Horticulture Innovation Australia

Final Report

Australian Avocado Benchmarking Program Development Rounds II and III

Howard Hall
Vadaka P/L ATF Hall Family Trust T/As Pinnacle Agribusiness

Project Number: AV13003

AV13003

This project has been funded by Horticulture Innovation Australia Limited using funds from the Avocado levy and funds from the Australian Government.

ISBN 0 7341 3889 X

Published and distributed by:
Horticulture Innovation Australia Limited
Level 8, 1 Chifley Square
Sydney NSW 2000
Tel: (02) 8295 2300
Fax: (02) 8295 2399

Contents

Summary

Over two hundred (200) one-on-one data collection meetings were completed in the kitchens, lounge rooms and home and farm offices of avocado growers across the eight Australian growing regions. The data now in the purpose-built database provides financial, operational and output information describing thirty percent (30%) of the total Australian production of avocados over four years. That is 66,000 tonnes of produce worth approximately $338 million at delivery to Distribution Centre (DC) or first intermediary.

The data is representative of grower businesses in the Australian industry, as can be seen from further information provided in Appendix 1. Very few agricultural industries in Australia or globally have information of this nature and detail about the financial and operational parameters of businesses in the industry. Summary information herein is based on four-year averages and trends for the financial years 2011-12 (FY 2012) to 2014-15 (FY 2015) inclusive.

Program participants recorded an average yield of 9.23 tonnes per producing hectare per annum. The average annual yield declined by -5% over the four years, however declined -21% over the last three years. The percentage of fruit sold as mid-sized fruit (counts 18-25) averaged 49%, declining by -8% over the period while the percentage packed to premium grade averaged 70%, declining by -7%.

Labour productivity, measured by tonnes produced and sold per full time employee equivalent (FTE) per annum, averaged 52 tonnes per FTE, declining by -24% over the period. The median farm size for participant businesses is 10.5 producing hectares and the average size is 24 producing hectares.

The prices paid to participants for fresh market avocado increased by 62% per tray equivalent (5.5 kg) sold and the total operating costs have increased by 31%, over four years . Averages for gross revenue, operating costs and cash profit (Earnings Before Interest Tax and Depreciation, EBITDA) are:

	Per Producing Hectare	**Per Tray Equiv. Sold**
Gross Revenue	$44,559	$26.55
Operating Costs	$29,986	$17.87
Cash Profit (EBITDA)	$14,572	$ 8.67

An average performing business with 10.5 producing hectares (median farm size) has, on average, received cash inflows of $470,000 per annum, outlaid $314,000 on average per annum and been able to retain an average $153,000 per annum as cash profit.

From the cash profit (EBITDA) each year the business has needed to service all farm debt and depreciate all plant and equipment. The remainder has been available to deliver a return on capital invested.

Where unpaid owner labour is accrued to the business in the analysis, it is costed in at the award rate for permanent farm labour (approximately $26 per hour). Effectively this undervalues owners' labour where that labour has been for any task more senior than that of a full time farm hand at award rates.

Top 10 participants achieved 43% higher average yield per hectare (12.1 t/ha) than the remainder of the benchmarking group (8.4 t/ha), 16% higher average pack out to mid-sized fruit and 7% higher average pack out to premium grade. This has been achieved with 16% lower average operating costs per hectare. However due, at least partly, to material differences in yield, grade and size the Top 10 achieved 195% higher average EBITDA per hectare ($30,163 compared to $10,214).

The differences in adoption of beneficial on-farm and management practices between the Top 10 and the remainder of the benchmarking group are most notable in five important areas of activity, being (in descending order of degree of difference)

	% Difference: Top 10 over Remainder
Mulching, Drainage & Phytophthora Management	49%
Canopy Management	34%
Irrigation Management	31%
Fertilizer and Nutrition Management	22%
Pest and Disease Management	20%

North Queensland, Western Australia and Tri States have recorded the highest averages for yield, grade and size attributes. These regions also invested the highest average operating costs per producing hectare.

The three regions recording the lowest averages for yield, grade and size were also those that invested the lowest (average) amount in operating costs per producing hectare, namely Central Queensland, Northern New South Wales and Sunshine Coast.

Recommendations are for future investment in research and development to include focus on the following:

1. Understand the key factors behind demonstrated declining trends in yield per hectare, pack out to preferred fruit sizes and pack out to premium grade and identify how growers can adapt practices to address trends;

2. Understand how overall fruit size can be increased from current levels. In a market with declining fruit prices paid to growers increasing the yield of preferred fruit sizes will enhance financial outcomes for growers;

3. Further investigate the impact of improving adoption of practices that improve physical and financial outcomes, in three areas in particular;

    - drainage, mulch and Phytophthora management;
    - canopy management; and
    - irrigation management;

   and seek ways to enhance adoption of these practices;

4. Maximize the value of the investment in the benchmarking program and the valuable data now captured. Understand the inherent capabilities and develop appropriate refinements and innovations that enable focus on key impact issues as they become evident, and timely and easier to use collection processes. Continue the Best Practice Benchmarking Program in the Australian Avocado Industry;

5. Industry representatives need to understand what the database package is capable of doing and how readily it can be adapted for the collection and analysis of data on many aspects of operations within the industry;

   It already is able to store and analyze production data at the block-by-block level in commercial production and also in research and development activities;

   It is able store and analyze harvest volume and revenue data per variety, per grade and per size count variant, for any defined data collection period.

The database package was recently used to quantify the annual cost to industry of Phytophthora disease and its control.

It could readily be used to collect, track and report market data and to develop and deliver prediction tools, to predict demand-supply trends and thereby assisting the orderly clearance of produce. It may also assist in ongoing supply chain improvement, fruit quality and shelf life, research.

It is close to impossible to describe or express all of the ways in which this tool can be used to manage information and add value to the industry, in just this one written report. Industry interaction and investigation into how it can assist industry decision making in areas of high importance is highly recommended.

The A$450,000 invested over four years in this total program, including the software developed and the data now captured, will prove to be a sound investment, if industry now puts in the effort to drive its ongoing use for the continuous improvement of the industry. Leaving it in 'archive storage' is not a good use of time, effort, and valuable resources including research and development funds. The developers and managers of the program to date have a desire to see it used, and further adapted, for long-term benefit.

Keywords

Avocado, Benchmarking, Best Practice, Research and Development Focus, Financial and Operational Parameters, Yield, Costs and Returns, Top 10 Performing Businesses, Management Practices, Differences Between Growing Regions.

Introduction

This project (AV 13003) Australian Avocado Benchmarking Program Development Rounds II and III is effectively the continuation of a prior project AV 11026 Australian Avocado Benchmarking Program Development.

The objectives of this project, completing Rounds II and III of the Avocado Industry Benchmarking Program, include:

1. Expand the data collection and analysis across a further three years and in so doing more effectively assist avocado growers to achieve Australian best practice in production, packing, marketing and human resource management;

2. Ongoing consultation with 60 growers over three years, including replacement growers (as some attrition can be expected amongst participants due to a range of circumstances), compile a comprehensive understanding of management skills and practices in use in the industry in production, packing, marketing and human resource management over the entire four year term (including Round I);

3. Evaluate linkages and correlations between grower's practices in production, packing, marketing and human resource management and the farm financial and non-financial outcomes achieved;

4. To assist the Australian Avocado Industry to compile information related to specific aspects of avocado farm operations (production, packing, marketing and human resource management) that may be if interest to industry and government agencies. Provide, where possible, comparisons of industry performance against the goals and objectives of the Avocado Industry Strategic Plan 2011 – 2015;

5. To provide recommendations to industry, based on the analysis of quantitative and qualitative data collection over multiple years, for future investment in research and development that will benefit the whole of the Australian avocado industry;

6. To communicate the findings of Rounds I, II and Ill to industry via regional presentations, and via the Final Report that will be available to industry, via AAL and HIA;

This Final Report describes the method and findings of the entire four (4) years of operation to collect and analyse data and report-back to participants in the Australian Avocado Benchmarking Program. Data has been collected, analysed and reported for four financial years, being:

1. Year ended June 30 2012 (FY2012);

2. Year ended June 30 2013 (FY2013);

3. Year ended June 30 2014 (FY2014); and

4. Year ended June 30 2015 (FY2015).

Methodology

This report (Final Report for Project AV13003) reports, in some detail, on the activity and findings of the management and operation of the Australian Avocado Industry Benchmarking Program. The program involved the recruiting of growers, collection of data from eighty two (82) individual grower businesses over four consecutive financial years, the analysis of this data in each of the four years, the provision of individual personalised reports to participating growers each year and the dissemination of aggregated high level project findings to the industry at large.

The eighty-two (82) participating grower businesses contributed two hundred and three separate sets of annual data including sensitive, private and confidential information about aspects of their personal business affairs.

The participant group farmed 1.47 million trees on 7,746 hectares over the four year period. Those numbers convert to an average of 343,890 producing trees on 1,845 producing hectares per annum during the study timeframe.

The participant group produced thirty percent (30%) of the total Australian production of avocados during the four consecutive years of the program.

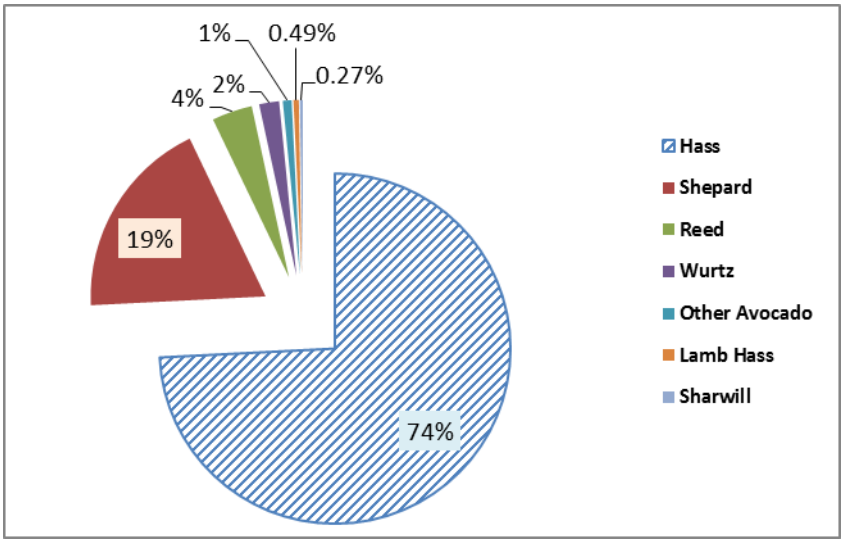
Table 1: Attributes of Participant Grower Businesses

Size of Grower Businesses	%	Types of Grower Businesses	%
Up to 10 Producing Ha per annum	25%	Single Location Family Operations	82%
11 - 20 Producing ha per annum	35%	Multiple Location Family Operations	13%
21 - 50 Producing Ha per annum	24%	Corporate'(1) Operations	5%
Larger than 50 Producing Ha per annum	16%		

(1) Includes family owned / operated businesses that are run along corporate lines.

The benchmarking group is a representative sample of the Australian Avocado Industry and demonstrates key attributes as outlined in Table 1. The percentage of producing trees captured in the program that were of different varieties is also provided in Figure 1.

Figure 1: Percent of Benchmarking Group Producing Trees Per Variety



A purpose-built software package incorporating an access database program and a comprehensive report generation module was designed by the program manager, with the assistance of professional data base engineers. This database is used to store, analyse and report on data collected. Readers are encouraged to read relevant sections of Appendix 1 to understand how the impact of non-producing orchards and tree age has been treated in this program and analysis.

The degree to which farm businesses keep separate records for producing and non-producing orchards, and for trees of different ages in their producing orchards, have been the key factors influencing how these variables have had to be treated in the data.

Several different types of comparative analysis and benchmarking have been used in this benchmarking program, including:

1. Regional Performance Benchmarking;
2. Total Group (National) Performance Benchmarking;
3. Internal Benchmarking Over Time;
4. Best Practice Benchmarking;
5. Regional and Zone Comparisons; and
6. Regional and Best Practice (Qualitative) Management Practices Benchmarking.

A matrix of the dissemination methods used to distribute information to the participants is provided in Appendix 1 and outlines mechanisms used to:

1. Inform participants, in detail, about their personal business outcomes that have been generated from the program, resulting from their generous contribution of data; and

2. Inform industry of the aggregated industry level data and findings that have been generated from data collected throughout the program.

With input and review from Avocados Australia Limited the macro findings of this program have been used to define the industry in FY 2015.

This extrapolation suggests the industry comprised of 1.56 million producing trees and 350,000 non-producing trees (predominantly immature) on a total planted area of 9,800 hectares in FY 2015. From that production base the industry produced 65,000 tonnes of market fruit in FY 2015 worth A$338 million. To produce and market this volume A$233 million was spent on operating costs, of which $81 million was spent on labour and contracting. Labour and contracting therefore accounted for 20% of sales value and 34% of operating expenditure.

The average yield per producing hectare in FY 2015 was 8.3 tonnes (1,500 trays equivalent) per producing hectare. On a per tray sold basis produce was sold on average for $31.92 per tray in FY 2015 and the total operating costs per tray equivalent sold were $19.62. The average Earnings Before Interest, tax, Depreciation and Amortisation (EBITDA, Cash Profit) was $12.32 per tray equivalent sold.

The average % sold as Mid-Sized fruit in FY 2015 was 49% and the average sold as Premium Grade fruit was 70%. The industry employed 1,350 full time employee equivalents, based on this extrapolation.

Outputs

Further detail and data are provided in Appendix 1. However, briefly:

From the data collected from the eighty two (82) different businesses researchers have created a new benchmark performance model. This new benchmark performance model ('Best Practice Data Set') is from the ten (10) most profitable businesses over the four-year period from July 1st 2011 to June 30th 2015. This Best Practice Data Set and information collected from all of the participants has been used to create several forms of comparative analysis and Benchmarking Analysis, being:

1. **Regional Performance Benchmarking:**

   The participants have been able to review their performance in any specified reporting period and compare their own performance in their growing region to the **average performance of all participants in their region;**

   Each comparative analysis report provided to participants shows their performance in more than ninety-four (94) different performance measures compared to the average for each measure and also advises them of their ranking on each measure in that region for the specified reporting period.

2. **Total Group (National) Performance Benchmarking:**

   Participants have been able to access reports that inform them of their performance in any specified reporting period and to compare their own performance to the **average performance of all participants in all regions**;

   These comparative analysis reports inform participants of their performance in more than ninety-four (94) different performance measures compared to the average for each measure and also advises them of their ranking on each measure in the total group (all regions).

3. **Internal Benchmarking Over Time**

   A specially designed multicolumn report enables participants to view the performance of their business in each financial year for which they provided data and **compare each year's performance of their business to each of the other years and to a multi-year average for their business**;

   This information allows participants to identify trends in their own business over time in regard to ninety-four (94) different performance measures.

4. **Best Practice Benchmarking:**

   This analysis compares the performance of the Top 10 and the Remainder (national industry level) over any specified reporting period, across all ninety-four (94) performance measures. Participants are able to **compare their own performance over any specified reporting period to that of the Top 10 and the Remainder** of the same period(s).

5. Regional Comparisons and Comparisons Between Zones:

Detailed comparative analysis has been generated between the eight growing regions in the Australian industry and also between the two zones as defined herein, This analysis also uses the same ninety-four (94) performance measures;

Areas where **notable differences, similarities and trends have emerged in and between regions** are presented and discussed.

6. Regional Management Practices, Comparison and Analysis:

A specifically designed qualitative survey instrument was used to collect information about how and what participants do on their farms. The survey instrument questions generate responses to one hundred and eight (108) questions;

Participants are able to view a particular task (E.G. frequency of irrigation in high demand periods) and see what proportion of participants in their region do this task, in what ways or at what frequencies (E.G. daily, every two days, weekly, etc.).

7. Management Practices Comparisons:

Key point comparisons have been presented to attendees of workshopsto inform meeting attendees how participants in different regions or different sub-groups (for example the Top 10) do each task. Comparing practices in the region in which the meeting is being held in to those of regions that produce avocados before and after that region, and to the Top 10 has proved very informative.

8. Relating Practices and Outcomes:

Notwithstanding this is not a statistical analysis, it has been possible in many comparisons to demonstrate how higher or lower performance in key outputs a region or group are accompanied by apparent patterns in management practices. For example, numerous comparisons demonstrate that higher profitability and high yield and quality appear to occur in regions or groups that irrigate more frequently in high demand periods.

Outcomes

Average Performance Measures for the Benchmarking Group

The information in the previous section is a snapshot image of the industry in FY2015 based on the data collected in FY2015.

A concise summary of parameters out of the data and the trends are in Table 2. The most notable observation is that while prices received (gross revenue) per tray sold and per producing hectare have increased significantly during the data collection period (although revenue per producing hectare declined since FY 2014) the costs per producing hectare have declined consistently since FY 2013.

Table 2: Summary of Key Data for Participant Group

	Per Producing Ha	Per Producing Tree	Per Tray Equiv. Sold	Other	Trend
Yield	9.23 t	8.95 trays			-5% Since FY 2013 (-21% Since FY 2013)
% Sold as Mid-Sized Fruit				49%	-8% Since FY2012
% Sold as Premium Grade				72%	-7% Since FY 2012
Tonnes Managed Per FTE				52 t / FTE	-24% Since FY 2012
Gross Revenue $	44,559		26.55		+62% / Tray Since FY 2012
Operating Costs $	29,986		17.87		+31% / tray Since FY 2012
EBITDA %	14,572		8.67		+161% / Tray Since FY 2012
Cost of Labour & Contracting	11,312		6.95		+20% Since FY 2012 (-7% Since FY 2013)

Should trends continue in the industry in the same manner as has been demonstrated in the benchmarking group (over four years), the profitability of avocado growers is likely to decline if the current prices achieved for fresh avocadoes were to decline.

Perhaps the impact of a lengthy period of good prices for fresh avocado on grower profitability may be masking and facilitating declines in some areas of management practices and costs / efficiency on farm.

Using Regression Analysis, statistically significant correlations are identified between the following three variables and the profitability (EBITDA) per tray equivalent sold:

1. Financial year of harvest;
2. Trays produced per producing hectare; and
3. Trees per producing hectare.

The positive correlations between each of 'financial year of harvest' and 'trays produced per producing hectare', and EBITDA per tray sold are readily understandable.

The negative correlation between the number of trees planted per hectare and profitability per tray equivalent sold may not be as expected, given the trends towards higher planting densities being seen in some regions and countries and the reported high returns and / or yields being enjoyed. This is an area worthy of further research and consideration. Particularly since the Top 10 group includes predominantly participants with less than 250 trees per producing hectare on average.

Simple observations (not yet shown to be statistically significant) suggest that participants that enjoy higher profitability per tray equivalent sold achieve higher percent (%) of fruit sold as Mid-Sized fruit and percent (%) of fruit sold as Premium Grade.

The fact that these correlations are not statistically significant from data collected over the four consecutive years deserves thought. With the degree of variability in many aspects of production conditions and practices and also market dynamics, more years of data may be needed to test statistical significance. Alternatively it may suggest there is no significant correlation. This is another area worthy of more research and the collection of data from more years for analysis.

Top 10 and The Remainder - Performance Measures Compared

The Top 10 Group, as defined in Appendix 1 have demonstrated marked differences in average performance outcomes over four consecutive years than the remainder of the benchmarking group, refer to Table 3.

On the basis of performance per producing hectare Top 10 participants achieved 43% higher yield, 16% higher pack out to mid-sized fruit and 7% higher pack out to premium grade fruit.

This was achieved with 16% lower operating costs and 63% higher gross revenue per producing hectare. Financially these "Best Practice" participants averaged an additional A$19,950 in EBITDA (profit) per producing hectare (195% higher).

Table 1: Summary of Key Data for Top 10 and Remainder

Measure / Parameter	Unit	REMAINDER (4 YEARS)	TOP 10 (4 YEARS)	*% DIFFERENCE (TOP 10 VS. REMAINDER)*
Yield				
Total Kgs Harvested / Producing Tree	Kg / Tree	42.83	78.66	*84%*
Total KGS Harvested per Producing Hectare	Kgs / Ha	8,437.84	12,072.47	*43%*
Pack-Out to Market Preferred Size and Grade				
% of Fruit Sold as Mid-Sized (Size Counts 18 to 25)	%	48%	55%	*16%*
% of Packed Fruit Sold as Premium Grade %	%	70%	75%	*7%*
Costs and Returns Per Producing Hectare				
Total Sales Revenue	$ / Prod. Ha	$39,223.31	$63,759.25	*63%*
Total Operating Costs per Producing Hectare	$ / Prod. Ha	$29,009.48	$33,595.71	*16%*
EBITDA (Profit Before Interest, Depreciation and ROI)	$ / Prod. Ha	$10,213.83	$30,163.54	*195%*
Costs and Returns per 5.5 Kg Tray Equivalent Sold				
Total Sales Revenue	$ / Tray Sold	$25.57	$29.09	*14%*
Total Operating Costs per Tray Equivalent Sold	$ / Tray Sold	$18.91	$15.34	*-19%*
EBITDA (Profit Before Interest, Depreciation and ROI)	$ / Tray Sold	$6.66	$13.74	*106%*

In order to understand how these participants have achieved significantly better physical and financial outcomes researchers also investigated the differences in management practices between the two groups. There are five main areas of management practices where Top 10 participants have shown notable differences in how they do things in their orchards and in their businesses.

Table 4 summarises a relatively simplistic approach to defining the differences between the practices of the Top 10 and the Remainder.. Readers are encouraged to read and understand both the approach used and the detail behind this approach, viz. the actual activities and uptake of the different parties.

The average physical and financial performance measures of these two groups in Table 3 appear to be accompanied by the differences in on farm activities / practices as demonstrated in Table 4.

Table 2: Differences in Management Practices for Top 10 and Remainder

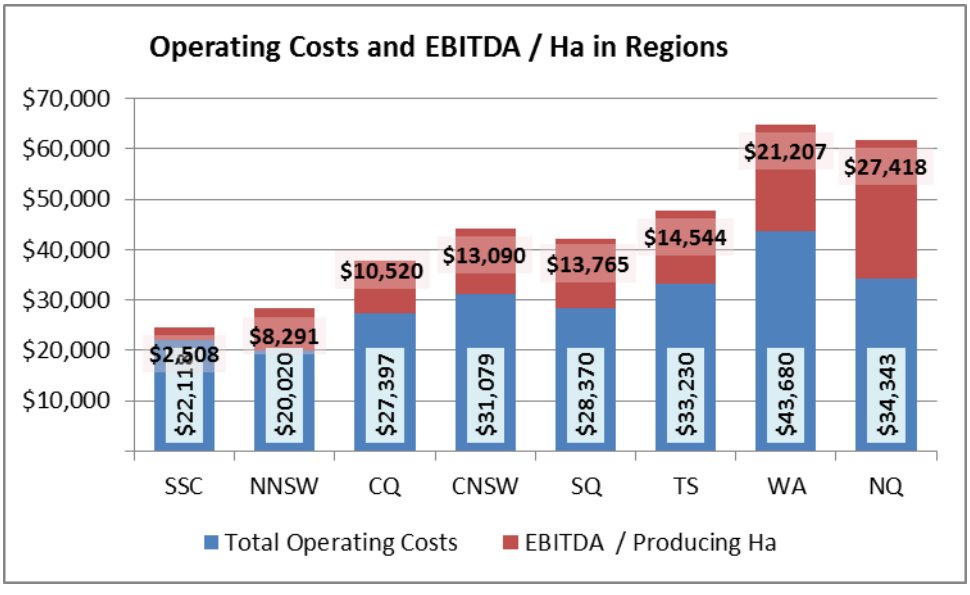
Practice Area	Relative Improvement in Adoption of Practices That Appear to Improve Physical (yield, grade and size) and Financial (EBITDA) Outcomes
Phytophthora Management Practices	+ 49%
Canopy Management Practices	+ 34%
Irrigation Management Practices	+ 31%
Fertilizer and Nutrition Practices	+ 22%
Pest Management Practices	+ 20%

Differences Between Producing Regions

Western Australian, North Queensland and Tri States participants have demonstrated the highest average 'region' yields per hectare over four financial years. This is despite the fact that the average plant density (trees per hectare) amongst participants was 328 (W.A.), 146 (N.Q.) 205 (T.S.) respectively.

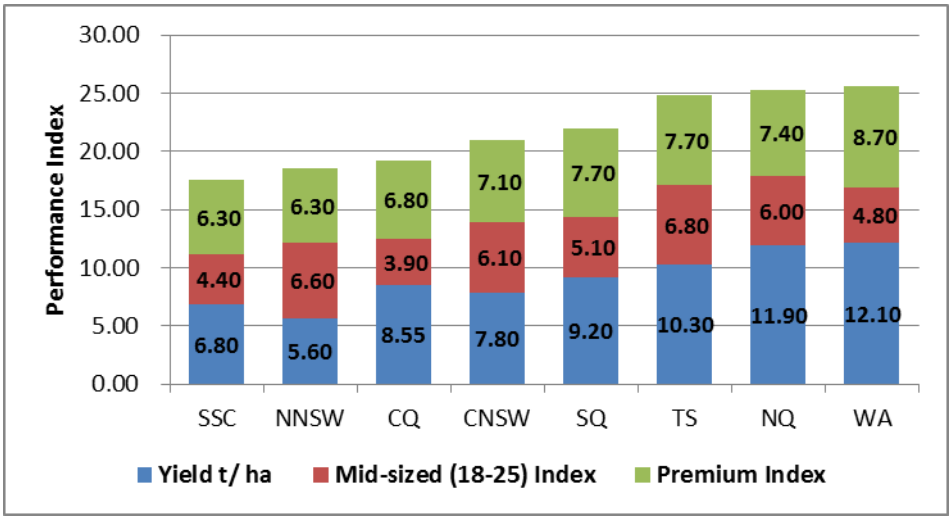
Participants from these three regions have also demonstrated the highest average operating costs invested in their crops per producing hectare **and** the highest average EBITDA achieved per producing hectare, as seen in Figure 2.

Figure 2: Average Operating Costs and EBITDA By Region



Participants from these three regions also demonstrated output performance in pack out to mid-sized fruit and pack out to premium grade is seen is Figure 3.

Figure 3: Composite Performance Indexes By Region



There are numerous areas where management practices also differ in these three regions compared to the other five regions . However as can be seen in Table 5 participants from the same three regions that lead the rankings in performance outcomes do not display common approaches to some of the key areas of management practices. The difference in climate between North Queensland (Northern Zone) and Western Australia and the Tri States (Southern Zone) is one major factor that appears to drive some of that difference in approach to management practices.

However, given the practices of participants in the Top 10, areas such as drainage, mulch and phytophthora treatment and canopy management may warrant further thought in Western Australia and Tri States (Southern Zone) . Similarly, some North Queensland (Northern Zone) participants may benefit from further consideration of irrigation management practices.

Table 5: Ranking of Regions re Adoption of Practices That Appear to Improve Outcomes

	Ranked By EBITDA per Producing Hectare (Increasing L to R)							
	SSC	NNSW	CQ	CNSW	SQ	TS	WA	NQ
Irrigation Management Practices	8	7	6	3	5	1	2	4
Fertilizer and Nutrition Management Practices	1	5	2	7	6	4	8	3
Pest and Disease Management Practices	7	2	3	4	5	6	8	1
Drainage, Mulching & Phytophthora Management Prac.	8	2	5	3	4	6	7	1
Canopy Management Practices	1	6	2	3	5	7	8	4

The two regions from which participants have demonstrated the lowest average yields and pack out to premium grade are Sunshine Coast and Northern New South Wales. Participants in these two regions

also demonstrated the lowest figures for average operating costs and EBITDA per producing hectare.

Evaluation and Discussion

Best Practice

Best Practice

Best practices are "those practices that have been shown to produce superior results; selected by a systematic process; and judged as exemplary, good, or successfully demonstrated"; these practices are then adapted to fit a particular organisation. Benchmarking is a systematic process used for identifying and implementing best or better practices.

***Best practice benchmarking**; this is where organisations search for and study organisations that are high performers in particular areas of interest. The processes themselves of these organisations are studied rather than just the associated performance levels, normally through some mutually beneficial agreement that follows a benchmarking code of conduct. Knowledge gained through the study is taken back to the organisation and where feasible and appropriate, these high performing or best practices are adapted and incorporated into the organisation's own processes. Therefore, best practice benchmarking involves the whole process of identifying, capturing, analysing, and implementing best practices . There are a number of best practice benchmarking methodologies. One of which is the TRADE Best Practice Benchmarking Methodology.*

Source : http://www.bpir.com/all-about-bpir-bpir.com.html

The 'Best Practice' Group (Top 10)

The Top 10 participant group has superior average physical and financial performance compared to the remainder of the benchmarking group over four consecutive years of operation. This has been achieved with less average operating costs per producing hectare and per tray equivalent sold, and substantially higher average EBITDA achieved per producing hectare (+195%) and per tray equivalent sold (+106%).

The Top 10 have also demonstrated a higher uptake of a number of on-farm and management practices in the following key areas:

1. Mulching;
2. Phytophthora management and related activities;
3. Canopy management;
4. Irrigation management;
5. Fertilizer and nutrition management, and;
6. Pest and disease management.

'Best Practice' (Best Performing) Regions

Participants from North Queensland, Western Australia and the Tri States regions have demonstrated the highest average levels of physical and financial outcomes of all the regions. They have also invested more on average into operating costs per producing hectare and achieved higher average EBITDA per producing hectare than participants in other regions.

Participants in these three regions do not demonstrate the same common propensity to adopt key on-farm and management practices in the same five areas as do the Top 10. However, the marked difference in climatic conditions and the length of time that fruit needs to remain on trees between flowering and harvest in these three regions may explain some of the diversity in practices.

Observations

Investment and Reward

Comparing the Top 10 to the remainder of the participants in the benchmarking program **and also** comparing regions, participants (growers) that invested more heavily and wisely in their crops have achieved increased (and perhaps maximised):

1. Yield;
2. Pack out to premium grade;
3. Larger fruit (namely higher pack out to mid-sized fruit that is in demand by a large segment of the domestic market); and
4. Better financial outcomes, as measured by EBITDA (Cash profit) per producing hectare and per tray equivalent sold.

Additionally, the positive relationship between EBITDA and trays harvested per hectare has shown to be statistically significant in this analysis. The statistical significance of the relationships between Grade and Size have not been shown from the data collected in this program. However, given the many variables and the diversity between growing regions a larger longitudinal study, over more years may be needed to fully test this relationship.

In the future if some growers focus on specialized production methods for either the export market and / or the processing market, the preferred fruit size profile is likely to be markedly different to the focus on mid-sized fruit discussed herein.

Participants in regions that have achieved poorer average physical and financial outcomes have invested significantly less on average in their crops.

Canopy Management in Southern Zone

individual participants in the Southern Zone that have been observed to have increased their investment in canopy management, namely retaining manageable tree size and opening tree shape to increase light penetration have experienced very significant increases in physical (yield, grade and size) and financial (EBITDA) outcomes.

Mulch Application to Root Zones

The researchers also believe that the extremes in temperature, evaporation and therefore soil moisture levels in the Southern Zone suggest that more use of mulch on root zones should be the subject of further research, experimentation and wider adoption.

The lessons now learnt in Central New South Wales by those participants that have invested heavily in enriched mulch application in recent years are also worthy of further investigation by growers, particularly in the Southern Zone.

Tree Canopy Temperature Management

The researchers note the fact that the Tri States region, a region that experiences extremes of high and low temperatures and significant frost events is in the top three regions based on physical and financial outcomes. Participants in this region have adopted several practices not widely observed in other regions, namely the installation of multiple irrigation lines in the crop, one being to manage high temperature peaks, and the installation of tree protection assemblies around young trees.

Current industry opinion appears to be that installing and using specific irrigation sub-systems in the tree canopy to manage peaks in high temperatures is only valid in Tri States, and possibly in Mediterranean climates generally and do not add value in more tropical or subtropical climates.

The researchers are yet to be convinced that enough research and investigation has been undertaken to test the benefits of adopting similar practices in other regions where summer temperature peaks (albeit commonly with higher humidity) are also thought to be impacting fruit set and the retention of fruit on the tree once set. Two areas in the Northern Zone in particular come to mind in this respect, namely parts of Southern Queensland (e.g. Lockyer Valley and Kumbia) and the western part of North Queensland (where participants have experienced difficulty in achieving fruit set and retention on Shepard avocados).

Plant Density and EBITDA

Regression analysis applied to the benchmarking data set has demonstrated a statistically significant negative relationship between plant density (trees per hectare) and financial outcomes (EITDA). This statistically significant correlation has been demonstrated on a data set covering four consecutive financial years, in effect four crop years, and the majority of the data related to higher density planting has come from participants in the Southern Zone.

This finding may be at odds with some currently held views. Much has been spoken about and written about regarding the positive impact of high density planting on early yields and outcomes, for example in Peru. This deserves further investigation.

One possible aspect to investigate is whether the local economy, and therefore the relative operating costs incurred in countries like Peru is a key element of this. For example is higher density avocado production in low cost economies more financially rewarding than higher density production in high cost economies.

Another angle to investigate may be whether the economics of high density production is impacted by longitude. For example is the economics of higher density production in Peru at say 12 degrees south different to economics of higher density production at Pemberton, 34 degrees south.

Recommendations

Concerning Trends in Physical (Orchard) Outcomes

Yield, pack out to mid-sized fruit and pack out to premium grade have declined over the data collection period. Prices paid growers for fruit have increased more than 60%, and operating costs per tray sold and EBITDA per tray have increased markedly. However, operating costs applied per producing hectare have declined.

The impact of an extended period of high and increasing prices paid to growers may be masking a decline in some areas of management practices, appropriate costs allocation and efficiency on farm. If this trend continues and prices paid growers begins to decline the financial outcomes for growers may at risk of declining.

Focus and further research and investigation is recommended into this.

Fruit Size

Fruit sold as mid-sized fruit (counts 18-25) are the preferred size for significant segments of the domestic market. The proportion (%) of fruit sold as mid-sized is running at around 50%. The vast majority of the remainder of fruit sold (a further 46%) is sold as smaller sizes (counts 26 and above).

Research and investigation into how growers can adopt practices and investment to improve the overall fruit size delivered to market is recommended. This may be a particularly strategic area of focus, should current buoyant prices paid to growers decline.

Important Management Practice Areas

The three areas of management practices that appear to positively impact higher yield, grade and size, appear to be:

1. Mulching, Drainage and Phytophthora Management;
2. Canopy Management; and
3. Irrigation Management.

This categorization does not suggest that areas including fertilizer and nutrition management and pest and disease management are not also important. Information collected suggests these may be being better addressed in general than the three listed above. Also, further refinement of qualitative information gathering in these areas may result in stronger data about their impacts.

Top 10 growers and participants in higher performing regions (i.e. higher physical and financial outcomes) have both shown higher adoption levels of practices that seem to correlate with better outcomes.

The data also suggests that:

1. Growers in the Southern Zone (CNSW, TS and WA) may benefit from increased focus on mulching, drainage and Phytophthora management and canopy management; and

2. Improved irrigation practices may benefits growers in the Northern Zone. Northern Zone growers may consider that they have adopted good irrigation management practices. However this analysis suggests growers in Tri States and Western Australia in particular may be doing it better.

These focus areas are recommended for further research and investigation in relevant regions of the industry.

Ongoing Best Practice Benchmarking

The industry has invested significantly in the program to date and the database that now holds uniquely valuable information. This includes funds, time, effort and industry engagement. This asset can only increase in value and continue to give increasing returns to industry if the industry continues to use it.

The program has provided valuable insight and learning to date. At the same time, given that it is a new initiative in this developing industry it has also taught us what it is capable of and how it can be used more and in more ways to deliver to industry.

Areas where the researchers have already recognised the ability to adapt and refine the process to focus on key and salient issues include and are not limited to:

1. Specific tools / approaches to investigate the impacts of better canopy management practices on achieving improved physical and financial outcomes (this is likely to involve development of new means / ways to describe different levels of canopy management for survey purposes and data capture);

2. Carefully designed and deeper focus on the impacts of fertilizer and nutrition management and pest management on better physical and financial outcomes;

3. Refining and streamlining interaction with participants (growers) by development and use of interfaces / integration that deliver specified export data streams out of commonly used accounting and operational software packages;

4. The design and use of purpose built record keeping and data collection forms and tools for use inside participant businesses;

5. The database already has much data in it and has the capacity to be searched and queried re any aspects, facts, trends, correlations and relationships, and more, for which it contains data. Investigating the database capabilities and interacting with someone who knows what is in it and what it can do will disclose much more about how it can be used to add value to the industry:

    - One example is to use it to develop better ways to track and report market data and develop tools to predict market trends and assist with the orderly clearance of produce. This tool can readily be adapted and used to assist in this area;

- Another is using the database to assist in very important research and development on the supply chain, fruit quality and shelf life. This tool can readily be adapted and used to assist in this area;

It has been used already to quantify the real annual cost Phytophthora disease and its control to industry of.

Intellectual Property/Commercialisation

No commercial IP generated

Acknowledgements

This information has been collected following approximately two hundred (200) one-on-one meetings with avocados growers across Australia. Participants have been very generous with their time and very open and sharing with their information, much of which is sensitive and confidential. **The researchers wish to thank participants for their willingness, trust, assistance, hospitality and support.**

Following four years of data collection, analysis and reporting the Australian Avocado Benchmarking Database currently contains very detailed operational and financial information and information on the way growers do key tasks in their orchards, for 66,000 tonnes of produce. This is equal to 12 million trays and 30% of the production of the Australian industry over the four years. Very few agricultural industries in Australia and globally have a resource of this nature and value. **The industry is encouraged to continue to use it and add to its value by continuing to collect data and, by doing so drive the process of continuous improvement in the industry.**

As part of this program the researchers have participated in Qualicado workshops in the eight growing regions across Australia. Our experience across many agricultural sectors over nearly thirty years causes us to suggest that these meetings are some of the most effective dissemination processes we have been exposed to. **Growers are not only attending in increasing numbers, they are also talking about them and referring to them after the event. It is important to have this sort of dissemination and industry interaction continue.**

Appendices

Appendix 1 Detailed Results

(PROJECT AV 13003)

Australian Avocado Industry Benchmarking Program

APPPENDIX 1

DETAILED RESULTS

Prepared by

Howard Hall

PINNACLE AGRIBUSINESS

5 October 2016

Project No. AV13003
Prepared By:

Howard Hall
Managing Director
Pinnacle Agribusiness

P O Box 1800
Milton QLD 4064
hhall@pinnacleagri.com.au
www.pinnacleagri.com.au

ACKNOWLEDGEMENT OF FUNDING SOURCES

This project has been funded by Horticulture Innovation Australia (formerly HAL) using the Avocado R&D levy and matched funds from the Australian Government.

DISCLAIMER

Any recommendations contained in this publication do not necessarily represent current Hort Innovation policy. No person should act based on the contents of this publication, whether as to matters of fact or opinion or other content, without first obtaining specific, independent professional advice in respect of the matters set out in this publication.

This report has been prepared for Horticulture Innovation Australia (formerly Horticulture Australia Ltd), pursuant to a Consultancy Agreement between Pinnacle Agribusiness and Horticulture Innovation Australia Ltd.

This report has been prepared from data and information gathered from various sources and from primary research carried out by Pinnacle Agribusiness. Pinnacle Agribusiness has used its best endeavours and exercised the best of its skill and ability to ensure accuracy of the data, information and research materials. Pinnacle Agribusiness believes the various sources to be reliable. However, Pinnacle Agribusiness does not warrant the accuracy of any of the data or information provided by third parties or of research materials not created by Pinnacle Agribusiness.

Pinnacle Agribusiness accepts no responsibility for any error contained in or any omission from the report arising from the data or information provided by third parties or from the research materials not created by Pinnacle Agribusiness.

This report is for the use only of Horticulture Innovation Australia Ltd. Pinnacle Agribusiness accepts no responsibility whatsoever to any third party in respect of the whole or part of this report (including all appendices) or its use.

TABLE OF CONTENTS

TABLE OF TABLES

TABLE OF FIGURES

GLOSSARY OF TERMS

Term Used	Meaning
% Difference	Refers to the difference between any pair of numbers displayed in this report in tabular form and expressed as a percentage (%)
5.5 KG Tray Equivalent	Total Kilograms (Kgs.) of fresh produce sold divided by 5.5 = 5.5KG Tray equivalents (where it assists in analysis, juice / processing fruit may also be referred to in 5.5Kg equivalents)
AAL	Avocados Australia Limited
Average	The average value reported amongst all participants that contributed information used in this measure / descriptor
Central New South Wales Region (CNSW)	The region in New south Wales bounded approximately by Grafton New South Wales in the north and Sydney NSW in the south in which avocados are grown, referred to as Central New South Wales or CNSW by participants in the Australian avocado industry
Central Queensland Region (CQ)	The region bounded approximately by Sarina in the North and Gympie in the south in which avocados are grown, referred to as Central Queensland or CQ by participants in the Australian avocado industry
Count / Count Size / Size	Count / Count Size / Size: Size of packed avocado fruit is determined by how many pieces of fruit will fit into a standard 5.5 Kg tray or tray equivalent, also referred to as Cash Profit
EBIT	Earnings Before Interest and Tax (Net Operating Profit+ Interest and Finance Costs)
EBITDA	Earnings Before Interest, Tax , Depreciation and Amortisation (EBIT + Depreciation and Amortisation) – Also sometimes termed 'Cash Profit'
Fixed Costs	In this analysis, these are all the costs associated with growing and maintaining the orchard and all overhead costs. It excludes costs associated with picking, packing, transporting, marketing and ripening fruit for market sale.
Full Time Employee Equivalent / FTE / FTEs	Full Time Employee Equivalent.: Treated as one full time employee working38 hours per week for 48 weeks per year (due to some variations in awards and hours per week in different jurisdictions an average of 2,000 hours has been used as an FTE, 2000 = 1 FTE)
FY2012, FY2013, FY2014, FY2015	Refers to Financial Year ended June 30th 2012, 2013, 2014 and 2015
Gross Sales Revenue	Gross sales achieved before any costs (before marketing fees, freight, PBR fees, brokerage etc. and all other costs)
Hass, Shepard, Sharwill, Wurtz, Lamb Hass, Pinkerton	Varieties of Avocado grown in the Australian avocado industry
High / Highest	The highest value reported amongst all participants that contributed information used in this measure / descriptor

Term Used	Meaning
Indicative Pay Rate	Where pay details are not provided the hourly rate of $25.50 per hour including Superannuation has been used.
Low / Lowest	The lowest value reported amongst all participants that contributed information used in this measure / descriptor
Mid-Sized	Avocados produced in the Australian avocado industry that are packed out into trays or cartons containing count sizes 18 to 2 inclusive
Net Profit Before Tax	Gross Sales Revenue achieved less Total Costs and Before Tax
North Queensland Region (NQ)	The region in Queensland bounded approximately by Lakelands in the North and Sarina in the south in which avocados are grown, referred to as North Queensland or NQ by participants in the Australian avocado industry
Northern New South Wales Region (NNSW)	The region in New south Wales bounded approximately by Tweed Heads New South Wales in the north and Grafton New South Wales in the south in which avocados are grown, referred to as Northern New South Wales or NNSW by participants in the Australian avocado industry
Operating Costs (Excluding Interest, Tax, Depreciation and Amortisation	Total Costs excluding Interest, Tax, Depreciation and Amortisation
Premium / Premium %	Premium Grade is the highest grade produce sold by participants Premium % is the % of total marketed produce that is sold as Premium Grade Produce
Producing Hectare	Hectare of planted trees that were harvested in the 2011 / 2012 harvest season
Producing Tree	An avocado tree that produced a marketable yield in the financial year
Rank	Rank 1 is the highest value recorded amongst participants, higher ranking numbers are the smallest numbers recorded for that measure / descriptor
Southern Queensland Region (SQ)	The region in Queensland bounded approximately by Kingaroy in the North and Coolangatta in the south in which avocados are grown, referred to as Southern Queensland or SQ by participants in the Australian avocado industry
Sunshine Coast Region (SSC)	The region in Queensland bounded approximately by Gympie in the North and Kingaroy in the south in which avocados are grown, referred to as Sunshine Coast or SSC by participants in the Australian avocado industry
Tensiometers, Enviroscan, Gypsum Block, Capacitance Probe	Refers to several different types of monitoring products / technologies that are used for the monitoring of soil moisture content in crops in Australia and internationally
The Remainder	The remainder of the benchmarking participation group that did not achieve adequate Cash Profit (EBITDA) per tray equivalent sold to be included in the Top 10

Term Used	Meaning
Top 10	The top ten (10 performing businesses in the benchmarking participation group, ranked on the basis of Cash Profit (EBITDA) per Producing Hectare
Total Costs	All costs incurred (including marketing fees, freight, PBR fees, brokerage etc., interest [where provided], depreciation (where provided], amortisation (where provided] and all other costs)
Tray Equivalent Sold, Tray Equivalent (Tray Equiv.)	A quantity equal to 5.5 Kilograms net that is traditionally packed in a tray shaped carton or RPC for sale as fresh fruit in the Australian avocado industry. For the purposes of analysis all volumes of avocados reported by participants in the benchmarking program are converted to Tray Equivalents, or Tray Equiv.
Tri States Region	The region in southern New south Wales, Victoria and South Australia bounded approximately by Balranald in the North and Adelaide in the south in which avocados are grown, referred to as Tri States or TS by participants in the Australian avocado industry
Variable Costs	In this analysis, these are the costs associated with picking, packing, packaging, contract packing fees, freight to market, marketing costs and fees and ripening costs and fees.
Western Australia Region	The region in Western Australia bounded approximately by Carnarvon in the North and Esperance in the south in which avocados are grown, referred to as Western Australia or WA by participants in the Australian avocado industry

1. INTRODUCTION

1.1 Project Objectives

This project (AV 13003) Australian Avocado Benchmarking Program Development Rounds II and III is effectively the continuation of a prior project AV 11026 Australian Avocado Benchmarking Program Development.

The objectives of this project, completing Rounds II and III of the Avocado Industry Benchmarking Program, include:

1. Expand the data collection and analysis across a further three years and in so doing more effectively assist avocado growers to achieve Australian best practice in production, packing, marketing and human resource management.
2. Ongoing consultation with 60 growers over three years, including replacement growers (as some attrition can be expected amongst participants due to a range of circumstances), compile a comprehensive understanding of management skills and practices in use in the industry in production, packing, marketing and human resource management over the entire four year term (including Round I).
3. Evaluate linkages and correlations between grower's practices in production, packing, marketing and human resource management and the farm financial and non-financial outcomes achieved.
4. To assist AAL to compile information related to specific aspects of avocado farm operations (production, packing, marketing and human resource management) that may be if interest to industry and government agencies. Provide, where possible, comparisons of industry performance against the goals and objectives of the Avocado Industry Strategic Plan 2011 - 2015
5. To provide recommendations to industry, based on the analysis of quantitative and qualitative data collection over multiple years, for future investment in research and development that will benefit the whole of the Australian avocado industry
6. To communicate the findings of Rounds I, II and Ill to industry via regional presentations, and via the Final Report that will be available to industry, via AAL and HAL.

This Final Report describes the method and findings of the entire four (4) years of operation to collect and analyse data and report-back to participants in the Australian Avocado Benchmarking Program. Data has been collected, analysed and reported for four financial years, being:

1. Year ended June 30 2012 (FY2012)
2. Year ended June 30 2013 (FY2013)
3. Year ended June 30 2014 (FY2014), and
4. Year ended June 30 2015 (FY2015).

1.2 Industry at a Glance

According to information provided in Infocado[1], the Australian annual avocado production during that period ranged from 8.8 million trays equivalent (48,726 tonnes, in FY2014) to 10.5 million trays equivalent (57,600 tonnes, in FY2015) (Table 1).

Table 1: Australian Avocado Production In 5.5 KG Equivalents (Four Years)

	FINANCIAL YEAR			
	2012	2013	2014	2015
TOTAL 55 Kg TRAYS EQUIVALENT	9,295,327	9,979,580	8,859,231	10,473,902

Source: Infocado, http://industry.avocado.org.au/Growers/Infocado.aspx

However, as illustrated in Figure 1, the production in some growing regions fluctuated significantly in this period. In particular, a pattern of high production followed by low production is notable in the Southern Queensland, Northern New South Wales, and Western Australian growing regions.

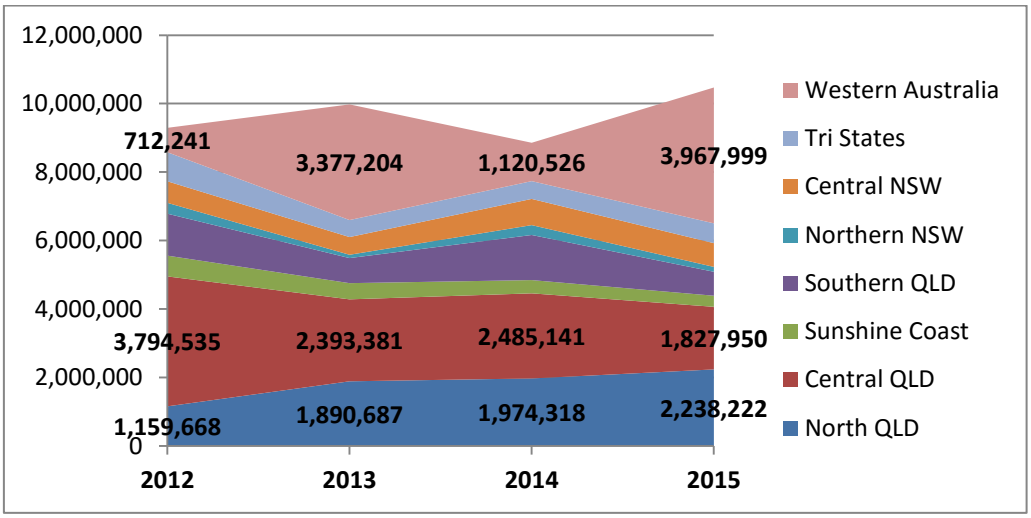
North Queensland, Central Queensland, Sunshine Coast, Central New South Wales and Tri States regions demonstrated very little year on year variation in production levels.

The annual production figures in some regions appear to reflect some specific conditions in these regions, including:

1. Central Queensland and Sunshine Coast: impacted by adversely wet conditions in January 2011 (Queensland Floods and Cyclone Yasi), and January 2013 (Ex-Tropical Cyclone Oswald);

2. Central New South Wales: Experienced poor yields, reasons not fully understood in FY2012 (crop year 2011) and (to a lesser extent) in FY2013 (crop year 2012), after which numerous growers acted proactively with resulting improvements in yield.

Figure 1: Australian Avocado Production Volumes by Region (Four Years)



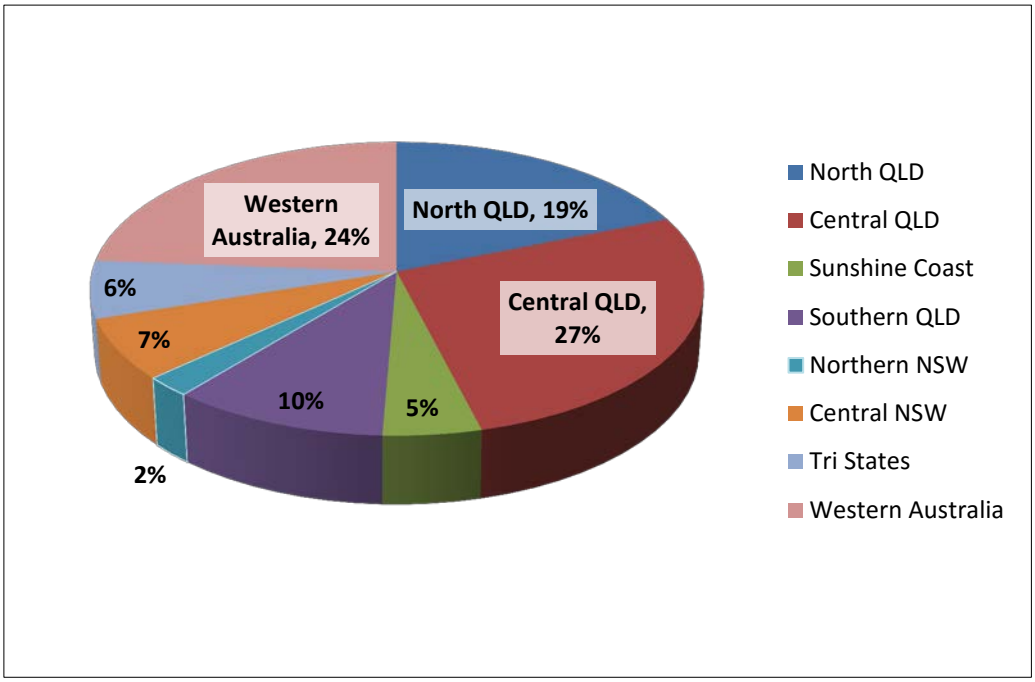
Source: Infocado, http://industry.avocado.org.au/Growers/Infocado.aspx

1

The total production of Australian avocados during these four financial years was distributed across the eight growing regions as in Figure 2.

The combined production of the three regions that deliver product to market in the hotter months, (Western Australia, North Queensland and Central Queensland) in this period accounted for 70% of Australian production.

Figure 2: Percentage of Australian Avocado Production In Each Region (Four Years)



Source: Infocado, http://industry.avocado.org.au/Growers/Infocado.aspx

The Australian industry may also be analysed in two zones, being:

1. **Northern Zone** (NQ, CQ, SSC, NNSW) where climatic conditions are such that the entire crop is harvested, and trees pruned (if pruned) before the following years' flowers are initiated, and

2. **Southern Zone** (CNSW, TS, and WA) where climatic conditions are such that flowers are present on trees before the entire crop is harvested or trees pruned (if pruned).

Of the total Australian production in this period 63% was produced in the Northern Zone and 37% in the Southern Zone, as in Table 2.

Table 2: Australian Avocado Production by Zone

Region	FY2012, FY2013, FY2014, FY2015	
	Production (Tray Equiv.)	%
Northern Regions (NQ, CQ, SSC, SQ, NNSW)	24,373,119	63%
Southern Regions (CNSW, TS, WA)	14,226,867	37%
Total	**38,599,986**	**100%**

Source: Infocado, http://industry.avocado.org.au/Growers/Infocado.aspx

The average parameters/ measures demonstrated in benchmarking data, and also Infocado data for the same period have been used to collate an overall picture of the Australian Avocado Industry, as provided in Table 3.

This information has been shared with Avocados Australia Limited (AAL). AAL input has been included in the table where appropriate (see notes in right hand column Table 3).

Table 3: Australian Avocado Industry At a Glance

	Unit	Industry FY2015 (1)	Notes
Total Producing Trees	Trees	1,562,100	
Total Producing Hectares	Ha	8,349	
Average Producing Trees / Hectare	Trees / Ha	187	(2)
Total Immature (Non Producing) Trees Planted	Trees	350,000	(3)
Total Immature (Non Producing) Hectares Planted	Ha	1,500	(3)
Total KGS Harvested, as Fresh Fruit	Kgs	65,479,176	
Total KGS Sold as Juice, Oil, Processing	Kgs	3,997,347	
Total KGS Harvested Including Juice / Processing	Kgs	69,476,523	
Total Trays (5.5 Kg Equiv.) Fresh Fruit Harvested & Sold	Trays	11,905,305	
Total Kgs Harvested / Producing Tree	Kg / Tree	44.48	
Total 5.5 KG Trays Equivalent Harvested / Producing Tree	Trays / Tree	8.09	
Total KGS Harvested per Producing Hectare	Kgs / Ha	8,321	
Total 5.5 KG Trays Equiv. Harvested / Producing Hectare	Trays / Ha	1,513	
Average Price Achieved $ / 5.5 KG Equivalent Sold	$ / Tray Sold	31.92	(2)
Total Operating Costs per 5.5 KG Equivalent Sold	$ / Tray Sold	19.62	
Average EBITDA per 5.5 KG Equivalent Sold	$ / Tray Sold	12.32	
% Mid-Sized Fruit (Counts 18 to 25)	%	49%	
% Premium Grade	%	70%	
Gross Sales Value (Before Deducting Marketing & Ripening $)	$	$380,000,000	
Total Operating Costs (Excluding Interest and Depreciation)	$	$233,000,000	
EBITDA $	$	$147,000,000	
Number of FTE Equivalents Employed	FTEs	1,350	
Estimated Labour & Contracting Expenditure (Ave $6.83 / Tray)	$	81,313,000	
Labour & Contracting as % of Gross Revenue	%	20%	

(1) Based on applying benchmarking findings to total harvest figures as provided by Infocado for FY2015

(2) Information collected in 'Orchard Data' and referenced by Avocados Australia Limited (AAL) suggests these figures may be under-estimates of between 9% and14%

(3) Estimates arrived at with the assistance of Avocados Australia Limited

2. MATERIALS AND METHODS

2.1 Participant Group (Sample)

Participants in this project were recruited through several key mechanisms including:

1. All Australian avocado growers that are members of Avocados Australia Limited (AAL) have been sent a letter by Avocados Australia Limited in each year in which data has been collected outlining the project and inviting them to participate;
2. Pinnacle Agribusiness's records were accessed to identify all known avocado growers as well as other rural producers that could assist with the identity of producers of avocados;
3. Farm input providers, researchers and government agency personnel in the regions have been contacted and have provided details of growers they are aware of that have shown interest in participating in a project of this nature;
4. Researchers have travelled extensively in each of the eight (8) avocado growing regions to introduce the project to producers and seek out those parties who wish to participate;
5. Researchers have attended regional grower meetings and Qualicado workshops in all regions to present interim findings from the project to date, inform all interested growers of the project and its objectives and to engage additional participants.

Eighty two (82) Australian avocado growing businesses participated in this project over the four years of data collection. Of those 72% participated for at least three of the four years.

In the latter two years of the project the researchers suggested to some participants that without significant changes to the way information was being recorded the information that the benchmarking program could not provide to them may be inaccurate.

This refers mainly to businesses that produce more than one agricultural commodity (crop) and whom are not able to maintain accurate records for each crop, separately. The most challenging records in this regard are separate costs for separate crops. In particular labour costs, chemical and fertilizer costs, and other variable or direct costs associated with each crop grown.

2.1.1 SAMPLE DISTRIBUTION ACROSS REGIONS

The participant group have collectively grown 1.47 million trees on a total of 7,746 hectares of land over the four years of production.

The average annual producing hectares and producing trees captured in the data collected, across the eight growing regions, is provided in Table 4:

Table 4: Average Annual Production Assets for Benchmarking Participants (By Region)

Region	Average Annual Producing Trees Managed by Participants	Average Annual Producing Hectares Managed by Participants	Average Annual Tray Equivalents (5.5 kg) Produced by Participants	Estimated % of Average Annual Harvest in Region
North Queensland (14)	49,364	338	701,913	39%
Central Queensland (9)	172,971	921	1,309,349	50%
Sunshine Coast (6)	8,135	42	49,266	11%
Southern Queensland (12)	19,632	117	196,583	20%
Northern New South Wales (9)	15,377	104	105,424	50%
Central New South Wales (10)	27,231	145	204,332	31%
Tri States (9)	12,713	62	115,841	19%
Western Australia (13)	38,468	117	256,577	11%
TOTAL (82)	343,890	1,845	2,939,284	**30%**

(..) = Number of participants in each region, during the term of the project.

2.1.2 SAMPLE DISTRIBUTION ACROSS BUSINESS SIZE CATEGORIES

The benchmarking participants are also representative of differing sized businesses in the industry. Twenty five percent (25%) of participants managed an average of up to 10 producing hectares per annum, 35% managed an average 11 to 20 producing hectares per annum, 24% managed 21 to 50 producing hectares per annum and 16% had businesses with greater than 51 producing hectares per annum, as in Table 5.

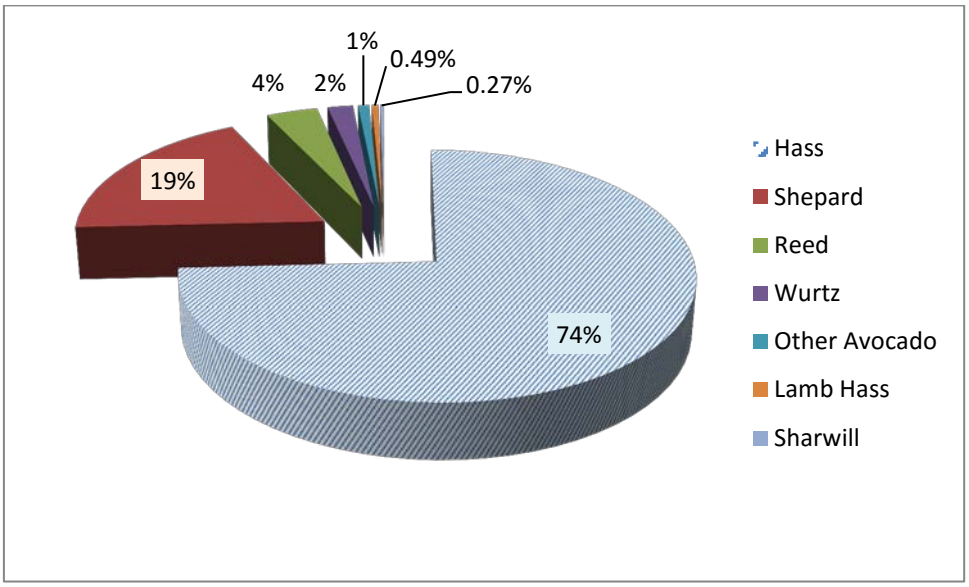
Table 5: Distribution of Participants By Size of Producing Area

Average Annual Producing Area	% of Benchmarking Group
Up to 10 Producing Hectares	25%
11 to 20 Hectares	35%
21 to 50 Hectares	24%
51 Hectares and Larger	16%

2.1.3 DISTRIBUTION OF VARIETIES IN SAMPLE

Seventy four percent (74%) of the producing trees captured in the benchmarking data were Hass variety, 19% were Shepard and 4% Reed (Table 5). Other varieties included in the sample represented less than 2% each of the producing trees, being Wurtz, Sharwill, Lamb Hass and others. Information is provided in Figure 6.

Figure 3: Varieties Grown by Benchmarking Participants



2.1.4 TYPES OF BUSINESS OPERATORS PARTICIPATING

Of the 82 separate businesses that participated over the four years, eighty two percent (82%, 67) were family owned and operated only one avocado producing orchard / location. 13% (11) of the participants were family owned and operated and managed more than one producing orchard in more than one location, and 5% (4) of the businesses are best categorised as corporate, including some family owned operations that are larger and operated along corporate lines.

2.2 Data Collection, Analysis and Reporting

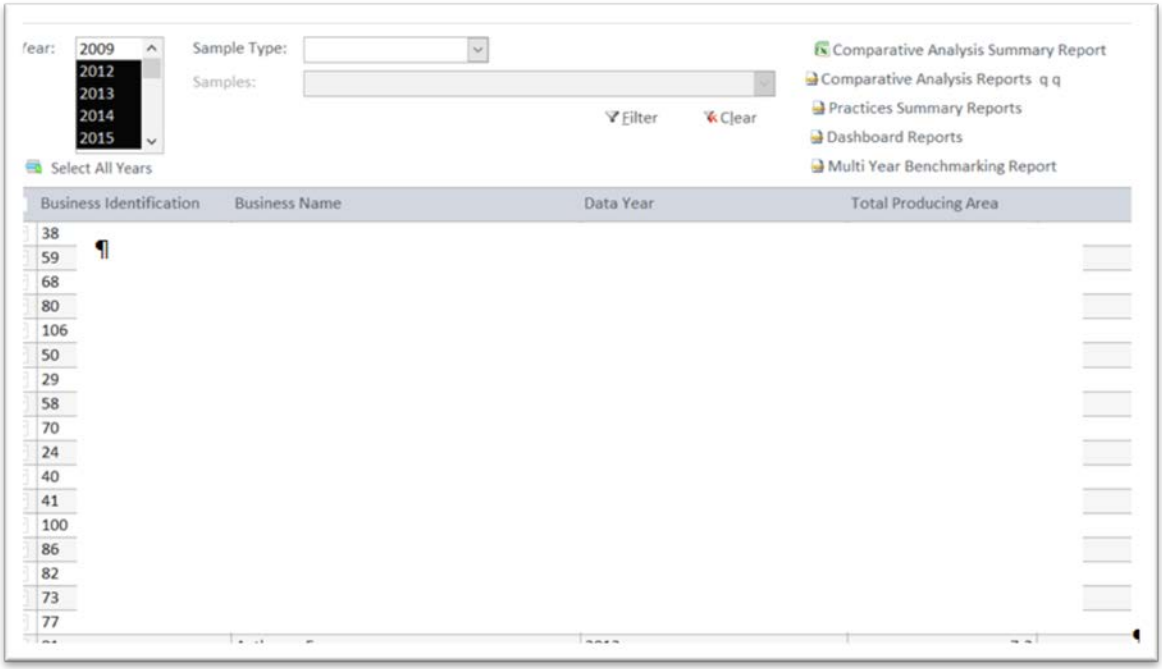
This report provides the first industry report outlining the findings arising out of collecting data from eighty-two (82) avocado growers distributed across all eight growing regions. The information was collated from records and sources specifically about the business practices, performance and outcomes of the participating businesses in four financial years, being FY2012, FY2013, FY2014 and FY2015.

The information has been entered stored and analysed using a program developed by Pinnacle Agribusiness and a professional data base design engineering firm. This software was developed with some clear goals in mind, particularly flexibility in how reports can be created for distribution to participants and how data can be analysed from multiple perspectives.

Report packages delivered to the participants include, and are not limited to:

1. Comparative Analysis Report By Region (4 Year Averages): Each participant's business compared to all participants in their own region;
2. Multi Year Benchmarking Report: Each participant's business as reported and analyzed for each of the four financial years and the business's average performance over the four year period (aggregate averages);
3. Practices Summary Report – For the Participant Group in Each Region

Figure 4: Avocado Production Data Base - Reporting Options



Resulting from the flexibility built into the software package, the researchers have been able to produce and deliver a number of specific reports that have been requested by some of the participants. These have included:

1. Reports comparing organic producers with other organic producers (only);

2. Reports comparing specific producers with other producers that have orchards of similar average size or age;

3. Reports providing information on several businesses, compared, as specifically requested by a group of growers that consent to their information being shared between a collaborating group.

Other reports were created, and extensively used, by researchers to analyse data at the industry level.

2.3 Process Steps

The process steps taken to undertake the research, and to complete and deliver reports to participating producers, and prepare this Draft Report are summarised in Table 6.

Table 6: Method Steps and Processes (Annual Steps Where Applicable)

PROCESS STEPS	STATUS
Identification of Prospective Participants	✓
Scoping / Content and Familiarity with Issues - Discussions with Project Reference Group and Selected Participants	✓
Survey Instrument / Questionnaire Design, Testing and Refinement	✓
Master Data Sheet Design	✓
Software Design - Data Entry	✓
Recruiting Willing Participants	✓
Set Up Visit Programs and On-Farm Visits	✓
Undertake On-Farm Visits	✓
Software Design - Reporting	✓
Collate, Clean, Normalise & Cross Reference Gathered Information	✓
Fill Gaps through Further Interaction with Participants	✓
Prepare and Send Master Data Sheets to each Participant	✓
Receive Verified Master Data Sheets from each Participant	✓
Enter Data - From Master Data Sheets to Database	✓
Run Test Reports and Cross Reference	✓
Complete Additional Data Cleaning and Normalising as Needed	✓
Update and Finalise Data in Database	✓
Run Participant Reports	✓
Review, Test, Check and Re-Clean / re-Normalise data as needed	✓
Deliver Participant Reports	✓
Follow Up to Ensure Reports Received	✓
Interact with Participants as Required	✓
Prepare Final Report	✓
Receive Feedback and Refinement from Project Reference Group / AAL / HAL	✓
Deliver Final Industry Report	✓
Dissemination / Technology Transfer as Per Contract Undertakings	✓

There has been a large body of data collected from producers, delivered in a multitude of forms and levels of detail. Every attempt has been made to cross check and validate information as it was transformed from raw data and notes into a form suitable for entry into a software database package.

2.4 Treatment of Tree Age & Orchard Development Costs

Software and data collection methods were originally designed to enable the collection and analysis of data at a very detailed level from each participant. This included collecting and analysing costs, harvest volumes, tree and hectare numbers, tree age, and practices at a block level. It also included the ability to separate data between producing and non- producing blocks or orchards.

It became apparent early that this was not going to be possible. Commonly on-farm records are not uniformly kept that enable separation of information between producing and non-producing orchards or blocks, or between trees of different ages. Also trees of different ages are not harvested separately with the harvest data records kept separately for different tree ages.

As a result of these factors researchers wish to clarify how some information is treated in this analysis:

PRODUCING AND NON-PRODUCING ORCHARDS OR BLOCKS

In this analysis:

All of the cost incurred by each participant, each year, in managing orchards and producing harvestable crop is treated as cost that has to be paid for by production from producing orchards. The impact of the cost of different quantities of non-producing orchards or blocks (trees and Hectares) is, by necessity, included as costs associated with producing orchards.

TREE AGE

In this analysis:

All harvest data, from trees of all ages, has been collated and analysed as total harvest volume, per grade and size count for each participant business in each financial year. Therefore the impact of differing ages of trees on harvest volumes is, by necessity, not accounted for.

2.5 Benchmarking in the Australian Avocado Industry

2.5.1 A LITTLE THEORY AND DEFINITION

BPIR[2]

BPIR, a well-recognised website, provides a relatively straightforward definition for:

Best Practice

Best practices are "those practices that have been shown to produce superior results; selected by a systematic process; and judged as exemplary, good, or successfully demonstrated"; these practices are then adapted to fit a particular organisation. Benchmarking is a systematic process used for identifying and implementing best or better practices.

Benchmarking

Benchmarking is a systematic process for identifying and implementing best or better practices. Although experts break benchmarking into several types, there exist two main types,"Informal" and "Formal" Benchmarking.

Formal Benchmarking

There are two types of Formal Benchmarking - Performance and Best Practice Benchmarking.

Performance benchmarking; this involves comparing the performance levels of organisations for a specific process. This information can then be used for identifying opportunities for improvement and/or setting performance targets. Performance levels of other organisations are normally called benchmarks and the ideal benchmark is one that originates from an organisation recognised as being a leader in the related area. Performance benchmarking may involve the comparison of financial measures (such as expenditure, cost of labour, cost of buildings/equipment, cost of energy, adherence to budget, cash flow, revenue collected) or non-financial measures (such as absenteeism, staff turnover, the percentage of administrative staff to front-line staff, budget processing time, complaints, environmental impact or call centre performance).

Best practice benchmarking; this is where organisations search for and study organisations that are high performers in particular areas of interest. The processes themselves of these organisations are studied rather than just the associated performance levels, normally through some mutually beneficial agreement that follows a benchmarking code of conduct. Knowledge gained through the study is taken back to the organisation and where feasible and appropriate, these high performing or best practices are adapted and incorporated into the organisation's own processes. Therefore, best practice benchmarking involves the whole process of identifying, capturing, analysing, and implementing best practices . There are a number of best practice benchmarking methodologies. One of which is the TRADE Best Practice Benchmarking Methodology.

[2] http://www.bpir.com/all-about-bpir-bpir.com.html

The BPIR.com website was launched in April 2002. It was developed by the Centre for Organisational Excellence Research (COER), Massey University and later formed into BPIR.com Ltd. Steve Welch one of the creators of the resource serves as the Managing Director and Dr Robin Mann, founder and creator, as the Commercial Director. Dr Robin Mann is also the Director of the Centre for Organisational Excellence Research and Chairman of the Global Benchmarking Network.

The BPIR started out as a project within COER where a team carried out research on what support is provided to organisations, small and large, via the internet, to help improve business performance. The foundation and interest behind the research was strongly linked to the experience of the team as qualified business excellence evaluators using the EFQM and Baldrige models

2.5.2 THE AUSTRALIAN AVOCADO INDUSTRY BENCHMARKING PROGRAM

This Benchmarking Program has been designed to incorporate both Performance Benchmarking and Best Practice Benchmarking, as defined in the previous section.

The data set accumulated describes and defines the business operations of a statistically and logically relevant and representative sample of industry. It uses data on both Financial and Non-Financial Measures as demonstated by participants. Some key measures generated and used in the analysis are:

FINANCIAL (QUANTITATIVE):

1. Revenue
2. Costs
3. Profitability (EBITDA is used as a proxy measure of Cash Profit)

NON-FINANCIAL (QUANTITATIVE):

1. Yield
2. Quality (Grade and Size, two of several parameters of quality as required by markets, grade being a relatively inclusive performance measure given that grade specifications include considerations for many attributes of the fruit including blemish and many more)
3. Labour Use Efficiency

QUALITATIVE DATA AND INFORMATION:

1. The manner in which participants undertake on-farm tasks and management practices
2. The frequency and intensity with which participants undertake key tasks and practices
3. What technologies are adopted by participants
4. How participants make key decisions
5. Ranking the marketing awareness and involvement of participants in the marketing of their produce

2.5.3 BEST PRACTICE AND BENCHMARKING TYPES INCLUDED

Unlike some industries there is no known avocado growing business in Australia or the world that is known and seen as an example a “Best Practice Operation” or “Best Practice” avocado growing businesses.

From the data collected from the eighty two (82) different businesses researchers have created a new benchmark performance model. This ‘Best Practice Data Set’ is from the ten (10) most profitable businesses over the four-year period. This Best Practice Data Set and information collected from all of the participants have been used to create several forms of comparative analysis and Benchmarking Analysis, being:

1. **Regional Performance Benchmarking:**

   The participants have been able to review their performance in any specified reporting period and compare their own performance in their growing region to the average **performance of all participants in their region.** Each comparative analysis report provided to participants shows their performance in more than ninety-four (94) different performance measures compared to the average for each measure and also advises them of their ranking on each measure in that region for the specified reporting period.

2. **Total Group (National) Performance Benchmarking:**

   Participants have been able to access reports that inform them of their performance in any specified reporting period and to compare their own performance to the average **performance of all participants in all regions**. These comparative analysis reports inform participants of their performance in more than ninety-four (94) different performance measures compared to the average for each measure and also advises them of their ranking on each measure in the total group (all regions).

3. **Internal Benchmarking Over Time**

   A specially designed multicolumn report enables participants to view the performance of their business in each financial year for which they provided data and **compare each year’s performance of their business to each of the other years and to a multi-year average for their business**. This information allows participants to identify trends in their own business over time in regard to ninety-four (94) different performance measures.

4. **Best Practice Benchmarking:**

   This analysis compares the performance of the Top 10 and the Remainder (national industry level) over any specified reporting period, across all ninety-four (94) performance measures. Participants are able **compare their own performance over any specified reporting period to that of the Top 10 and the Remainder** of the same period(s).

5. **Regional Comparisons and Comparisons Between Zones:**

   Detailed comparative analysis has been generated between the eight growing regions in the Australian industry and also between the two zones as defined herein, This analysis also uses the same ninety-four (94) performance measures. Areas where **notable differences, similarities and trends have emerged in and between regions** are presented and discussed.

6. **Regional Management Practices, Comparison and Analysis:**

A specifically designed qualitative survey instrument was used to collect information about how and what participants do on their farms. The survey instrument questions generate responses to one hundred and eight (108) questions

Participants are able to view a particular task (E.G. frequency of irrigation in high demand periods) and see what proportion of participants in their region do this task, in what ways or at what frequencies (E.G. daily, every two days, weekly, etc.).

7. Management Practices Comparisons:

Key point comparisons have been presented to attendees to inform meeting attendees how participants in different regions or different sub-groups (for example the Top 10) do each task. Comparing practices in the region in which the meeting is being held in to those of regions that produce avocados before and after that region, and to the Top 10 has proved very informative

8. Relating Practices and Outcomes:

Notwithstanding this is not a statistical analysis, it has been possible in many comparisons to demonstrate how higher or lower performance in key outputs a region or group are accompanied by apparent patterns in management practices. For example, numerous comparisons demonstrate that higher profitability and high yield and quality appear to occur in regions or groups that irrigate more frequently in high demand periods.

Statistical analysis of some of these apparent patterns was undertaken and is discussed in Section 3.1.6.

3. RESULTS

3.1 National Benchmarking Group & Trends

3.1.1 KEY OUTPUT AND COST PARAMETERS FOR THE GROUP

A concise summary of some key attributes and descriptors of the benchmarking group is outlined in Figure 5. An itemised summary of average output and cost parameters for the benchmarking group is also provided in Table 7.

Figure 5: Average Parameters for Benchmarking Group Over 4 Years of Operations

1. **Average Yield:**
   - 9.23 tonnes / producing hectare;
   - 8.95 trays (equivalent) / tree.
2. **Average % Sold as Mid-Sized (18 – 25):**
   - 49%.
3. **Average % Sold as Premium Grade:**
   - 72%.
4. **Average Labour Use Productivity;**
   - 52 tonnes produced, packed and marketed per FTE per annum.
5. **Average Gross Revenue Achieved:**
   - $44,559 / producing hectare;
   - $26.55 / tray equivalent.
6. **Average Operating Costs Incurred (excl. Interest, Depreciation, Amortization & Return on Investment [ROI]):**
   - $29,986 / hectare;
   - $17.87 / tray equivalent.
7. **Average EBITDA (Profit before Interest, Depreciation, Amortization and ROI):**
   - $14,572 / producing hectare;
   - $8.67 / tray equivalent.
8. **Average Cost of Labour and Contracting (incl. contract packing where adopted):**
   - $11,312 / producing hectare;
   - $6.95 / tray equivalent.

Table 7: Key Outputs and Parameters For Participants

	UNIT	TOTAL BENCHMARK GROUP (4 YEARS)
Yield, Size and Grade		
Total Kgs Harvested / Producing Tree	Kg / Tree	49.23
Total 5.5 KG Trays Equivalent Harvested / Producing Tree	Trays / Tree	8.95
Total KGS Harvested per Producing Hectare	Kgs / Ha	9,230.88
Total 5.5 KG Trays (Equivalent) Harvested per Producing Hectare	Trays / Ha	1,678.34
% of Fruit Sold as Small Sized (Size counts 26 and above)		46.31%
% of Fruit Sold as Mid-Sized (Size Counts 18 to 25)	%	49.14%
% of Fruit Sold as Large Sized (Size Counts		4.55%
% of Packed Fruit Sold as Premium Grade %	%	71.78%
% of Packed Fruit Sold as A Grade / Grade 1		14.64%
% of Packed Fruit Sold as B Grade / Grade 2		9.64%
Tonnes Produced, Packed, Marketed per Full Time Employee Equivalent (FTE)	T/FTE	52
Costs, Returns and EBITDA per Producing Hectare		
Total Sales Revenue	$ / Producing Ha	$44,558.57
Employment / Labour Costs	$ / Producing Ha	$8,290.94
Marketing & Ripening Costs	$ / Producing Ha	$4,058.52
Chemical and Fertiliser Costs	$ / Producing Ha	$2,781.22
Contract Packing Fees	$ / Producing Ha	$2,669.96
Freight Costs	$ / Producing Ha	$2,632.52
Packaging and Pallet Costs	$ / Producing Ha	$2,544.27
General Expenses	$ / Producing Ha	$2,362.65
Repairs & Replacements	$ / Producing Ha	$1,540.30
Rates Levies, Licenses, Memberships, Registrations	$ / Producing Ha	$810.90
Fuel & Oil Costs	$ / Producing Ha	$645.81
Power & Gas Costs	$ / Producing Ha	$566.96
Consultants And Contractor Fees	$ / Producing Ha	$355.20
Insurance Costs	$ / Producing Ha	$295.89
Water Costs	$ / Producing Ha	$295.68
Motor Vehicles	$ / Producing Ha	$133.82
Royalties & PVR Costs	$ / Producing Ha	$1.64
Total Operating Costs	$ / Producing Ha	$29,986.27
EBITDA (Profit Before Interest, Depreciation and ROI)		$14,572.30

	UNIT	TOTAL BENCHMARK GROUP (4 YEARS)
Costs, Returns and EBITDA per Tray Equivalent Sold		
Total Sales Revenue	$ / Tray Sold	$26.55
Total Labour and Contracting / Consulting Costs	$ / Tray Sold	$6.74
Marketing and Ripening Costs	$ / Tray Sold	$2.42
Chemical and Fertiliser Costs	$ / Tray Sold	$1.66
Freight Costs	$ / Tray Sold	$1.57
Packaging Costs	$ / Tray Sold	$1.52
General Expenses	$ / Tray Sold	$1.20
Repairs & Replacements	$ / Tray Sold	$0.92
Rates, Levies, Licenses, Memberships, Registrations	$ / Tray Sold	$0.48
Fuel & Oil Costs	$ / Tray Sold	$0.38
Power and Gas Costs	$ / Tray Sold	$0.34
Consultants And Contractor Fees	$ / Tray Sold	$0.21
Insurance Costs	$ / Tray Sold	$0.18
Water Costs	$ / Tray Sold	$0.18
Motor Vehicles	$ / Tray Sold	$0.08
Royalties & PVR Costs	$ / Tray Sold	$0.00
Total Operating Costs		$17.87
EBITDA (Profit Before Interest, Depreciation and ROI)	$ / Tray Sold	$8.67

3.1.2 PLANT DENSITY

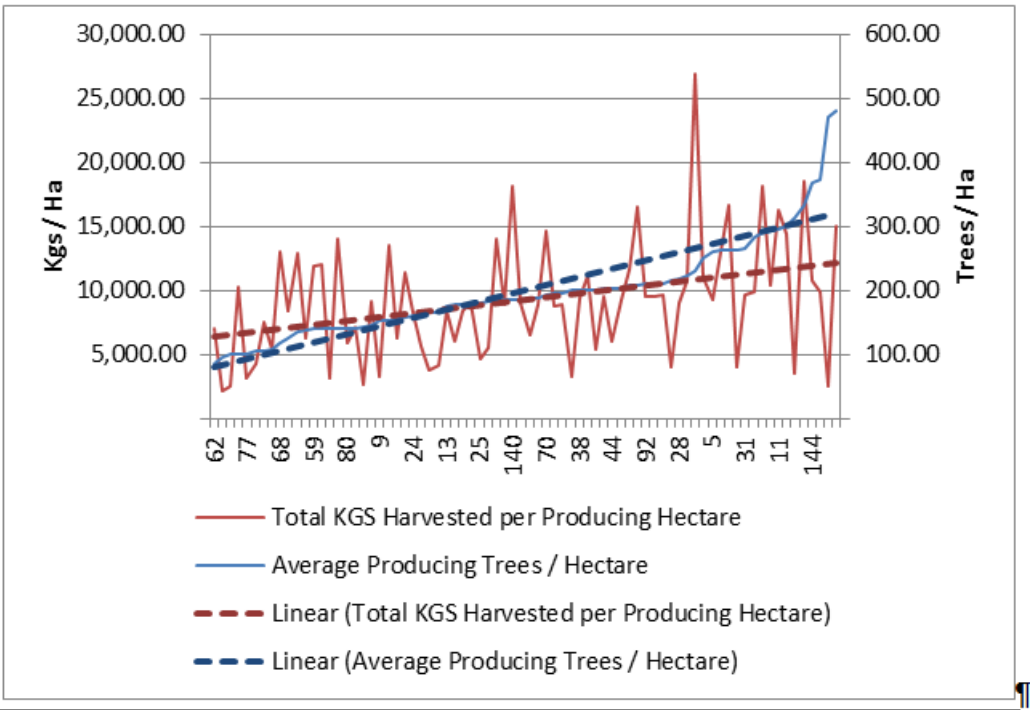
Plant densities adopted by the participant businesses cover a range from 84 trees per hectare to 480 trees per hectare. This range may also be de described as:

1. From eighty four (84) trees / hectare, (e.g. 10m X 12m); to
2. Four hundred and eighty (480) trees / hectare, (e.g. 6.5m X 3m).

Figure 6 and Figure 7 provide some insight into the relationship demonstrated by the data between planting density and yield (per producing hectare and per producing tree). The relationship between plant density and yield that may seem 'under-expressed' when considered in the context of industry thinking. Also the Correlation Coefficients included show that the values for these variables are only slightly correlated (high positive correlation is a value close to +1, high negative / inverse correlation is a value close to -1).

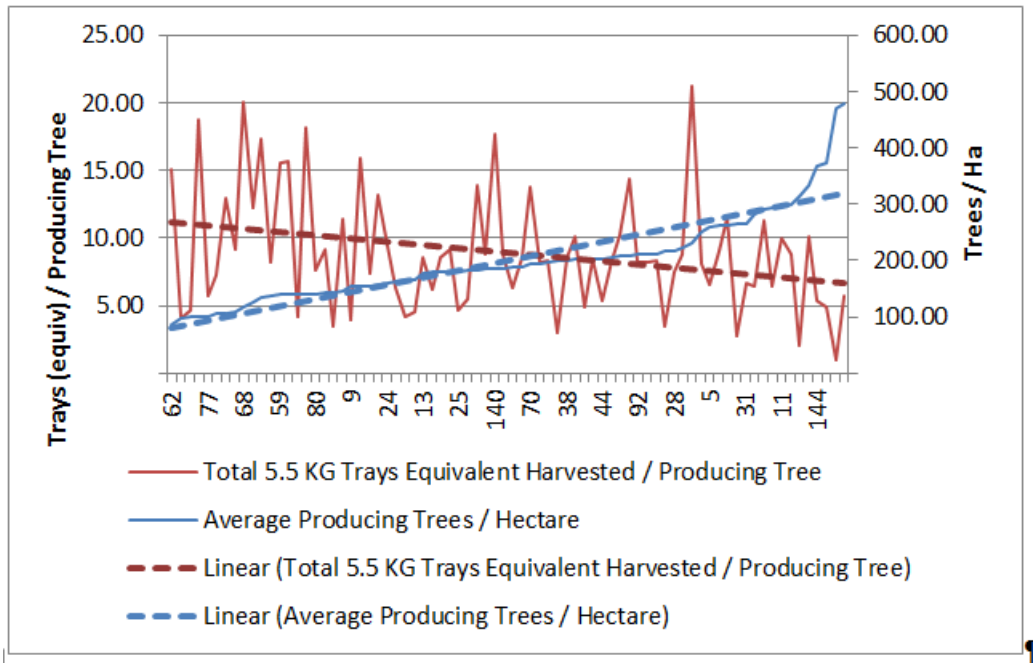
These findings may however reflect that other variables in the process of producing a crop are significantly affecting crop yield (for example tree health, nutrition, canopy management, climate variability, irrigation practices, mulch and phytophthora treatments and others).

Figure 6: Plant Density and Yield per Producing Hectare



CORRELATION	Average Producing Trees / Hectare
Total KGS Harvested per Producing Hectare	0.219459479

Figure 7: Plant Density and Yield per Producing Tree



CORRELATION	Average Producing Trees / Hectare
Total 5.5 KG Trays Equivalent Harvested / Producing Tree	-0.368095735

3.1.3 TRENDS OVER FOUR FINANCIAL YEARS

YIELD GRADE AND SIZE

Three key output parameters, yield per producing hectare, percent (%) of fruit sized 18 – 25, and & percent (%) of fruit sold as Premium grade have demonstrated slightly declining trends across the four financial years as shown in Figure 8 and Figure 9.

Figure 8: Yield Trends Over 4 Years of Operations

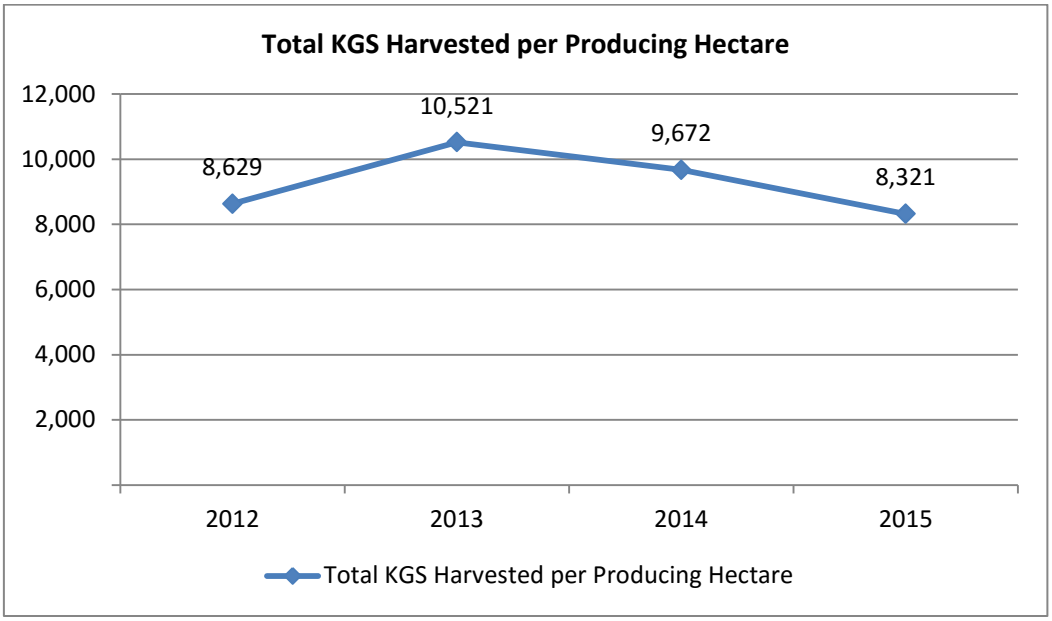
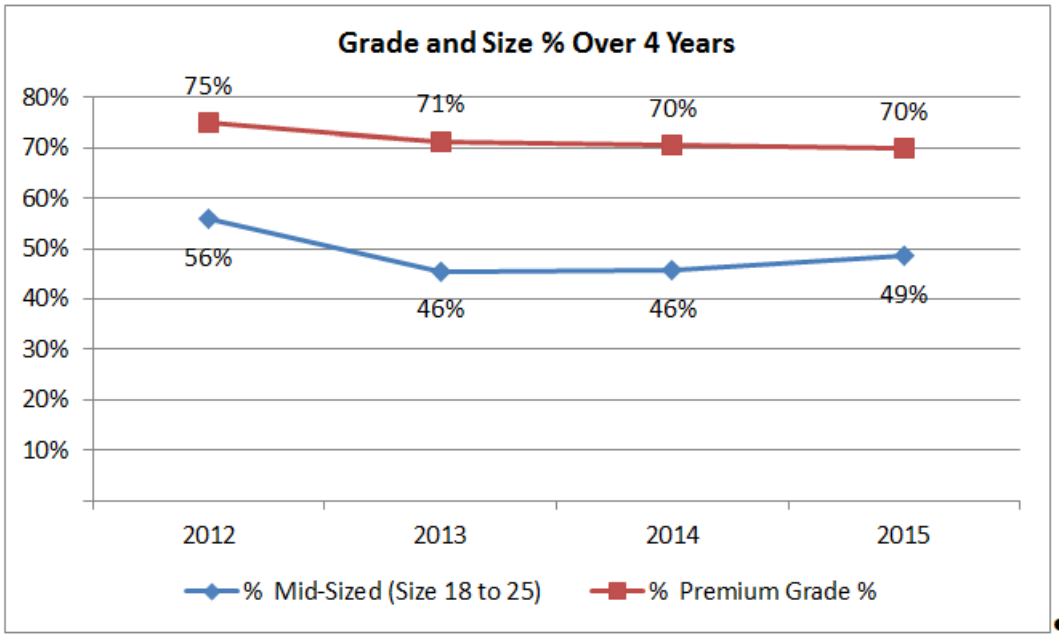


Figure 9: Grade and Size Trends Over 4 Years of Operations



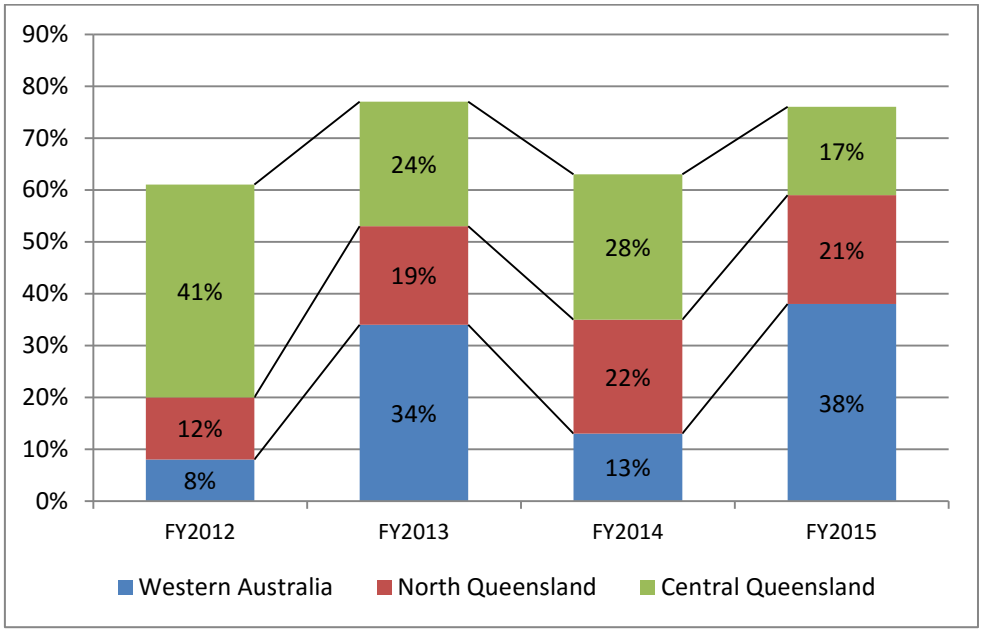
These are not significant declines, however I would be productive to further understand the reasons for this pattern.

THE THREE LARGEST PRODUCING REGIONS (BY VOLUME)

The total percentage of the Australian harvest accounted for by the three regions producing the largest volume (Western Australia, North Queensland and Central Queensland) is: 61% in FY2012, 77% in FY2013, 63% in FY2014 and 76% in Fy2015, as provided in Figure 10.

The biennial pattern in these total figures is a closely related to the pattern of production volumes recorded by participants in Western Australia in each year.

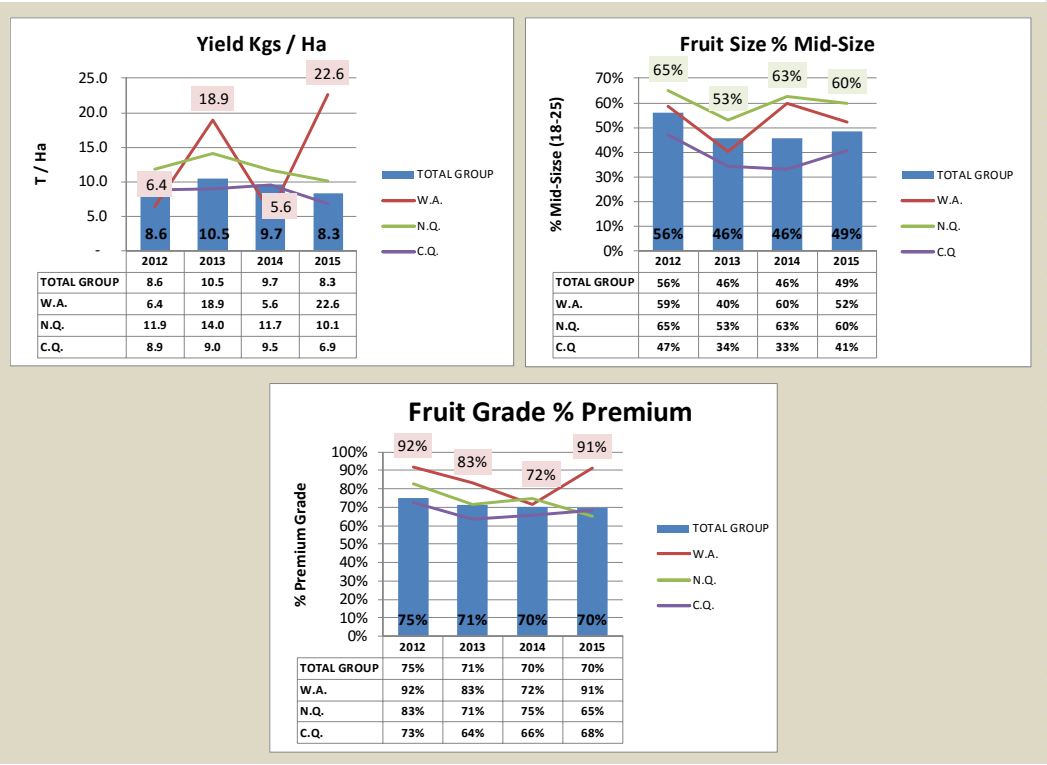
Figure 10: Larges Regions - Average % of Production by Region Over 4 Years



The graphs provided in Figure 11 show some marked differences in yield, size and grade between these three regions compared to the average for the total benchmarking group (all regions)..

The difference in yield (top graph in Figure 11) between Western Australia and North and Central Queensland regions appears to emphasise the impact of alternate bearing and / or uneven bearing as it affects producers in Western Australia. The trend of increasing yields in Western Australia, albeit every second year may also reflect the fact that more of the participants' producing trees in Western Australia are yet to reach maturity.

Figure 11: Yield, Grade and Size Trends – 3 "Summer Supply Regions" (4 Years)



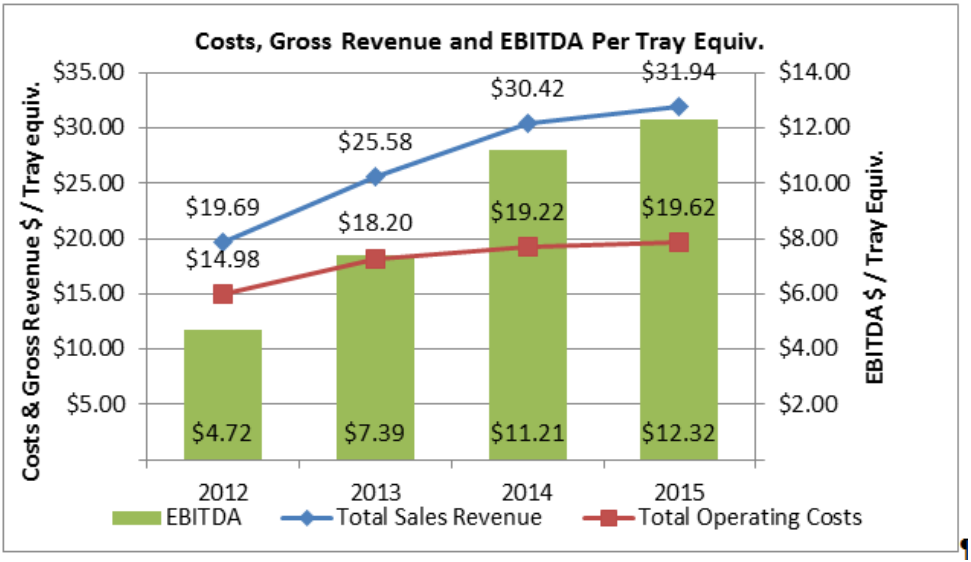
GROSS SALES RETURNS, OPERATING COSTS AND EBITDA

Per Tray Equivalent Sold

The average gross revenue per 5.5 kg tray equivalent received by the benchmarking group participants over data collection period **has increased by 62%,**

The average total operating cost per 5.5 Kg tray equivalent **has increased by 31%** (refer Figure 12). The resulting average EBITDA per tray equivalent achieved by the group **has increased 161%**, to $12.32 in FY2015.

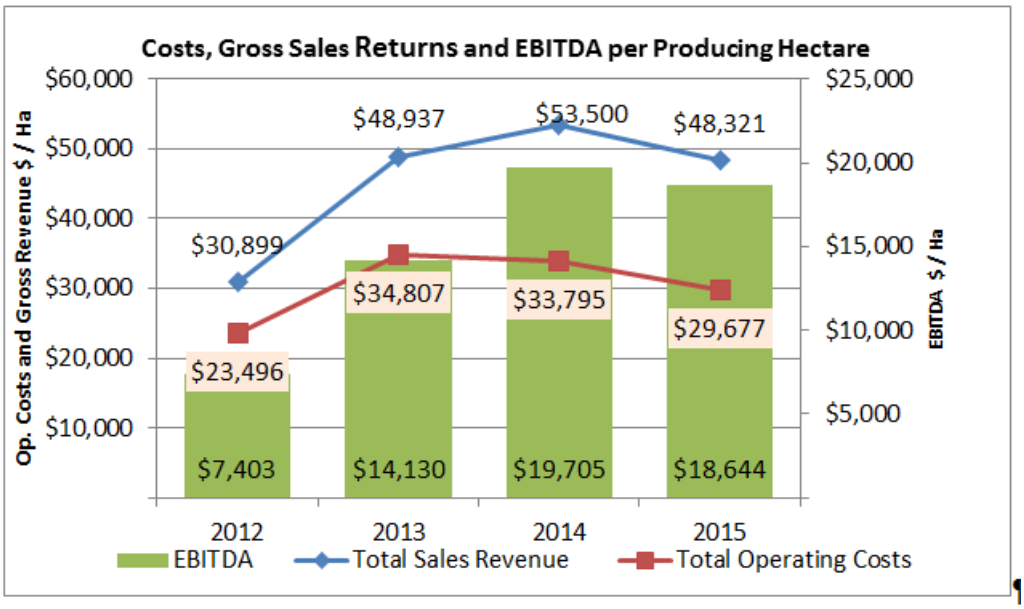
Figure 12: Costs, Revenue and Profit (EBITDA) / Tray Equiv. - Trends Over 4 Years



Per Producing Hectare

The average EBITDA per hectare achieved by the group has also increased by 152% to $18,644 per producing hectare in FY2015 (refer to Figure 13). This represents an estimated 37% of gross sales value (sales revenue) being delivered to the EBITDA line in the financials of an average producer, a highly regarded return for any business.

Figure 13: Costs, Revenue and Profits (EBITDA) / Hectare – Trends Over 3 Years



From this return an average producer must service all debt including plant and equipment finance, put aside an adequate depreciation reserve for plant and equipment replacement and deliver an acceptable return on investment(in land, improvements, plant and equipment and working capital employed).

3.1.4 OBSERVATIONS ON TRENDS OVER 4 YEARS

NOTE 1 (PER TRAY EQUIVALENT SOLD):

Average gross revenue, costs and returns (profits / EBITDA) per tray equivalent sold has trended up constantly since FY2012 for benchmarking participants. This trend is clearly due to improved prices achieved over the same period.

NOTE 2 (PER PRODUCING HECTARE):

However, the average costs incurred / invested per producing hectare has declined since FY2013. Gross revenue per hectare and profits (EBITDA) per hectare have also declined since FY2014. This decline in performance per hectare is most likely related to corresponding declines in yields, grade and fruit size over the same period.

KEY POINTS

In this four-year period, prices achieved by the benchmarking group have increased 62% and operating costs invested in the crop have increased 31%.

Concurrently yield per hectare has declined marginally (4%), the percent of fruit sold as mid-sized has declined 12.7% and the percent packed to premium grade has declined 7%.

Should these trends continue in the industry in the same manner as has been demonstrated in the benchmarking group over four years, the profitability of avocado growers is likely to decline if the current prices paid to growers decline.

Perhaps the impact of the lengthy period of improved prices may be masking declines in some areas of management practices and costs / efficiency on farm.

3.1.5 CORRELATIONS AND RELATIONSHIPS – OBSERVATIONS ON PATTERNS

Patterns are observed between some key performance parameters and attributes in the data set. These primarily relate to observed patterns between financial outcomes and crop performance outcomes. Namely the relationships between fruit size, fruit grade and yield and EBITDA .

Figure 14, Figure 15 and Figure 16 demonstrate some observed patterns. Purely by observations, participants appear to achieve higher / better financial outcomes as measured by EBITDA achieved per tray sold, when they achieve higher results in terms of % Mid-Size Fruit, % Premium and yield in Kilograms per hectare.

Figure 14: Tracking Profit (EBTDA) and Fruit Size (% Mid-Sized) – 4 Year Averages

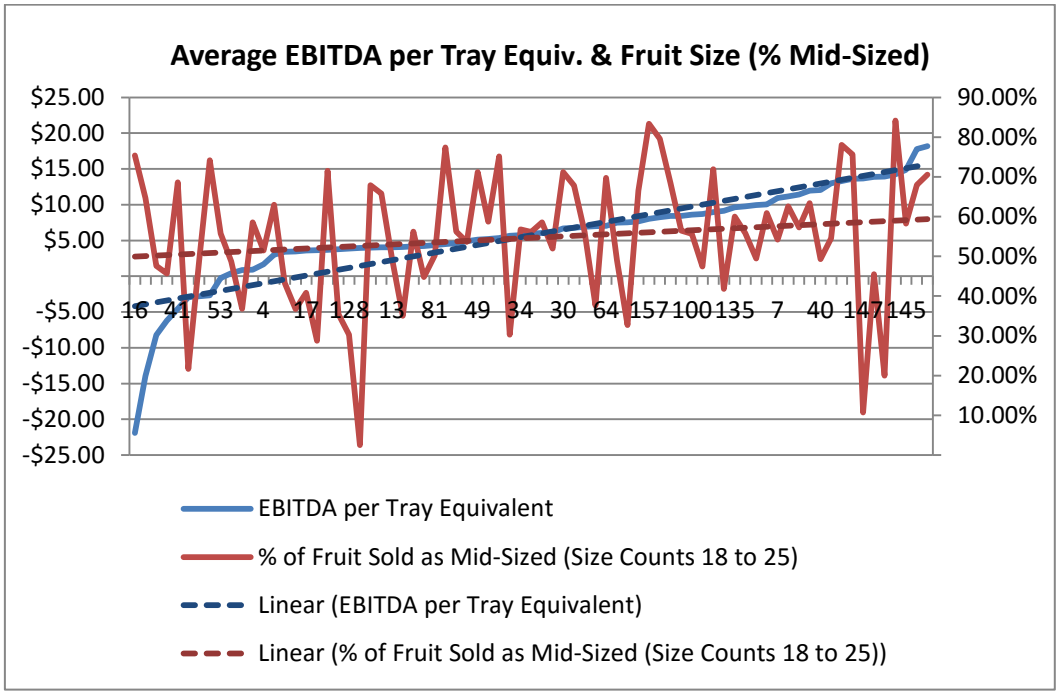


Figure 15: Tracking Profit (EBITDA) and Grade (% Premium) – 4 Year Averages

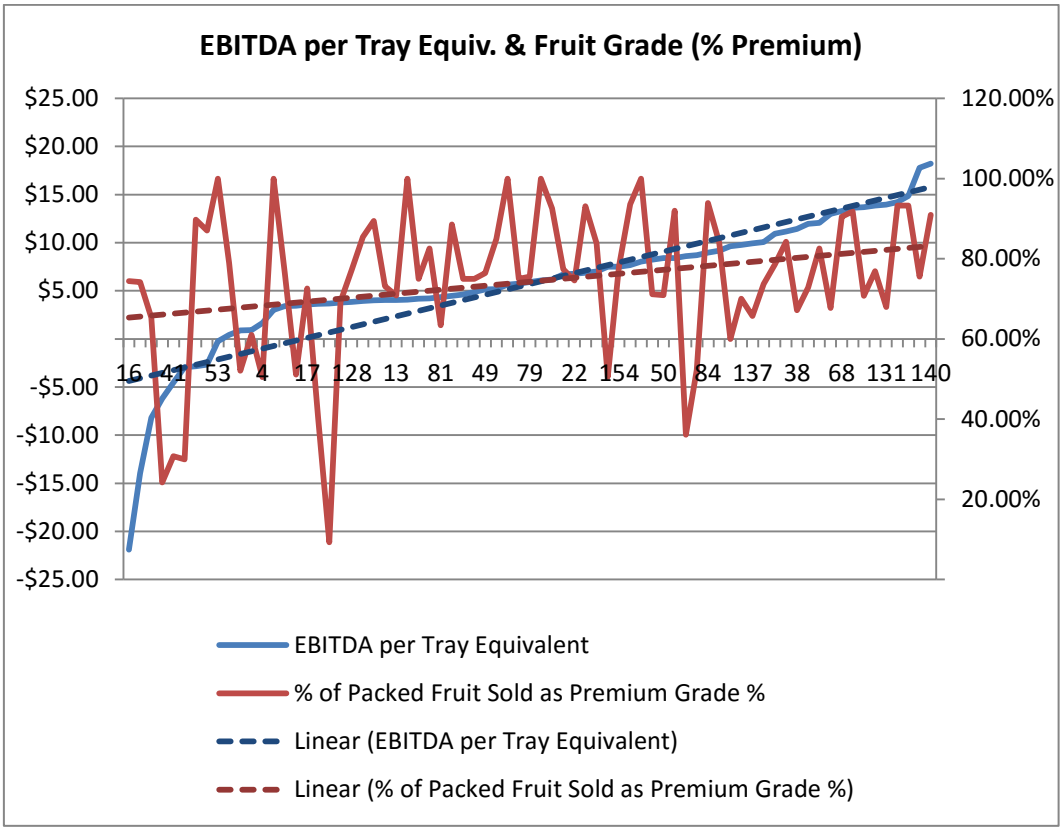
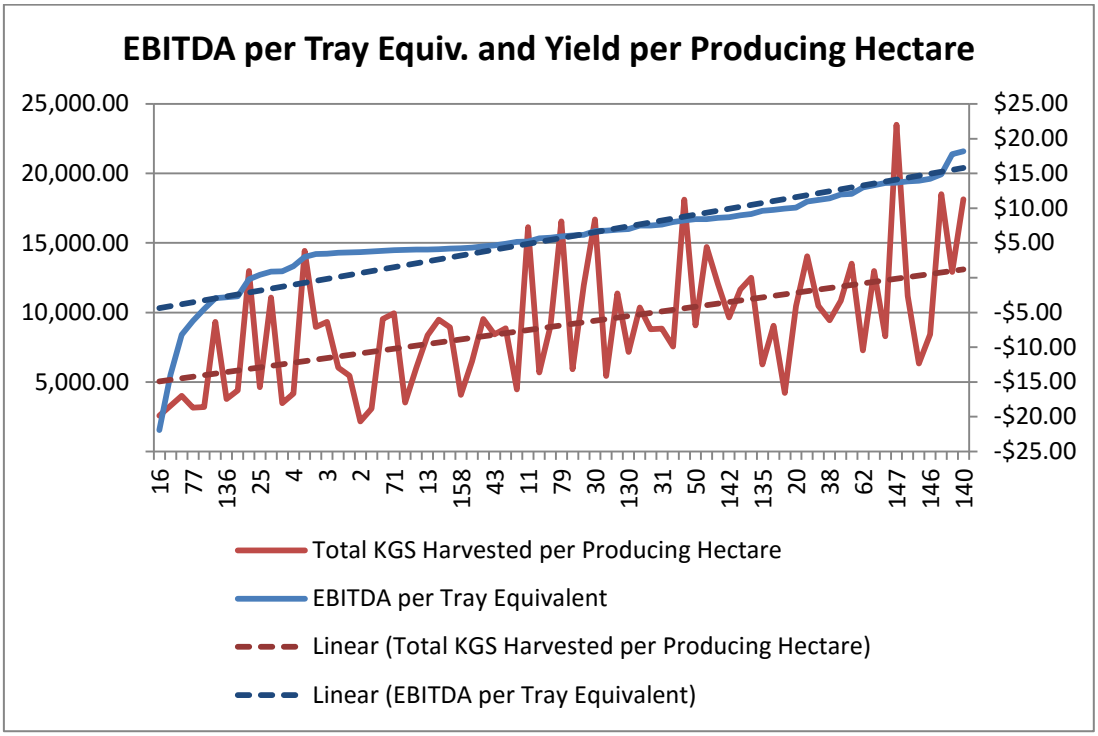


Figure 16: Tracking Profit (EBITDA) and Yield (KGS/Ha) – 4 Year Averages



These are observations and are not arrived at following any statistical analysis to assess if the observed relationships are statistically significant.

3.1.6 STATISTICAL ANALYSIS – RELATIONSHIPS (SOME VARIABLES & EBITDA)

With the assistance of Dr Miranda Mortlock of the School of Agriculture & Food Sciences at the University of Queensland, some inferential statistical analysis has been carried out on data collected from participants. The purpose of this analysis was to investigate whether any of the attributes and performance outcomes observed have relationships with EBITDA that are statistically significant.

Regression analysis has been used to investigate which of the following variables had a statistically significant impact on EBTDA per producing hectare:

1. Year of Harvest (FY2012, FY2013, FY2014 and FY2015)
2. Plant Density in trees per hectare
3. Yield in Trays per Hectare
4. % Premium Grade
5. % Mid-Sized Fruit

The same analysis also was applied to the variables to investigate whether there were statistically significant correlations between these variables and EBITDA per Tray Sold.

With the data currently collected three (3) of these five (5) variables have demonstrated a statistically significant relationship to the EBITDA achieved per hectare and per tray sold, being:

1. **Year of Harvest:**

   A positive relationship exists between EBITDA achieved and year of harvest

2. **Yield in Trays per Hectare:**

   A positive relationship exists between EBITDA and trays harvested per hectare; and

3. **Trees per Hectare:**

   A negative relationship exists between EBITDA and plant density in plants per hectare

There is little surprise regarding the relationship between yield and EBITDA. The relationship between EBITDA and year of harvest is of particular interest given that information elsewhere in this report informs that prices increased by 62% over the four-year data collection period, and operating costs increased just 31% in the same period.

The negative relationship between tree density and EBITDA is possibly a surprise.

Notes

1. We know (discussed elsewhere in this report) that for the Top 10 group 97% of the producing trees are planted at less than 250 trees per hectare and over 90% of these trees are planted in the Northern Zone;

2. The data used for the analysis is for trees of all ages and therefore the analysis is unable to determine if tree age is impacting this finding;

3. Four years of data has been used for this analysis however given the variability in conditions, locations, and farm management practices to be found in the data set, data for a longer period may be needed to identify if this, and other relationships are valid.

The plot effect displays for these three variables and EBITDA per tray sold and per producing hectare are provided in Figure 17 and Figure 18.

Figure 17: Effect Plots for 3 Variables on EBITDA per Tray Sold

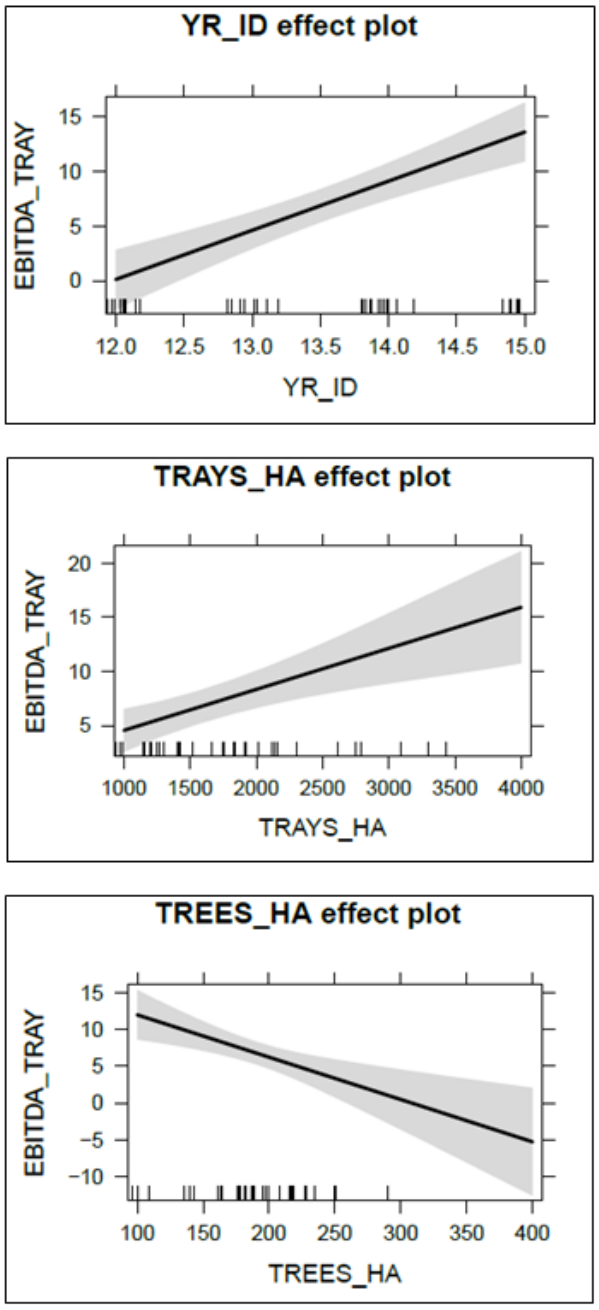
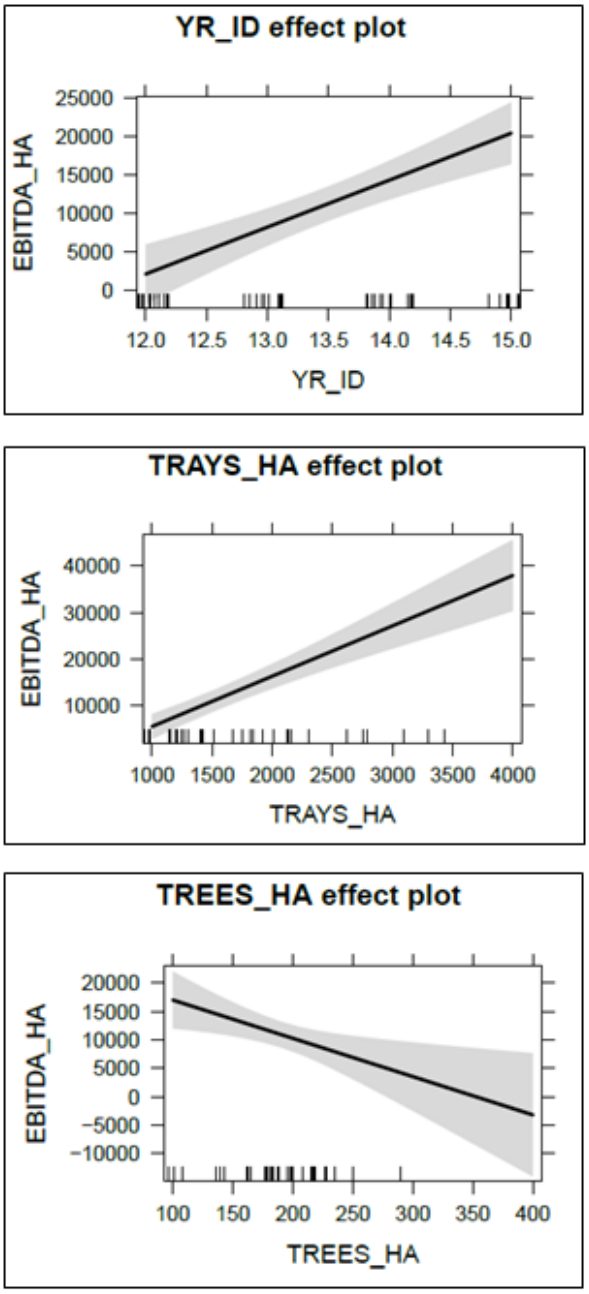
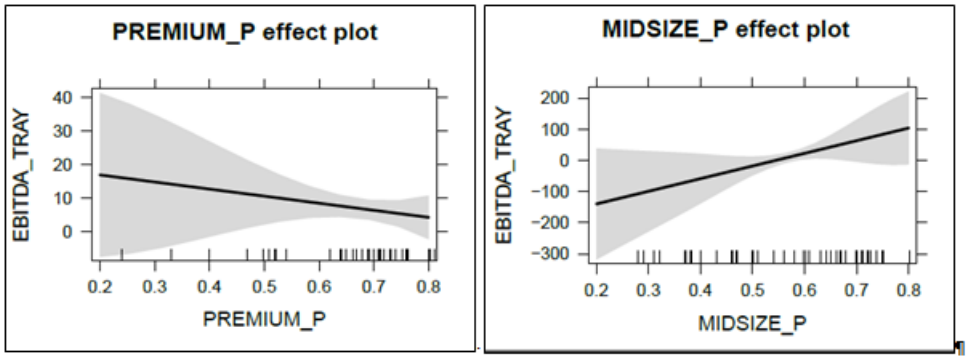


Figure 18: Effect Plots for 3 Variables on EBITDA per Producing Hectare

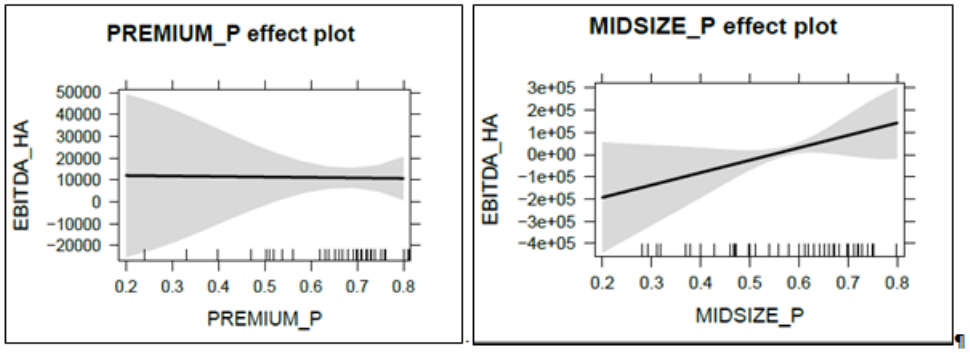


Effect plots for the relationship between % Mid-Sized Fruit and EBITDA and between % Premium and EBITDA are shown in Figure 19. These variables did not demonstrate a statistically significant relationship to EBITDA. However the regression lines each show trends similar to observed patterns. The data used to date (four years of data) does not support a statistically significant relationship.

Figure 19: Effect Plots for % Premium % and % Mid-Sized Fruit and EBITDA



Effect Plots: EBITDA PER TRAY AND PREMIUM, EBITDA PER TRAY AND MID-SIZES FRUIT



Effect Plots: EBITDA PER HA AND PREMIUM, EBITDA PER HA AND MID-SIZES FRUIT

A larger data set, including more years of data would enable further analysis. More analysis, particularly with a larger longitudinal data set, may enable investigations between some other variables. For example:

1. With more years of data it may be productive to analyze the relationship between Grade, and Fruit Size and gross revenue achieved, separately from:

2. The correlations between each of gross revenue, operating costs, and yield on EBITDA

3.1.7 MANAGEMENT PRACTICES OF PARTICIPANTS

Four (4) year average survey responses to the Management Practices survey are provided in Table 8. In a later section of this report (Section 3.4), the differences between the management practices of the top 10 most profitable participating businesses (Top 10) and the remainder of the benchmarking group (Remainder) are outlined and discussed.

Table 8: Management Practices Of Participant Businesses Over 4 Years

	MEASURE	TOTAL BM GROUP
1. MARKETING AND SALES		
a. Marketing Channel Used - % Sold		
Direct to Major Chains	% of Produce	30.27%
Via Brokers	% of Produce	37.02%
Via Wholesalers	% of Produce	20.27%
Through Pack House that Markets Fruit	% of Produce	11.15%
Export	% of Produce	1.14%
Independent Greengrocers Directly	% of Produce	
Direct to Public (Including Farmers Markets)	% of Produce	0.15%
b. Growers' Level of Involvement In Marketing		
Low	% of Respondents	41.57%
Medium	% of Respondents	28.09%
High	% of Respondents	30.34%
2. IRRIGATION PRACTICES		
a. Method of Soil Moisture Monitoring		
Visual (Visual Judgement / Physical Inspection)	% of Respondents	52.78%
Tensiometers	% of Respondents	47.22%
Enviroscan / Capacitance Probe	% of Respondents	44.44%
Gypsum Block (e.g. G-DOT)	% of Respondents	
b. Tensiometers, Enviroscan or Gypsum block		**91.66%**
Fixed Interval Scheduling	% of Respondents	11.11%
Other	% of Respondents	8.33%
None	% of Respondents	
c. Soil Moisture Monitoring Frequency - High Demand Periods		
Two or More Times Per Day	% of Respondents	10.81%
Daily	% of Respondents	35.14%
Daily or More Frequently that Daily		45.95%
Every 2 Days	% of Respondents	10.81%
Twice Weekly	% of Respondents	13.51%
Weekly	% of Respondents	16.22%
Less Frequently Than Weekly	% of Respondents	5.41%
Automatic / Computerised System	% of Respondents	
Other (Specify)	% of Respondents	13.51%
d. Irrigation Frequency in High Demand Period		
Two or More Times Per Day	% of Respondents	22.58%
Daily	% of Respondents	11.83%
Daily or More Frequently that Daily		34.41%
Every 2 Days	% of Respondents	33.33%
Every 2 Days or More Frequently that Daily		67.74%
Twice Weekly	% of Respondents	8.60%
Weekly	% of Respondents	15.05%
Less Frequently Than Weekly	% of Respondents	7.53%
Automatic / Computerised System	% of Respondents	1.08%
Other (Specify)	% of Respondents	
3. FERTILIZER AND NUTRITION		
a. Frequency of Soil Analysis		

	MEASURE	TOTAL BM GROUP
Twice Per Year (or more frequently)	% of Respondents	8.24%
Yearly	% of Respondents	60.00%
Yearly or More Often		68.24%
Less Frequently Than Yearly	% of Respondents	31.76%
b. Frequency of Leaf TISSUE Analysis		
Twice Per Year (or more frequently)	% of Respondents	32.58%
Yearly	% of Respondents	49.44%
Yearly or More Often		82.02%
Less Frequently Than Yearly	% of Respondents	17.98%
c. Frequency of Leaf SAP Analysis		
Twice Per Year (or more frequently)	% of Respondents	60.00%
Yearly	% of Respondents	40.00%
Less Frequently Than Yearly	% of Respondents	
d. Fertilizer Application Method (% of Total Application)		
Foliar	% of Respondents	4.30%
Solid	% of Respondents	38.71%
Fertigation	% of Respondents	52.57%
e. Use of External Advisor for Nutrition		**0.5699**
Use Paid External Agronomist for Nutrition Program Decisions (Paid)	% of Respondents	
Use Supplier Staff (Not Paid) for Nutrition Program decisions - as part of their service (Not Paid)	% of Respondents	45.00%
Use Government Agricultural Dept. Staff (Not Paid)	% of Respondents	37.50%
Use External Source of Advice for Decision Making		82.50%
Internal decision, following published guidelines (e.g. Avoman, Agrilink, Best Practice Resources)	% of Respondents	
Internal decision, based on experience / neighbours / friends / experience	% of Respondents	17.50%
3. PEST AND DISEASE MANAGEMENT		
a. Use of External Advice for Pest Management Decisions		
Use Paid External Agronomist for Pest Management Decisions (Paid)	% of Respondents	30.77%
Use Supplier Staff (Not Paid) for Pest Management decisions - as part of their service (Not Paid)	% of Respondents	15.38%
Use Government Agricultural Dept. Staff (Not Paid)	% of Respondents	5.13%
Use External Source of Advice for Decision Making		51.28%
Internal decision, following published guidelines (e.g. Avoman, Agrilink, Best Practice Resources)	% of Respondents	5.13%
Internal decision, based on experience / neighbours / friends / experience	% of Respondents	43.59%
b. Number of Anthracnose Orchard Sprays Applied		
None	% of Respondents	26.32%
1 to 5 per Year	% of Respondents	18.42%
6 to 10 per Year	% of Respondents	36.84%
More Than 10 per Year	% of Respondents	18.42%
6 Per Year or More Frequently		55.26%
4. DRAINAGE, MOUNDING, MULCH AND PHYTOPHTHORA MANAGEMENT		
a. Mounding of Trees (Building up root zone above normal ground level)		
No trees are Mounded at Planting	% of Respondents	35.90%
Some Trees are Mounded at Planting	% of Respondents	10.26%
Majority of Trees are Mounded at Planting	% of Respondents	

	MEASURE	TOTAL BM GROUP
All Trees are Mounded at Planting	% of Respondents	53.84%
b. How Often is Mulch Applied to Trees		
More Than Twice Yearly	% of Respondents	2.56%
Twice Yearly	% of Respondents	5.13%
Once Per Year	% of Respondents	38.46%
At Least Once per Year		46.15%
Less Often Than Once per Year	% of Respondents	20.51%
Slash / Rake existing clippings / leaves / debris into root zone only	% of Respondents	28.21%
Not done - none of the Above	% of Respondents	5.13%
c. Specific Drainage Works Installed In Orchard		
Not Applicable	% of Respondents	43.59%
Not to Date, may do so in the future	% of Respondents	23.08%
Yes in wet areas	% of Respondents	33.33%
d. Basis For Phytophthora / Root Rot Treatment Strategy		
Based on recommendations from Phos. Acid Analysis of root samples	% of Respondents	32.50%
Based on external consultant advice (Paid advisor)	% of Respondents	10.00%
Based on supplier or reseller representative advice (Not paid)	% of Respondents	7.50%
Based on Government Ag. Dept. Staff advice (Not Paid)	% of Respondents	
Use External Source of Advice for Decision Making		50.00%
Internal decision, following published guidelines (e.g. Avoman, Agrilink, Best Practice Resources)	% of Respondents	2.50%
Internal decision, based on experience / neighbours / friends / experience	% of Respondents	47.50%
e. Phytophthora Treatment Method		
Needle Injection (Phos. Acid)	% of Respondents	70.00%
Foliar Spray (Phos. Acid)	% of Respondents	55.00%
Metalaxyl (Ridomil)	% of Respondents	10.00%
Other	% of Respondents	7.50%
None - Don't Do it	% of Respondents	2.50%
f. Phytophthora Treatment Frequency		
More Than Twice Yearly	% of Respondents	17.50%
Twice Yearly	% of Respondents	45.00%
At Least Twice per Year		62.50%
Once Per Year	% of Respondents	32.50%
At least Once per Year		95.00%
Less Often Than Once per Year	% of Respondents	2.50%
None - Don't Do it	% of Respondents	2.50%
5. CANOPY MANAGEMENT (ON MATURE TREES)		
a. Average Tree Density		
Less than 200 per ha	% of Respondents	55.00%
201 to 400 per Ha	% of Respondents	40.00%
More Than 400 per Ha	% of Respondents	5.00%
b. Canopy Management Methods		
No canopy Management (NIL)	% of Respondents	
Mechanical Hedging and / or Topping	% of Respondents	39.47%
Selective Limb Removal	% of Respondents	89.47%
Removal of Alternate Trees or Rows	% of Respondents	2.63%
Major Manual Canopy Reduction	% of Respondents	28.95%
Stag Horn	% of Respondents	15.79%
c. Frequency of Canopy Management		

	MEASURE	TOTAL BM GROUP
More Than Twice Yearly	% of Respondents	2.63%
Twice Yearly	% of Respondents	10.53%
Once Per Year	% of Respondents	73.68%
At Least Once per Year		86.84%
Less Often Than Once per Year	% of Respondents	13.16%
d. % of Orchard Pruned Per Year (Average at that Frequency)d		
100% Each Year	% of Respondents	34.21%
Between 50% & 99% Each Year	% of Respondents	18.42%
Between 25% & 49% Each year	% of Respondents	13.16%
Between 11% & 24% Each Year	% of Respondents	15.79%
10% or Less Per Year	% of Respondents	18.42%
6. PACKING STRATEGY		
Pack Own Fruit	% of Produce	47.53%
Use Contract Packing House	% of Produce	52.47%

3.2 Differences Between Producing Regions

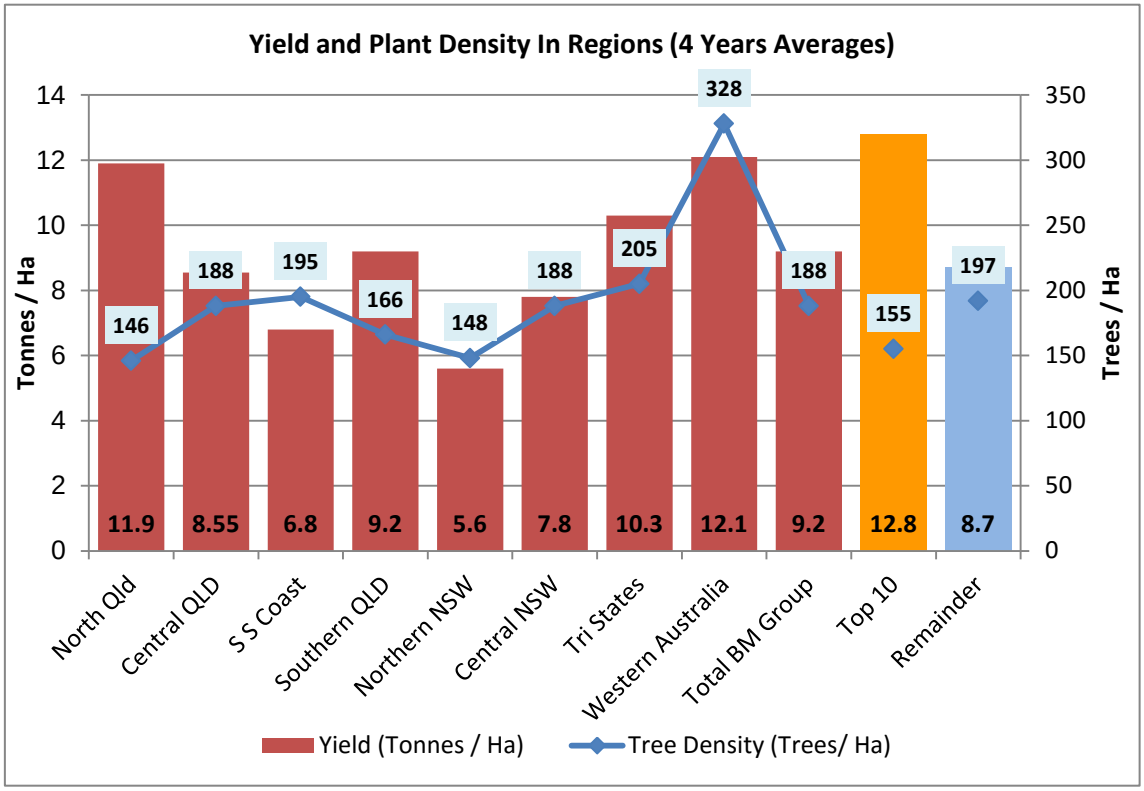
3.2.1 YIELD (AND AVERAGE PLANT DENSITY) IN REGIONS

A summary outline of the average yields (4 years) achieved, in each of the eight regions and the average plant density reported in each region, is provided in Figure 20.

Summary observations on this data are:

1. **Highest Yielding Regions:** Western Australia (12.1 t/ha) and North Queensland (11.9 t/ha) have recorded the highest average annual yield, despite the marked difference in plant density between the regions (W.A, 328 trees / ha, N.Q. 146 trees / ha);
2. **Lowest Yielding Regions**: Northern New South Wales (5.6 t / ha and 148 trees / ha) and the Sunshine Coast (6.8 t / ha and 195 trees / ha) have recorded the lowest average yields (4 years);
3. **The total benchmarking group**: averaged 9.2 t/ ha with an average 188 trees / ha (4 years), the Top 10 (12.8 t / ha, 155 trees / ha) achieved 47% higher yield than the Remainder (8.7 t / ha and 197 trees / ha).

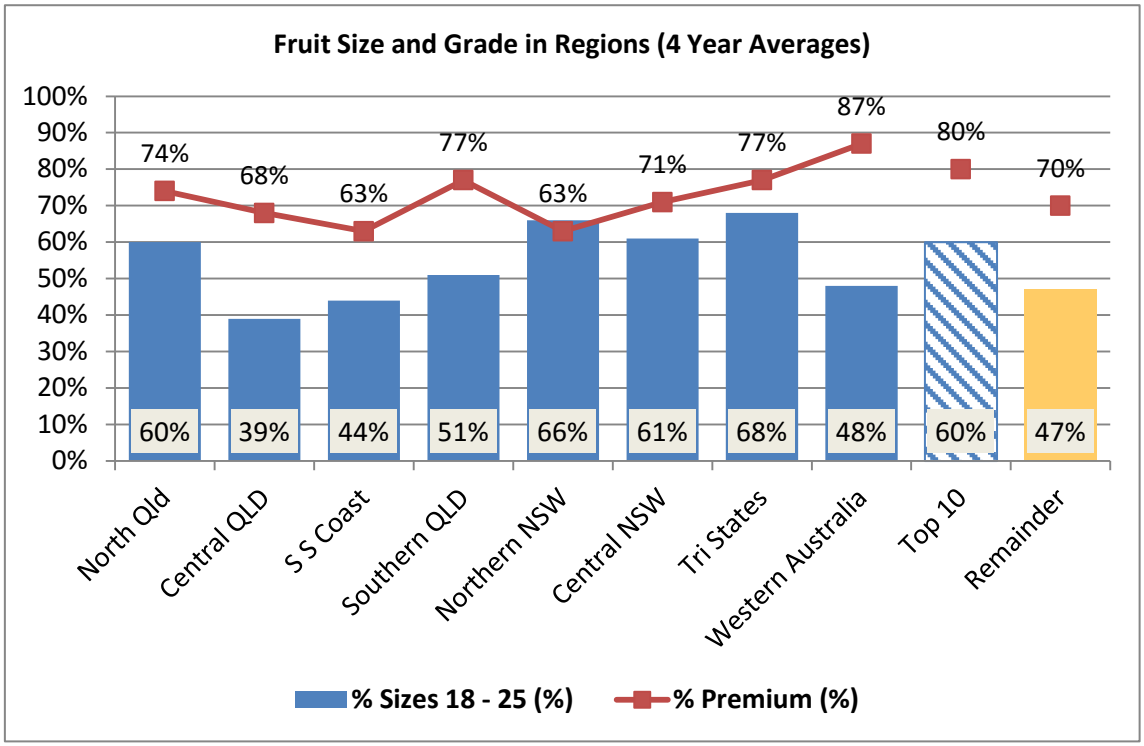
Figure 20: Yield per Hectare and Plant Density in Regions



3.2.2 FRUIT GRADE AND SIZE IN REGIONS

The four-year average results for percentage mid-sized fruit (18-25) and percentage Premium Grade are included in Figure 21.

Figure 21: Pack Out to Premium and Pack Out to Mid-Sized Fruit in Regions



Summary observations are:

PACK OUT TO PREMIUM

1. Western Australia (87%) and Southern Queensland (77%) growers achieved the highest pack out to premium;

2. Sunshine Coast (63) and Northern New South Wales (63%) achieved the lowest pack out to premium;

PACK OUT TO MID-SIZED FRUIT

1. Tri States (68%) and North Queensland (60%) growers achieved the highest pack out to mid-sized fruit;

2. Central Queensland (39%) and Sunshine Coast (44%) growers achieved the lowest pack out to mid-sized fruit, with Western Australia also sub 50% (48%).

OBSERVATION - FRUIT SIZE

Fruit size (pack out to midsized) appears to be one area that deserves careful attention as a means of improving the ability of industry to satisfy large supermarket customers and concurrently improve the profitability of growers

3.2.3 A COMPOSITE COMPARATIVE INDEX

One possible way to crystalise the differences between regions in the key output parameters may be to create a composite index that compares the eight regions on the three key measures (Yield, Pack Out to Mid-Sized Fruit and pack Out to Premium Grade.

In Table 9 the score each region achieved in pack out into mid-sized fruit and in pack out to premium grade has been converted to a score out of 10. These two values are added to the yield in tonnes per hectare to create the Composite Comparative Performance Index .

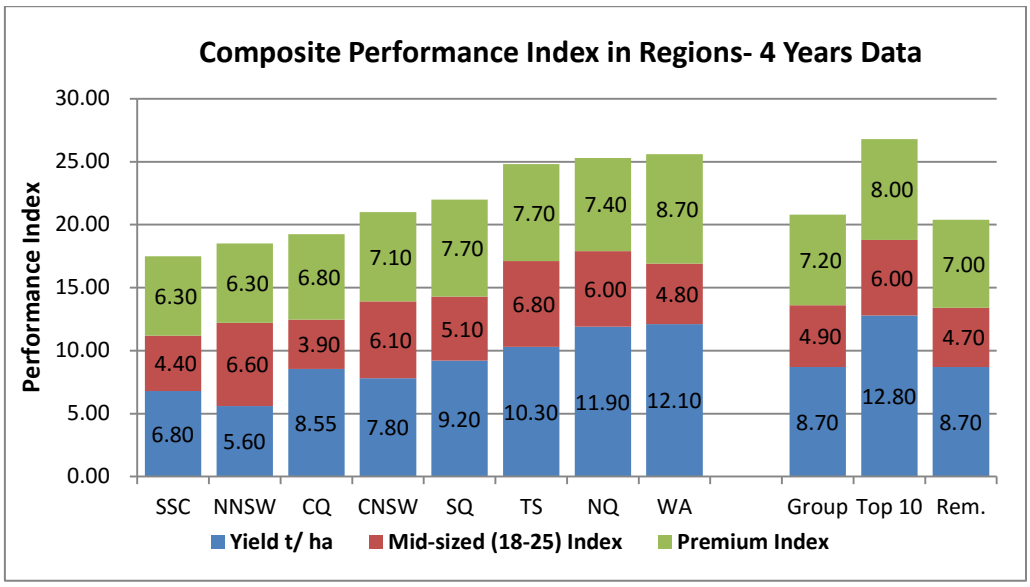
Table 9: Composite Comparative Performance Index in Regions

Region	Composite Comparative Performance Index (Declining Order)
Western Australia	25.60
North QLD	25.30
Tri States	24.80
Southern QLD	22.00
Central NSW	21.00
Central QLD	19.25
Northern NSW	18.50
Sunshine Coast	17.50
Total Group	**20.80**
Top 10	**26.80**
Remainder	**20.40**

Using this index as the comparative performance measure, participants in Western Australia, North Queensland and Tri States have achieved the highest composite output ranking over the four years.

Participants in the Sunshine Coast and in Northern NSW appear to be having the greatest difficulty achieving good (non-financial) performance outcomes. The resulting rankings are shown in Figure 22.

Figure 22: Relative Performance of Growing Regions



3.2.4 COSTS, REVENUE AND PROFIT (EBITDA) IN REGIONS

The average total operating costs and profits (EBITDA) for participants in each region is provided in Figure 23 and Figure 24.

Figure 23: Operating Costs and Profit (EBITDA) / Hectare in Regions

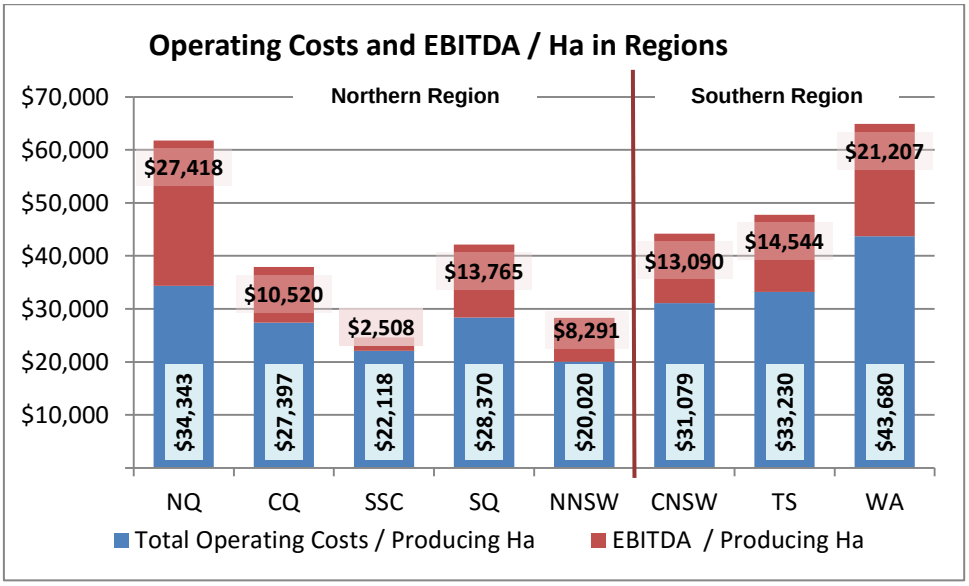
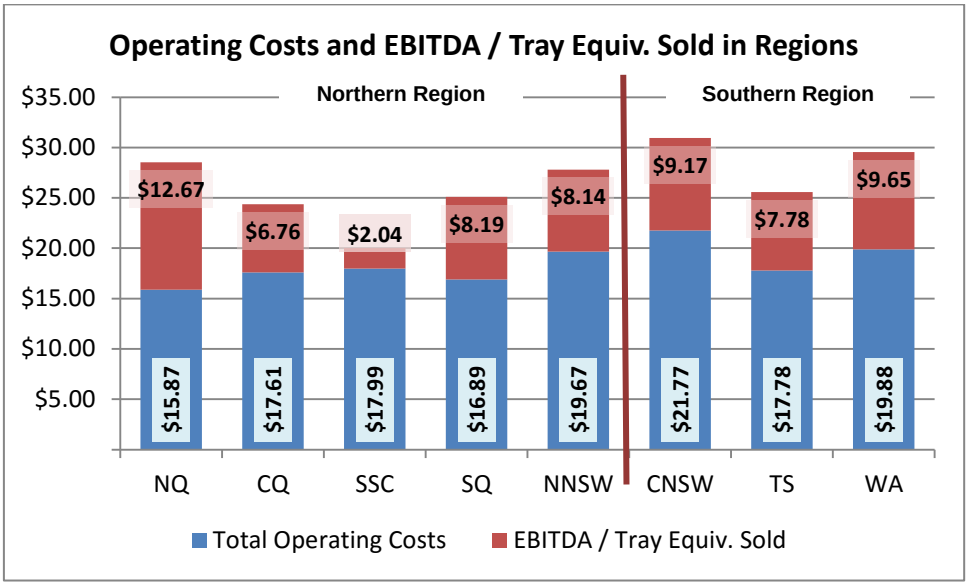


Figure 24: Operating Costs and Profits (EBITDA) / Tray Equiv. Sold in Regions



SUMMARY OBSERVATIONS ARE:

1. Average operating costs for Sunshine Coast and Northern New South Wales participants are the lowest of any region, the two regions that have demonstrated the lowest scores on key outputs as in Section Table 9;

2. Central Queensland and Southern Queensland participants have also demonstrated low input costs per producing hectare.

   Central Queensland participants are also low in the rankings for key outputs and concurrently the third and fifth lowest in average input costs per hectare.

Southern Queensland however has demonstrated better outcomes in:

a. Average yield per hectare;

b. Average % packed to min-size; and

c. Average percentage packed to Premium Grade;

3. Southern regions (CNSW, TS and WA) demonstrate higher costs of inputs per hectare, however all three regions have demonstrated sound achievements in key output parameters (yield, mid-size % and premium %);

   Higher input costs in southern states have resulted in sound average scores in output parameters; where as participants in the Northern Region with low input costs (Northern New South Wales, Sunshine Coast and Central Queensland) may have improved performance with higher investment in the crop.

Detailed information on the differences between regions is in Table 10.

Table 10: Detailed Information on Differences Between Regions

		NQ	CQ	SSC	SQ	NNSW	CNSW	TS	WA
Total Kgs Harvested / Producing Tree	Kg / Tree	81.48	45.56	34.63	55.71	37.89	41.70	50.12	36.74
Total 5.5 KG Trays Equivalent Harvested / Producing Tree	Trays / Tree	14.81	8.28	6.30	10.13	6.89	7.58	9.11	6.68
Total KGS Harvested per Producing Hectare	Kgs / Ha	11,905.21	8,555.68	6,762.75	9,238.32	5,598.96	7,851.51	10,278.25	12,081.73
Total 5.5 KG Trays (Equivalent) Harvested per Producing Hectare	Trays / Ha	2,164.58	1,555.58	1,229.59	1,679.69	1,017.99	1,427.55	1,868.77	2,196.68
% of Fruit Sold as Mid-Sized (Size Counts 18 to 25)	%	59.74%	39.14%	43.63%	51.35%	66.36%	61.01%	67.65%	55.26%
% of Packed Fruit Sold as Premium Grade %	%	73.50%	67.96%	63.33%	77.41%	62.66%	71.44%	76.53%	87.09%
Tonnes Produced and Sold Per FTE per Annum	Tonnes / FTE	51.91	59.80	43.31	47.25	47.78	44.36	43.69	50.59
Per Producing Hectare									
Total Sales Revenue	$ / Producing Ha	$61,761	$37,917	$24,625	$42,135	$28,310	$44,168	$47,774	$64,888
Employment / Labour Costs	$ / Producing Ha	$10,576	$6,866	$7,092	$8,878	$5,323	$8,083	$10,700	$10,992
Marketing & Ripening Costs	$ / Producing Ha	$5,410	$3,814	$2,019	$3,307	$1,937	$3,159	$3,710	$5,814
Freight Costs	$ / Producing Ha	$3,647	$2,359	$1,725	$2,192	$1,224	$2,875	$2,972	$3,364
Packaging and Pallet Costs	$ / Producing Ha	$3,289	$2,261	$1,933	$3,025	$1,973	$2,201	$2,871	$3,088
Chemical and Fertiliser Costs	$ / Producing Ha	$2,753	$2,813	$2,262	$2,362	$1,922	$2,912	$2,644	$3,755
Repairs & Replacements	$ / Producing Ha	$2,092	$1,171	$1,469	$1,415	$1,009	$2,691	$1,676	$2,038
Rates Levies, Licenses, Memberships, Registrations	$ / Producing Ha	$1,223	$622	$738	$916	$580	$786	$1,135	$1,049
Power & Gas Costs	$ / Producing Ha	$926	$426	$261	$503	$220	$626	$871	$845
General Expenses	$ / Producing Ha	$908	$2,139	$1,137	$1,863	$977	$2,205	$1,703	$3,224
Contract Packing Fees	$ / Producing Ha	$908	$3,052	$2,218	$1,397	$3,194	$3,252	$1,281	$6,195
Fuel & Oil Costs	$ / Producing Ha	$651	$658	$432	$689	$538	$706	$372	$652
Water Costs	$ / Producing Ha	$399	$368	$37	$270	$18	$17	$614	$11
Insurance Costs	$ / Producing Ha	$233	$167	$314	$871	$208	$422	$440	$688
Consultants And Contractor Fees	$ / Producing Ha	$216	$286	$168	$228	$171	$450	$1,094	$1,214

		NQ	CQ	SSC	SQ	NNSW	CNSW	TS	WA
Motor Vehicles	$ / Producing Ha	$102	$60	$218	$159	$194	$439	$253	$255
Royalties & PVR Costs	$ / Producing Ha	$9							
Total Operating Costs (Excluding Interest and Depreciation)	$ / Producing Ha	$34,343	$27,397	$22,118	$28,370	$20,020	$31,079	$33,230	$43,680
EBITDA PER PPRODUCING HECTARE	$ / Producing Ha	$27,418	$10,520	$2,508	$13,765	$8,291	$13,090	$14,544	$21,207
Per Tray Equiv. Sold									
Total Sales Revenue	$ / Tray Sold	$28.53	$24.37	$20.03	$25.09	$27.81	$30.94	$25.56	$29.54
Total Labour and Contracting / Consulting Costs	$ / Tray Sold	$5.40	$6.56	$7.71	$6.25	$8.54	$8.26	$7.00	$8.38
Marketing and Ripening Costs	$ / Tray Sold	$2.50	$2.45	$1.64	$1.97	$1.90	$2.21	$1.99	$2.65
Freight Costs	$ / Tray Sold	$1.69	$1.52	$1.40	$1.31	$1.20	$2.01	$1.59	$1.53
Packaging Costs	$ / Tray Sold	$1.52	$1.45	$1.57	$1.80	$1.94	$1.54	$1.54	$1.41
Chemical and Fertiliser Costs	$ / Tray Sold	$1.27	$1.81	$1.84	$1.41	$1.89	$2.04	$1.41	$1.71
Repairs & Replacements	$ / Tray Sold	$0.97	$0.75	$1.19	$0.84	$0.99	$1.89	$0.90	$0.93
General Expenses	$ / Tray Sold	$0.89	$1.59	$1.00	$1.29	$1.48	$1.72	$1.39	$1.69
Rates, Levies, Licenses, Memberships, Registrations	$ / Tray Sold	$0.57	$0.40	$0.60	$0.55	$0.57	$0.55	$0.61	$0.48
Power and Gas Costs	$ / Tray Sold	$0.43	$0.27	$0.21	$0.30	$0.22	$0.44	$0.47	$0.38
Fuel & Oil Costs	$ / Tray Sold	$0.30	$0.42	$0.35	$0.41	$0.53	$0.49	$0.20	$0.30
Water Costs	$ / Tray Sold	$0.18	$0.24	$0.03	$0.16	$0.02	$0.01	$0.33	$0.00
Insurance Costs	$ / Tray Sold	$0.11	$0.11	$0.26	$0.52	$0.20	$0.30	$0.24	$0.31
Motor Vehicles	$ / Tray Sold	$0.05	$0.04	$0.18	$0.09	$0.19	$0.31	$0.14	$0.12
Royalties & PVR Costs	$ / Tray Sold	$0.00							
Total Operating Costs (Excluding Interest and Depreciation)	$ / Tray Sold	$15.87	$17.61	$17.99	$16.89	$19.67	$21.77	$17.78	$19.88
EBITDA PER TRAY SOLD	$ / Tray Sold	$12.67	$6.76	$2.04	$8.19	$8.14	$9.17	$7.78	$9.65

3.2.5 MANAGEMENT PRACTICES IN REGIONS

The average responses to the survey on management practices, for this group of 21 queries is summarised in Table 11. The proportion of participants in each region that gave positive responses to each query is the represented as a percentage of all participants in that region.

The 21 practice areas, or queries, are presented in five (5) groups or categories, being:

1. Irrigation Management Practices;
2. Fertilizer and Nutrition Management Practices;
3. Pest and Disease Management Practices;
4. Drainage and Phytophthora Treatment Management Practices;
5. Canopy Management Practices.

Table 11: Key Management Practices & Composite Performance Index in Regions

		Northern Zone					Southern Zone		
	Measure	NQ	CQ	SSC	SQ	NNSW	CNSW	TS	WA
Composite Performance Index (See Section 6.2.7)	Index of Yield, Mid-Size & Grade	25.3	19.25	17.5	22	18.5	21	24.8	25.6
1. IRRIGATION PRACTICES									
Use of Tensiometers, Enviroscan or Gypsum block (More than one response possible) (1)	% of Respondents	150%	233%	150%	113%	86%	133%	150%	113%
Monitor Soil Moisture Levels Daily or More Frequently than Daily	% of Respondents	33%	0%	0%	25%	57%	56%	78%	100%
Irrigate at least Daily In High Demand Periods	% of Respondents	46%	0%	0%	71%	43%	71%	67%	75%
Irrigate at least Every 2 Days in High Demand Periods	% of Respondents	85%	56%	50%	86%	57%	71%	78%	75%
2. FERTILIZER AND NUTRITION									
Use Soil Analysis Yearly or More Often	% of Respondents	92%	100%	100%	63%	71%	78%	67%	14%
Use Leaf Tissue Analysis Yearly or More Often	% of Respondents	85%	89%	100%	88%	86%	88%	43%	71%
Use Leaf Sap Analysis Yearly or More Often							100%	100%	100%
Use Fertigation as Primary Nutrition Delivery System	% of Respondents	77%	78%	67%	50%		44%	100%	25%
Use External Source of Advice for Nutrition Decisions	% of Respondents	57%	50%	100%	86%	71%	25%	78%	50%
3. PEST AND DISEASE MANAGEMENT									
Use External Source of Advice for Pest Management Decisions	% of Respondents	17%	0%	0%	25%	43%	13%	13%	0%
Use at least 6 Anthracnose Treatments per Year	% of Respondents	100%	100%	33%	50%	71%	63%	22%	0%
4. DRAINAGE, MOUNDING, MULCH AND PHYTOPHTHORA MANAGEMENT									
Apply Mulch At Least Once per Year	% of Respondents	100%	0%	0%	38%	57%	44%	0%	13%
Install Specific Drainage Works in Wet Areas	% of Respondents	50%	100%	33%			44%	22%	13%
Use External Source of Advice for Photophthora Treatment Decisions	% of Respondents	67%	33%	0%	63%	43%	33%	75%	29%
Use Needle Injection For Phytophthora Treatment (1)	% of Respondents	67%	67%	100%	88%	100%	50%	44%	57%

		Northern Zone					Southern Zone		
	Measure	NQ	CQ	SSC	SQ	NNSW	CNSW	TS	WA
Composite Performance Index (See Section 6.2.7)	Index of Yield, Mid-Size & Grade	25.3	19.25	17.5	22	18.5	21	24.8	25.6
Use Foliar Spray For Phyophthora Treatment (1)	% of Respondents	67%	33%	33%	50%	29%	88%	56%	29%
Use Metalaxyl For Phyophthora Treatment (1)	% of Respondents		33%	33%	13%	29%	38%		14%
Treat for Phytophthora at Least Twice per Year	% of Respondents	100%	67%	0%	38%	71%	71%	33%	57%
Treat for Phytophthora at least Once per Year	% of Respondents	100%	67%	67%	100%	100%	100%	78%	71%
5. CANOPY MANAGEMENT (ON MATURE TREES)									
Use Some Form of Manual Canopy Management Annually (1)	% of Respondents	100%	167%	167%	100%	129%	111%	150%	129%
Undertake Manual Canopy management at Least Once per Year	% of Respondents	100%	100%	100%	100%	86%	100%	57%	57%
Undertake Manual Canopy Management on 100% of Orchard Annually	% of Respondents	83%	67%		50%	29%		25%	14%

(1) = More than one response possible for these survey questions.

3.2.6 WHAT CAN WE LEARN – DIFFERENCES BETWEEN REGIONS

(For reference Table 9 is repeated here as Table 12).

Table 12: Composite Comparative Performance Index in Regions (Repeated)

Region	Composite Comparative Performance Index
Western Australia	25.60
North QLD	25.30
Tri States	24.80
Southern QLD	22.00
Central NSW	21.00
Central QLD	19.25
Northern NSW	18.50
Sunshine Coast	17.50
Total Group	**20.80**
Top 10	**26.80**
Remainder	**20.40**

The rankings in Table 12 are not based on any scientific basis, rather they are a practical way to rank the relative average crop performance of participant businesses in terms of average physical (non-financial) outputs from avocado crops grown in different regions.

The ranking of growing regions by average financial outcomes achieved (EBITDA) is presented in Section 3.2.4. Both the key financial and key non-financial performance rankings are combined and presented in Table 13.

NOTES:

1. The information appears to demonstrate a clear pattern of increasing performance in regions with increasing investment by participant businesses in Operating Costs per Hectare;
2. That pattern of increasing performance appears consistent across:
    a. Physical (non-financial) performance parameters (an index compiled around yield, grade and pack out to mid-sized fruit);
    b. Financial performance as measured by EBITDA per producing hectare; and
    c. Financial performance as measured by EBITDA per 5.5 Kg tray equivalent sold;
3. It suggest that, regarding the five (5) management practices areas listed and ranked by region, the uptake of potentially beneficial management practices is higher in participant businesses in regions with higher average orchard performance.

Table 13: Comparative Data for Regions Ranked by Performance & in Zones

	Northern Regions						Southern Regions		
	Measure	NQ	SQ	CQ	NNSW	SSC	WA	TS	CNSW
Composite Comparison Performance Index (See Section 6.2.7)	Index of Yield, Mid-Size & Grade	25.3	22	19.25	18.5	17.5	25.6	24.8	21
Average EBITDA / Tray Equiv. Sold	$ / Tray Equiv.	$12.67	$8.19	$6.76	$8.14	$2.04	$9.65	$7.78	$9.17
Average EBITDA / Producing Ha	$ / Producing Ha	$27,418	$13,765	$10,520	$8,291	2,508	$21,207	$14,544	$13,090
Average Operating Cost per Producing Hectare	$ / Producing Ha	$34,343	$28,370	$27,397	$20,020	$22,118	$43,680	$33,230	$31,079
Irrigation Management Practices	Rank	4	5	6	7	8	2	1	3
Fertilizer and Nutrition Management Practices	Rank	3	6	2	5	1	8	4	7
Pest and Disease Management Practices	Rank	1	5	3	2	7	8	6	4
Drainage, Mulching & Phytophthora Management Practices	Rank	1	4	5	2	8	7	6	3
Canopy Management Practices	Rank	4	5	2	6	1	8	7	3

3.3 Top 10 - Performance and Practices

3.3.1 TOP 10 AND REMAINDER

The Top 10 group is defined as:

The participant businesses that achieved the ten highest results over four years for Average EBITDA (Cash Profit) per 5.5 kg tray equivalent sold.

In the absence of any national or international data sets for 'best practice' performance in this type of business, the Top 10 is used herein as a default 'Best Practice' group. The Top 10 data set has been compared to the data set for the Remainder to facilitate Best Practice Benchmarking.

Some key differences between the two groups is provided in Table 14.

Table 14: Outputs, Costs and Profits for Top 10 Compared to Remainder

Measure / Parameter	Unit	REMAINDER (4 YEARS)	TOP 10 (4 YEARS)	*% DIFFERENCE (TOP 10 VS. REMAINDER)*
Yield per Producing Tree				
Total Kgs Harvested / Producing Tree	Kg / Tree	42.83	78.66	*84%*
Total 5.5 KG Trays Harvested / Producing Tree	Trays / Tree	7.79	14.30	*84%*
Yield per Producing Hectare				
Total KGS Harvested per Producing Hectare	Kgs / Ha	8,437.84	12,072.47	*43%*
Total 5.5 KG Trays Harvested per Producing Hectare	Trays / Ha	1,534.15	2,194.99	*43%*
Pack-Out to Market Preferred Sizes and Grade				
% of Fruit Sold as Mid-Sized (Size Counts 18 to 25)	%	48%	55%	*16%*
% of Packed Fruit Sold as Premium Grade %	%	70%	75%	*7%*
Costs and Returns Per Producing Hectare				
Total Sales Revenue	$ / Prod. Ha	$39,223.31	$63,759.25	*63%*
Total Operating Costs per Producing Hectare	$ / Prod. Ha	$29,009.48	$33,595.71	*16%*
EBITDA (Profit Before Interest, Depreciation and ROI)	$ / Prod. Ha	$10,213.83	$30,163.54	*195%*
Costs and Returns per 5.5 Kg Tray Equivalent Sold				
Total Sales Revenue	$ / Tray Sold	$25.57	$29.09	*14%*
Total Operating Costs per Tray Equivalent Sold	$ / Tray Sold	$18.91	$15.34	*-19%*
EBITDA (Profit Before Interest, Depreciation and ROI)	$ / Tray Sold	$6.66	$13.74	*106%*

3.3.2 KEY COMPARISONS BETWEEN TOP 10 AND REMAINDER

1. The Top 10 achieved 84% higher average yield per tree and 43% average yield per hectare than the remaining participants

2. The percentage of fruit packed to mid-sized (18-25) was 16% higher for the Top 10 and the Top 10 pack-out to premium grade was 7% higher.

3. These outputs were achieved with significantly less cost per producing hectare (-16%) and per 5.5 Kg tray equivalent sold (-19%).

4. The increased prices (gross revenue) achieved by the Top10 is likely to have been assisted by the improved pack-out performance as well as the marked increase in average yield achieved by Top 10 businesses.

Further detail regarding the costs, revenue and profits of these two groups are outlined in Table 15.

Table 15: Costs, Revenue and Profits Detail – Top 10 Compared to Remainder

Measure / Parameter	Unit	REMAINDER (4 YEARS)	TOP 10 (4 YEARS)	*% DIFFERENCE (TOP 10 VS. REMAINDER)*
Total Sales Revenue	$ / Prod. Ha	$39,223.31	$63,759.25	*63%*
Employment / Labour Costs	$ / Prod. Ha	$8,001.88	$9,397.79	*17%*
Marketing & Ripening Costs	$ / Prod. Ha	$3,566.62	$5,823.42	*63%*
Freight Costs	$ / Prod. Ha	$2,413.98	$3,409.60	*41%*
Packaging and Pallet Costs	$ / Prod. Ha	$2,328.88	$3,324.63	*43%*
Chemical and Fertiliser Costs	$ / Prod. Ha	$2,882.48	$2,441.12	*-15%*
Contract Packing Fees	$ / Prod. Ha	$2,873.40	$1,925.15	*-33%*
Repairs & Replacements	$ / Prod. Ha	$1,494.88	$1,707.07	*14%*
General Expenses	$ / Prod. Ha	$1,110.73	$439.27	*-60%*
Rates Levies, Licenses, Memberships, Registrations	$ / Prod. Ha	$703.78	$1,192.40	*69%*
Finance Costs	$ / Prod. Ha	$784.21	$994.08	*27%*
Power & Gas Costs	$ / Prod. Ha	$501.08	$804.54	*61%*
Fuel & Oil Costs	$ / Prod. Ha	$644.49	$659.84	*2%*
Consultants And Contractor Fees	$ / Prod. Ha	$326.43	$473.64	*45%*
Depreciation and Amortisation Costs	$ / Prod. Ha	$631.95	$338.08	*-47%*
Water Costs	$ / Prod. Ha	$287.04	$325.05	*13%*
Insurance Costs	$ / Prod. Ha	$304.02	$269.36	*-11%*
Motor Vehicles	$ / Prod. Ha	$151.53	$70.69	*-53%*
Royalties & PVR Costs	$ / Prod. Ha	$2.09		*-100%*
Total Operating Costs per Producing Hectare	$ / Prod. Ha	$29,009.48	$33,595.71	*16%*
EBITDA (Profit Before Interest, Depreciation and ROI	$ / Prod. Ha	$10,213.83	$30,163.54	*195%*
Costs and Returns per 5.5 Kg Tray Equivalent Sold				
Total Sales Revenue	$ / Tray Sold	$25.57	$29.09	*14%*
Total Labour and Contracting / Consulting Costs	$ / Tray Sold	$7.30	$5.37	*-26%*
Marketing and Ripening Costs	$ / Tray Sold	$2.32	$2.65	*14%*
Freight Costs	$ / Tray Sold	$1.57	$1.55	*-1%*
Packaging Costs	$ / Tray Sold	$1.52	$1.51	*0%*
Chemical and Fertiliser Costs	$ / Tray Sold	$1.88	$1.11	*-41%*
Repairs & Replacements	$ / Tray Sold	$0.97	$0.78	*-20%*
General Expenses	$ / Tray Sold	$1.43	$0.63	*-56%*
Rates, Levies, Licenses, Memberships, Registrations	$ / Tray Sold	$0.46	$0.54	*18%*
Power and Gas Costs	$ / Tray Sold	$0.33	$0.37	*12%*
Fuel & Oil Costs	$ / Tray Sold	$0.42	$0.30	*-28%*
Consultants And Contractor Fees	$ / Tray Sold	$0.21	$0.22	*1%*
Water Costs	$ / Tray Sold	$0.19	$0.15	*-21%*
Insurance Costs	$ / Tray Sold	$0.20	$0.12	*-38%*
Motor Vehicles	$ / Tray Sold	$0.10	$0.03	*-67%*
Total Operating Costs per Tray Equivalent Sold		$18.91	$15.34	*-19%*
EBITDA (Profit Before Interest, Depreciation and ROI	$ / Tray Sold	$6.66	$13.74	*106%*

3.3.3 MANAGEMENT PRACTICES – TOP 10 AND REMAINDER

Using the 'Composite Comparative Index' developed and outlined in an earlier section the Top 10 have demonstrated a 32% relative improvement in key output measures compared to the Remainder, as in Table 16.

Table 16 contains a selected sub set of the management practices that appear to have the most potential to impact outputs and performance as observed in farm visits and discussions with industry participants, researchers and observers. This table relies on averaged data from four years of collected data. The 21 line items in the table are grouped in the five categories of:

1. Irrigation Practices;
2. Fertilizer and Nutrition Practices;
3. Pest and Disease Management Practices;
4. Drainage, Mounding, Mulching, and Phytophthora Management Practices; and
5. Canopy Management Practices

At the completion of each year of data collection a similar comparison of how the Top 20 do tasks on their farms and how the remainder do these tasks showed more pronounced differences between the management practices of these two groups.

The information in Table 16 appears to have 'smooothed' the differences between the responses of the two groups, when compared to the annual comparisons undertaken during the course of the program. This is perhaps understandable given the stark differences in outcomes that were achieved in some years in most of the regions.

Table 16: Selected Key Management Practices by Top 10 and Remainder

	MEASURE	Remainder	Top 10	% Difference Top 10 V. Rem.
Composite Performance Index (See Section 6.2.7)	Index of Yield, Mid-Size & Grade	20.24	26.8	32%
1. IRRIGATION PRACTICES				
Use Tensiometers, Enviroscan or Gypsum block	% of Respondents	77.78%	133.34%	71%
Monitor Soil Moisture Daily or More Frequently	% of Respondents	46.43%	44.44%	-4%
Irrigate at Least Daily in High Demand Periods	% of Respondents	33.33%	40.00%	20%
Irrigate at Least Every 2 Days in High Demand Periods	% of Respondents	64.11%	86.66%	35%
2. FERTILIZER AND NUTRITION				
Use Soil Tests Yearly or More Often	% of Respondents	64.79%	85.71%	32%
Use Leaf Tissue Tests Yearly or More Often	% of Respondents	81.08%	86.67%	7%
Use Fertigation as Primary Nutrition Delivery Method	% of Respondents	52.57%	80.00%	52%
Use External Source of Advice for Nutrition Decisions	% of Respondents	83.33%	80.00%	-4%
3. PEST AND DISEASE MANAGEMENT				
Use External Source of Advice for Pest Management Decisions	% of Respondents	50.01%	55.55%	11%
Use at Least 6 Anthracnose Treatments per Year	% of Respondents	51.72%	66.67%	29%
4. DRAINAGE, MOUNDING, MULCH AND PHYTOPHTHORA MANAGEMENT				
Apply Mulch at Least Once per Year	% of Respondents	40.00%	66.67%	67%
Install Specific Drainage Systems in wet areas	% of Respondents	30.00%	44.45%	48%
Use External Source of Advice for Phytophthora Treatment Decisions	% of Respondents	45.17%	66.67%	48%
Use Needle Injection for Phytophthora Treatment	% of Respondents	64.52%	88.89%	38%
Use Foliar Spray for Phytophthora Treatment	% of Respondents	48.39%	77.78%	61%
Use Metalaxyl (Ridomil) for Phytophthora Treatment	% of Respondents	12.90%		-100%
Treat for Phytophthora at Least Twice per Year	% of Respondents	58.06%	77.78%	34%
Treat for Phytophthora at least Once per Year	% of Respondents	93.54%	100.00%	7%
5. CANOPY MANAGEMENT (ON MATURE TREES)				
Undertake Some Form of Manual Canopy Management Annually	% of Respondents	137.92%	133.33%	-3%
Undertake Manual Canopy Management at Least Once per Year	% of Respondents	86.21%	88.89%	3%
Undertake Manual Canopy Management on 100% of Orchards Each Year	% of Respondents	27.59%	55.56%	101%

3.3.4 SUMMARY OBSERVATIONS: DIFFERENCES BETWEEN TOP 10 & REMAINDER

There appears to be significant differences in the proportion of Top 10 growers that have adopted the management activities as defined by the line items in Table 16,compared to the proportions of the Remainder, in each of the five key areas of management activity, being:

1. **Irrigation Management;**
2. **Fertilizer and Nutrition Management;**
3. **Pest and Disease Management;**
4. **Management of Phytophthora** (treatment, root zone management and other); and
5. **Canopy Management.**

One simplistic way of capturing this difference in management practices may be to:

1. Assume that all of the twenty three (21) management practices (line items) in Table 16 are practices that equally enhance the performance of producing avocado orchards; and
2. Extrapolate the average increase in the percentage of adoption of the practices in the five specific areas / disciplines, by the Top 10, compared to the Remainder.

Table 17 summarises the picture created by adopting this simplistic measure.

Table 17: Management Practices Outcomes In Five (5) Key Categories

Key Management Area / Discipline	Average % Increase in Adoption (by) Top 10 Growers V. Remainder
Irrigation Management	31%
Fertilizer and Nutrition Management	22%
Pest and Disease Management	20%
Phytophthora Management	49%
Canopy Management	34%
All 23 Individual Management Activities (1)	34%
% Packed as Mid-Sized (18-25)	*16%*
% Packed as Premium Grade	*7%*
Yield KGS / Ha	*43%*
Composite Comparative Performance Index (2)	*32%*

(1) The average percentage adoption as reported for all of the management activities / parameters (line items) in *Table 16, (2) Created as a composite performance index in Section 3.2.3.*

If it is as straight forward as this, then the Top 10 may be able to be described as having achieved 32% better crop performance and have a 34% higher uptake of key management practices that potentially enhance crop performance.

It may also be feasible to suggest that Top 10 growers have:

1. **49% better uptake of potentially beneficial Phytophthora Management Practices,;**
2. **34% higher uptake of potentially beneficial Canopy Management Practices;**
3. **31% higher uptake of potentially beneficial Irrigation Management Practices;**
4. **22% higher uptake of potentially beneficial Fertilizer and Nutrition Management Strategies; and**
5. **20% higher uptake of potentially beneficial Pest and Disease Management Practices.**

The listing of all of the parameters that were included in the management practices survey over four years, and the average adoption rates (%) for each of the Top 10 and the Remainder are in Table 18:

This is the information / record from which management practices responses information in Table 16 and Table 17 has been sourced.

Table 18: Management Practices of Top 10 and Remainder Over Four (4) Years

	MEASURE	REMAINDER (4 YEARS)	TOP 10 (4 Years)	VARIANCE TOP 10 V. REM.
1. MARKETING AND SALES				
a. Marketing Channel Used - % Sold				
Direct to Major Chains	% of Produce	38.68%	12.23%	-68.38%
Via Brokers	% of Produce	25.80%	61.08%	136.74%
Direct to Major Chains or Via Brokers		64.48%	73.31%	13.69%
Via Wholesalers	% of Produce	22.03%	16.50%	-25.10%
Through Pack House that Markets Fruit	% of Produce	11.60%	10.19%	-12.16%
Export	% of Produce	1.67%		-100.00%
Independent Greengrocers Directly	% of Produce			
Direct to Public (Including Farmers Markets)	% of Produce	0.22%		-100.00%
b. Growers' Level of Involvement In Marketing				
Low	% of Respondents	44.60%	26.67%	-40.20%
Medium	% of Respondents	24.32%	46.66%	91.86%
High	% of Respondents	31.08%	26.67%	-14.19%
2. IRRIGATION PRACTICES				
a. Method of Soil Moisture Monitoring				
Visual (Visual Judgement / Physical Inspection)	% of Respondents	55.56%	44.44%	-20.01%
Tensiometers	% of Respondents	37.04%	77.78%	109.99%
Enviroscan / Capacitance Probe	% of Respondents	40.74%	55.56%	36.38%
Gypsum Block (e.g. G-DOT)	% of Respondents			
Tensiometers, Enviroscan or Gypsum block		77.78%	133.34%	
Fixed Interval Scheduling	% of Respondents	14.81%		
Other	% of Respondents	11.11%		
None	% of Respondents			
b. Soil Moisture Monitoring Frequency - High Demand Periods				
Two or More Times Per Day	% of Respondents	3.57%	33.33%	833.61%
Daily	% of Respondents	42.86%	11.11%	-74.08%
Daily or More Frequently that Daily		46.43%	44.44%	-4.29%
Every 2 Days	% of Respondents	10.71%	11.11%	3.73%
Twice Weekly	% of Respondents	14.29%	11.11%	-22.25%
Weekly	% of Respondents	10.71%	33.33%	211.20%
Less Frequently Than Weekly	% of Respondents	7.14%		-100.00%
Automatic / Computerised System	% of Respondents			
Other (Specify)	% of Respondents	14.29%	11.11%	-22.25%
c. Irrigation Frequency in High Demand Period				
Two or More Times Per Day	% of Respondents	21.79%	26.67%	22.40%
Daily	% of Respondents	11.54%	13.33%	15.51%
Daily or More Frequently that Daily		33.33%	40.00%	20.01%
Every 2 Days	% of Respondents	30.78%	46.66%	51.59%
Every 2 Days or More Frequently that Daily		64.11%	86.66%	35.17%
Twice Weekly	% of Respondents	8.97%	6.67%	-25.64%
Weekly	% of Respondents	16.67%	6.67%	-59.99%
Less Frequently Than Weekly	% of Respondents	8.97%		-100.00%
Automatic / Computerised System	% of Respondents	1.28%		-100.00%

	MEASURE	REMAINDER (4 YEARS)	TOP 10 (4 Years)	VARIANCE TOP 10 V. REM.
Other (Specify)	% of Respondents			
3. FERTILIZER AND NUTRITION				
a. Frequency of Soil Analysis				
Twice Per Year (or more frequently)	% of Respondents	7.04%	14.29%	102.98%
Yearly	% of Respondents	57.75%	71.42%	23.67%
Yearly or More Often		64.79%	85.71%	32.29%
Less Frequently Than Yearly	% of Respondents	35.21%	14.29%	-59.41%
b. Frequency of Leaf TISSUE Analysis				
Twice Per Year (or more frequently)	% of Respondents	33.78%	26.67%	-21.05%
Yearly	% of Respondents	47.30%	60.00%	26.85%
Yearly or More Often		81.08%	86.67%	6.89%
Less Frequently Than Yearly	% of Respondents	18.92%	13.33%	-29.55%
c. Frequency of Leaf SAP Analysis				
Twice Per Year (or more frequently)	% of Respondents	66.67%	50.00%	-25.00%
Yearly	% of Respondents	33.33%	50.00%	50.02%
Less Frequently Than Yearly	% of Respondents			
d. Fertilizer Application Method (% of Total Application)				
Foliar	% of Respondents	2.56%	13.33%	420.70%
Solid	% of Respondents	44.87%	6.67%	-85.13%
Fertigation	% of Respondents	52.57%	80.00%	52.18%
e. Use of External Advisor for Nutrition				
Use Paid External Agronomist for Nutrition Program Decisions (Paid)	% of Respondents	46.66%	40.00%	-14.27%
Use Supplier Staff (Not Paid) for Nutrition Program decisions - as part of their service (Not Paid)	% of Respondents	36.67%	40.00%	9.08%
Use Government Agricultural Dept. Staff (Not Paid)	% of Respondents			
Use External Source of Advice for Decision Making		83.33%	80.00%	-4.00%
Internal decision, following published guidelines (e.g. Avoman, Agrilink, Best Practice Resources)	% of Respondents			
Internal decision, based on experience / neighbours / friends / experience	% of Respondents	16.67%	20.00%	19.98%
3. PEST AND DISEASE MANAGEMENT				
a. Use of External Advice for Pest Management Decisions				
Use Paid External Agronomist for Pest Management Decisions (Paid)	% of Respondents	26.67%	44.44%	66.63%
Use Supplier Staff (Not Paid) for Pest Management decisions - as part of their service (Not Paid)	% of Respondents	16.67%	11.11%	-33.35%
Use Government Agricultural Dept. Staff (Not Paid)	% of Respondents	6.67%		-100.00%
Use External Source of Advice for Decision Making		50.01%	55.55%	11.08%
Internal decision, following published guidelines (e.g. Avoman, Agrilink, Best Practice Resources)	% of Respondents	6.67%		-100.00%
Internal decision, based on experience / neighbours / friends / experience	% of Respondents	43.32%	44.45%	2.61%
b. Number of Anthracnose Orchard Sprays Applied				

	MEASURE	REMAINDER (4 YEARS)	TOP 10 (4 Years)	VARIANCE TOP 10 V. REM.
None	% of Respondents	27.59%	22.22%	-19.46%
1 to 5 per Year	% of Respondents	20.69%	11.11%	-46.30%
6 to 10 per Year	% of Respondents	41.38%	22.22%	-46.30%
More Than 10 per Year	% of Respondents	10.34%	44.45%	329.88%
6 Per Year or More Frequently		51.72%	66.67%	28.91%
4. DRAINAGE, MOUNDING, MULCH AND PHYTOPHTHORA MANAGEMENT				
a. Mounding of Trees (Building up root zone above normal ground level)				
No trees are Mounded at Planting	% of Respondents	33.33%	44.44%	33.33%
Some Trees are Mounded at Planting	% of Respondents	13.33%		-100.00%
Majority of Trees are Mounded at Planting	% of Respondents			
All Trees are Mounded at Planting	% of Respondents	53.34%	55.56%	4.16%
b. How Often is Mulch Applied to Trees				
More Than Twice Yearly	% of Respondents	3.33%		-100.00%
Twice Yearly	% of Respondents	6.67%		-100.00%
Once Per Year	% of Respondents	30.00%	66.67%	122.23%
At Least Once per Year		40.00%	66.67%	66.68%
Less Often Than Once per Year	% of Respondents	23.33%	11.11%	-52.38%
Slash / Rake existing clippings / leaves / debris into root zone only	% of Respondents	33.34%	11.11%	-66.68%
Not done - none of the Above	% of Respondents	3.33%	11.11%	233.63%
c. Specific Drainage Works Installed In Orchard				
Not Applicable	% of Respondents	46.67%	33.33%	-28.58%
Not to Date, may do so in the future	% of Respondents	23.33%	22.22%	-4.76%
Yes in wet areas	% of Respondents	30.00%	44.45%	48.17%
d. Basis For Phytophthora / Root Rot Treatment Strategy				
Based on recommendations from Phos. Acid Analysis of root samples	% of Respondents	25.81%	55.56%	115.27%
Based on external consultant advice (Paid advisor)	% of Respondents	9.68%	11.11%	14.77%
Based on supplier or reseller representative advice (Not paid)	% of Respondents	9.68%		-100.00%
Based on Government Ag. Dept. Staff advice (Not Paid)	% of Respondents			
Use External Source of Advice for Decision Making		45.17%	66.67%	47.60%
Internal decision, following published guidelines (e.g. Avoman, Agrilink, Best Practice Resources)	% of Respondents	3.23%		-100.00%
Internal decision, based on experience / neighbours / friends / experience	% of Respondents	51.60%	33.33%	-35.41%
e. Phytophthora Treatment Method				
Needle Injection (Phos. Acid)	% of Respondents	64.52%	88.89%	37.77%
Foliar Spray (Phos. Acid)	% of Respondents	48.39%	77.78%	60.74%
Metalaxyl (Ridomil)	% of Respondents	12.90%		-100.00%
Other	% of Respondents	9.68%		-100.00%
None - Don't Do it	% of Respondents	3.23%		-100.00%
f. Phytophthora Treatment Frequency				
More Than Twice Yearly	% of Respondents	16.13%	22.22%	37.76%

	MEASURE	REMAINDER (4 YEARS)	TOP 10 (4 Years)	VARIANCE TOP 10 V. REM.
Twice Yearly	% of Respondents	41.93%	55.56%	32.51%
At Least Twice per Year		58.06%	77.78%	33.96%
Once Per Year	% of Respondents	35.48%	22.22%	-37.37%
At least Once per Year		93.54%	100.00%	6.91%
Less Often Than Once per Year	% of Respondents	3.23%		-100.00%
None - Don't Do it	% of Respondents	3.23%		-100.00%
5. CANOPY MANAGEMENT (ON MATURE TREES)				
a. Average Tree Density				
Less than 200 per ha	% of Respondents	48.39%	77.78%	60.74%
201 to 400 per Ha	% of Respondents	45.16%	22.22%	-50.80%
More Than 400 per Ha	% of Respondents	6.45%		-100.00%
b. Canopy Management Methods				
No canopy Management (NIL)	% of Respondents			
Mechanical Hedging and / or Topping	% of Respondents	31.03%	66.67%	114.86%
Selective Limb Removal	% of Respondents	93.10%	77.78%	-16.46%
Removal of Alternate Trees or Rows	% of Respondents		11.11%	
Major Manual Canopy Reduction	% of Respondents	31.03%	22.22%	-28.39%
Stag Horn	% of Respondents	13.79%	22.22%	61.13%
Some Form of Manual Canopy Management		137.92%	133.33%	-3.33%
c. Frequency of Canopy Management				
More Than Twice Yearly	% of Respondents	3.45%		-100.00%
Twice Yearly	% of Respondents	6.90%	22.22%	222.03%
Once Per Year	% of Respondents	75.86%	66.67%	-12.11%
At Least Once per Year		86.21%	88.89%	3.11%
Less Often Than Once per Year	% of Respondents	13.79%	11.11%	-19.43%
d. % of Orchard Pruned Per Year (Average at that Frequency)				
100% Each Year	% of Respondents	27.59%	55.56%	101.38%
Between 50% & 99% Each Year	% of Respondents	20.69%	11.11%	-46.30%
Between 25% & 49% Each year	% of Respondents	13.79%	11.11%	-19.43%
Between 11% & 24% Each Year	% of Respondents	17.24%	11.11%	-35.56%
10% or Less Per Year	% of Respondents	20.69%	11.11%	-46.30%
6. PACKING STRATEGY				
Pack Own Fruit	% of Produce	38.44%	69.84%	81.69%
Use Contract Packing House	% of Produce	61.56%	30.16%	-51.01%

3.4 Differences Between Northern & Southern Zones

A summary outline of the average yields (4 years) achieved, in each of the two zones, Northern Zone and Southern Zone, as provided in Table 20. Summary observations on this data are:

1. The participants in the Southern Zone have demonstrated marginally higher yields per producing hectare (6%, 500kg), higher pack out to Premium Grade (12%) and higher pack out to Sizes 18 – 25 (mid-sized) fruit (26%).

   Southern zone participants is a 32% lower pack out to small fruit (Counts 26 and above) and 85% increase in large fruit (up to Count 16). **Southern Zone participants appear to achieve higher average fruit sizes than those in the Northern Zone**

2. Concurrent with achieving these improved outputs participants in the Southern Zone have demonstrated:

   a. higher average gross revenue per hectare and per tray sold;

   b. higher operating costs per hectare and per tray sold; and

   c. Retained higher EBITDA per hectare (+29%) and per tray sold (+9%).

3. The average cost of labour, contracting and consulting and contract packing for southern zone participants is significantly higher than for northern zone participants.

   Contract Packing Costs are calculated by subtracting a realistic cost for packing materials from contract packing costs (charged by contract packers to participants). Where other costs such as freight and marketing fees are included in these packing charges they are also removed. The contract packing fee as reported to participants and as in Table 19, is the estimated costs charged by contract packers for labour, utilities, facility fees and operating margin. Further analysis demonstrates:

   - Contract packing fees as incurred by participants in the **Northern Zone** that use contract packers averaged **$2.03** per tray equivalent over 4 years ($3,082 / Ha);
   - Contract packing fees as incurred by participants in the **Southern Zone** (including Western Australian participants) that use contract packers averaged **$2.63** per tray equivalent over 4 years ($4,860 / ha)
   - Contract packing fees as incurred by participants in the Western Australian participants only, that use contract packers averaged **$3.25** per tray equivalent over 4 years ($7,254 / Ha), 60% more expensive than those experienced in the Northern Zone.

   As is seen in Table 19, the costs that have shown to have the largest differential between northern zone participants and southern zone participants include:

   - Motor Vehicle Costs (excluding fuel and oil)
   - Contract and Consulting Costs other than Contract Packing
   - Insurance Costs

- Repairs and Maintenance
- Contract Packing Costs
- Power and Gas Costs, and
- Employment and Labour Costs

Table 19: % Higher Costs by Line Item for Southern Zone Participanyts

Costs per Producing Hectare	
Motor Vehicles	277%
Contracting and Consulting Costs other than Contract Packing	251%
Insurance Costs	95%
Repairs & Replacements	60%
Contract Packing Fees	57%
Power & Gas Costs	34%
Employment / Labour Costs	32%
General Expenses	29%
Rates Levies, Licenses, Memberships, Registrations	21%
Freight Costs	21%
Chemical and Fertiliser Costs	16%
Marketing & Ripening Costs	13%
Packaging and Pallet Costs	4%
Fuel & Oil Costs	0%
Water Costs	-63%
Royalties & PVR Costs	-100%

Costs per Tray Equivalent Sold	
Motor Vehicles	256%
Contracting and Consulting Costs other than Contract Packing	243%
Insurance Costs	84%
Repairs & Replacements	51%
Contract Packing Costs	48%
Power and Gas Costs	26%
Employment / Labour Costs	24%
General Expenses	23%
Rates, Levies, Licenses, Memberships, Registrations	14%
Freight Costs	14%
Chemical and Fertiliser Costs	9%
Marketing and Ripening Costs	7%
Packaging Costs	-2%
Fuel & Oil Costs	-5%
Water Costs	-65%
Royalties & PVR Costs	-100%

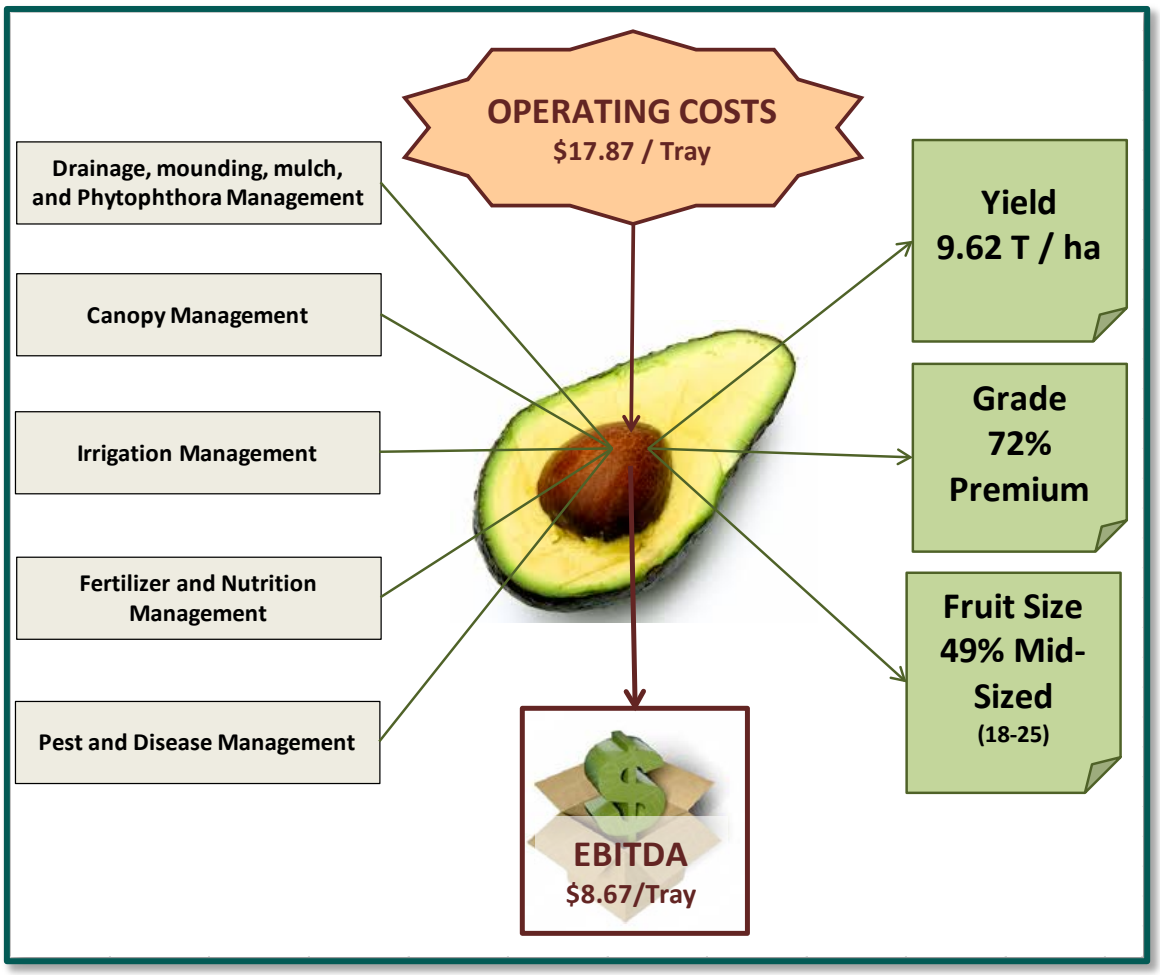
4. Participants in the Southern Zone have demonstrated a 41% higher average planting density. Several of the cost categories discussed above may be higher for southern zone participants due to plant density.

Table 20: Key Data for Northern Zone and Southern Zone

	Unit	NORTHERN ZONE AVERAGE	SOUTHERN ZONE AVERAGE	% DIFFERENCE SOUTHERN V. NORTHERN
1. Yield Grade and Size				
Average Producing Trees / Hectare	Trees / Ha	176	249	41%
Total Kgs Harvested / Producing Tree	Kg / Tree	52.94	39.78	-25%
Total 5.5 KG Trays Equivalent Harvested / Producing Tree	Trays / Tree	9.63	7.23	-25%
Total KGS Harvested per Producing Hectare	Kgs / Ha	9,336	9,890	6%
Total 5.5 KG Trays (Equivalent) Harvested per Producing Hectare	Trays / Ha	1,697	1,798	6%
Average Price Achieved $ / 5.5 KG Equivalent of Market Fruit	$ / 5.5 Kg	$25.57	$29.69	16%
Total Operating Costs (Excluding Interest and Depreciation)	$ / Tray Sold	$17.05	$20.68	21%
Average EBITDA per 5.5 KG Equivalent Sold	$ / Tray Sold	$8.61	$9.37	9%
% of Packed Fruit Sold as Premium Grade %	%	70.41%	78.71%	12%
% of Packed Fruit Sold as A Grade %	%	13.58%	15.79%	16%
% of Packed Fruit Sold as B Grade %	%	9.91%	8.67%	-13%
% of Packed Fruit Sold as Bulk %	%	0.42%	0.09%	-79%
% of Market Fruit Sold as Large (Count Sizes 1 to 17)	%	3.90%	7.20%	85%
% of Fruit Sold as Mid-Sized (Size Counts 18 to 25)	%	46.97%	59.22%	26%
% of Market Fruit Sold as Small (Size Counts 26 and Higher)	%	49.13%	33.58%	-32%
Tonnes Produced and Sold Per FTE per Annum	Tonnes / FTE	55.66	43.34	-22%
2. PROFITABILITY PER PRODUCING HA				
Total Sales Revenue	$ / Producing Ha	$43,560	$54,050	24%
EBITDA Per Producing Hectare	$ / Producing Ha	$14,616	$16,856	15%
Employment / Labour Costs	$ / Producing Ha	$7,886	$10,396	32%
Marketing & Ripening Costs	$ / Producing Ha	$4,061	$4,590	13%
Chemical and Fertiliser Costs	$ / Producing Ha	$2,749	$3,183	16%
Freight Costs	$ / Producing Ha	$2,600	$3,139	21%
Packaging and Pallet Costs	$ / Producing Ha	$2,550	$2,649	4%
Contract Packing Fees	$ / Producing Ha	$2,481	$3,889	57%
General Expenses	$ / Producing Ha	$2,284	$2,950	29%
Repairs & Replacements	$ / Producing Ha	$1,409	$2,250	60%
Rates Levies, Licenses, Memberships, Registrations	$ / Producing Ha	$792	$957	21%
Fuel & Oil Costs	$ / Producing Ha	$658	$661	0%
Power & Gas Costs	$ / Producing Ha	$542	$726	34%
Water Costs	$ / Producing Ha	$346	$128	-63%
Insurance Costs	$ / Producing Ha	$251	$490	95%
Consultants And Contractor Fees	$ / Producing Ha	$245	$861	251%
Motor Vehicles	$ / Producing Ha	$86	$326	277%
Royalties & PVR Costs	$ / Producing Ha	$2		-100%

	Unit	NORTHERN ZONE AVERAGE	SOUTHERN ZONE AVERAGE	% DIFFERENCE SOUTHERN V. NORTHERN
	$ / Producing Ha	$28,944	$37,194	29%
EBITDA Per Producing Hectare	$ / Producing Ha	$14,616	$16,856	15%
3. PROFITABILITY PER 5.5 Kg TRAY EQUIVALENT				
Total Sales Revenue	$ / Tray Sold	$25.66	$30.06	17%
Total Operating Costs (Excluding Interest and Depreciation)	$ / Tray Sold	$17.05	$20.68	21%
EBITDA per Tray Equivalent Sold	$ / Tray Sold	$8.61	$9.37	9%
Total Labour	$ / Tray Sold	$4.65	$5.78	24%
Marketing and Ripening Costs	$ / Tray Sold	$2.39	$2.55	7%
Chemical and Fertiliser Costs	$ / Tray Sold	$1.62	$1.77	9%
Freight Costs	$ / Tray Sold	$1.53	$1.75	14%
Packaging Costs	$ / Tray Sold	$1.50	$1.47	-2%
Contract Packing Costs	$ / Tray Sold	$1.46	$2.16	48%
General Expenses	$ / Tray Sold	$1.34	$1.64	23%
Repairs & Replacements	$ / Tray Sold	$0.83	$1.25	51%
Rates, Levies, Licenses, Memberships, Registrations	$ / Tray Sold	$0.47	$0.53	14%
Fuel & Oil Costs	$ / Tray Sold	$0.39	$0.37	-5%
Power and Gas Costs	$ / Tray Sold	$0.32	$0.40	26%
Water Costs	$ / Tray Sold	$0.20	$0.07	-65%
Insurance Costs	$ / Tray Sold	$0.15	$0.27	84%
Contracting and Consulting Costs other than Contract Packing	$ / Tray Sold	$0.14	$0.48	243%
Motor Vehicles	$ / Tray Sold	$0.05	$0.18	256%
Royalties & PVR Costs	$ / Tray Sold	$0.00		-100%
EBITDA per Tray Equivalent Sold	$ / Tray Sold	$8.61	$9.37	9%

4. DISCUSSION AND DISSEMINATION



4.1 Discussion

4.1.1 THINKING BEST PRACTICE

Best Practice

Best practices are "those practices that have been shown to produce superior results; selected by a systematic process; and judged as exemplary, good, or successfully demonstrated"; these practices are then adapted to fit a particular organisation. Benchmarking is a systematic process used for identifying and implementing best or better practices.

***Best practice benchmarking**; this is where organisations search for and study organisations that are high performers in particular areas of interest. The processes themselves of these organisations are studied rather than just the associated performance levels, normally through some mutually beneficial agreement that follows a benchmarking code of conduct. Knowledge gained through the study is taken back to the organisation and where feasible and appropriate, these high performing or best practices are adapted and incorporated into the organisation's own processes. Therefore, best practice benchmarking involves the whole process of identifying, capturing, analysing, and implementing best practices . There are a number of best practice benchmarking methodologies. One of which is the TRADE Best Practice Benchmarking Methodology.*

Source : http://www.bpir.com/all-about-bpir-bpir.com.html

TOP 10

The Top 10 participant group has superior average physical and financial performance compared to the remainder of the benchmarking group over four consecutive years of operation. This has been achieved with less average operating costs per producing hectare and per tray equivalent sold, and substantially higher average EBITDA achieved per producing hectare (+195%) and per tray equivalent sold (+106%).

The Top 10 have also demonstrated a higher uptake of a number of on-farm and management practices in five key areas, Mulching, Phytophthora management and related activities (#1), canopy management (#2), irrigation management (#3), fertilizer and nutrition management (#4) and pest management (#5).

BEST PERFORMING REGIONS

Participants from North Queensland, Western Australia and the Tri States regions have demonstrated the highest average levels of physical and financial outcomes of all the regions. They have also invested more on average into operating costs per producing hectare and achieved higher average EBITDA per producing hectare than participants in other regions.

Participants in these three regions do not demonstrate the same common propensity to adopt key on-farm and management practices in the same five areas as do the Top 10. However, the

marked difference in climatic conditions and the length of time that fruit needs to remain on trees between flowering and harvest in these three regions may explain some of the diversity in practices.

4.1.2 OBSERVATIONS

OBSERVATION: INVESTMENT AND REWARD

Comparing the Top 10 to the remainder of the participants in the benchmarking program **and also** comparing regions have both demonstrated that in the four consecutive years of the benchmarking program:

Participants (growers) that invested more heavily and wisely in their crops thereby increasing (perhaps maximising)

1. Yield;
2. Pack out to premium grade; and
3. Larger fruit (namely higher pack out to mid-sized fruit that is in demand by a large segment of the domestic market);

achieved better financial outcomes, as measured by EBITDA (Cash profit) per producing hectare and pre tray equivalent sold.

Additionally, the positive relationship between EBITDA and trays harvested per hectare has shown to be statistically significant in this analysis. The statistical significance of the relationships between Grade and Size have not been shown from the data collected in this program. However, given the many variables and the diversity between growing regions a larger longitudinal study, over more years may be needed to fully test this relationship.

In the future if some growers focus on specialised production methods for either the export market and / or the processing market, the preferred fruit size profile is likely to be markedly different to the focus on mid-sized fruit discussed herein.

Participants in regions that have achieved poorer average physical and financial outcomes have invested significantly less on average in their crops.

OBSERVATION: CANOPY MANAGEMENT IN SOUTHERN ZONE

Individual participants in the Southern Zone that have been observed to have increased their investment in canopy management, namely retaining manageable tree size and opening tree shape to increase light penetration have experienced very significant increases in physical (yield, grade and size) and financial (EBITDA) outcomes.

OBSERVATION: MULCH APPLICATION TO ROOT ZONES

The researchers also believe that the extremes in temperature, evaporation and therefore soil moisture levels in the Southern Zone suggest that more use of mulch on root zones should be the subject of further research, experimentation and wider adoption.

The lessons now learnt in Central New South Wales by those participants that have invested heavily in enriched mulch application in recent years are also worthy of further investigation by growers, particularly in the Southern Zone.

OBSERVATION: TREE CANOPY TEMPERATURE MANAGEMENT

The researchers note the fact that the Tri States region, a region that experiences extremes of high and low temperatures and significant frost events is in the top three regions based on physical and financial outcomes. Participants in this region have adopted several practices not widely observed in other regions, namely the installation of multiple irrigation lines in the crop, one being to manage high temperature peaks, and the installation of tree protection assemblies around young trees.

Current industry opinion appears to be that installing and using specific irrigation sub-systems in the tree canopy to manage peaks in high temperatures is only valid in Tri States, and possibly in Mediterranean climates generally and do not add value in more tropical or subtropical climates.

The researchers are yet to be convinced that enough research and investigation has been undertaken to test the benefits of adopting similar practices in other regions where summer temperature peaks (albeit commonly with higher humidity) are also thought to be impacting fruit set and the retention of fruit on the tree once set. Two areas in the Northern Zone in particular come to mind in this respect, namely parts of Southern Queensland (e.g. Lockyer Valley and Kumbia) and the western part of North Queensland (where participants have experienced difficulty in achieving fruit set and retention on Shepard avocados).

OBSERVATION: PLANT DENSITY AND EBITDA

Regression analysis applied to the benchmarking data set has demonstrated a statistically significant negative relationship between plant density (trees per hectare) and financial outcomes (EITDA). This statistically significant correlation has been demonstrated on a data set covering four consecutive financial years, in effect four crop years, and the majority of the data related to higher density planting has come from participants in the Southern Zone.

This finding may be at odds with some currently held views. Much has been spoken about and written about regarding the positive impact of high density planting on early yields and outcomes, for example in Peru. This deserves further investigation.

One possible aspect to investigate is whether the local economy, and therefore the relative operating costs incurred in countries like Peru is a key element of this. For example is higher density avocado production in low cost economies more financially rewarding than higher density production in high cost economies.

Another angle to investigate may be whether the economics of high density production is impacted by longitude. For example is the economics of higher density production in Peru at say 12 degrees south different to higher density production at Pemberton, 34 degrees south.

4.2 Dissemination

Information outlining the project process and findings have been disseminated to participants, and the total industry through several mechanisms. There are two types of information that have been disseminated, to relevant targets, being:

1. Personalized information containing detailed information about how each business looks compared to averages of relevant reference groups, and how each business performs based on ninety-four (94) quantitative performance measures; and

2. High level comparative and descriptive information about the performance and characteristics of the total participant group at regional, zone and total group scale.

In Table 21 the methods / channels through which information reports or information packages have been disseminated to industry is summarised for each of the types of reports outlined in Section 2.5.1.

The types of information that are personalised, containing detailed and sensitive information about the individual businesses of participants, and only provided to each participant are highlighted in yellow in Table 21.

Table 21: Methods of Dissemination

	Standard Reporting Package - Direct to Participants (Personalised Reports)	Direct to Participants (Personalised Reports) By Request	Presented to Region Workshops & Meetings	In Project Reports
Internal Benchmarking Over Time (Internal)	✔	✔		
Regional Performance Benchmarking (External)	✔	✔		
Total Group (National Performance Benchmarking (External)		✔	✔	✔
Best Practice Benchmarking (External)			✔	✔
Regional Comparisons & Comparisons between Zones (External)			✔	✔
Regional Management Practices (Qualitative)	✔	✔	✔	✔
Management Practices Comparisons Between Sub Groups (Qualitative)		✔	✔	✔
Relating Practices and Outcomes (Qualitative)			✔	✔
Special Purpose Reports per Request (by individuals or by groups)		✔		

4.3 Recommendations

4.3.1 MANAGEMENT PRACTICES IN REGIONS

The results of the Top 10 analysis and regional comparisons suggests that drainage, mulching, phytophthora treatment and related activities (#1) and canopy management (#2) are areas where Western Australian and Tri States participants, and other Southern Zone participants may benefit from further research, experimentation and adoption.

And

Irrigation management (#3) is an area where North Queensland participants and other Northern Zone participants may benefit from further research, experimentation and adoption.

The inter-relationship between irrigation practices and the benefits of higher use of mulch to protect root zones from the impact of moisture and temperature variations has not really been examined in this program and may also be worthy of further research.

4.3.2 FRUIT SIZE

The average pack out to mid-sized fruit (18-25) for the benchmarking group is 49%. The Top 10 averaged 60%, Western Australia reported the highest region average of 68% and Central Queensland the lowest at 39%.

The pack out to mid-sized has also declined 12.7% over four years for the group

Fruit size (pack out to midsized) appears to be one area that deserves further research and investigation as a means of improving the ability of industry to satisfy large supermarket customers and improving profitability for growers.

4.3.3 DECLINING TRENDS IN ORCHARD PERFORMANCE MEASURES

Yield per hectare has declined marginally (4%), the percent of fruit sold as mid-sized has declined 12.7% and the percent packed to premium grade has declined 7%.

Should these trends occur in the industry in the same manner as has been demonstrated in this program, the profitability of avocado growers is likely to decline if prices achieved for fresh avocadoes were to decline.

The impact of the lengthy period of improved prices for fresh avocado on grower profitability may be masking and facilitating declines in some areas of management practices and costs / efficiency on farm.

4.3.4 FUTURE (BEST PRACTICE) BENCHMARKING

By devising a process for identifying a Best Practice Data Set, using the concept of the Top 10 most profitable businesses, there is now an extremely valuable data set and methodology that can readily be used in an ongoing basis to drive continuous improvement for avocado growers in Australia.

By necessity this program had to initially be exploratory and flexible while the program managers found out what level record keeping and other available sources of information could be accessed.

There are several areas where the records and information that is able to be provided by participants defined the degree to which benchmarking data sets and analysis could be supported. Some of those areas were;

1. How growers keep records for producing and non-producing orchards and the inputs and outputs from different aged trees;
2. The practicality of collecting detailed information on some aspects of fertilizer and nutrition management practices and pest and disease management practices and retaining participant support (e.g. managing time required from participants to provide data to the program);
3. Designing survey questions and question sequencing so as the many aspects of canopy management and Phytophthora management processes can be captured and used to capture and report differences in practices meaningfully.

The researchers believe that a continuation of benchmarking in this industry will continue to deliver increasingly useful and meaningful information to participants, industry and industry organisations charged with deciding how to invest future R & D funds.

Canopy management and its impact on physical and financial outcomes is an area where much more can be learnt from benchmarking. To do so the researchers have begun to think of new ways to structure survey instruments and capture data.

Fertilizer and nutrition management and pest and disease management (including in this context Phytophthora treatment and related activities) have also been peaking the interest of the researchers (i.e. 'how to do it differently') for future data design and collection.

Developing mechanisms (including interfaces or specifically designed data export protocols) for export of data from widely used on-farm and pack-house accounting and operations software is on the 'do list' of how to improve the process.

There are also areas where developing and introducing specifically designed recording structures and approaches for use by participants in their own businesses can improve timeliness and accuracy of data collection.

4.3.5 R & D INFORMATION DISSEMINATION AND EXTENSION

A huge body of knowledge has been developed and captured from past research and development activities in this industry. Research and development continues and dissemination of the resulting knowledge is ongoing.

QUALICADO WORKSHOPS AND SIMILAR

In the early annual interaction cycles of this project we observed and commented on the fact that knowledge seemed to be in 'silos' and has been localised in this industry. Changes are occurring.

It is important to state that the impact of the Qualicado workshops that have been running now for approximately two years has been very positive and very highly spoken of by participants in this program.

With almost thirty years providing consulting and advisory input to numerous horticultural and broader agricultural sectors it is our view that this dissemination program is one of the most effective dissemination programs observed. Not only is it attracting ever increasing numbers of attendees in each region, it is also being talked about and referred to widely amongst industry participants as we have interacted one-on-one with growers.

It is very important that this type of extension activity, the meaningful dissemination of information, and the facilitation of grower interaction within regions, **and across regions**, is continued.

4.3.6 THE AVOCADO INDUSTRY BENCHMARKING DATA BASE

The Australian Avocado Industry Database currently holds detailed operational, financial and management practices information about the production and marketing of twelve million 5.5 kg trays of avocados (66,000 tonnes) worth approximately $338 million. Very few agricultural industries in Australia or globally have a resource if this nature and scale.

The information and learning generated to date out of this has been substantial. However there is much more that can be done with this in the future. It will be enhanced in accuracy and value by continued data collection and use. The more years of data collected and analysed the more value it can deliver to the industry.

We have now collectively (industry and program manager) learnt what we can do with it. Its use to date has also shown how it can be utilised in different ways, to focus in on aspects of particular interest to industry

We encourage the Australian avocado industry to develop ways to continue to use it and add to its value by pursuing continuous improvement with the aid of this asset.

4.3.7 APPROXIMATELY 200 ON-FARM, ONE-ON-ONE, INTERVIEWS LATER

Over the four years of this project the Program Manager and / or personnel have sat in the kitchens, lounge rooms and farm offices of avocado growers more than two hundred times, including visits to growers that chose not to participate for one or more reasons.

Participants have been very open and generous with the sharing of information, much of which is sensitive and personal. Our responsibility has been to ensure that any information that is sensitive, personal and confidential be managed appropriately. We believe we have achieved that.

We wish to express our sincere thanks to the participants of this program for their generosity with their time and their information and the hospitality and support that has been afforded us as we have managed and delivered this program and project.

4.3.8 FURTHER IMPORTANT RECOMMENDATION

This report and recommendations have been prepared with reference to information in the Australian Avocado Industry Database (AVOBM), an information resource for which the capabilities are far beyond simply what can be included in aa final project report.

It is strongly recommended that the industry (namely AAL Board and the newly announced Advisory Group, and others) interact with the researchers, tapping into their intimate knowledge of what the database can do, as part of the process of deciding what actions should be initiated from these findings.

The database already has large amount of data in it and has the capacity to be searched and queried re any aspects, facts, trends, correlations and relationships, and more, for which it contains data. Investigating the database capabilities and interacting with someone who knows what is in it and what it can do will disclose much more about how it can be used to add value to the industry.

One example is to develop better ways to track and report market data and develop prediction tools that can predict market trends, and assist with orderly produce clearance. This existing tool can readily be adapted and used to assist in this area.

Another is using the database to assist in the ongoing work on the supply chain, fruit quality and shelf life. This existing tool can readily be adapted and used to assist in this areas.

It has been used already to produce a quantification of the real cost of Phytophthora disease and its control to the industry.

Much of the capacity that has been designed into the database is still relatively unused. For example the package is designed to capture and analyse data on a block by block basis, and capture harvest and revenue data as volume and value per grade and count size variant (very readily adapted to collect market data and develop prediction tools).

It is close to impossible to describe or express all of the ways in which this tool can be used to extract information and add value to the industry, in just this one written report. Interaction and investigation into how it can assist industry decision making in many areas is highly recommended.

Appendix 2: Sample Regional Comparative Analysis Report

AVOCADO BENCHMARKING PROGRAM

COMPARATIVE ANALYSIS REPORT

FOR YEAR ENDED JUNE 30 2015

Prepared by Pinnacle Agribusiness (Formerly CDI Pinnacle Management)

Pinnacle AGRIBUSINESS

Horticulture Innovation Australia

Avocados Australia

Notes for Participating Growers

Reading and Using this Comparative Analysis Report

This report is compiled from information gathered from approximately sixty (60) Avocado growers across the eight main regions that grow avocados. It is based on data collected relevant for the financial years ended June 30th 2012, 2013, 2014 and 2015.

The information in this report addresses key areas of your business and the industry. The main focus areas are:

- Business Performance Overall
- Production,
- Returns Received for Produce,
- Quality
- Profitability
- Costs and Cost Management

There are some terms and definitions used that readers will have differing levels of exposure to. These are listed in Terms and Definitions which are available from Pinnacle Agribusiness should you require them. Some of these are important to discuss here.

• Producing and Non Producing Trees / Hectares:

Where not given specific information to the contrary, the tree spacing provided have been used to calculate the number of hectares planted to producing and non-producing trees.

For the purposes of collating this data, any costs associated with non-producing trees(whether due to being immature and not yet producing, or considered unproductive due to sickness or other causes), are treated as being serviced by the producing orchards in your business.

• Labour Costs and Full Time Employee Equivalents(FTEs)

The Term FTE as used in this report is short for Full Time Employee Equivalent. A standard measure used in economic analysis, the annual cost of an FTE is the full cost of employing one permanent employee for 12 months at the existing pay rates and hours per week. Whilst this varies a little from state to state it is currently approximately $46,000 per annum including superannuation and family leave allowances. To determine how many FTE's your business employs divide the total cost of labour (wages and superannuation) to your business for a financial year (0r 12 month period) by the a total cost of an FTE, (for example this may be Total Labour Costs / $46,000 = x FTEs).

• Net Operating Profit, EBIT and EBITDA

These are terms used by accountants and bankers extensively. The best way to look at information about profitability in these reports is to look at the **EBITDA** figures (EG. EBITDA per planted hectare, EBITDA per 5.5 Kg tray equivalent sold, etc.).

EBITDA = Earnings Before Interest, Tax, Depreciation and Amortisation

EBITDA is actually the profit a business makes before paying tax, before paying any interest to the bank or finance company interest, and before adding depreciation or amortisation of business assets into the accounts. Not all participants have provided information that includes the interest they paid and the depreciation they recorded in that year. Focus on EBITDA figures and ask, if you seek more understanding about this measure.

• Rankings

Rankings are provided in key areas of this report. Rankings show where an individual business outcome is on a particular 'measure' or 'descriptor', compared to the other participants.

In all rankings, **Rank 1 is the Highest Value recorded across the entire group** (it may be the highest sales revenue, highest profits, highest costs, highest value of any **measure).**

Comparative Analysis Report (2012/2013/2014/2015)-SAMPLE FARM ID 900-Same Region-Central QLD

• Group Average, Group High, Group Low

For each measure or factor included in the report the information provided includes:

Your value as provided to us or calculated from information provided
The Average for the entire group of participants
The Highest value recorded amongst participants
The Lowest value recorded amongst participants

• Fruit Grades

Premium	= Highest Grade sold to market
A Grade	= Second Highest Grade sold to market
B Grade	= Third Highest Grade sold to Market
Bulk	= All Bulk Sales treated as one Grade

• Consider Rankings In The Right Context.

If the report says that your business is above average on costs, or ranks high on costs (a low rank number), this may not necessarily mean costs are a problem. If your business is high in costs and also high in yield and profitability, then this may really be indicating that by investing more in your crop you are getting better outcomes.

Alternatively, if your business costs are low or your business has a favourable ranking in costs (e.g. a high rank number) and your returns or business outcomes are not as good as you would like, it may be that you could improve your business by investing more in inputs.

Look at each part of the report information as part of the overall picture. In many cases it will be best to consider several aspects of the outcomes / results together.

• Marketing and Ripening Costs

The data collected from all participants has been analysed to identify the proportion of the produce sold by the participants that was distributed via each possible distribution channel, being Direct to Supermarket Chains, Via Brokers, Via Wholesalers, Vis export channels, etc. With this information a weighted average figure (% of Gross Sales Value into Supermarket) was calculated. Where participants did not reflect at least the weighted average % for marketing and ripening fees, the weighted average % for marketing and ripening fees has been included in financials.

• Unpaid Family Labour Costs and FTEs

In many farming businesses family members are working in the business without being paid (in the accounts). An additional $46,000 per annum (financial year 2015)has been added to the accounts for every Family Full Time Employee Equivalent (Family FTE), or part thereof, that is working in the business without pay being recorded in the accounts of the business.

There are many aspects of your business (listed down the left hand side of each page in the report) for which comparative information is provided in this report. Those parties that we know of that have used these reports to assist them to decide what areas to focus on for improving their business have tended to focus on one or a small number of areas at any one time. It is valuable to remember that if you change a multiple number of areas of how you do your business all at once, then it is very difficult to work out which of the changes actually positively impacted the performance of the business.

Please do not hesitate to contact us at hhall@pinnacleagri.comm.au, or 0412 674083, if you wish to further discuss this report or how it can be interpreted in the context of your overall business

Comparative Analysis Report (2012/2013/2014/2015)-SAMPLE FARM ID 900-Same Region-Central QLD

SAMPLE FARM					900		
	Unit	Your Value	Group Average	Group High	Group Low	Your Rank in Group	Total Number in Group (Count)
1. ENTERPRISE INFORMATION							
Total Producing Trees	Trees	8,929.00					
Total Producing Hectares	Ha	47.50					
Average Producing Trees / Hectare	Trees / Ha	187.98					
Total Trees (Producing and Immature)	Trees	8,929.00					
Total Hectares Planted (Producing and Immature)	Ha	47.50					
Total KGS Harvested, Packed and Sold	Kgs	421,003.00					
Total KGS Sold as Juice, Oil, Processing	Kgs	0.00					
Total KGS Harvested	Kgs	421,003.00					
Total Trays (5.5 Kg Equivalent) Harvested Packed and Sold	Trays	76,546.00					
Total Kgs Harvested / Producing Tree	Kg / Tree	47.15	45.56	50.52	35.77	5	9
Total 5.5 KG Trays Equivalent Harvested / Producing Tree	Trays / Tree	8.57	8.28	9.19	6.50	5	9
Total KGS Harvested per Producing Hectare	**Kgs / Ha**	**8,863.22**	**8,555.68**	**9,443.57**	**6,335.74**	**5**	**9**
Total 5.5 KG Trays (Equivalent) Harvested per Producing Hectare	**Trays / Ha**	**1,611.49**	**1,555.58**	**1,717.01**	**1,151.95**	**5**	**9**
Average Price Achieved $ / 5.5 KG Equivalent of Market Fruit	**$ / 5.5 Kg**	**$18.48**	**$24.36**	**$32.71**	**$13.16**	**8**	**9**
Total Costs per 5.5 KG Equivalent Sold	**$ / Tray Sold**	**$14.76**	**$18.28**	**$23.12**	**$14.76**	**9**	**9**
Average EBITDA per 5.5 KG Equivalent Sold	**$ / Tray Sold**	**$4.88**	**$6.76**	**$13.95**	**($2.95)**	**6**	**9**
% of Fruit Sold as Mid-Sized (Size Counts 18 to 25)	**%**	**53.68%**	**39.14%**	**57.27%**	**19.96%**	**3**	**9**

Comparative Analysis Report (2012/2013/2014/2015)-SAMPLE FARM ID 900-Same Region-Central QLD

SAMPLE FARM					900		
	Unit	Your Value	Group Average	Group High	Group Low	Your Rank in Group	Total Number in Group (Count)
2. BUSINESS SCALE AND OUTCOMES							
Gross Sales Revenue (Before Marketing & Ripening Costs) $	$	$1,428,958.00	$15,522,929.44				
Total Costs	$	$1,129,525.00	$11,641,220.44				
NET PROFIT BEFORE TAX	$	$299,433.00	$3,881,709.00				
EBIT $	$	$350,675.00	$4,182,515.67				
Total Operating Costs (Excluding Interest and Depreciation)	$	$1,055,279.00	$11,216,029.11			7	9
EBITDA $	$	$373,679.00	$4,306,900.33				
Operating Costs as % of Gross Sales Revenue	%	73.85%	72.25%	122.41%	55.72%		
3. PACK OUT							
% of Packed Fruit Sold as Premium Grade %	%	75.00%	67.96%	83.85%	29.97%	4	9
% of Packed Fruit Sold as A Grade %	%	25.00%	9.73%	70.03%	3.85%		
% of Packed Fruit Sold as B Grade %	%	0.00%	12.50%	18.06%	9.37%		
% of Packed Fruit Sold as Bulk %	%	0.00%	0.65%	5.33%	5.33%		
% of Harvest Sold as Packed Fruit %	%	100.00%	91.38%	100.00%	85.35%	5	9
% of Total Harvest Sold as Juice or Processing	%	0.00%	8.62%	14.65%	1.32%		
% of Market Fruit Sold as Large (Count Sizes 1 to 17)	%	16.03%	3.66%	16.03%	0.31%		
% of Fruit Sold as Mid-Sized (Size Counts 18 to 25)	%	53.68%	39.14%	57.27%	19.96%	3	9
% of Market Fruit Sold as Small (Size Counts 26 and Higher)	%	30.30%	57.20%	79.72%	30.30%	9	9
4. SELECTED LABOUR USE MEASURES							
Total FTEs Employed / Producing Ha	FTE / Ha	0.19	0.14	0.19	0.08	1	9
Total Producing Hectares Managed per FTE	Ha / FTE	5.26	7.14				
Gross Sales Revenue Achieved Per Total FTE	$ / FTE	$156,170.27	$263,666.56	$433,486.29	$115,965.33	8	9
EBITDA Achieved Per Total FTE	$ / FTE	$40,839.23	$73,155.37	$184,786.36	($25,988.00)	8	9
Tonnes Produced and Sold Per FTE per Annum	Tonnes / FTE	48.13	59.80	69.74	45.25	8	9

Comparative Analysis Report (2012/2013/2014/2015)-SAMPLE FARM ID 900-Same Region-Central QLD

SAMPLE FARM					900		
	Unit	Your Value	Group Average	Group High	Group Low	Your Rank in Group	Total Number in Group (Count)
5. INDICATOR COST CENTRES							
Chemicals & Fertilizers as % of Gross Sales Revenue (Before Marketing and Ripening Costs are Deducted)	%	0.00%	7.42%	11.65%	4.41%	9	9
Employment and Contracting Costs as % of Gross Sales Revenue (Before Marketing and Ripening Costs are Deducted)	%	28.16%	26.91%	51.63%	21.46%	4	9
6. PROFITABILITY PER PRODUCING HA							
Total Sales Revenue	$ / Producing Ha	$30,083.33	$37,916.91	$43,756.25	$22,301.03	8	9
Total Costs	$ / Producing Ha	$23,779.47	$28,435.30	$31,518.14	$19,616.87		
Net Profit (Before Tax)	$ / Producing Ha	$6,303.85	$9,481.61	$16,839.03	($8,978.21)		
EBIT	$ / Producing Ha	$7,382.63	$10,216.37	$18,355.55	($7,207.18)		
Total Operating Costs (Excluding Interest and Depreciation)	$ / Producing Ha	$22,216.40	$27,396.71	$30,815.25	$19,160.40	8	9
EBITDA	$ / Producing Ha	$7,866.93	$10,520.20	$19,373.75	($4,997.69)	6	9
Total Farm Gate Operating Revenue (After Freight, Marketing, Ripening Costs Deducted) (FARM GATE CASH REVENUE)	$ / Producing Ha	$23,295.39	$31,743.87	$39,986.24	$21,784.36		
Total Farm Gate Operating Costs (Excl. Freight, Marketing, Ripening Costs Deducted)(FARM GATE CASH COST)	$ / Producing Ha	$15,428.46	$21,223.67	$26,782.05	$13,734.26		
7. COSTS PER PRODUCING HA							
General Expenses	$ / Producing Ha	$1,025.35	$2,139.38	$3,173.63	$514.62	6	9
Consultants And Contractor Fees	$ / Producing Ha	$105.01	$285.53	$2,378.57	$40.82	5	9
Contract Packing Fees	$ / Producing Ha	$0.00	$3,051.51	$4,615.38	$2,463.86	9	9
Chemical and Fertiliser Costs	$ / Producing Ha	$0.00	$2,812.89	$3,891.17	$1,577.25	9	9
Power & Gas Costs	$ / Producing Ha	$346.91	$426.07	$611.28	$128.99	5	9
Freight Costs	$ / Producing Ha	$2,257.39	$2,358.70	$2,722.57	$516.67	7	9
Fuel & Oil Costs	$ / Producing Ha	$0.00	$658.25	$774.02	$435.77	9	9
Marketing & Ripening Costs	$ / Producing Ha	$4,530.55	$3,814.34	$4,866.20	$1,047.45	2	9
Packaging and Pallet Costs	$ / Producing Ha	$2,984.55	$2,261.43	$2,984.55	$1,620.20	1	9
Employment / Labour Costs	$ / Producing Ha	$8,365.89	$6,866.09	$8,365.89	$4,164.14	1	9
Water Costs	$ / Producing Ha	$213.26	$368.22	$473.90	$213.26	9	9
Insurance Costs	$ / Producing Ha	$199.83	$166.78	$531.03	$66.54	6	9
Finance Costs	$ / Producing Ha	$1,078.78	$734.76	$1,771.03	$456.47	3	9
Depreciation and Amortisation Costs	$ / Producing Ha	$484.29	$303.83	$3,671.28	$484.29	7	9

Comparative Analysis Report (2012/2013/2014/2015)-SAMPLE FARM ID 900-Same Region-Central QLD

SAMPLE FARM					900		
	Unit	Your Value	Group Average	Group High	Group Low	Your Rank in Group	Total Number in Group (Count)
Rates Levies, Licenses, Memberships, Registrations	$ / Producing Ha	$762.21	$621.65	$1,184.08	$474.73	4	9
Motor Vehicles	$ / Producing Ha	$209.77	$60.03	$383.36	$11.69	2	9
Repairs & Replacements	$ / Producing Ha	$1,215.68	$1,170.54	$3,042.05	$425.87	4	9
Royalties & PVR Costs	$ / Producing Ha	$0.00	$0.00	$0.00	$0.00	9	9
8. DIFFERENTIATED LABOUR COSTS PER PRODUCING HA							
Unallocated Owners Labour Costs	$ / Producing Ha	$832.08	$70.94	$4,181.64	$731.81	3	9
General / Farm Labour Costs	$ / Producing Ha	$1,835.75	$3,007.18	$4,260.13	$335.05	6	9
Pruning Labour Costs	$ / Producing Ha	$606.57	$438.96	$1,013.61	$62.09	3	9
Picking Labour Costs	$ / Producing Ha	$2,790.40	$1,530.53	$3,290.09	$861.35	2	9
Packing Labour Costs	$ / Producing Ha	$1,896.48	$480.76	$1,896.48	$29.38	1	9
Admin. / Other / Marketing Labour Costs	$ / Producing Ha	$266.69	$256.40	$866.18	$46.59	4	9
9. PROFITABILITY PER 5.5 Kg TRAY EQUIVALENT							
Total Sales Revenue	$ / Tray Sold	$18.67	$24.37	$32.71	$13.16	8	9
Total Costs	$ / Tray Sold	$14.76	$18.28	$23.12	$14.76	9	9
Net Profit Before Tax	$ / Tray Sold	$3.91	$6.10	$13.50	($5.30)	5	9
EBIT	$ / Tray Sold	$4.58	$6.57	$13.95	($4.25)	5	9
Total Operating Costs (Excluding Interest and Depreciation)	$ / Tray Sold	$13.79	$17.61	$22.57	$13.79	9	9
EBITDA	$ / Tray Sold	$4.88	$6.76	$13.95	($2.95)	6	9
Total Operating Costs as % of Gross Sales Revenue	%	73.85%	72.25%	122.41%	55.72%	5	9
EBITDA as % of Gross Sales Revenue	%	26.15%	27.75%	44.28%	-22.41%	5	9
Total Farm Gate Operating Revenue (FARM GATE CASH REVENUE)	$ / Tray Sold	$14.46	$20.41	$27.40	$12.86	8	9
Total Farm Gate Operating Costs (FARM GATE CASH COSTS)	$ / Tray Sold	$9.57	$13.64	$17.19	$9.57	9	9

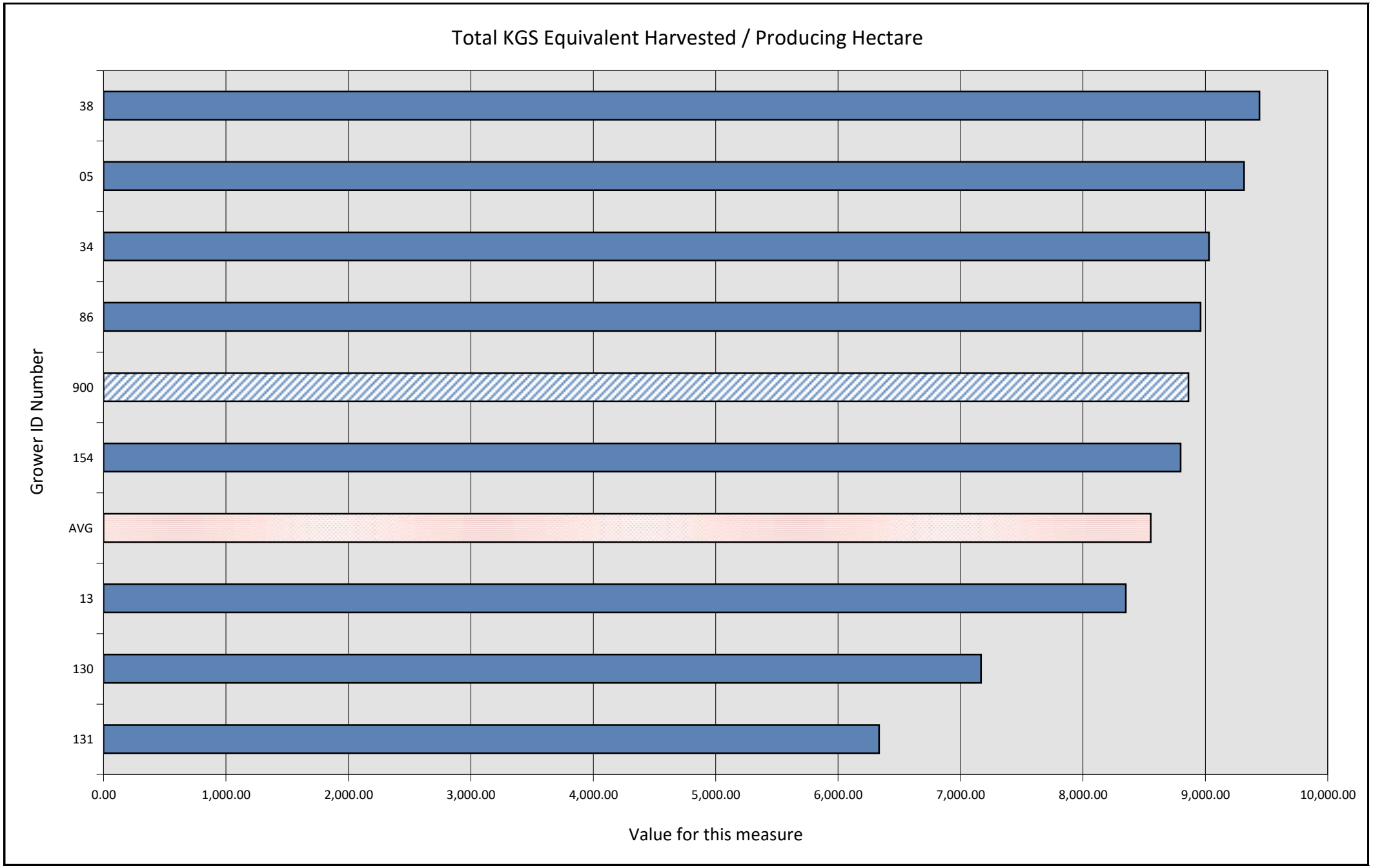
Comparative Analysis Report (2012/2013/2014/2015)-SAMPLE FARM ID 900-Same Region-Central QLD

SAMPLE FARM					900		
	Unit	Your Value	Group Average	Group High	Group Low	Your Rank in Group	Total Number in Group (Count)
10. GROWING COSTS, OVERHEADS, OTHER COSTS PER 5.5 Kg TRAY EQUIVALENT							
General Expenses	$ / Tray Sold	$0.64	$1.38	$2.32	$0.33	6	9
Consultants And Contractor Fees	$ / Tray Sold	$0.07	$0.18	$1.45	$0.03	5	9
Chemical and Fertiliser Costs	$ / Tray Sold	$0.00	$1.81	$3.09	$1.06	9	9
Fuel & Oil Costs	$ / Tray Sold	$0.00	$0.42	$0.57	$0.29	9	9
Employment / Labour Costs	$ / Tray Sold	$2.28	$3.12	$4.09	$2.13	8	9
Water Costs	$ / Tray Sold	$0.13	$0.24	$0.36	$0.13	8	9
Insurance Costs	$ / Tray Sold	$0.12	$0.11	$0.32	$0.04	7	9
Finance Costs	$ / Tray Sold	$0.67	$0.47	$1.05	$0.33	4	9
Depreciation and Amortisation Costs	$ / Tray Sold	$0.30	$0.20	$2.91	$0.30	6	9
Rates, Levies, Licenses, Memberships, Registrations	$ / Tray Sold	$0.47	$0.40	$0.94	$0.41	3	9
Motor Vehicles	$ / Tray Sold	$0.13	$0.04	$0.30	$0.01	2	9
Repairs & Replacements	$ / Tray Sold	$0.75	$0.75	$1.80	$0.42	4	9
Royalties & PVR Costs	$ / Tray Sold	$0.00	$0.00	$0.00	$0.00	9	9
TOTAL GROWING, OVERHEADS AND OTHER COSTS	$ / Tray Sold	$5.57	$9.11	$14.10	$5.57	9	9
11. "TO-MARKET" COSTS (PICK, PACK, FREIGHT & MARKETING) PER 5.5 Kg TRAY EQUIVALENT							
Picking Labour	$ / Tray Sold	$1.73	$0.98	$2.17	$0.63	2	9
Packing Labour	$ / Tray Sold	$1.18	$0.31	$1.18	$0.02	1	9
Packaging Costs	$ / Tray Sold	$1.85	$1.45	$1.85	$1.46	1	9
Power and Gas Costs	$ / Tray Sold	$0.22	$0.27	$0.41	$0.08	6	9
Contract Packing Costs	$ / Tray Sold	$0.00	$1.96	$2.72	$1.50	9	9
Freight Costs	$ / Tray Sold	$1.40	$1.52	$1.91	$0.30	8	9
Marketing and Ripening Costs	$ / Tray Sold	$2.81	$2.45	$3.85	$0.62	4	9
TOTAL TO-MARKET COSTS	$ / Tray Sold	$9.19	$8.95	$11.00	$5.81	5	9

12. DIFFERENTIATED LABOUR COSTS PER 5.5 Kg TRAY EQUIVALENT							
Unallocated Labour Costs	$ / Tray Sold	$0.60	$0.74	$3.36	$0.08	6	9
General / Farm Labour Costs	$ / Tray Sold	$1.14	$1.93	$3.12	$0.27	6	9
Pruning Labour Costs	$ / Tray Sold	$0.38	$0.28	$0.67	$0.04	3	9
Picking Labour Costs	$ / Tray Sold	$1.73	$0.98	$2.17	$0.63	2	9
Packing Labour Costs	$ / Tray Sold	$1.18	$0.31	$1.18	$0.02	1	9
Admin / Other / Marketing Labour Costs	$ / Tray Sold	$0.17	$0.16	$0.51	$0.05	4	9
Total Labour Costs	$ / Tray Sold	$5.19	$4.41	$5.71	$3.82	3	9
Total Labour and Contracting / Consulting Costs	$ / Tray Sold	$5.26	$6.56	$7.76	$5.26	9	9

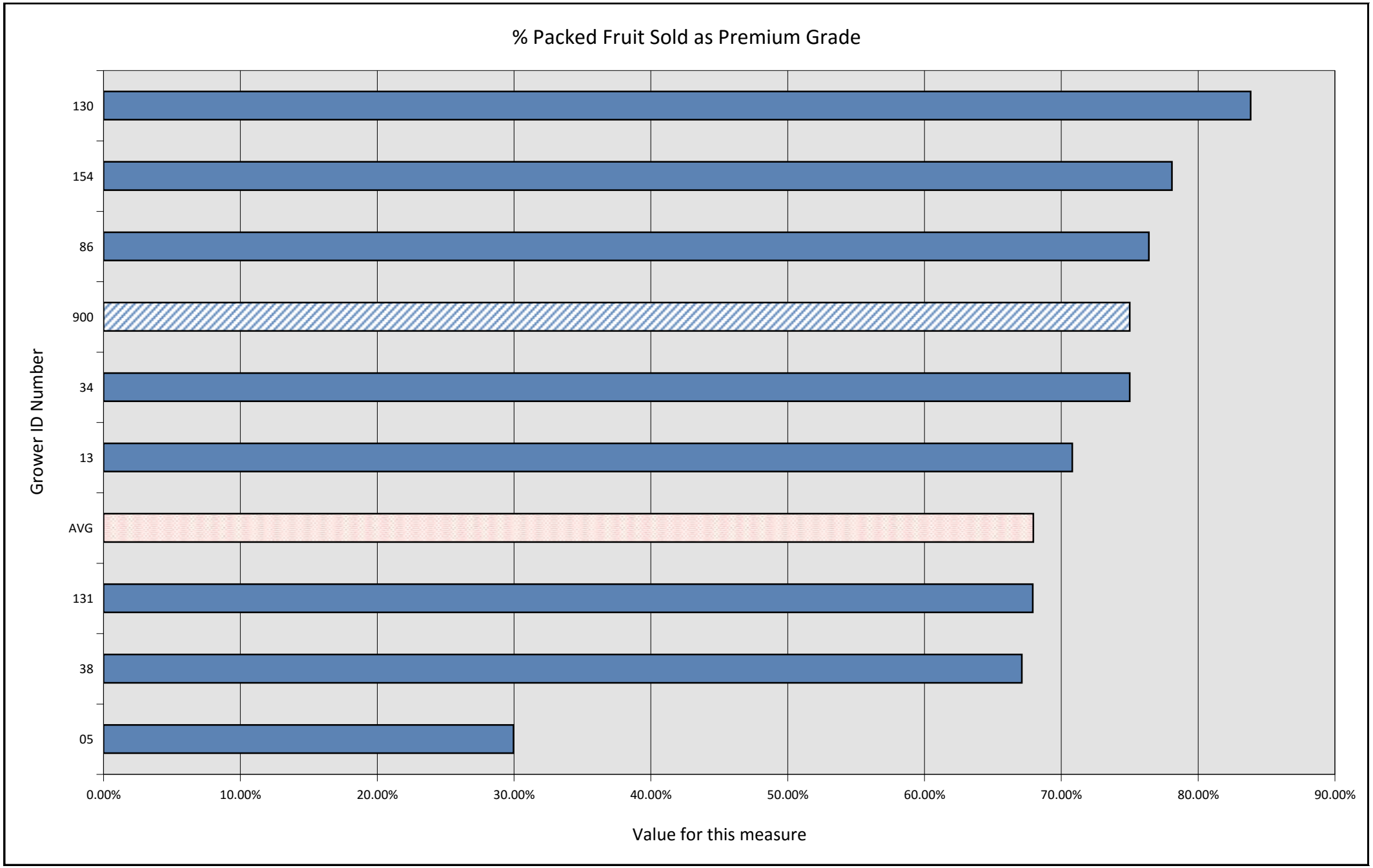
Comparative Analysis Report (2012/2013/2014/2015)-SAMPLE FARM ID 900-Same Region-Central QLD

SAMPLE FARM	900



Comparative Analysis Report (2012/2013/2014/2015)-SAMPLE FARM ID 900-Same Region-Central QLD

SAMPLE FARM	900

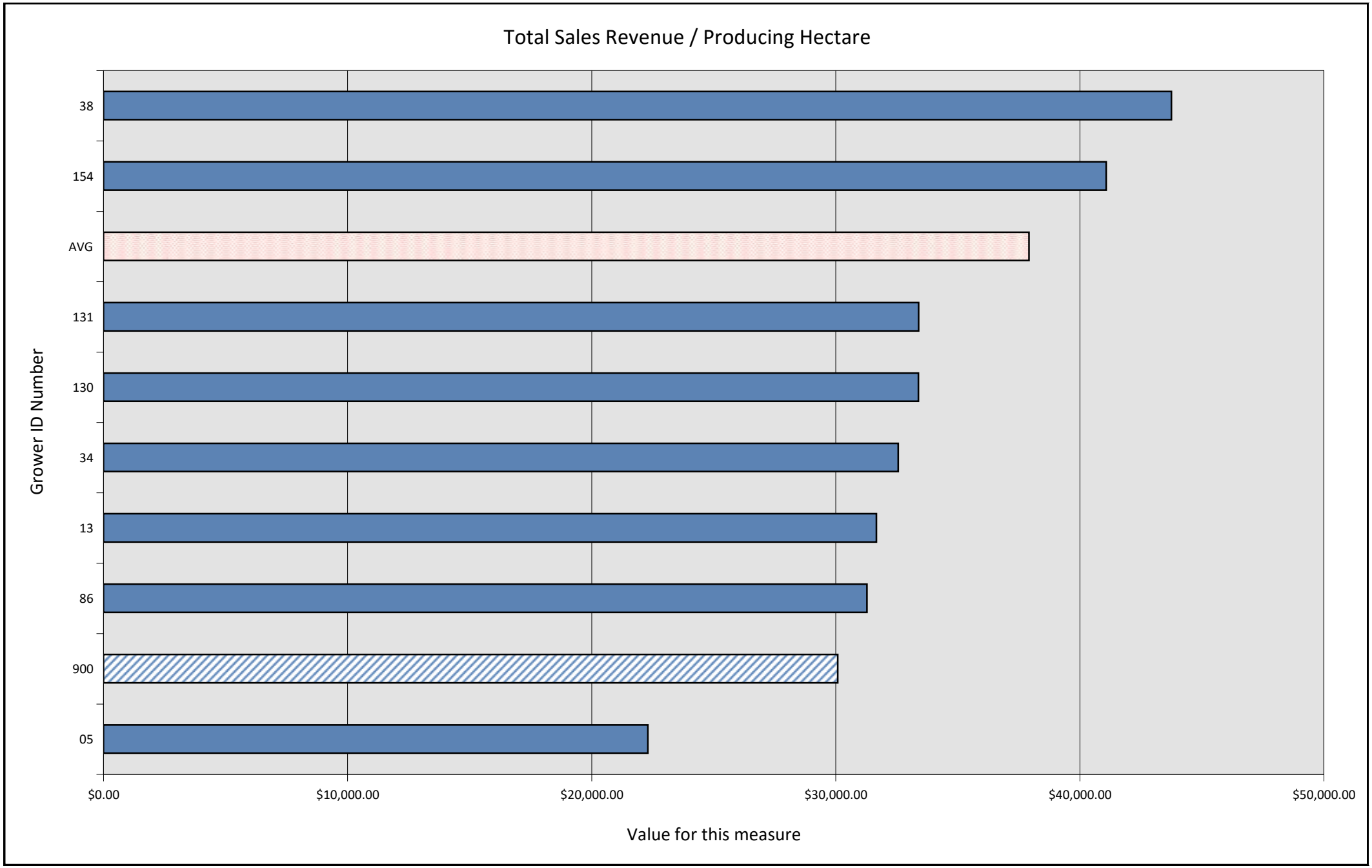


Comparative Analysis Report (2012/2013/2014/2015)-SAMPLE FARM ID 900-Same Region-Central QLD

SAMPLE FARM	**900**

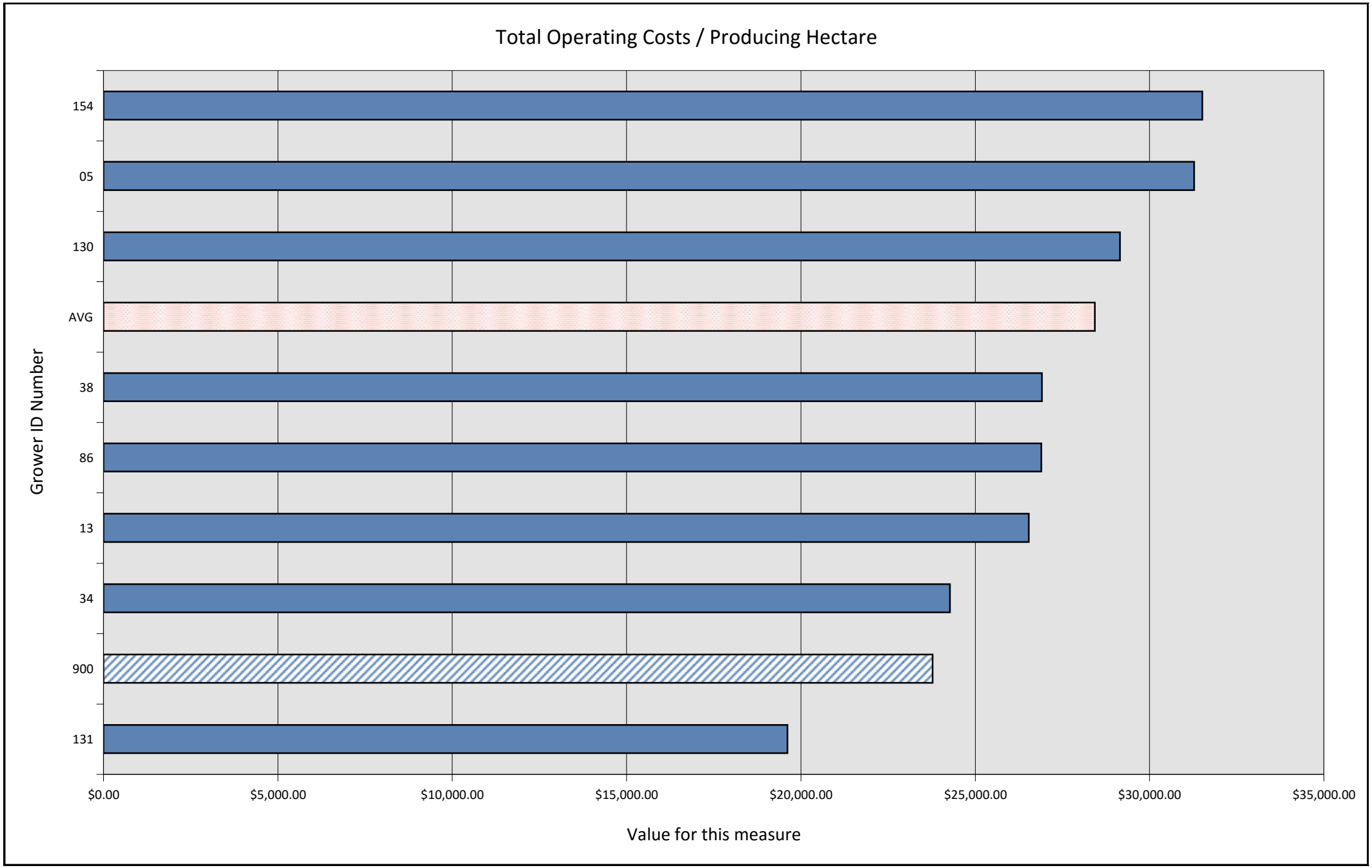
Comparative Analysis Report (2012/2013/2014/2015)-SAMPLE FARM ID 900-Same Region-Central QLD

SAMPLE FARM	900



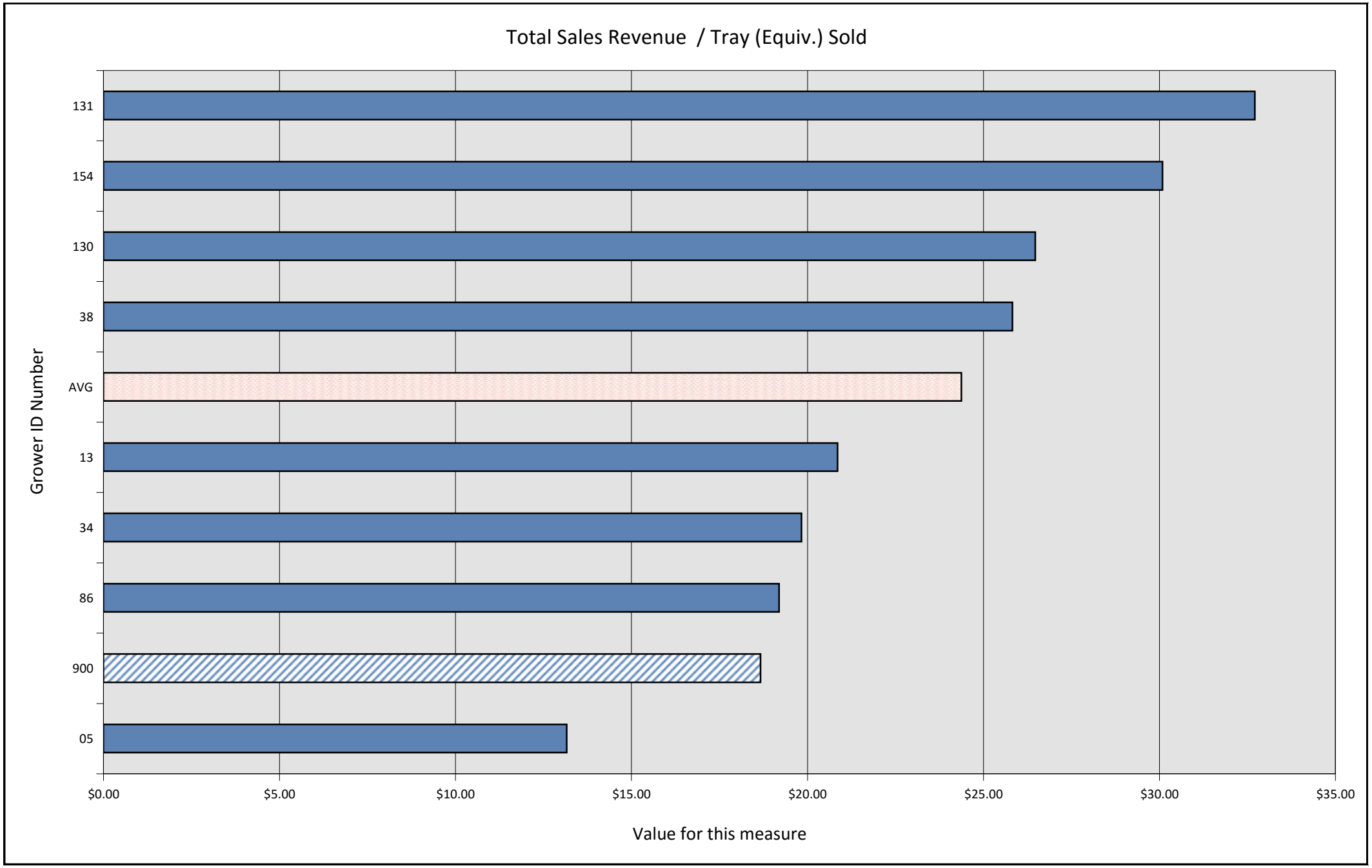
Comparative Analysis Report (2012/2013/2014/2015)-SAMPLE FARM ID 900-Same Region-Central QLD

SAMPLE FARM	900



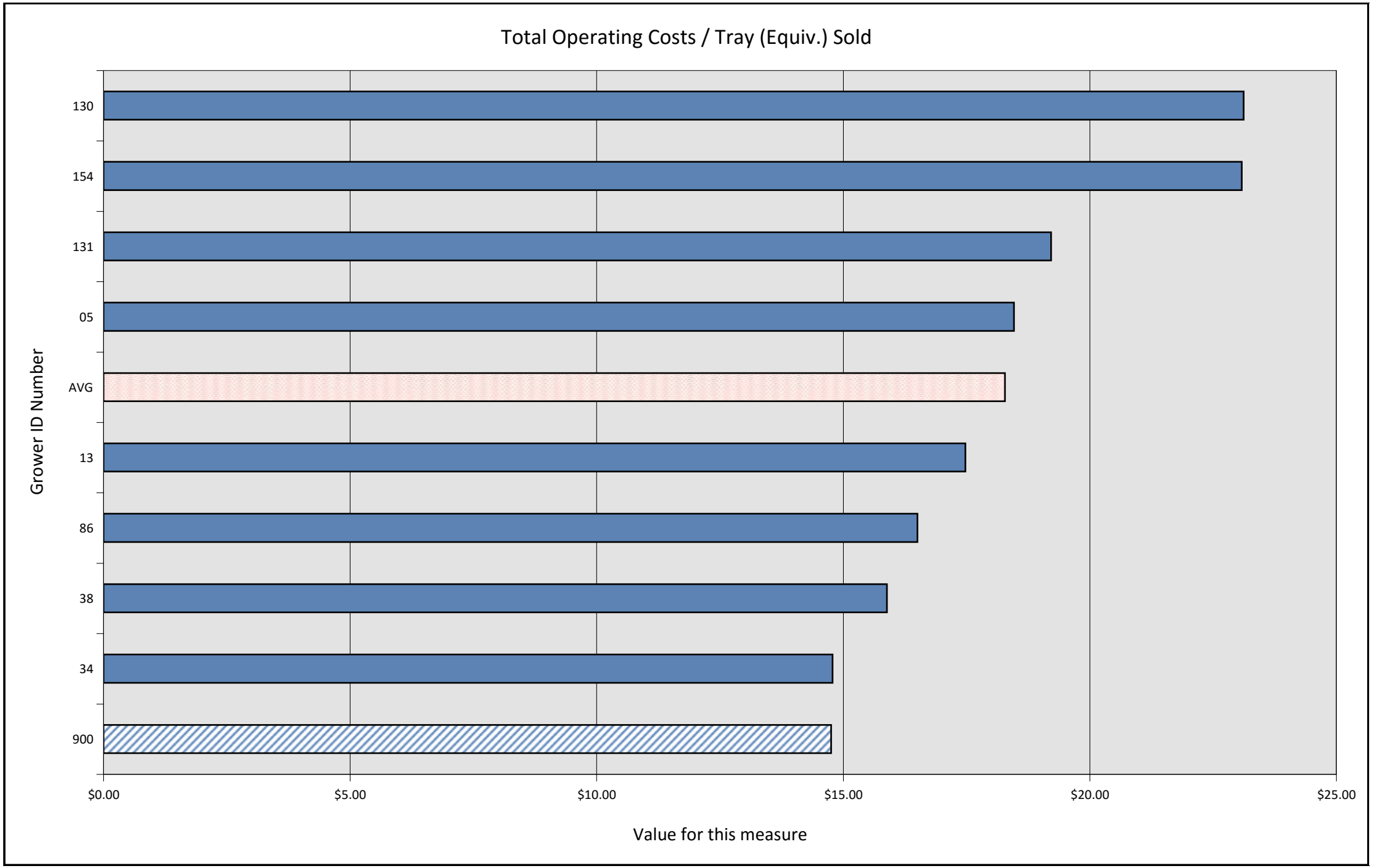
Comparative Analysis Report (2012/2013/2014/2015)-SAMPLE FARM ID 900-Same Region-Central QLD

SAMPLE FARM	900



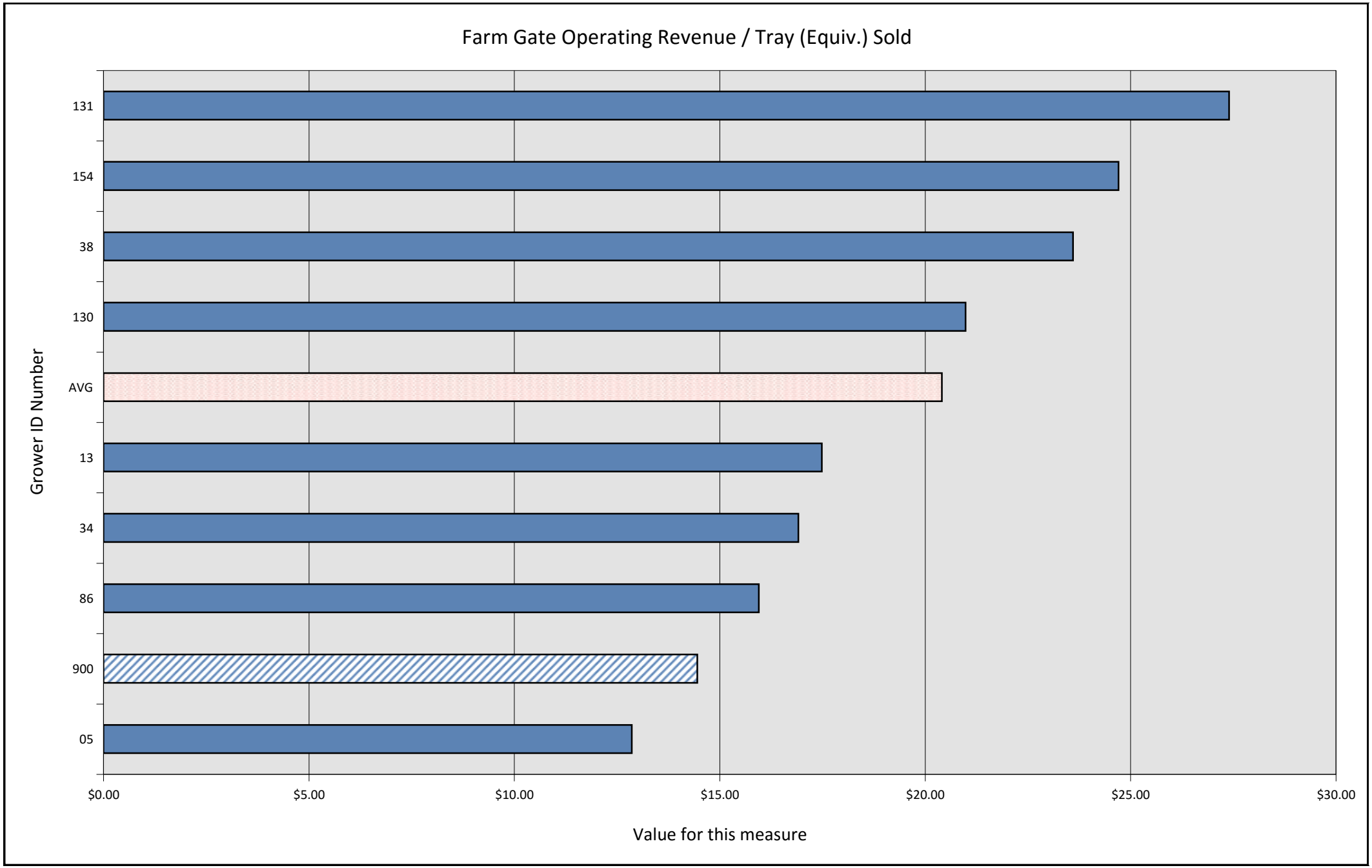
Comparative Analysis Report (2012/2013/2014/2015)-SAMPLE FARM ID 900-Same Region-Central QLD

SAMPLE FARM	900



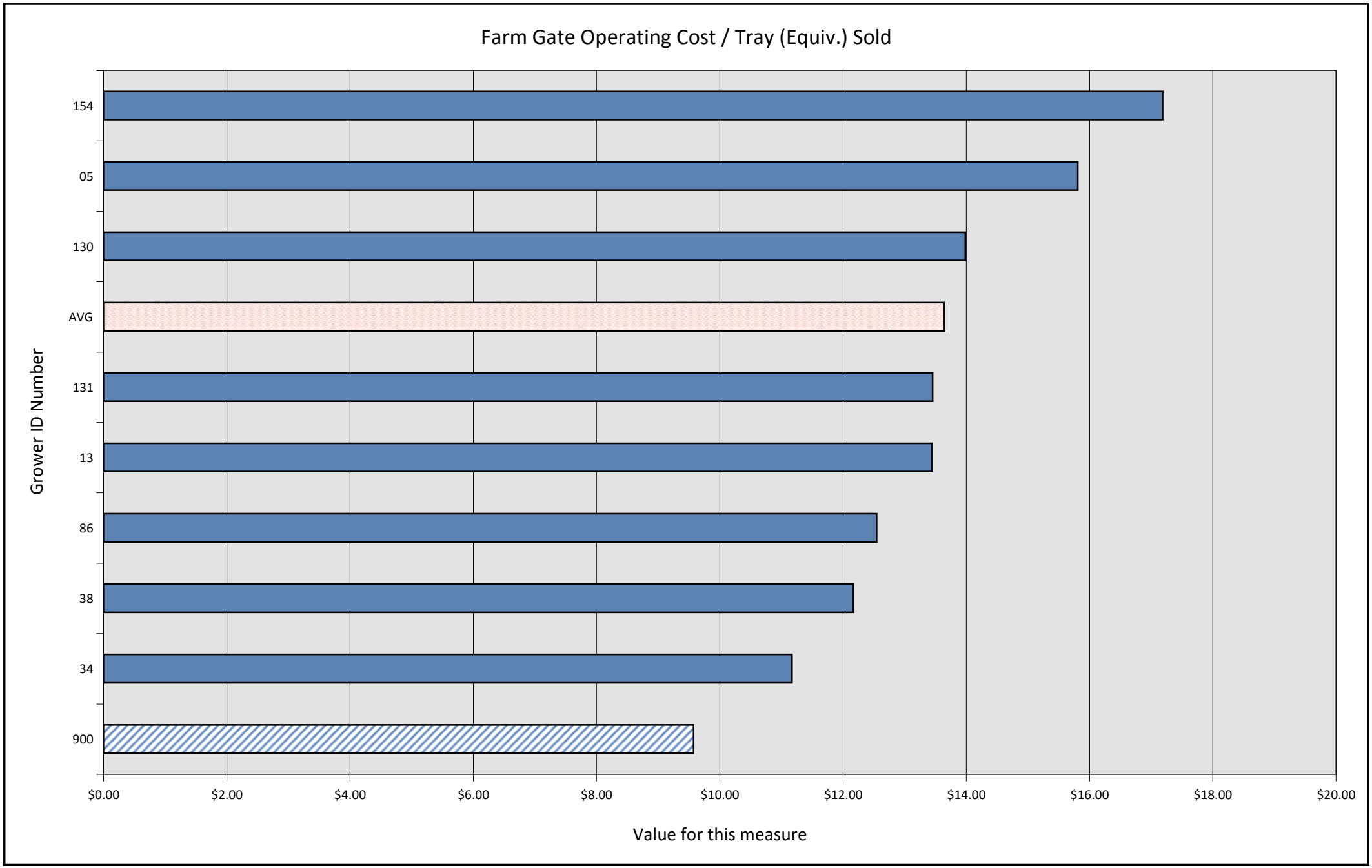
Comparative Analysis Report (2012/2013/2014/2015)-SAMPLE FARM ID 900-Same Region-Central QLD

SAMPLE FARM	900



Comparative Analysis Report (2012/2013/2014/2015)-SAMPLE FARM ID 900-Same Region-Central QLD

SAMPLE FARM	900



Appendix 3: Sample Multi-Year Analysis Report

Multiple Year Benchmarking Data For Years 2012 / 2013 / 2014 / 2015 And Aggregate Average Values-SAMPLE FARM ID 900-Central QLD

SAMPLE FARM						900
	Unit	2012	2013	2014	2015	Aggregate Ave. Values for Yrs 2012 / 2013 / 2014 / 2015
1. ENTERPRISE INFORMATION						
Total Producing Trees	Trees	8,929.00				8,929.00
Total Producing Hectares	Ha	47.50				47.50
Average Producing Trees / Hectare	Trees / Ha	187.98				187.98
Total Trees (Producing and Immature)	Trees	8,929.00				
Total Hectares Planted (Producing and Immature)	Ha	47.50				
Total KGS Harvested, Packed and Sold	Kgs	421,003.00				421,003.00
Total KGS Sold as Juice, Oil, Processing	Kgs	0.00				
Total KGS Harvested	Kgs	421,003.00				
Total Trays (5.5 Kg Equivalent) Harvested Packed and Sold	Trays	76,546.00				76,546.00
Total Kgs Harvested / Producing Tree	Kg / Tree	47.15				47.15
Total 5.5 KG Trays Equivalent Harvested / Producing Tree	Trays / Tree	8.57				8.57
Total KGS Harvested per Producing Hectare	Kgs / Ha	8,863.22				8,863.22
Total 5.5 KG Trays (Equivalent) Harvested per Producing Hectare	Trays / Ha	1,611.49				1,611.49
Average Price Achieved $ / 5.5 KG Equivalent of Market Fruit	$ / 5.5 Kg	$18.48				$18.48
Total Costs per 5.5 KG Equivalent Sold	$ / Tray Sold	$14.76				$14.76
Average EBITDA per 5.5 KG Equivalent Sold	$ / Tray Sold	$4.88				$4.88
% of Fruit Sold as Mid-Sized (Size Counts 18 to 25)	%	53.68%				53.68%

Multiple Year Benchmarking Data For Years 2012 / 2013 / 2014 / 2015 And Aggregate Average Values-SAMPLE FARM ID 900-Central QLD

SAMPLE FARM						900
	Unit	2012	2013	2014	2015	Aggregate Ave. Values for Yrs 2012 / 2013 / 2014 / 2015
2. BUSINESS SCALE AND OUTCOMES						
Gross Sales Revenue (Before Marketing & Ripening Costs) $	$	$1,428,958.00				$1,428,958.00
Total Costs	$	$1,129,525.00				$1,129,525.00
NET PROFIT BEFORE TAX	$	$299,433.00				$299,433.00
EBIT $	$	$350,675.00				$350,675.00
Total Operating Costs (Excluding Interest and Depreciation)	$	$1,055,279.00				$1,055,279.00
EBITDA $	$	$373,679.00				$373,679.00
Operating Costs as % of Gross Sales Revenue	%	73.85%				73.85%
3. PACK OUT						
% of Packed Fruit Sold as Premium Grade %	%	75.00%				75.00%
% of Packed Fruit Sold as A Grade %	%	25.00%				25.00%
% of Packed Fruit Sold as B Grade %	%	0.00%				0.00%
% of Packed Fruit Sold as Bulk %	%	0.00%				0.00%
% of Harvest Sold as Packed Fruit %	%	100.00%				100.00%
% of Total Harvest Sold as Juice or Processing	%	0.00%				0.00%
% of Market Fruit Sold as Large (Count Sizes 1 to 17)	%	16.03%				16.03%
% of Fruit Sold as Mid-Sized (Size Counts 18 to 25)	%	53.68%				53.68%
% of Market Fruit Sold as Small (Size Counts 26 and Higher)	%	30.30%				30.30%
4. SELECTED LABOUR USE MEASURES						
Total FTEs Employed / Producing Ha	FTE / Ha	0.19				0.19
Total Producing Hectares Managed per FTE	Ha / FTE	5.26				5.26
Gross Sales Revenue Achieved Per Total FTE	$ / FTE	$156,170.27				$156,170.27
EBITDA Achieved Per Total FTE	$ / FTE	$40,839.23				$40,839.23
Tonnes Produced and Sold Per FTE per Annum	Tonnes / FTE	48.13				48.13

Multiple Year Benchmarking Data For Years 2012 / 2013 / 2014 / 2015 And Aggregate Average Values-SAMPLE FARM ID 900-Central QLD

SAMPLE FARM						900
	Unit	2012	2013	2014	2015	Aggregate Ave. Values for Yrs 2012 / 2013 / 2014 / 2015
5. INDICATOR COST CENTRES						
Chemicals & Fertilizers as % of Gross Sales Revenue (Before Marketing and Ripening Costs are Deducted)	%	0.00%				0.00%
Employment and Contracting Costs as % of Gross Sales Revenue (Before Marketing and Ripening Costs are Deducted)	%	28.16%				28.16%
6. PROFITABILITY PER PRODUCING HA						
Total Sales Revenue	$ / Producing Ha	$30,083.33				$30,083.33
Total Costs	$ / Producing Ha	$23,779.47				$23,779.47
Net Profit (Before Tax)	$ / Producing Ha	$6,303.85				$6,303.85
EBIT	$ / Producing Ha	$7,382.63				$7,382.63
Total Operating Costs (Excluding Interest and Depreciation)	$ / Producing Ha	$22,216.40				$22,216.40
EBITDA	$ / Producing Ha	$7,866.93				$7,866.93
Total Farm Gate Operating Revenue (After Freight, Marketing, Ripening Costs Deducted) (FARM GATE CASH REVENUE	$ / Producing Ha	$23,295.39				$23,295.39
Total Farm Gate Operating Costs (Excl. Freight, Marketing, Ripening Costs Deducted)(FARM GATE CASH COST)	$ / Producing Ha	$15,428.46				$15,428.46
7. COSTS PER PRODUCING HA						
General Expenses	$ / Producing Ha	$1,025.35				$1,025.35
Consultants And Contractor Fees	$ / Producing Ha	$105.01				$105.01
Contract Packing Fees	$ / Producing Ha	$0.00				$0.00
Chemical and Fertiliser Costs	$ / Producing Ha	$0.00				$0.00
Power & Gas Costs	$ / Producing Ha	$346.91				$346.91
Freight Costs	$ / Producing Ha	$2,257.39				$2,257.39
Fuel & Oil Costs	$ / Producing Ha	$0.00				$0.00
Marketing & Ripening Costs	$ / Producing Ha	$4,530.55				$4,530.55
Packaging and Pallet Costs	$ / Producing Ha	$2,984.55				$2,984.55
Employment / Labour Costs	$ / Producing Ha	$8,365.89				$8,365.89
Water Costs	$ / Producing Ha	$213.26				$213.26
Insurance Costs	$ / Producing Ha	$199.83				$199.83
Finance Costs	$ / Producing Ha	$1,078.78				$1,078.78
Depreciation and Amortisation Costs	$ / Producing Ha	$484.29				$484.29

Multiple Year Benchmarking Data For Years 2012 / 2013 / 2014 / 2015 And Aggregate Average Values-SAMPLE FARM ID 900-Central QLD

SAMPLE FARM						900
	Unit	2012	2013	2014	2015	Aggregate Ave. Values for Yrs 2012 / 2013 / 2014 / 2015
Rates Levies, Licenses, Memberships, Registrations	$ / Producing Ha	$762.21				$762.21
Motor Vehicles	$ / Producing Ha	$209.77				$209.77
Repairs & Replacements	$ / Producing Ha	$1,215.68				$1,215.68
Royalties & PVR Costs	$ / Producing Ha	$0.00				$0.00
8. DIFFERENTIATED LABOUR COSTS PER PRODUCING HA						
Unallocated Owners Labour Costs	$ / Producing Ha	$832.08				
General / Farm Labour Costs	$ / Producing Ha	$1,835.75				
Pruning Labour Costs	$ / Producing Ha	$606.57				
Picking Labour Costs	$ / Producing Ha	$2,790.40				
Packing Labour Costs	$ / Producing Ha	$1,896.48				
Admin. / Other / Marketing Labour Costs	$ / Producing Ha	$266.69				
9. PROFITABILITY PER 5.5 Kg TRAY EQUIVALENT						
Total Sales Revenue	$ / Tray Sold	$18.67				$18.67
Total Costs	$ / Tray Sold	$14.76				$14.76
Net Profit Before Tax	$ / Tray Sold	$3.91				$3.91
EBIT	$ / Tray Sold	$4.58				$4.58
Total Operating Costs (Excluding Interest and Depreciation)	$ / Tray Sold	$13.79				$13.79
EBITDA	$ / Tray Sold	$4.88				$4.88
Total Operating Costs as % of Gross Sales Revenue	%	73.85%				73.85%
EBITDA as % of Gross Sales Revenue	%	26.15%				26.15%
Total Farm Gate Operating Revenue (FARM GATE CASH REVENUE)	$ / Tray Sold	$14.46				$14.46
Total Farm Gate Operating Costs (FARM GATE CASH COSTS)	$ / Tray Sold	$9.57				$9.57

Multiple Year Benchmarking Data For Years 2012 / 2013 / 2014 / 2015 And Aggregate Average Values-SAMPLE FARM ID 900-Central QLD

SAMPLE FARM						900
	Unit	2012	2013	2014	2015	Aggregate Ave. Values for Yrs 2012 / 2013 / 2014 / 2015
10. GROWING COSTS, OVERHEADS, OTHER COSTS PER 5.5 Kg TRAY EQUIVALENT						
General Expenses	$ / Tray Sold	$0.64				$0.64
Consultants And Contractor Fees	$ / Tray Sold	$0.07				$0.07
Chemical and Fertiliser Costs	$ / Tray Sold	$0.00				$0.00
Fuel & Oil Costs	$ / Tray Sold	$0.00				$0.00
Employment / Labour Costs	$ / Tray Sold	$2.28				$2.28
Water Costs	$ / Tray Sold	$0.13				$0.13
Insurance Costs	$ / Tray Sold	$0.12				$0.12
Finance Costs	$ / Tray Sold	$0.67				$0.67
Depreciation and Amortisation Costs	$ / Tray Sold	$0.30				$0.30
Rates, Levies, Licenses, Memberships, Registrations	$ / Tray Sold	$0.47				$0.47
Motor Vehicles	$ / Tray Sold	$0.13				$0.13
Repairs & Replacements	$ / Tray Sold	$0.75				$0.75
Royalties & PVR Costs	$ / Tray Sold	$0.00				$0.00
TOTAL GROWING, OVERHEADS AND OTHER COSTS	$ / Tray Sold	$5.57				$5.57
11. "TO-MARKET" COSTS (PICK, PACK, FREIGHT & MARKETING) PER 5.5 Kg TRAY EQUIVALENT						
Picking Labour	$ / Tray Sold	$1.73				
Packing Labour	$ / Tray Sold	$1.18				
Packaging Costs	$ / Tray Sold	$1.85				$1.85
Power and Gas Costs	$ / Tray Sold	$0.22				$0.22
Contract Packing Costs	$ / Tray Sold	$0.00				$0.00
Freight Costs	$ / Tray Sold	$1.40				$1.40
Marketing and Ripening Costs	$ / Tray Sold	$2.81				$2.81
TOTAL TO-MARKET COSTS	$ / Tray Sold	$9.19				$9.19

Multiple Year Benchmarking Data For Years 2012 / 2013 / 2014 / 2015 And Aggregate Average Values-SAMPLE FARM ID 900-Central QLD

SAMPLE FARM						900
	Unit	2012	2013	2014	2015	Aggregate Ave. Values for Yrs 2012 / 2013 / 2014 / 2015
12. LABOUR COSTS PER 5.5 Kg TRAY EQUIVALENT						
Total Labour Costs including On Costs	$ / Tray Sold	$5.19				$5.19
Total Labour and Contracting / Consulting Costs including On Costs	$ / Tray Sold	$5.26				$5.26

Appendix 4: Sample Management Practices Summary Report

AVOCADO BENCHMARKING PROGRAM

Management Practices Summary report

For

Year Ended June 30th 2015

Prepared by Pinnacle Agribusiness (formerly CDI Pinnacle Management)

Pinnacle AGRIBUSINESS

Horticulture Innovation Australia

Avocados Australia

Practices Summary Report -Same Region-Western Aust.

	Measure	Result
MARKETING AND SALES		
Marketing Channel Used - % Sold		
Direct to Major Chains	% of Produce	22.15%
Via Brokers	% of Produce	10.73%
Via Wholesalers	% of Produce	51.31%
Through Pack House that Markets Fruit	% of Produce	15.81%
Export	% of Produce	
Independent Greengrocers Directly	% of Produce	
Direct to Public (Including Farmers Markets)	% of Produce	
Growers' Level of Involvement In Marketing		
Low	% of Respondents	50.00%
Medium	% of Respondents	12.50%
High	% of Respondents	37.50%
IRRIGATION PRACTICES		
Method of Soil Moisture Monitoring		
Visual (Visual Judgement / Physical Inspection)	% of Respondents	25.00%
Tensiometers	% of Respondents	62.50%
Enviroscan / Capacitance Probe	% of Respondents	25.00%
Gypsum Block (e.g. G-DOT)	% of Respondents	
Fixed Interval Scheduling	% of Respondents	12.50%
Other	% of Respondents	
None	% of Respondents	
Soil Moisture Monitoring Frequency - High Demand Periods		
Two or More Times Per Day	% of Respondents	62.50%
Daily	% of Respondents	37.50%
Every 2 Days	% of Respondents	
Twice Weekly	% of Respondents	12.50%
Weekly	% of Respondents	
Less Frequently Than Weekly	% of Respondents	
Automatic / Computerised System	% of Respondents	
Other (Specify)	% of Respondents	
Irrigation Frequency in High Demand Period		
Two or More Times Per Day	% of Respondents	37.50%
Daily	% of Respondents	37.50%
Every 2 Days	% of Respondents	
Twice Weekly	% of Respondents	
Weekly	% of Respondents	
Less Frequently Than Weekly	% of Respondents	
Automatic / Computerised System	% of Respondents	25.00%
Other (Specify)	% of Respondents	

Practices Summary Report -Same Region-Western Aust.

	Measure	Result
FERTILIZER AND NUTRITION		
Frequency of Soil Analysis		
Twice Per Year (or more frequently)	% of Respondents	
Yearly	% of Respondents	14.29%
Less Frequently Than Yearly	% of Respondents	85.71%
Frequency of Leaf TISSUE Analysis		
Twice Per Year (or more frequently)	% of Respondents	42.86%
Yearly	% of Respondents	28.57%
Less Frequently Than Yearly	% of Respondents	28.57%
Frquency of Leaf SAP Analysis		
Twice Per Year (or more frequently)	% of Respondents	50.00%
Yearly	% of Respondents	50.00%
Less Frequently Than Yearly	% of Respondents	
Fertilizer Application Method (% of Total Application)		
Foliar	% of Respondents	
Solid	% of Respondents	75.00%
Fertigation	% of Respondents	25.00%
Use of External Advisor for Nutrition		
Use Paid External Agronomist for Nutrition Program Decisions (Paid)	% of Respondents	37.50%
Use Supplier Staff (Not Paid) for Nutrition Program decisions - as part of their service (Not Paid)	% of Respondents	12.50%
Use Government Agricultural Dept. Staff (Not Paid)	% of Respondents	
Internal decision, following published guidelines (e.g. Avoman, Agrilink, Best Practice Resources)	% of Respondents	25.00%
Internal decision, based on experience / neighbours / friends / experience	% of Respondents	25.00%
PEST AND DISEASE MANAGEMENT		
Use of External Advice for Pest Management Decisions		
Use Paid External Agronomist for Pest Management Decisions (Paid)	% of Respondents	14.29%
Use Supplier Staff (Not Paid) for Pest Management decisions - as part of their service (Not Paid)	% of Respondents	
Use Government Agricultural Dept. Staff (Not Paid)	% of Respondents	
Internal decision, following published guidelines (e.g. Avoman, Agrilink, Best Practice Resources)	% of Respondents	42.86%
Internal decision, based on experience / neighbours / friends / experience	% of Respondents	42.85%
Number of Anthracnose Orchard Sprays Applied		
None	% of Respondents	62.50%
1 to 5 per Year	% of Respondents	37.50%
6 to 10 per Year	% of Respondents	
More Than 10 per Year	% of Respondents	

Practices Summary Report -Same Region-Western Aust.

	Measure	Result
DRAINAGE, MOUNDING, MULCH AND PHYTOPHTHORA MANAGEMENT		
Mounding of Trees (Building up root zone above normal ground level)		
No trees are Mounded at Planting	% of Respondents	87.50%
Some Trees are Mounded at Planting	% of Respondents	
Majority of Trees are Mounded at Planting	% of Respondents	
All Trees are Mounded at Planting	% of Respondents	12.50%
How Often is Mulch Applied to Trees		
More Than Twice Yearly	% of Respondents	
Twice Yearly	% of Respondents	
Once Per Year	% of Respondents	12.50%
Less Often Than Once per Year	% of Respondents	25.00%
Slash / Rake existing clippings / leaves / debris into root zone only	% of Respondents	50.00%
Not done - none of the Above	% of Respondents	12.50%
Specific Drainage Works Installed In Orchard		
Not Applicable	% of Respondents	75.00%
Not to Date, may do so in the future	% of Respondents	12.50%
Yes in wet areas	% of Respondents	12.50%
Basis For Phytophthora / Root Rot Treatment Strategy		
Based on recommendations from Phos. Acid Analysis of root samples	% of Respondents	14.29%
Based on external consultant advice (Paid advisor)	% of Respondents	14.29%
Based on supplier or reseller representative advice (Not paid)	% of Respondents	
Based on Government Ag. Dept. Staff advice (Not Paid)	% of Respondents	
Internal decision, following published guidelines (e.g. Avoman, Agrilink, Best Practice Resources)	% of Respondents	42.85%
Internal decision, based on experience / neighbours / friends / experience	% of Respondents	28.57%
Phytophthora Treatment Method		
Needle Injection (Phos. Acid)	% of Respondents	57.14%
Foliar Spray (Phos. Acid)	% of Respondents	28.57%
Metalaxyl (Ridomil)	% of Respondents	14.29%
Other	% of Respondents	
None - Don't Do it	% of Respondents	14.29%
Phytophthora Treatment Frequency		
More Than Twice Yearly	% of Respondents	14.29%
Twice Yearly	% of Respondents	42.84%
Once Per Year	% of Respondents	14.29%
Less Often Than Once per Year	% of Respondents	14.29%
None - Don't Do it	% of Respondents	14.29%

Practices Summary Report -Same Region-Western Aust.

	Measure	Result
CANOPY MANAGEMENT (ON MATURE TREES)		
Average Tree Density		
Less than 200 per ha	% of Respondents	37.50%
201 to 400 per Ha	% of Respondents	50.00%
More Than 400 per Ha	% of Respondents	12.50%
Canopy Management Methods		
No canopy Management (NIL)	% of Respondents	14.29%
Mechanical Hedging and / or Topping	% of Respondents	
Selective Limb Removal	% of Respondents	85.71%
Removal of Alternate Trees or Rows	% of Respondents	14.29%
Major Manual Canopy Reduction	% of Respondents	14.29%
Stag Horn	% of Respondents	14.29%
Frequency of Canopy Management		
More Than Twice Yearly	% of Respondents	14.29%
Twice Yearly	% of Respondents	
Once Per Year	% of Respondents	57.14%
Less Often Than Once per Year	% of Respondents	28.57%
% of Orchard Pruned Per Year (Average at that Frequency)		
100% Each Year	% of Respondents	14.29%
Between 50% & 99% Each Year	% of Respondents	
Between 25% & 49% Each year	% of Respondents	42.85%
Between 11% & 24% Each Year	% of Respondents	14.29%
10% or Less Per Year	% of Respondents	28.57%
PACKING STRATEGY		
Pack Own Fruit	% of Produce	20.59%
Use Contract Packing House	% of Produce	79.41%

Appendix 5: Sample Regional Grower Presentation

‘Maximising Profits in Avocados’

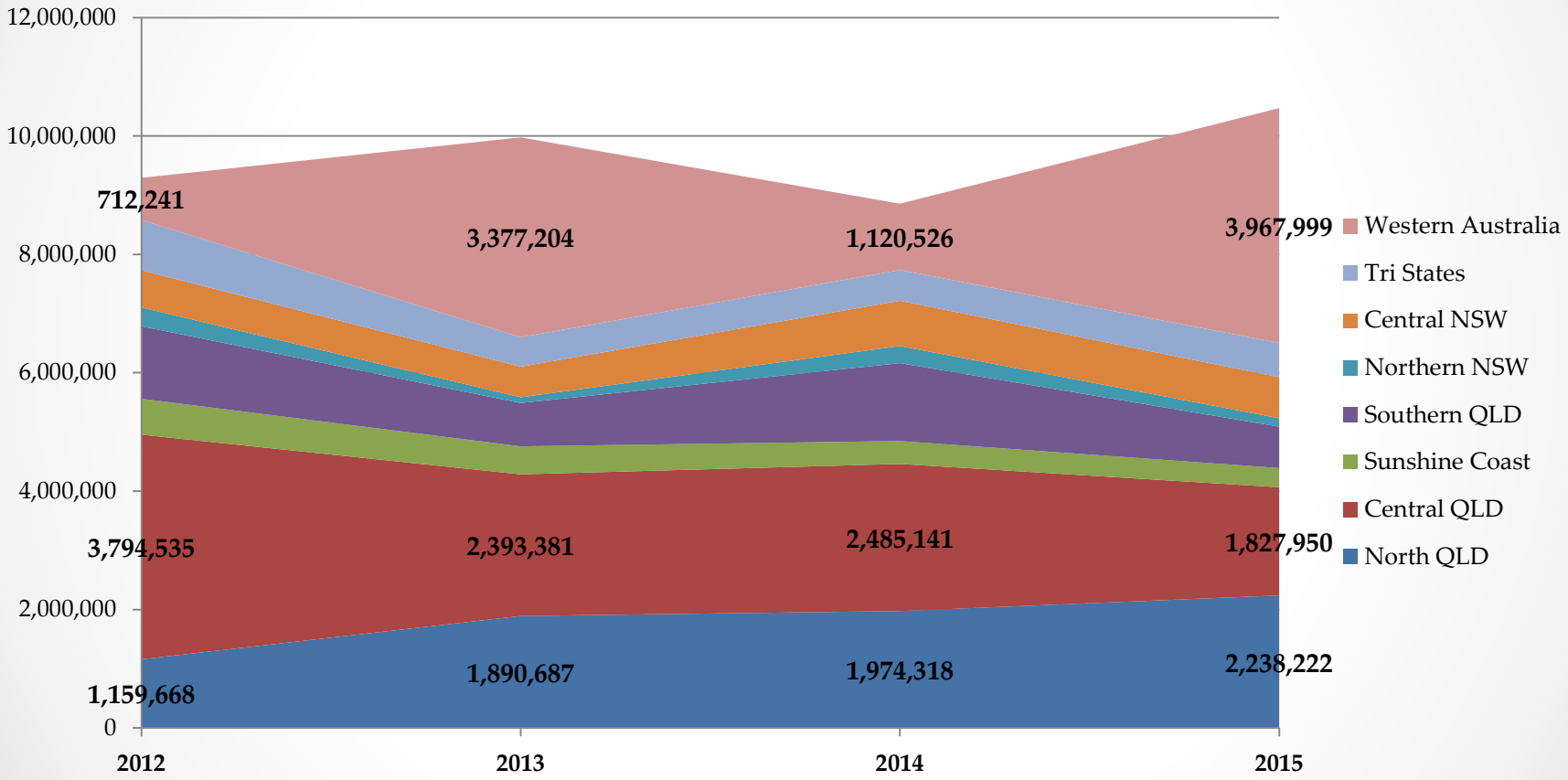
(4 Years Benchmarking Data)

July 14th 2016, Mareeba QLD.

Summary of (All Regions) Benchmarking Data (4 Year Averages)

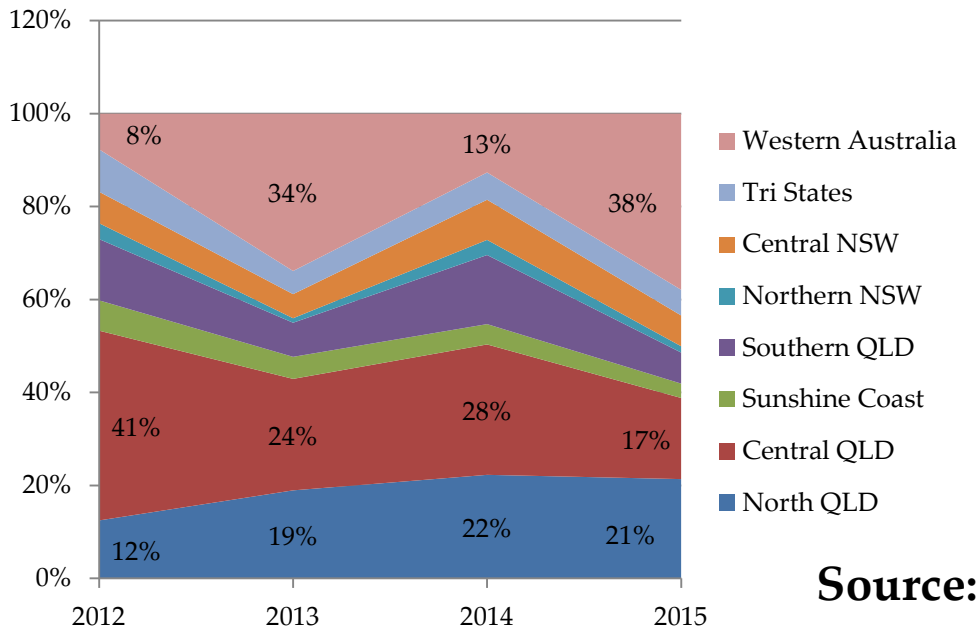
National Production Trends:

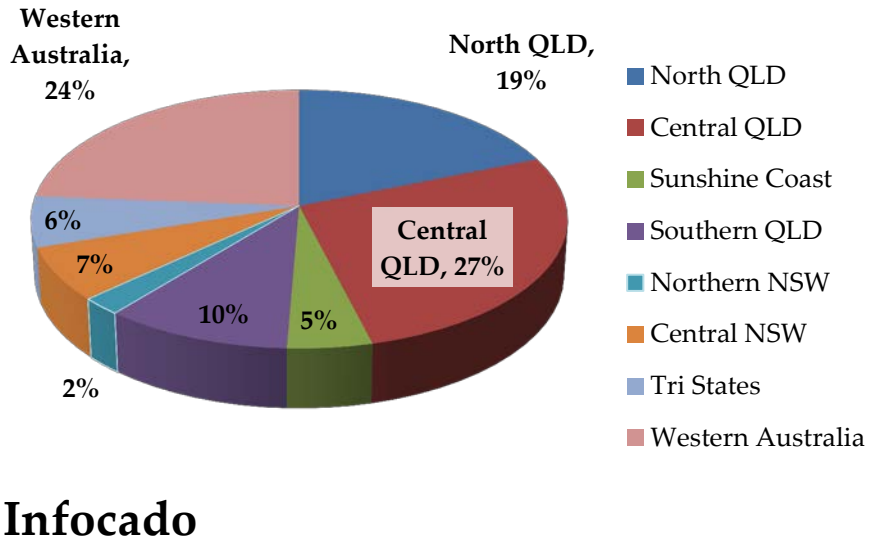
(Source - Infocado)



National Industry Data

& Benchmarking Sample Size



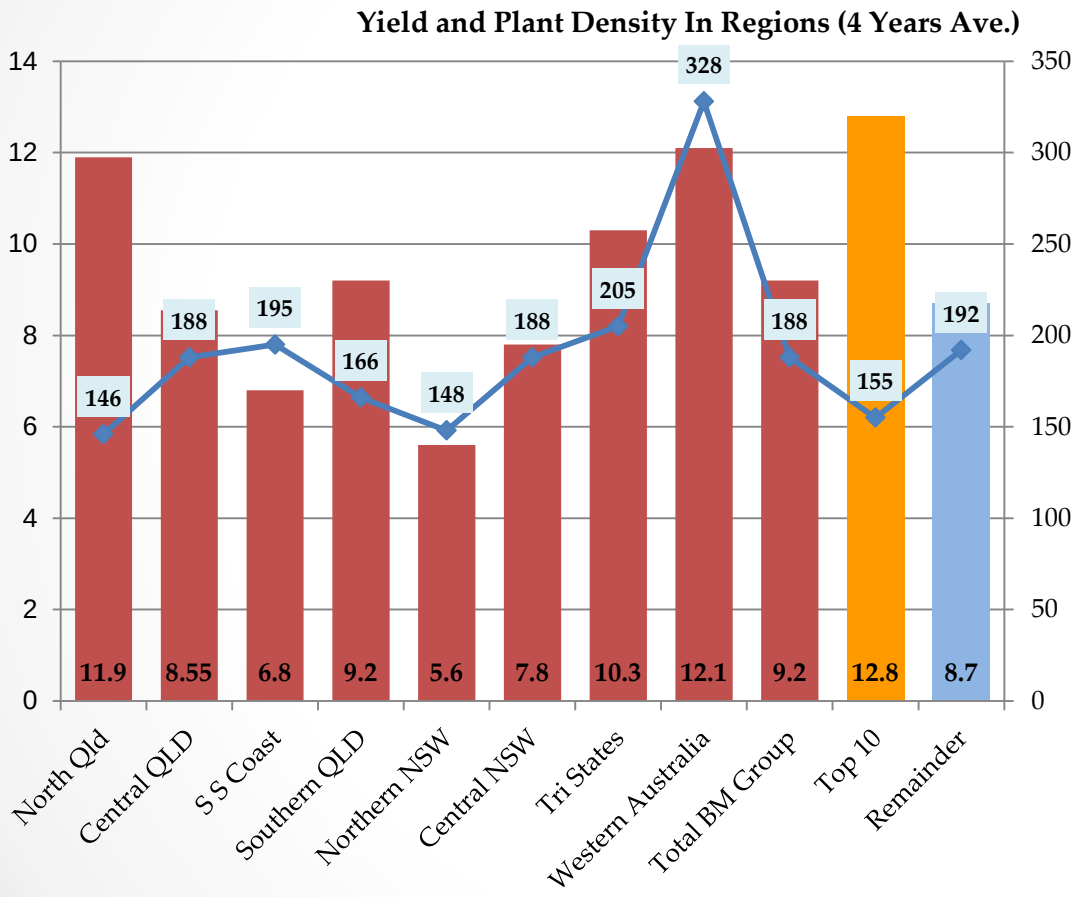


Source: Infocado

Benchmarking Group: 31% of National Harvest Volume Over 4 Years
and 35% OF North Qld Harvest over 4 Years

Between the Regions:

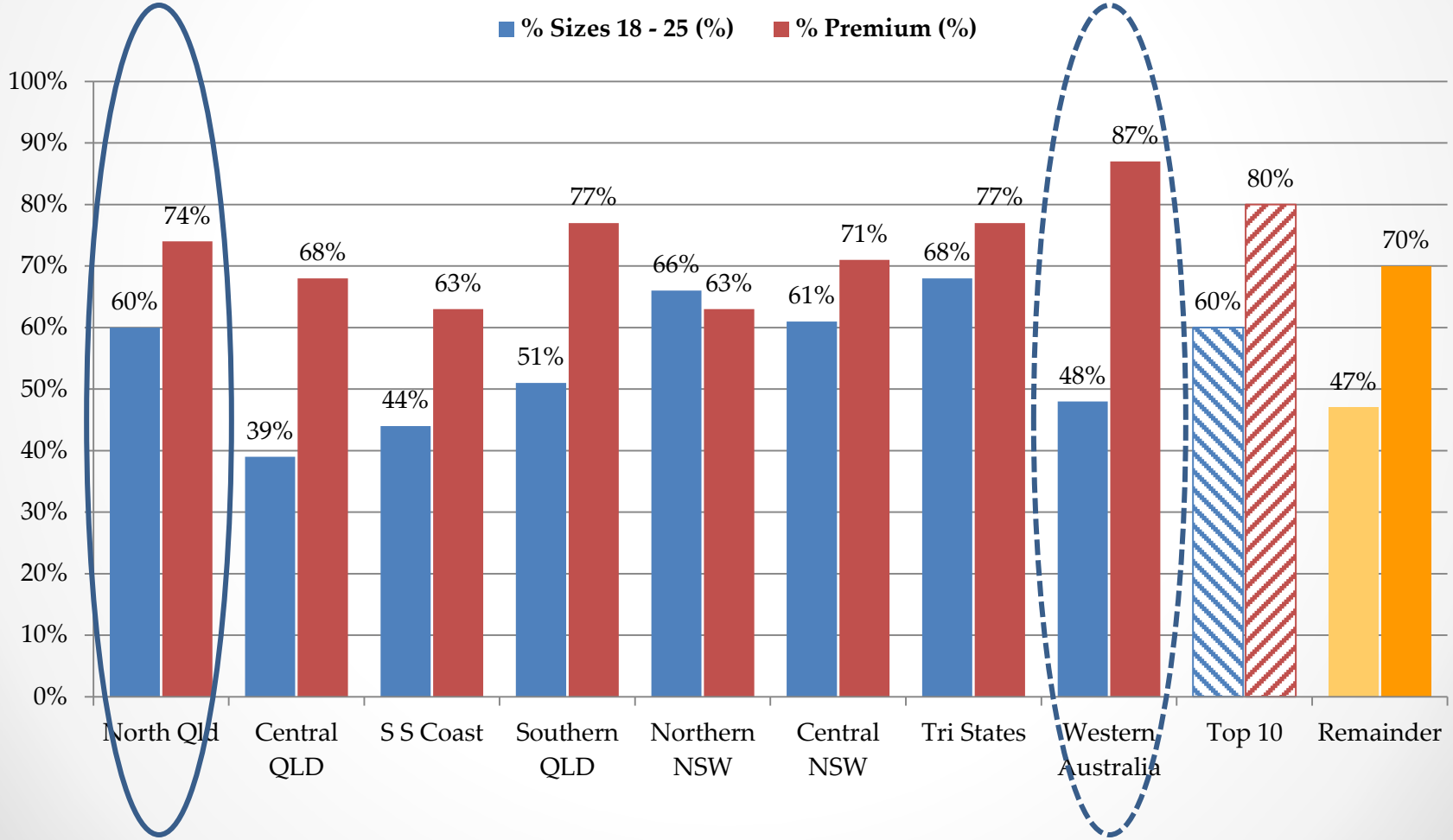
Yield and Plant Density



TOP 10 GROUP	
North QLD	4
Southern QLD	1
Central NSW	1
Western Australia	4
TOTAL	10

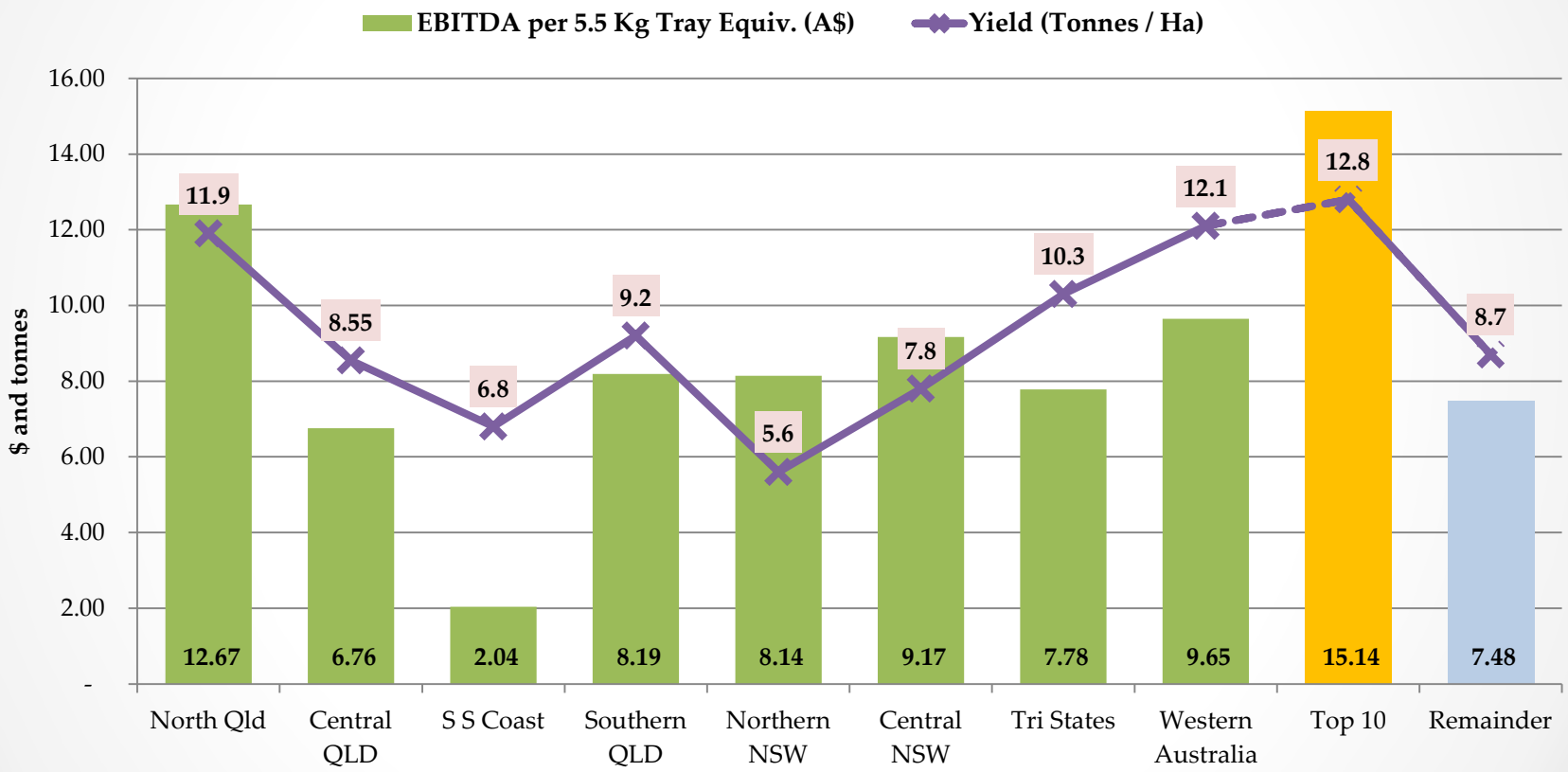
Between the Regions:

Fruit Size and Grade (4 Year Ave.)



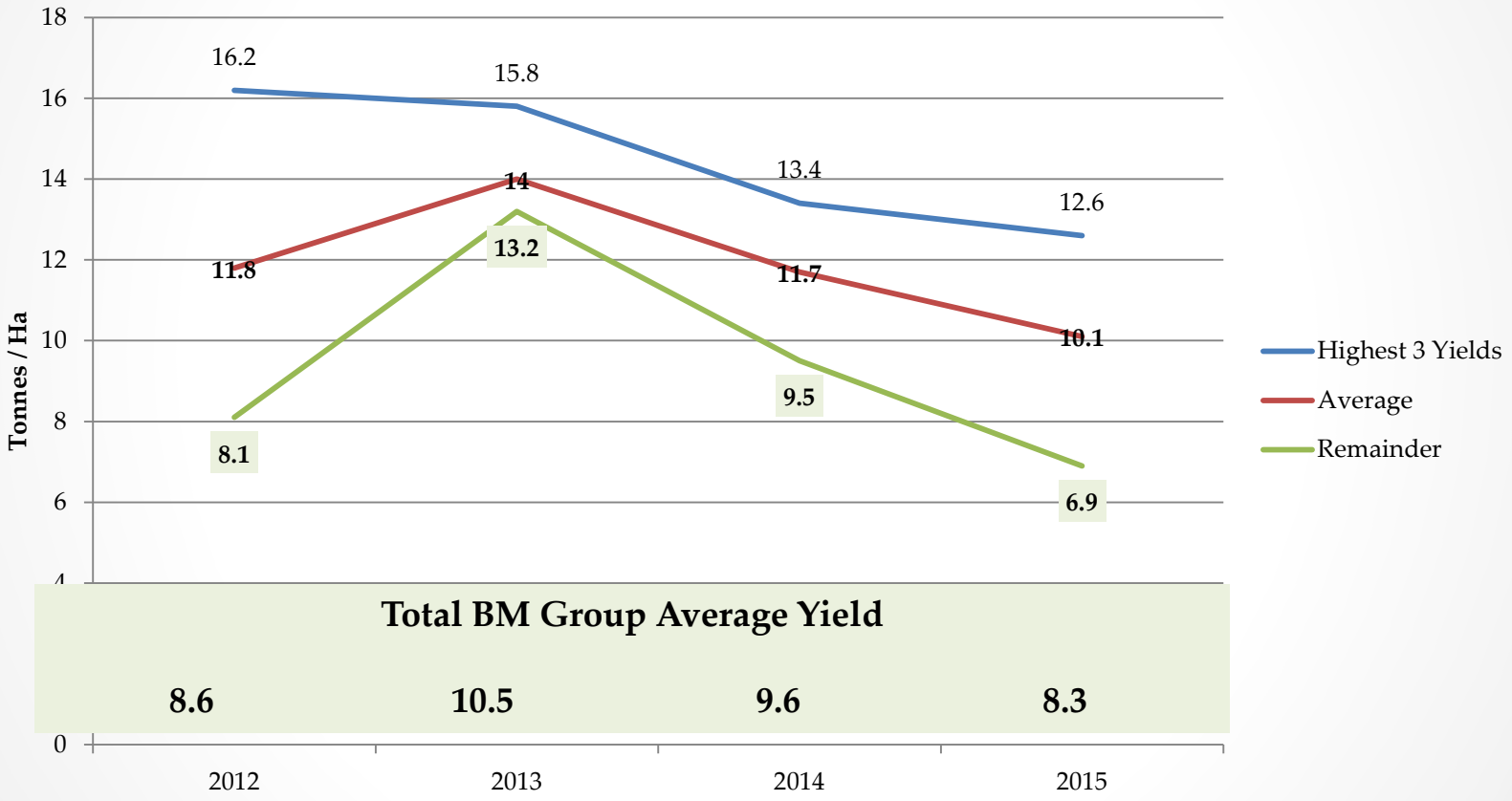
Between the Regions:

Yield and EBITDA



North Queensland Region

North QLD: Yield Each Year



North QLD:

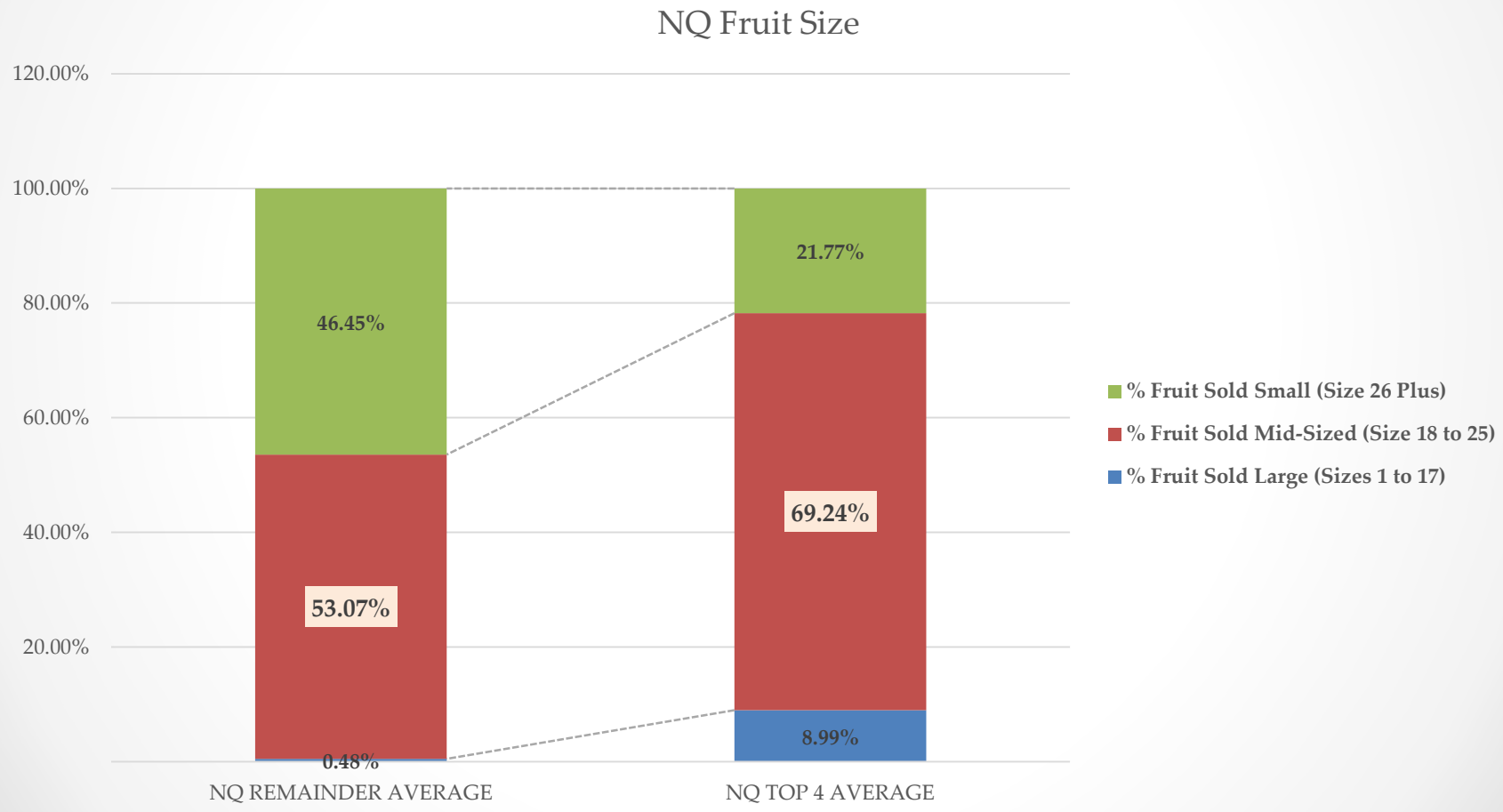
EBITDA, Fruit Size & Grade (4 Year Ave.)

Report Format Extract

(from 1 Farm over 4 Years)

	Unit	2012	2013	2014	2015	Aggregate Ave. Values for 4 Years
Average Producing Trees / Hectare	Trees / Ha	137	137	137	128	135
Total 5.5 KG Trays Equivalent / Producing Tree	Trays / Tree	22	20	16	12	17
Total KGS Harvested per Producing Ha	**Kgs / Ha**	**16,744**	**14,960**	**11,918**	**8,337**	**12,990**
% of Fruit Sold as Mid-Sized (18 to 25)	**%**	**69%**	**58%**	**77%**	**71%**	**69%**
% of Packed Fruit Sold as Premium %	**%**	**81%**	**83%**	**68%**	**63%**	**74%**
Chemical and Fertiliser Costs	$ / Tray Sold	$0.62	$0.73	$0.66	$0.75	$0.69
Fuel & Oil Costs	$ / Tray Sold	$0.20	$0.25	$0.28	$0.33	$0.26
Packaging Costs	$ / Tray Sold	$1.88	$0.66	$1.38	$1.28	$1.30
Power and Gas Costs	$ / Tray Sold	$0.09	$0.13	$0.19	$0.30	$0.18
Total Labour and Contracting Costs	$ / Tray Sold	$3.46	$2.91	$4.77	$5.07	$4.05

Within North QLD (4 Year Ave.): Fruit Size – 'Top 4' & Remainder



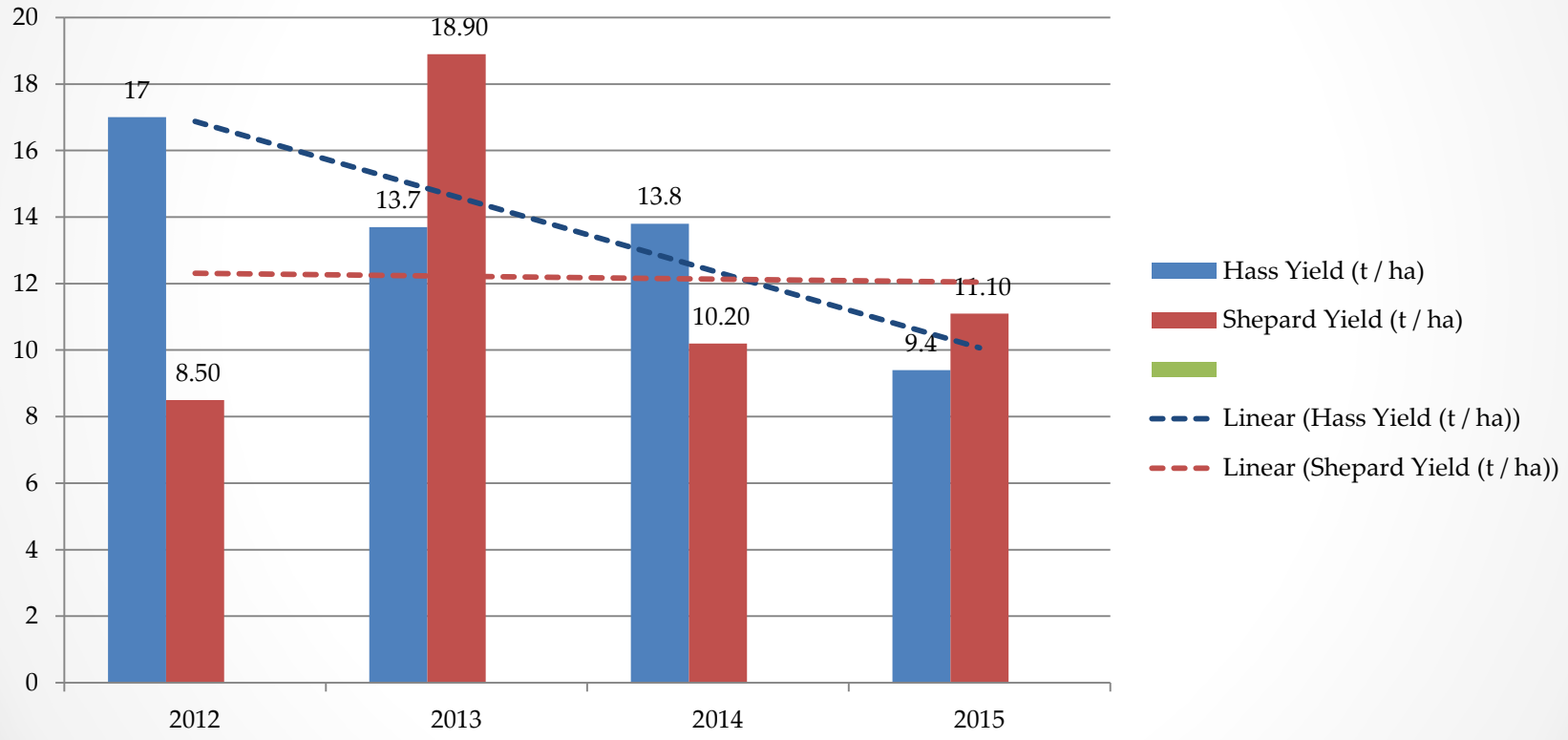
North QLD (4 Year Ave.): $ Per Hectare Basis

	Unit	NQ TOP 4 AVERAGE	NQ NON TOP 4 AVERAGE	% DIFFERENCE
Total Sales Revenue	**$ / Producing Ha**	**$66,938.12**	**$58,339.72**	**15%**
Employment / Labour Costs		$9,885.40	$11,032.46	-10%
Chemical and Fertiliser Costs		$2,943.15	$2,626.62	12%
Fuel & Oil Costs		$694.54	$622.09	12%
Total Costs		**$31,986.18**	**$35,899.81**	**-11%**
EBITDA		**$34,951.93**	**$22,439.91**	**56%**

North QLD (4 Year Ave.): $ Per 5.5 Kg Equiv. Sold Basis

	Unit	NQ TOP 4 AVERAGE	NQ NON TOP 4 AVERAGE	% DIFFERENCE
Total Sales Revenue	**$ / Tray Sold**	**$29.82**	**$27.63**	**8%**
Total Labour and Contracting / Consulting Costs	$ / Tray Sold	$4.50	$6.04	-25%
Chemical and Fertiliser Costs	$ / Tray Sold	$1.31	$1.24	5%
Fuel & Oil Costs	$ / Tray Sold	$0.31	$0.29	5%
Total Costs		**$14.25**	**$17.00**	**-16%**
EBITDA	**$ / Tray Sold**	**$15.57**	**$10.63**	**47%**

North QLD
Yield by Variety



North QLD (4 Year Ave.) 'Top 4' Verses Remainder

	Unit	NQ TOP 4 AVERAGE	NQ NON TOP 4 AVERAGE	% DIFFERENCE
Total 5.5 KG Trays Equiv. Harvested / Producing Tree	Trays / Tree	16.46	13.84	19%
Total KGS Harvested per Producing Hectare	Kgs / Ha	12,344.47	11,614.96	6%
Average EBITDA per 5.5 KG Equivalent Sold	$ / Tray Sold	$15.57	$10.63	47%
% of Fruit Sold as Mid-Sized (Size Counts 18 to 25)	%	69.24%	53.07%	30%
% of Packed Fruit Sold as Premium Grade %	%	80.38%	68.67%	17%

What Do The 'NQ Most Profitable 4' Do Different

- **Marketing**
  - More than 50% of Produce is sold Direct (57%, V. 0%)
- **Irrigation Management**
  - Monitor soil moisture at least Twice Weekly (100% V 33%)
  - Twice as Many Irrigate '*daily or more frequently*' (67%, V. 33%)
- **External Nutrition Advice**
  - Use more external input re Nutrition (100%, V. 33%)
- **Phytophthora Treatment**
  - Rely more on Root Sample Tests (100% V. 33%)
  - More of them treat Twice Per year (33% V. 0%)
- **Canopy Management**
  - More Hand Pruning / Selective Limb Removal (100% V. 67%)
  - All prune 100% of their orchards each year (100% V. 67%)

What Can We Learn

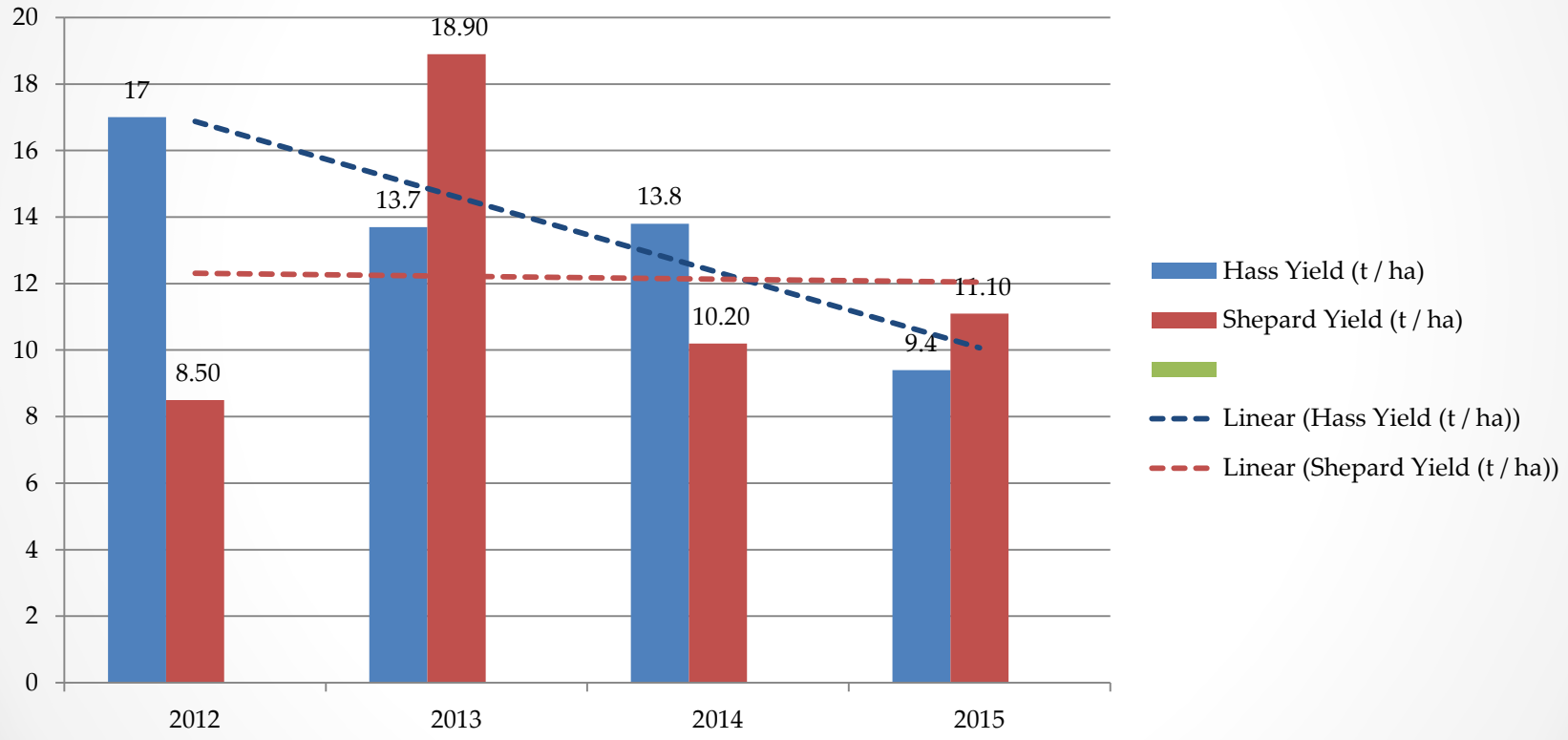
Top Performing Businesses Yield (4 Year Averages)

		WA	WA	TS	WA	NQ	NQ	NQ	NQ
Total Tonnes per Producing Hectare	**T / Ha**	**27**	**19**	**18**	**15**	**14**	**14**	**13**	**13**
Total Kgs / Producing Tree	Kg / Tree	**117**	56	98	31	**100**	87	111	96
% of Fruit Sold as Mid-Sized (Size 18 to 25)	%	**31%**	58%	71%	41%	**54%**	49%	78%	68%
Average Producing Trees / Hectare	Trees / Ha	**231**	333	186	480	**141**	154	118	135
Average Tree Age		**16**	16	14	14	**19**	20	21	16
Average EBITDA per 5.5 KG Equivalent	$ / Tray Sold	**$14**	$15	$18	$10	**$13**	$12	$13	$18

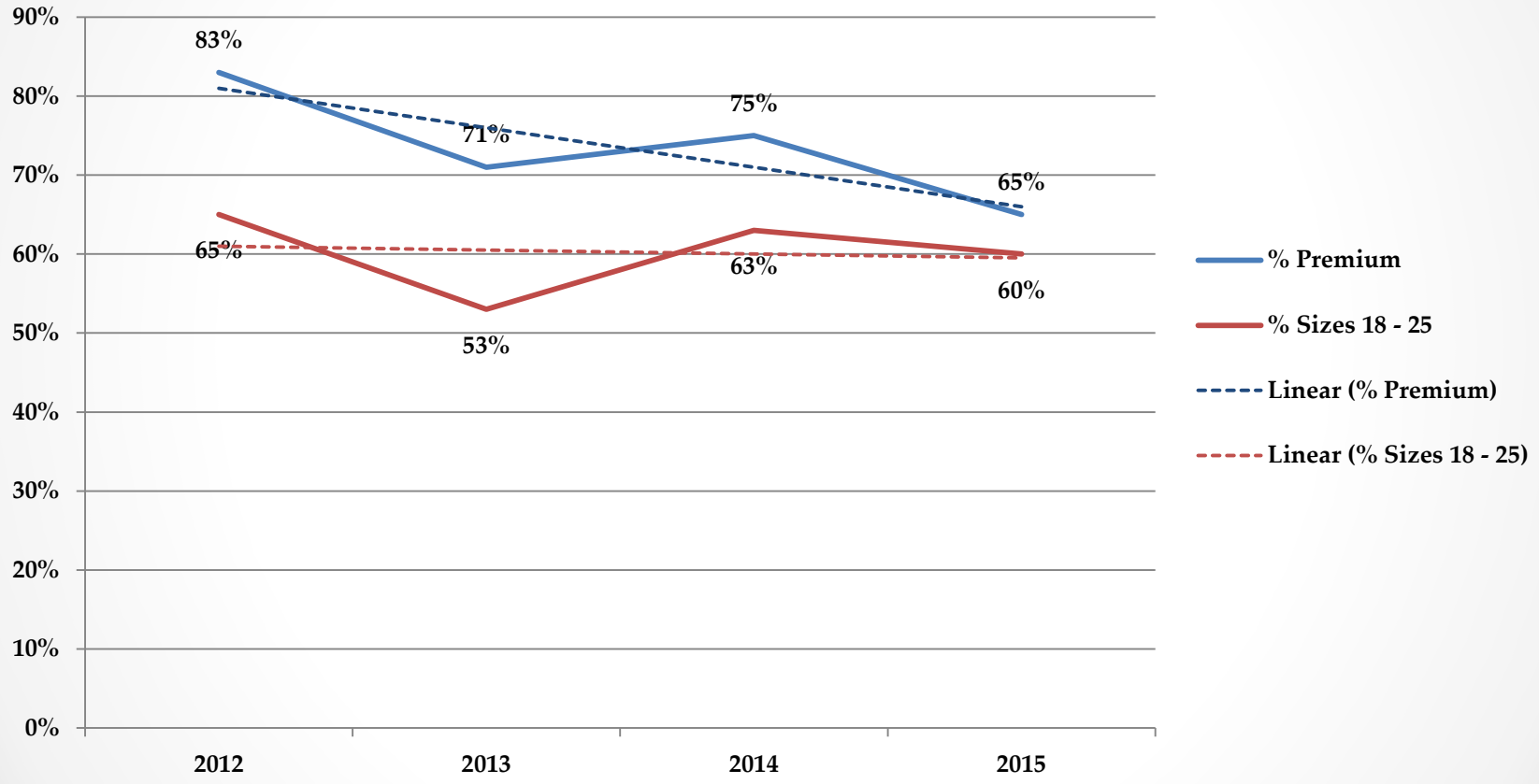
Top Performing Businesses Size Count (4 Year Averages)

		NQ	TS	NQ	WA	WA	NQ	NQ	SQ
% of Fruit Sold as Mid-Sized (Size 18 to 25)	%	78%	71%	68%	63%	58%	54%	49%	46%
% of Packed Fruit Sold as Premium Grade %	%	91%	91%	76%	73%	93%	79%	83%	77%
Total Tonnes per Producing Hectare	T / Ha	13	18	13	11	19	14	13	11
Average Producing Trees / Hectare	Trees / Ha	118	186	135	368	333	141	154	202
Average Tree Age		21	14	16	14	16	19	21	26
Average EBITDA per 5.5 KG Equivalent	$ / Tray Sold	13	18	18	12	15	13	12	14

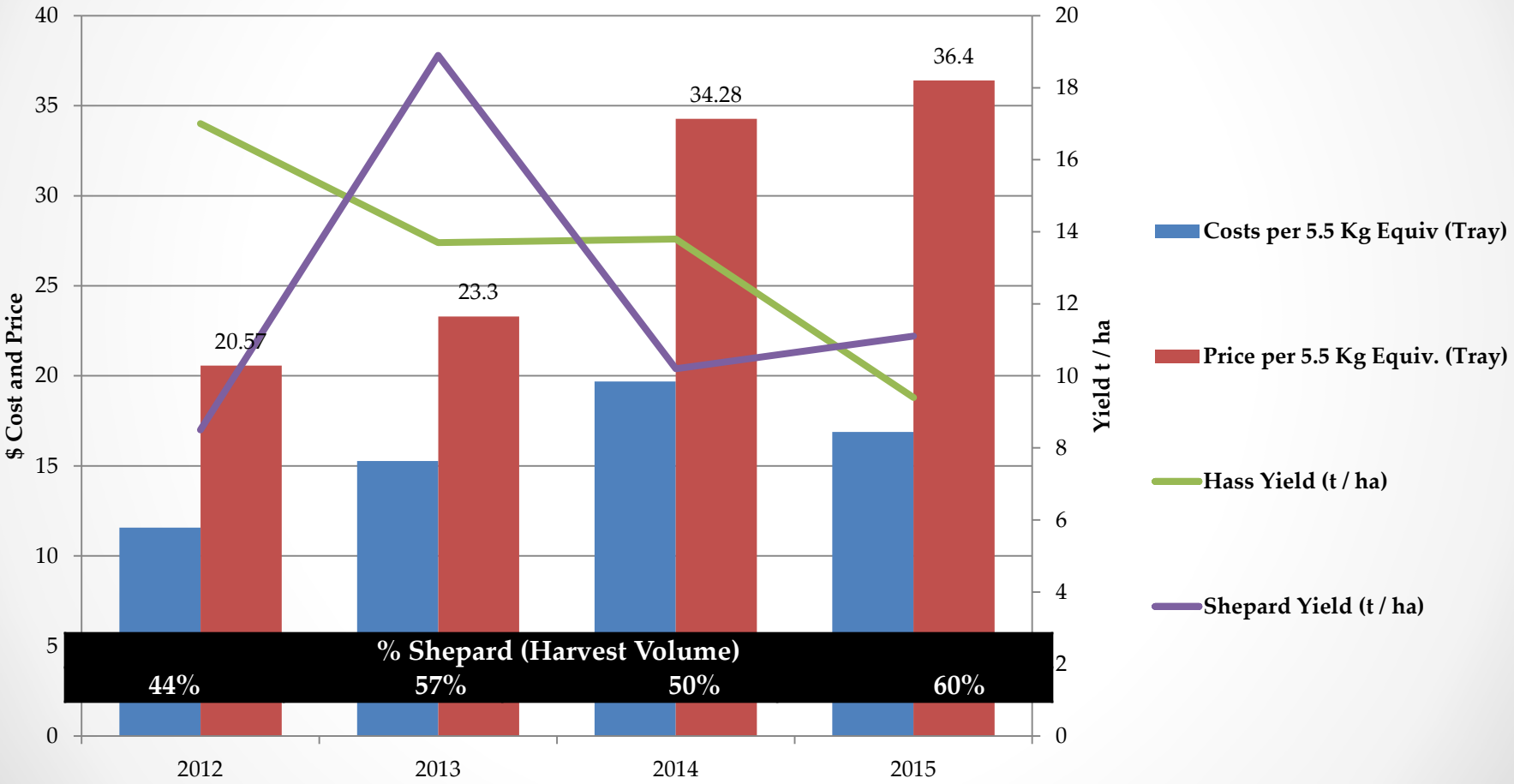
North QLD
Yield by Variety



NQ Grade and Size



North QLD
Costs, Prices(*) and Yield



Take Home – North QLD (1)

- Yield
  - NQ Hass yields declined 14% over 4 years
  - 4 year NQ average 11.8 (t/ha) (Top NQ Performers 12.3 (t/ha))
  - NQ Shepard yields appear more stable
- Grade (% Premium)
  - NQ grades appears to be on decline (trend line)
  - 4 year average 74% (Top NQ Performers 80%)
  - Top performers (10) across industry achieving average 80%
- Size (% 18-25)
  - NQ sizes appear relatively stable (trend line)
  - 4 year average 60% (Top NQ Performers 74%)
  - Top performers (10) across industry achieving average 80% (all 49%)
  - Every 3 Trays of small fruit (27) converted to Medium is 4 Trays of Medium

Take Home – North QLD (2)

- Costs (Before Paying Interest, Depreciation, ROI)
  - NQ Operating Costs slightly increasing, (some may be from impact of Shepard %)
  - 4 Year average $15.87 / Tray (Top NQ Performers $14.25)
- Prices (Before Deducting Marketing, Ripening, Levies, Freight)
  - Average NQ prices have increased about 80% in 4 years
  - 4 Year average $28.32 / Tray (Top NQ Performers $29.72)
  - Impact of price increases could mask other trends (yield, grade, size)
- Profit (EBITDA)
  - 4 Year NQ average $12.67 / Tray (NQ Top Performers $15.57 / Tray)

Most Profitable NQ Businesses (4 years data)

- Averaged 30% higher medium fruit (Count 18 – 25)
- Averaged 17% higher grade score (% Premium)
- Averaged 19% higher Gross Revenue (Price / Tray)
  - This may be from impact of better size and grade profiles
- Had similar yields to others (+6%, immaterial)
- Had 16% lower operating costs/tray (labour costs -10%)
- Achieved 47% higher profits (EBITDA)
- Appear to do some things differently:
  - Moisture monitoring and irrigation
  - More external nutrition advice
  - More Phytophthora Treatment
  - More manual canopy management
  - Pruned all orchard every year
- Some "intuitives"
  - Nutrition and pruning practices, mulching, phyto. Treatment, irrigation management, temperature (at flowering and 'heat'), using information more.