Avocado Retail Quality Surveys Phase II

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Avocados Australia Limited (AAL)

Project Number: AV08034

AV08034

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Avocados Australia

HAL Project

AV08034 (November 2011)

Avocado Retail Quality Surveys Phase II

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Project details

Project Name: Avocado Retail Quality Surveys Phase II

Project Number: AV08034

Date: November 2011

Project Purpose:

- Measure how much fruit at the retail level currently fulfils consumer's quality demands (based off consumer research findings and industry benchmarks) and where there are significant differences in quality, between store types and/or seasons.
- Communication of these findings to the supply chain.
- Use these findings to provide up to date analysis of what current quality issues are as a foundation for future research and development work in the area of quality management.
- Use the stores that are supplying consistently high quality fruit as case studies for industry best practice. Where quality in store falls below consumer expectations (as per consumer sensory results) the results from the sensory work which will be combined with the retail survey results to build an economic argument providing retailers with hard data expressing the impact of suboptimal quality on their sales.

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Disclaimer

1. Media Summary

Consistent fruit quality continues to be a barrier to increasing avocado consumption in the domestic market. In order to improve this situation, the avocado industry has made significant investment in consumer research over the last six years to gain a better understanding of the consumers and their purchasing habits. This research has helped guide industry research and development (R&D) and promotion.

Consumer research has identified three key areas where industry performance needs to be improved: internal quality, maturity, and ripeness. Through research, the industry has responded by developing guidelines and benchmarks in regard to premium grade avocados, recommending that:

- Dry Matter (DM) for Hass should be 23% or above,
- DM for Shepard should be 21% or above
- Ripeness levels should be between 0.65 and 0.45 kilogram force
- Damage to flesh should not exceed 10%

In order to benchmark industry's performance against these standards this program was developed and two systems implemented:

- Monthly fruit quality surveys are conducted in 16 stores each in Perth, Brisbane, Sydney and Melbourne. A random sample of avocados (up to 240 pieces of fruit – either 0, 10 or 15 from each store depending on ripeness levels) each month are purchased and assessed for internal quality blemishes including bruising, internal rots, vascular browning, diffuse flesh discolouration and stem end rot.
- Dry Matter Percentage (DM%) testing is conducted each month from randomly selected fruit from the Sydney markets to measure fruit maturity. Up to 220 individual avocados are sampled each month and the aggregated results of these tests are reported on the Avocados Australia website. Results for individual growers or packers are also sent to those businesses.

Outcomes of the program:

- Overall internal quality in Hass and Shepard has improved since 2008 when surveys began.
- Up until 2010 Bruising was always the most significant quality issue however in 2010 a reduction in the level of bruising resulted in the overall level of damage decreasing and the significance of bruising as the cause of internal damage reduced below body rots for the first time since testing began.
- Bruising is the most significant issue in Shepard avocados.
- Coles and Woolworths stores surveyed have improved levels of total damage.
- Independent supermarkets have had the least improvement and consistently the highest level of damage.
- Independent fruit and vegetable stores have always had either the lowest or second lowest level of damage.
- Regarding DM%, all regions at the beginning of their seasons have fruit that falls short of the 23% dry matter standard for Hass (generally with the exception of the Tristate and Western Australian growing regions).

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2. Technical Summary

Consistent fruit quality continues to be a barrier to increasing consumption in the domestic market. In order to improve this situation, the avocado industry has made significant investment in consumer research over the last six years to gain a better understanding of the consumers and their purchasing habits. This research has helped guide industry R&D and promotion.

Through consumer research the industry has identified three key areas where industry performance needs to be improved: internal quality, maturity, and ripeness. Specifically the consumer research found that:

- 85% of consumers want ripe fruit they can eat tonight or tomorrow which equals a ripeness level between soft or medium soft (not firm)
- Consumers want fruit with less than 10% internal flesh defects
- Consumers want mature fruit
    - Minimum of 23% DM for Hass
    - Minimum of 21% DM for Shepard

Perhaps more importantly, the research was demonstrated that if industry couldn't supply avocados to those specifications then this would adversely affect repurchase probability.

The research also found that the severity of any flesh defect was more important than either price or the frequency of encountering that defect.

Through research, the industry has responded by developing guidelines in regard to premium grade avocados, recommending that:

- DM for Hass should be 23% or above,
- DM for Shepard should be 21% or above,
- Ripeness levels should be between 0.65 and 0.45 kilogram force
- Damage to flesh should not exceed 10%

In order to benchmark industry's performance against these standards this project and its precursor *AV07018: Avocado Quality Retail Surveys* were developed. Two systems have been in place within this program. Firstly, monthly fruit quality surveys are conducted in 16 stores each in Perth, Brisbane, Sydney and Melbourne. A random sample of avocados (up to 240 pieces of fruit – either 0, 10 or 15 from each store depending on ripeness levels) each month are purchased to assess for internal quality blemishes including bruising, internal rots, vascular browning, diffuse flesh colour and stem end rot.

Secondly, random DM% testing is conducted each month from fruit sampled from the Sydney markets to measure fruit maturity. Up to 220 individual avocados are sampled each month and the aggregated results of these tests are reported on the Avocados Australia website. Results for individual growers or packers are also sent to those businesses.

This information helps industry to build an understanding of its performance against the set quality targets.

Specific results from the program to date:

- Since the program began in 2008, overall internal quality in both Hass and Shepard has improved.
- Up until 2010 bruising was always the most significant quality issue. In 2010 however a reduction in the level of bruising resulted in the overall level of damage decreasing and the significance of bruising as the cause of internal damage reduced below body rots for the first time. The proportion of Hass avocados with more than 10% bruising to the flesh decreased by 50% between 2008 and 2010 from 12% to 6%. The most significant improvements have been made in New South Wales (NSW) and Victoria (VIC).
- Bruising is still the most significant issue in Shepard avocados with the reduction in body rots being the largest contributing factor to the overall reduction in internal damage. Bruising actually increased very slightly between 2009 and 2010 although not to the levels it was at in 2008.
- In terms of store type, the data was summarised into four store type groupings ie. Major Supermarket 1 (M1), Major Supermarket 2 (M2), Independent Supermarkets (IS) and Independent Fruit and Vegetable Stores (I). The results indicate that:
    - Both major supermarkets have improved levels of total damage
    - Independent supermarkets have had the least improvement and consistently the highest level of damage
    - Independent fruit and vegetable stores have always had either the lowest or second lowest level of damage
- Regarding DM%, all regions at the beginning of their seasons have fruit that falls short of the 23% DM standard for Hass (generally with the exception of the Tristate and Western Australian growing regions). This is also the case for the Shepard variety but it should be noted that the Shepard season only runs for a few months and thus less data was collected.

Recommendations for future R&D:

- Avocados Australia, through *AV10006: Avocado Supply Chain Education Materials Phase 2* continues to train retailers on how to improve the quality of avocados in their stores and highlights the opportunities this presents for them in terms of increased sales and throughput of stock. Learnings from retailers who already have these practices in place will continue to be promoted through the training.
- *AV10019: Reducing flesh bruising and skin spotting in Hass avocado:* should be continued as the results from this project and AV08034 will influence future research and development in terms of how the supply chain can manage and reduce avocado bruising.
- It is strongly recommended that *AV11015: Avocado Industry Fruit Quality Benchmarking* be funded to continue the retail quality surveys and DM testing. This project is crucial to the continued growth and profitability of the Australian Avocado industry as it monitors the ongoing quality of fruit in the market place. With this data, the industry will be able to continue to gauge the success and adoption of its supply chain education programs and materials.
- Preliminarily findings from AV10019 as well as anecdotal retailer feedback collected as a part of AV10006 indicate that consumers are themselves causing a significant amount of bruising to the avocado flesh. Given how detrimental flesh defects can be to consumers purchasing habits, it is strongly recommended that:
    - Consumer research be conducted to establish the best way of educating consumers on how to handle avocados. Depending on the findings from this research, an education campaign needs to be rolled out. Current education materials may need to be redeveloped targeted at consumers.

3. Introduction

It is recognised that a wide variety of factors affecting fruit quality, productivity and supply chain efficiency are interrelated. As a result, in 2007 a Supply Chain Improvement Program was contracted aimed at specifically addressing these strategic objectives. There were three distinct activities which made up the overall program. They were:

A. The full implementation and management of a data collection system providing members of industry with timely and relevant market information to assist in making short term marketing decisions and collection of production statistics to assist the industry as a whole in making long term marketing and promotions decisions.
B. The completion of a comprehensive review of quality standards/accreditation systems in other countries and other industries and recommendation for the Australian avocado industry with a view to implement an appropriate system for the Australian avocado industry in the future.
C. Development, management and coordination of a suite of supply chain projects aimed at addressing avocado quality along the supply chain.

This project and its precursor *AV07018: Avocado Quality Retail Surveys* fall into activity C. The goal of AV07018 was to identify where the industry currently sat in terms of quality and efficiency and identification of points in the supply chain where further work is required to make improvements in these areas. AV08034's objective was to continue the fruit quality surveys to assess and benchmark quality at a retail level. The project also continued monthly DM testing to monitor the maturity of fruit in the market place. Access to this data is crucial as it enables industry to monitor and improve current industry practices affecting customer and consumer satisfaction with the end product.

Through consumer research the industry identified three key areas where industry performance needs to be improved: internal quality, maturity, and ripeness. Specifically the consumer research found that:

- 85% of consumers want ripe fruit they can eat tonight or tomorrow which equals a ripeness level between soft or medium soft (not firm)
- Consumers want fruit with less than 10% internal flesh defects
- Consumers want mature fruit

Perhaps more importantly, the research was able to show that if industry couldn't supply avocados to those specifications then this would adversely affect repurchase probability.

The research also found that the severity of any flesh defect was more important than either price or the frequency of encountering that defect.

Through research, the industry has responded by developing guidelines in regard to premium grade avocados, recommending that:

- DM for Hass should be 23% or above,
- DM for Shepard should be 21% or above
- Ripeness levels should be between 0.65 and 0.45 kilogram force
- Damage to flesh should not exceed 10%

As mentioned above, through project AV07018 two quality monitoring systems were implemented:

- Monthly fruit quality surveys are conducted in 16 stores each in Perth, Brisbane, Sydney and Melbourne. A random sample of avocados (up to 240 pieces of fruit – either 0, 10 or 15 from each store depending on ripeness level) each month were purchased and assessed for internal quality blemishes including bruising, internal rots, vascular browning, diffuse flesh colour and stem end rot.
- DM% testing was conducted each month from randomly selected fruit from the Sydney markets to measure fruit maturity. Up to 220 individual avocados were sampled each month and the aggregated results of these tests continue to be reported on the Avocados Australia website. Results for individual growers or packers were also sent to those businesses.

AV08034 has continued this monitoring and improvements to the system have been made as needed. These projects align with both:

- 2005 – 2010 Strategic Plan for the Australian Avocado Industry
    - Goal P1: To ensure that consumers can confidently purchase consistently high-quality fresh avocados at retail level
- Avocado Industry Strategic Plan 2011 -2016
    - Strategy 1.2: To ensure that consumers can confidently purchase consistently high quality fresh avocados at retail level

The results from this program are vital to make informed decisions about the extent and severity of quality issues at a retail level. By collecting this data over time it will allow industry to monitor the success of its supply chain education programs.

4. Materials & Methods

The program had four steps:

1. Development of a sampling plan
2. Determination of assessment criteria and updated training for assessors (as needed)
3. Completion of retail surveys
4. Communication of findings at specific intervals

4.1 Development of a sampling plan

a. Retail Quality Surveys

Monthly fruit quality surveys have been conducted in 16 stores each in Perth, Brisbane, Sydney and Melbourne (a total of 64 stores). The stores selected were a mix of major supermarkets, independent supermarkets and independent green grocers as shown in Table 1. The localities and specific stores were determined based on Australian Bauru of Statistics (ABS) data to ensure a spread across suburbs with varied socioeconomic profiles. Either 0, 10 or 15 pieces of fruit per variety (Hass and Shepard) per store were collected each month depending of the level of ripeness.

Table 1: Sampling Plan - Retailers

Retail sector/ business	**Number of shops per city**
Woolworths	3
Coles	3
IGA/ Foodland/ Foodworks	3
Independent chains (eg Harris Farms, Cocos)	3
Large volume/ price sensitive retailers	2
High quality retailers	2

Both NSW and Queensland (QLD) have independent chains such as Harris Farms and Cocos. In other states where currently there are no independent chains, large volume/price sensitive retailers or high quality retailers were substituted.

Originally Food Circus was subcontracted to conduct the surveys and assessments; however it became more efficient for Avocados Australia to subcontract directly with the assessor staff. The assessor staff provided Avocados Australia with completed copies of the quality surveys on a monthly basis.

b. Monthly DM Testing

The DM sampling plan was developed in conjunction with Agri-Science Queensland, Department of Employment, Economic Development and Innovation (DEEDI). A sample of 10 pieces of fruit from each tray was deemed statistically significant. A maximum of 220 pieces of fruit were sampled each month from as many different growers as possible to get a cross section of fruit from across each growing region supplying fruit at that time of year. Again only Hass and Shepard varieties were sampled.

The fruit was immediately shipped to the testing facility Maroochy Research Station in Nambour Queensland. DEEDI staff then test the fruit for each individual its DM% and the raw data was emailed to Avocados Australia.

4.2 Determination of assessment criteria and updated training for assessors (as needed)

a. Retail Quality Surveys

A procedure for sampling and assessing quality was developed and resource materials prepared to assess quality and record assessment results. This was done in conjunction with DEEDI. Assessor training was conducted by Avocados Australia in partnership DEEDI. Refresher training was provided to assessors on an annual basis as well as when new staff came on board.

Where possible during training, sample fruit was assessed when at the preferred ripeness as determined by previous components of the study. The sampling procedure is shown below. The numbers in brackets refer to the Quality Survey Form as seen at Appendix 1.

Procedure for information collection at store level

- Take photograph of outside sign of store name before entering
- Note store name (1)
- Note store location (2)
- Date and time collected (3)
- Locate the main avocado display/s in the store or fruit and vegetable section. For most of the year this will be Hass avocados but from February through June you may find Shepard avocados only or Shepard and Hass avocados –
    1. If there is only a display of Shepard avocados then assess and collect the Shepard avocados. If there are displays of both then assess and collect fruit from both displays (ie. Complete 2 forms and purchase 30 pieces of fruit in total). During March especially, in the supermarkets assessors may find that there is only Shepard on sale. In some stores assessors may not be able to collect fruit because it is not ripe enough. If assessors cannot purchase a minimum of 10 pieces of fruit per variety per store, then no fruit of that variety in that store should be bought.
    2. Only collect Shepard fruit if it is clearly marked that it is Shepard ie. On the signage or stickers on the fruit. There are other green skin varieties that may look similar so if it is not clearly marked don't collect any.
- Do a rough assessment of size of display (note length and width) (5)
- Note whether single layer of fruit on display or stacked up fruit (6)
- Make overall assessment of display in terms of proportion of coloured fruit (as per laminated sheet provided). This is only relevant for Hass – if it is a Shepard display then just leave this part blank (7)
- Collect price and country of origin information – this information is to be collected from the signage on the display. If the sign on the display indicates that it is Australian Fruit but the stickers on the individual pieces of fruit indicates that it is New Zealand (NZ) fruit assessors would still tick (8) Australian Fruit. In this instance assessors would also make a note in the comments section that the stickers indicated mixed origin. Country of origin is only an issue between August and April/May each year during the New Zealand avocado season. (8, 9, 10, 11,12)
- Note the percentage of fruit with skin spotting in display. For ripening Hass it can be difficult to assess the fruit for Skin Spotting as the skin becomes so dark that the spots cannot be clearly seen. (13)
    - Note the percentage of fruit with skin spotting severity level 1 (1-10%)
    - Note the percentage of fruit with skin spotting severity level 2 (11-25%)
    - Note the percentage of fruit with skin spotting severity level 3 (26-49%)
    - Note the percentage of fruit with skin spotting severity level 4 (>50%)

- If possible take a photograph of the stand
- Collect either 0, 10 or 15 pieces of fruit from the display depending on the availability of ripe fruit.
    - For Hass only fruit of a colour rating of 4 or above should be chosen. This colour rating is based off the Avocado Colour and Ripeness Chart which was developed as a part of *AV08017: Avocado Supply Chain Education Materials*.
    - For Shepard gently squeeze the stem end of the fruit and select fruit that feels soft enough to eat tomorrow.
    - Collect fruit from a part of the display that is within easy arms length unless fruit of suitable colour is not available. In this instance collect fruit from further back in display or a layer below.
    - Do not select fruit that to look at is obviously rotten, mummified or shrivelled.
- Collect fruit in an avocado (or similar) tray/carton and make sure the tray is clearly labelled with the store name. Put assessment sheet in the box to ensure its clear which store the fruit was collected from.
- Fruit should be stored overnight in the trays they were collected in, in a cool shaded place.
- Assessments are to be made no later than the following day after collection.

Procedure for assessment of each piece of fruit on the day after collection

- Number each piece of fruit
- Remove sticker and glue on to assessment sheet
- Weigh whole fruit
- Assess skin colour (only for Hass – for Shepard leave blank)
- For each piece of fruit estimate the level of skin spotting. If Hass fruit is too dark to make an estimate, write NA in the Skin Spotting column on for that piece of fruit.
- Cut slither of skin from side of avocado and take penetrometer reading
- Cut open fruit and remove seed
- Cut fruit into quarters and assess internal quality using support materials provided. The following categories should be assessed for each fruit:
    - % total damage – how much of the fruit wouldn't or couldn't be eaten?
    - % bruising
    - % diffuse flesh discoloration
    - % vascular browning
    - % stem end rot
    - % body rots
    - % other defects

Circle appropriate % ie. If no damage circle "0". If it's not perfect but 10% or less damage then circle "10". If more than 10% but no more than 25% then circle "25" etc.

Equipment provided

- Penetrometer
- Digital camera
- Balance
- Assessment book
- Assessment poster
- Clip board
- Cutting board
- Knife
- Fruit trays/cartons for fruit collection

- Glue sticks
- Map showing stores
- Assessment sheets for each store each month
- Laminated example form filled out front and back for each assessor
- Background document regarding Skin Spotting showing the different severity levels

b. Monthly DM Testing

Once the fruit has been delivered to the Maroochy Research Station flesh samples from each fruit are obtained and dried. The DM% for each fruit this then determined. The DM% for individual fruit are recorded and sent to Avocados Australia within one week of assessment.

4.3 Completion of retail surveys

The Retail Quality Surveys and the DM% Testing are conducted monthly using the above assessment procedures.

a. Retail Quality Surveys

Raw data from the completed Retail Quality Survey forms is entered into an excel spread sheet every month by an external contractor. Every six months this data is statistically analysed by The New Zealand Institute for Plant & Food Research Limited. The terms of the analysis are:

For both total damage and specific defects to measure the proportion of fruit that fits into each of the intervals described below:

- Overall
- By state,
- By state by month,
- By store type,
- By store type by state,
- By store type by state by month.
- How this relates to the different price points at which the fruit is being sold (in line with the price points identified in previous consumer surveys).
- Analyse the data by variety (the only varieties that have been assessed are Hass and Shepard)
- Only assess fruit that has a penetrometer reading less than 1kgf.
- Determine if there are any specific growers (as marked by packhouse ID) that have higher quality issues than others.
- Where possible analyse quality issues by growing region.

Analysis is also needed for the types and levels of internal defects in 'Hass' and 'Shepard' avocados within Australia analysed as a function of the stores sampled in the original study. Where possible, the analysis will relate this information to the predicted impact on the 'bottom line'.

<u>Defect Intervals</u>

Total Damage: Proportion of fruit that has total percentage damage in the intervals used in the online survey

- (if x = total level of damage) then
  - No damage at all, x = 0%,
  - 10% damage: 0<x<=10%,

- 25% damage: 10%<x<=25%,
- 33% damage: 25<x<=33,
- 50% damage: 33<x<=50,
- 50%+ damage x>50.

Specific defects: Bruising, diffuse flesh discolouration, vascular browning, stem end rot and body rots. When surveyors assess the fruit they circle a percentage of damage for each of these defects. For example, once they cut open the fruit and see that there is 20% damage they may then discover that 5% of that is due to bruising and 15% is due to body rots. They would then circle 10% for bruising and 25% for body rots. This is based on the breakdown as above: circling 10 means 0%>x=>10% where x = damage attributed to bruising (therefore they would circle 10 for 5% bruising damage). In order to not overestimate damage, during analysis the midpoint of each of the points should be used.

b. Monthly DM Testing

Regarding DM testing, in order to analyse how much fruit complied with current standards, DM% for Hass were broken into two intervals (below 23% and 23% and above). DM% for Shepard were broken into two intervals as well (below 21% and 21% and above). In addition, in order to analyse how much complied with consumer preferences, DM was broken down into a further three categories (below 23%, 23-28% and greater than 28%) as per the consumer sensory research conducted in March 2007.

4.4 Communication of findings at specific intervals

A multitude of presentations have also been made at industry meetings over the time of this project to communicate the findings. For further details refer to the Technology Transfer section of this report.

a. Retail Quality Surveys

Statistically analysed results tracking quality over time by state and month have been added to the Avocados Australia website.

b. Monthly DM Testing

As stated above both Hass and Shepard results were broken into intervals in order to analyse how much fruit complied with the industry's benchmarks. In addition to these intervals, in order to analyze how much fruit complied with consumer preferences, DM for both varieties was also broken down into the following data intervals:

- <=18%
- 18.1% - 20.9%
- 21% - 22.9%
- 23% - 28%
- 28.1% - 40%
- >40%

Results for each region were broken down thus.

Each month the results of these surveys were communicated to industry. Updated data was posted on the Avocados Australia website: http://industry.avocado.org.au/MaturityMonitoring.aspx These results were also emailed to all contributors to the Infocado program on a monthly basis. Infocado is an internet based crop forecasting system which is a key part of *AV09001: National Avocado Quality and Information Management System*. Individual DM reports were mailed or emailed to each grower or packhouse whose fruit was sampled for that month. Included in this letter was an explanation of

why the DM benchmarks had been set and the ramifications if immature fruit is sent to market. All individual results were kept confidential and only aggregated data was published to the wider industry.

Regular articles were included in Talking Avocados the industry's quarterly magazine on the results of the surveys.

5. Results

a. Retail Quality Surveys

Since 2008 when the Australian Avocado Industry began collecting retail quality survey data, results show that overall internal quality in both Hass and Shepard has improved over that time period. Figures 1 and 2 below represent the change in proportion of fruit that has more than 10% internal damage to the flesh.

Figure 1: Proportion of Hass with more than 10% internal damage

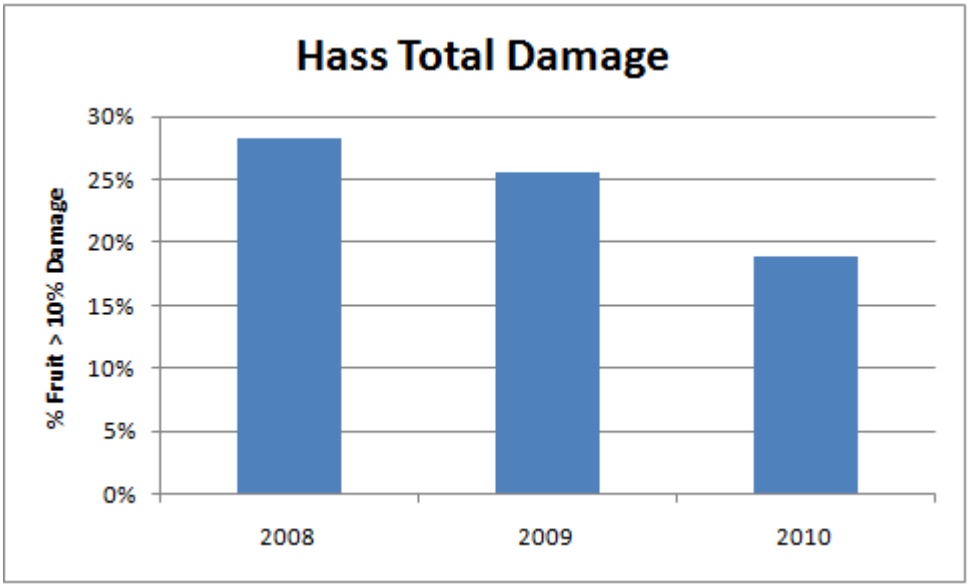
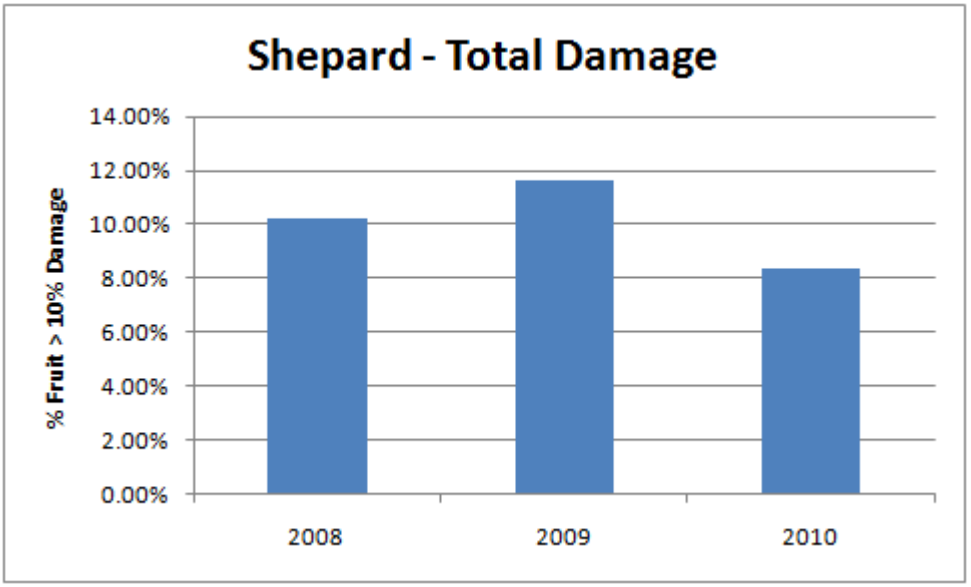


Figure 2: Proportion of Shepard with more than 10% internal damage



Up until 2010 bruising was always the most significant quality issue however in 2010 a reduction in the level of bruising resulted in the overall level of damage decreasing and the significance of bruising as the cause of internal damage reduced below body rots for the first time. Figure 3 shows that the proportion of Hass avocados with more than 10% bruising to the flesh has decreased by 50% between 2008 and 2010 from 12% to 6%. Figure 4 shows that this is now less than the proportion of Hass avocados with more than 10% damage due to body rots. The most significant improvements have been made in New South Wales (NSW) and Victoria (VIC).

Figure 3: Proportion of Hass with more than 10% specific internal defects 2008 - 2010

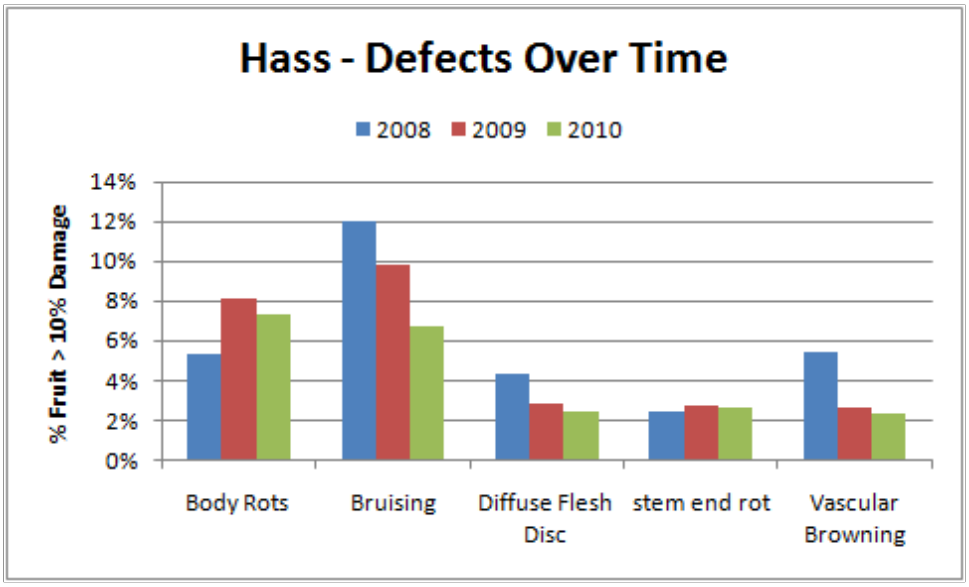
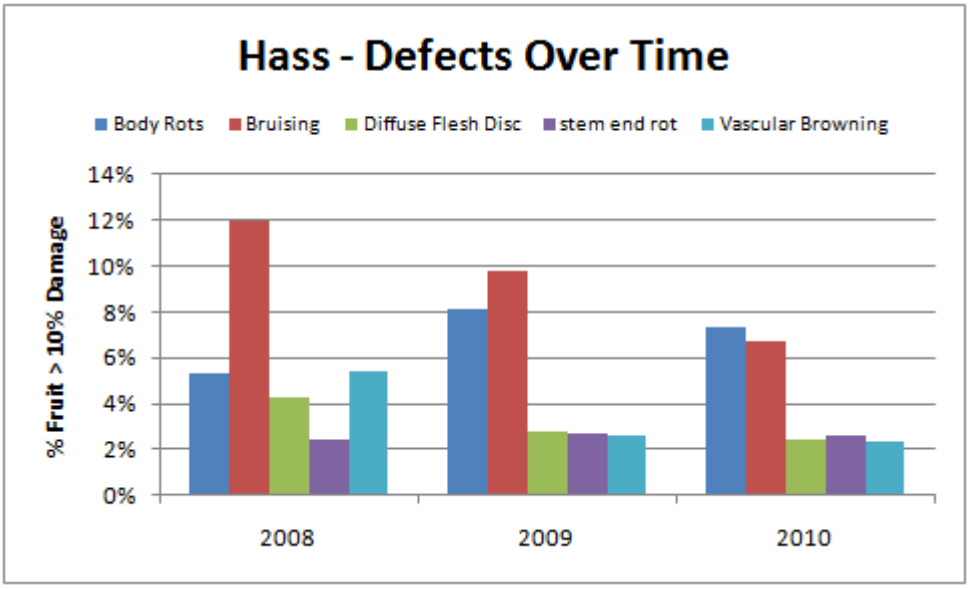


Figure 4: Proportion of Hass with more than 10% of specific defects by year



In Shepard avocados, bruising is still the most significant issue (as shown in Figure 5) with the reduction in body rots being the largest contributing factor to the overall reduction in internal damage. Figure 6 shows that bruising actually increased very slightly between 2009 and 2010 although not nearly to the levels it was at in 2008.

Figure 5: Proportion of Shepard with more than 10% specific internal defects 2008 - 2010

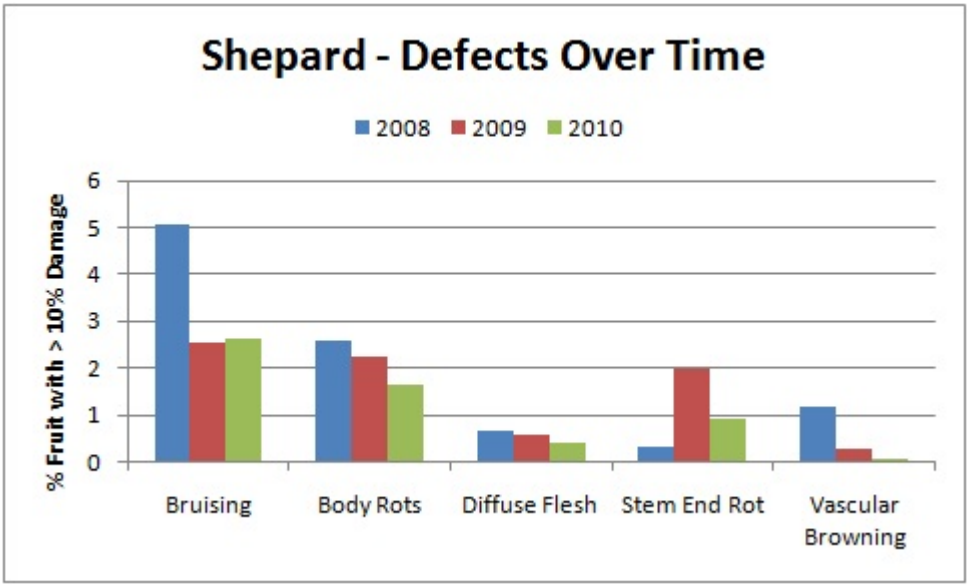
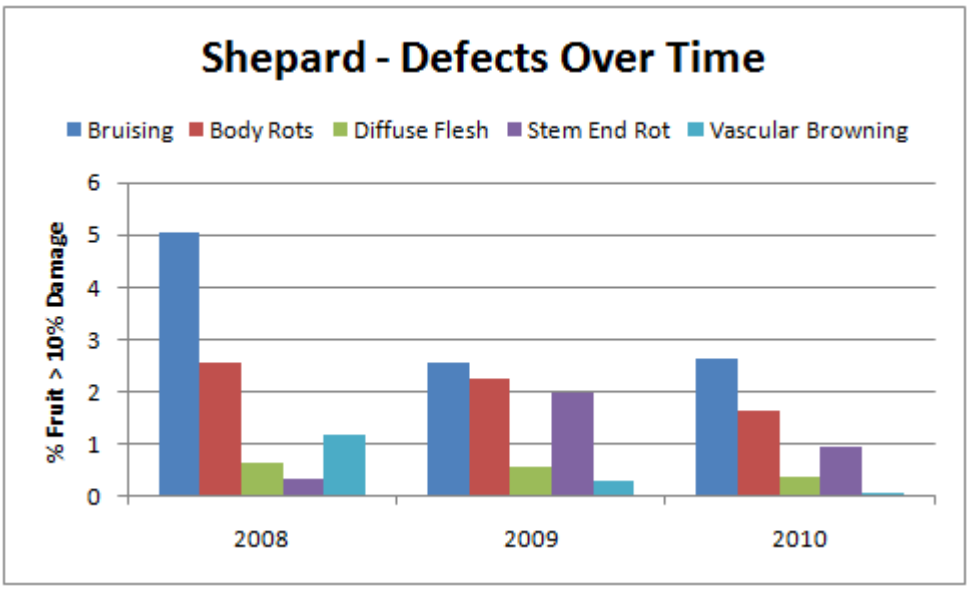


Figure 6: Proportion of Shepard with more than 10% of specific defects by year



In terms of store type, the data is summarised into four store type groupings; Major Supermarket 1 (M1), Major Supermarket 2 (M2), Independent Supermarkets (IS) and Independent Fruit and Vegetable Stores (I). The results indicate that both supermarkets have improved levels of total damage, independent supermarkets have had the least improvement and consistently the highest level of damage and independent fruit and vegetable stores have always had either the lowest or second lowest level of damage.

This is consistent when looking at bruising specifically in Hass avocados. M1 performance was variable; bruising levels improved significantly in 2009 but started to worsen again in 2010. M2 has shown the most improvement. Again independent supermarkets had the least improvements.

Figure 7: Hass with more than 10% total internal damage by store type 2008 - 2010

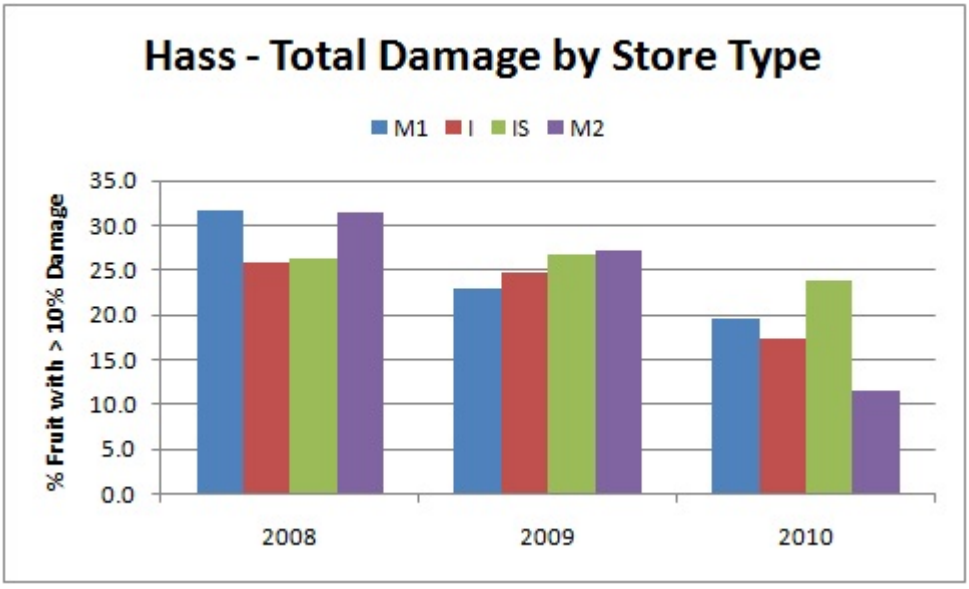
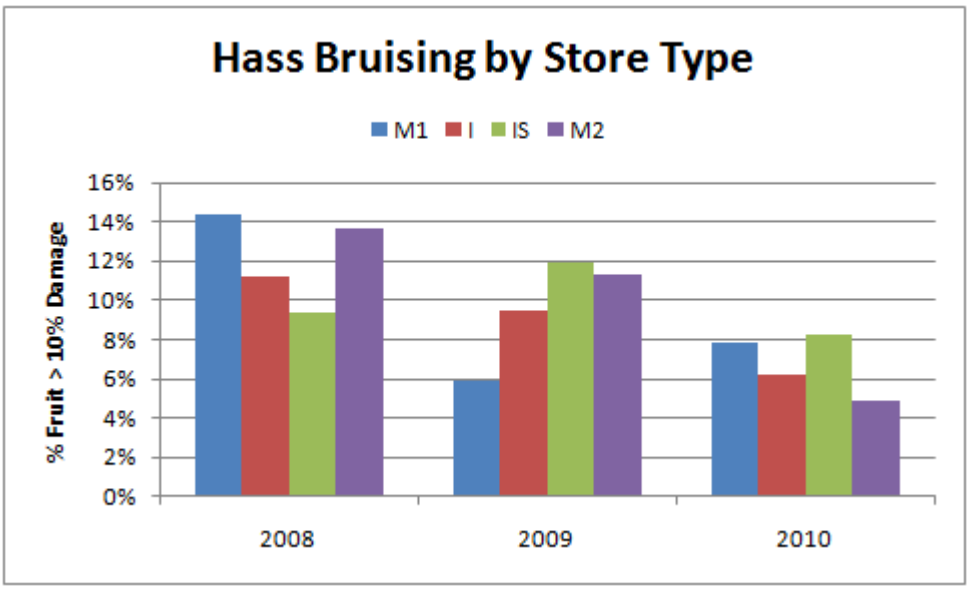


Figure 8: Proportion of Hass with more than 10% bruising by store type 2008 - 2010



Within this project only 6 months of data had been collected for the 2011 season therefore it is not possible to compare this data against 2008, 2009 and 2010, however it is possible to compare overall monthly total damage levels for each month by year. See figures 9, 10, 11 and 12 below.

Figure 9: Proportion of Hass with more than 10% total damage by month/year

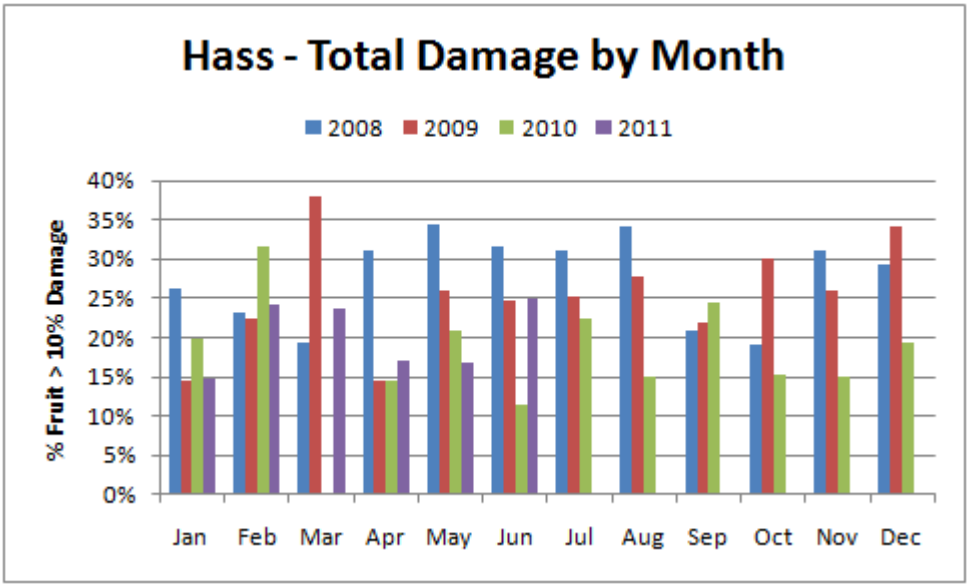


Figure 10: Proportion of Hass with more than 10% total damage by year/month

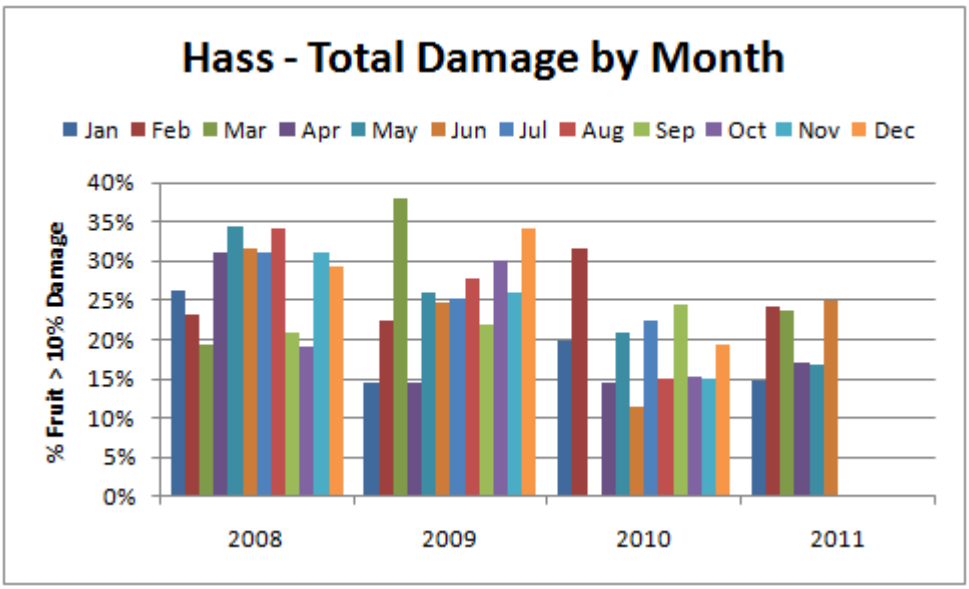


Figure 11: Proportion of Shepard with more than 10% total damage by month/year

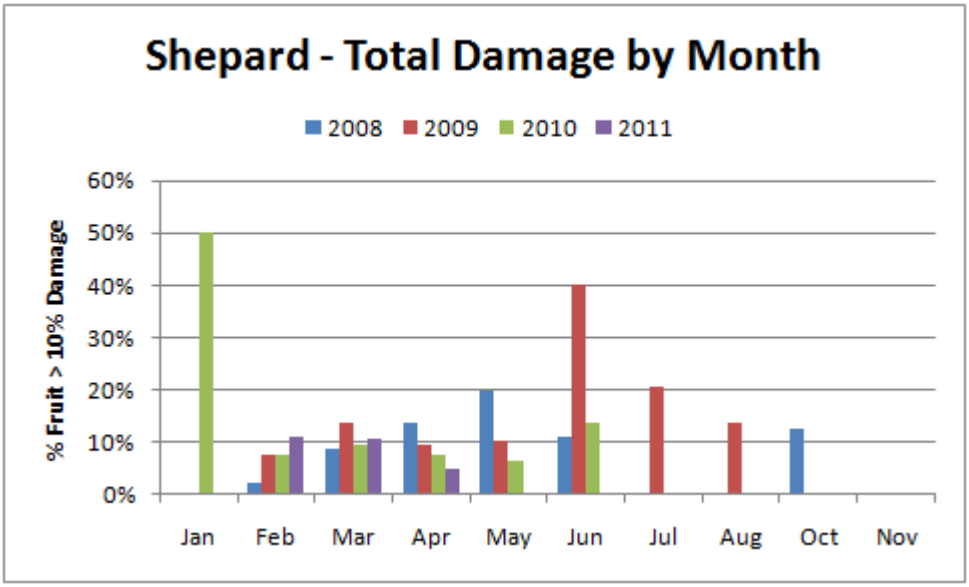
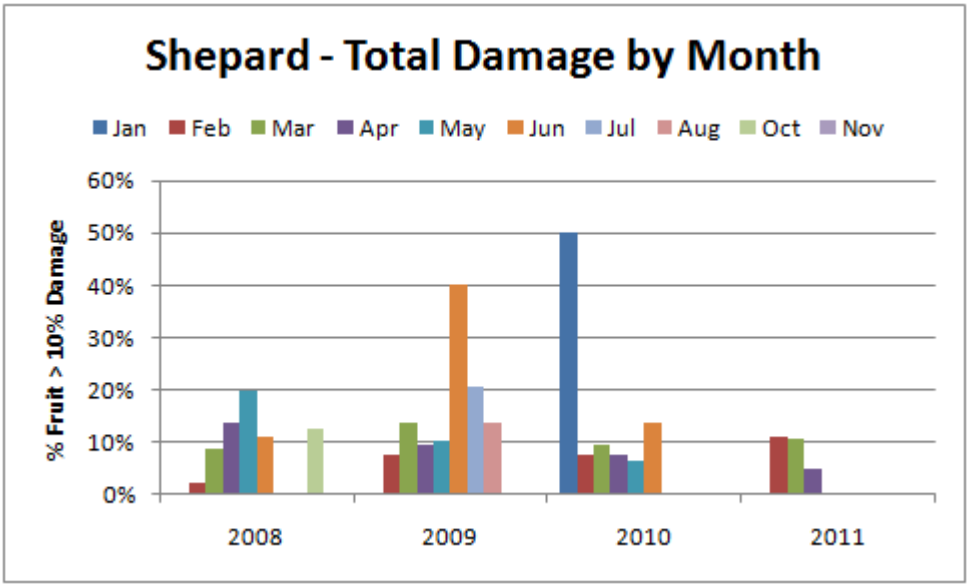


Figure 12: Proportion of Shepard with more than 10% total damage by year/month



Raw data from the Retail Quality Surveys can be seen at Appendix 2.

b. Monthly DM Testing

Below are the results for DM% testing for Hass and Shepard avocados for each growing region from January 2008 to October 2011. The growing region codes are as follows:

- NQ: North Queensland
- CQ: Central Queensland
- SC: Sunshine Coast Queensland
- SQ: South Queensland
- Tam/NQ: Tamborine/Northern Rivers New South Wales
- CNSW: Central New South Wales

- Tristate: Victoria, Tasmania and South Australia
- WA: Western Australia

Also included below are graphs plotting the average, minimum and maximum DM results by year and growing region. Trend lines have not been included on the graphs for some regions for some years as their season may be split across two calendar years and the graphs are designed by calendar year. The fruit is selected at random for testing so in some instances there are fewer samples for some regions in any one year compared with others. This coupled with some growing regions being spread across two calendar years has meant that including a trend line would be misleading to the viewer in some instances. This is particularly the case for Central New South Wales and Western Australia.

North Queensland Hass

Table 2: 2008 North Queensland DM Results

NQ Hass	2008												
Titles	**DM intervals**	**21-Jan**	**18-Feb**	**31-Mar**	**21-Apr**	**26-May**	**23-Jun**	**21-Jul**	**25-Aug**	**22-Sep**	**27-Oct**	**24-Nov**	**15-Dec**
<=18%	18			0	1	0	0						
18.1%-20.9%	20.99			10	37	3	1						
21%-22.9%	22.99			8	23	14	2						
23%-28%	28			2	9	23	20						
28.1%-40%	40			0	0	0	17						
>40%	100			0	0	0	0						
Sum		**0**	**0**	**20**	**70**	**40**	**40**	**0**	**0**	**0**	**0**	**0**	**0**
Month Average				**20.87**	**20.96**	**23.64**	**27.57**						
High				**2.76**	**5.00**	**3.94**	**8.59**						
Low				**2.06**	**4.26**	**4.03**	**7.32**						

Table 3: 2009 North Queensland DM Results

NQ Hass	2009												
Titles	**DM intervals**	**19-Jan**	**23-Feb**	**30-Mar**	**20-Apr**	**4-May**	**25-May**	**29-Jun**	**27-Jul**	**31-Aug**	**28-Sep**	**26-Oct**	**30-Nov**	**15-Dec**
<=18%	18				7	0	0	0					0	
18.1%-20.9%	20.99				36	10	0	0					0	
21%-22.9%	22.99				52	32	3	0					0	
23%-28%	28				33	47	35	3					0	
28.1%-40%	40				2	1	12	7					8	
>40%	100				0	0	0	0					2	
Sum		**0**	**0**	**0**	**130**	**90**	**50**	**10**	**0**	**0**	**0**	**0**	**10**	**0**
Month Average					**21.79**	**23.37**	**26.14**	**28.22**					**36.27**	
High					**8.72**	**5.34**	**4.27**	**1.98**					**6.78**	
Low					**9.20**	**4.87**	**4.21**	**3.17**					**3.59**	

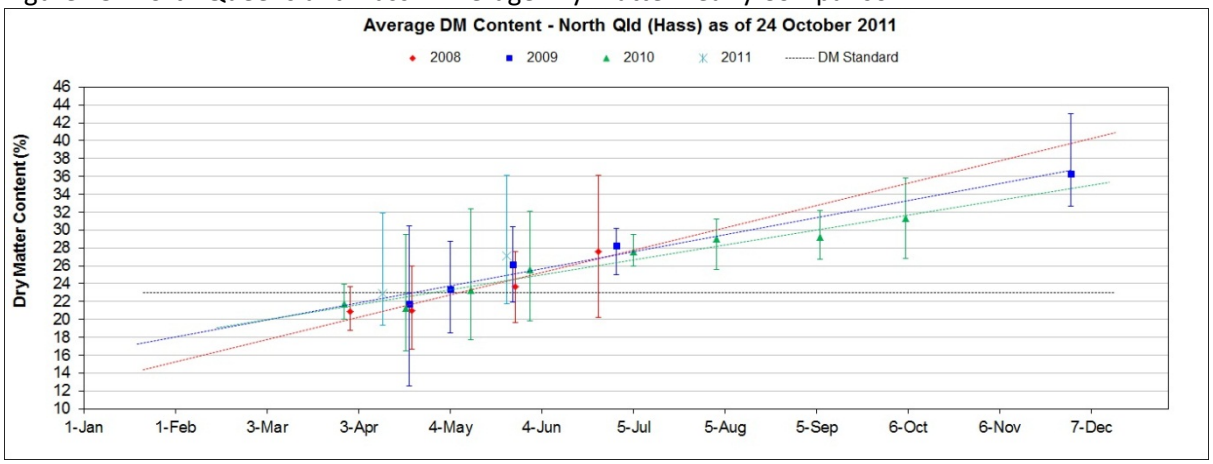
Table 4: 2010 North Queensland DM Results

NQ Hass	2010														
Titles	**DM intervals**	**19-Jan**	**15-Feb**	**1-Mar**	**29-Mar**	**19-Apr**	**11-May**	**31-May**	**5-Jul**	**2-Aug**	**6-Sep**	**5-Oct**	**25-Oct**	**29-Nov**	**13-Dec**
<=18%	18				0	10	1	0	0	0	0	0			
18.1%-20.9%	20.99				3	37	14	2	0	0	0	0			
21%-22.9%	22.99				5	16	34	6	0	0	0	0			
23%-28%	28				2	25	46	32	8	4	2	2			
28.1%-40%	40				0	2	4	10	2	14	8	8			
>40%	100				0	0	0	0	0	0	0	0			
Sum		**0**	**0**	**0**	**10**	**90**	**99**	**50**	**10**	**18**	**10**	**10**	**0**	**0**	**0**
Month Average					**21.72**	**21.29**	**23.31**	**25.58**	**27.61**	**29.00**	**29.19**	**31.29**			
High					**2.27**	**8.18**	**9.12**	**6.54**	**1.93**	**2.26**	**2.99**	**4.54**			
Low					**1.72**	**4.79**	**5.61**	**5.73**	**1.69**	**3.41**	**2.46**	**4.46**			

Table 5: 2011 North Queensland DM Results

NQ Hass	2011												
Titles	DM intervals	31-Jan	21-Feb	28-Mar	11-Apr	23-May	27-Jun	25-Jul	29-Aug	26-Sep	24-Oct	28-Nov	19-Dec
<=18%	18				0	0							
18.1%-20.9%	20.99				13	1							
21%-22.9%	22.99				21	4							
23%-28%	28				24	51							
28.1%-40%	40				2	70							
>40%	100				0	70							
Sum		**0**	**0**	**0**	**60**	**196**	**0**	**0**	**0**	**0**	**0**		
Month Average					**22.86**	**27.12**							
High					**9.01**	**9.01**							
Low					**3.51**	**5.41**							

Figure 13: North Queensland Hass – Average Dry Matter Yearly Comparison



Central Queensland Hass

Table 6: 2008 Central Queensland DM Results

CQ Hass	2008												
Titles	DM intervals	21-Jan	18-Feb	31-Mar	21-Apr	26-May	23-Jun	21-Jul	25-Aug	22-Sep	27-Oct	24-Nov	15-Dec
<=18%	18			0	0	0	0	0	0				
18.1%-20.9%	20.99			15	11	0	0	0	0				
21%-22.9%	22.99			4	14	15	1	1	0				
23%-28%	28			1	15	23	31	9	4				
28.1%-40%	40			0	0	2	8	10	26				
>40%	100			0	0	0	0	0	0				
Sum		**0**	**0**	**20**	**40**	**40**	**40**	**20**	**30**	**0**	**0**	**0**	**0**
Month Average				**20.25**	**22.32**	**24.46**	**26.18**	**28.64**	**31.17**				
High				**3.09**	**4.93**	**4.97**	**4.83**	**7.00**	**7.48**				
Low				**1.88**	**3.17**	**3.09**	**5.08**	**5.68**	**4.64**				

Table 7: 2009 Central Queensland DM Results

CQ Hass	2009												
Titles	DM intervals	19-Jan	23-Feb	30-Mar	20-Apr	4-May	25-May	29-Jun	27-Jul	31-Aug	28-Sep	26-Oct	30-Nov	15-Dec
<=18%	18					0	0	0	0	0				
18.1%-20.9%	20.99					24	8	0	0	0				
21%-22.9%	22.99					31	28	1	0	0				
23%-28%	28					25	61	47	11	0				
28.1%-40%	40					0	3	12	29	20				
>40%	100					0	0	0	0	0				
Sum		**0**	**0**	**0**	**0**	**80**	**100**	**60**	**40**	**20**	**0**	**0**	**0**	**0**
Month Average						**22.24**	**23.81**	**26.52**	**29.44**	**31.94**				
High						**4.52**	**5.86**	**7.15**	**5.51**	**4.92**				
Low						**3.27**	**4.88**	**3.83**	**5.02**	**3.33**				

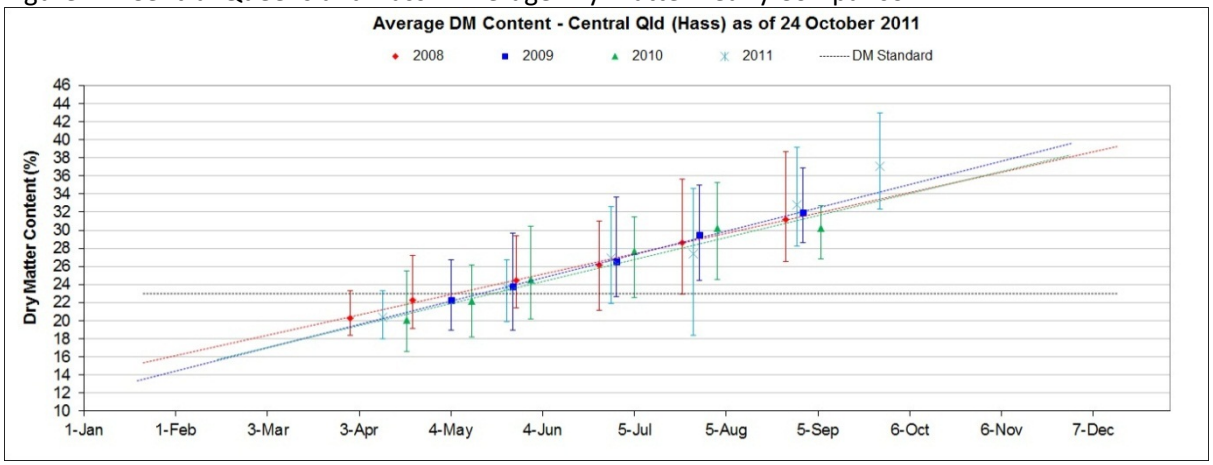
Table 8: 2010 Central Queensland DM Results

CQ Hass	2010														
Titles	DM intervals		15-Feb	1-Mar	29-Mar	19-Apr	11-May	31-May	5-Jul	2-Aug	6-Sep	5-Oct	25-Oct	29-Nov	13-Dec
<=18%	18					4	0	0	0	0	0				
18.1%-20.9%	20.99					9	19	5	0	0	0				
21%-22.9%	22.99					4	28	14	1	0	0				
23%-28%	28					3	22	33	19	7	2				
28.1%-40%	40					0	0	8	10	43	8				
>40%	100					0	0	0	0	0	0				
Sum		**0**	**0**	**0**	**0**	**20**	**69**	**60**	**30**	**50**	**10**	**0**	**0**	**0**	**0**
Month Average						**20.07**	**22.15**	**24.51**	**27.68**	**30.27**	**30.25**				
High						**5.39**	**4.03**	**5.92**	**3.83**	**5.02**	**2.50**				
Low						**3.53**	**3.91**	**4.32**	**5.12**	**5.72**	**3.40**				

Table 9: 2011 Central Queensland DM Results

CQ Hass	2011												
Titles	DM intervals	31-Jan	21-Feb	28-Mar	11-Apr	23-May	27-Jun	25-Jul	29-Aug	26-Sep	24-Oct	28-Nov	19-Dec
<=18%	18				0	0	0	0	0	0			
18.1%-20.9%	20.99				13	3	0	4	0	0			
21%-22.9%	22.99				6	13	3	3	0	0			
23%-28%	28				1	34	39	14	0	0			
28.1%-40%	40				0	0	18	19	34	9			
>40%	100				0	0	0	0	0	1			
Sum		**0**	**0**	**0**	**20**	**50**	**60**	**40**	**34**	**10**	**0**		
Month Average					**20.33**	**23.66**	**26.88**	**27.38**	**32.82**	**37.12**			
High					**3.00**	**3.06**	**5.75**	**7.18**	**6.38**	**5.87**			
Low					**2.28**	**3.77**	**4.96**	**8.98**	**4.57**	**4.75**			

Figure 14: Central Queensland Hass – Average Dry Matter Yearly Comparison



Sunshine Coast Hass

Table 10: 2008 Sunshine Coast DM Results

SC Hass	2008												
Titles	DM intervals	21-Jan	18-Feb	31-Mar	21-Apr	26-May	23-Jun	21-Jul	25-Aug	22-Sep	27-Oct	24-Nov	15-Dec
<=18%	18			0	0		0	0	0	0		0	
18.1%-20.9%	20.99			2	11		0	0	0	0		0	
21%-22.9%	22.99			4	15		0	0	0	0		0	
23%-28%	28			4	16		4	2	2	0		0	
28.1%-40%	40			0	0		6	8	8	7		10	
>40%	100			0	0		0	0	0	3		0	
Sum		**0**	**0**	**10**	**42**	**0**	**10**	**10**	**10**	**10**	**0**	**10**	**0**
Month Average				**22.58**	**24.76**		**28.66**	**29.66**	**29.54**	**35.87**		**33.04**	
High				**1.36**	**2.94**		**3.64**	**4.21**	**1.96**	**5.56**		**3.05**	
Low				**1.99**	**3.08**		**3.90**	**2.39**	**2.52**	**5.20**		**2.77**	

Table 11: 2009 Sunshine Coast DM Results

SC Hass	2009													
Titles	DM intervals	19-Jan	23-Feb	30-Mar	20-Apr	4-May	25-May	29-Jun	27-Jul	31-Aug	28-Sep	26-Oct	30-Nov	15-Dec
<=18%	18	0					0	0	0	0	0	0		0
18.1%-20.9%	20.99	0					0	2	0	0	0	0		0
21%-22.9%	22.99	0					0	10	0	0	0	0		0
23%-28%	28	0					10	25	6	2	11	0		0
28.1%-40%	40	10					0	3	24	28	19	19		7
>40%	100	0					0	0	0	0	0	1		3
Sum		**10**	**0**	**0**	**0**	**0**	**10**	**40**	**30**	**30**	**30**	**20**	**0**	**10**
Month Average		**34.72**					**25.50**	**24.35**	**31.02**	**31.59**	**29.18**	**35.28**		**38.86**
High		**4.48**					**2.25**	**5.70**	**6.65**	**6.00**	**5.81**	**8.01**		**5.13**
Low		**3.32**					**2.06**	**4.45**	**6.50**	**5.28**	**5.65**	**5.42**		**4.43**

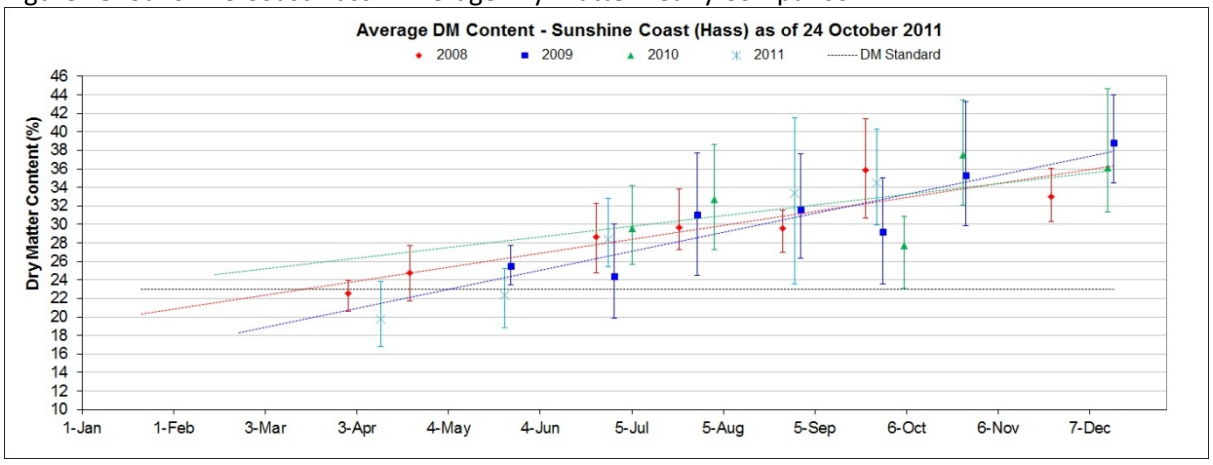
Table 12: 2010 Sunshine Coast DM Results

SC Hass	2010													
Titles	DM intervals	19-Jan	15-Feb	1-Mar	29-Mar	19-Apr	11-May	31-May	5-Jul	2-Aug	6-Sep	5-Oct	25-Oct	29-Nov	13-Dec
<=18%	18								0	0		0	0		0
18.1%-20.9%	20.99								0	0		0	0		0
21%-22.9%	22.99								0	0		0	0		0
23%-28%	28								4	1		3	0		0
28.1%-40%	40								16	9		7	8		16
>40%	100								0	0		0	2		4
Sum		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**20**	**10**	**0**	**10**	**10**	**0**	**20**
Month Average									**29.55**	**32.73**		**27.71**	**37.56**		**36.16**
High									**4.61**	**5.87**		**3.13**	**5.91**		**8.53**
Low									**3.85**	**5.46**		**4.57**	**5.50**		**4.83**

Table 13: 2011 Sunshine Coast DM Results

SC Hass	2011												
Titles	DM intervals	31-Jan	21-Feb	28-Mar	11-Apr	23-May	27-Jun	25-Jul	29-Aug	26-Sep	24-Oct	28-Nov	19-Dec
<=18%	18				1	0	0		0	0			
18.1%-20.9%	20.99				7	5	0		0	0			
21%-22.9%	22.99				1	7	0		0	0			
23%-28%	28				1	8	8		3	0			
28.1%-40%	40				0	0	12		35	19			
>40%	100				0	0	0		2	1			
Sum		**0**	**0**	**0**	**10**	**20**	**20**	**0**	**40**	**20**	**0**		
Month Average					**19.80**	**22.37**	**28.34**		**33.32**	**34.51**			
High					**4.08**	**2.84**	**4.48**		**8.17**	**5.78**			
Low					**3.01**	**3.49**	**2.97**		**9.74**	**4.61**			

Figure 15: Sunshine Coast Hass – Average Dry Matter Yearly Comparison



South Queensland Hass

Table 14: 2008 South Queensland DM Results

SQ Hass	2008												
Titles	**DM intervals**	**21-Jan**	**18-Feb**	**31-Mar**	**21-Apr**	**26-May**	**23-Jun**	**21-Jul**	**25-Aug**	**22-Sep**	**27-Oct**	**24-Nov**	**15-Dec**
<=18%	18			0	0	0	0	0	0	0	0	0	
18.1%-20.9%	20.99			3	3	5	8	0	0	0	0	0	
21%-22.9%	22.99			3	5	13	3	0	1	0	0	0	
23%-28%	28			4	2	22	14	19	11	9	1	0	
28.1%-40%	40			0	0	0	5	11	28	40	47	30	
>40%	100			0	0	0	0	0	0	1	2	0	
Sum		**0**	**0**	**10**	**10**	**40**	**30**	**30**	**40**	**50**	**50**	**30**	**0**
Month Average				**21.95**	**21.65**	**23.32**	**24.27**	**27.81**	**29.24**	**32.06**	**33.52**	**34.55**	
High				**3.34**	**3.64**	**4.23**	**5.89**	**10.70**	**5.62**	**8.65**	**10.08**	**4.83**	
Low				**2.89**	**2.41**	**3.89**	**5.19**	**3.91**	**6.67**	**6.60**	**5.55**	**5.26**	

Table 15: 2009 South Queensland DM Results

SQ Hass	2009												
Titles	**DM intervals**	**19-Jan**	**23-Feb**	**30-Mar**	**20-Apr**	**4-May**	**25-May**	**29-Jun**	**27-Jul**	**31-Aug**	**28-Sep**	**26-Oct**	**30-Nov**	**15-Dec**
<=18%	18	0						0	0	0	0	0	0	
18.1%-20.9%	20.99	0						0	0	0	0	0	0	
21%-22.9%	22.99	0						11	1	1	0	0	0	
23%-28%	28	1						24	11	2	4	3	3	
28.1%-40%	40	26						5	8	46	51	27	16	
>40%	100	3						0	0	0	5	0	1	
Sum		**30**	**0**	**0**	**0**	**0**	**0**	**40**	**20**	**49**	**60**	**30**	**20**	**0**
Month Average		**34.91**						**24.98**	**26.99**	**32.64**	**35.38**	**32.19**	**32.25**	
High		**8.97**						**4.84**	**3.86**	**6.08**	**7.17**	**6.90**	**14.42**	
Low		**7.13**						**3.91**	**4.10**	**9.73**	**9.75**	**5.64**	**4.89**	

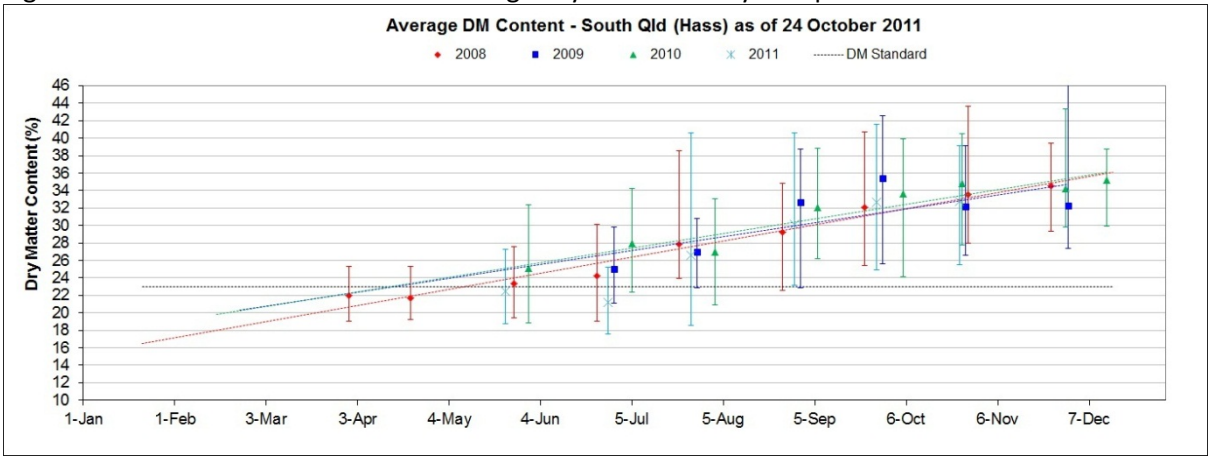
Table 16: 2010 South Queensland DM Results

SQ Hass	2010													
Titles	**DM intervals**	**19-Jan**	**15-Feb**	**1-Mar**	**29-Mar**	**19-Apr**	**11-May**	**31-May**	**5-Jul**	**2-Aug**	**6-Sep**	**5-Oct**	**25-Oct**	**29-Nov**	**13-Dec**
<=18%	18							0	0	0	0	0	0	0	0
18.1%-20.9%	20.99							3	0	1	0	0	0	0	0
21%-22.9%	22.99							3	1	4	0	0	0	0	0
23%-28%	28							8	23	5	6	4	1	0	0
28.1%-40%	40							6	26	9	34	56	48	48	20
>40%	100							0	0	0	0	0	1	2	0
Sum		**0**	**0**	**0**	**0**	**0**	**0**	**20**	**50**	**19**	**40**	**60**	**50**	**50**	**20**
Month Average								**25.12**	**27.99**	**27.00**	**32.05**	**33.63**	**34.87**	**34.27**	**35.23**
High								**7.21**	**6.28**	**6.04**	**6.81**	**6.32**	**5.66**	**9.06**	**3.47**
Low								**6.29**	**5.58**	**6.10**	**5.81**	**9.52**	**7.09**	**4.49**	**5.31**

Table 17: 2011 South Queensland DM Results

SQ Hass	2011												
Titles	**DM intervals**	**31-Jan**	**21-Feb**	**28-Mar**	**11-Apr**	**23-May**	**27-Jun**	**25-Jul**	**29-Aug**	**26-Sep**	**24-Oct**	**28-Nov**	**19-Dec**
<=18%	18					0	1	0	0	0	0		
18.1%-20.9%	20.99					8	9	2	0	0	0		
21%-22.9%	22.99					12	5	4	0	0	0		
23%-28%	28					10	5	29	10	6	7		
28.1%-40%	40					0	0	14	19	51	53		
>40%	100					0	0	1	1	2	0		
Sum		**0**	**0**	**0**	**0**	**30**	**20**	**50**	**30**	**59**	**60**		
Month Average						**22.46**	**21.24**	**26.63**	**30.12**	**32.62**	**32.74**		
High						**4.82**	**4.01**	**14.01**	**10.53**	**8.96**	**6.44**		
Low						**3.70**	**3.70**	**8.05**	**6.92**	**7.71**	**7.25**		

Figure 16: South Queensland Hass – Average Dry Matter Yearly Comparison



Tamborine/Northern Rivers Hass

Table 18: 2008 Tamborine/Northern Rivers DM Results

Tam/NR Hass	2008												
Titles	**DM intervals**	**21-Jan**	**18-Feb**	**31-Mar**	**21-Apr**	**26-May**	**23-Jun**	**21-Jul**	**25-Aug**	**22-Sep**	**27-Oct**	**24-Nov**	**15-Dec**
<=18%	18							0	0	0	0	0	
18.1%-20.9%	20.99							0	1	0	0	0	
21%-22.9%	22.99							1	2	0	0	0	
23%-28%	28							10	18	5	1	0	
28.1%-40%	40							9	9	14	26	10	
>40%	100							0	0	1	3	0	
Sum		**0**	**0**	**0**	**0**	**0**	**0**	**20**	**30**	**20**	**30**	**10**	**0**
Month Average								**28.73**	**27.00**	**32.28**	**33.62**	**30.07**	
High								**7.82**	**6.29**	**11.17**	**10.73**	**2.40**	
Low								**6.79**	**6.68**	**7.41**	**8.28**	**1.81**	

Table 19: 2009 Tamborine/Northern Rivers DM Results

Tam/NR Hass	2009												
Titles	**DM intervals**	**19-Jan**	**23-Feb**	**30-Mar**	**20-Apr**	**4-May**	**25-May**	**29-Jun**	**27-Jul**	**31-Aug**	**28-Sep**	**26-Oct**	**30-Nov**	**15-Dec**
<=18%	18							0	0	0	0	0		
18.1%-20.9%	20.99							0	0	0	0	0		
21%-22.9%	22.99							1	0	2	0	0		
23%-28%	28							13	12	13	6	0		
28.1%-40%	40							6	8	14	24	30		
>40%	100							0	0	1	0	0		
Sum		**0**	**0**	**0**	**0**	**0**	**0**	**20**	**20**	**30**	**30**	**30**	**0**	**0**
Month Average								**27.33**	**28.00**	**29.72**	**32.65**	**33.61**		
High								**5.92**	**9.19**	**12.66**	**7.29**	**4.40**		
Low								**5.20**	**2.58**	**7.80**	**7.56**	**3.73**		

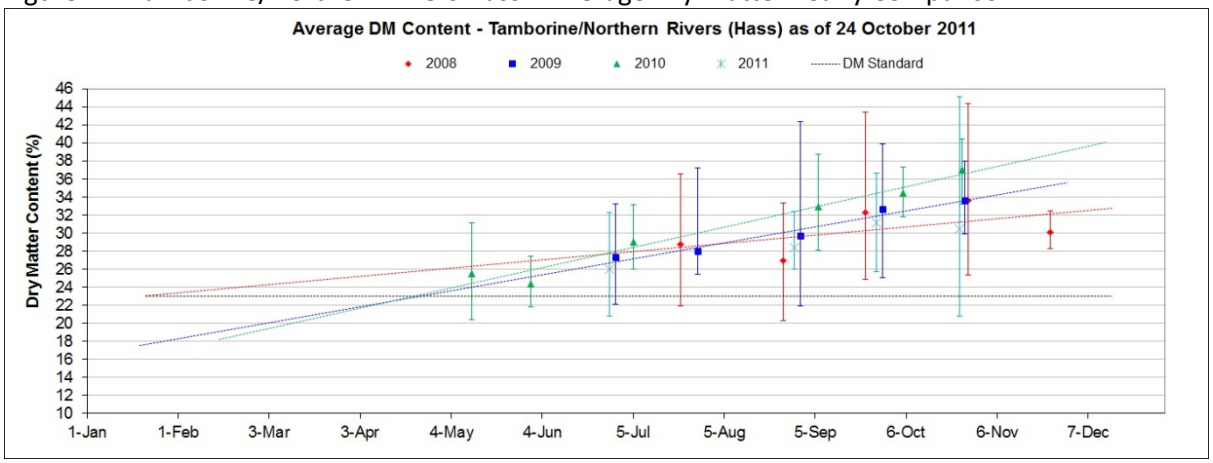
Table 20: 2010 Tamborine/Northern Rivers DM Results

Tam/NR Hass	2010													
Titles	**DM intervals**	**19-Jan**	**15-Feb**	**1-Mar**	**29-Mar**	**19-Apr**	**11-May**	**31-May**	**5-Jul**	**2-Aug**	**6-Sep**	**5-Oct**	**25-Oct**	**29-Nov**	**13-Dec**
<=18%	18						0	0	0		0	0	0		
18.1%-20.9%	20.99						1	0	0		0	0	0		
21%-22.9%	22.99						5	2	0		0	0	0		
23%-28%	28						19	8	9		0	0	0		
28.1%-40%	40						5	0	11		49	10	8		
>40%	100						0	0	0		0	0	2		
Sum		**0**	**0**	**0**	**0**	**0**	**30**	**10**	**20**	**0**	**49**	**10**	**10**	**0**	**0**
Month Average							**25.49**	**24.34**	**29.01**		**32.93**	**34.52**	**37.07**		
High							**5.67**	**3.12**	**4.12**		**5.80**	**2.85**	**3.44**		
Low							**5.13**	**2.53**	**2.99**		**4.83**	**2.67**	**3.80**		

Table 21: 2011 Tamborine/Northern Rivers DM Results

Tam/NR Hass	2011												
Titles	DM intervals	31-Jan	21-Feb	28-Mar	11-Apr	23-May	27-Jun	25-Jul	29-Aug	26-Sep	24-Oct	28-Nov	19-Dec
<=18%	18						0		0	0	0		
18.1%-20.9%	20.99						2		0	0	1		
21%-22.9%	22.99						1		0	0	0		
23%-28%	28						12		6	3	5		
28.1%-40%	40						5		4	37	33		
>40%	100						0		0	0	1		
Sum		**0**	**0**	**0**	**0**	**0**	**20**	**0**	**10**	**40**	**40**		
Month Average							**26.02**		**28.42**	**31.13**	**30.51**		
High							**6.23**		**3.95**	**5.52**	**14.66**		
Low							**5.23**		**2.43**	**5.46**	**9.79**		

Figure 17: Tamborine/Northern Rivers Hass – Average Dry Matter Yearly Comparison



Central New South Wales Hass

Table 22: 2008 Central New South Wales DM Results

CNSW Hass	2008												
Titles	DM intervals	21-Jan	18-Feb	31-Mar	21-Apr	26-May	23-Jun	21-Jul	25-Aug	22-Sep	27-Oct	24-Nov	15-Dec
<=18%	18	0				1	0	0	0	0	0	0	
18.1%-20.9%	20.99	0				5	7	0	0	0	0	0	
21%-22.9%	22.99	0				3	5	1	0	1	0	0	
23%-28%	28	2				1	18	9	11	12	8	1	
28.1%-40%	40	18				0	0	20	39	37	31	28	
>40%	100	0				0	0	0	0	0	1	1	
Sum		**20**	**0**	**0**	**0**	**10**	**30**	**30**	**50**	**50**	**40**	**30**	**0**
Month Average		**31.20**				**20.35**	**23.55**	**30.23**	**30.71**	**31.25**	**32.84**	**32.86**	
High		**4.16**				**3.27**	**4.17**	**6.23**	**5.91**	**8.15**	**9.66**	**7.57**	
Low		**4.36**				**2.42**	**5.01**	**7.82**	**6.92**	**8.55**	**9.47**	**5.55**	

Table 23: 2009 Central New South Wales DM Results

CNSW Hass	2009												
Titles	DM intervals	19-Jan	23-Feb	30-Mar	20-Apr	4-May	25-May	29-Jun	27-Jul	31-Aug	28-Sep	26-Oct	30-Nov	15-Dec
<=18%	18	0	0						1	0	0	0	0	0
18.1%-20.9%	20.99	0	0						0	0	0	0	0	0
21%-22.9%	22.99	0	0						0	0	2	0	0	0
23%-28%	28	1	0						17	7	7	1	2	0
28.1%-40%	40	56	8						22	32	16	39	38	54
>40%	100	3	2						0	1	5	0	0	6
Sum		**60**	**10**						**40**	**40**	**30**	**40**	**40**	**60**
Month Average		**34.52**	**37.86**						**28.52**	**31.19**	**32.72**	**34.14**	**31.86**	**35.24**
High		**8.48**	**3.91**						**10.58**	**9.39**	**10.10**	**4.20**	**5.23**	**9.01**
Low		**8.58**	**2.86**						**10.96**	**6.47**	**10.08**	**6.32**	**6.17**	**7.01**

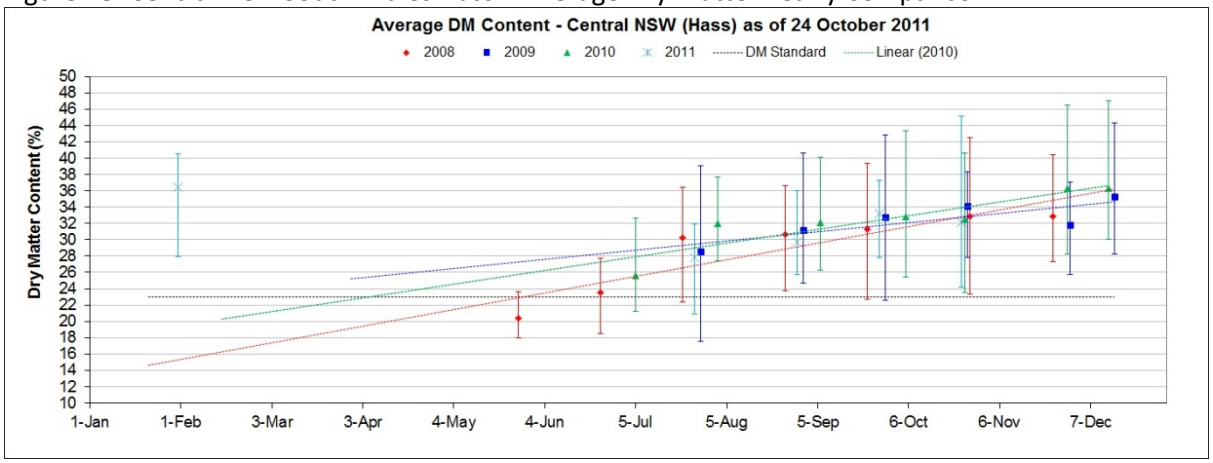
Table 24: 2010 Central New South Wales DM Results

CNSW Hass	2010														
Titles	DM intervals	19-Jan	15-Feb	1-Mar	29-Mar	19-Apr	11-May	31-May	5-Jul	2-Aug	6-Sep	5-Oct	25-Oct	29-Nov	13-Dec
<=18%	18								0	0	0	0	0	0	0
18.1%-20.9%	20.99								0	0	0	0	0	0	0
21%-22.9%	22.99								6	0	0	0	0	0	0
23%-28%	28								17	2	6	3	6	0	0
28.1%-40%	40								7	38	53	34	63	28	49
>40%	100								0	0	1	3	1	12	11
Sum		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**30**	**40**	**60**	**40**	**70**	**40**	**60**
Month Average									**25.60**	**32.08**	**32.18**	**32.90**	**32.60**	**36.36**	**36.38**
High									**7.05**	**5.65**	**7.96**	**10.41**	**8.00**	**10.18**	**10.69**
Low									**4.36**	**4.67**	**5.88**	**7.44**	**9.12**	**8.12**	**6.30**

Table 25: 2011 Central New South Wales DM Results

CNSW Hass	2011												
Titles	DM intervals	31-Jan	21-Feb	28-Mar	11-Apr	23-May	27-Jun	25-Jul	29-Aug	26-Sep	24-Oct	28-Nov	19-Dec
<=18%	18	0						0	0	0	0		
18.1%-20.9%	20.99	0						1	0	0	0		
21%-22.9%	22.99	0						0	0	0	0		
23%-28%	28	1						10	13	1	9		
28.1%-40%	40	36						9	27	9	70		
>40%	100	3						0	0	0	1		
Sum		**40**	**0**	**0**	**0**	**0**	**0**	**20**	**40**	**10**	**80**		
Month Average		**36.39**						**27.80**	**29.77**	**33.21**	**32.18**		
High		**4.11**						**4.08**	**6.21**	**4.02**	**12.99**		
Low		**8.45**						**6.94**	**4.02**	**5.42**	**8.01**		

Figure 18: Central New South Wales Hass – Average Dry Matter Yearly Comparison



Tristate Hass

Table 26: 2008 Tristate DM Results

Tristate Hass	2008												
Titles	DM intervals	21-Jan	18-Feb	31-Mar	21-Apr	26-May	23-Jun	21-Jul	25-Aug	22-Sep	27-Oct	24-Nov	15-Dec
<=18%	18									0	0	0	
18.1%-20.9%	20.99									0	0	0	
21%-22.9%	22.99									0	0	0	
23%-28%	28									3	1	1	
28.1%-40%	40									17	29	29	
>40%	100									0	0	0	
Sum		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**20**	**30**	**30**	**0**
Month Average										**31.52**	**35.10**	**32.54**	
High										**5.79**	**4.87**	**5.06**	
Low										**5.74**	**7.40**	**4.82**	

Table 27: 2009 Tristate DM Results

Tristate Hass	2009													
Titles	DM intervals	19-Jan	23-Feb	30-Mar	20-Apr	4-May	25-May	29-Jun	27-Jul	31-Aug	28-Sep	26-Oct	30-Nov	15-Dec
<=18%	18	0	0						0		0	0	0	
18.1%-20.9%	20.99	0	0						0		0	0	0	
21%-22.9%	22.99	0	0						0		0	0	0	
23%-28%	28	0	0						10		5	0	1	
28.1%-40%	40	9	10						0		15	30	19	
>40%	100	1	0						0		0	0	0	
Sum		**10**	**10**	**0**	**0**	**0**	**0**	**0**	**10**	**0**	**20**	**30**	**20**	**0**
Month Average		**34.52**	**33.28**						**25.16**		**30.41**	**34.01**	**32.52**	
High		**8.48**	**2.81**						**1.98**		**8.29**	**3.95**	**3.68**	
Low		**8.58**	**5.27**						**1.94**		**4.83**	**4.93**	**5.36**	

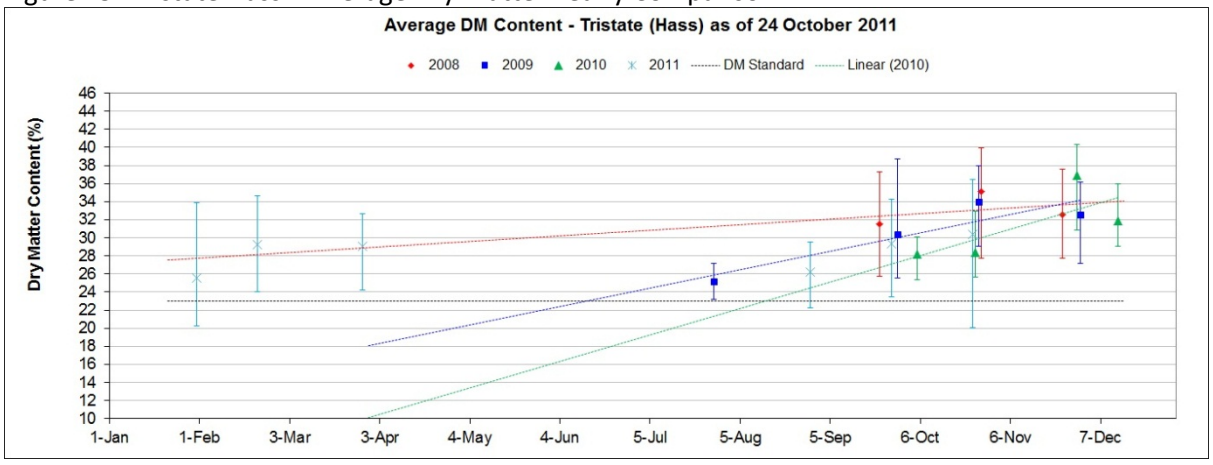
Table 28: 2010 Tristate DM Results

Tristate Hass	2010														
Titles	DM intervals	19-Jan	15-Feb	1-Mar	29-Mar	19-Apr	11-May	31-May	5-Jul	2-Aug	6-Sep	5-Oct	25-Oct	29-Nov	13-Dec
<=18%	18											0	0	0	0
18.1%-20.9%	20.99											0	0	0	0
21%-22.9%	22.99											0	0	0	0
23%-28%	28											4	6	0	0
28.1%-40%	40											6	4	8	20
>40%	100											0	0	2	0
Sum		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**10**	**10**	**10**	**20**
Month Average												**28.24**	**28.37**	**36.94**	**31.88**
High												**1.87**	**4.56**	**3.39**	**4.11**
Low												**2.85**	**2.75**	**6.05**	**2.79**

Table 29: 2011 Tristate DM Results

Tristate Hass	2011												
Titles	DM intervals	31-Jan	21-Feb	28-Mar	11-Apr	23-May	27-Jun	25-Jul	29-Aug	26-Sep	24-Oct	28-Nov	19-Dec
<=18%	18	0	0	0					0	0	0		
18.1%-20.9%	20.99	1	0	0					0	0	1		
21%-22.9%	22.99	2	0	0					1	0	0		
23%-28%	28	22	4	4					5	5	3		
28.1%-40%	40	5	6	6					4	15	16		
>40%	100	0	0	0					0	0	0		
Sum		**30**	**10**	**10**	**0**	**0**	**0**	**0**	**10**	**20**	**20**		
Month Average		**25.54**	**29.28**	**29.04**					**26.22**	**29.35**	**30.42**		
High		**8.39**	**5.39**	**3.59**					**3.33**	**4.86**	**6.01**		
Low		**5.32**	**5.22**	**4.81**					**3.99**	**5.90**	**10.33**		

Figure 19: Tristate Hass – Average Dry Matter Yearly Comparison



Western Australia Hass

Table 30: 2008 Western Australia DM Results

WA Hass	2008												
Titles	**DM intervals**	**21-Jan**	**18-Feb**	**31-Mar**	**21-Apr**	**26-May**	**23-Jun**	**21-Jul**	**25-Aug**	**22-Sep**	**27-Oct**	**24-Nov**	**15-Dec**
<=18%	18	0										0	
18.1%-20.9%	20.99	0										0	
21%-22.9%	22.99	0										0	
23%-28%	28	1										8	
28.1%-40%	40	9										12	
>40%	100	0										0	
Sum		**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**20**	**0**
Month Average		**32.26**										**28.76**	
High		**3.13**										**6.27**	
Low		**4.39**										**4.73**	

Table 31: 2009 Western Australia DM Results

WA Hass	2009												
Titles	**DM intervals**	**19-Jan**	**23-Feb**	**30-Mar**	**20-Apr**	**4-May**	**25-May**	**29-Jun**	**27-Jul**	**31-Aug**	**28-Sep**	**26-Oct**	**30-Nov**	**15-Dec**
<=18%	18	0											0	0
18.1%-20.9%	20.99	0											0	0
21%-22.9%	22.99	0											0	0
23%-28%	28	6											3	12
28.1%-40%	40	24											36	38
>40%	100	0											0	0
Sum		**30**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**39**	**50**
Month Average		**31.50**											**31.79**	**30.52**
High		**4.80**											**6.18**	**6.43**
Low		**5.77**											**6.37**	**7.27**

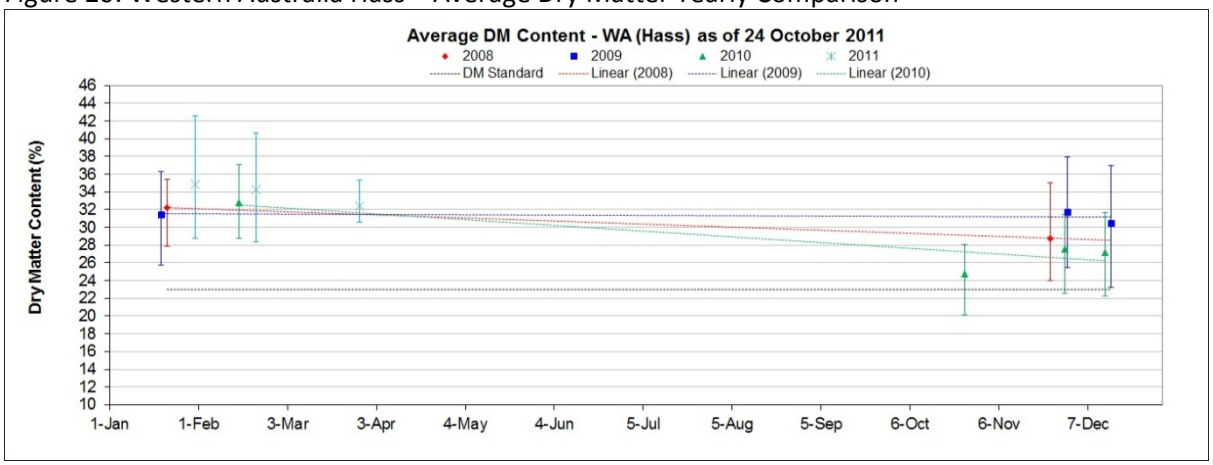
Table 32: 2010 Western Australia DM Results

WA Hass	2010														
Titles	**DM intervals**	**19-Jan**	**15-Feb**	**1-Mar**	**29-Mar**	**19-Apr**	**11-May**	**31-May**	**5-Jul**	**2-Aug**	**6-Sep**	**5-Oct**	**25-Oct**	**29-Nov**	**13-Dec**
<=18%	18		0										0	0	0
18.1%-20.9%	20.99		0										1	0	0
21%-22.9%	22.99		0										2	2	1
23%-28%	28		0										6	19	15
28.1%-40%	40		10										1	19	13
>40%	100		0										0	0	0
Sum		**0**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**10**	**40**	**29**
Month Average			**32.82**										**24.79**	**27.59**	**27.18**
High			**4.28**										**3.25**	**3.86**	**4.49**
Low			**4.10**										**4.66**	**4.99**	**4.89**

Table 33: 2011 Western Australia DM Results

WA Hass	2011												
Titles	**DM intervals**	**31-Jan**	**21-Feb**	**28-Mar**	**11-Apr**	**23-May**	**27-Jun**	**25-Jul**	**29-Aug**	**26-Sep**	**24-Oct**	**28-Nov**	**19-Dec**
<=18%	18	0	0	0									
18.1%-20.9%	20.99	0	0	0									
21%-22.9%	22.99	0	0	0									
23%-28%	28	0	0	0									
28.1%-40%	40	18	29	10									
>40%	100	2	1	0									
Sum		**20**	**30**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**		
Month Average		**34.85**	**34.22**	**32.39**									
High		**7.69**	**6.44**	**2.89**									
Low		**6.06**	**5.88**	**1.81**									

Figure 20: Western Australia Hass – Average Dry Matter Yearly Comparison



North Queensland Shepard

Table 34: 2008 North Queensland DM Results

NQ Shepard	2008												
Titles	DM intervals	21-Jan	18-Feb	31-Mar	21-Apr	26-May	23-Jun	21-Jul	25-Aug	22-Sep	27-Oct	24-Nov	15-Dec
<=18%	18		35	0	0								
18.1%-20.9%	20.99		26	2	0								
21%-22.9%	22.99		13	2	0								
23%-28%	28		21	29	4								
28.1%-40%	40		5	47	14								
>40%	100		0	0	2								
Sum		**0**	**100**	**80**	**20**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Month Average			**20.22**	**28.51**	**32.88**								
High			**11.91**	**8.12**	**8.61**								
Low			**9.63**	**9.04**	**7.88**								

Table 35: 2009 North Queensland DM Results

NQ Shepard	2009												
Titles	DM intervals	19-Jan	23-Feb	30-Mar	20-Apr	4-May	25-May	29-Jun	27-Jul	31-Aug	28-Sep	26-Oct	30-Nov	15-Dec
<=18%	18		2	1										
18.1%-20.9%	20.99		15	4										
21%-22.9%	22.99		34	8										
23%-28%	28		39	39										
28.1%-40%	40		20	38										
>40%	100		0	0										
Sum		**0**	**110**	**90**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Month Average			**24.30**	**27.40**										
High			**9.64**	**10.46**										
Low			**7.86**	**9.60**										

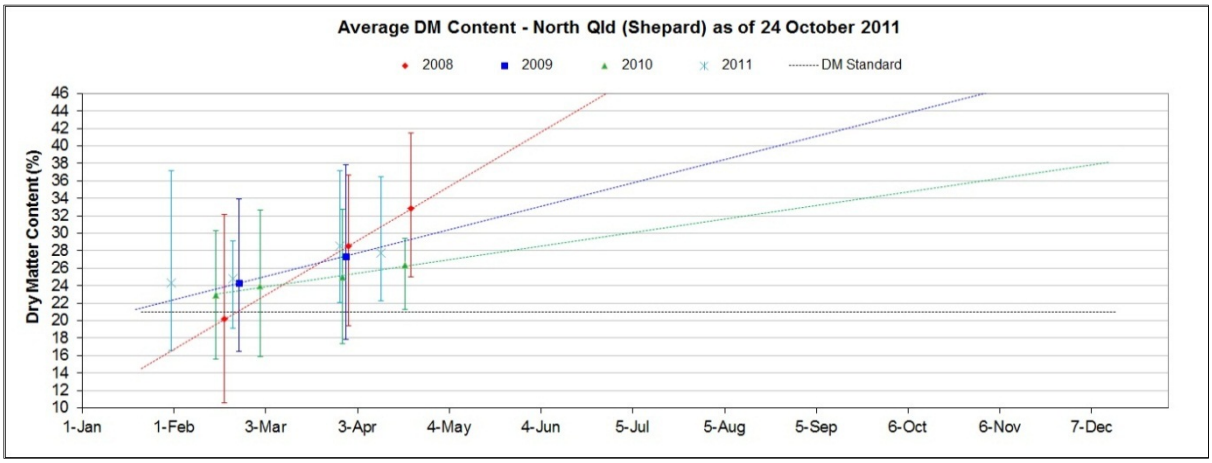
Table 36: 2010 North Queensland DM Results

NQ Shepard	2010													
Titles	DM intervals	19-Jan	15-Feb	1-Mar	29-Mar	19-Apr	11-May	31-May	5-Jul	2-Aug	6-Sep	5-Oct	25-Oct	29-Nov	13-Dec
<=18%	18		4	1	4	0									
18.1%-20.9%	20.99		21	17	13	0									
21%-22.9%	22.99		38	35	19	1									
23%-28%	28		52	75	52	15									
28.1%-40%	40		5	11	32	4									
>40%	100		0	0	0	0									
Sum		**0**	**120**	**139**	**120**	**20**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Month Average			**22.97**	**23.94**	**24.97**	**26.34**									
High			**7.28**	**8.68**	**7.77**	**3.08**									
Low			**7.39**	**8.03**	**7.60**	**5.08**									

Table 37: 2011 North Queensland DM Results

NQ Shepard	2011												
Titles	DM intervals	31-Jan	21-Feb	28-Mar	11-Apr	23-May	27-Jun	25-Jul	29-Aug	26-Sep	24-Oct	28-Nov	19-Dec
<=18%	18	2	0	0	0								
18.1%-20.9%	20.99	11	9	0	0								
21%-22.9%	22.99	7	13	2	2								
23%-28%	28	41	72	55	35								
28.1%-40%	40	9	6	53	23								
>40%	100	0	0	0	0								
Sum		**70**	**100**	**110**	**60**	**0**	**0**	**0**	**0**	**0**	**0**		
Month Average		**24.35**	**24.80**	**28.51**	**27.79**								
High		**12.82**	**4.33**	**8.66**	**8.73**								
Low		**7.79**	**5.71**	**6.43**	**5.52**								

Figure 21: North Queensland Shepard – Average Dry Matter Yearly Comparison



Central Queensland Shepard

Table 38: 2008 Central Queensland DM Results

CQ Shepard	2008												
Titles	DM intervals	21-Jan	18-Feb	31-Mar	21-Apr	26-May	23-Jun	21-Jul	25-Aug	22-Sep	27-Oct	24-Nov	15-Dec
<=18%	18			1	2								
18.1%-20.9%	20.99			7	5								
21%-22.9%	22.99			4	3								
23%-28%	28			21	0								
28.1%-40%	40			7	0								
>40%	100			0	0								
Sum		**0**	**0**	**40**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Month Average				**24.88**	**19.23**								
High				**8.61**	**2.50**								
Low				**8.02**	**2.85**								

Table 39: 2009 Central Queensland DM Results

CQ Shepard	2009												
Titles	DM intervals	19-Jan	23-Feb	30-Mar	20-Apr	4-May	25-May	29-Jun	27-Jul	31-Aug	28-Sep	26-Oct	30-Nov	15-Dec
<=18%	18			0	0									
18.1%-20.9%	20.99			2	2									
21%-22.9%	22.99			5	0									
23%-28%	28			12	6									
28.1%-40%	40			1	2									
>40%	100			0	0									
Sum		**0**	**0**	**20**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Month Average				**23.87**	**24.18**									
High				**6.20**	**4.33**									
Low				**4.27**	**4.76**									

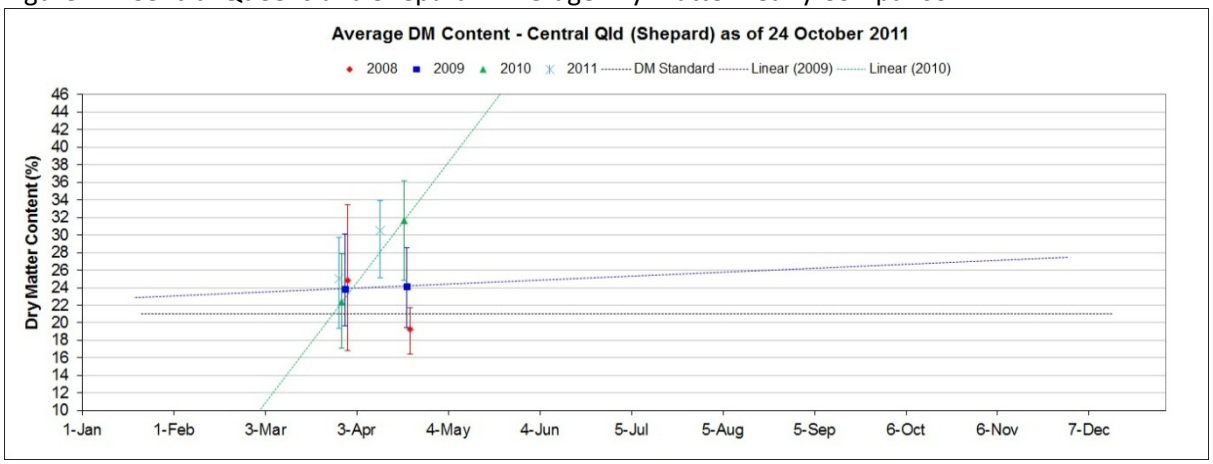
Table 40: 2010 Central Queensland DM Results

CQ Shepard	2010														
Titles	DM intervals	19-Jan	15-Feb	1-Mar	29-Mar	19-Apr	11-May	31-May	5-Jul	2-Aug	6-Sep	5-Oct	25-Oct	29-Nov	13-Dec
<=18%	18				3	0									
18.1%-20.9%	20.99				10	0									
21%-22.9%	22.99				5	0									
23%-28%	28				12	1									
28.1%-40%	40				0	9									
>40%	100				0	0									
Sum		**0**	**0**	**0**	**30**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Month Average					**22.39**	**31.67**									
High					**5.50**	**4.53**									
Low					**5.31**	**6.88**									

Table 41: 2011 Central Queensland DM Results

CQ Shepard	2011											
Titles	DM intervals	31-Jan	21-Feb	28-Mar	11-Apr	23-May	27-Jun	25-Jul	29-Aug	26-Sep	24-Oct	28-Nov	19-Dec
<=18%	18			0	0								
18.1%-20.9%	20.99			2	0								
21%-22.9%	22.99			6	0								
23%-28%	28			19	1								
28.1%-40%	40			3	9								
>40%	100			0	0								
Sum		**0**	**0**	**30**	**10**	**0**	**0**	**0**	**0**	**0**	**0**		
Month Average				**24.99**	**30.45**								
High				**4.68**	**3.51**								
Low				**5.68**	**5.33**								

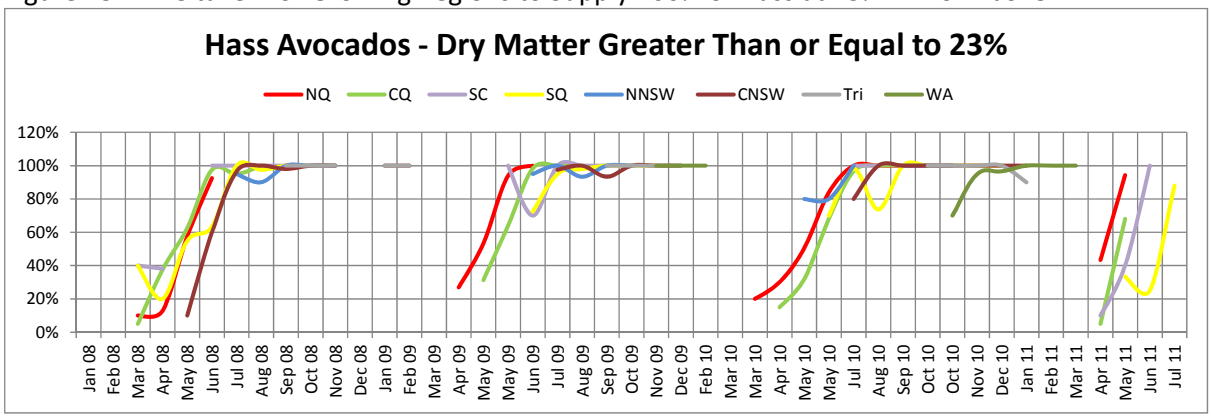
Figure 22: Central Queensland Shepard – Average Dry Matter Yearly Comparison



The common theme with all of the results is that DM are generally more of an issue at the beginning of each growing region's season. As the season progresses and fruit becomes more mature DM increases.

Figure 23 shows the amount of time it takes each region to supply 100% of their fruit at 23% or above for Hass.

Figure 23: Time taken for Growing Regions to Supply 100% of Hass at 23% DM or Above



Figures 24 to 31 show the amount of time it takes each individual to supply 100% of their fruit at 23% or above for Hass.

Figure 24: Time taken for North Queensland to Supply 100% of Hass at 23% DM or Above

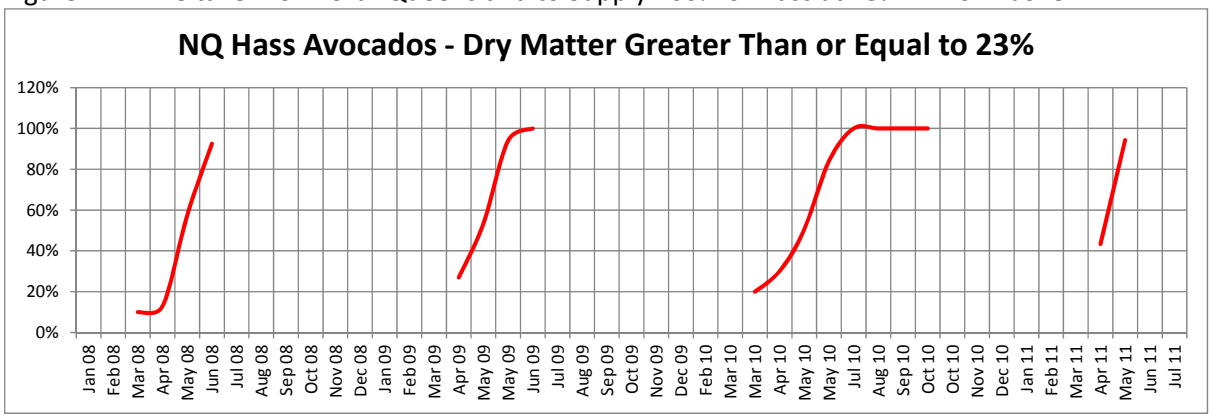


Figure 25: Time taken for Central Queensland to Supply 100% of Hass at 23% DM or Above

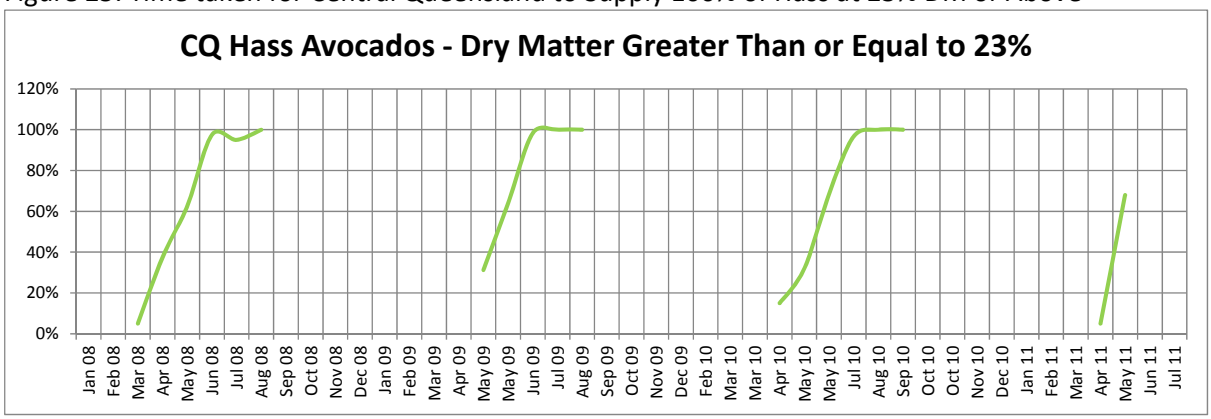


Figure 26: Time taken for Sunshine Coast to Supply 100% of Hass at 23% DM or Above

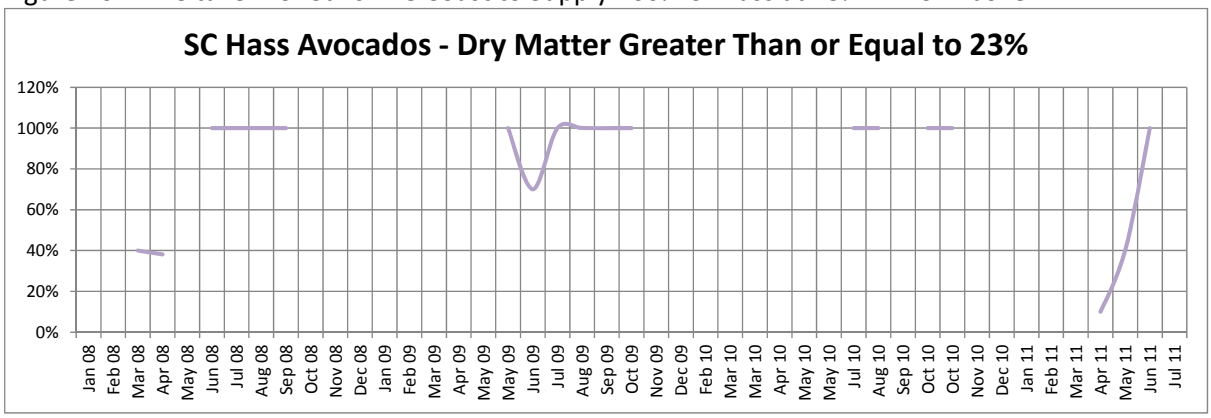


Figure 27: Time taken for South Queensland to Supply 100% of Hass at 23% DM or Above

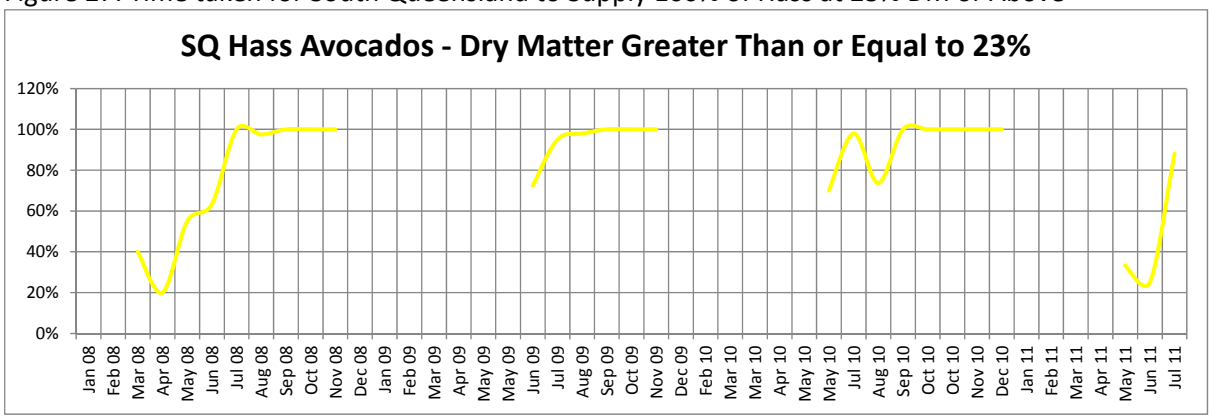


Figure 28: Time taken for Tamborine/Northern Rivers to Supply 100% of Hass at 23% DM or Above

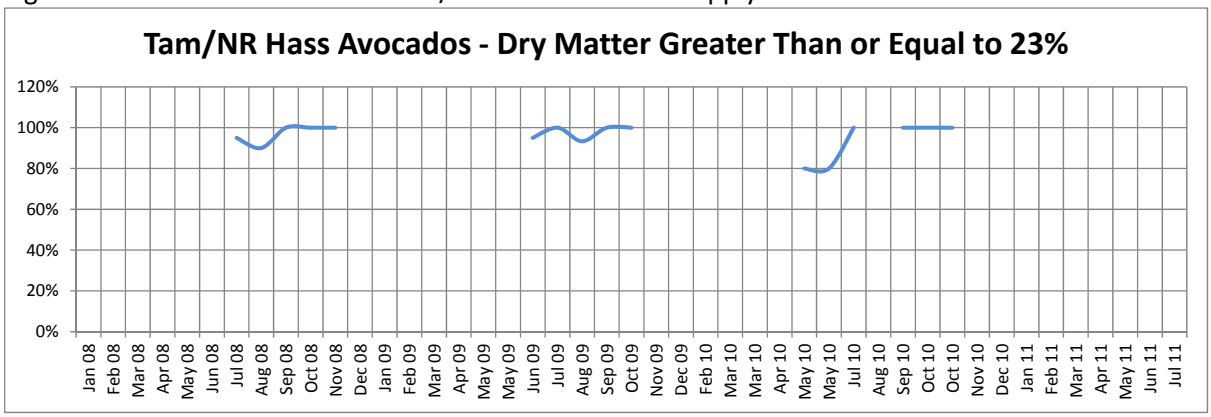


Figure 29: Time taken for Central New South Wales to Supply 100% of Hass at 23% DM or Above

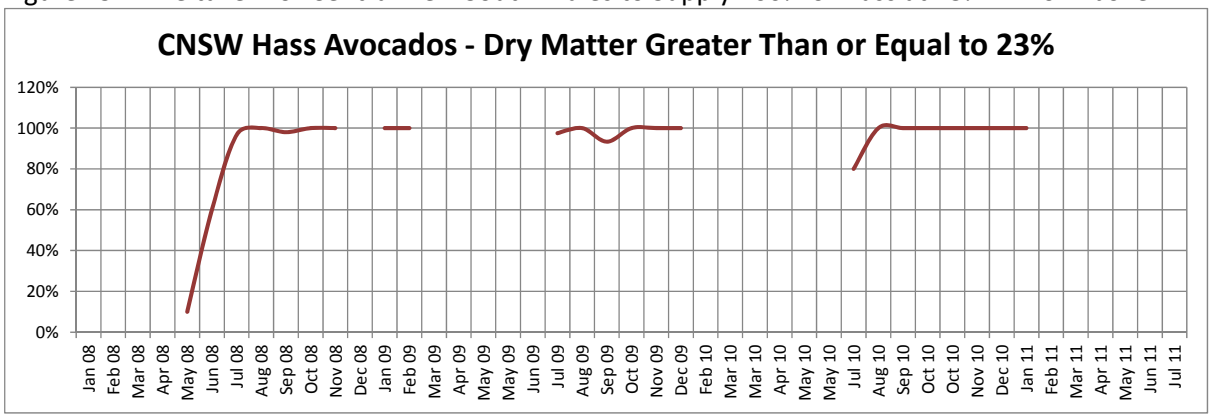


Figure 30: Time taken for Tristate to Supply 100% of Hass at 23% DM or Above

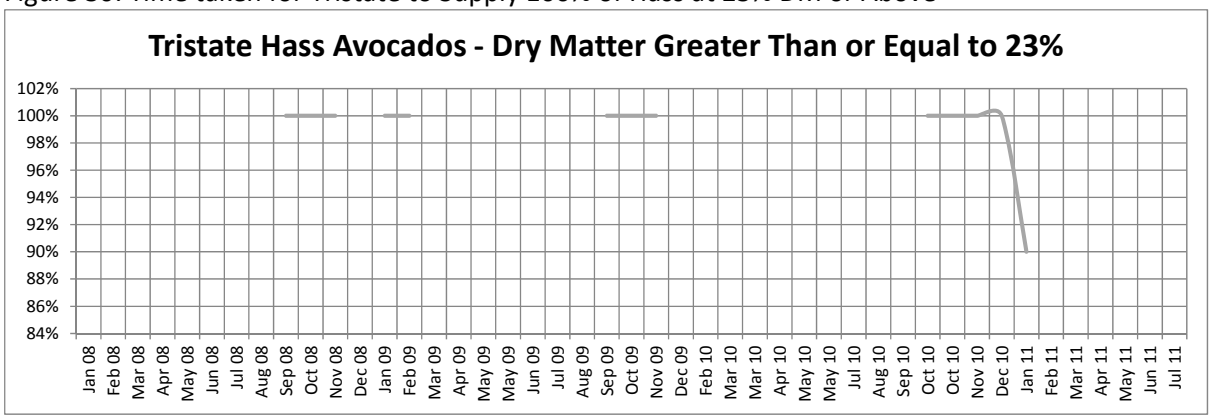


Figure 31: Time taken for Western Australia to Supply 100% of Hass at 23% DM or Above

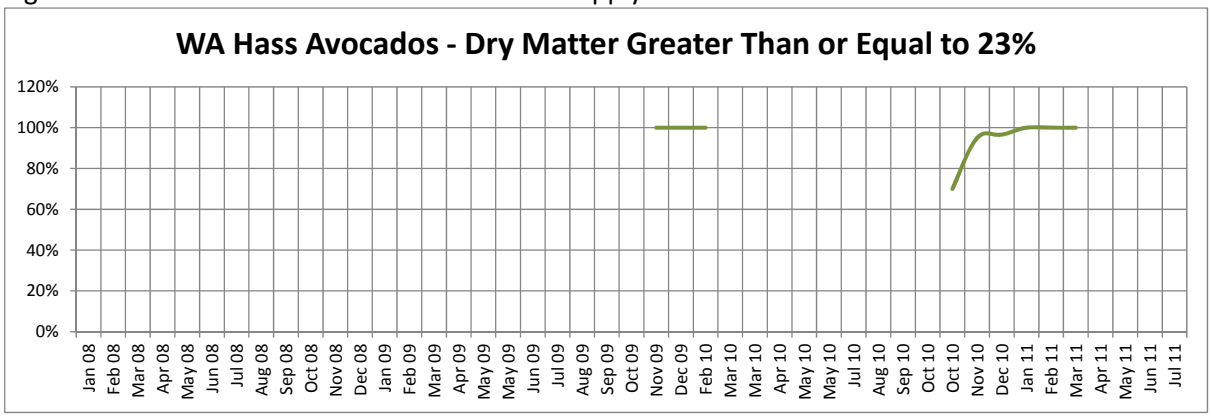
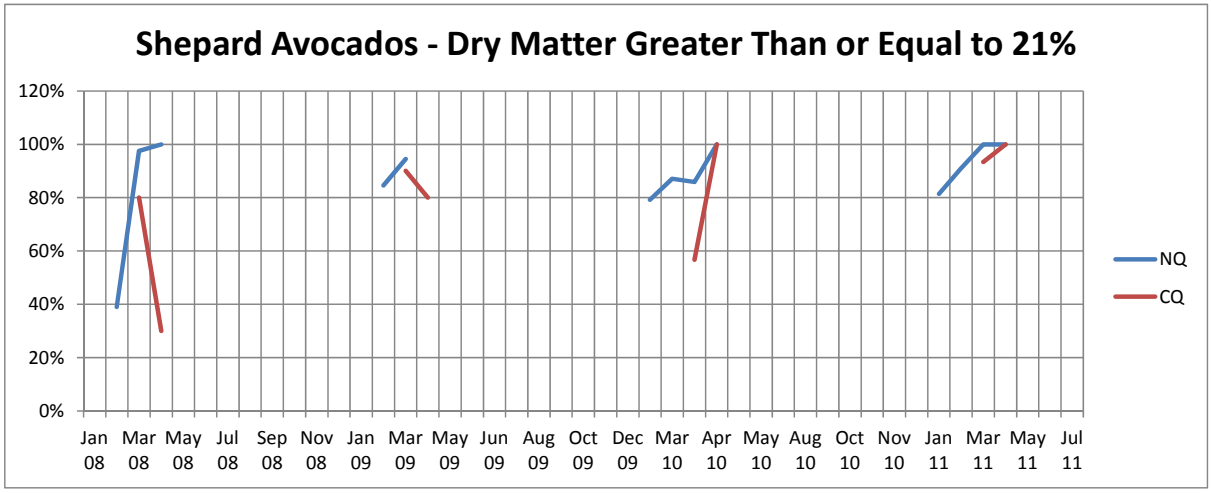


Figure 32 shows the amount of time it takes North Queensland and Central Queensland to supply 100% of their fruit at 21% or above for Shepard. Obviously because the Shepard season is much shorter than the Hass season, the data is only able to be collected for a few months at a time.

Figure 32: Time taken for North Queensland and Central Queensland to Supply 100% of Shepard at 23% DM or Above



6. Discussion

The project outcomes from this project include:

- Measure how much fruit at the retail level currently fulfils consumer's quality demands (based off consumer research findings and industry benchmarks) and where there are significant differences in quality, between store types and/or seasons.
    - This has been achieved – see Results section of this report.
    - Since the program began in 2008, overall internal quality in both Hass and Shepard has improved.
    - Up until 2010 bruising was always the most significant quality issue. In 2010 however a reduction in the level of bruising resulted in the overall level of damage decreasing and the significance of bruising as the cause of internal damage reduced below body rots for the first time. The proportion of Hass avocados with more than 10% bruising to the flesh decreased by 50% between 2008 and 2010 from 12% to 6%. The most significant improvements have been made in New South Wales (NSW) and Victoria (VIC).
    - Bruising is still the most significant issue in Shepard avocados with the reduction in body rots being the largest contributing factor to the overall reduction in internal damage. Bruising actually increased very slightly between 2009 and 2010 although not to the levels it was at in 2008.
    - In terms of store type, the data was summarised into four store type groupings ie. Major Supermarket 1 (M1), Major Supermarket 2 (M2), Independent Supermarkets (IS) and Independent Fruit and Vegetable Stores (I). The results indicate that:
        - Both major supermarkets have improved levels of total damage
        - Independent supermarkets have had the least improvement and consistently the highest level of damage
        - Independent fruit and vegetable stores have always had either the lowest or second lowest level of damage
    - Regarding DM%, all regions at the beginning of their seasons have fruit that falls short of the 23% DM standard for Hass (generally with the exception of the Tristate and Western Australian growing regions). This is also the case for the Shepard variety but it should be noted that the Shepard season only runs for a few months and thus less data was collected.
- Communication of these findings to the supply chain.
    - This has been achieved – see communication section in the Method of this report and the below Technology Transfer section.
- Use these findings to provide up to date analysis of what current quality issues are as a foundation for future research and development work in the area of quality management.
    - This is ongoing – as stated previously this program has influenced the research conducted in AV10006 and AV10019.
- Use the stores that are supplying consistently high quality fruit as case studies for industry best practice. Where quality in store falls below consumer expectations (as per consumer sensory results) the results from the sensory work which will be combined with the retail survey results to build an economic argument providing retailers with hard data expressing the impact of suboptimal quality on their sales.
    - This is ongoing – see below section on Technology Transfer.

7. Technology Transfer

The most important intended outcomes from this project were to:

- Measure how much fruit at the retail level currently fulfils consumer's quality demands (based off consumer research findings and industry benchmarks) and where there are significant differences in quality, between store types and/or seasons.
    - This has been achieved – see Results section of this report.
- Communication of these findings to the supply chain.
    - This has been achieved – see communication section in the Method of this report. Details of meetings held where the results of this project were discussed are also listed below.
- Use these findings to provide up to date analysis of what current quality issues are as a foundation for future research and development work in the area of quality management.
    - This is ongoing – as stated previously this program has influenced the research conducted in AV10006 and AV10019.
- Use the stores that are supplying consistently high quality fruit as case studies for industry best practice. Where quality in store falls below consumer expectations (as per consumer sensory results) the results from the sensory work which will be combined with the retail survey results to build an economic argument providing retailers with hard data expressing the impact of suboptimal quality on their sales.
    - Results from this project have provided direction into the retailer education activities undertaken in AV10006. Specifically, this project has influenced the content and direction of the retailer education and training highlighting the prevalence of bruising in avocados and the flow on affects this has with consumer purchasing.
    - Feedback from stores has been used in the development of the retailer education materials and when designing the retailer training. Learnings from stores with high quality fruit have been communicated through the retailer training. For example, some high end retailers use signage and well trained staff to remind consumers not to squeeze the ripe avocados. Staff in these stores are on hand to help educate consumers on how to pick a ripe, good quality avocado.

A multitude of presentations have been made at industry meetings over the time of this project to communicate the findings and encourage adaption of solutions presented. Below is a list of those meetings:

- September 2011: 7th World Avocado Congress: targeting delegates from across the world. A full paper was written for the congress which can be found on the congress website along with the power point presentation: http://worldavocadocongress2011.com To locate the paper and power point presentation, click on program, program and presentations, Thursday and Friday, Joanna Embry: Avocado Testing Helps Lead to Improved Eating Quality for Consumers.
- 10 August 2011: Avocado Researcher Workshop: aimed at communicating the objectives and results of this program to other researchers in the avocado industry.
- 27 July 2011: Stanthorpe Young Grower's Meeting: aimed at communicating the objectives and results of this program to members of other industries.
- 2011: A multitude of meetings concerning the results of the retail quality surveys and the work undertaken in *AV10019: Reducing flesh bruising and skin spotting in Hass avocado.* This included presentations to Coles avocado category managers regarding the implications

of the results of both projects on their handling procedures for avocados in store. A similar meeting was scheduled with Woolworths staff but unfortunately a mutually acceptable meeting date could not be arranged.

- October 2010: Infocado Summit (*AV10007: Infocado Summit October 2010 and Extension to Industry*): aimed at communicating the objectives and results of this program to industry stakeholders.
- June 2010: Avocado Researcher Workshop: aimed at communicating the objectives and results of this program to other researchers in the avocado industry.
- July 2009: 4th Australian and New Zealand Avocado Growers Conference: aimed at communicating the objectives and results of this program to industry stakeholders.

As detailed in the communication section of the Method of this report, monthly reports were distributed to relevant industry stakeholders regarding the DM results. Results of the retail quality surveys were also published on the Avocados Australia website.

8. Recommendations

It is recommended that:

- Avocados Australia continues to conduct face to face meetings with relevant stakeholders including representatives from the stores surveyed, growers representing different growing regions and wholesalers to discuss the findings of the research both in relation to internal damage and also fruit maturity (as measured by DM%).
- Avocados Australia, through AV10006 continues to train retailers on how to improve the quality of avocados in their stores and the opportunities this presents for them in terms of increased sales and throughput of stock. Learnings from retailers who already have these practices in place will continue to be promoted through the training.
- *AV10019: Reducing flesh bruising and skin spotting in Hass avocado:* should be continued as the results from this project and AV08034 will influence future research and development in terms of how the supply chain can manage and reduce avocado bruising.
- It is strongly recommended that *AV11015: Avocado Industry Fruit Quality Benchmarking* be funded to continue the retail quality surveys and DM testing. This project is crucial to the continued growth and profitability of the Australian Avocado industry as it monitors the ongoing quality of fruit in the market place. With this data, the industry will be able to continue to gauge the success and adoption of its supply chain education programs and materials.
- Preliminarily findings from AV10019 as well as anecdotal retailer feedback collected as a part of AV10006 indicate that consumers are themselves causing a significant amount of bruising to the avocado flesh. Given how detrimental flesh defects can be to consumers purchasing habits, it is strongly recommended that:
    - Consumer research be conducted to establish the best way of educating consumers on how to handle avocados. Depending on the findings from this research, an education campaign needs to be rolled out. Current education materials may need to be redeveloped targeted at consumers.

9. Acknowledgments

Avocados Australia would like to acknowledge the input from:

- The New Zealand Institute for Plant & Food Research Limited (formerly known as HortResearch) who conducted the statistical analysis of the data for this project.
- The four retail quality survey assessors for their attention to detail and diligence.
- DEEDI and Applied Horticultural Research for their ongoing assistance with the DM testing.

10. Bibliography of literature cited

NA

11.Appendix 1 – Retail Quality Survey Form

Avocado Retail Quality Survey – Store and display information

1. Store name :	2. Store location :
3. Date and time collected :	4. Variety (Hass or Shepard) :
5. Size of display (WxL) :	6. Single layer or stacked display:
7. Proportion of different coloured fruit on display – see laminated avocado colour chart please indicate the percentage of each colour rating that is on the display (total should add up to 100%)	
% of **colour rating 1**: emerald green:	% of **colour rating 2** : forest green
% of **colour rating 3** : approx 25% coloured	% of **colour rating 4** : approximately 75% coloured
% of **colour rating 5** :purple	% of **colour rating 6** :black

8. Price (each)	9. Australian fruit (✓)	10. Imported fruit (✓)	11. Mixed origin (✓)	12. Not specified (✓)

Any other comments

_____

_____

_____

Assessor name : ……..

Avocado Retail Quality Survey – Fruit Quality Information

Date of assessment:						Time of assessment:					
Fruit no.	Sticker (s)	Fruit weight	Skin colour (1 – 6)	Penetrometer reading	% Total damage	% Bruising	% Diffuse flesh discolour	% Vascular browning	% Stem end rot	% Body rots	% Other defects
1						0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+
2						0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+
3						0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+
4						0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+
5						0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+
6						0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+
7						0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+
8						0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+
9						0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+
10						0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+
11						0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+
12						0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+
13						0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+
14						0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+
15						0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+	0 10 25 33 50 50+

*** Circle the appropriate % level for each defect observed for each fruit .**

12.Appendix 2 – Retail Quality Survey Raw Data

Table 50: Percentage of Total Damage in Hass by Month during 2008 and 2009

Total Damage														
Year														
	2008							2009						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	32.55	41.20	15.54	2.64	3.96	4.11	682	43.79	41.61	9.32	0.93	2.02	2.33	644
2	40.27	36.58	12.92	1.51	6.21	2.52	596	39.10	38.41	17.82	1.04	3.11	0.52	578
3	40.32	40.32	11.83	1.08	4.30	2.15	186	38.55	23.46	18.44	3.35	10.61	5.59	179
4	31.46	37.34	19.18	2.81	5.63	3.58	391	47.76	37.81	8.96	1.49	3.48	0.50	201
5	40.76	25.15	15.76	9.39	6.82	2.12	660	40.87	33.03	12.07	3.32	6.18	4.52	663
6	36.17	32.42	17.00	6.34	4.47	3.60	694	43.05	32.16	13.74	2.01	4.36	4.69	597
7	38.83	30.20	15.10	2.41	7.87	5.58	788	41.25	33.46	12.45	3.31	6.03	3.50	514
8	34.39	31.50	20.77	2.89	6.60	3.85	727	41.62	30.51	16.58	2.47	4.23	4.59	567
9	38.86	40.08	13.32	1.90	4.35	1.49	736	48.30	29.72	13.16	2.01	4.02	2.79	646
10	43.33	37.62	12.38	1.59	4.13	0.95	630	39.23	30.71	17.52	2.89	6.27	3.38	622
11	31.04	37.91	21.89	2.72	4.43	2.00	699	36.68	37.72	16.61	2.08	4.67	2.25	578
12	34.23	36.32	18.68	1.94	7.47	1.35	669	31.36	34.66	21.87	2.48	6.46	3.16	727
Average	36.85	35.55	16.20	3.10	5.52	2.78	7458	40.96	33.61	14.88	2.28	5.12	3.15	6516
	<=10%		>0.10%					<=10%		>0.10%				
	72.41		27.59					74.57		25.43				

Table 51: Percentage of Total Damage in Hass by Month during 2010 and 2011

Total Damage														
Year														
	2010							2011						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	47.71	32.48	11.38	2.57	3.49	2.39	545	43.56	41.78	10.69	1.19	1.78	0.99	505
2	41.73	26.72	17.56	4.83	4.83	4.33	393	22.94	52.98	15.83	2.98	4.36	0.92	436
3	*	*	*	*	*	*	0	31.75	44.57	15.04	1.67	4.74	2.23	359
4	62.65	22.89	10.84	0.00	3.61	0.00	83	42.04	40.76	8.92	2.55	5.10	0.64	157
5	50.63	28.37	11.85	1.62	1.97	5.57	557	48.06	35.11	12.66	1.58	1.01	1.58	695
6	55.66	32.87	6.57	1.96	1.40	1.54	715	37.50	37.31	14.04	2.88	4.04	4.23	520
7	45.73	31.72	12.72	2.74	3.86	3.22	621							
8	51.00	33.90	11.90	0.60	1.30	1.30	628							
9	44.40	31.10	14.80	2.40	4.10	3.20	656							
10	49.83	34.78	10.73	1.04	1.90	1.73	578							
11	54.52	30.52	9.93	1.48	1.78	1.78	675							
12	41.05	39.57	12.64	1.15	1.31	4.27	609							
Average	49.54	31.36	11.90	1.85	2.69	2.66	6060	37.64	42.09	12.86	2.14	3.50	1.76	2672
	<=10%		>0.10%					<=10%		>0.10%				
	80.89		19.11					79.73		20.27				

Table 52: Percentage of Body Rots in Hass by Month during 2008 and 2009

Body Rots														
Year														
	2008							2009						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	58.94	28.45	7.18	3.81	0.88	0.73	682	84.01	12.58	1.40	0.47	0.00	1.55	644
2	76.34	19.13	3.36	0.50	0.50	0.17	596	82.01	15.57	2.25	0.00	0.17	0.00	578
3	70.97	22.04	5.91	1.08	0.00	0.00	186	62.57	24.02	10.61	2.23	0.56	0.00	179
4	77.49	17.90	2.81	1.28	0.51	0.00	391	73.13	22.89	2.99	0.00	1.00	0.00	201
5	81.36	10.91	5.45	2.12	0.00	0.15	660	67.87	23.08	6.49	1.21	0.90	0.45	663
6	79.25	14.84	4.32	1.15	0.29	0.14	694	77.39	12.40	4.86	1.84	1.34	2.18	597
7	86.29	9.39	2.79	0.76	0.25	0.51	788	78.40	13.23	3.89	2.72	0.39	1.36	514
8	83.91	10.59	3.30	0.83	0.00	1.38	727	76.01	14.81	5.82	1.06	0.88	1.41	567
9	84.51	12.91	1.63	0.68	0.14	0.14	736	76.93	15.33	4.80	0.77	1.24	0.93	646
10	86.19	11.27	2.22	0.16	0.16	0.00	630	72.83	15.11	6.27	3.05	0.96	1.77	622
11	86.55	9.73	3.29	0.29	0.00	0.14	699	75.95	17.65	4.67	1.04	0.52	0.17	578
12	82.21	14.50	2.24	0.45	0.30	0.30	669	70.70	18.84	6.05	1.93	0.96	1.51	727
Average	79.50	15.14	3.71	1.09	0.25	0.30	7458	74.82	17.13	5.01	1.36	0.74	0.94	6516
	<=10%		>0.10%					<=10%		>0.10%				
	94.64		5.36					91.94		8.06				

Table 53: Percentage of Body Rots in Hass by Month during 2010 and 2011

Body Rots														
Year														
	2010							2011						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	75.96	15.23	4.59	1.83	0.73	1.65	545	80.68	13.75	4.78	0.40	0.40	0.00	502
2	75.83	11.20	6.36	3.56	0.76	2.29	393	74.36	18.01	6.24	1.15	0.23	0.00	433
3	*	*	*	*	*	*	0	70.95	20.11	6.98	0.56	1.40	0.00	358
4	92.77	4.82	1.20	1.20	0.00	0.00	83	77.71	16.56	5.73	0.00	0.00	0.00	157
5	75.76	14.36	4.85	1.26	0.54	3.23	557	79.54	15.09	3.77	1.31	0.29	0.00	689
6	80.98	12.03	3.50	1.54	0.70	1.26	715	69.69	22.24	5.31	1.57	1.18	0.00	508
7	78.26	13.53	3.70	1.13	0.64	2.74	621							
8	83.10	13.20	1.80	0.80	0.20	1.00	628							
9	79.50	12.20	5.60	1.40	0.00	1.20	655							
10	82.01	12.63	3.46	0.35	0.17	1.38	578							
11	84.59	9.48	3.56	1.04	0.30	1.04	675							
12	81.44	11.66	2.46	1.31	0.82	2.30	609							
Average	80.93	11.85	3.73	1.40	0.44	1.64	6059	75.49	17.63	5.47	0.83	0.58	0.00	2647
	<=10%		>0.10%					<=10%		>0.10%				
	92.78		7.22					93.11		6.89				

Table 54: Percentage of Bruising in Hass by Month during 2008 and 2009

Bruising														
Year														
	2008							2009						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	66.72	22.87	6.89	2.93	0.44	0.15	682	62.58	29.97	4.19	1.09	0.47	1.71	644
2	74.83	18.62	5.37	0.84	0.17	0.17	596	66.26	29.58	3.63	0.00	0.35	0.17	578
3	83.33	10.75	5.38	0.54	0.00	0.00	186	83.24	13.41	3.35	0.00	0.00	0.00	179
4	43.22	37.08	11.25	3.84	2.56	2.05	391	67.16	26.87	4.98	0.50	0.50	0.00	201
5	50.76	33.33	12.42	1.97	0.91	0.61	660	52.49	31.83	8.45	3.62	2.56	1.06	663
6	48.85	36.74	9.94	2.02	0.86	1.59	694	59.63	28.31	7.71	1.84	0.50	2.01	597
7	52.66	33.50	10.28	1.02	1.40	1.14	788	60.70	28.60	7.39	2.14	0.97	0.19	514
8	44.57	37.41	11.83	2.89	0.83	2.48	727	61.90	26.46	9.88	1.06	0.35	0.35	567
9	50.27	39.54	8.29	1.09	0.27	0.54	736	64.86	26.93	4.64	1.24	1.39	0.93	646
10	57.46	34.60	6.35	0.79	0.16	0.63	630	59.00	28.62	8.36	2.41	0.64	0.96	622
11	47.64	42.20	8.58	0.86	0.14	0.57	699	61.94	32.87	4.50	0.35	0.35	0.00	578
12	56.35	35.72	6.73	0.30	0.60	0.30	669	62.40	25.34	9.78	1.65	0.14	0.69	726
Average	56.39	31.87	8.61	1.59	0.69	0.85	7458	63.51	27.40	6.40	1.32	0.69	0.67	6515
	<=10%		>0.10%					<=10%		>0.10%				
	88.26		11.74					90.91		9.09				

Table 55: Percentage of Bruising in Hass by Month during 2010 and 2011

Bruising														
Year														
	2010							2011						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	72.66	20.55	4.22	0.73	0.55	1.28	545	82.94	15.08	1.98	0.00	0.00	0.00	504
2	73.03	17.05	6.62	2.29	0.51	0.51	393	69.98	21.94	6.93	1.15	0.00	0.00	433
3	*	*	*	*	*	*	0	83.24	13.69	2.51	0.00	0.56	0.00	358
4	69.88	21.69	6.02	1.20	0.00	1.20	83	72.61	24.84	2.55	0.00	0.00	0.00	157
5	73.25	15.80	6.46	2.51	0.18	1.80	557	70.19	21.71	7.24	0.58	0.29	0.00	691
6	75.38	20.98	2.52	0.70	0.00	0.42	715	58.72	28.88	9.11	2.52	0.78	0.00	516
7	73.43	20.29	4.03	1.13	0.32	0.81	621							
8	72.90	21.70	5.10	0.20	0.00	0.20	628							
9	71.30	20.60	5.80	1.20	0.80	0.30	656							
10	78.20	16.96	3.98	0.35	0.17	0.35	578							
11	77.48	17.04	3.85	0.59	0.00	1.04	675							
12	73.23	20.20	3.94	1.48	0.16	0.99	609							
Average	73.70	19.35	4.78	1.13	0.25	0.81	6060	72.95	21.02	5.05	0.71	0.27	0.00	2659
	<=10%		>0.10%					<=10%		>0.10%				
	93.05		6.96					93.97		6.03				

Table 56: Percentage of Diffuse Flesh Discolouration Hass by Month during 2008 and 2009

Diffuse Flesh Discolouration														
Year														
	2008							2009						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	93.11	3.23	1.32	0.59	0.73	1.03	682	93.32	4.35	0.62	0.00	0.16	1.55	644
2	90.76	6.89	1.18	0.67	0.34	0.17	595	89.62	8.48	1.38	0.17	0.00	0.35	578
3	91.40	6.45	1.08	1.08	0.00	0.00	186	88.27	10.61	0.00	0.56	0.56	0.00	179
4	93.86	5.12	1.02	0.00	0.00	0.00	391	96.02	3.48	0.50	0.00	0.00	0.00	201
5	91.97	3.64	2.88	0.76	0.30	0.45	660	90.05	7.09	2.41	0.30	0.15	0.00	663
6	86.89	5.48	5.04	1.44	0.43	0.72	694	87.60	9.38	1.51	0.67	0.34	0.50	597
7	87.31	5.96	3.05	1.02	1.02	1.65	788	83.07	12.84	3.11	0.19	0.19	0.58	514
8	91.47	5.36	1.65	0.28	0.14	1.10	727	83.60	10.41	3.53	1.23	0.53	0.71	567
9	90.35	4.89	3.40	0.82	0.27	0.27	736	89.94	8.20	1.39	0.15	0.00	0.31	646
10	91.90	6.03	1.75	0.16	0.00	0.16	630	91.64	6.59	0.80	0.32	0.16	0.48	622
11	86.82	9.60	2.29	0.72	0.00	0.57	698	87.87	10.05	1.39	0.35	0.35	0.00	577
12	83.11	9.57	4.63	2.24	0.00	0.45	669	88.98	7.85	1.65	0.69	0.14	0.69	726
Average	89.91	6.02	2.44	0.81	0.27	0.55	7456	89.16	8.28	1.53	0.39	0.21	0.43	6514
	<=10%		>0.10%					<=10%		>0.10%				
	95.93		4.07					97.44		2.56				

Table 57: Percentage of Diffuse Flesh Discolouration in Hass by Month during 2010 and 2011

Diffuse Flesh Discolouration														
Year														
	2010							2011						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	88.99	6.61	0.73	1.28	0.55	1.83	545	97.82	1.98	0.20	0.00	0.00	0.00	505
2	89.31	9.16	0.76	0.51	0.00	0.25	393	93.56	5.75	0.23	0.23	0.23	0.00	435
3	*	*	*	*	*	*	0	95.82	3.90	0.28	0.00	0.00	0.00	359
4	93.98	6.02	0.00	0.00	0.00	0.00	83	91.08	7.64	0.64	0.00	0.64	0.00	157
5	89.59	7.36	0.90	1.26	0.18	0.72	557	95.94	2.32	1.45	0.29	0.00	0.00	690
6	91.89	5.45	0.84	0.98	0.00	0.84	715	93.58	2.33	1.95	1.75	0.39	0.00	514
7	90.18	7.41	1.61	0.32	0.00	0.48	621							
8	89.00	9.60	1.30	0.00	0.00	0.20	628							
9	91.00	5.30	0.80	1.10	0.60	1.20	656							
10	96.54	2.60	0.52	0.17	0.00	0.17	578							
11	96.44	1.63	0.74	0.59	0.00	0.59	675							
12	94.42	2.79	0.99	0.49	0.16	1.15	609							
Average	91.94	5.81	0.84	0.61	0.14	0.68	6060	94.64	3.99	0.79	0.38	0.21	0.00	2660
	<=10%		>0.10%					<=10%		>0.10%				
	97.75		2.26					98.62		1.38				

Table 58: Percentage of Stem End Rot in Hass by Month during 2008 and 2009

Stem End Rot														
Year														
	2008							2009						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	77.3	18.8	2.6	1.3	0.0	0.0	682	79.2	18.2	1.7	0.2	0.2	0.6	644
2	78.0	19.0	2.9	0.2	0.0	0.0	596	75.4	23.4	1.2	0.0	0.0	0.0	578
3	86.0	12.4	1.6	0.0	0.0	0.0	186	68.7	20.7	10.6	0.0	0.0	0.0	179
4	81.6	15.9	2.0	0.5	0.0	0.0	391	89.1	10.9	0.0	0.0	0.0	0.0	201
5	84.2	12.0	3.5	0.3	0.0	0.0	660	86.0	11.3	2.6	0.2	0.0	0.0	663
6	86.0	10.7	3.0	0.3	0.0	0.0	694	84.6	11.6	3.7	0.2	0.0	0.0	597
7	87.7	10.2	1.6	0.3	0.1	0.1	788	88.3	8.4	3.1	0.2	0.0	0.0	514
8	89.4	8.0	1.8	0.1	0.1	0.6	727	91.5	6.7	1.6	0.2	0.0	0.0	567
9	92.7	6.4	1.0	0.0	0.0	0.0	736	91.0	7.9	0.6	0.2	0.3	0.0	646
10	88.1	11.1	0.8	0.0	0.0	0.0	630	87.0	11.3	1.0	0.2	0.0	0.6	622
11	76.1	21.2	2.6	0.1	0.0	0.0	699	79.6	18.3	1.7	0.3	0.0	0.0	578
12	76.5	22.3	0.9	0.1	0.0	0.1	669	71.2	23.6	4.4	0.4	0.0	0.4	726
Average	83.64	13.97	2.03	0.27	0.02	0.07	7458	82.63	14.34	2.68	0.16	0.04	0.14	6515
	<=10%		>0.10%					<=10%		>0.10%				
	97.61		2.39					96.98		3.02				

Table 59: Percentage of Stem End Rot in Hass by Month during 2010 and 2011

Stem End Rot														
Year														
	2010							2011						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	78.7	16.9	3.5	0.9	0.0	0.0	545	73.66	24.36	1.58	0.40	0.00	0.00	505
2	76.1	17.8	4.6	1.3	0.0	0.3	393	56.42	38.07	5.50	0.00	0.00	0.00	436
3	*	*	*	*	*	*	0	52.09	40.67	7.24	0.00	0.00	0.00	359
4	83.1	15.7	1.2	0.0	0.0	0.0	83	81.53	15.29	2.55	0.00	0.64	0.00	157
5	84.4	11.3	3.2	0.7	0.2	0.2	557	86.62	11.65	1.58	0.14	0.00	0.00	695
6	89.9	7.6	2.1	0.3	0.1	0.0	715	83.46	12.31	3.65	0.58	0.00	0.00	520
7	84.86	13.20	1.77	0.00	0.00	0.16	621							
8	89.50	9.60	1.00	0.00	0.00	0.00	628							
9	91.90	6.90	1.10	0.20	0.00	0.00	656							
10	91.70	7.27	0.87	0.00	0.00	0.17	578							
11	88.59	9.19	2.07	0.15	0.00	0.00	675							
12	76.52	20.20	3.28	0.00	0.00	0.00	609							
Average	85.03	12.32	2.25	0.32	0.03	0.07	6060	72.30	23.72	3.69	0.19	0.11	0.00	2672
	<=10%		>0.10%					<=10%		>0.10%				
	97.35		2.67					96.02		3.98				

Table 60: Percentage of Vascular Browning in Hass by Month during 2008 and 2009

Vascular Browning														
Year														
	2008							2009						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	71.7	22.0	3.1	2.1	0.3	0.9	682	88.0	10.4	1.1	0.2	0.0	0.3	644
2	85.7	9.4	2.3	1.2	0.5	0.8	596	86.3	11.2	2.2	0.2	0.0	0.0	578
3	73.7	19.4	3.8	0.5	2.2	0.5	186	76.0	15.1	6.1	1.7	0.6	0.6	179
4	84.4	10.2	3.3	1.3	0.3	0.5	391	92.5	6.5	1.0	0.0	0.0	0.0	201
5	89.4	5.6	3.9	0.8	0.3	0.0	660	96.4	2.7	0.5	0.3	0.0	0.2	663
6	91.1	5.6	2.9	0.4	0.0	0.0	694	91.8	5.2	1.7	0.3	0.2	0.8	597
7	84.4	8.9	3.8	1.3	0.8	0.9	788	86.8	9.7	2.5	0.4	0.6	0.0	514
8	87.6	6.6	3.0	1.4	0.1	1.2	727	85.4	11.3	2.3	0.5	0.4	0.2	567
9	89.1	7.7	1.5	1.0	0.3	0.4	736	90.1	8.4	1.4	0.2	0.0	0.0	646
10	90.0	5.9	3.0	0.8	0.2	0.2	630	88.4	9.2	1.9	0.3	0.0	0.2	622
11	81.0	12.3	3.9	1.6	0.7	0.6	699	78.4	18.2	2.4	0.7	0.2	0.2	578
12	79.2	13.0	6.1	0.9	0.6	0.1	669	80.2	16.9	2.3	0.4	0.1	0.0	727
Average	83.94	10.55	3.39	1.09	0.51	0.52	7458	86.69	10.39	2.13	0.43	0.16	0.20	6516
	<=10%		>0.10%					<=10%		>0.10%				
	94.49		5.51					97.08		2.92				

Table 61: Percentage of Vascular Browning in Hass by Month during 2010 and 2011

Vascular Browning														
Year														
	2010							2011						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	92.5	6.1	1.3	0.2	0.0	0.0	545	90.30	8.12	1.39	0.20	0.00	0.00	505
2	77.4	18.3	2.8	1.0	0.0	0.5	393	79.45	15.47	2.54	1.39	1.15	0.00	433
3	*	*	*	*	*	*	0	86.07	11.14	2.51	0.28	0.00	0.00	359
4	98.8	1.2	0.0	0.0	0.0	0.0	83	89.81	9.55	0.00	0.64	0.00	0.00	157
5	92.3	4.5	1.4	0.2	0.2	1.4	557	97.70	1.58	0.58	0.14	0.00	0.00	695
6	97.1	2.1	0.8	0.0	0.0	0.0	715	93.27	4.62	1.54	0.19	0.38	0.00	520
7	88.24	9.82	1.13	0.81	0.00	0.00	621							
8	94.70	4.80	0.50	0.00	0.00	0.00	628							
9	92.80	6.10	1.10	0.00	0.00	0.00	656							
10	92.56	5.19	1.21	0.69	0.00	0.35	578							
11	90.52	4.74	3.11	0.89	0.44	0.30	675							
12	89.82	6.08	1.64	0.49	0.16	1.81	609							
Average	91.51	6.26	1.37	0.39	0.07	0.40	6060	89.43	8.41	1.42	0.47	0.26	0.00	2669
	<=10%		>0.10%					<=10%		>0.10%				
	97.77		2.23					97.85		2.15				

Table 62: Percentage of Other Defects in Hass by Month during 2008 and 2009

Other Defects														
Year														
	2008							2009						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	99.0	0.9	0.1	0.0	0.0	0.0	682	98.3	1.7	0.0	0.0	0.0	0.0	644
2	93.6	6.4	0.0	0.0	0.0	0.0	596	97.6	2.2	0.2	0.0	0.0	0.0	578
3	93.5	6.5	0.0	0.0	0.0	0.0	186	94.4	2.2	2.8	0.0	0.6	0.0	179
4	99.7	0.3	0.0	0.0	0.0	0.0	391	96.5	3.0	0.0	0.0	0.5	0.0	201
5	99.5	0.5	0.0	0.0	0.0	0.0	660	96.4	1.5	2.0	0.0	0.2	0.0	663
6	99.3	0.7	0.0	0.0	0.0	0.0	694	99.0	0.8	0.2	0.0	0.0	0.0	597
7	98.5	1.5	0.0	0.0	0.0	0.0	788	96.3	3.3	0.4	0.0	0.0	0.0	514
8	99.2	0.7	0.0	0.0	0.0	0.1	727	96.3	2.6	0.7	0.0	0.2	0.2	567
9	98.5	1.4	0.0	0.0	0.1	0.0	736	97.2	2.2	0.6	0.0	0.0	0.0	646
10	99.2	0.8	0.0	0.0	0.0	0.0	630	95.2	3.7	0.6	0.2	0.2	0.2	622
11	98.6	1.4	0.0	0.0	0.0	0.0	699	96.9	1.6	1.6	0.0	0.0	0.0	578
12	99.0	0.9	0.0	0.0	0.1	0.0	669	97.4	1.0	1.5	0.0	0.1	0.0	727
Average	98.13	1.82	0.01	0.00	0.02	0.01	7458	96.79	2.16	0.88	0.01	0.14	0.03	6516
	<=10%		>0.10%					<=10%		>0.10%				
	99.95		0.05					98.94		1.06				

Table 63: Percentage of Other Defects in Hass by Month during 2010 and 2011

Other Defects														
Year														
	2010							2011						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	94.7	3.3	1.8	0.2	0.0	0.0	545	99.41	0.40	0.20	0.00	0.00	0.00	505
2	97.5	0.5	2.0	0.0	0.0	0.0	393	95.41	4.59	0.00	0.00	0.00	0.00	436
3	*	*	*	*	*	*	0	98.33	1.39	0.28	0.00	0.00	0.00	359
4	100.0	0.0	0.0	0.0	0.0	0.0	83	96.82	1.91	1.27	0.00	0.00	0.00	157
5	97.1	1.1	0.9	0.2	0.2	0.5	557	97.12	2.59	0.29	0.00	0.00	0.00	695
6	99.7	0.3	0.0	0.0	0.0	0.0	715	97.50	1.54	0.58	0.19	0.19	0.00	520
7	98.23	1.29	0.16	0.00	0.00	0.32	621							
8	98.90	1.10	0.00	0.00	0.00	0.00	628							
9	96.30	1.70	1.70	0.20	0.20	0.00	656							
10	98.96	1.04	0.00	0.00	0.00	0.00	578							
11	99.41	0.59	0.00	0.00	0.00	0.00	675							
12	98.19	1.31	0.33	0.00	0.16	0.00	609							
Average	98.09	1.11	0.63	0.05	0.05	0.08	6060	97.43	2.07	0.44	0.03	0.03	0.00	2672
	<=10%		>0.10%					<=10%		>0.10%				
	99.20		0.81					99.50		0.50				

Table 64: Percentage of Total Damage in Shepard by Month during 2008 and 2009

Total Damage														
Year														
	2008							2009						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	40.00	60.00	0.00	0.00	0.00	0.00	5	80.00	20.00	0.00	0.00	0.00	0.00	5
2	72.41	25.29	2.30	0.00	0.00	0.00	87	61.54	30.77	7.69	0.00	0.00	0.00	39
3	51.27	39.95	7.39	0.23	1.15	0.00	433	49.37	37.13	11.81	0.42	1.27	0.00	237
4	43.63	42.86	11.20	0.77	0.77	0.77	259	44.95	45.57	7.95	1.22	0.00	0.31	327
5	49.18	31.15	14.75	1.64	3.28	0.00	61	62.50	27.08	8.33	0.00	2.08	0.00	48
6	50.00	38.89	8.33	1.39	1.39	0.00	72	20.00	40.00	20.00	20.00	0.00	0.00	5
7	30.00	70.00	0.00	0.00	0.00	0.00	10	55.17	24.14	13.79	6.90	0.00	0.00	29
8	*	*	*	*	*	*	0	59.09	27.27	9.09	4.55	0.00	0.00	22
10	37.50	50.00	12.50	0.00	0.00	0.00	8	*	*	*	*	*	*	0
11	100.00	0.00	0.00	0.00	0.00	0.00	1	*	*	*	*	*	*	0
Total	52.67	39.79	6.27	0.45	0.73	0.09	936	54.08	31.49	9.83	4.14	0.42	0.04	712
	<=10%		>0.10%					<=10%		>0.10%				
	92.46		7.54					85.57		14.43				

Table 65: Percentage of Total Damage in Shepard by Month during 2010 and 2011

Total Damage														
Year														
	2010							2011						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	20.00	30.00	40.00	0.00	10.00	0.00	10	73.33	26.67	0.00	0.00	0.00	0.00	15
2	64.17	28.33	4.17	0.83	0.83	1.67	120	45.16	43.87	9.03	1.94	0.00	0.00	155
3	63.25	27.25	8.75	0.25	0.50	0.00	400	48.94	40.43	8.16	1.77	0.00	0.71	282
4	60.60	31.80	6.54	0.35	0.71	0.00	566	46.98	48.25	4.44	0.32	0.00	0.00	315
5	60.65	32.90	6.45	0.00	0.00	0.00	155	58.82	41.18	0.00	0.00	0.00	0.00	51
6	45.45	40.91	13.64	0.00	0.00	0.00	22							
7	*	*	*	*	*	*	0							
8	76.92	23.08	0.00	0.00	0.00	0.00	13							
10	*	*	*	*	*	*	0							
11	*	*	*	*	*	*	0							
Total	55.86	30.61	11.36	0.21	1.72	0.24	1286	54.65	40.08	4.33	0.81	0.00	0.14	818
	<=10%		>0.10%					<=10%		>0.10%				
	86.47		13.53					94.73		5.27				

Table 66: Percentage of Body Rots in Shepard by Month during 2008 and 2009

Body Rots														
Year														
	2008							2009						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	60.00	40.00	0.00	0.00	0.00	0.00	5	80.00	20.00	0.00	0.00	0.00	0.00	5
2	98.85	1.15	0.00	0.00	0.00	0.00	87	81.58	10.53	7.89	0.00	0.00	0.00	38
3	83.33	15.05	1.62	0.00	0.00	0.00	432	80.34	18.38	1.28	0.00	0.00	0.00	234
4	70.16	24.42	5.04	0.39	0.00	0.00	258	79.75	17.18	2.45	0.61	0.00	0.00	326
5	75.41	19.67	4.92	0.00	0.00	0.00	61	85.42	14.58	0.00	0.00	0.00	0.00	48
6	86.11	13.89	0.00	0.00	0.00	0.00	72	60.00	40.00	0.00	0.00	0.00	0.00	5
7	90.00	10.00	0.00	0.00	0.00	0.00	10	100.00	0.00	0.00	0.00	0.00	0.00	29
8	*	*	*	*	*	*	0	100.00	0.00	0.00	0.00	0.00	0.00	22
10	75.00	25.00	0.00	0.00	0.00	0.00	8	*	*	*	*	*	*	0
11	100.00	0.00	0.00	0.00	0.00	0.00	1	*	*	*	*	*	*	0
Total	82.10	16.58	1.29	0.04	0.00	0.00	934	83.39	15.08	1.45	0.08	0.00	0.00	707
	<=10%		>0.10%					<=10%		>0.10%				
	98.67		1.33					98.47		1.53				

Table 67: Percentage of Body Rots in Shepard by Month during 2010 and 2011

Body Rots														
Year														
	2010							2011						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	40.00	50.00	10.00	0.00	0.00	0.00	10	100.00	0.00	0.00	0.00	0.00	0.00	15
2	90.00	5.83	1.67	0.83	0.00	1.67	120	80.65	16.13	3.23	0.00	0.00	0.00	155
3	95.25	4.75	0.00	0.00	0.00	0.00	400	86.88	8.87	2.84	1.42	0.00	0.00	282
4	89.58	8.30	1.77	0.35	0.00	0.00	566	89.52	10.16	0.32	0.00	0.00	0.00	315
5	87.10	11.61	1.29	0.00	0.00	0.00	155	100.00	0.00	0.00	0.00	0.00	0.00	51
6	86.36	9.09	4.55	0.00	0.00	0.00	22							
7	*	*	*	*	*	*	0							
8	100.00	0.00	0.00	0.00	0.00	0.00	13							
10	*	*	*	*	*	*	0							
11	*	*	*	*	*	*	0							
Total	84.04	12.80	2.75	0.17	0.00	0.24	1286	91.41	7.03	1.28	0.28	0.00	0.00	818
	<=10%		>0.10%					<=10%		>0.10%				
	96.84		3.16					98.44		1.56				

Table 68: Percentage of Bruising in Shepard by Month during 2008 and 2009

Bruising														
Year														
	2008							2009						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	40.00	60.00	0.00	0.00	0.00	0.00	5	80.00	20.00	0.00	0.00	0.00	0.00	5
2	83.91	13.79	2.30	0.00	0.00	0.00	87	69.23	25.64	5.13	0.00	0.00	0.00	39
3	66.90	29.17	3.70	0.00	0.00	0.23	432	70.26	26.72	3.02	0.00	0.00	0.00	232
4	59.30	32.95	6.59	1.16	0.00	0.00	258	68.83	28.40	2.78	0.00	0.00	0.00	324
5	57.38	36.07	6.56	0.00	0.00	0.00	61	75.00	25.00	0.00	0.00	0.00	0.00	48
6	56.34	38.03	5.63	0.00	0.00	0.00	71	100.00	0.00	0.00	0.00	0.00	0.00	5
7	55.56	44.44	0.00	0.00	0.00	0.00	9	79.31	20.69	0.00	0.00	0.00	0.00	29
8	*	*	*	*	*	*	0	81.82	18.18	0.00	0.00	0.00	0.00	22
10	57.14	42.86	0.00	0.00	0.00	0.00	7	*	*	*	*	*	*	0
11	100.00	0.00	0.00	0.00	0.00	0.00	1	*	*	*	*	*	*	0
Total	64.06	33.03	2.75	0.13	0.00	0.03	931	78.06	20.58	1.37	0.00	0.00	0.00	704
	<=10%		>0.10%					<=10%		>0.10%				
	97.09		2.91					98.63		1.37				

Table 69: Percentage of Bruising in Shepard by Month during 2010 and 2011

Bruising														
Year														
	2010							2011						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	50.00	40.00	10.00	0.00	0.00	0.00	10	86.67	13.33	0.00	0.00	0.00	0.00	15
2	77.50	17.50	2.50	0.83	0.83	0.83	120	60.65	34.19	5.16	0.00	0.00	0.00	155
3	82.00	16.50	1.50	0.00	0.00	0.00	400	75.80	19.22	3.91	1.07	0.00	0.00	281
4	72.08	24.73	2.65	0.53	0.00	0.00	566	70.16	27.94	1.90	0.00	0.00	0.00	315
5	81.29	17.42	1.29	0.00	0.00	0.00	155	100.00	0.00	0.00	0.00	0.00	0.00	51
6	72.73	22.73	4.55	0.00	0.00	0.00	22							
7	*	*	*	*	*	*	0							
8	100.00	0.00	0.00	0.00	0.00	0.00	13							
10	*	*	*	*	*	*	0							
11	*	*	*	*	*	*	0							
Total	76.51	19.84	3.21	0.19	0.12	0.12	1286	78.65	18.94	2.20	0.21	0.00	0.00	817
	<=10%		>0.10%					<=10%		>0.10%				
	96.35		3.65					97.59		2.41				

Table 70: Percentage of Diffuse Flesh Discolouration in Shepard by Month during 2008 and 2009

Diffuse Flesh Discolouration														
Year														
	2008							2009						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	100.00	0.00	0.00	0.00	0.00	0.00	5	100.00	0.00	0.00	0.00	0.00	0.00	5
2	97.70	2.30	0.00	0.00	0.00	0.00	87	100.00	0.00	0.00	0.00	0.00	0.00	39
3	95.61	3.70	0.69	0.00	0.00	0.00	433	93.64	6.36	0.00	0.00	0.00	0.00	236
4	95.37	4.25	0.39	0.00	0.00	0.00	259	96.49	2.56	0.64	0.32	0.00	0.00	313
5	95.08	1.64	3.28	0.00	0.00	0.00	61	100.00	0.00	0.00	0.00	0.00	0.00	48
6	100.00	0.00	0.00	0.00	0.00	0.00	71	100.00	0.00	0.00	0.00	0.00	0.00	5
7	60.00	40.00	0.00	0.00	0.00	0.00	10	89.66	6.90	3.45	0.00	0.00	0.00	29
8	*	*	*	*	*	*	0	100.00	0.00	0.00	0.00	0.00	0.00	22
10	100.00	0.00	0.00	0.00	0.00	0.00	8	*	*	*	*	*	*	0
11	100.00	0.00	0.00	0.00	0.00	0.00	1	*	*	*	*	*	*	0
Total	93.75	5.76	0.48	0.00	0.00	0.00	935	97.47	1.98	0.51	0.04	0.00	0.00	697
	<=10%		>0.10%					<=10%		>0.10%				
	99.52		0.48					99.45		0.55				

Table 70: Percentage of Diffuse Flesh Discolouration in Shepard by Month during 2010 and 2011

Diffuse Flesh Discolouration														
Year														
	2010							2011						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	100.00	0.00	0.00	0.00	0.00	0.00	10	86.67	13.33	0.00	0.00	0.00	0.00	15
2	90.00	9.17	0.00	0.00	0.00	0.83	120	94.84	3.23	0.65	1.29	0.00	0.00	155
3	89.75	9.75	0.50	0.00	0.00	0.00	400	98.22	1.42	0.36	0.00	0.00	0.00	281
4	94.17	5.48	0.18	0.18	0.00	0.00	566	98.10	1.27	0.63	0.00	0.00	0.00	315
5	98.06	1.94	0.00	0.00	0.00	0.00	155	100.00	0.00	0.00	0.00	0.00	0.00	51
6	90.91	9.09	0.00	0.00	0.00	0.00	22							
7	*	*	*	*	*	*	0							
8	100.00	0.00	0.00	0.00	0.00	0.00	13							
10	*	*	*	*	*	*	0							
11	*	*	*	*	*	*	0							
Total	94.70	5.06	0.10	0.03	0.00	0.12	1286	95.56	3.85	0.33	0.26	0.00	0.00	817
	<=10%		>0.10%					<=10%		>0.10%				
	99.76		0.24					99.41		0.59				

Table 71: Percentage of Stem End Rot in Shepard by Month during 2008 and 2009

Stem End Rot														
Year														
	2008							2009						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	60.00	40.00	0.00	0.00	0.00	0.00	5	80.00	20.00	0.00	0.00	0.00	0.00	5
2	89.66	10.34	0.00	0.00	0.00	0.00	87	82.05	15.38	2.56	0.00	0.00	0.00	39
3	88.22	11.32	0.46	0.00	0.00	0.00	433	76.69	21.61	1.69	0.00	0.00	0.00	236
4	82.63	17.37	0.00	0.00	0.00	0.00	259	85.93	13.76	0.31	0.00	0.00	0.00	327
5	73.77	24.59	1.64	0.00	0.00	0.00	61	79.17	16.67	4.17	0.00	0.00	0.00	48
6	87.50	12.50	0.00	0.00	0.00	0.00	72	60.00	0.00	20.00	20.00	0.00	0.00	5
7	90.00	10.00	0.00	0.00	0.00	0.00	10	75.86	13.79	6.90	3.45	0.00	0.00	29
8	*	*	*	*	*	*	0	63.64	31.82	4.55	0.00	0.00	0.00	22
10	87.50	12.50	0.00	0.00	0.00	0.00	8	*	*	*	*	*	*	0
11	100.00	0.00	0.00	0.00	0.00	0.00	1	*	*	*	*	*	*	0
Total	84.36	15.40	0.23	0.00	0.00	0.00	936	75.42	16.63	5.02	2.93	0.00	0.00	711
	<=10%		>0.10%					<=10%		>0.10%				
	99.77		0.23					92.05		7.95				

Table 70: Percentage of Stem End Rot in Shepard by Month during 2010 and 2011

Stem End Rot														
Year														
	2010							2011						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	60.00	30.00	10.00	0.00	0.00	0.00	10	93.33	6.67	0.00	0.00	0.00	0.00	15
2	84.17	14.17	0.83	0.83	0.00	0.00	120	82.58	15.48	1.94	0.00	0.00	0.00	155
3	83.00	16.25	0.75	0.00	0.00	0.00	400	88.65	8.87	2.48	0.00	0.00	0.00	282
4	80.39	18.55	1.06	0.00	0.00	0.00	566	91.43	8.25	0.32	0.00	0.00	0.00	315
5	90.97	9.03	0.00	0.00	0.00	0.00	155	100.00	0.00	0.00	0.00	0.00	0.00	51
6	81.82	18.18	0.00	0.00	0.00	0.00	22							
7	*	*	*	*	*	*	0							
8	100.00	0.00	0.00	0.00	0.00	0.00	13							
10	*	*	*	*	*	*	0							
11	*	*	*	*	*	*	0							
Total	82.91	15.17	1.81	0.12	0.00	0.00	1286	91.20	7.85	0.95	0.00	0.00	0.00	818
	<=10%		>0.10%					<=10%		>0.10%				
	98.07		1.93					99.05		0.95				

Table 71: Percentage of Vascular Browning in Shepard by Month during 2008 and 2009

Vascular Browning														
Year														
	2008							2009						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	100.00	0.00	0.00	0.00	0.00	0.00	5	100.00	0.00	0.00	0.00	0.00	0.00	5
2	100.00	0.00	0.00	0.00	0.00	0.00	87	100.00	0.00	0.00	0.00	0.00	0.00	39
3	95.36	3.71	0.93	0.00	0.00	0.00	431	97.05	2.95	0.00	0.00	0.00	0.00	237
4	91.05	6.23	1.95	0.78	0.00	0.00	257	98.47	0.92	0.61	0.00	0.00	0.00	327
5	95.08	4.92	0.00	0.00	0.00	0.00	61	100.00	0.00	0.00	0.00	0.00	0.00	48
6	98.61	1.39	0.00	0.00	0.00	0.00	72	100.00	0.00	0.00	0.00	0.00	0.00	5
7	100.00	0.00	0.00	0.00	0.00	0.00	10	96.55	3.45	0.00	0.00	0.00	0.00	29
8	*	*	*	*	*	*	0	100.00	0.00	0.00	0.00	0.00	0.00	22
10	100.00	0.00	0.00	0.00	0.00	0.00	8	*	*	*	*	*	*	0
11	100.00	0.00	0.00	0.00	0.00	0.00	1	*	*	*	*	*	*	0
Total	97.79	1.80	0.32	0.09	0.00	0.00	932	99.01	0.91	0.08	0.00	0.00	0.00	712
	<=10%		>0.10%					<=10%		>0.10%				
	99.59		0.41					99.92		0.08				

Table 72: Percentage of Vascular Browning in Shepard by Month during 2010 and 2011

Vascular Browning														
Year														
	2010							2011						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	100.00	0.00	0.00	0.00	0.00	0.00	10	100.00	0.00	0.00	0.00	0.00	0.00	15
2	96.67	3.33	0.00	0.00	0.00	0.00	120	96.77	1.29	1.29	0.65	0.00	0.00	155
3	98.50	1.50	0.00	0.00	0.00	0.00	400	99.29	0.71	0.00	0.00	0.00	0.00	282
4	97.88	1.94	0.18	0.00	0.00	0.00	566	99.68	0.32	0.00	0.00	0.00	0.00	315
5	100.00	0.00	0.00	0.00	0.00	0.00	155	100.00	0.00	0.00	0.00	0.00	0.00	51
6	100.00	0.00	0.00	0.00	0.00	0.00	22							
7	*	*	*	*	*	*	0							
8	100.00	0.00	0.00	0.00	0.00	0.00	13							
10	*	*	*	*	*	*	0							
11	*	*	*	*	*	*	0							
Total	99.01	0.97	0.03	0.00	0.00	0.00	1286	99.15	0.46	0.26	0.13	0.00	0.00	818
	<=10%		>0.10%					<=10%		>0.10%				
	99.97		0.03					99.61		0.39				

Table 73: Percentage of Other Defects in Shepard by Month during 2008 and 2009

Other Defects														
Year														
	2008							2009						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	100.00	0.00	0.00	0.00	0.00	0.00	5	100.00	0.00	0.00	0.00	0.00	0.00	5
2	97.70	2.30	0.00	0.00	0.00	0.00	87	100.00	0.00	0.00	0.00	0.00	0.00	39
3	98.85	0.92	0.23	0.00	0.00	0.00	433	95.78	1.69	2.53	0.00	0.00	0.00	237
4	97.30	2.70	0.00	0.00	0.00	0.00	259	98.17	1.83	0.00	0.00	0.00	0.00	327
5	100.00	0.00	0.00	0.00	0.00	0.00	61	100.00	0.00	0.00	0.00	0.00	0.00	48
6	100.00	0.00	0.00	0.00	0.00	0.00	72	100.00	0.00	0.00	0.00	0.00	0.00	5
7	100.00	0.00	0.00	0.00	0.00	0.00	10	100.00	0.00	0.00	0.00	0.00	0.00	29
8	*	*	*	*	*	*	0	100.00	0.00	0.00	0.00	0.00	0.00	22
10	100.00	0.00	0.00	0.00	0.00	0.00	8	*	*	*	*	*	*	0
11	100.00	0.00	0.00	0.00	0.00	0.00	1	*	*	*	*	*	*	0
Total	99.32	0.66	0.03	0.00	0.00	0.00	936	99.24	0.44	0.32	0.00	0.00	0.00	712
	<=10%		>0.10%					<=10%		>0.10%				
	99.97		0.03					99.68		0.32				

Table 74: Percentage of Other Defects in Shepard by Month during 2010 and 2011

Other Defects														
Year														
	2010							2011						
	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total	Undamaged	1-10%	11-25%	26-33%	34-50%	50%+	Total
Month	Row %	Row %	Row %	Row %	Row %	Row %	N	Row %	Row %	Row %	Row %	Row %	Row %	N
1	100.00	0.00	0.00	0.00	0.00	0.00	10	100.00	0.00	0.00	0.00	0.00	0.00	15
2	100.00	0.00	0.00	0.00	0.00	0.00	120	95.48	4.52	0.00	0.00	0.00	0.00	155
3	99.50	0.25	0.25	0.00	0.00	0.00	400	97.16	2.84	0.00	0.00	0.00	0.00	282
4	99.29	0.35	0.18	0.18	0.00	0.00	566	98.41	1.59	0.00	0.00	0.00	0.00	315
5	100.00	0.00	0.00	0.00	0.00	0.00	155	100.00	0.00	0.00	0.00	0.00	0.00	51
6	100.00	0.00	0.00	0.00	0.00	0.00	22							
7	*	*	*	*	*	*	0							
8	100.00	0.00	0.00	0.00	0.00	0.00	13							
10	*	*	*	*	*	*	0							
11	*	*	*	*	*	*	0							
Total	99.83	0.09	0.06	0.03	0.00	0.00	1286	98.21	1.79	0.00	0.00	0.00	0.00	818
	<=10%		>0.10%					<=10%		>0.10%				
	99.91		0.09					100		0				

13.Appendix 3 – Final Reconciliation of Project Funds

Final Reconciliation of Project Funds

Project Code: AV08034
Project Title: Avocado Retail Quality Surveys Phase II

The abovementioned project has now been completed and below is reconciliation of expenditure:

Description	Budget approved from HAL $	Payments Received from HAL $	Total Expenditure on Activity $	Expenditure on Capital Items $	Budget minus Total Expenditure $
[Retail survey training travel/accommodation and meal costs]	14,880	14,880	19,212		-4,332
Retail survey training charge	4,950	4,950	3,300		1,650
Food Circus Management Charge	25,245	25,245	26,400		-1,155
Fruit Cost for Retail Survey	82,620	82,620	59,536		23,084
Labour Cost (Including time for training)	142,440	142,440	156,077		-13,637
Dry Matter Testing – collection of fruit	19,125	19,125	17,160		1,965
Dry Matter Testing – cost of fruit and transport to Nambour	19,890	19,890	25,490		-5,600
Dry Matter Testing – analysis	38,250	38,250	40,590		-2,340
Retail Survey Assessment Equipment	979	979	1,152		-173
TOTAL	**348,379**	**348,379**	**348,917**		-538