VG97028
Economic sustainability of vegetable farms

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Know-how for Horticulture™

VG97028

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ECONOMIC SUSTAINABILITY OF VEGETABLE FARMS

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Purpose of Report:
This document reports on three consecutive years of study that monitored the financial performance of a hypothetical vegetable farm located in the heart of the prime vegetable growing area of North West Tasmania. This area is intensively cropped with a range of vegetables, both fresh and processed, yielding high quality produce for local, interstate and export markets. However, both sectors are concerned about the financial future for farmers who, like farmers everywhere, have endured diminishing real returns, higher input costs and often unpredictable risks.

Crop yield data used in this report has been provided freely by Tasmanian industry. The inventory of plant and machinery, farm rotations and input costs have been provided by the author using 25 years knowledge of farms of this type in the area.

Financial performance has been measured in business terms - Return to Capital and Net Profit. These represent, in turn, the return to all capital invested in the business (including borrowed funds) and the return to the owner's capital.

The results of this study highlight the critical importance of measuring financial performance in business terms. It not only provides a comparison with non-farm investments, but can also be used to put a dollar value on the rural lifestyle. Further, key determinants of Return to Capital – the value of land, scale, yield and costs can be examined to determine their effect on Profit. Trends evident over the three years of this study can also be used to gauge the 'health' and sustainability of the rural industry at the farm level.

The results presented here should be of relevance to farmers and agribusiness alike. The format used is recommended for all those who wish to evaluate the financial performance of properties of this type.

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1 Industry Summary

The results of this study highlight suggest fundamental issues associated with vegetable farm profitability in Tasmania. Despite the hypothetical nature of this study, , the results illustrate the severe effect of reduced crop income. Not only that, it demonstrates that when farmers are working within low Returns to Capital, relatively small changes to a number of key crops within the rotation can easily lead to a loss situation.

In two crop rotational models adopted, Year 3 was a disasterous year with negative Returns to Capital recorded. Whilst further analysis indicated that rotation (and the associated changes in crop areas) was responsible for a portion of the difference in Total Crop Gross Margin, the main cause was the very low crop margins in that year. This, in turn, was caused by reduced yields (in the case of broccoli, carrots and onions), reduced price and higher costs, particularly sprays (new crop protection strategies) and irrigation (drier and windier season).

It is understood that most farm business would try to compensate in loss years, either by reducing their own wages of by not maintaining an appropriate machinery replacement program, hence the often heard phrase "living off the depreciation". Clearly, most businesses can cope with this in the short term, but not in the longer term. To remain financially sustainable, businesses need to be able to remunerate their decision makers appropriately and maintain a proper machinery replacement program.

Properties with a less intense cropping program than that used here are likely to be returning even lower Returns to Capital, unless significant improvements could be made in crop yields.

If the results presented here could be continued on an annual basis and confirmed, there are potentially serious implications for all sectors of the vegetable industry. These include –

- Growers will always be looking for alternative crops. Often these are grown on a small scale and can detract managers from the "big picture" and prevent economies of scale on the "mainstream" crops.

- The risk of crops not reaching expected yield levels is under-estimated by all sectors of the industry.

- Two of the key drivers of Return to Capital are crop income and the value of Total Assets. For Return to Capital to improve, income needs to be increased and/or land values reduced. Reduced land prices would encourage larger properties with the potential for improved economies of scale. It would also provide scope for the introduction of best practice management and alternative technologies. A study of the potential for such changes to improve Return to Capital should be encouraged.

- This study also assumes that the manager "owns" the land. Whilst traditionally the case, agriculture needs to find more innovative and efficient ways to using the land resource and utilising capital rather than tying it up in real estate.

- Unless farmers are making acceptable Returns to Capital, it will be difficult to encourage the next generation into farming. This may have major implications for the industry within the next 10-15 years.

- Vegetable growers should improve their understanding of business finances. Despite the current availability of some vocational and other courses, grower's own recognition of needing to improve their skills in this area need to be supported by the provision of dedicated training courses. However, a change in attitude towards such courses is required before such a program would be successful.

- An innovative approach would be to link crop contracts with attendance at training courses. These could also be used to continually benchmark local performance with growers in other areas and overseas.

2 Technical Summary

This results of this study support existing knowledge of the vegetable industry in Tasmania. Farm profitability is generally low and subject to severe seasonal fluctuations that may make it very difficult for some businesses to survive a significant downturn in farm income.

Of the two rotational models used here, Return to Capital declined over the period from an initial 5.2% to below –6%. A dramatic reduction occurred in Year 3 following decreased average yields and to some extent reduced price in that year (Figure 1).

Figure 1: Return to Capital & Return to Equity Summary

	1997-98	1998-99	1999-2000
Model 1	($'000)		
Total Crop Gross Margin	236	207	142
Overheads	-160	-162	-169
Earnings Before Interest & Tax *	**76** (5.2%)	**45** (3.0%)	**-27** (-1.8%)
Interest	-42	-39	-43
Net Profit **	**34** (3.4%)	**6** (0.6%)	**-70**(-6.6%)

Model 2	($'000)		
Total Crop Gross Margin	236	231	140
Overheads	-160	-163	-170
Earnings Before Interest & Tax *	**76** (5.2%)	**68** (4.6%)	**-30** (-1.9%)
Interest	-42	-39	-42
Net Profit **	**34** (3.4%)	**29** (2.7%)	**-72** (-6.7%)

* (Return to Capital)
** (Return to Equity)

Over the three year period Equity decreased from an initial 70% to 69.1% (Model 1) and to 69.4% (Model 2). Cash on hand also decreased from an initial $100,000 to $59,000 (Model 1) and to $71,000 (Model 2).

3 Introduction

In recent years, increases in input costs, fluctuating commodity prices and competition for the better land have all influenced the opportunities available and the economic performance of Tasmania farm businesses. However, neither farmers nor agribusiness have had any objective tools to measure the effect of these changes in farm business profitability.

With the wide adoption of "best practice" and quality assurance at the agribusiness and farm level, it is crucial that the industry is more aware of farm business profitability and the factors affecting it. It is equally crucial that all sectors of the industry take "ownership" of the results and work towards improving farm profitability.

Despite the availability of vocational and more formal courses of farm finances and business skills, farmers throughout Australia include a lack of business skills as being one of the industry's principal problems. This study was designed to employ some basic business management tools to measure the profitability of a hypothetical farm over a period of three years. These tools provide an objective measure of profitability and can be used to benchmark any business against other farm businesses or alternative investments.

4 Materials & Methods

4.1 Hypothetical Farm

In order to undertake this study, a hypothetical farm was established which was representative of intensively cropped vegetable farms on the North West Coast of Tasmania.

The model farm selected had a total area of 120 hectares, of which 100 hectares were croppable. An investment of $1 million was estimated to be required (Figure 2).

Figure 2: Land & Improvements

		Value ($'000)
100 ha Croppable	@ $7,250	725
20 ha Other (dams, laneways, yards, structures etc)	@ $2,000	40
Main Residence		100
Outbuildings		50
Other Improvements		35
		$950
Purchase Costs (Stamp, Duty, Legal etc)		50
Total Investment Required		**$1,000**

Characteristics of the farm were as follows –

Soil type and pH:
- Well drained red ferrosol with a pH of 5.8-6.5. No capital dressings of pH enhancing material was expected over the three year period.

Water requirement:
- Required volume of water available from on-farm storage dams re-filled annually from winter runoff.
- Application by travelling irrigators via a system of underground mains and above ground moveable aluminium pipes.
- Driven by electrically powered pump sets.

Cropping history:
- A range of vegetable crops and poppies grown previously.
- No recorded problem with clubroot, a serious fungal disease of brassicas caused by *Plasmodiophora brassicae.*
- Traces of white rot (*Sclerotium cepivorum*) in onions and powdery scab (*Spongospora subterranea*) of potatoes.

In order to undertake the cropping program, an inventory of plant and machinery with a total value of $360,000 was required (Figure 3).

This included basic equipment for soil preparation, spraying and irrigation and included farm vehicles and four wheeler motor bikes. No allowance was made for specialised planting or harvesting equipment except for a brassica transplanter. For these operations, the business was assumed to use contractors. Most of the equipment was assumed to be second hand and in good condition.

Figure 3: Plant & Machinery

	Value ($'000)
Tractors	164
Irrigation Equipment	71
Vehicles	45
Implements	60
Workshop, Communications, Office etc	20
Total Plant & Equipment	**$360**

A total investment of $1.46 million was required, including an allowance for working capital.

Figure 4: Total Investment

	Value ($'000)
Property Purchase	1,000
Plant & Machinery	360
Working Capital	100
Total Investment Required	**$1,460**

4.2 Enterprise Selection

Enterprises were selected to reflect choices available to farmers on the North West Coast of Tasmania. All crops were grown under contract and supplied to vegetable processors (beans, broccoli, peas, potatoes), fresh exporters (carrots, onions) and the pharmaceutical industry (poppies).

A continuous cropping regime with some double cropping was assumed. This reflects the level of intensity adopted by an increasing number of managers in the area. In order to help sustain this level of intensity, a large area of green manure crop was included for sowing in the autumn of each year. This was assumed to be ploughed in and not fed to any stock.

Crop selection, rotations and areas adopted on the hypothetical farm were consistent with accepted agricultural practice. However, given the intensity of the cropping regime there is some doubt that the sustainability of the soil resource could be assured over the longer term. Whilst this possibility is a concern for farmers, the figures presented here cannot be used to prove or disprove this theory. Suffice to say, the long term sustainability of the soil resource is of crucial importance to future agricultural productivity and the best way of insuring this can occur is to be able to operate at an acceptable level of profitability.

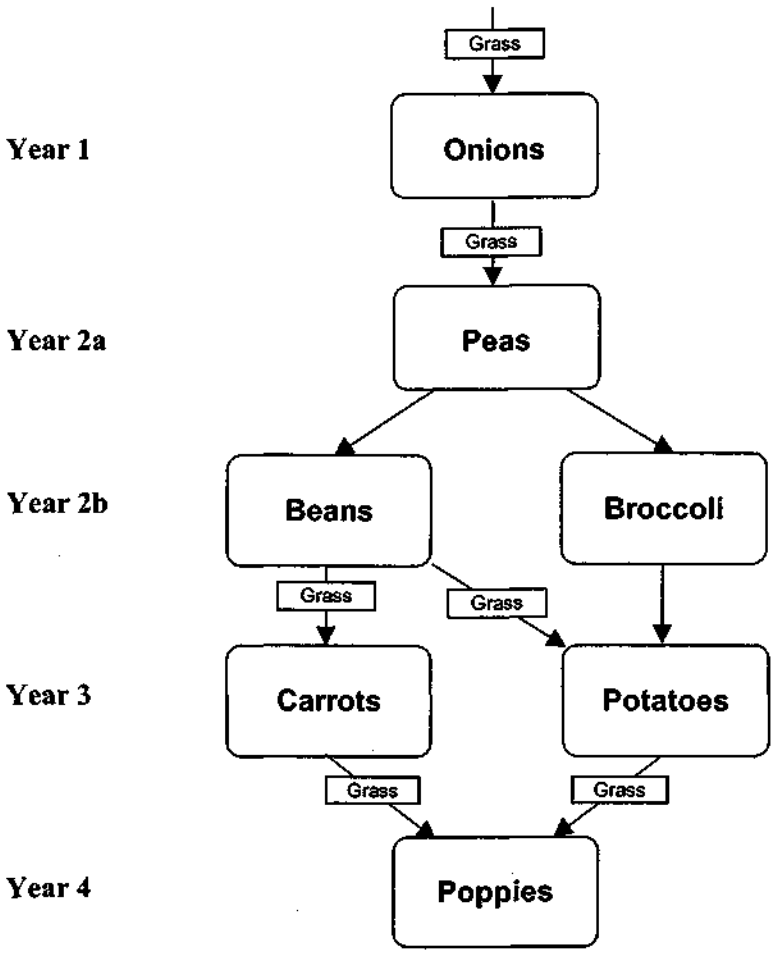
Two separate cropping regimes were adopted for the farm. In Year 1, 1997-98, Model 1 was established which included a total of 130 ha of crops produced from 100 ha of land, 30 ha being double cropped (beans and broccoli after early peas). A total of 90 ha of green manure crop was sown in the autumn of 1998 for

ploughing in. This Model was continued for the second and third years, varying only by rotational constraints. The annual crop areas and associated rotation for Model 1 are illustrated in Figure 5 and Figure 6. Compared to Year 1, only 120 hectares were cropped in each of Years 2 and 3.

Figure 5: Model 1 Cropping Program

		Area (Ha)		
		1997-98	1998-99	1999-2000
Beans	After Peas	20.00	10.00	10.00
Broccoli	After Peas	10.00	10.00	10.00
Carrots		10.00	10.00	5.00
Onions		20.00	20.00	30.00
Peas		30.00	20.00	20.00
Poppies		20.00	30.00	30.00
Potatoes		20.00	20.00	15.00
Green Manure		90.00	90.00	90.00

Figure 6: Model 1 Rotation

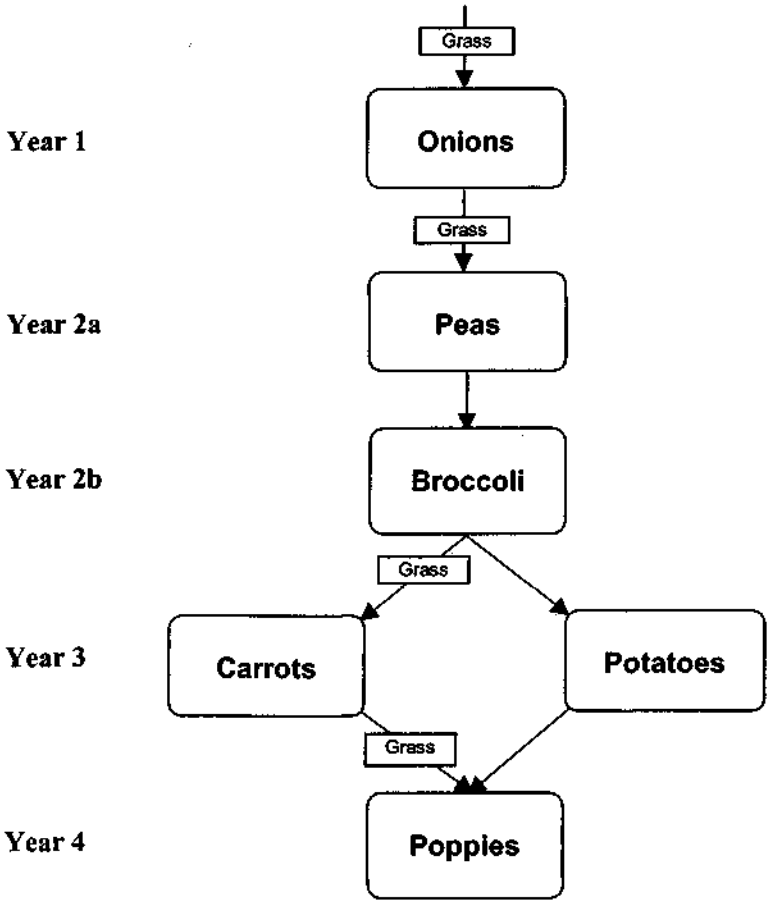


After Year 1, a second crop model, Model 2, was introduced. This new model was based on a sound, but more flexible rotation, thereby simulating growers' need to be more selective in choosing enterprises to maximise profitability. The annual crop areas and associated rotation for Model 2 are illustrated in Figure 7 and Figure 8. The models are similar and differ mainly due to the omission of beans from Model 2.

Figure 7: Model 2 Cropping Program

		Area (Ha)		
		1997-98	1998-99	1999-2000
		Model 1	Model 2	
Beans	After Peas	20.00		
Broccoli	After Peas	10.00	20.00	20.00
Carrots		10.00	15.00	10.00
Onions		20.00	20.00	30.00
Peas		30.00	20.00	20.00
Poppies		20.00	30.00	30.00
Potatoes		20.00	15.00	10.00
Green Manure		90.00	70.00	90.00

Figure 8: Model 2 Rotation



4.3 Economic Analysis

Each season, agribusiness partners to this project contributed actual industry average yield performances for each crop in the general location of the hypothetical farm. Crop costs and overheads were derived from a detailed analysis of production costs and from the author's own knowledge of overheads normally associated with operating a property of this size. All income and expenditure was assumed to occur within a 12 month period, thereby avoiding undue complications with debtors and creditors.

Crop production costs have been adjusted annually from price lists supplied from trade suppliers. Similarly with overheads except where no direct adjustment was possible an adjustment based on ARARE [1] indexes was used. Management and permanent labour costs were derived from the Tasmanian Farming & Fruit Growing Award and lending information was obtained from the Westpac Bank.

Irrigation requirements for each crop in Years 2 and 3 were varied after Year 1 by taking into account variations in monthly rainfall and wind.

The business was established assuming an equity of 70%, thereby requiring it to service a $438,000 loan on an interest only basis.

Measurement of profitability in all cases was based on Return to Capital and Return to Equity according to the following formula –

Total Crop Gross Margin
Less
Business Overheads
Less
Allowance for Operator's Labour
Less
Depreciation
Equals
EARNINGS BEFORE INTEREST & TAX

Divided by
Total Assets
Equals
RETURN TO CAPITAL

Less
Interest
Equals
NET PROFIT

Divided by
Owner's Equity
Equals
RETURN TO EQUITY

These terms were selected as they represent accurate measurements of the return to the asset base or all capital invested in the business (Return to Capital) and the return to the owner's funds invested (Return to Equity). It also allows a ready comparison with other agricultural businesses and alternative investments.

[1] Indexes of Prices Paid by Farmers and Terms of Trade, Contained in Australian Commodities, Australian Bureau of Research Economics, Canberra.

4.4 Technology Transfer

Since its inception, results of this project have been communicated to project partners and industry forums in Tasmania.

Presentations of the findings have been made to industry and growers at a special Research & Development Seminar held in Burnie, Tasmania in 1998 and 1999 and at Ulverstone this year. Results were also presented to meetings of potato growers held in Ulverstone and Scottsdale in November 1998. The Report also featured in the 1998 HRDC Research Report – HortReport 98.

5 Results

5.1 Model 1

Over three years, Net profit and Return to Capital declined over the period. Despite some increase in overheads and interest over this period, the main reason for the trend was a significant reduction in Total Crop Gross Margin (Figure 9). Equity also declined slightly from an initial 70% to 69.1% (Figure 10).

Figure 9: Model 1 Net Profit Over 3 Years

	1997-98	1998-99	1999-2000
	($'000)		
Total Crop Gross Margin	236 (Average $1,810/ha)	207 (Average $1,725/ha)	142 (Average $1,185/ha)
Less			
Overheads			
General Overheads	15	14	15
Manager Wages	47	49	50
Permanent Labour	29	30	31
Vehicle Operating	14	13	16
Insurance	10	10	12
Repairs to Structures	9	9	9
Capital Replacement	36	36	36
	160	162	169
Earnings Before Interest & Tax	**76 (5.2%)**	**45 (3.0%)**	**-27 (-1.8%)**
Less			
Interest on Borrowings	38	37	40
Interest on Overdraft	4	2	3
	42	39	43
Net Profit	**34 (3.4%)**	**6 (0.6%)**	**-70(-6.6%)**

Figure 10: Model 1 Equity and Cash on Hand Over 3 Years

	97-98	98-99	98-99
	($'000)		
Equity			
Opening at 1 July	1,022 (70%)	1,056 (70.7%)	1,050 (70.6%)
Closing at 30 June *	1,056 (70.7%)	1,050 (70.6%)	981 (69.1%)
Cash on Hand			
Opening at 1 July	100	134	128
Closing at 30 June *	134	128	59

* After payment of Company Tax

5.2 Model 2

Over three years with this model, Net profit and Return to Capital also declined. Despite a superior performance in Year 2 compared to Model 1, Year 3 performed relatively poorly. Again, the main reason being a significant reduction in Total Crop Gross Margin (Figure 11). Equity also declined slightly from an initial 70% to 69.1% at the end of Year 3 (Figure 12).

Figure 11: Model 2 Net Profit Over 3 Years

	1997-98	1998-99	1999-2000
	($'000)		
Total Crop Gross Margin	236 (Average $1,810/ha)	231 (Average $1,925/ha)	140 (Average $1,170/ha)
Less			
Overheads			
General Overheads	15	14	15
Manager Wages	47	49	50
Permanent Labour	29	30	31
Vehicle Operating	14	13	16
Insurance	10	11	13
Repairs to Structures	9	9	9
Capital Replacement	36	36	36
	160	163	170
Earnings Before Interest & Tax	**76** (5.2%)	**68** (4.6%)	**-30** (-1.9%)
Less			
Interest on Borrowings	38	37	40
Interest on Overdraft	4	2	2
	42	39	42
Net Profit	**34** (3.4%)	**29** (2.7%)	**-72** (-6.7%)

Figure 12: Model 2 Equity & Cash on Hand Over 3 Years

	97-98	98-99	98-99
	($'000)		
Equity			
Opening at 1 July	1,022 (70%)	1,056 (70.7%)	1,073 (71.0%)
Closing at 30 June *	1,056 (70.7%)	1,073 (71.0%)	993 (69.4%)
Cash on Hand			
Opening at 1 July	100	134	151
Closing at 30 June *	134	151	71

* After payment of Company Tax

6 Discussion

Irrespective of which model was used, a striking feature of this analysis was the relatively Returns to Capital achieved, especially considering the intensity of the cropping program undertaken. However, from experience, levels such as this are fairly typical of vegetable properties on the North West Coast. Due to the level of borrowings, Return to Equity (or return to the owner's capital) is very low in all years with the lowest level recorded in Year 3 of around –6%.

In both models, Year 3 was a disasterous year with negative Returns to Capital recorded. Whilst further analysis indicated that rotation (and the associated changes in crop areas) was responsible for around $20,000 of the difference in Total Crop Gross Margin, the main cause was the very low crop margins in that year. This, in turn, was caused by reduced yields (in the case of broccoli, carrots and onions), reduced price and higher costs, particularly sprays (new crop protection strategies) and irrigation (drier and windier season). Despite the hypothetical nature of this study, the results illustrate the severe effect of reduced crop income. Not only that, it demonstrates that when farmers are working within low Returns to Capital, relatively small changes to a number of key crops within the rotation can easily lead to a loss situation.

It is understood that most farm business would try to compensate in loss years, either by reducing their own wages of by not maintaining an appropriate machinery replacement program, hence the often heard phrase "living off their depreciation". Clearly, most businesses can cope with this in the short term, but not in the longer term. To remain financially sustainable, businesses need to be able to remunerate their decision makers appropriately and maintain a proper machinery replacement program.

Properties with a less intense cropping program than that used here are likely to be returning even lower Returns to Capital, unless significant improvements could be made in crop yields.

If the results presented here could be continued on an annual basis and confirmed, there are potentially serious implications for all sectors of the vegetable industry. These include –

- Growers will always be looking for alternative crops. Often these are grown on a small scale and can detract managers from the "big picture" and prevent economies of scale on the "mainstream" crops.

- The risk of crops not reaching expected yield levels is under-estimated by all sectors of the industry. In the effort to "intensify" cropping programs in search of extra profitability, often things can go wrong. This study reveals the strong negative impact of these events. Experience suggests that it can take considerable longer to recover from such a situation, if at all.

- Two of the key drivers of Return to Capital are crop income and the value of Total Assets. For Return to Capital to improve, income needs to be increased and/or land values reduced. Over the 3 year period of this study, land values have not altered. It is the author's opinion that land values need to be reduced. This would encourage larger properties with the potential for improved economies of scale. It would also provide scope for the introduction of best practice management and alternative technologies such as pivot or linear move irrigation systems. A study of the potential for such changes to improve Return to Capital would be worthwhile.

- This study also assumes that the manager "owns" the land. Whilst traditionally the case, agriculture needs to find more innovative and efficient ways to using the land resource and utilising capital rather than tying it up in real estate.

- Unless farmers are making acceptable Returns to Capital, it will be difficult to encourage the next generation into the business. This may well have major implications for the industry within the next 10-15 years.

7 Recommendations

Given the results of this study and the close agreement with what happens in practice, farmers, farmers organisations, agribusiness and funding bodies need to give urgent attention to issues which are able to increase Return to Capital. These issues are the "big ticket" items that are currently overlooked or are considered too difficult to tackle. They include –

- Alternatives to land ownership.
- Improving farm business skills.
- Innovative ways to share resources eg. land, water, capital, contracts and management.
- Improving economies of scale.
- Benchmarking against other farm businesses or alternative investments.
- Encouraging innovation and entrepreneurship
- Better management of risk.
- Improving leadership skills.
- Encouraging all sectors in the industry to share "ownership" of the problem of low Returns to Capital at the farm level.

Further, an extension of this study for a further 3-5 years would continue to provide important information on the economic sustainability of vegetable farms. It would assist all sectors in monitoring the "health" of the industry and encourage a cooperative approach and commitment in improving profitability of the farm sector.

8 Acknowledgements

The author wishes to acknowledge the support of HRDC in pursuit of this project as well as the following firms and organisations. Without their support and assistance these results would not have been possible.

- Field Fresh Tasmania
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- McCain Foods (Aust) Pty Ltd
- Simplot Australia Pty Limited
- Tasmanian Farmers & Graziers Association
- Vegetable Agricultural Research & Advisory Committee