

Avocado supply chain education materials

Joanna Embry
Avocados Australia Limited (AAL)

Project Number: AV08017

AV08017

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Level 7
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Telephone: (02) 8295 2300
Fax: (02) 8295 2399

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Know-how for Horticulture™

Avocados Australia

HAL Project

AV08017

Avocado Supply Chain Education
Materials



Prepared by:

*Joanna Embry et al.
Avocados Australia Limited
PO Box 663
Stones Corner QLD 4120
P: 07 3846 6566
F: 07 3846 6577
E: j.embry@avocado.org.au*

June 2010

Project details

Project Name: Avocado Supply Chain Education Materials

Project Number: AV08017

Date: June 2010

Project Purpose:

The purpose of this project is to update education materials available to members along the supply chain to assist in improving avocado quality for avocado consumers

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Project Leader: Joanna Embry
Avocados Australia
PO Box 8005, Woolloongabba QLD 4102
P: 07 3846 6566 F: 07 3846 6577 E: j.embry@avocado.org.au

Team Members: Antony Allen
Avocados Australia Ltd
PO Box 8005, Woolloongabba QLD 4102
P: 07 3846 6566 F: 07 3846 6577 E: ceo@avocado.org.au

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Media Summary

In the Australian Avocado Industry Strategic Plan 2005-2010, eating quality of avocados, productivity and supply chain efficiency are identified as priority areas for industry to address. Recognising that a wide variety of factors affecting fruit quality, productivity and supply chain efficiency are interrelated, the Supply Chain Improvement Program of which this project is one component was developed. Its aim is to specifically identify where the industry currently sits in terms of quality and efficiency and identify points in the supply chain where further work is required to make improvements in these areas.

To date, consumer sensory testing (AV06025 and AV07019) has been completed to determine quality levels which provide an acceptable consumption experience for consumers and hence do not negatively impact on future purchasing decisions. The results from this work in summary indicated that consumers prefer Hass avocados of maturity equal to or higher than 22% DM and there is a competitive advantage to be gained by supplying Hass increasingly along the range from 22% through to 28%. In light of these results the Industry endorsed that the Dry Matter Standard for Hass has been changed from 21% to 23%

The results from the consumer work also indicated that 85% of consumers prefer to buy avocados at a level of ripeness that they can consume that evening and that that level of ripeness is in the range of ripe to soft ripe.

Lastly, consumers indicated that any internal quality defects to more than 10% of the overall flesh at all price points would impact negatively on future purchase intent.

Results from subsequent retail quality surveys (AV07018) identified that there is still up to 30% of avocados at the retail level that has more than 10% internal flesh damage and bruising is the biggest issue in terms of internal damage.

The education materials have been designed therefore to assist in addressing quality issues including maturity, ripeness and internal damage with a significant focus on reducing bruising damage at all points of the supply chain.

Significant research has been conducted over the past 10 years which still has relevance in assisting members of the supply chain to supply a better quality product to the consumer in line with the consumer research above. A significant proportion of that information was available but needed updating in terms of format and usability. This project was specifically designed to do just that.

A step by step process was used to develop and produce the updated materials. Gaps were identified in currently available education materials, feedback from packhouses, wholesalers and retailers was sought as to what they understood to be the priorities in terms of both education/handling messages and the media that should be used to produce the material. Based on the priority areas, all available information was put into a matrix which was then prioritised and summarised in line with the target audience.

Through consultation with members of industry including avocado quality researchers as well as an instructional designer, theming was developed for the material, including the

development of an avocado character who could be used with various props to better communicate relevant messages to target audiences. It was seen as important that the character be designed as a tool to engage the audience.

Because of the close relationship between level of ripeness and susceptibility to damage, specific handling requirements are very much dependent on the level of ripeness of avocados. The first piece of material developed therefore was aimed at providing a tool to better identify the different levels of ripeness both by colour and firmness. This material was then used as a basis for handling requirements for fruit at different levels of ripeness from the packing shed right through to the retail floor. Material was subsequently designed and produced for each of those sectors. In parallel to this a small book was designed including the newly designed avocado mascot, "Alvin" providing a basic history of avocados in general and an overview of the avocado supply chain. This was designed to give everyone in the supply chain an indication of where they fit in the supply chain and how their treatment of the avocado will impact on the end quality of the product.

Both the ripeness poster and the Little Green Book have been distributed to all members of the Industry as general reference materials and as a platform for the more focused, specific materials. Each of the other posters has been distributed to members of the relevant supply chain sectors. All material will be made available online.

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1.0 Introduction

In the 2005-2010 Strategic Plan for the Australian Avocado Industry, prepared by Avocados Australia, it was recognised that one of the priority issues that needed to be addressed by the industry was eating quality of avocados so that by 2010, 90% of fruit at retail level would meet or exceed the fruit quality expectations of consumers,

The Supply Chain Improvement Program of which this project is one component was developed to specifically address this (as well as other) strategic objectives.

In regard to quality improvement, Avocados Australia recently completed research to develop benchmarks for industry performance in eating quality (primarily maturity and freedom from internal flesh damage) by measuring the points at which fruit quality impacts on actual consumer purchasing behaviour. This was followed by retail surveys to measure the amount of fruit at the retail level that currently meets these benchmarks at the preferred level of eating ripeness and the types of internal quality issues that are presenting the biggest quality issues. The biggest issue identified in the retail quality surveys was bruising followed by body rots, vascular browning, stem end rot and diffuse flesh discolouration. It was also determined that there is still up to 30% of fruit that has higher than acceptable internal flesh damage.

This project was developed to produce a range of education materials to assist sectors of the supply chain improve quality to the desired 90% level. It was recognised that there are impacts on quality in the packhouse right through to the retail floor. Because bruising has been identified as the most significant quality issue, addressing this issue has been central to all material produced. Temperature control and storage times and conditions were also targeted for each sector because of the impacts these factors have on expression of rots, on vascular browning and diffuse flesh discolouration.

A step by step process was used to capture all of the available research in avocado handling and quality control. An instructional designer was also employed to ensure that the material, as well as being technically correct and comprehensive, would be successful in educating the target audience.

2.0 Materials and Methods

There were a range of steps taken to ensure that the education materials developed were technically accurate, based on prioritised needs and pitched correctly at the target audiences.

1. Members from across the avocado supply chain were contacted to determine where their priorities lay in need for information which would assist them in supplying avocados of a higher quality. A spreadsheet including different sections for each broad area of interest and then each specific topic was sent to 46 retailers, 23 wholesalers and 25 packhouses from around the country. This was done via email and post and sent to relevant sectors including packhouses, wholesalers and retailers. A copy of the completed Priority Matrix with a summary of the feedback is attached as Appendix 1.
2. An audit of other horticulture industries was undertaken to review at what sort of education/handling materials they have produced to address quality issues in their industries. The industries contacted include apple and pear, citrus, mango, mushrooms and bananas. The table below summarises the material that these industries have available.

Industry	Material available	Format
Apples and Pears	Storage technology for apples and pears: a guide to production, postharvest treatment and storage of pome fruit in Australia	Book
Citrus	Citrus Quality Improvement Guide, 2009	Ring binder folder
	Picking pocket guide	Spiral bound pocket book
	Picking poster	Poster
	Sorting pocket guide	Spiral bound pocket book
	Citrus defect guide poster	Poster
Mangoes	Mango ripening guide	Fact sheet
	Mango defect guide	Poster
	Mango handling guide	Poster
	A workers guide to picking and packing mangoes without going troppo	A5 book
Mushrooms	Mushrooms in Transit "Handle with Care"	Brochure
Bananas	Product Description Language	Ring binder Folders
	Harvest and Postharvest defects of Bananas	Poster
	Pre Harvest Defects of Bananas	Poster

3. For each section of the supply chain for which gaps were identified and research results were available, the most relevant, user friendly and appropriate media for that

particular audience was determined. The feedback from industry (as per appendix 1) was consulted but the media was primarily decided in consultation with the Instructional Designer who has worked in a great range of industries and was therefore able to advise as to the media and theming that would be most effective.

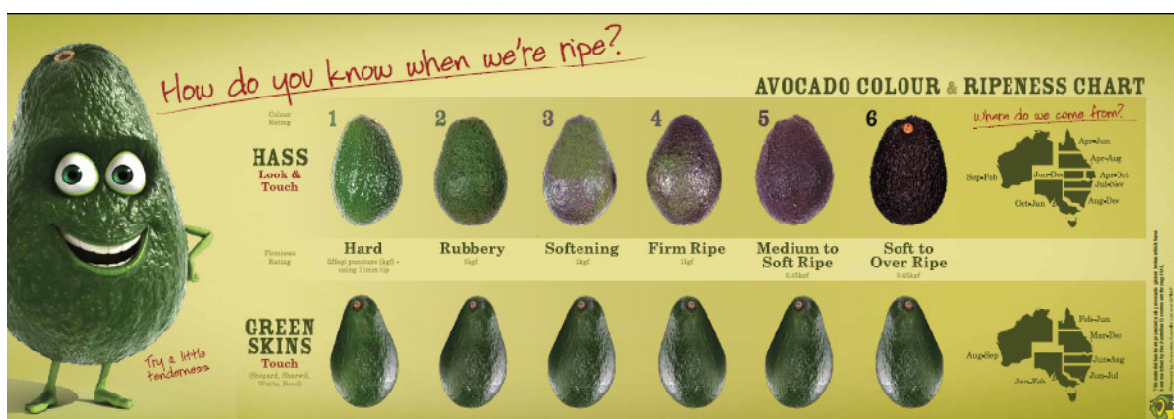
4. A matrix including all of the education messages that were relevant to the different sectors in terms of quality was developed. Through a process of consultation with both industry members and the Avocado research community and continual feedback a final list of core messages was eventually developed for each piece of material. This matrix is attached as Appendix 2.
5. Through consultation with members of industry including avocado quality researchers as well as the instructional designer, theming was developed for the material, including the development of an avocado character who could be used with various props to better communicate relevant messages to target audiences and to engage the audience.
6. Once the material was completed it was distributed to the appropriate sectors. Both the "Little Green Book" and the "Ripeness and Colour Chart" were distributed to all industry members including growers, packhouses, wholesalers and retailers. The Packhouse handling poster was distributed to all Australian packhouses, the wholesale handling poster was distributed to all Australian avocado wholesalers and the retail handling poster was distributed directly to the retail chain stores and the independent fruit and vegetable retailers who are known to the industry. They are also being distributed to retailers from the wholesale market. All the materials are also being made available on the Avocados Australia website.

3.0 Key results

Materials were developed to target three priority sectors of the supply chain. Those being: the packhouses, wholesalers and retailers. Five pieces of material were developed.

Title	Format	Audience
Avocado Colour and Ripeness Chart	Poster (210 x 594mm)	Across the supply chain
Avocado Handling: Packhouse	Poster (210 x 594mm)	Packhouses
Avocado Handling: Wholesale	Poster (210 x 594mm)	Wholesalers
Avocado Handling: Retail	Poster (210 x 594mm)	Retailers
The Little Green Book: The Adventures of Alvin	12 page soft cover book (A6)	Across the supply chain

The Avocado Colour and Ripeness Chart was produced for use by all members of the supply chain. Its purpose is to provide a common language when discussing avocado ripeness levels as well as to provide some general information about the origin of fruit at different times of the year. A full pdf version of this is attached in Appendix 3.



"The Little Green Book: The Adventures of Alvin" was produced with all sectors of the supply chain as the target audience. The purpose of the book is to give everyone in the supply chain, specifically those people who haven't been in the industry long or work in areas where there is high staff turnover, an understanding of where they fit in the overall scheme of the industry. More specifically it aims to emphasise the impact that their role can have on the final quality of the product. This publication has been mailed out to all members of the supply chain including growers, packhouses, wholesalers and retailers. It is also being made available online. A full pdf version of this is attached in Appendix 4.

THE LITTLE GREEN BOOK

THE ADVENTURES OF ALVIN



The Packhouse Avocado Handling Guide is as it implies, a handling guide targeted at Packhouse employees. The main focus of the packhouse guide is:

- Maturity (providing the required DM% to ensure mature fruit)
- Temperature control for storage
- Acceptable storage times
- Handling tips to prevent bruising in unripe fruit.

This material is also being made available online. A full pdf version of this is attached in Appendix 5.

AVOCADO HANDLING: PACKHOUSE

Look after your avocados! They have a long way to go.

Start 'em right

Maturity

Make sure fruit is mature

- Hass: 23% DM
- Shepard: 21% DM

Handle 'em right

Precooling

- Commence within 6hrs after harvest
- Forced air cooling preferred (takes 8-12hrs)

Storage

- Leave 5cm gap around pallets for air circulation, unless forced air cooling then leave no gaps

Ripening

- Ethylene: 10 ppm trickle for 2-3 days
- Venting: continuous to keep CO₂ less than 1%

This helps delay ripening and softening.

Treat 'em right

Be Gentle

- Minimise drop heights to less than 30cm during bin tipping and along the packing line
- Operate grading lines at an appropriate speed to avoid damage from brushing and rolling
- Stack packages carefully to ensure correct alignment

This avoids bruising and skin damage.

This prevents pack-up collapse.

	Hard	Softening	Pre-Ripe	Medium Ripe	Soft Ripe	
HASS	1	2	3	4	5	6
Precool	5°C					
Store	5°C - 14 days					
Ripen	16-20°C					
	<i>At dispatch, cool to ambient space.</i>					
	Hard	Softening	Pre-Ripe	Medium Ripe	Soft Ripe	
SHEPARD	1	2	3	4	5	
Precool	7°C					
Store	7°C - 14 days					
Ripen	16-20°C					
	<i>At dispatch, cool to ambient space.</i>					

The Wholesale Avocado Handling Guide is as it implies, a handling guide targeted at Wholesaler employees. The main focus of the wholesaler handling guide is:

- Checking quality as dispatches arrive
- Ripening temperatures and times
- Handling tips to prevent bruising in fruit ranging from unripe right through to ripe

This material is also being made available online. A pdf version of this is attached in Appendix 6.



The Retail Avocado Handling Guide is as it implies, a handling guide targeted at Retail employees. The main focus on the retailer handling guide is:

- Handling and display tips to prevent bruising in fruit that is ripening through to ripe –avocados become more vulnerable to bruising damage as they ripen
- Storage and display temperatures and times

This material is also being made available online. A full pdf version of this is attached in Appendix 7.



4.0 Discussion

A copy of both the "Colour and Ripeness Chart" and the "Little Green Book" have been distributed to all members of the supply chain including growers, packhouses, wholesalers and retailers

Copies of the packhouse, wholesale and retail handling posters have been sent to all members (where possible) of each of those respective sectors. The distribution list was taken from avocados Australia for packhouses and wholesalers. Retail posters are being distributed through a variety of avenues including direct mail outs to the large supermarket chains and via the wholesale markets for the independent fruit and vegetable retailers.

All posters and the book have been designed to provide both technically accurate information to all members across the supply chain to assist in reducing damage and improving quality overall but also to engage the specific audience. This was achieved using a number of methods including the use of the "Alvin Avocado" character and situational photos to engage audiences, including a reduced version of the ripeness chart on each subsequent piece of material to communicate specific handling needs at different levels of ripeness and minimising the amount of text used where possible.

5.0 Technology transfer

As well as hard copy distribution of the materials each will also be made available from the Avocados Australia website so that industry members can use both the complete product or use components of the material within their own commercial education packages.

6.0 Recommendations

It is recommended that a 2nd phase education materials project be implemented. The main aims of this would be to:

- Develop consumer education material that can be used instore with consumers helping customers to understand best practices for product handling.
 - Both hard copy material and instore consumer video
 - Information regarding handling avocados in the home
 - Background information about history and life of avocados
- To take the material that was developed in phase I and to develop interactive tools for use at each stage of the supply chain
 - Short interactive training modules that can be used at each stage of the supply chain
 - Available online and on cds

7.0 Acknowledgements

Avocados Australia would like to acknowledge the input from the Postharvest Team at Horticulture and Forestry Science, Agri-Science Queensland, (DEEDI), Alec McArthy from the Department of Agriculture & Food WA, for their technical contributions to the material. We would also like to acknowledge the numerous growers, packhouse managers, wholesalers and retailers who provided their feedback throughout the process to ensure the material was both technically correct and practical for use in a commercial setting.

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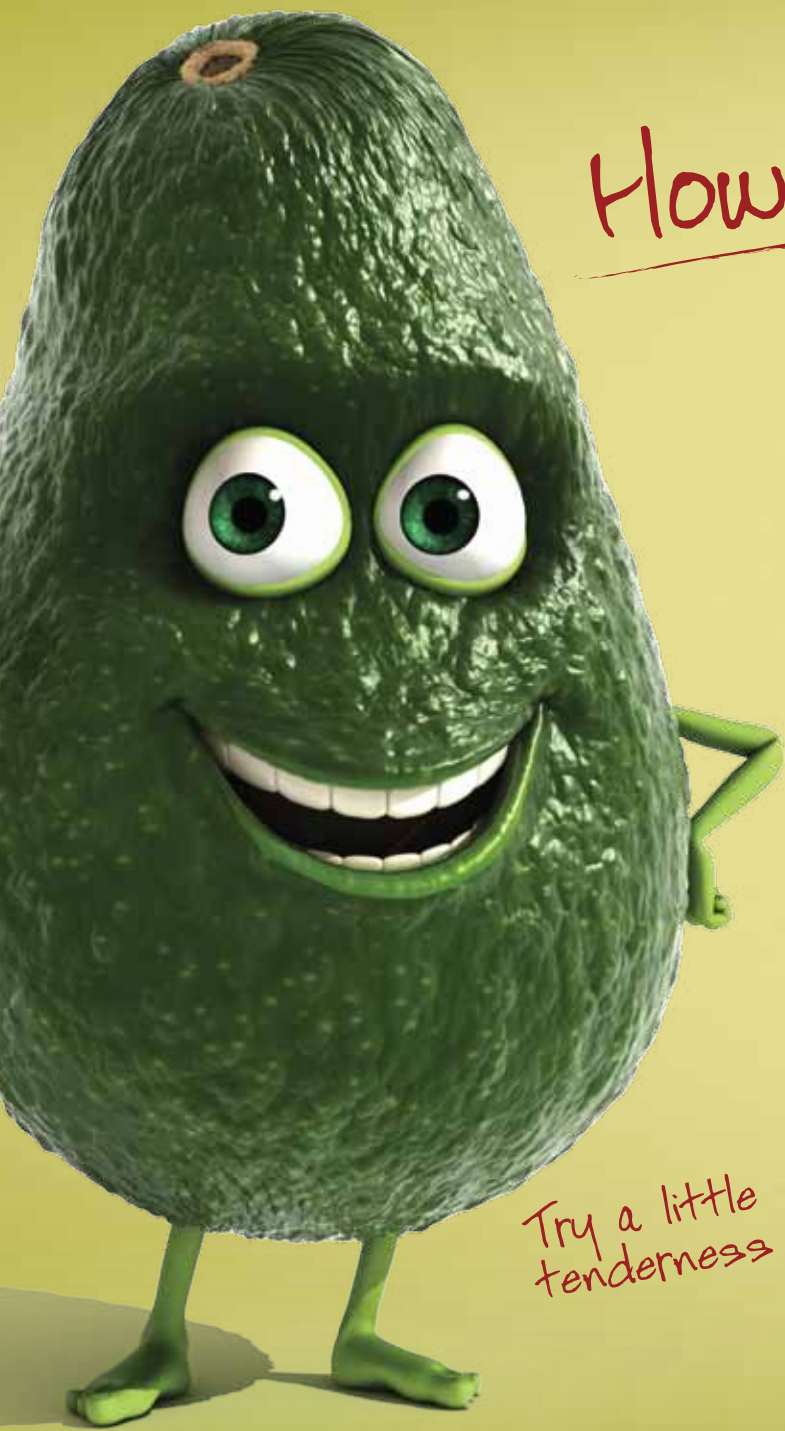
Appendix 1: Completed Gap Matrix

Broad Area of Interest	Specific Topic	Priority (high, med, low, zero)	Type of material preferred (eg posters/manuals/CD)	sectors requiring material (eg. Growers/packers/wholesalers/retailers)	Comments/extra information
Fruit Harvest	Yield, maturity & quality monitoring - Field assessments & forecasting	High	Posters/Online/CD	Grower/packers	Highlight the connection - farm quality / retail value
Fruit Harvest	Picking	Med			
Fruit Harvest	Pick up, transport and packhouse delivery prep	High			
Fruit Harvest	insect controls	High			
Fruit Harvest	disease controls	High			
Fruit Packing	Pre pack inspections & records - QA, receipt admin, quarantine,	High	Posters/Online/CD	Grower/packers	quality disciplines in - Brand loyalty follows
Fruit Packing	Pre pack treatments - Quarantine, p-harvest appl., cooling	High			
Fruit Packing	Grading and sorting	High			
Fruit Packing	Packaging and labelling	High			
Fruit Packing	Quality mgmt. systems	High			
Fruit Packing	Palletising	High			
Fruit Packing	Storage & supply management	High			
Fruit Packing	insect ID	High			
Fruit Packing	Disease ID	High			
Within Chain Logistics	Transport - Loading/unloading, general handling & transit	High	Posters/Online/CD	Transport / ripeners	Handling & ripening disciplines are the glue that cements both ends of the supply chain
Within Chain Logistics	Quarantine protocols - Market access reqts. on route	High			
Within Chain Logistics	Ripening & controlled atmosphere	High			
Within Chain Logistics	Post harvest quality, cool chain & food safety monitoring	High			
Within Chain Logistics	Temperature management	High			
Within Chain Logistics	timelines by supply chain segment..	High			
Intermediary Fruit Sales	Supply management / stock control	High	Posters/Online/CD	ripeners / wholesalers	Forecasting and shortening the supply chain is inexorably tied to repeat sale
Intermediary Fruit Sales	Storage and handling	High			
Intermediary Fruit Sales	Stock turn disciplines	High			
Intermediary Fruit Sales	forecasting	High			
Intermediary Fruit Sales	Store stock management (storage and handling)	High	Posters/Online/CD	wholesalers / retailers	repeat sale is the higher ambition not short term profit
Intermediary Fruit Sales	Provision of consumer handling information	High			
Intermediary Fruit Sales	Stock levels vis demand	High			
Intermediary Fruit Sales	Promotional events / co-ordination	High			

Appendix 2: Research Message Matrix

Stage of supply chain	Recommended procedure	Type of defect	Source
Packhouse			
	Minimise drop heights at any point in the dumping, grading, palletising and handling of fruit	bruising	Improving avocado handling during marketing
	Operate grading line at appropriate speed to prevent fruit impacting on themselves and the equipment	skin damage / bruising	Improving avocado handling during marketing
	Ensure every package is PLACED on pallets and never thrown or dropped	bruising	Improving avocado handling during marketing
	Pre-cool to 5°C within 24 hours of harvest	premature ripening	
	Use a forced air system to pre-cool fruit, usually less than 12 hours.	premature ripening	Avocado quality hazard analysis
	Space pallets in cool rooms (at least 5cm around all sides) to improve air circulation	premature ripening	Avocado quality hazard analysis
	Storage guidelines for Hass - Green mature : 5°C >90% RH	flesh damage	Avocado quality hazard analysis
	Ripening guidelines for Hass : 16 - 20°C with ethylene	colour development	
Wholesale			
	On receipt, prevent damage to the packages.	bruising	Improving avocado handling during marketing
	Minimise the amount of fruit held on the floor for display.	general	Improving avocado handling during marketing
	Avocados bruise easily when close to ripeness - handle carefully and minimise the number of handlings of individual packages	bruising	Improving avocado handling during marketing
	Minimise handling	skin damage / bruising	
	Storage guidelines for Hass - before and after ripening : 5°C >90% RH	general	Avocado quality hazard analysis
	Ripening guidelines for Hass - 16 - 20°C with ethylene	general	
	Do not hold fruit for longer than 3 days after ripening	fruit rots	Avocado quality hazard analysis
	Secure loads thoroughly to minimise movement of packages in transit.	skin damage / bruising	Improving avocado handling during marketing
Retail			
backroom	Place boxes with soft fruit on top and those with hard fruit on the bottom	bruising	california avocado commission
storage at retail level	Avocados bruise easily when they are close to fully ripe. Avoid throwing or dropping packages, unnecessary handling of fruit, or incorrect stacking packages	bruising	
	Upon delivery, stock should be stored at 5°C	fruit rots	Coles quality poster
display at retail level	Do not tumble fill a display - dropping from 100mm is enough to bruise an avocado. Treat them like eggs	bruising	fresh produce tips (ahc)
	When displaying green or sprung fruit, avoid displays that are more than two layers deep. Display ripest fruit on top and towards the front of the display. Ideally identify fruit that is "ripe for tonight" by using a separate display or stickers	bruising	Improving avocado handling during marketing
	Do not squeeze avocados: test for a ripe avocado by gently pressing the stem end	bruising	fresh produce tips (ahc)
	Regularly monitor displays and stock levels.	general	Coles quality poster
	Discard avos that have been dropped - selling a dropped avocado will only guarantee disappointment	bruising	fresh produce tips (ahc)
	Rotate stock so that fruit is not left on display shelf for longer than 2 days	fruit rots	Avocado quality hazard analysis
	If fruit are ripe or near ripe, display at 5-10°C. If fruit are firmer / sprung, display at 20°C	general	Avocado quality hazard analysis

Appendix 3: Avocado Colour and Ripeness Chart

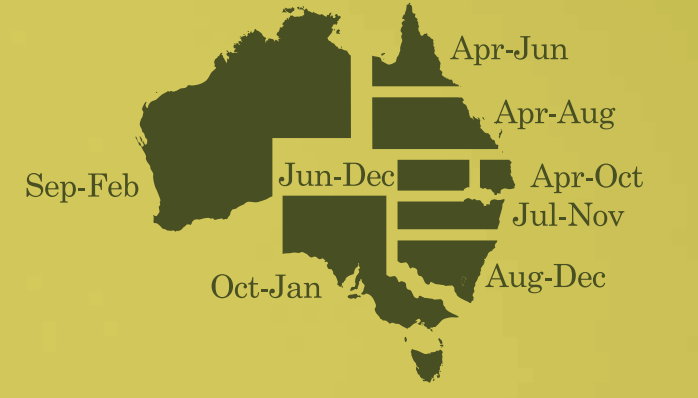


How do you know when we're ripe?

AVOCADO COLOUR & RIPENESS CHART

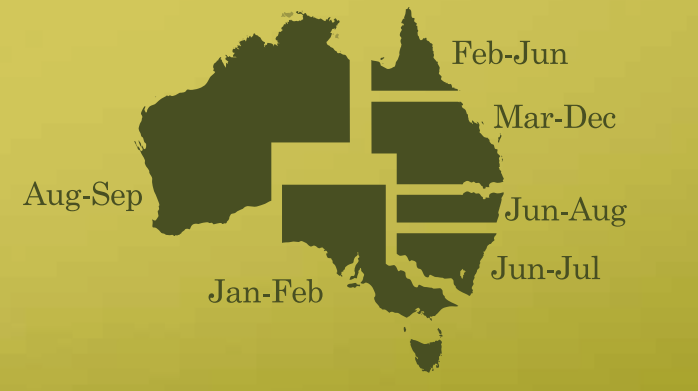
Colour Rating	1	2	3	4	5	6
HASS Look & Touch						
Firmness Rating	Hard Effegi puncture (kgf) - using 11mm tip	Rubbery 5kgf	Softening 2kgf	Firm Ripe 1kgf	Medium to Soft Ripe 0.65kgf	Soft to Over Ripe 0.45kgf

Where do we come from?



Try a little tenderness

GREEN SKINS
Touch
(Shepard, Sharwil, Wurtz, Reed)



This material has been produced using avocado grower leaves which have been matched by the Australian Government through HAL.
 Prepared by Avocados Australia Ltd and QPI&F
 © Copyright Avocados Australia Ltd. Photos supplied by Plant & Food Research (Hass) and QPI&F (Shepard)



Appendix 4: The Little Green Book

THE LITTLE GREEN BOOK

THE ADVENTURES OF ALVIN



My Journey to Australia



CENTRAL AMERICA

EUROPE

SYDNEY

Hi Everybody!

I'm Alvin Avocado from Down Under, here to tell you my story. I was first discovered by the Aztecs way back around 300BC when I grew wild in Central America, Mexico and Colombia. I was called Ahucatl then, but my name changed over the centuries and now I'm simply know as an Avocado.

I like adventure and I like to travel, so when the Spanish offered me a ride to Europe in the 16th century, I jumped at the chance and I've never looked back.

ole!



I came to Australia in 1840
and was planted in the Royal
Botanical Gardens in Sydney.

Liking my new home I wrote to my
friends about it, and soon other avocados
came in their thousands.

We prospered, spreading far and wide and
by the end of the 1960's, we were ready to
do serious business.

And that's how the Australian avocado
industry was born.



These days my friends and I grow on large trees in lovely orchards in all states of Australia.

Because we live in all different regions it means we grow well all year round.





The Hass Family

So here I am, Alvin Avocado, part of the Hass family. I'm very popular; you'll find me growing everywhere. But I'm not alone in this business. My mates **Reed**, **Sharwil**, **Shepard** and **Wurtz** help me spread the taste.

Think we're one and the same?

There's one small difference that sets me apart.

See it?

It's the colour. I'm green when picked, but turn purple as I ripen. My mates stay green all their lives and that's why they're called green skins.



So how do you know when it's the right time to pick me?

My size doesn't matter, I'm not soft to touch and I won't start to ripen until I'm picked.

So what can you do to see if I'm ready?

It's quite simple.

You can give me the dry matter test and if I pass that, you know I'll pass the good taste test when I'm ripe.



GREEN SKINS

Touch
(Shepard, Sharwil,
Wurtz, Reed)

Firmness
Rating



Hard

Effegi puncture (kgf) -
using 11mm tip



Rubbery

5kgf



Softening

2kgf



Firm Ripe

1kgf



**Medium to
Soft Ripe**

0.45kgf



**Soft
Over Ripe**

0.25kgf



I need to be treated with respect at all times. I bruise easily so please don't EVER

drop me or pick me when it's raining. Don't pack me too tightly in the bins, and don't leave me sitting in the field too long because I'll get sunburnt!

Get it?

Handle me with care and I'll look and taste all the better for it.

After I'm picked, I go to the packing shed where they grade me for quality and size.



They look after me very well there. They even treat me to prevent yucky fruit rot.

Ew!

Then, it's into the trays and out to see the world.





My favourite ride!



Waiting to get on the road again

I always travel in style. My favourite form of transport is the refrigerated truck. This keeps me cool and fresh. My first stop could be the wholesale market, the avocado ripener, or, the supermarket distribution centre. I always get treated like a rock star, with everyone at my disposal helping me get ready to meet my fans.

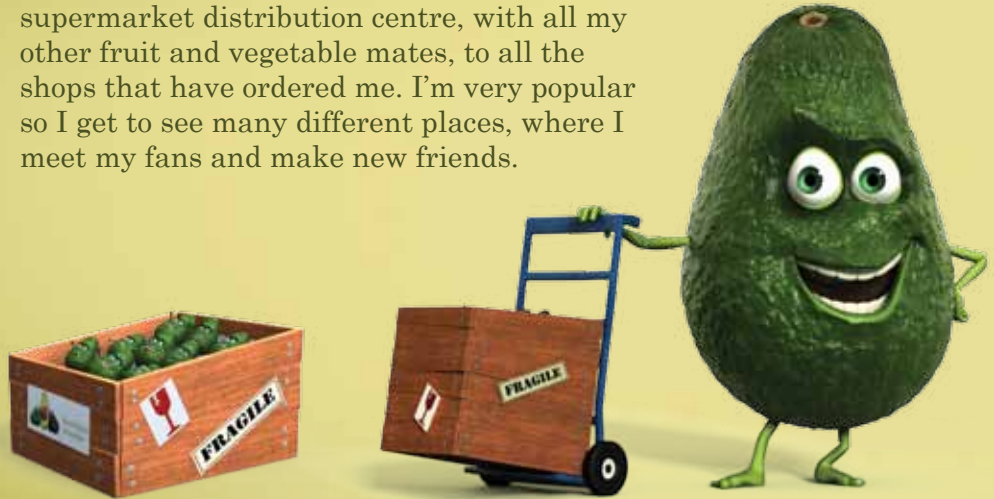


All that's left to do now is for me to ripen, which takes me between 5 and 12 days, depending on my age.

The air here is about 20°C and enriched with my own fruity ethylene gas to help me ripen more quickly and evenly.



Once I'm ripe I like to cool down to 5°C again. Then I go from the wholesaler or the supermarket distribution centre, with all my other fruit and vegetable mates, to all the shops that have ordered me. I'm very popular so I get to see many different places, where I meet my fans and make new friends.





Me and my mates



Time to shine



The big day!

So finally I've arrived at the shop. I want to look my best on display, nice and fresh for my many fans.

My mates and I like to be displayed in a single layer as we need a little breathing space.

So you guys can decide which of us to buy first, we like to be arranged from ripe to unripe.

But most of all we'd like everyone - from pickers to checkout - to treat us well; so please be gentle and you won't be sorry.

We'll reward you with the best taste **EVER!**





My adventure from supermarket trolley to your home should be bump-free. If I'm a bit hard when we get home, put me in a paper bag with an apple or banana as I like some company in the fruit bowl.

When I'm ripe and ready to eat I also like the fridge to keep me cool. I'll only stay tasty for a day or two here, so

Eat Me!!

Looking forward to meeting you soon,
Alvin Avocado



Just ripening a bit more

ADD AN AVO EVERY DAY

www.avocado.org.au

This material has been produced using avocado grower levies which have been matched by the Australian Government through HAL.



Australian
Avocados



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Appendix 5: Packhouse Avocado Handling Guide

AVOCADO HANDLING: PACKHOUSE



*Look after your avocados!
They have a long way to go.*



Start 'em right

Maturity

Make sure fruit is mature

- Hass: 23% DM
- Shepard: 21% DM



Handle 'em right

Precooling

- Commence within 6hrs after harvest
- Forced air cooling preferred (takes 8-12hrs)

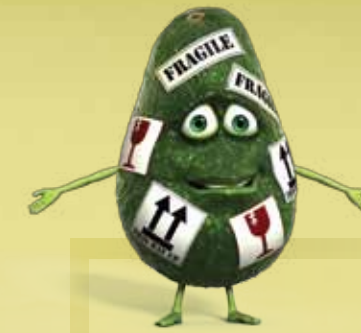
Storage

- Leave 5cm gap around pallets for air circulation, unless forced air cooling then leave no gaps

Ripening

- Ethylene: 10 ppm trickle for 2-3 days
- Venting: continuous to keep CO₂ less than 1%

This helps deliver consistent fruit ripeness.



Treat 'em right

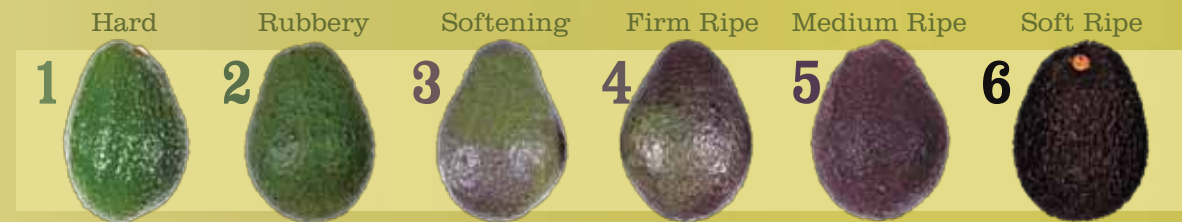
Be Gentle

- Minimise drop heights to less than 30cm during bin tipping and along the packing line
- Operate grading lines at an appropriate speed to avoid damage from brushing and rolling
- Stack packages carefully to ensure correct alignment

This avoids bruising and skin damage.

This prevents package collapse.

HASS



	Precool	5°C	
>85% Relative Humidity	Store	5°C ^{14 days max}	Don't store below 16°C
	Ripen	16-20°C	

At dispatch, cool to customer specs

SHEPARD



	Precool	7°C	
>85% Relative Humidity	Store	7°C ^{7 days max}	Don't store below 16°C
	Ripen	16-20°C	

At dispatch, cool to customer specs

Appendix 6: Wholesale Avocado Handling Guide

AVOCADO HANDLING: WHOLESALE



*Look after your avocados!
They're at their most fragile.*



Start 'em right

Quality Check

- Check quality on arrival or after ripening
- Give growers/packhouses feedback ASAP if there are concerns



Handle 'em right

Ripening

- Ethylene: 10 ppm trickle for 2-3 days
- Venting: continuous to keep CO₂ less than 1%

This helps deliver consistent fruit ripeness.

Display

- Minimise the quantity of avocados held on market stand

This avoids over-ripe fruit.



Treat 'em right

Be Gentle

- Avocados bruise easily so minimise drop heights:
 - Rubbery to softening fruit: less than 10cm
 - Firm ripe to soft ripe fruit: less than 3cm
- Secure pallet loads effectively
- Stack packages carefully to ensure correct alignment

This avoids bruising and skin damage.

This prevents package collapse.

HASS

>85%
Relative
Humidity

Ripen

Store



1	2	3	4	5	6
16-20°C	16-20°C	16-20°C	16-20°C	16-20°C	16-20°C
5°C	10 days max	Don't store below 16°C	5°C	5 days max	Too late! (no shelf life)

SHEPARD

>85%
Relative
Humidity

Ripen

Store



1	2	3	4	5	6
16-20°C	16-20°C	16-20°C	16-20°C	16-20°C	16-20°C
7°C	7 days max	Don't store below 16°C	7°C	3 days max	Too late! (no shelf life)

Appendix 7: Retail Avocado Handling Guide

AVOCADO HANDLING: RETAIL



Treat 'em right

Be Gentle

- Avocados bruise easily so minimise drop heights:
 - Rubbery to softening fruit: less than 10cm
 - Firm ripe to soft ripe fruit: less than 3cm
- Do not tumble fill displays
- Stack packages carefully for correct alignment

This avoids bruising and skin damage.

This prevents package collapse.

Check Quality

- Ripeness test: gently press the stem end. Don't squeeze!
- Discard avocados that are dropped, over-soft, or have rots

Selling a bruised avocado will only guarantee disappointment.



Display 'em right

Display

- Optimise stock control, minimise storage and display time
- Do not stack fruit more than 2 layers deep
- Regularly check display and stock levels
- Rotate stock so the oldest or ripest fruit is displayed first

This avoids bruising and over-ripe fruit.

Helping Customers

- Display ripest avocados on top and towards the front
- Ideally, identify avocados that are "ripe for tonight" with separate display or stickers



*Look after your avocados!
They're close to ripe
and easily bruised.*



Handle 'em right

HASS



Precool
Store
Ripen

16-20°C

16-20°C until ready for sale

air temperature

5°C 3 days max

5°C 2 days max

Remove
over-soft fruit
and
fruit with rots

SHEPARD



Precool
Store
Ripen

16-20°C

16-20°C until ready for sale

air temperature

7°C 3 days max

7°C 2 days max

Remove
over-soft fruit
and
fruit with rots