182,433 | 185,698 | 185,698 | 185,698 | 185,698 | 185,698 | 185,698 | 185,698 | 185,698 | 185,698 | *$6.88* | | *$18,570* |
| GROSS MARGIN | (63,851) | (122,996) | (150,145) | 238 | 151,419 | 144,995 | 141,767 | 251,972 | 251,972 | 251,972 | 251,972 | 251,972 | 251,972 | 251,972 | 251,972 | 251,972 | *$9.33* | | *$25,197* |
| **less : Orchard overheads** | | | | | | | | | | | | | | | | | | | |
| Lease cost | 20,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | *$1.48* | | *$4,000* |
| Administration | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | *$0.26* | | *$714* |
| Property Charges | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | *$0.26* | | *$707* |
| Crop insurance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | *$0.00* | | *$0* |
| Subtotal Orchard Overheads | 34,210 | 54,210 | 54,210 | 54,210 | 54,210 | 54,210 | 54,210 | 54,210 | 54,210 | 54,210 | 54,210 | 54,210 | 54,210 | 54,210 | 54,210 | 54,210 | *$2.01* | | *$5,421* |
| **CASH ORCHARD SURPLUS** (EBITDAR) | (98,061) | (177,206) | (204,355) | (53,972) | 97,209 | 90,785 | 87,557 | 197,762 | 197,762 | 197,762 | 197,762 | 197,762 | 197,762 | 197,762 | 197,762 | 197,762 | *$7.32* | | *$19,776* |
| Development Costs | 716,164 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| Total Cash Surplus/Deficit | (814,226) | (177,206) | (204,355) | (53,972) | 97,209 | 90,785 | 87,557 | 197,762 | 197,762 | 197,762 | 197,762 | 197,762 | 197,762 | 197,762 | 197,762 | 197,762 | | | |
| Cummulative Cash Result | (814,226) | (991,432) | (1,195,787) | (1,249,759) | (1,152,549) | (1,061,764) | (974,207) | (776,446) | (578,684) | (380,923) | (183,161) | 14,600 | 212,362 | 410,123 | 607,885 | 805,646 | | | |

Table 8. Normal input system financial result breakdown.

| | |
|---|---|
| **IRR to Year 15** | 5.5% |
| **IRR to Year 10** | -2.2% |
| **NPV (6%) after 15 years** | -$50,734 |
| **NPV (6%) after 10 years** | -$489,571 |
| **Cash Surplus at year 15** | $805,646 |
| **Cash Surplus at Year 10** | -$183,161 |
| **Breakeven year** | 12 |

| ANNUAL INCOME & EXPENSES | | | Low input system model | | | | | | | | | | | | | | Price/cost per unit at full production | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | $/kg GROSS | | $/HA AREA |
| **INCOME** | | | | | | | | | | | | | | | | | | | |
| Yield - T/ha | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | | | |
| - Kg (Gross) | 0 | 0 | 0 | 10,000 | 10,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | | | |
| Total Income | 0 | 0 | 0 | 160,000 | 160,000 | 320,000 | 320,000 | 320,000 | 320,000 | 320,000 | 320,000 | 320,000 | 320,000 | 320,000 | 320,000 | 320,000 | $16.00 | | $32,000 |
| **EXPENSES** | | | | | | | | | | | | | | | | | | | |
| **Post Harvest Expenses** | | | | | | | | | | | | | | | | | | | |
| Reprocessing | 0 | 0 | 0 | 2,000 | 2,000 | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 | $0.20 | | $400 |
| Drying | 0 | 0 | 0 | 1,800 | 1,800 | 3,600 | 3,600 | 3,600 | 3,600 | 3,600 | 3,600 | 3,600 | 3,600 | 3,600 | 3,600 | 3,600 | $0.18 | | $360 |
| Hulling and Shelling | 0 | 0 | 0 | 1,800 | 1,800 | 3,600 | 3,600 | 3,600 | 3,600 | 3,600 | 3,600 | 3,600 | 3,600 | 3,600 | 3,600 | 3,600 | $0.18 | | $360 |
| Freight (orchard to packhouse) | 0 | 0 | 0 | 1,000 | 1,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | $0.10 | | $200 |
| Industry Levy | 0 | 0 | 0 | 600 | 600 | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | $0.06 | | $120 |
| Total Post Harvest Expenses | 0 | 0 | 0 | 7,200 | 7,200 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | $0.72 | | $1,440 |
| Orchard Gate Income | 0 | 0 | 0 | 152,800 | 152,800 | 305,600 | 305,600 | 305,600 | 305,600 | 305,600 | 305,600 | 305,600 | 305,600 | 305,600 | 305,600 | 305,600 | $15.28 | | $30,560 |
| **Labour Expenses** | | | | | | | | | | | | | | | | | | | |
| Pruning | 4,165 | 4,165 | 6,942 | 11,107 | 16,660 | 19,437 | 22,213 | 24,990 | 24,990 | 24,990 | 24,990 | 24,990 | 24,990 | 24,990 | 24,990 | 24,990 | $1.25 | | $2,499 |
| Spraying | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | $0.25 | | $500 |
| Harvesting | 0 | 0 | 0 | 1,748 | 2,622 | 3,284 | 3,705 | 4,163 | 4,163 | 4,163 | 4,163 | 4,163 | 4,163 | 4,163 | 4,163 | 4,163 | $0.21 | | $416 |
| Other Wages | 2,925 | 5,850 | 14,625 | 21,938 | 26,325 | 29,250 | 29,250 | 29,250 | 29,250 | 29,250 | 29,250 | 29,250 | 29,250 | 29,250 | 29,250 | 29,250 | $1.46 | | $2,925 |
| Wages of management | 20,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | $2.00 | | $4,000 |
| ACC | 308 | 528 | 639 | 766 | 870 | 931 | 962 | 993 | 993 | 993 | 993 | 993 | 993 | 993 | 993 | 993 | $0.05 | | $99 |
| **Operating Expenses** | | | | | | | | | | | | | | | | | | | |
| Weed & Pest control | 2,000 | 7,000 | 14,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | $1.00 | | $2,000 |
| Pollination | 0 | 0 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | $0.25 | | $500 |
| Fertiliser | 10,000 | 20,000 | 20,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | $0.50 | | $1,000 |
| Orchard Sundries | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | $0.75 | | $1,500 |
| Vehicle expenses | 750 | 3,750 | 5,625 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | $0.38 | | $750 |
| Fuel | 700 | 4,900 | 5,950 | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | $0.35 | | $700 |
| Repairs and Maintenance | 0 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | $0.60 | | $1,200 |
| Electricity | 200 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | $0.10 | | $200 |
| Total Variable Expenses | 61,048 | 120,193 | 146,781 | 159,058 | 169,977 | 176,402 | 179,630 | 182,895 | 182,895 | 182,895 | 182,895 | 182,895 | 182,895 | 182,895 | 182,895 | 182,895 | $9.14 | | $18,290 |
| GROSS MARGIN | (61,048) | (120,193) | (146,781) | (6,258) | (17,177) | 129,198 | 125,970 | 122,705 | 122,705 | 122,705 | 122,705 | 122,705 | 122,705 | 122,705 | 122,705 | 122,705 | $6.14 | | $12,270 |
| **less : Orchard overheads** | | | | | | | | | | | | | | | | | | | |
| Lease cost | 20,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | $2.00 | | $4,000 |
| Administration | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | 7,140 | $0.36 | | $714 |
| Property Charges | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | 7,070 | $0.35 | | $707 |
| Crop insurance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $0.00 | | $0 |
| Subtotal Orchard Overheads | 34,210 | 54,210 | 54,210 | 54,210 | 54,210 | 54,210 | 54,210 | 54,210 | 54,210 | 54,210 | 54,210 | 54,210 | 54,210 | 54,210 | 54,210 | 54,210 | $2.71 | | $5,421 |
| **CASH ORCHARD SURPLUS** (EBITDAR) | (95,258) | (174,403) | (200,991) | (60,468) | (71,387) | 74,988 | 71,760 | 68,495 | 68,495 | 68,495 | 68,495 | 68,495 | 68,495 | 68,495 | 68,495 | 68,495 | $3.42 | | $6,849 |
| Development Costs | 620,964 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| Total Cash Surplus/Deficit | (716,222) | (174,403) | (200,991) | (60,468) | (71,387) | 74,988 | 71,760 | 68,495 | 68,495 | 68,495 | 68,495 | 68,495 | 68,495 | 68,495 | 68,495 | 68,495 | | | |
| Cummulative Cash Result | (716,222) | (890,625) | (1,091,616) | (1,152,085) | (1,223,472) | (1,148,484) | (1,076,723) | (1,008,228) | (939,734) | (871,239) | (802,744) | (734,249) | (665,754) | (597,259) | (528,765) | (460,270) | | | |

Table 9. Low input system financial result breakdown

| | |
|---|---|
| **IRR to Year 15** | -4.9% |
| **IRR to Year 10** | -14.7% |
| **NPV (6%) after 15 years** | -$690,471 |
| **NPV (6%) after 10 years** | -$842,462 |
| **Cash Surplus at year 15** | -$460,270 |
| **Cash Surplus at Year 10** | -$802,744 |
| **Breakeven year** | 17 |

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